User resistance to information system implementations

A dual mode processing perspective

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Abstract

Users often resist information system implementations and it has been established that this can cause an implementation to fail. In this paper, the user attitudes that can cause resistance are examined using an established attitude change theory from social and cognitive psychology: the Elaboration Likelihood Model (ELM). It is argued that users who cannot or will not think deeply about systems represent a key blockage and that their attitudes are largely based not on a system's intended benefits or other central issues but on heuristics and what ELM calls peripheral influences. The results of a wide-ranging study are presented that, in addition to supporting this argument, identifies and classifies 19 new heuristics and peripheral influences (in addition to the nine already known) that commonly, and adversely, affect user attitudes and responses to new information system implementations.

Key words

User resistance; User acceptance; The Elaboration Likelihood Model; User attitudes.

1 Introduction

Information System (IS) implementation projects are often delayed, cancelled before completion, over budget or deliver an under-utilized system (for example, Johnson 1995; Goldfinch 2007; Standish Group 2009). High profile failures are routinely reported in the popular press (for example, Wright 2011; Matier and Ross 2012). User resistance, which IS research tends to regard neither as a good thing nor a bad thing (for example Hirschheim and Newman 1988; Lapointe and Rivard 2005; Ferneley and Sobreperez 2006; Laumer and Eckhardt 2012), is a common cause of such outcomes (for example, Lyytinen and Hirscheim

1987; Hirschheim and Newman 1988; Cooke and Peterson 1998; Beaudry and Pinsonneault 2005; Kim and Pan 2006) and is an established area of research.

Social and cognitive psychology provide significant insights into attitude change – for an excellent overview see Wood (2000) – and it is known that user attitudes, which form and change during IS implementations, can cause either resistance or acceptance (for example, Angst and Agarwal 2004; Zhang and Sun 2009; Kim et al. 2009; Donat et al. 2009; Alsajjan and Dennis 2010; Lee 2011). Despite this, relatively little research has employed psychology to help understand how user attitudes form and change during IS implementations. In this domain, although alternatives can be found (for example, Alsajjan and Dennis 2010; Bajaj and Nidumolu 1998; Coklin 2006; Read et al. 1997), the Elaboration Likelihood Model (ELM) (Petty and Cacioppo 1986) is currently the attitude change theory with the biggest literature presence. Although our research builds on existing work, its focus and approach are different. Previous studies where ELM has been used to examine user attitudes have been deductive and generally based on a single case study, whereas the research detailed in this article was inductive and gathered information from multiple projects across several organizations and sectors. This enabled a broad understanding to be established of the heuristics and peripheral routes that affect user attitudes.

Like other dual mode processing theories, such as the Heuristic-Systematic Model (Chaiken et al. 1989), ELM is based on an assertion that the human reasoning process is determined by an individual's ability and motivation to process available information. When people are unmotivated or unable to process information and a decision needs to be made, normal behavior is to ignore the detail and to make a judgment based on easily available information and/or heuristics. ELM proposes that attitudes form across an elaboration continuum ranging

from low to high, which is dictated by an individual's ability and motivation to process relevant information, and that there are two associated influence routes – central and peripheral. The central influence route predominates in situations of high elaboration. It relates to influential information that is perhaps not immediately obvious and requires thought (high elaboration). Perceived argument quality will then become the biggest factor in establishing attitudes. High elaboration is highly conscious; the recipient, able and motivated to process information, will employ logic, reflection, analysis and consideration. Subjects are aware they have been persuaded, arguments have been assessed and decisions reached based on the most favorable thoughts produced. Low elaboration, by contrast, is non-intrusive, little thought occurs and attitudes form which are based on heuristics and peripheral influences (HAPI). Heuristics here refers to rules of thumb, intuition, common sense, educated guesses and so forth. Peripheral route influences are based on easily available information such as the perceived source credibility, quality of the presentation or the number of messages received. Attitudes formed through low elaboration are weaker and less enduring than those formed under high elaboration. Figure 1 is a simplified illustration of ELM.

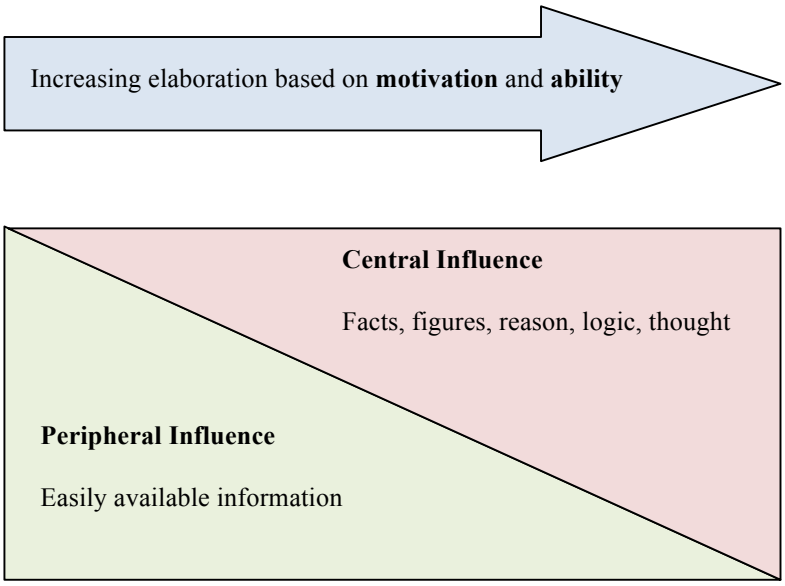

Figure 1: Simplified Elaboration Likelihood Model (after Petty and Cacioppo 1986)

Previous studies have demonstrated that during IS implementations, low elaboration among users is common and a few of the HAPI that can affect user attitudes have already been identified. These are as diverse as a user's level of emotional arousal (Hee-Woong et al. 2007) and legacy attitudes inherited from prior experiences (Zhang and Sun 2009). It was this recognition of diversity that motivated our research. It appeared that the range of HAPI that can affect an IS implementation was both substantive and varied but on-going research, restrained by deductive techniques or focused on other issues, was identifying HAPI at a rate that suggested decades could pass before a range adequate to significantly inform practice was unveiled. Our study, therefore, was inductive and was simply intended to provide evidence for known HAPI and to identify as many new HAPI as possible. Although it cannot be claimed that all relevant HAPI are identified here, we believe that those most commonly affecting IS implementations in a traditional professional environment are. This research also reveals low elaboration to be the norm, supporting further the proposition that HAPI are important.

By reviewing existing literature, this paper begins by supporting the theory that HAPI are able to significantly affect IS implementations. The nine HAPI identified in previous research are unveiled and the knowledge lacuna's breadth is confirmed. The following section outlines how, using expert interviews, information was gathered from 88 projects across 43 organizations. Research findings are then presented and, initially, it is noted that low elaboration among users is the norm, which implies that, during IS implementations, HAPI generally have a more significant impact on user attitudes than central route influences. The nine HAPI identified in existing literature are then re-assessed and the further 19 HAPI unveiled by our research are presented and discussed. Taking the number of HAPI identified up to 28, we believe that a number adequate to inform practice has now been unveiled.

In conclusion, the 28 HAPI are summarized into a taxonomy intended to support those directing IS implementations. Although no HAPI are universally relevant to all projects and their manifestation in each may differ, many projects are affected by a subset of them. The HAPI identified here can significantly affect user attitudes and, when their impact is negative, can subsequently cause user resistance. Our taxonomy provides a tool by which practitioners might reflect on HAPI potentially affecting their projects, thus enabling a better understanding of users and the affiliated project risks.

2 ELM in existing relevant literature

User resistance and acceptance are established research areas. It is 25 years since the Technology Acceptance Model (TAM) (Davis 1989) was first published, many evolutions of which have since been developed (for example, Malhotra and Galletta 1999; Venkatesh and Davis 2000; Moon and Kim 2001; Venkatesh et al. 2003; Saadé and Bahli 2005; Schepers and Wetzels 2007; Boakye et al. 2012). Another common approach has been to learn from troubled projects by identifying factors that contribute to failure and success (for example, Hirschheim and Newman 1988; Fitzgerald and Russo 2005) and a range of theories and perspectives have been employed to help understand these areas better (e.g Hee-Woong and Kankanhalli 2009; Jones et al. 2005; Allen et al. 2013; Selander and Henfridsson 2012). The scope of our investigation, however, is narrow and concerned only with examining user resistance through an ELM lens.

In 2009, two papers observed that only limited work on user attitudes during IS implementations had been undertaken due to an erroneous perception that attitudes were unimportant (Kim et al. 2009, Zhang and Sun 2009). Although the foci of these papers was attitude strength and structure, both used ELM to reflect on their findings, concluding that user attitudes can be affected by previous similar experiences. Zhang and Sun (2009)

specifically classed legacy experiences as a peripheral influence. Several other papers confirm that user attitudes can cause resistance or acceptance (for example, Angst and Agarwal 2004; Donat et al. 2009; Alsajjan and Dennis 2010; Lee 2011). On another occasion where ELM was used to explain research findings, it was proposed that user involvement in the design improves acceptance because it motivates and enables high elaboration (Mak et al. 1997). In contrast, those users not involved form attitudes based on HAPI (low elaboration), the most influential being the credibility of the system champion.

A more rigorous application of ELM is presented by Bhattacherjee and Sanford (2006) who compare the impact of central and peripheral influence routes on user attitudes. Elaboration likelihood has four key parameters: peripheral cues; central cues; motivation to elaborate; and ability to elaborate. To test their hypothesis, they selected one example of each: source credibility (peripheral route); argument quality (central route); job relevance (motivation to elaborate); and user expertise (ability to elaborate). The peripheral cue of source credibility was selected due to its popular use in ELM research when compared to other variables such as the number of messages, range of message sources and likeability of the source. Source Likability as a concept is relatable to Reactive Devaluation; for a relevant description of this see Bazerman (2006) or Nolan (2011). Bhattacherjee and Sanford (2006) intended to evolve TAM (Davis 1989) to incorporate ELM. TAM proposes that user attitude and behavioral intention is a product of Perceived Usefulness (PU) and Perceived Ease of Use (PEU) – basic propositions supported by relatively recent meta-analyses (King and He 2006; Schepers and Wetzels 2007). Bhattacherjee and Sanford (2006) discovered that argument quality (central route) and source credibility (peripheral route) both had a direct impact on PU. Source credibility (peripheral route) was also found to impact user attitudes directly. Predictably, user expertise (ability to elaborate) had a positive moderating effect on the central route

(argument quality) and a negative moderation on the peripheral route (source credibility). That is to say, that as predicted, users who are able and motivated to elaborate focus more on central route influence and are less dependent on heuristics, thus confirming the relevance of ELM to user attitudes. More recent work (Lee 2008, 2011) has also confirmed source credibility to be a peripheral route that affects user attitudes.

Hee-Woong et al. (2007) critiqued existing IT adoption and continuance studies claiming that all existing models, in particular TAM, the Theory of Planned Behavior (TPB) (Ajzen 1985) and the IS Continuance model (Bhattacherjee 2001) are cognition-orientated. They developed a multi-disciplinary model that also incorporated emotion. Most significantly, this research showed that emotions (states of pleasure and arousal) affect user attitudes and, subsequently, participation. In using psychology to justify the impact of emotion on all human activity and decision-making, emotions are defined as peripheral influence routes. The link between emotions and attitude is well established in psychology (for example, Rosenburg et al. 1969).

Of the researchers who sought to incorporate ELM into a TAM evolution, Shumarova and Swatman (2006) were the most ambitious. Claiming that existing models such as TAM, TPB and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al. 2003) ignore influence source and focus only on the cognitive processes that occur after knowledge has been acquired, Shumarova and Swatman's ELM in IT Usage Context model incorporates an ambitious range of elaboration factors but remains a theoretical perspective. The peripheral cues mentioned include the number of messages, number of prior users, source likeability and source credibility. Acknowledging others, the list concludes with “etc.”. Likewise, motivational dimensions included are “IT job relevance, job fit etc.”

(Shumarova and Swatman 2006). A subsequent paper by the same authors (Shumarova and Swatman 2007) makes only a passing reference to ELM.

Typifying much of the research in this area, Sussman and Siegal (2003) mined attitude change literature to shed new light on an existing conversation. In this case, the intention was to encourage employees to accept IT mediated information (primarily e-mails). Their work confirmed that ELM principles are as applicable to computer-mediated information as other formats. In this case, in the context of emails received, experts were found to focus on argument quality (central route, high elaboration) in contrast to non-experts who focused on source credibility (peripheral route, low elaboration).

Promoting web use in schools, Akpinar and Bayramoglu (2008) also found ELM to be relevant, acknowledging that expertise encourages high elaborations, and thus obstructs the persuasive impact of poor arguments (Petty and Wegener 1998), and that weak arguments are more effective when elaboration is low. The importance of source credibility is also referenced.

Angst and Agarwal (2004) examined sustained technology usage over time in light of Kelman's processes, ELM and social learning theory. Kelman (1958) described three processes of attitude change based on the premise that, although overt behaviors in a group may be comparable, the internal processes causing those behaviors can differ. Thus, he describes three processes of influence with differing degrees of penetration, namely, compliance, identification and internalization. Observing the introduction of a relationship management system into a bank, Angst and Agarwal (2004) found that, for compliance users, managerial usage of a technology encouraged subordinate use. They also found that

compliance users increased their participation over time, internalization users continued with no changes to their pattern of involvement and all users eventually came to full participation. The level of initial participation (compliance, identification or internalization) simply defined a user's initial position on a trajectory towards full participation. Quoting Social Learning Theory (Bandura 1977), Angst and Agarwal (2004) argued that a core mechanism of learning is behavior modeling where individuals learn vicariously through the observation of others. Despite the phrase "Central and peripheral routes" being in the paper's title, it is not clear which routes were employed. However, given the Bandura reference and a focus on group activity, it can be assumed that the observation of others constitutes the peripheral route. It was found that users with different levels of participation were affected by different peripheral influences and that observation of peers and management behavior served as two potential peripheral influences whereas average peer group perception and management beliefs did not.

3 Summary of HAPI identified in existing literature and the role of low elaboration

The papers reviewed above confirm that user attitudes can cause the resistance to and/or acceptance of an IS implementation, that user elaborations are often low, that the attitudes of low elaboration users are affected by HAPI and that ELM is relevant to this debate.

During their first encounter with a new system most users have an open mind (Kim et al. 2009) and are willing to be influenced. As an implementation progresses, their attitudes strengthen (Kim et al. 2009), feed into one another (Zhang and Sun 2009) and play an increasingly important role (Lee 2011). Psychology research external to this domain has demonstrated that once attitudes strengthen into dogmas, reasonable measures are unlikely to

dislodge them (for example, Batson 1975; Brock and Balloun 1967; Burris et al. 1997; Frey 1986; Lifton 1961). Even when information disconfirming strong attitudes is important and powerful, people tend to seek out confirming information (for example, Bazerman 2006). The system champion's obvious objective therefore, is to cultivate positive attitudes as they form and evolve. The attitudes of low elaborators are weaker and less enduring than those of their high elaborating counterparts and will quickly decay should the influences cease (for example, Bajaj and Nidumolu 1998; Petty and Cacioppo 1986). Accordingly, the positive or negative trajectory along which their attitudes proceed will be determined by the sustained set of HAPI to which they are subjected. Existing literature has identified a diverse set of nine HAPI as summarized in Table 1. The objective of this research was to identify many more. It should be remembered that none of the HAPI identified are universally relevant. Each will only affects some users, on some projects, some of the time and to a differing extent (for example, Angst and Agarwal 2004; Zhang and Sun 2009).

HAPI	Researchers	Status
Legacy experiences	Zhang and Sun 2009	Relevance demonstrated
Source credibility	Bhattacherjee and Sanford 2006, Lee 2011, Shumarova and Swatman 2006, Mak et al. 1997, Sussman and Siegal 2003	Generally understood to be the most significant HAPI. Relevance demonstrated by three of the 5five papers referenced. Relevance theorized in the other two
Emotional state (pleasure) Emotional state (arousal)	Hee-Woong et al. 2007	Relevance demonstrated
Number of messages Number of prior users Source likeability	Shumarova and Swatman 2006	Theorized to be relevant
Observation of peers Observation of managers	Angst and Agarwal 2004	Relevance demonstrated

Table 1: Summary of HAPI identified by existing research.

4 An inductive method based on expert interviews

4.1 Defining IS implementation expertise and selecting interview candidates

The method was based on the defendable assumption that significant understanding and good practice is embedded in the knowledge (tacit and explicit), practice and oral traditions of IS implementation experts; an assumption partly reflected in the market rates for such positions. Commercial and industrial enterprises appear to value systems integration experience and the expertise of those with a history of successful delivery. The word ‘expert’ however, should be

employed with some circumspection as there is no widely agreed definition of 'an expert' or of 'expertise' (Hoffman et al. 1995; Gobet and Campitelli 2007; Germain and Ruiz 2009). The only meaningful cross-domain consensus is that expertise constitutes a blend of domain-specific knowledge, skills and experience (Germain and Ruiz 2009). Qualifying criteria are topic dependent (e.g. Germain 2006) and so establishing a robust definition of an expert for any given subject could prove to be a research challenge in its own right (e.g. Germain 2006; Gobet and Campitelli 2007). With regard to IS implementation experts, no useful definition has been hitherto advanced in the literature. Hoffman et al. (1995) surveyed definitions of 'experts' proposing a return to craft guilds terminology for expert professionals. It is interesting to note that, in failing to establish a clear definition of 'expert' in modern literature, mediaeval taxonomies have been revived. Accordingly, Hoffman et al. presented a taxonomy with seven respective categories: naivette; novice; initiate; apprentice; journeyman; expert; and master. At one end of this comprehensive spectrum is the naivette "who is totally ignorant of a domain" (Hoffman et al. 1995, p. 132) with masters being those who are the expert in a sub domain, "whose judgments set the regulations, standards or ideals" (Hoffman et al. 1995, p. 132). However, most relevant is their definition of an expert: "The distinguished or brilliant journeyman, highly regarded by peers, whose judgments are uncommonly accurate and reliable, whose performance shows consummate skill and economy of effort, and who can deal effectively with rare or "tough" cases. Also, expert is one who has special skills or knowledge derived from extensive experience with subdomains" (Hoffman et al. 1995, p, 132).

It nevertheless remains the case that any definition of an expert is to some extent arbitrary, particularly one that attempts to apply that definition to all professionals. However, for the purposes of this study, Hoffman et al.'s (1995) taxonomy did provide a useful basis from

which candidate selection criteria could be generated. IS implementation experts are defined for this study as highly regarded by their peer group and are referred to using distinguishing terminology such as ‘leader,’ ‘expert’ or ‘strongest.’ They have practitioner experience in excess of eight years, have led the introduction and implementation of at least three major systems and have participated in many more. They have a proven track record of dealing effectively with exceptional (‘tough’) user acceptance issues and have expertise that has been recognized by a professional organization that promoted, or appointed, them to a position that differentiates them from ‘journeymen.’ The numeric values contained in these guidelines (years experience and number of implementations) were also considered relevant in the conferment of the ‘expert’ epithet.

Arriving at an optimal sample size is also a challenge in interview-based research (e.g. Guest et al. 2006; Onwuegbuzie and Leech 2007). Typical good practice is that data gathering should continue until the point of saturation (Onwuegbuzie and Leech 2007). Guest and colleagues (2006) reviewed the commonly used term ‘theoretical saturation’ in academic literature, finding that, although it was routinely proposed as a milestone for selecting a sample size, the same literature “did a poor job of operationalizing the concept of saturation, providing no description of how saturation might be determined and no practical guidelines for estimating sample sizes for purposively sampled interviews” (Guest et al. 2006, p.60). They went on to review work where a given number of interviews was suggested, finding, not surprisingly, a wide variation in suggested figures. Although they observed that many papers suggested small numbers to be adequate (perhaps only five or six participants), ultimately it has to be concluded that the issue of sample size is highly study-specific. In our research, 15 interviews were conducted before the interviewer observed that significant new data had stopped emerging. As saturation had been reached, no more interviews were

conducted. After interview analysis was complete, it became apparent that with respect to HAPI, saturation actually occurred during the eighth interview. Although no additional themes emerged from later interlocutions, they did serve to confirm the earlier findings.

Interview subjects were drawn from a range of professional situations whilst meeting the definition of expert as defined above. Seven were senior managers responsible for major change programs, typically managing 50+ specialist staff. The remaining eight were project managers, team leaders or technical leads, generally leading implementations that required them to manage fewer than 15 specialists. In total, interviewees had worked full time for 57 organizations in a range of sectors namely financial services, health care, catering, logistics, manufacturing, retail, media, hi-tech, education, pharmaceuticals, international standards and energy production. As all subjects were primarily IS practitioners, regardless of sector their perspectives were essentially the same. Indeed, eight subjects had worked in multiple sectors. All essentially viewed IS projects from a strategic and experienced IS practitioner's standpoint. A brief profile of the 15 subjects is provided is Table 2. On the specific subject of HAPI in user acceptance, they provided examples from 88 separate projects across 43 organizations. The aggregated user acceptance experience of all the interviewees came to 302 years.

Subject	Years of relevant experience	Brief profile
1	10	Project manager in a large, highly regulated energy generation company. A specialist in health and safety systems.
2	15	Senior member of a consultancy group focused on IS in manufacturing.
3	34	Program manager who has held senior positions with well-known IT vendors, government organizations and in a private consultancy. UK representative on multiple international committees.
4	10	Lead systems analyst and team leader in a large logistics company.
5	10	Customer-facing project manager for an international hi-tech solutions company.
6	41	Program manager who held senior IT management positions in three blue chip companies and a government body; chair of several national user groups; UK representative on multiple international committees; served as an expert witness in over 300 IT related cases.
7	33	Main board director for a well known, international USD($) multi-billion manufacturing group.
8	8	Senior manager. Head of accountancy systems in a blue chip financial services group.
9	15	Consultant project manager. Formerly Head of IT for a regional newspaper and now in a Further Education college.
10	14	Head of Information Systems in a British University.
11	14	Consultant program manager. Led programs in four blue chip financial services groups, a government department and a national catering group. Formerly a technical team leader.
12	30	Team leader and project manager in a blue chip financial services group.
13	26	Analyst programmer and technical lead who moves jobs every 18-24 months. His former employers include high street banks, major IT vendors, large industrial groups, ‘dot com’ start ups and the public sector.
14	28	Senior manager. Several positions held in a major telecommunications company.
15	14	Systems Analyst / Business analyst for a petroleum company, a large retail company and in a financial services group.

Table 2: Brief profile of interview subjects.

4.2 The approach taken to elicit expert knowledge

Eliciting expert knowledge, although difficult (Kidd, 1987), is a proven empirical technique exploited in a wide range of applications and disciplines (Hoffman et al., 1995). With respect to the role of user attitude and behavior in IS implementations, however, this research represents the first study of its kind. Modeling the epistemology on the famous four stages of competence model (often attributed to Maslow) and Kolb's (1984) experiential learning theory, it could be said that experts have significant unconscious and conscious competence. They have what Kolb (1984) might describe as *concrete experience* that they may or may not have reflected on or conceptualized. The intention was to facilitate *reflective observation* (Kolb 1984) and *abstract conceptualization* (Kolb 1984) through learning, thus enabling *concrete experience* to be discussed and recorded. Subjects were introduced to ELM and encouraged to reflect on where they had encountered the phenomena described. The interviewer, who is both an experienced educator and practitioner, sat individually with each subject and, assisted by a laminated diagram (Figure 1), he brought each subject's understanding of ELM to an adequate level. This new understanding then served as the stimuli with the diagrams and the interviewer primarily playing pedagogic roles. Subjects were then encouraged to reflect on their professional experience of low elaboration, heuristics and peripheral influence among users. Remembering that the subject's 'new knowledge' was the primary stimuli, the interviewer observed a protocol in which, apart from social cues to confirm that he was listening and requests for clarification, he spoke only to explain psychological theory and to keep subjects on-topic. It is understood that imagery can assist communication and learning (for example, Nelson et al. 1976; Paivio 1971; 1986; Stanwick 1996) and that diagrams can assist qualitative research interviews (Crilly et al. 2006, Törrönen 2002; Umoquit et al. 2008;). However, as far as we could uncover, this is the first

study in which simple graphics have been used to assist subject-learning for the purpose of knowledge elicitation during research interviews.

Subjects did reflect on practice and generally provided narratives that included details of HAPI-related events along with the preceding and consequent state of affairs; three standard elements of narrative as outlined by Czarniawska (1998). In a few cases, subjects instead described HAPI they had repeatedly encountered but even these were supported by examples. An unexpected outcome was that, overwhelmingly, subjects spoke about HAPI causing obstructions. Their focus was user resistance and not acceptance. This is reflected in the paper's title. Even positive references tended to describe how HAPI had been manipulated to become less obstructive. As the HAPI identified here affect user attitudes, they may also contribute to user acceptance but this has not been confirmed and is not the focus of this paper.

Most subjects, then, provided two or three examples before requiring further stimulus that was in the form of an additional graphic (Figure 2) representing HAPI identified in existing literature. In Figure 2, the middle boxes light colored boxes represent HAPI already shown to affect users, the top three darker boxes are well established HAPI that existing research assumes to be relevant, source credibility is in bold as it is generally considered the most relevant and the bottom boxes marked 'other' emphasize that this list is incomplete. Subjects tended to comment on the HAPI mentioned in the diagram before reflecting on the others they had encountered. This paper represents the first theme to emerge from a larger investigation. Once the second graphic had been discussed, the intention was to move on to other attitude change theory. In most cases this occurred after about 30 minutes but subjects routinely came back to the HAPI topic as further examples came to mind.

Quantity of messages		Range of sources	
Likeability of the source		Observation of peers (Do you see them doing it?)	
User's emotional state (Arousal)		User's emotional state (Pleasure)	
Source credibility		Legacy similar experiences	
Observation of managers (Do you see them doing it?)		First impressions (From first encounter)	
Other	Other	Other	Other
Other	Other	Other	Other

Figure 2: Second graphic used to stimulate subjects.

Each interlocution was recorded, transcribed and then thematically analyzed. Conducting and transcribing all interviews alone, the lead author became familiar with the data as the interviews progressed. All discourse describing user attitudes being affected by HAPI was then extracted from the transcripts into a new document of 70,408 words. During interview, subjects had occasionally summarized the underlying cause of HAPI-related incidents with such phrases as ‘it was a tribal thing’ and ‘they are very brand driven in our place.’ Such summative reflections provided an initial 16 HAPI themes into which discourse was coded. Remaining text related to new HAPI was then organized into three groups of similar incidents to create the additional themes (in Table 3, those numbered 12, 13 and 19). Each finding's subsection presented below represents one such theme. Although generally not considered essential in thematic analysis, these results were reviewed and verified by five of the original subjects.

5 Findings

Three significant sets of findings arose from this study to which this section is dedicated: the first stresses the prevalence of low elaboration; the second considers the relevance of previously identified HAPI; and the third is a taxonomy of the 19 HAPI newly unveiled. In a final conclusions section, HAPI identified by our research are combined with those unveiled in existing literature to form a hierarchical taxonomy. As is common with interpretive research, the intention is not to be explanatory but descriptive.

5.1 The prevalence of low elaboration

The prevalence of low elaboration was one of the earliest and most significant emergent themes. Without prompting, all 15 subjects expressed the opinion that low elaboration during user acceptance is common. 13 described high elaboration as rare. Subject 12, for example, was incredulous that users might even be expected to elaborate, referring to those who do as the "geeky," "tiny minority" expressing that "normal human beings" are only interested in "the trivia […] how it looks, how it feels or [...] if it's fast." Similar sentiments came from subject 15 stating that "90% of people" are "obsessed with trivia, looks good, nice colors, nice fonts, all that sort of [expletive deleted]." Other subjects focused not on their users' unwillingness to elaborate, but their inability. Subject 3 said that "most people don't know what a computer system does, or can do." Subject 7 described part of his group as "you've got these two guys who are very knowledgeable about the system and you've got 20 people who […] don't really understand it." The consensus was that low elaboration is the norm. As most users will not or cannot elaborate, user attitudes are mostly based not on central route influences but on HAPI.

Before proceeding to the next sections that discuss HAPI, a research boundary should be clarified. All subjects reported user attitudes being significantly influenced by relatively

minor system defects that perhaps should have been tolerated. Their point was that minor defects affecting response times, ease of use, reliability, duplication of effort, data accuracy, safety, speed, accessibility or security might invoke disproportionately strong negative attitudes. This, however, is outside the scope of this investigation. The focus of this research is not how user attitudes are affected by system faults; instead, the focus is HAPI that relate to essentially healthy and worthwhile systems.

5.2 HAPI identified in existing literature

When subjects examined Figure 2, they tended to comment on the existing HAPI. An initial observation relates to the boxes that subjects were most drawn to. *Source credibility*, *First impressions* and *Legacy similar experiences* invoked the most discussion. Subjects tended to have ready examples of these. *Likeability of the source* and *Quantity of messages* were discussed relatively briefly. *User's emotional state* and *Observation of peers* were acknowledged as syndromes that subjects had seen but no more than that. Two were not even mentioned, namely *Observation of managers* and *Range of sources*. The potential of *Observation of managers* to affect users has been previously demonstrated (Angst and Agarwal 2004) but *Range of sources* has not. *Range of sources* therefore remains a theoretical HAPI not shown to have any practical relevance, unlike the other HAPI listed above. Those wishing to draw practical lessons from this paper may choose to ignore *Range of sources* until evidence to the contrary is forthcoming.

Furthermore, an order of prevalence is thus proposed: *Source credibility*, *First impressions* and *Legacy similar experiences*; followed by *Likeability of the source* and *Quantity of messages*; followed by *Observation of peers* and *User's emotional state*; followed by *Observation of managers*.

5.3 HAPI Identified by this research

This section presents the 19 new HAPI identified by this research. These are summarized in Table 3 and then each is expanded upon in turn. Later, in the conclusions, these HAPI are merged with those identified in existing literature to form a taxonomy of those now known to affect IS implementations.

	Name / working title	**Brief description**
1	Tribalism	Community affiliation, discrimination and prejudice.
2	Unrelated antipathy	Pre-existing vexation between actors.
3	Sex and sexism	Sexual arousal and prejudice related to gender or sexual practice.
4	Suspicion and distrust	Concerns that intentions are sinister or systems incompetent.
5	Hardware location	The precise location of visible hardware.
6	Physical beauty	The size, appearance and feel of visible hardware.
7	Covetousness and materialism	A desire to have systems perceived as superior to others'.
8	Interface aesthetics	The cosmetic appearance of screens and printouts.
9	Compared aesthetics	How aesthetics compare to other more familiar technologies.
10	Formatting	Format of screen layouts, printouts, forms and reports.
11	Personalization and control	A user's capacity to alter interfaces based on personality or mood.
12	Creature comforts	A user's physical comfort while engaging with the implementation or system.

13	Equipment paradigms	How visible hardware compares to that traditionally found in a work place.
14	Purchase paradigms and customer loyalty	Tendency to continue with existing providers.
15	Industry trends	Inclination to follow the rest of the industry.
16	Brand names	Faith in given brand names.
17	Inherited wisdom	Views of previously encountered influential actors.
18	Expectations set by expenditure	Perception that expenditure and quality are related.
19	Familiarity and the comfort of routine	Familiarity with a system being replaced or changed.

Table 3: Summary of the 19 new HAPI identified by this research.

In the following text, each of the 19 HAPI are expanded upon and a summary of related interview discussions is provided. To provide clarity, each expansion is limited to a paragraph of less than 250 words.

HAPI 1: Tribalism

The prejudices and stereotypes that separate communities are user acceptance heuristics and an implementation's effect on a user's community is a peripheral influence. Furthermore, what those communities are may not be apparent. Subject 1, while working in a remote location, first noticed this after her wedding: "they worked well with me […] until my surname turned to [subject's surname] and then overnight they would no longer hear anything I had to say […] it was a tribal thing." She continued: "anyone who came in with [name of the area] claims […] you were fine but if you didn't […] they were turned off to you." In

remote locations with small populations, she implied that tribalism is generally present with workforce loyalty towards their local community being stronger than towards the company. Other subjects encountered similar tribal behavior being drawn up around regions, countries and, in one case (subject 6), religion. Other examples included: prejudice towards fresh graduates, contractors (subject 13) and young professionals (subject 1); a dislike of systems 'not invented here' (subject 14); actors rallying behind dominant companies and nations (subject 6); and a preference for those who rose through the ranks as opposed to entering as graduates (subject 14). An additional message emerged, that although a community's first allegiance is generally to themselves, they are not necessarily hostile to outsiders. However, care should be taken to understand and respect the community structures. It is worth restating, that community allegiances may be invisible.

HAPI 2: Unrelated antipathy

Antipathy quite unrelated to a system can cause the user acceptance process to become a new 'field of war' between vexatious factions. In some cases, subjects described obstacles caused by those whose main "interest was in winning little political wars across the organization" (subject 11) or who "had a bit of a thing about the IT department" (subject 3) and those focused on "settling old scores." In other cases, it was less personal as users expressed innate dispositions to resist dominant forces. This was particularly prevalent when systems were introduced due to the arrival of a new authority as the result of a merger or takeover.

HAPI 3: Sex and sexism

Given that a user's degree of emotional arousal is a HAPI (Hee-Woong et al. 2007), why shouldn't their level of sexual arousal be also? Likewise, if *Tribalism* is a heuristic, why not allegiance or prejudice based on gender, sexual practice or orientation? Three subjects raised sex or sexism. One made direct reference to arousal where a female colleague was told "when

the demonstration starts to go badly ... undo another button on your blouse" (subject 3) and outside of this research, the lead author has known professionals entertained by vendors in lap dancing bars and the like. Subject 15 recalled a system champion who lost his users' affections through an extra-marital affair (sexual practice). Subject 1 then succinctly summarized sexism explaining that she, unlike her colleague, was unable to influence a particular user group. When asked what her colleague had that she didn't, she simply responded: "They weren't a woman."

HAPI 4: Suspicion and distrust

Ten subjects described user concerns about systems corrupting data or being used for covert sinister purposes. They had seen users coerced into handing over data and parts of their roles to distrusted actors. Subject 13 confirmed two occasions where systems *were* implemented for sinister reasons other than those advertised; any user suspicion or mistrust was thus justified. Other subjects described scenarios where: user groups pertaining only to part of a system believed that there may be uncontrolled gaps beyond their remit (subjects 10 and 15); users were blamed for poor data that they believed the system had mangled (subject 11); an appeal system removed a user's ability to support their argument with debate, rhetoric and networking and was thus not to trusted to adequately represent their arguments (subject 12); and there was remit creep causing a system proven in one arena to be ported into another where it was unproven and distrusted (subjects 2 and 12).

HAPI 5: Hardware location

The physical location of hardware can have a significant impact. Problems can emerge if kit is installed when "no-one has thought about where" (subject 4); especially if someone's workspace is awkwardly altered. Subject 9 stated that someone's work environment is often "their world" and should be respected as such. On a different theme, subject 1 recalled two

systems with terminals that were excessively visible. Separated from the normal work environment, users felt conspicuous and exposed when participating. Subject 9 then provided a contrasting example where high visibility had been beneficial: “they were suffering with disk space […] graphic designers, they were dealing with heavy images […] I bought two, 3TB external hard drives […] I could have plugged this [expletive deleted] thing in the server room upstairs where they would have known nothing about it. But I plugged it in where they could see it, they could see it flash when they were saving data […] the head of graphic design came up and said, [subject's first name] thanks a lot it's brilliant.”

HAPI 6: Physical beauty

The emergence of hardware’s physical beauty as a HAPI was predictable given that Fishbein and Ajzen (1975) linked attitudes toward an object with attitudes towards behavior and this was later related to user acceptance (Zhang and Sun 2009). The surprise, however, was the basic factors on which attitudes towards the object were based. The look, feel and touch. Two subjects (15 and 9) spoke with contempt about those who appreciate the physical aesthetics of a machine, considering such things as rounded corners, the finish on the case or the lights that flash. Subject 9 summarized this as part of the human condition, talking about equipment that “looks cool,” is “more desirable” and is “aesthetically pleasing," and added “what user wouldn’t accept that as a good thing?” In contrast, subject 1 provided an example of physical ostentatiousness as a negative HAPI: “it wasn’t just a computer screen, it was this big expensive looking console surrounded by posters, and it was all glitz and all glamour.”

HAPI 7: Covetousness and materialism

Emerging in several forms, this ultimately came down to some basic principles: people desire nice things; do not want inferior things to their neighbors; and if there is a favored party, they want it to be them. Subjects spoke about situations where some users had better looking PC

cases than others, more modern monitors or better mobile phones; positive influences to the haves, and negative influences to the have-nots. Three subjects described pride in warehouse automation systems: subject 4, a system that used "little robots," made the local news and excited employees; subject 6, a 90ft high fully automated warehouse; and subject 1, a company that automated one of its warehouses as a pilot, causing staff to be proud and to compete for jobs in that area. Fundamentally, people like to have something superior to their neighbors making this HAPI particularly effective when a new system compares favorably to a competitor's. However, internally, it can cause resentment if some parties appear to be favored over others.

HAPI 8: Interface aesthetics

The cosmetic appearance of screens, printouts and other interfaces is HAPI 8. Although all subjects raised this with a tone or body language that expressed frustration they had learnt not to fight it, accepting as a highly prevalent, if unpopular, HAPI. Subject 15, for example, said that people were "obsessed with trivia, looks good, nice colors, nice fonts," adding that he had "seen this repeatedly" and subject 12 described a "ghastly" and despised system that became less unpopular when a new glossy front end was put over it. Significantly, subject 8 had found that company directors unable to elaborate often selected aesthetics as their peripheral route of choice saying that "they tend to disregard the technology required to get the data accurate and robust and reliable and performing well and calculating fast and all of those things [but] colors definitely matter, fonts, dashboard kind of stuff which shows green, amber, red […] that floats people's boat at that level." Subject 5 interestingly said that when his customers raised this, "nine times out of ten, because we tell them 'we'll charge them to make a change', they'll live with it." He had never seen it become a deal breaker.

HAPI 9: Compared aesthetics

Closely related to the previous HAPI, this is the comparison of interface aesthetics to others that users engage with. In their personal lives, people often use low functionality applications whose easy-to-use and glossy interfaces can become a benchmark. During the site visit, a co-worker of subject 11 expressed frustration that establishing major robust applications with similar features and appearances to simple applications routinely found on mobile devices is problematic, but that user expectations are high. Subject 15 explained that this had been happening since the eighties when people with a color-enabled BBC micro at home, would dislike the VT220s they used at work. He also described the problems of linking "little apps on devices […] through to a serious application on a legacy machine" and classed user expectations in this regard as "a nightmare."

HAPI 10: Formatting

Closely related to *Interface Aesthetics*, a number of subjects said that relatively trivial document and display formatting issues could cause a significant impasse. This was particularly so in the 1970s and 1980s when computer-formatting capabilities were primitive compared to the manual systems they replaced. This influence's prevalence has not decreased but, as formatting is now generally configurable, it tends not to linger. No subjects implied that formatting was not significant and they generally considered it an aspect of good system design.

HAPI 11: Personalization and control

Raised by four subjects, this is simply a user's ability to personalize their environment. Subject 6 believed that personalizing interfaces creates a greater sense of ownership and subject 9 expressed frustration that this is increasingly rare as companies require a uniform

corporate look about their workplaces. Subject 13 had supported a system where users defined their own field locations in CICS screens; in his words: “users loved it. We hated it.”

HAPI 12: Creature comforts

This influence refers not to the system, but to the physical comfort of users while they transact with it or are introduced to it. Subjects 4 and 8 discussed this with particular reference to systems, while subject 9 summarized that physical comfort affects an employee's view of everything work-related. References were made, for example, to noisy printers (subject 15) and the automation of unpleasant dirty jobs (subject 6). Three subjects stated that comfort was particularly important during a user’s first encounter with a system to create a mental affiliation between the system and comfort. For this purpose they often took subjects to hotels or other comfortable environments.

HAPI 13: Equipment paradigms

This influence tends to emerge when systems alter a shop floor by introducing alien or suspicious objects. Subjects observed that many shop-floor workers are most comfortable in their native shop-floor surroundings and that some computer hardware can be perceived as simply not belonging there. Subject 15 had encountered warehouse staff openly hostile towards a small screen attached to specialist hardware that they were obliged to use. Attitudes changed when the terminal was replaced with hardware that resembled lathe controls. Subject 1 had a similar experience; her shop floor workers wouldn’t interact with her web application because sitting at a computer screen gave the impression that they were relaxing. Subject 15 summarized the sentiments he had encountered at a shed manufacturer: “Computers are good for offices, they are nothing to do with cutting timber into lengths and nothing to do with what panels will be built.”

HAPI 14: Purchase paradigms and customer loyalty

When a close relationship exists with a given provider, this can create a tendency to prefer systems or system components solely because they are from that provider. Three subjects described large companies who had been loyal to given vendors for as long as anyone could remember and two spoke about the prohibitive effort required to build new relationships acknowledging that this significantly affected purchasing decisions. Frustration was also expressed about poor providers who, while still engaged, had lost their credibility. Take the words of subject 11 for example: "they deliver bad service at high cost with bad client management […] I don't even think they were very likable, but they were seen as very credible because of history."

HAPI 15: Industry trends

This heuristic suggests that, "what the rest of the industry is doing must be right." By way of example, subject 10 described momentum in the education sector where, unable or lacking confidence to undertake high elaboration on service desk software, organizations take a lead from their competitors. Subjects expressed frustration at similar homogenizing effects in other sectors and described the level of confidence required to go against industry trends and stressful occasions when they had done so. Following industry trends is often considered the safe option; if things go wrong, the industry is blamed and not the individual. Finally, subject 6, citing an NHS dental practice that had copied a system employed in a private practice, warned that just because a system works well in one organization does not mean that it will work in another.

HAPI 16: Brand names

Closely linked to Industry trends, brand names are a well known part of marketing and most people, to some extent, allow brand names to affect their purchasing decisions. As many

brand names have a well-earned reputation, this is not necessarily a bad thing. However, it is appropriate that it be recorded here as a peripheral influence. The two subjects that raised this viewed it negatively, recounting scenarios where a good system had been put into an environment that it was not suited for and where a good reputation was not particularly well deserved.

HAPI 17: Inherited wisdom

Only raised by one subject, this is close to the personal experience of many, where people trust the view of someone they knew in the past. In the example raised, new graduates made judgments based on the dogmas of academics who taught them as undergraduates.

HAPI 18: Expectations set by expenditure

This influence is not directly related to cost. Cost related attitudes generally form under high elaboration. This instead relates to the link between expenditure and expectation. Users often want to spend their budget and their energies and they want expensive and complex solutions assuming the more expensive options to be better. Subjects 8 and 15 spoke about systems that were perfectly fine but rejected due to their low expenditure, solutions that perhaps seemed too good to be true. In the words of subject 8: “People were ready for a seriously big task, [but] were being presented with what was a fairly easy solution, and it seemed too easy, so they didn’t trust it […] and now it's being used.” She summarized the typical view of her users saying, “we are a complicated business, we are a big organization, now there’s no way that we should be able to do it for less than [large figure quoted]." Then the view of the board “I am now the director of what is a huge merged financial organization and I expect it to be a tricky system.”

HAPI 19: Familiarity and the comfort of routine

Fear, or an inherent dislike, of change came up in most interviews. However, no subjects mentioned a time when amorphous 'fear of change' caused problems; there was always something specific. Subjects used the phrase to summarize the emotional and attitudinal journey that users are required make. One subject (12) tended to summarize anything she was unmotivated to discuss in this way but, when pressed, could always tie it down to something specific. She appeared to use the phrase to dismiss inquisitive parties, as if to say "there's nothing unusual about this, don't worry and leave it to me." The peripheral route that is the nearest relative of 'fear of change' is comfort and familiarity with the old environment. When users are comfortable with legacy systems, emancipation can be difficult.

6 Conclusions and the hierarchical HAPI taxonomy

It is already established that negative attitudes can cause user resistance (for example, Angst and Agarwal 2004; Zhang and Sun 2009; Kim et al. 2009; Donat et al. 2009; Alsajjan and Dennis 2010; Lee 2011) and that this can significantly obstruct IS implementations (for example Lyytinen and Hirscheim 1987; Hirschheim and Newman 1988; Cooke and Peterson 1998; Beaudry and Pinsonneault 2005; Kim and Pan 2006). This paper has argued that the user attitudes that can critically affect IS implementations commonly form under low elaboration and are accordingly primarily influenced by HAPI and not by central issues. Given their own high elaboration levels, system champions are often unaware of this and erroneously focus on central route persuasion while paying inadequate attention to the HAPI molding the majority of their user's attitudes. User attitudes are often based on what system champions might regard as being irrelevant or trivial. This research has identified 19 new HAPI that do affect IS implementations and these are summarized in Table 3.

When users first encounter a new system, most are indifferent towards it and susceptible to influence (Kim et al. 2009). Then, as an implementation proceeds, their attitudes form, strengthen (Kim et al. 2009) and, playing an increasingly important role (Lee 2011), can cause a system to be accepted or resisted (Alsajjan and Dennis 2010; Angst and Agarwal 2004; Donat et al. 2009; Kim et al. 2009; Lee 2011; Zhang and Sun 2009). System champions are advised, therefore, to consider how the HAPI outlined in this paper might be affecting their users and, given that established attitudes are less susceptible to change (for example Brock and Balloun 1967; Batson 1975; Frey 1986; Burris, Harmon-Jones and Tarpley 1997), to do so from a user's first encounter onwards.

Reflecting further on the 28 HAPI identified here, that is, the nine from existing literature and 19 from the empirical work, each could be assigned to one of four larger themes affiliated to a basic human tendency. Namely: *the primeval*, the tribal and often primitive tendencies of users to gather and consume, to prioritize their own people and to react emotionally; *the habitat*, influences originating not directly from the implementation but from the wider environment to which users are exposed; *the thing*, the observed physical features of the system; and *the trends*, how others are reacting and what is being said. Figure 3 is a graphical representation of the 28 HAPI separated into these four larger taxa. A brief summary of each HAPI in each taxon is then provided in Tables 4 to 7.

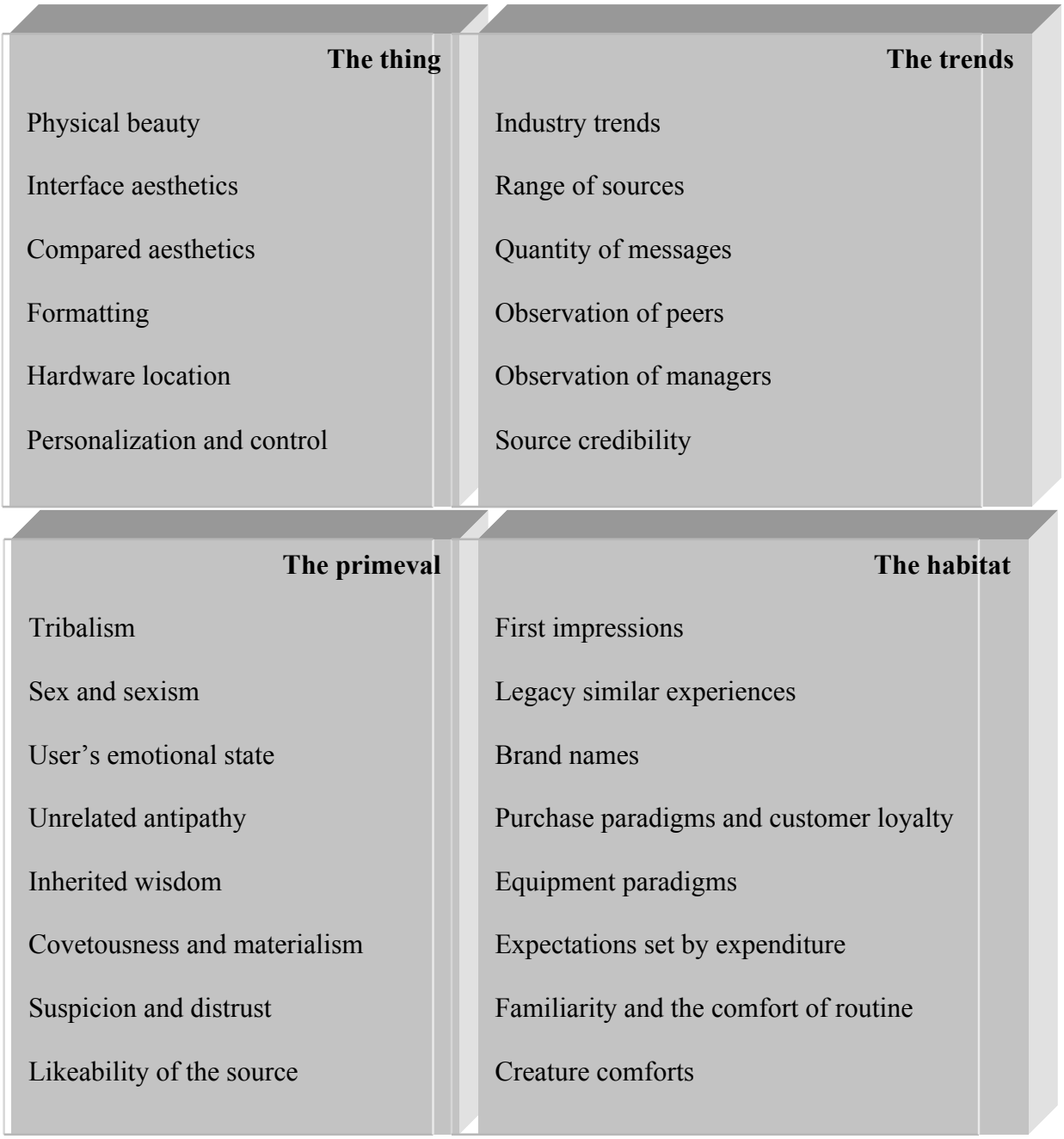

Figure 3: The hierarchical HAPI taxonomy

Although not explicitly stated, but based on the language that subjects used, something can be said about the strength of each HAPI. It was apparent, for example, that HAPI related to *the trends* are particularly influential at a strategic level and, affecting senior people with budgetary control, are often hard to oppose. Those related to *the thing* have the potential to be significant negative influences but, in most cases, alterations can be made that will satisfy

disgruntled users. Those described as primeval are the most variable, un-malleable and unpredictable. As a general rule, their effect, if present, is weak to negligible but on occasion can be strong enough to paralyze progress. In such circumstances, subjects found themselves relatively helpless, resorting to workarounds or, in some cases, admitting defeat. The remainder, which largely relate to the habitat, once again can be powerful but are generally malleable and so can be managed.

The primeval	
Tribalism	Community affiliation, discrimination and prejudice.
Sex and sexism	Sexual arousal and prejudice related to gender or sexual practice.
User's emotional state	The emotional state users in terms or arousal and pleasure.
Unrelated antipathy	Pre-existing vexation between actors.
Inherited wisdom	Views of previously encountered influential actors.
Covetousness and materialism	A desire to have systems perceived as superior to others'.
Suspicion and distrust	Concerns that intentions are sinister or systems incompetent.
Likeability of the source	How likeable users perceive system champions to be.

Table 4: Summary of HAPI related to *the primeval*

The thing	
Physical beauty	The size, appearance and feel of visible hardware.
Interface aesthetics	The cosmetic appearance of screens and printouts.
Compared aesthetics	How aesthetics compare to other more familiar technologies.
Formatting	Format of screen layouts, printouts, forms and reports.
Hardware location	The precise location of visible hardware.
Personalization and control	A user's capacity to alter interfaces based on personality or mood.

Table 5: Summary of HAPI related to *the thing*

The trends	
Industry trends	Inclination to follow the rest of the industry.
Range of sources	Range of sources from which supportive and opposing are messages are received.
Quantity of messages	Quantity of supportive and opposing messages.
Observation of peers	The extent to which a user's peers are seen to participate.
Observation of managers	The extent to which managers are seen to participate.
Source credibility	The perceived credibility of system champions.

Table 6: Summary of HAPI related to *the trends*

The habitat	
First impressions	Impressions formed upon first encounter with the system.
Legacy similar experiences	User experiences with other similar projects.
Brand names	Faith in given brand names.
Purchase paradigms and customer loyalty	Tendency to continue with existing providers.
Equipment paradigms	How visible hardware compares to that traditionally found in a work place.
Expectations set by expenditure	Perception that expenditure and quality are related.
Familiarity and the comfort of routine	Familiarity with a system being replaced or changed.
Creature comforts	A user's physical comfort while engaging with the implementation or system.

Table 7: Summary of HAPI related to *the habitat*

The overarching message of this paper is that user attitudes can be a decisive factor in an implementation's success and that the majority of these attitudes, forming under low elaboration, are based on HAPI, many of which are surprisingly base. Although few users would admit to their professional attitudes being influenced by such factors as sex, tribalism or the physical appearance of kit, this research has revealed that this is exactly what happens. System champions are often unaware of this and most of those interviewed had at some point been caught out or confused by the HAPI they described. They also warned that visible HAPI might only be partly as they appear and that hidden HAPI are often at play. In some cases, the

HAPI that affect an implementation will never be unveiled. It is hoped that the contents of this paper will provide a basis by which practitioners might assess the HAPI affecting their projects, thus enabling a better understanding of their users and the affiliated project risks to be overcome.

7 Future work

Although we believe that those HAPI most commonly affecting IS implementations in traditional professional environments are here identified, it can not be claimed that this list is comprehensive. More may be unveiled if expert knowledge is examined through a different lens or an alternative premise could unveil HAPI unbeknown to experts. Future research is also suggested with respect to depth. The identified HAPI could be individually or collectively examined to consider areas as the factors that dictate their relevance, their forms of manifestation, their potentially positive influences and related good practice. Alternative explanations for the relevance of identified HAPI might also provide a basis for further discovery. This research has unveiled a significant range of HAPI but future research may well increase this range and provide a deeper understanding of each.

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