Toward the user-commitment continuum: establishing the importance of realisation

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Abstract: Understanding how users learn and become committed to a new information system helps developers design better implementation methods and academics identify the factors influencing that commitment. The authors propose the idea of a user continuum, in which 'learning' and 'use' increase commitment over time and are influenced by a variety of change events. We develop a model of commitment and examine the first stage. To test this model, the authors focused on the first phase of a major enterprise resource planning (ERP) implementation at a military installation, proposed a series of testable hypotheses, and used a participant survey with partial least squares analysis to measure the effects of user awareness, information transfer, and recognition on user realisation of the system. Pre- and post-training results showed model R2's of .77 and .57, respectively, and increases in the initial stage of user commitment was statistically significant.

Keywords: user-commitment theory; realisation; awareness; information transfer; recognition; technology acceptance; cognitive processes; systems implementation.

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1 Introduction

Corporations continue to spend large sums on employee education and training. Forbes Magazine reported that training grew by 15% in 2014 to over $70 billion in the USA and $130 billion globally (Bersin, 2014). These numbers suggest that gaps in skill levels persist in the workforce, corporations are willing to invest in their employees and workers wish to learn and grow (O’Leonard, 2008). Organisations report that getting new professionals fully productive takes three to five years (Bersin, 2014). As users of technology, employees also need time to become familiar with, learn how to use, and become proficient with organisational computer systems. Exploring how users come to learn a new system could lead to a better understanding of:

1 how to manage such transitions

2 how to avoid costly missteps or training mistakes

3 where best to invest training and learning dollars.

Therefore, this paper considers whether users commit to new systems over time in order to better understand potential training and learning stages.

Toward such a goal, we first provide a literature review related to user commitment and our stages of interest. Following this, we formulate research hypotheses and propose a research model that integrates some of the literature and provides a framework for testing the first stage of our model empirically. We next describe an empirical study in which we collected data about the initial stages of learning in a new system and use partial least squares to analyse our survey. Finally, we discuss the results of this analysis, identify several study limitations, present our conclusions, and outline directions for future work.

2 A brief literature review of user commitment

Commitment as a construct of interest takes on many different definitions. For the purposes of this study, we use the definition of commitment developed by Salancik (1977).

> "Commitment is a state of being in which an individual becomes bound by his actions and through these actions to beliefs that sustain the activities and his own involvement." (Salancik, 1977)

The information systems literature suggests that we can view 'user commitment' in several different ways. Alternate interpretations include:

1 the personal selection of one system over one or more others (Datta, 2010) – e.g., when a user selects a particular instant messaging application

2 an organisational choice (Cohen, 2010) – e.g., when a company commits to one ERP provider over another

3 continuous patronage (Li et al., 2006) – e.g., when a customer decides to shop repeatedly at a preferred website

4 a force that binds individuals to particular courses of action – e.g., when a user agrees to back up his files daily (Meyer and Herscovitch, 2001)

5 customer retention – e.g., when a business executive agrees to fly on a certain airline exclusively (Li et al., 2006)

6 psychological attachment (Kelman, 1958).

We agree with Malhotra and Galletta (2005) who suggest that this last view of user 'psychological attachment' is most relevant to IS implementations. Authors studying 'psychological attachment' indicate that the dimensions or attributes of commitment require examination in order to understand how a person comes to be committed (Meyer and Herscovitch, 2001; O'Reilly and Chatman, 1986). These types of diverse understandings of 'user commitment' and gap in our understanding of the term make it difficult to advance theory, research, and practice on this topic (Malhotra and Galletta, 2005).

2.1 The technology acceptance model

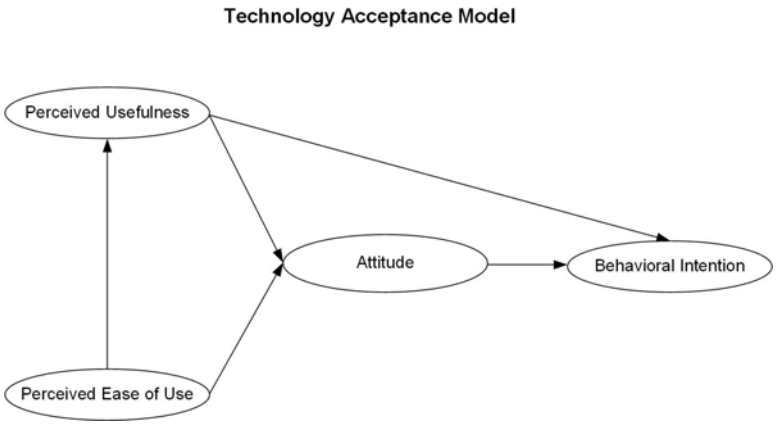
The technology acceptance model (TAM) describes how users accept a particular information system. Figure 1 depicts the two influential factors hypothesised by Davis (1989):

1 'perceived usefulness', which Davis defines as "the degree to which a person believes that using a particular system will enhance his or her job performance"

2 'perceived ease of use', which he defines as "the degree to which a person believes that using a particular system will be free of effort".

Researchers often use TAM to investigate behavioural intentions that impact the usability of information technology (Amoako-Gyampah and Salam, 2004; Gumussoy et al., 2007; Venkatesh and Bala, 2008). In fact, TAM was specifically developed to explain how users come to accept an information system.

Figure 1 Technology acceptance model



Source: Davis (1985)

Despite its compelling simplicity and logic, a primary criticism has been "the inability of TAM as a theory to provide a systematic means of expanding and adapting its core model" – an inability that has limited its usefulness in the context of the dynamic world of IT (Legris et al., 2003; Benbasat and Barki, 2007). The evolving nature of advancing information technology has motivated researchers to extend TAM in at least two primary ways. The first approach involves introducing factors from related models such as self-efficacy, subjective norm, and perceived behavioural control (Hartwick and Barki, 1994; Taylor and Todd, 1995; Lederer et al., 2000; Mathieson et al., 2001; King and He, 2006). For example, a study by Malhotra and Galletta (2005) found that such social influences as "internalization: the influence to accept information from others as evidence of reality" and "identification: the social normative influences to maintain a favorable image with a reference group" can positively affect user technology acceptance.

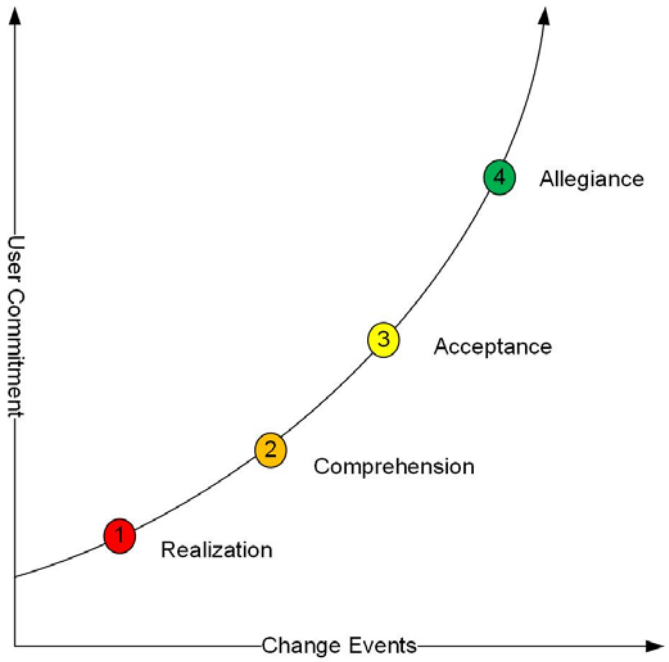
A second approach adds the possibility of additional or alternative belief factors to the model. This includes adding key related factors from the diffusion of innovation literature, such as trialability, compatibility, visibility, or result demonstrability (Agarwal

and Prasad, 1999; Karahanna and Straub, 1999). For example, Wells et al. (2010) found that 'perceived novelty' can be a salient affective belief that can lead to increased user acceptance of a new IS technology. We find that the literature reports acceptance without considering how users come to such commitment through learning and training. For example, how can users initially accept a system when they lack an introduction or understanding of its function, and how to obtain support or their role in such a system?

3 Proposing a new paradigm

A growing body of research suggests that 'user acceptance' is probably not fixed, but rather is something that develops and strengthens over time (Agarwal and Karahanna, 2000; Venkatesh et al., 2003; Li et al., 2006). For example, Li et al. (2006) suggest that a viewer's decision to use a specific website depends upon growing levels of personal trust, 'affective commitment' (i.e., when the user experiences positive emotions like pleasure or loyalty in using a site) and 'calculative commitment' (i.e., when the user recognises the rewards or benefits of maintaining a relationship with an internet vendor).

Figure 2 User commitment continuum (see online version for colours)



In similar fashion, these and other authors suggest that it may be more useful to treat the concept of 'user commitment' as points along a continuum of exposure to, experience with, and learning about an information system (Malhotra and Galletta, 2002; Li et al., 2006; Bagozzi, 2007). Thus, we propose that 'user commitment' is not a simple acceptance value, but rather something that moves through various stages, through learning and training. We therefore postulate that it is better to view 'user commitment' as a continuous experience that starts with learning that leads to a 'realisation of the new

system' (i.e., an introduction to its existence), followed by a comprehension or understanding of how the system works, subsequent acceptance of the system as a tool for accomplishing work, and finally loyalty and dedication to a system's use and success. Figure 2 presents a basic increasing commitment model; however, commitment may take different forms such as a stepped model or other more complex forms.

We derived our model from this area of the literature and adopted those assumptions about how users learn a new system. The model stipulates that, over time, usage, learning and other factors will affect a user's commitment to a new system. Commitment may grow more slowly, go up or down incrementally or drop off completely if a company changes software. Figure 2 identifies the stages we view as commonly associated with the learning a new information system:

1 *realisation* that the system exists

2 *comprehension* of how the system works

3 *acceptance* of the system as useful

4 *allegiance* to the system's use and success.

What follows is a more-detailed explanation of our learning model. For expository purposes, we discuss user learning under the four main headings of:

1 realisation

2 comprehension

3 acceptance

4 allegiance.

3.1 Stage 1 – realisation

As used here, *realisation* refers to knowledge of something not previously seen, heard, or known. Users first become mindful and through exposure and use, grow more knowledgeable about the system. Schmidt and Simone (2000) describe 'awareness' as the point in time at which "competent members can develop a rudimentary mindfulness which enables them to align to accomplish work in an orderly fashion and infer the intentions and plans of colleagues". This means that users become aware of a system that will enable them to perform their job tasks either informally from co-workers or formally from trainers.

When users receive a preliminary introduction to a system, the goal is to increase their familiarity with it – i.e., their realisation of it. We therefore envision 'realisation' as the first stage of user commitment. Conceptualisation of realisation is necessary to capture user perceptions of system existence as a point of measurement (Mobley, 1966). When users know the system is 'real', they typically also want to know why people need it or what it will accomplish. After users understand the purpose of a new system, they typically also want to know how this new system will affect them, and others in the system, and what their roles will be in its routine usage. For the purpose of this study, we define 'realisation' as the point in time at which users become aware that a system is real, receive information concerning the system via one or more management change events,

and are able to recognise and understand their roles in its planned use, in relation to others in the system.

Many previous studies indicate that 'training' helps users become aware of a new system and that encourages their acceptance and willingness to use it (Compeau et al., 1995; Nelson et al., 1995; Hsu and Turoff, 2007). To accomplish this, trainers increase user awareness, facilitate information transfer, and thereby help achieve system recognition.

3.2 Stage 2 – comprehension

Ives and Olson (1984) suggest that system quality and/or system-acceptance studies often ignore the important underlying cognitive and motivational characteristics of individuals affected by system change. We agree and therefore suggest that, following realisation, users begin to transition to the next stage in a user-commitment continuum – comprehension. Thus, we define *comprehension* as the act of understanding the concepts, technical skills, and components of a specific information system.

In this stage, hands-on training or similar events trigger a higher level of understanding. Users receive information at one or more subsequent change events about how to use a system correctly, which in turn helps them transition to the new system. This next level of user learning facilitates the acquisition of skills to support their work activities.

Not all employees require the same level of training, but all employees must first be exposed to the system (Katsikas, 2000). The extant literature suggests that 'comprehension' usually takes more time than 'realisation', is usually more formal, and requires employees to take a more active role in the learning process (Wilson et al., 1998; Todd and Gigerenzer, 2000; Oppenheimer, 2003). After participating in a well-designed training course, for example, users develop specific skills and knowledge to help them solve both new and recurrent problems. Similarly, exposure to the look and feel of the new system supports both familiarity and skill development. Training is required for those employees whose roles necessitate recognition of the system and its components.

3.3 Stage 3 – acceptance

We suggest that a third stage in the user commitment continuum is 'acceptance'. As noted above, the concept of technology acceptance has evolved overtime. The original proposition is the TAM, while the newer consolidation is termed the unified theory of acceptance and use of technology (UTAUT). While UTAUT attempted to consolidate a variety of prior acceptance research, it has been criticised as lacking the ability to expand and adapt the core TAM model (Bagozzi, 2007). We view *acceptance* as a third phase along the user continuum that occurs after users are introduce to a new system and receive training to accomplish work. It is possible that *rejection* of a system may occur at this point, however for the purposes of this study we only consider traditional acceptance.

3.4 Stage 4 – allegiance

After users learn about a new information system, begin to understand how the system works, and learn how they will use it, they eventually become committed to it. An alternative to allegiance may occur if a user fails to commit or becomes disgruntled and

fails to adapt to system only using the minimum functions of a system. For the purposes of this study, our framework considers 'allegiance' as the last stage in our user-acceptance continuum. We envision committed or allegiant users as similar to power users – that is, they know how to use the system, have accepted it, and have become committed to it. Non-power users may seek them out for assistance because of their high skill level as well as their belief that the system is needed and therefore beneficial to the organisation. These users may also actively encourage others to utilise the system.

4 A new model

Although Figure 2 suggests that change events such as 'introductory training' influence user learning of a new system in a positive way, we note that this is not necessarily always the outcome. We recognise that this level of learning can also be influenced by the intensity of the training or the reinforcement effects of other intrinsic factors -- for example, the quality of the program, the attitudes of colleagues, and the quality of the instructor.

These matters require empirical verification. As a first step, we hypothesise that change events such as introductory preparation, hands-on training, enhanced learning, and the reinforcement of previously-learned information should *increase* a user's commitment to a new system. For example, we believe that informing users about:

1 their responsibilities after a new system becomes operational

2 how they can obtain further help during and after such training

3 the value of a system itself will help them realise how a new system will ultimately benefit their organisation and improve the quality of their own work.

We therefore assert that 'awareness', 'information transfer' and 'system recognition' as defined, positively affect *realisation* – the first stage of the user commitment continuum.

4.1 Awareness, information transfer and system recognition

User mindfulness or awareness constitutes the point of entry for all users into the world of information systems. Schmidt and Simone (2000) describe 'awareness' as the point in time at which "competent members can develop a rudimentary awareness that enables them to understand how a new system can help them accomplish work in an orderly fashion and infer the intentions and plans of colleagues". This means that user awareness of a new system will enable them to better perform their job tasks in one of two ways:

1 by gaining awareness informally from co- workers

2 by gaining awareness more formally from trainers.

Thus, we define user 'awareness' as the act of becoming conscious of a system and being cognisant that a system is available and useful.

Acquiring information to support needed skills via information transfer is also necessary. The process of information transfer is closely related to the problems of organisational change (Miller, 1953), and may be described as a process of:

1 unfreezing

2 moving

3 refreezing (Schein, 1961).

'Unfreezing' is necessary because users come to the new system with ingrained habits of feeling, thought, and action. To change a user, his/her normal habits must first be questioned and disturbed, or 'unfrozen'. Organisations can accomplish this by focusing user attention on informational needs that they cannot satisfy with the old system. The trainers can then explain how a proposed new system will allow its users to perform such tasks – that is, 'moving'. If the new system is more useful in meeting these needs, the individual will establish personal continuity by freezing the new behaviour (Nelson and Cheney, 1987). In this work, we define 'information transfer' as having learned enough specifics about an information system that a user can obtain needed information to function using a system.

'Recognition' usually takes more time than awareness, is more formal, and requires learners to take a more active role in the learning process (Wilson et al., 1998; Todd and Gigerenzer, 2000; Oppenheimer, 2003). After participating in a well-designed training course, users develop specific skills and should then be able to apply the knowledge gained to solving both new and recurrent problems. Exposing users to the look and feel of the new system during training facilitates problem solving. Training is required for those employees whose role necessitates recognition of the system and its components. Not all employees require the same level of training. But all employees must first be exposed to the system (Katsikas, 2000). We define 'recognition' as the act of identifying something that has been previously seen, heard or known.

5 Hypotheses

While we suggest that 'realisation' is the first stage in our proposed user commitment continuum, this conviction requires empirical validation. Based on our literature review and prior research questions, therefore, we developed the following hypotheses:

Hypothesis 1 There will be a positive relationship between *awareness* and *realisation*.

We define 'awareness' as:

1 a user's consciousness of a system

2 understanding that a system will become available.

Similarly, we define 'realisation' as the point at which:

1 a user conceives a system as real

2 knows why it is needed

3 understands his or her anticipated role in its subsequent use.

'Awareness – understand that a system will be available' should affect 'realisation – knows why the system is needed and understands his or her role'. When users become aware of a new system, they can begin to appreciate its potential benefits to both themselves and their organisations. Thus, up to some limit, we believe that increased

awareness should result in increased realisation or put another way – understanding that a system will become available affects knowing why it is needed and one's role in the system.

Hypothesis 2 There will be a positive relationship between *information transfer* and *realisation*.

Information transfer occurs when users receive training on a new system, become aware of job needs that they cannot meet with the old system, and know where and how to obtain information about the system. We hypothesise that 'information transfer' also positively affects 'realisation'. When useful information transfers from an instructor to a system user, the result should be an increased realisation of the system. Conversely, when information transfer is unsuccessful, the user likely will not experience increased realisation of the system. In the higher stages of this model it may be that such a transfer inspires independent learning, exploration and creativity. At this stage, we believe that information transfer will positively affect realisation.

Hypothesis 3 There will be a positive relationship between *recognition* and *realisation*.

We define *recognition* as a user's ability to identify something that he or she has seen, heard, or known previously. We hypothesise that recognition of the new system will increase realisation as users are able to identify the new system's characteristics and potential benefits to themselves and their company. Increased recognition should lead to greater user realisation.

6 An empirical test

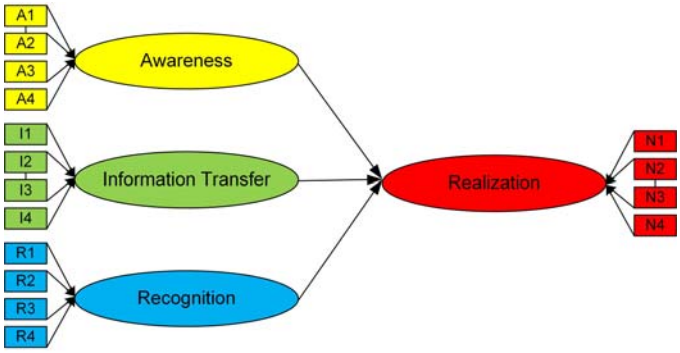
To test these hypotheses, the authors developed a survey with which to measure the factors of our model. We derived the survey questions from a combination of elements included in Amoako-Gyampah and Salam's (2004) work in extending the TAM model and discussion of relevant factors among the researchers. We included four items to measure each construct.

The participants were members of an Air National Guard unit involved with the preliminary implementation of an enterprise resource planning (ERP) system to manage military logistics. These respondents were a mix of enlisted personnel and officers, all of whom had logistics backgrounds. Only a very small number (2 or 3) of respondents had prior knowledge of the new ERP system. A total of 61 respondents, 49 males and 12 females completed the initial survey and then participated in a formal training program. This program was designed to introduce them to the new logistics system which was foreign to the user. The participants were made informed of the system's existence that the new system was indeed coming and they needed to know the name and functions of the new system. They also were provided user support training about where more information could be found and trained on navigation and how the ERP system would appear on their computers. Each user then learned their role in the system and how all roles were to interact in the larger game plan for the organisation. Following the training program, the respondents completed a post-training survey.

6.1 Structural model and analysis

The structural model shown in Figure 3 reflects our assumptions that awareness, information transfer, and recognition affect a user's realisation of a new system. In total, the survey contained 16 questions, four in each area, designed to measure user awareness, information transfer, recognition, and realisation of a system. In Figure 3, we labelled the awareness questions A1-4 the information transfer items I1-4, the recognition queries R1-4, and the realisation assessments R1-4 (see Appendix for specifics).

Figure 3 Stage 1 of the user commitment continuum (see online version for colours)



This study used partial least squares regression (PLS) to analyse the repeated measures data, following the structural equation modelling techniques of Gefen and Straub (2005). In PLS, the goal is to test the predictive model created in the structural model. The structural or inner model is represented by the constructs in the oval symbols. The outer model represents the relationships between the items or questions and the construct. The outer model is used to determine the model's reliability. Validity is established in PLS by using factor analysis to compare loadings and cross loadings (Sanchez, 2013).

We prefer the PLS estimation methodology to alternate methodologies because it is easy to use, is capable of analysing both reflective and formative indicators, and enables researchers to analyse relationships using empirical observations (Chin, 1998a, 1998b). Because of these capabilities and advantages, PLS analysis is now widely used in information systems research providing a robust way of analysing survey data (Chin, 1998b; Gefen et al., 2000; Chin et al., 2003; Gefen and Straub, 2005).

One current concern when utilising PLS is the distribution of the data and the lack of adequate power with small sample sizes (Marcoulides, 2009). Marcoulides (2009) argues that many researchers have used 'rules of thumb' in determining an adequate sample size in PLS analysis of '5 or 10 times'. Goodhue et al. (2006) suggest that this can lead to unacceptably low levels of statistical power, therefore in this work, we performed a power analysis. Effect size is used to estimate the degree of association between variables. Because Cohen's effect size (1992) tables were created prior to the increased use of PLS, regular regression is listed amongst the alternative statistical methods. We used three independent variables in a linear regression model to determine power. For such a model, a large effect between variables could be determined with a sample size of 50 at $p = .01$ level, a medium effect between variables could be determined with a sample of 76 at $p = .05$ level and a large effect could be determined with a sample size of 34 at

p = .05 level. Our sample size consisted of 61 respondents, therefore the effect size for this work falls between a large effect at p = .01 and a medium effect at p = .05.

6.2 Reliability and validity

As noted above, we measured awareness, information transfer, recognition, and realisation using Amoako-Gyampah and Salam's (2004) extension of the TAM, which we modified to fit this ERP context. We then used SmartPLS (Ringle et al., 2005) to perform the partial least squares analysis. Our indicators modelled behavioural beliefs considered important in understanding our structural model for realisation. To analyse the psychometric properties of the measures, we calculated the average variance extracted (AVE), composite reliability (ρ_c), Cronbach's alpha (CA), latent variable correlations and cross loadings. Table 1 reports the AVE, ρ_c and CA for both the pre-training and post-training surveys.

Table 1 Average variance extracted, composite reliability and Cronbach's alpha

	Pre training			*Post training*		
	AVE	ρ_c	*CA*	*AVE*	ρ_c	*CA*
Awareness	0.72	0.91	0.88	0.86	0.96	0.94
Information transfer	0.86	0.96	0.94	0.85	0.96	0.94
Realisation	0.83	0.95	0.93	0.75	0.92	0.89
Recognition	0.79	0.94	0.91	0.84	0.95	0.94

The reliabilities of both the pre- and post-event survey were similar in that our Cronbach's alpha statistic exceeded .88 for all items in both surveys. Although there is no standard method for calculating statistically acceptable composites, the generally-accepted rule is for composite reliability to be greater than 0.70 (Yi and Davis, 2003). In this study, the lowest composite reliability was for 'awareness' at 0.91. We therefore believe that all constructs demonstrated reliability.

PLS measures convergent and discriminate validity by comparing both 'on-factor loadings' and 'cross-factor loadings'. We examined the convergent and discriminant validities of individual items by verifying that all loadings were greater than 0.70. Appendix A provides the factor loadings for all pre-realisation and post-realisation items. All item loadings met the convergent measurement criteria exceeding the 0.70 threshold with the lowest loading (AW4) at 0.80. To be discriminately valid, cross loadings should be less than the convergent loading after having met the 0.70 threshold for convergent validity. All items met both the 0.70 threshold and loaded lower 'off factor' than their 'on factor' loadings.

7 Results

7.1 Pre-training analysis

The repeated measures methodology used in this research enabled us to measure the effects of a change management event on user attitudes. After establishing survey reliability and validity, we sought to measure the effects of awareness, information

transfer, and recognition on 'user realisation'. To do this, we employed SmartPLS and performed a bootstrap sampling method, generating 500 samples for our measurement model using the standard settings. We then calculated individual path values and t-statistics for the relationships in our model to determine their statistical significance. Again, as stated above, we hypothesised positive relationships between awareness, information transfer, and recognition with realisation.

Figure 4 Pre-training results (see online version for colours)

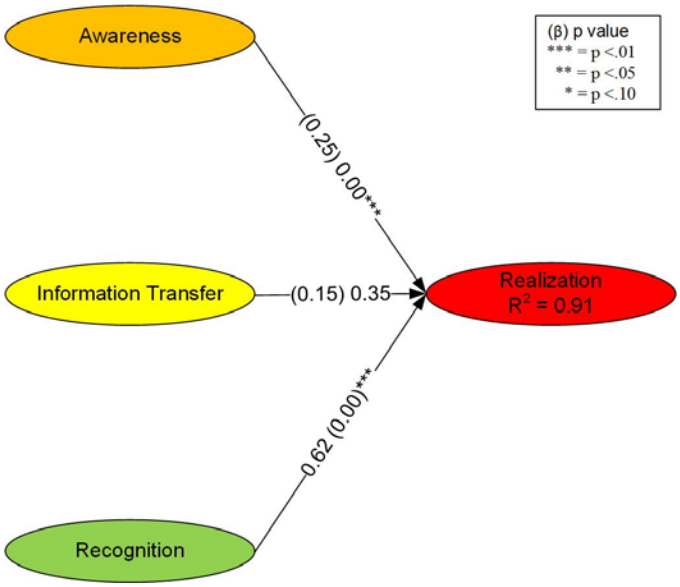


Figure 4 summarises our pre-event results, including both the path value (β) and corresponding p value indicators. Prior to the training change event, the awareness (0.25) and recognition (0.62) paths showed a positive relationship to realisation ($p < .01$). While the relationship between information transfer (0.15) and realisation was positive, it was not significant. However, the results of our data analysis indicate that awareness and recognition all substantially contribute to realisation as measured by our R^2 value of 0.77. Table 2 summarises the statistics for the sample beta values, standard deviations, t statistics, and p values for the constructs prior to the training change event.

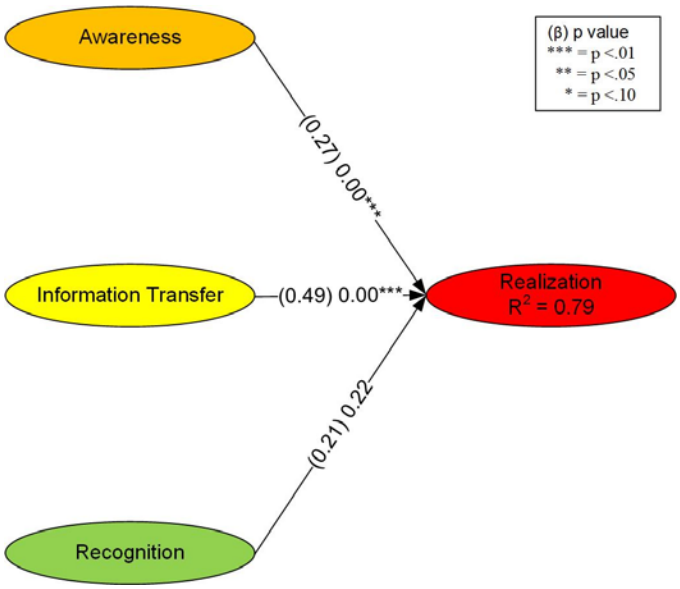
Table 2 Pre-test results

Path	*Original sample beta*	*Sample mean*	*Standard deviation*	*t statistic*	*p value*
Awareness → Realisation	0.25	0.25	0.06	4.29	0.00
Information transfer → Realisation	0.15	0.13	0.15	0.95	0.35
Recognition → Realisation	0.62	0.64	0.13	4.68	0.00

7.2 Post-training analysis

All users participated in a training session that introduced them to the new ERP system. This change event provided airmen with handouts containing information about the new implementation followed by hands-on training. A manager then discussed the impending system, worker roles, sources of further information, and the importance of a successful rollout. Following this event, the same participants then completed a second survey with identical questions to the initial survey. Figure 5 presents the path results from this second survey.

Figure 5 Post test results (see online version for colours)



The results in Figure 5 include both the path value (β) and corresponding p value. Post training, both 'information transfer' ($\beta = 0.49$) and 'awareness' ($\beta = 0.27$) had positive relationships with 'realisation' ($p < .01$). The value for 'recognition' was also positive ($\beta = 0.21$), but was not statistically significant. In this post realisation survey, awareness, information transfer and recognition contribute to realisation, with R^2 at 0.57. Table 3 provides the sample beta estimate, standard deviation, t-statistic and p-value for each of our constructs after the change event. The results for post-realisation indicate that 'awareness' and 'information transfer' each affect 'realisation' ($p < .01$).

Table 3 Post realisation results

Path	*Post sample beta*	*Sample mean*	*Standard deviation*	*t-statistics*	*p-value*
Awareness → Realisation	0.27	0.27	0.09	2.96	0.00
Information transfer → Realisation	0.49	0.48	0.13	3.81	0.00
Recognition → Realisation	0.21	0.21	0.17	1.24	0.22

We tested three hypotheses, each of which examined a dimension of our basic model both before and after a training session about such a system. Results for these hypotheses follow.

Hypothesis 1 There will be a positive relationship between *awareness* and *realisation*.

This hypothesis was supported in both pre and post training surveys. We found awareness was significantly related to realisation. Both pre- and post-training surveys indicated a strong relationship between these factors. The evidence against the null hypothesis supports Hypothesis 1. Most awareness questions were about the existence of the new system. Members became aware of the new system when introduced to the purpose of the system. This suggests that making users mindful that a system exists, that the new system is coming positively affects realisation.

Hypothesis 2 There will be a positive relationship between *information transfer* and *realisation*.

There was no support for this hypothesis in the pre-training survey, however there was support in the post training survey. We believe that this is due to the nature of information transfer. Because the users had not experienced any information transfer prior to the training event, it is reasonable for this relationship not to be significant. Our post training survey showed a strong relationship between information transfer and realisation, suggesting that when users know that information is readily available, they know where to access information about the new system and that information transfer will positively affect realisation.

Hypothesis 3 There will be a positive relationship between *recognition* and *realisation*.

This hypothesis was supported prior to training, but not after. These questions relate to the user's ability to recognise the new system. This finding suggests that users think they are able to recognise the new ERP system, but after some training, realise they were not able to do so. This is notable because users may have seen and used other systems, but if they have not previously seen this ERP system, they would not be able to recognise it. While this seems trivial it is not given the large number of systems that these users deal with on a daily basis.

8 Discussion

This work examined user realisation and the effects of formal training on user awareness, information transfer, and recognition. We surveyed members of the US Air Force who were in the initial stages of an ERP implementation both prior to a training session and after this event about the new system. There are several practical purposes to such training such as improving user learning, increasing user acceptance and reducing implementation failures. However, the literature suggests that implementations have yielded mixed results. Chau (1996) reported that perceptions of technological support were positively associated with perceptions of ease of use. Karahanna and Straub (1999) reported no influence of technological support on user perceptions of ease of use. Agarwal and Prasad (1999) report increased perceptions of usefulness as the primary benefit from training. Sumner et al. (1999) state that 'training employees' is a key success factor when implementing ERP systems. These results suggest that formal training

session can influence users' awareness, information transfer and recognition when implementing complex new systems.

8.1 Study limitations

A number of factors limit our findings. Because our respondents were members of the military and therefore compliant participants, for example, we were able to obtain a 100% sample of end users at the specific western operations base. But this was not the only implementation site for the ERP system described here. We recognise that conducting our study at only one location and for only one industry confines our results. Further, although extrapolating our findings to other venues such as non-military installations seems reasonable, we understand that the same favourable results we found here are not assured in different venues.

We also note that our study focused on a single ERP system implementation. We have no reason to believe our results would have been different for an alternate software application, but we do not know this to be the case. Similarly, because our end users were military personnel, we recognise that our survey participants were especially compliant. They answered our survey questions anonymously, but we recognise that this does not necessarily mean 'impartially'.

Finally, we recognise that we have proposed a continuum, rather than a Boolean model, of 'user commitment' but have only tested the first stage of such a continuum. Our results are promising in that 'training' increased end user awareness, information transfer, and system recognition.

8.2 Future research

We envision several avenues for future research. One path is the need for replicative studies.

For example, we feel it would be useful to repeat our work at other locations, in other industries, and for other software. Although both theory and our own empirical experience suggest that our proposed user commitment model makes sense in alternate settings, more sampling would be useful to validate our findings further.

As noted above, we also realise that we have only investigated 'realisation' – the first component of our model. Subsequent points along our hypothesised continuum require verification through additional research. Our own experiences in this study also points to the need for reliable measurements. In particular, it would be beneficial to establish consistent metrics for assessing 'user commitment' as it changes over time.

Finally, researchers will find this work useful as it frames 'user commitment' in a new light and provides a richer, and to us more accurate, view of user acceptance. Other researchers may wish to explore how 'user commitment' relates to 'system success'.

9 Conclusions

Organisations continue to spend considerable sums of money on system training and software acquisition. An important element of such latter efforts is 'user commitment' – an element that typically has an important bearing on the success or failure of a new

system. It is also becoming clear that such commitment is not necessarily consistent over time that employees often 'grow into' new systems, and that many factors can affect such growth. Examples include the amount of prior exposure individuals have to a new system, the value and status of the roles users expect to have in the new order, and the amount of training they receive prior to system usage. For these reasons, we suggest that it makes sense to view 'user commitment' as points along a continuum.

Hearsay, training, hands-on experience, and formal announcements are further examples of factors that can affect such commitment – especially during the initial stages of software implementations. For this reason, we further feel that it makes sense to mark progress with the advent of such managerial change events as training sessions, planning meetings, and progress updates, as these are times when users obtain new information that is likely to affect their thinking about, and commitment to, a new system. The model we developed reflects these matters and integrates a number of theories that describe how such influences as user awareness, familiarity, and appreciation of a new system affect commitment to the system.

To test the user commitment model empirically, the authors selected the first point on the continuum – *realisation* – and used measures of 'awareness', 'information transfer', and 'recognition' derived from prior research to predict *realisation* both prior to, and then after, a training event that introduced potential users to a forthcoming ERP system. Using a structural equation method, we found high statistical measures of model reliability and validity. In addition, we found 'awareness' and 'recognition' statistically significant influences prior to the change event, and that 'awareness' and 'recognition' significantly influenced 'realisation' after the training event. Finally, we found that realisation increased with user training in a new system, supporting our idea of a user continuum. For these reasons, we feel that both academicians and industry practitioners will find the suggested model useful in understanding how users come to accept and embrace a new system.

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Appendix A

Pre-realisation loadings

	Awareness	*Information transfer*	*Recognition*	*Realisation*
A1	**0.87**	0.59	0.47	0.48
A2	**0.80**	0.46	0.41	0.41
A3	**0.88**	0.64	0.56	0.51
A4	**0.85**	0.76	0.70	0.73
I1	0.71	**0.91**	0.79	0.81
I2	0.68	**0.96**	0.89	0.83
I3	0.61	**0.93**	0.84	0.77
I4	0.75	**0.91**	0.79	0.79
R1	0.67	0.84	**0.87**	0.82
R2	0.42	0.72	**0.88**	0.83
R3	0.60	0.74	**0.91**	0.80
R4	0.64	0.88	**0.90**	0.82
N1	0.60	0.83	0.87	**0.94**
N2	0.52	0.75	0.81	**0.87**
N3	0.60	0.80	0.85	**0.93**
N4	0.66	0.77	0.79	**0.89**

Post realisation loadings

	Awareness	*Information transfer*	*Recognition*	*Realisation*
A1	**0.93**	0.35	0.42	0.35
A2	**0.93**	0.35	0.44	0.30
A3	**0.93**	0.34	0.47	0.36
A4	**0.92**	0.46	0.45	0.50
I1	0.36	**0.89**	0.65	0.66
I2	0.44	**0.93**	0.62	0.74
I3	0.32	**0.95**	0.60	0.73
I4	0.42	**0.93**	0.72	0.71
R1	0.49	0.59	**0.89**	0.61
R2	0.41	0.61	**0.92**	0.69
R3	0.44	0.69	**0.95**	0.74
R4	0.44	0.66	**0.91**	0.63
N1	0.28	0.72	0.63	**0.86**
N2	0.46	0.52	0.63	**0.83**
N3	0.40	0.63	0.72	**0.89**
N4	0.34	0.78	0.56	**0.87**

Appendix B

Survey

Code	*Question*	*Scale of agreement*						
		Strongly disagree	*Disagree*	*Slightly disagree*	*Neither agree nor*	*Slightly agree*	*Agree*	*Strongly agree*
A1	I am aware that that the ECSS system exists	1	2	3	4	5	6	7
I1	Information about the ECSS system is readily available	1	2	3	4	5	6	7
R2	The ECSS system is easily identified		2	3	4	5	6	7
I2	I can access information about the ECSS system	1	2	3	4	5	6	7
N1	My role in using the ECSS system is clear	1	2	3	4	5	6	7
R2	I know what the ECSS system looks like	1	2	3	4	5	6	7
IT3	The ECSS system information can be easily obtained	1	2	3	4	5	6	7
A2	I know that the ECSS system is coming	1	2	3	4	5	6	7
N2	I know what the plan is for the ECSS system in my organisation	1	2	3	4	5	6	7
I4	I can obtain the information I need about the ECSS system	1	2	3	4	5	6	7
N3	The plan for the ECSS system is clear to me	1	2	3	4	5	6	7
A3	I am conscious of the fact that the ECSS system exists	1	2	3	4	5	6	7
R3	I can identify the ECSS system	1	2	3	4	5	6	7
A4	I know the name of the new system	1	2	3	4	5	6	7
R4	The ECSS system is easy to recognise	1	2	3	4	5	6	7
N4	I know my role in the ECSS system game plan	1	2	3	4	5	6	7