A SENSE-MAKING APPROACH TO AGILE METHOD ADOPTION

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Abstract: As is often argued in the diffusion of innovation literature, the adoption of innovations can be hindered by the learning required to successfully deploy the technology or methodology. This paper reports on a research in progress to develop a novel approach to Agile method adoption and introduces the use of sense-making workshops to facilitate improved understanding of the issues concerning Agile adoption.

1 INTRODUCTION

In this paper we present a sense making workshop approach to agile adoption. Problems seen with the introduction of a new software process, or methodology, can often be explained by the diffusion of innovation theory, described in Rogers (1962. When innovations (including process innovations) are diffused in an organisation, there are four phases: comprehension, adoption, implementation, and assimilation (Swanson, 2001). In the context of this paper it is the comprehension phase of such diffusion of innovation that is of most importance with regard to Agile method adoption in particular. However, there are no procedures available to assist decision makers choose the best development method for a given situation (Abrahamsson *et al*., 2002).

One alternate theoretical approach with regard to the adoption process is offered by Seligman (2006). Seligman (2006) argued that examining a series of sense-making cycles may facilitate a better understanding of an adoption process as opposed to focusing on what could be considered the making of a single decision. Seligman (2006) argues that the sense-making perspective provides a 'look under the hood' of the adopter's mental engine. In spite of its originality, the impact of sense-making theory on the Information Systems (IS) community has been modest (Seligman, 2006).

The basic premise of the constructivist view of sense-making theory is that people act on the basis of the meaning that they attribute to situations, where action emerges from social interaction and is developed and modified through an interpretive process. This approach embraces the notion that action precedes cognition (thinking) and focuses cognition (Weick, 1988; Seligman, 2006). Therefore, if understanding is facilitated by action, managers have to take some action and see what happens (Weick, 1988). Indeed, Weick (1988, p.503) commented that there is a *"delicate tradeoff between dangerous action which produces understanding and safe inaction which produces confusion"*. It is argued that this 'taking of action' will determine the *appropriate action* based on a review of the outcomes of the action taken (Weick, 1988). However, here in lies the problem with regard to the practicality of using sense-making.

2 THE PROPOSED METHOD: A SENSE-MAKING APPROACH TO AGILE ADOPTION

There is a need for a method to facilitate 'dangerous action producing understanding' (Weick, 1988). What is required is an inexpensive environment for the experimentation that 'doing first' requires, but where the outcomes of actions can be reflected on and therefore can inform future decisions to act. This illustrates the real value-added of our proposed method. Decision makers may be able to use the

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benefit of *foresight* as opposed to *hindsight* in their approach to Agile method adoption.

2.1 Sense-Making Workshop Inputs: CAFs and the Future Scenario

The theoretical foundations of the sense-making workshop combines the work carried out by Boland (1984) on retrospective sense-making, the notation and rules of Ragin's (1987) work on comparative method, and the dialectical method, as described by Mason and Mitroff (1981). The design of the sense-making workshop uses a set of factors critical to the adoption of a Agile method and a simple future scenario to get participants to retrospectively make sense of their actions during the hypothetical time period. In an effort to make each participants interpretation of the future scenario visible, they represent their individual understanding of the scenario as a truth function. A process of Boolean minimisation is then used (the construction of a truth table and a prime implicant chart is facilitated by the workshop coordinator) to achieve logically maximum parsimony.

As a result, having conducted a preliminary literature review for the purpose of this research, we present ten factors, that could be regarded as Critical Adoption Factors (CAFs) in attempting to assess the suitability of a software project to the adoption of an Agile methodology. The 10 CAFs selected are: duration of the project (DP), location of the customer (LC), customer involvement (CI), acceptance of change (to requirements) (AC), team size (TS), skill level of team (SLT), organisational and reporting structure (ORS), process (P), documentation requirements (DR), and layout of workplace (LW).

We acknowledge the list is not an absolute truth, and that different researchers may agree or disagree with the CAFs presented, but it is an important starting point for the sense-making workshop exercise, as is the future scenario used, representing a period two months into an Agile project, as shown below.

"Developers have started to complain about the Agile process and are blaming problems on the Quality group. Iteration lengths are changing but the developers say that it is sorted and it will not happen again. Management are willing to let the developers make the call on this. Management are allowing the team to get on with the project and are not asking for continuous updates on progress. Documentation is being kept to a minimum and management have provided an open plan workspace (which other teams are complaining about)."

The aim of this future scenario is to present a representation of an Agile project and a selection of issues with such projects. The future scenario represents genuine problems observed in Agile adoptions throughout a variety of Agile projects. Through sense-making, the workshop participants can determine what they perceive to be the critical issues (from the CAF list) and how they are at play in the Agile project described. From this collection of individual workshop participants' comprehension of the scenario, we can ultimately simplify multiple views into one common view (represented as a logically minimal Boolean expression).

2.2 Moving from Individual Interpretations to Synthesis

One of the main concerns of this sense-making exercise centres on the need for workshop participants to develop a shared understanding of the CAFs for Agile adoption; therefore moving from individual interpretations of criticality to a synthesis using a common vocabulary. As a result, workshop participants will highlight the *absence* or *presence* of certain CAFs within the future scenario presented. Participants will generate their truth function from their perception of the *absence* or *presence* of certain CAFs in the future scenario, as illustrated in Table 1.

Table 1: Workshop Participants Interpretation of the Future Scenario.

Participant #	DP	LC	CI	AC	TS	SLT	ORS	P	DR	LW
1					1	0	0		1	1
2	0						1	0		1
3		0		1		1	1		0	1
4					0	0	1	1	1	1
5	0						1	1	1	1
6						1	1	1	1	1
7	0						0	1	0	1
8	0						0	0	0	0
9							1	1		
10				0			1	0	1	1
11							1	1	0	1
12						0	0	0	1	1
13							0	0	1	1
14	0						1	0	0	1
15							1	1	1	1
16							0	1	0	
frequency (>50%)	31.25%	6.25%	0%	12.5%	12.5%	31.25%	100%	87.5%	87.5%	87.5%

The first phase of the complexity reduction process of the workshop participants' interpretations of the scenario is to concentrate on the most frequently cited CAFs. From Table 1 these can be identified as ORS, P, DR, and LW (with a frequency of > 50%). While this leaves a varied and complex collection of individual's truth functions the next step of the workshop is to generate a logically minimal Boolean expression (single truth function) for the scenario using some of the techniques in the comparative method (cf. Ragin, 1987). For example representing participant's perceptions in a truth table (Table 2) and using a prime implicant chart (Table 3) to reduce the complexity of the truth functions and achieve a parsimonious explanation (in the form of a single truth function) representing the combinatorial nature of the CAFs for Agile adoption. Following the Boolean minimisation process to derive the prime implicant chart (Table 3) it is necessary to further reduce, or simplify, the output from all workshop participants (Table 1) into a Truth Table (Table 2).

Table 2: Truth Table for the Agile Project Future Scenario.

ORS	P	DR	LW	Frequency
0	**0**	**0**	**0**	**1**
0	0	0	1	0
0	0	1	0	0
0	**0**	**1**	**1**	**1**
0	1	0	0	0
0	**1**	**0**	**1**	**1**
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	**0**	**1**	**1**	**1**
1	1	0	0	0
1	**1**	**0**	**1**	**1**
1	1	1	0	0
1	**1**	**1**	**1**	**3**

Table 1, 2 and 3 highlight the progression from complexity to simplicity representing the workshop participants' synthesised understanding of the combined *absence*/*presence* of CAFs in the future scenario.

The truth table presented in Table 2 contains four conditions (input variables) which were identified as causally relevant features (presented by the workshop participants) of the future scenario. The frequency column represents the number of times a combination appears (the workshop participants' interpretations of the combination *absence*/*presence* dichotomy of CAFs). As an example, the first participant (fourth row in Table 2) appears in Table 3 (on the last row). It is one of three participants sharing the same interpretation of the combination of CAFs.

Using the truth table, a number of steps are adhered to in an effort to unravel complexity. In our case there were six primitive expressions identified in the truth table (Table 2) and these form the columns of Table 3.

Table 3: Prime Implicant Chart.

		Primitive Expressions					
Prime Implicants		orspdrlw	orspDRLW	orsPdrLW	ORSpDRLW	ORSPdrLW	ORSPDRLW
	orsdr	X		X			
	pDRLW		X		X		
	ORSPLW					X	X

These primitive expressions are the combination of the four CAFs that have a frequency of >=1. To further reduce complexity, prime implicants were determined from these primitive expressions. These prime implicants form the rows of Table 3. The goal of this phase of the minimisation process is to 'cover' as many of the primitive expressions as possible with a logically minimal number of prime implicants (Ragin, 1987). In our search for maximum parsimony there were three essential prime implicants identified that covered all six primitive expressions.

The value of this exercise is to take a vast array of conjunctural causations between CAFs expressed by workshop participants and facilitate the generation of an explicit statement of multiple conjunctural causation, which is a logically minimal equation achieving maximum logical parsimony. As a result, *"the equation that results from use of the prime implicant chart is a logically minimal Boolean expression"* (Ragin, 1987 p.98). Our equation is as follows:

Y = orsdr + pDRLW + ORSPLW

Where Y represents the project outcome with respect to the future scenario, the '+' symbol represents a logical OR, and the relevant variables are shown as being present or absent (through uppercase and lower case lettering respectively.

3 DISCUSSION AND CONCLUSIONS

The core value of the equation (**Y = orsdr + pDRLW + ORSPLW**) representing maximum logical parsimony is to produce a theorising output that can:

- promote discussion amongst workshop participants focusing on creative conflict. From this dialectic between opposing views a greater understanding of the Critical Adoption Factors (CAFs) for Agile method adoption can emerge with a pooling of information in pursuit of better decision-making, and
- be used as propositions for future research, therefore raising the theoretical contribution of such outputs.

Our equation illustrates that there are three basic combinations of CAFs that capture the workshop participants' interpretation of the future scenario. However, even after the minimisation process there are obvious contradictions inherent in these combinations which can be further removed to achieve parsimonious explanations. An example of one of these contradictions is where part of the expression states that 'orsdr' influences success, while another part states that 'pDRLW' influences success. Therefore, the presence of 'DR' and the absence of 'dr' are contradictory.

By listing all individual parts of the expression, they can be compared to each of the other parts of the expression. This comparison leads to further simplification and further insight. As a result of this clarifying exercise we are able to produce three statements of conjunctual combinations of CAFs for Agile adoption that are *necessary* in assessing the suitability of Agile to a software project. Our three statements are as follows:

- layout of workspace (LW) is *necessary* but *not sufficient* for Agile adoption.
- process (P) and the layout of workspace (LW) are *necessary* factors in the *absence* of documentation requirements (DR) and organisational and reporting structure (ORS).
- organisational and reporting structure (ORS), documentation requirements (DR) and the layout of workspace (LW) are *necessary* factors in the *absence* of process (P).

Although these statements apply only to the scenario presented to the participants in this study, they still provide useful insight and opportunities for further discussion. It is proposed that a workshop environment, promoting the enacted sense-making of outcomes, in light of the level of participant awareness of the CAFs for Agile adoption (before any decisions or actions are taken), will promote the establishment of a *mindful* (Swanson and Ramiller, 2004) approach to adopting Agile methods for a software project. In fact, the sense-making process can be viewed as an operationalisation of the concept of *mindfulness* discussed by Swanson and Ramiller (2004).

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