Integrating the Intuitive into User Acceptance of Technology Theory

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by

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Declaration

I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

Dan McAran

Abstract

The increased pervasiveness of computer (and mobile) technology in all spheres of human life is all encompassing. The Technology Acceptance Model (TAM), and the models derived from TAM, dominate user acceptance of technology theory and are amongst the most researched, well known, and pervasive theories in information systems (IS) research. There is concern, most profoundly expressed by several authors in the 2007 special issue of the *Journal of the Association for Information Systems* entitled *Quo Vadis TAM – Issues and Reflections on Technology Acceptance Research*, that despite the extent of the research performed on user acceptance of technology, few design specifications or interventions have emerged to enhance or promote user acceptance of technology.

The TAM model as modified for this research includes the proposed Perceived Intuitiveness (PI) of technology construct which is hypothesized to have a significant effect on Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Compatibility (COM), and USE. Partial Least Squares Structural Equation Modeling (PLS-SEM) is used to explore and evaluate these relationships. The design of intuitive technology is an emergent area of research; integrating the PI construct into the TAM model would address the call to link technology acceptance to technology design.

A formal process is used for development of the construct based on the recommended procedures. Measurement items are identified based on a preliminary exploratory pilot study and a review of the literature. Model specification, scale evaluation and refinement were performed in a second pilot study.

This research uses a web-based questionnaire directed towards legal professionals asking them to complete the survey instrument based on their personal experiences with a self-selected legal technology product. Respondents were solicited using the social media site LinkedIn.

User Experience has emerged in the literature as a summative term for the total user interaction with computer technology. Based on the literature review, the second level construct consisting of two first order reflective constructs, PI and Compatibility, is identified as User Experience (UE). The resultant model is identified as the Technology Acceptance User Experience (TAUE) model and consists of the second level UE construct, the PU construct and the dependent variable USE. The TAUE model explains in the range of 36% of the variance in USE.

The integration of a PI construct into the TAM model provides an approach to resolving what has been referred to as the "TAM Logjam" by providing a link from TAM to the research stream of intuitive technology design which would benefit both academic and practitioner communities.

Keywords: Perceived Intuitiveness, User Experience, Technology Adoption

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Publications Resulting from this Research

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Abbreviations and Acronyms

AVE	Average Value Extracted
BI	Behavioural Intention
CAMR	Categorical Agreement Among Multiple Raters
CMB	Common Method Bias
CMV	Common Method Variance
COM	Compatibility
EMR	Electronic Medical Records
FIMIX	Finite Mixture (Segmentation)
HCI	Human-Computer Interaction
ICT	Information and Communications Technology
IOT	Internet of Things
IS	Information Systems
ISR	Information Systems Research (Journal)
IT	Information Technology
JAIS	Journal of the Association for Information Systems
LV	Latent Variable
MIS	Management Information Systems
MISQ	Management Information Systems Quarterly (Journal)
MLMV	Measured Latent Marker Variable
PEOU	Perceived Ease of Use
PBC	Perceived Behavioural Control
PI	Perceived Intuitiveness
PLS	Partial Least Squares
PLS-SEM	Partial Least Squares – Structural Equation Modeling
PU	Perceived Usefulness

Abbreviations and Acronyms (Continued)

SN	Subjective Norm
QUESI	Questionnaire for the Subjective Consequences of Intuitive Use
TAIP	Technology Acceptance by Individual Professionals
TAM	Technology Acceptance Model
TAM2	Technology Acceptance Model 2
TAM3	Technology Acceptance Model 3
TAUE	Technology Acceptance User Experience Model
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UE	User Experience
UMLC	Unmeasured Latent Marker Construct
UTAUT	Unified Theory of Acceptance and Use of Technology
UTAUT2	Unified Theory of Acceptance and Use of Technology 2
VIF	Variance Inflation Factor
VOL	Degree of Voluntary Use

1. Introduction

1.1 Introduction

The overall objective of this research is to identify additional factors that affect user acceptance of technology specific to a legal technology environment. The specific factor investigated is the user's perception of the technology as intuitive. The research hypothesis is that the creation of a Perceived Intuitiveness (PI) construct and the integration of the PI construct into the Technology Acceptance Model (TAM) will increase the explanatory power of the TAM model and contribute to the resolution of what has been characterized as the "TAM Logjam" (Straub and Burton-Jones 2007, p. 223).

In this research, the integration of the intuitive into technology acceptance results in the creation of a new technology acceptance model identified as the Technology Acceptance User Experience (TAUE) model that includes a PI construct but excludes the Perceived Ease of Use (PEOU) construct. The research is limited to legal technology. "Legal technology" is a summary term that is used to mean technology specifically designed for the legal profession and used by legal professionals to perform legal work.

Intuitive design is an emerging area of technology development (Blackler 2006; Blackler, Hurtienne 2007; Blacker and Popovic 2015; O'Brien, Rogers, and Fisk 2010), however, it is notable that the "intuitive" in regards to management has been of interest for many years (Morris 1967): "Thus in both management and science considerable importance attaches to effective intuitive behavior. It is a part of "good management" and a part of "good science"" (p. B-161). Simon (1960) identifies intuition as the method traditionally used for unstructured decisions in business.

With the creation of Information Systems (IS) technology for most areas of human endeavour and for most professions, the issue of intuitive technology is becoming salient: Spool (2005) reports:

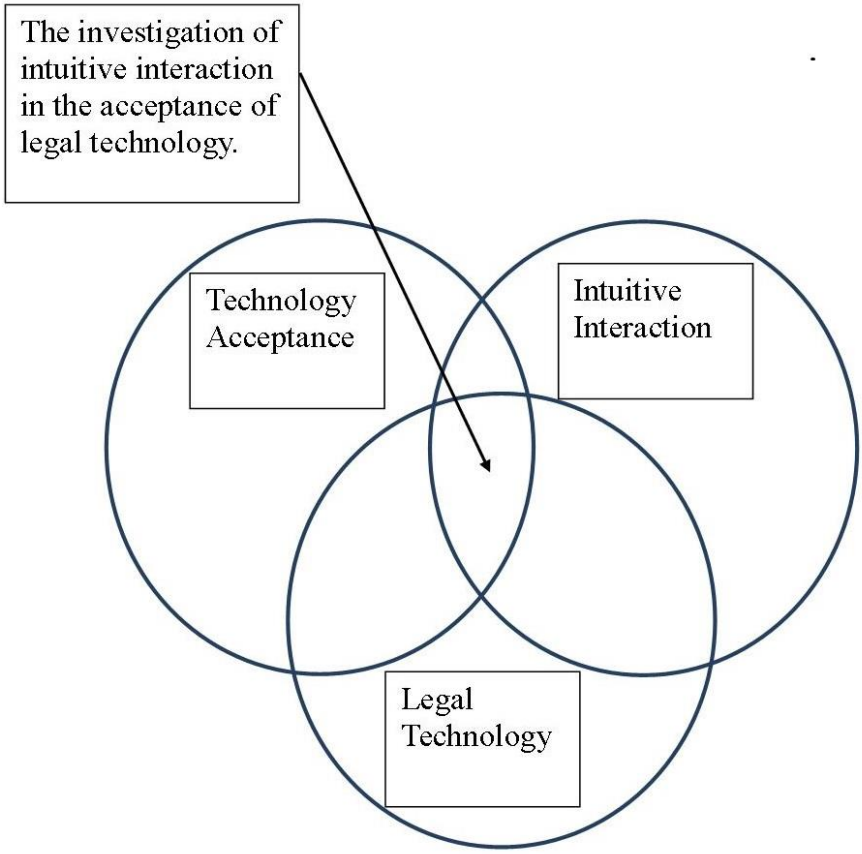
> In a recent usability test, I once again witnessed something I've seen a hundred times before: a frustrated user claiming he knows exactly what is wrong with the interface he was fighting with. What was his suggestion? "These guys need to make this thing a lot more intuitive. The problem is that this program isn't intuitive enough. It needs to be more intuitive!" (http://uie.com/articles/design_intuitive).

The TAM originated in the doctoral dissertation research of Davis **(**1986). TAM and related models are amongst the most researched, well known and pervasive theories in IS research (Benbasat and Barki 2007). Few design specifications or interventions have emerged to enhance or promote user acceptance of technology from TAM research: Benbasat and Barki (2007) note "the knowledge "usefulness is useful" has, in fact, provided little in terms of actionable research (Benbasat and Zmud 1999) and hence a paucity of recommendations to direct design and practice" (p. 213).

A consensus has emerged that the user acceptance of technology research stream has reached a turning point, where research is now needed on interventions to promote user acceptance (Venkatesh, Davis and Morris 2007). As will be outlined, there has been substantial evolution of IS and IS academic research; this sets the context of the proposed evolution presented in this dissertation: the emergence of "intuitive" IS systems which potentially will lead to design recommendations.

There have been adaptations of the TAM theory for specific technologies and contexts. Technology used by lawyers to do legal work (henceforth: "legal technology") is a subset of the technology used by the professions, which itself is a part of workplace technology. Only a few academic researchers have addressed issues related to legal technology. The investigation of factors that affect user acceptance of technology related to the legal profession would be beneficial both for practicing members and to the suppliers of technology to the profession. In addition, the nature of intuitive technology has broad application to other technology (Blackler 2006; Stern 2015).

Figure 1-1 Focus of Research (Adapted from West 2011)



The remaining part of the Introduction is organized using the format of West (2011), as follows: section 1.2 provides a brief overview of the evolution of Management Information Systems (MIS) research and user acceptance research; section 1.3 the research objective; section 1.4 the research stages; section 1.5 the presentation of the research; section 1.6 the importance of research to practice; section 1.7 is the conclusion.

1.2 The Evolution of MIS Research and the Origins of User Acceptance.

It has been about 50 years since computer technology emerged in the late 1960s as a significant factor in business: Mumford and Ward (1966) note:

> The computer has been likened to the plough or the wheel in its potential for changing work and society… there is, as yet, little empirical evidence for many of these statements.…in view of the probable rapid increase in computer use in Britain, (there are now around 1,100 machines in operation, by 1970 it is estimated there will be 5,400) it is clear that we must change speculation into fact (p. 244).

Petter, DeLone, and McLean (2012) identify specific periods in the evolution of IS:

- The Data Processing Era (1950-1960)
- The Management Reporting and Decision Support Era (1960-1980)
- The Strategic and Personal Computing Era (1980-1990)
- The Enterprise System and Networking Era (1990-2000), and
- The Customer-Focussed Era (2000 and beyond) (p. 343).

MIS – with a focus on decision support – followed from the initial implementation of data processing systems (Ackoff 1967; King and Rodriguez 1978). There has been an evolution of MIS. Batch processing was followed by terminal processing (Zmud 1979). The utilization of computer based systems increased dramatically as hardware cost declined (Gremillion 1980). End-user computing emerged in the early 1980s as an important issue in IS (Dickson, Leitheser, Wetherbe and Nechis 1984; Rivard and Huff 1984).

There was a corresponding evolution in MIS theory in this early period (Nolan and Wetherbe 1980). Defining the nature of an MIS was a concern in the emergence of MIS research (Benbasat and Schroeder 1977). Concerns were raised about the significant failure rate of information systems and the need to focus on users (Lucas 1975). Davis (1986) developed TAM during the time period when personal workstations were an emerging technology.

Early on the need to make the technology appropriate to the user was recognized, Benbasat and Taylor (1978) comment:

> Conceptual frameworks for MIS design presented by Chervany, et al. [16] and Mason and Mitroff [33] were the first to emphasize the importance of decision-maker characteristics. The developers of these frameworks… suggested that information systems should be designed to suit the individual characteristics and capabilities of decision-makers. (p. 44).

This theme is present in this research: in the present context, designing legal technology suitable for legal professionals in the highest degree means creating technology that is intuitive to use. Simon (1997) recognized the importance of intuition in the practice of the professions and

management: “The evidence indicates strongly that the intuitive skills of managers depend on the same kinds of mechanisms as the intuitive skills of chess masters or physicians” (p. 136). As will be outlined in Chapter 3, the concept of “intuitive” technology is emergent and represents a further evolution of both IS practice and IS academic research.

Also early on, the issue of user acceptance and the related issue of user satisfaction with a system emerged in MIS studies: attitudes to new MIS systems became a focus of MIS research (Maish 1979). Early in the development of MIS research there was substantial evidence that individual differences were an important factor in MIS success (Zmud 1979) with the emphasis “to locate the critical individual differences and how best to design a MIS for individuals so characterized” (p. 969). Zmud (1979) also found “the strongest associations have been observed …relate to...cognitive styles and related personality constructs that construct and sustain an individual’s “world view”” (p. 974). Interestingly, ease-of-use of a MIS system also emerged early on as a factor of interest (Zmud 1979). Ginzberg (1981) also found a link between user pre-implementation expectation about a system and system success.

An update of the TAM model is appropriate because of the very substantial changes in IS technology that have occurred since the development of TAM by Davis (1986). Since this time we have seen the societal, cultural and business revolution that has occurred because of the internet. In addition, the personal computer is now being superseded by mobile-device proliferation (Kassner 2015).

There is a precedent for a revision of TAM: DeLone and McLean (2003) updated their original Model of Information Systems Success (DeLone and McLean 1992) stating it was necessary to “evaluate its usefulness in light of the dramatic changes in IS practice, especially the advent and explosive growth of e-commerce” (p.10). A further extension of the DeLone and McLean model was published by Petter, DeLone and McLean (2013) identifying the determinants of Information Systems Success. Benbasat and Barki (2007) state “the original TAM has outlived its usefulness” (p. 214). This research will explore and evaluate integration of “intuitive” nature of IS technology through the introduction of a PI construct: this potentially will function to update TAM in the same manner as DeLone and McLean (2003) and Petter *et al.* (2013) have updated the Model of Information Systems Success.

1.3 Research Objective

The research objective is the development of a PI of technology construct and the evaluation of the new PI construct in the TAM model of Davis (1986). The research questions are as follows:

1. Can a Perceived Intuitiveness construct for legal technology be created?
2. Assuming a Perceived Intuitiveness construct can be created; can it be explored and evaluated in the TAM model?
3. What are the conclusions that can be drawn in regards to technology acceptance and use by integrating and testing the Perceived Intuitiveness construct in the TAM model?
4. What is effect of the degree of voluntary use of legal technology on technology acceptance?

The required tasks to accomplish this are

1. To understand the creation, development and history of TAM as well as its limitations.
2. To understand the nature of intuition.
3. To understand the current relationship of intuition to technology.
4. To create measurement items for a Perceived Intuitiveness construct.
5. To explore and evaluate the proposed Perceived Intuitiveness construct in the TAM model.

Ultimately the objective of this research is similar to that of Davis (1986) who was firmly centered on the utility of his research: "TAM should provide the theoretical basis for a practical "user acceptance testing" methodology that would enable system designers and implementors to evaluate proposed new systems prior to their implementation" (p. 2).

Further Davis states:

> To a great extent, MIS research is concerned with the development of theories and techniques that permit practitioners to better measure and predict how the decisions under their control affect MIS success. Within this broad context, the present research is concerned with developing techniques for enabling practitioners to assess the impact of one class of managerially controllable variables, system characteristics, on the motivation of members of intended user community to accept and use new end-user information systems (p. 8).

Davis (1986) wrote his dissertation at the time when end-user computer systems were becoming increasingly prevalent. Now thirty years later, IS technology has permeated most professions and areas of human endeavour; we have now moved beyond end-user systems into an era of the internet of everything (Montresor 2014).

Artificial intelligence systems have not yielded the fruits they promised in the 1980's: Susskind and Susskind (2015) comment:

> In the professions, certainly, thirty years on, there are far fewer operational expert systems of the sort we developed than we expected…When commentators and academics argue that expert systems in law, tax, and audit have failed, they are often saying that architecturally speaking few systems that were developed using the techniques of the 1980s have ever left the research labs (p. 183-184).

In contrast, in the contemporary marketing of information technology there is strong focus on the "intuitive" nature of the technology (Raskin 1994). In the current era the expectation is that information technology be "intuitive" as perceived by information technology users. In this sense, there has been a metamorphosis of user acceptance of technology: in the era of the smartphone the psychological demands for users is for the "intuitive" beyond the baseline demand of PEOU. The "motivation" (Davis 1986, p. 8) and the "motivational model" (Davis 1986, p. 11) remain true, but the basis of the motivation has evolved.

The salient beliefs related to technology are changing. Benbasat and Barki (2007) note:

> These changes have led to the evolution of IT applications from a single user system in an organizational context to multiple users communicating via technologies in inter-organizational and more global settings…. This evolution has created conditions under which PU and PEOU have largely ceased to be the sole salient beliefs. For example, trust in online shopping contexts, cognitive absorption in Internet usage, and the social presence of others with whom one is communicating in collaborative online work contexts…represent salient beliefs that have become increasingly more important (p. 214).

The requirement for "intuitive" technology is emerging as a salient belief – and a person will normally only hold a small number of salient beliefs (Fishbein and Ajzen 1975, p. 218). The following definition of "Intuitive Human-Computer Interaction" (HCI) from O'Brien *et al.* (2010) is used as the working definition in this research:

> interactions between humans and high technology in lenient learning environments that allow the human to use a combination of prior experience and feedforward methods to achieve their functional and abstract goals (p. 107).

The above definition and the concept of intuitive technology are explored further in chapter 3 *Legal Technology and Intuition Literature Review*.

1.4 Research Stages

This research proceeds through the following stages to address the previously mentioned research objective and tasks:

1. Qualitative Exploratory Pilot Study: The research began with a preliminary qualitative pilot study which sought to identify a beginning set of characteristics of "intuitive" legal technology based on responses from users of legal technology.

2. Literature Review: The literature is reviewed in 2 stages. The first stage was a review of the Technology Acceptance literature; this includes a review of the Compatibility (COM) construct and the role of Voluntary Use as a modifier in the technology acceptance literature. The second stage was the review of literature related to intuition and the emergent literature related to the "intuitive" nature of technology. Thirteen component themes of "intuitive" technology are developed.

3. Methodology Review: A review was made of research methodology and a Positivist approach decided upon. Quantitative research methods in business and management were reviewed and the decision was made to use Partial Least Squares – Structural Equation Modelling (PLS-SEM) as the statistical method to evaluate the results of the research.

4. Statement of the Hypotheses and Research Model: In this stage a definition was created for the new Perceived Intuitiveness construct, the hypotheses created, and a preliminary research model was developed.

5. Development of Measurement Items: Based on the themes developed from the literature review and the first exploratory qualitative pilot study, a set of measurement items were developed for the proposed Perceived Intuitiveness construct. Fifteen items were developed and refined to ten items based on two pre-tests adapted from Davis (1986). An additional thirteen measurement items were added for perceived intuitiveness based on an existing instrument that was identified.

6. Questionnaire Creation: The research questionnaire was developed. The questionnaire included the measurement items for the PI construct, as well as measurement items for PEOU, Perceived Usefulness (PU), and COM. Slide bar scales were added to measure Degree of Use, Degree of Feature Use, and the Degree of Voluntary Use.

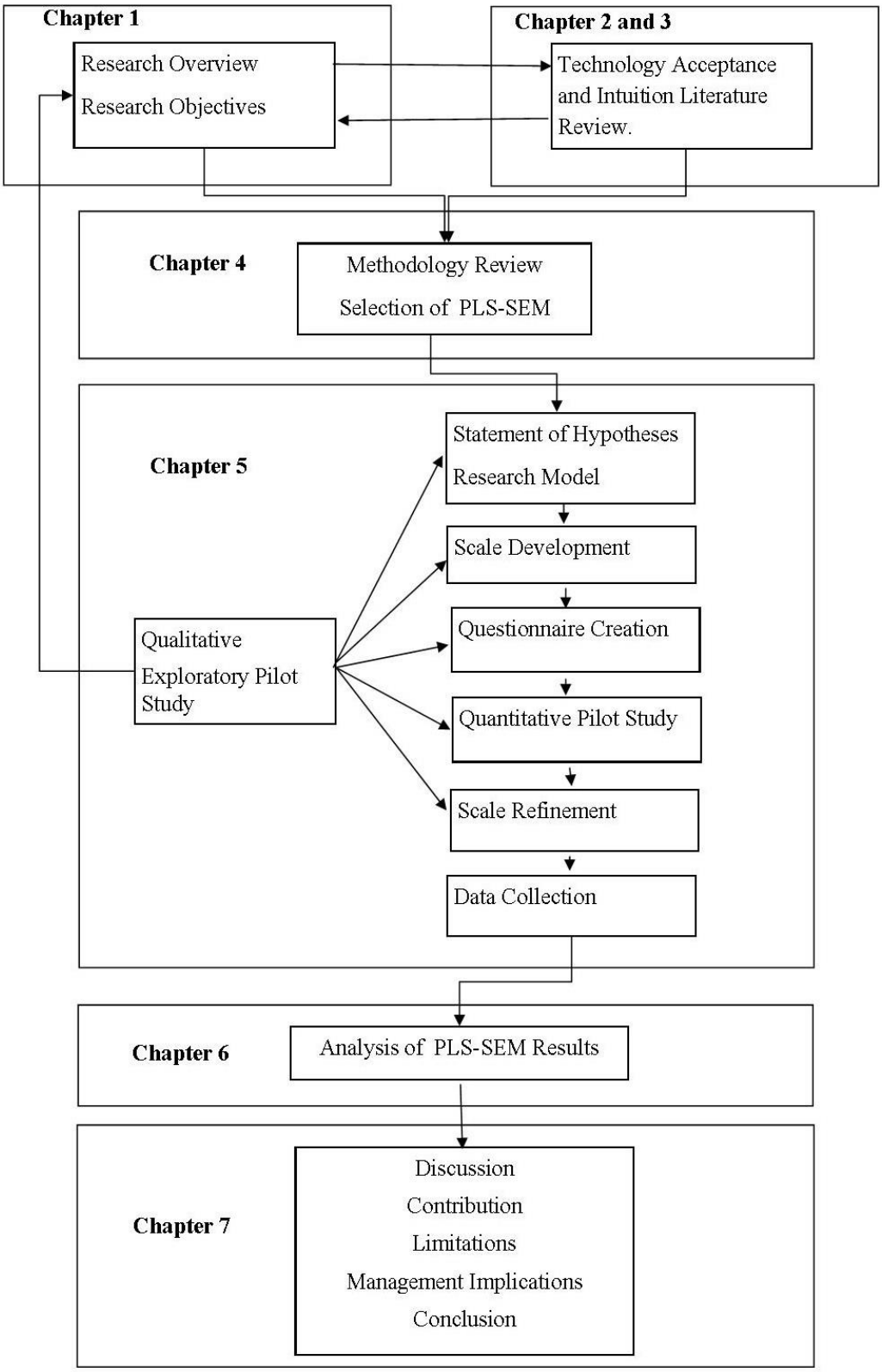
7. Refinement of Measurement Items: A quantitative pilot study was conducted and based on factor analysis of the results the 23 potential measurement items for the new Perceived Intuitiveness construct were reduced to fifteen items.

8. Solicitation of Respondents and Data Collection: Respondents were solicited using social media (LinkedIn and Technolawyer). Respondents were directed to an online Qualtrics questionnaire.

9. Analysis of Results: The data obtained from Qualtrics survey was analysed using PLS-SEM. The original research model was modified based on the f^2 and q^2 analysis and identified as the TAUE model. The measurement and the structural models for the final research are evaluated.

10. Discussion: An analysis of the results is provided in the discussion section focusing on the emergent requirement for "intuitive" technology and the practical value of this user requirement. Contribution to theory, methodology, and practice are outlined, as well as limitations of the research, areas of future research, management implications and a conclusion.

Figure 1-2 Research Process (Adapted from West 2011)



1.5 Presentation of Research

The thesis is organized as follows:

Chapter 1 provides an overview of the research objectives, questions related to research objectives, tasks and processes related to the research; and the chapter structure and organization of the thesis.

Chapter 2 reviews literature related to the TAM model, the development of the TAM and related models, and issues that remain unresolved. The COM construct is reviewed and the relationship of voluntary usage to the Theory of Reasoned Action (TRA) and TAM is discussed. The process used by Davis (1986) in the development of the PEOU construct is evaluated.

Chapter 3 commences with a review of legal technology with a focus on legal research technology which is the basis of this research. Intuition literature related to psychology, design, and economics is reviewed. The importance of intuition as related to technology and information systems is detailed. The chapter ends with a summary of factors that would comprise a perceived intuitiveness construct.

Chapter 4 is the methodology review. It provides an overview of research philosophy and the aspects of reliability, validity and generalizability. A Positivist approach is decided upon: quantitative methods used in business and management research are discussed. PLS-SEM is discussed and selected as the statistical method to be used in this research.

Chapter 5 is the scale development chapter. It details the specific hypotheses for the research. It also covers the original qualitative pilot study, the creation of measurement items for the PI construct and the pretests related to the development of these items. The research model and the remaining measurement items for PU, PEOU, and COM are provided. The process and results of the quantitative pilot study and the consequent scale refinement for PI are detailed. The chapter ends by listing the final fifteen measurement items for PI to be used in the research.

Chapter 6 presents the results. The chapter begins with the solicitation of responses and the data collected. The process by which the PLS-SEM results were evaluated is detailed. This includes results specific to the measurement model (Reliability; Fornell-Larcker criteria; Average Value

Extracted (AVE) and the structural model (R^2; total effects; bootstrap results; USE confidence intervals). Complementary analysis is also provided for Finite Mixture Segmentation; multigroup analysis; moderator analysis; common method bias (CMB); and non-response bias. The chapter ends with a comparison of the newly designated TAUE model with the TAM model in regards to the research results.

Chapter 7 presents the evaluation of the hypotheses, the discussion and relation of additional literature to the findings, and the contribution to theory, methodology and practice. It also includes the limitations of the research, future areas of research, management implications, and conclusion.

1.6 Importance of Research to Practice

The practical application of this research is addressed by Blackler and Popovic (2015) in their editorial *Towards Intuitive Interaction Theory* in the special issue of *Interacting with Computers.* Blackler and Popovic (2015) articulate why it is important that academics research intuitive interaction.

> A question commonly asked by researchers in related fields is why study intuitive interaction? Designers and marketers and users talk about it every day. If researchers are using different terms from the rest of the world, how can we hope to have any impact and to improve the design of everyday interfaces? Also, intuitive interaction adds a further dimension than simple knowledge transfer or prior experience - that of non-conscious or implicit knowledge (p. 1).

As already identified by Spool (2005) and commented upon by Blackler and Popovic (2015) "intuitive" technology is a requirement that has emerged from the user community. The salience of the focus in the market on the intuitive nature of technology can be found in the Apple design guidelines. Mike Stern, User Experience Evangelist at Apple, states "The very best user interfaces are so intuitive…so natural…that they just sort of disappear and allow us to focus on what truly matters" (2015, https://www.youtube.com/watch?v=HAITh41jNX8).

Further commentary on Apple design guidelines will be provided in the chapter 7 discussion. Technology designed to be perceived by the user as intuitive has a direct connection to Schön (1983): technology is an artifact but it is also "intuitive artistry" (p.239)

which is designed to match the true nature of professional practice. Schön (1983) also notes the similar importance of intuition in business:

> And managers have become acutely aware that they are often confronted with unique situations to which they must respond under conditions of stress and limited time which leave no room for extended calculation and analysis. Here they tend to speak not of technique but of 'intuition' (p. 239).

The nature of professional work points to a design objective of technology used by professionals: it should be designed so that it is perceived as intuitive by the user.

Richard Susskind (2010) has written on the effects of technology on legal practice for 30 years. His central theme early on was radical change:

> …many of the fundamental assumptions about the nature of legal process would be challenged by the coming of information technology and the internet. In other words, much that we had always taken for granted in the past, about the way that lawyers work and the way non-lawyers received legal guidance, would change through technology (p. 13).

Susskind and Susskind's (2015) current view is that even more radical change is on the horizon:

> Technology lies at the core of most of the changes that we are encountering in the professions. Traditionally practical expertise has been held in people's heads, textbooks, and the filing cabinets. Increasingly the expertise is being stored in digital form, in a variety of machines, systems, and tools. (p. 109).

Simon (1996) defines Bounded Rationality as "The meaning of rationality in situations where the complexity of the environment is immensely greater than the computational powers of the adaptive system" (p. 166). It can be inferred that legal technology is being used to deal with human "bounded rationality" by members of the professions. Technology in the professions is being used as an extension of the human mind; it is rational to postulate the technology used by professionals should be perceived as intuitive to facilitate this process.

Kahneman (2002) has written extensively on cognitive errors that can be introduced into decision making. The use of well-designed "intuitive" legal technology can potentially guard against such errors in the decision making process: this is further elaborated on in the Chapter 7

discussion. In summary, as briefly outlined, there are many practical advantages in legal technology designed to be "intuitive".

1.7 Conclusion

The purpose of the research is to explore a new way for technology acceptance research to move forward, potentially providing a way to overcome current limitations in this research stream. An outline has been provided in this chapter on how this research objective will be undertaken, specifying the research tasks and stages. This research adopts a Positivist research methodology which relates to the desire to provide explanation/prediction and design recommendations as an outcome; a theme commonly found in IS research (Gregor 2006).

The research creates a new Perceived Intuitiveness construct with measurement items that are based in the literature and refined based on a quantitative pilot study. This new PI construct is integrated into the TAM model resulting in the conceptually new TAUE model which offers the potential of linking technology acceptance to intuitive technology design; potentially providing a path to the resolution of the "TAM Logjam" (Straub and Burton-Jones 2007, p. 223). In addition, the design of "intuitive" legal technology offers potential advantages for professional practice. The next stage in this research is a review of the literature.

2. Technology Acceptance Literature Review

2.1 Introduction

The literature review follows the general approach of Davis in which literature was reviewed "building upon and integrating previous research in a cumulative manner" (Davis 1986, p. 3). As this research proposes a modification of the TAM model, the origins and development of TAM and related models are explored in depth. The literature review is organized into the following sections designed to support the proposed novel integrative contribution to theory.

2.1 Introduction
2.2 User Acceptance of Technology
2.3 Compatibility
2.4 Degree of Voluntary Use
2.5 The Davis (1986) PEOU Construct
2.6 Summary of Technology Acceptance Literature Review

2.2 User Acceptance of Technology

Expensive IS systems can often fail (Charette 2005; Kimberling 2010; Manwani 2008); there continues to be a strong motivation among IS practitioners, and consequently IS academics, to identify factors affecting user acceptance of technology and, therefore prevent technology failure (Garcia 2011).

Lee, Kozar and Larsen (2003) state "…the Technology Acceptance Model (TAM) is considered the most influential and commonly employed theory of describing an individual's acceptance of information systems" (p. 752). Benbasat and Barki (2007) note "some also consider it to be the only well-recognized theory in IS…" (p. 212). However, there is a need for renewal in TAM, Bagozzi (2007) comments:

> The study of technology adoption/acceptance/rejection is reaching a stage of chaos, and knowledge is becoming increasingly fragmented with little coherent integration. A good example is the recently proposed unified theory of acceptance and use of technology (UTAUT), Venkatesh *et al*. 2003) …in the end we are left with a model with 41 independent variables for predicting intentions and at least eight independent variables for predicting behavior… (p. 245).

TAM was an adaptation of the TRA to user acceptance of technology (Davis 1986). Davis adapted TRA to technology as "actual use of a system is a behavior and thus, the Theory of Reasoned Action would be a suitable model to explain and predict that behavior" (Chuttur 2009, p. 4). Davis (1989) first presented the TAM model using three factors: PU, PEOU, and Attitude; self-reported use and Behavioral Expectation were included as the dependent variables. TAM has been replicated across a number of technologies (Venkatesh *et al.* 2007).

TRA was created by Fishbein and Ajzen (1975) in order to formalize the meaning of the attitude concept in relation to other constructs in a theoretical network: the concept of attitude was prevalent in social psychology but "was in relative disarray before their work" (Sheppard, Hartwick and Warshaw 1988, p. 340). TRA is centered on "attitudes towards performing particular behaviors" (Ajzen 2012, p. 444) as opposed to "general attitudes…of the kind studied in most prior research" (p. 444). Sheppard *et al.* (1988) analyzed 87 studies and found strong evidence for TRA's predictive ability. A central postulate of TRA is that Behavioral Intention (BI),

> …will predict the performance of *any voluntary act, unless intent changes prior to performance or unless the intention measure does not correspond to the behavioral criterion in terms of action, target, context, time-frame and/or specificity* (p. 325, emphasis in the original).

Studies using TRA should use measures that clearly ensure the restrictions in regards to "*terms of action, target, context, time-frame and/or specificity*" (p. 325, emphasis in the original) are met; a point stressed by Moore and Benbasat (1991) who also noted that technology adoption research should focus on "behaviour" (p. 199).

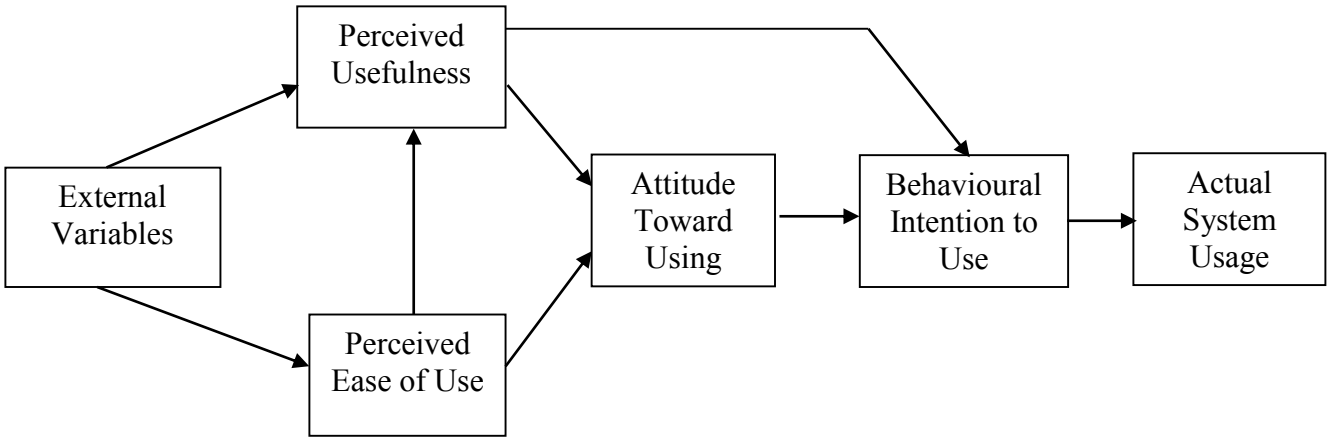
It is notable that the TRA model shows "Intention to perform behavior *X*" leading to "Behavior *X*". "Behavior *X*" is also shown feeding back to "Intention to perform behavior *X*" (Fishbein and Ajzen 1975, p. 16). Interestingly, this feedback mechanism was not incorporated into the development of TAM but offers insight into the effects of experience found in the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh, Morris, Davis, and Davis 2003).

TRA postulates expected outcomes of behaviour influence the resultant attitude, however, "according to the TRA's expectancy-value model, only beliefs that are *readily accessible* in memory determine the prevailing attitude" (Ajzen 2012, p. 442, emphasis in original). In this research it is postulated that the perceived intuitiveness of the technology product is a salient contemporary belief affecting attitude to using a computer technology product. In the preliminary qualitative pilot study for this research, one respondent commented, "From my point of view the "intuitive aspect" is the biggest factor in trying and then buying new technology".

Subsequently the Theory of Planned Behaviour (TPB) was developed by Ajzen (2012) modifying TRA to include Perceived Behavioral Control (PBC) which is "the extent to which people believe that they can perform a given behavior if they are inclined to do so" (p. 443) and closely related to the work of Bandura on self-efficacy (Ajzen 2012). As outlined in Appendix A, Davis, Bagozzi, and Warshaw (1989) compared research results in technology acceptance using TAM and TRA; Mathieson (1991) compared research results using TAM and TPB.

PU was defined by Davis (1986) as "the degree to which an individual believes that using a particular system would enhance his or her job performance" (p. 26) and PEOU as "the degree to which an individual believes that using a particular system would be free of physical and mental effort" (p. 26). Figure 2-1 shows the modified TAM model of Davis *et al.* (1989).

Figure 2-1 TAM Model Adapted from Davis, Bagozzi, and Warshaw (1989)



Attitude was subsequently dropped from the TAM model. Taylor and Todd (1995b) comment:

> Interestingly, attitude does not have an indirect effect on behavior…This would appear to support the contention of Davis *et al.* (1989) that attitude may not be an important determinant of intention and usage in workplace settings when other factors such as usefulness are independently taken into account. The explanation of such a finding is based on the fact that in workplace settings, performance is key (p. 165-166).

Notably, removal of the Attitude construct also removes any direct influence of system characteristics on Attitude (Chuttur 2009; Davis 1993). Davis (1993) found a small but significant effect of system characteristics on Attitude.

Four stages of subsequent research on TAM are identified by Chuttur (2009):

1) replicating TAM and testing its propositions and possible limitations;
2) comparing TAM with other models such as the TRA and the TPB;
3) adapting TAM for various settings such as mandatory scenarios, different applications, and cultures; and
4) extending the model to include other variables such as subjective norm (SN), extrinsic motivations, playfulness, and so on (p. 10-11).

In the first period of TAM research the focus was on replication and limitations of TAM - see Appendix A; studies followed comparing TAM to TRA and TPB: these also appear in Appendix A.

Chuttur (2009) citing several meta studies of TAM (King and He 2006; Lee *et al* 2003; Legris, Ingham and Collerette 2003; Ma and Liu 2004; Sharp 2007; Yousafzai, Foxall, Pallister 2007) consolidates information concerning the diversity of TAM research that has been performed; these are shown in Table 2-1. This table demonstrates the contribution that results from researching legal technology which has not previously been researched.

Table 2-1 Adoption of TAM (Applications, Country, Type of Study, Participants)	
	Summary
Applications	16 different types of applications are identified including: email, voicemail, e-commerce application, expert support system, and telemedicine technology.
Country	15 countries are identified including USA, UK, Hong Kong, France, and China.
Type of Study	3 types of study were identified: lab, field, and web surveys.
Participants	11 types of participants were identified including students, physicians, internet users, brokers, and sales assistants.

Source**:** Adapted from Chuttur M.Y. (2009, p. 13-15) Overview of the Technology Acceptance Model: Origins, Developments and Future Directions; Chuttur cites King and He (2006); Lee *et al.* (2003); Legris *et al.* (2003); Ma and Liu (2004); Sharp (2007); Yousafzai *et al.* (2007).

It is notable that none of the meta-studies cited above utilized legal professionals as participants or investigated technology used by the legal profession to do legal work. The application of TAM research to the technology used by the legal profession to do legal work is part of the contribution to knowledge of this research. Details of research extending TAM are provided in Appendix A. Chuttur (2009) also delineates the limitations of TAM, which are outlined in Table 2-2.

Table 2-2 Limitations of TAM	
Limitation	Description
Methodology	1. Uses self-reported use rather than real use. 2. Uses students in controlled environments. 3. Few studies in mandatory technology adoption situations.
Variables and Relationship	1. Attitude represented using Affective and Cognitive variables may be significant to technology acceptance. 2. PEOU may be more significant in the situations where there is mandatory adoption of technology. 3. There may be other factors influencing technology adoption that are not mediated by PU and PEOU.
Theoretical Foundations	1. BI may not be the sole factor influencing use. 2. There may be other salient beliefs other than PU and PEOU that influence technology adoption.

Source: Chuttur M.Y. (2009). Overview of the Technology Acceptance Model: Origins, Developments and Future Directions.

Many of the limitations outlined by Chuttur (2007) in Table 2-2 have been addressed by subsequent extensions to the TAM model, notably the UTAUT of Venkatesh *et al*. (2003) and Technology Acceptance Model 3 (TAM3; Venkatesh and Bala 2008). These theories are also reviewed in this section of the literature review. Notably the limitation detailed in Table 2-2 in regards to cognitive variables and salient beliefs presented by Chuttur (2009) in relation to the theoretical foundations of TAM are addressed by this research which investigates the proposed PI construct as an additional cognitive variable and salient belief related to technology adoption. We will now review the extensions to TAM that are also presented in Appendix A. Additional articles relevant to TAM are summarized in Appendix A.

A revised version of TAM, the Technology Acceptance Model 2 (TAM2), published by Venkatesh and Davis (2000) identified the following factors that affect the PU construct of the TAM model:

1. SN - the perception by the user that people who are important to the user think the user should use the technology product.
2. Image - the degree to which the technology enhances the user's image.
3. Job Relevance/Output Quality - the degree to which the technology is relevant to the user's job requirements.
4. Result Demonstrability - the degree to which the technology is associated with job performance.
5. Voluntariness is included as a moderating variable.
6. Experience is included as a moderating variable.

TAM2 explained 40% - 60% of the variance of the PU of the new system (Venkatesh and Davis 2000).

In an additional longitudinal study over a three-month period, Venkatesh (2000) identified the following antecedents of PEOU:

Anchors:

1. Computer Self-Efficacy
2. Perceptions of External Control
3. Computer Anxiety
4. Computer Playfulness

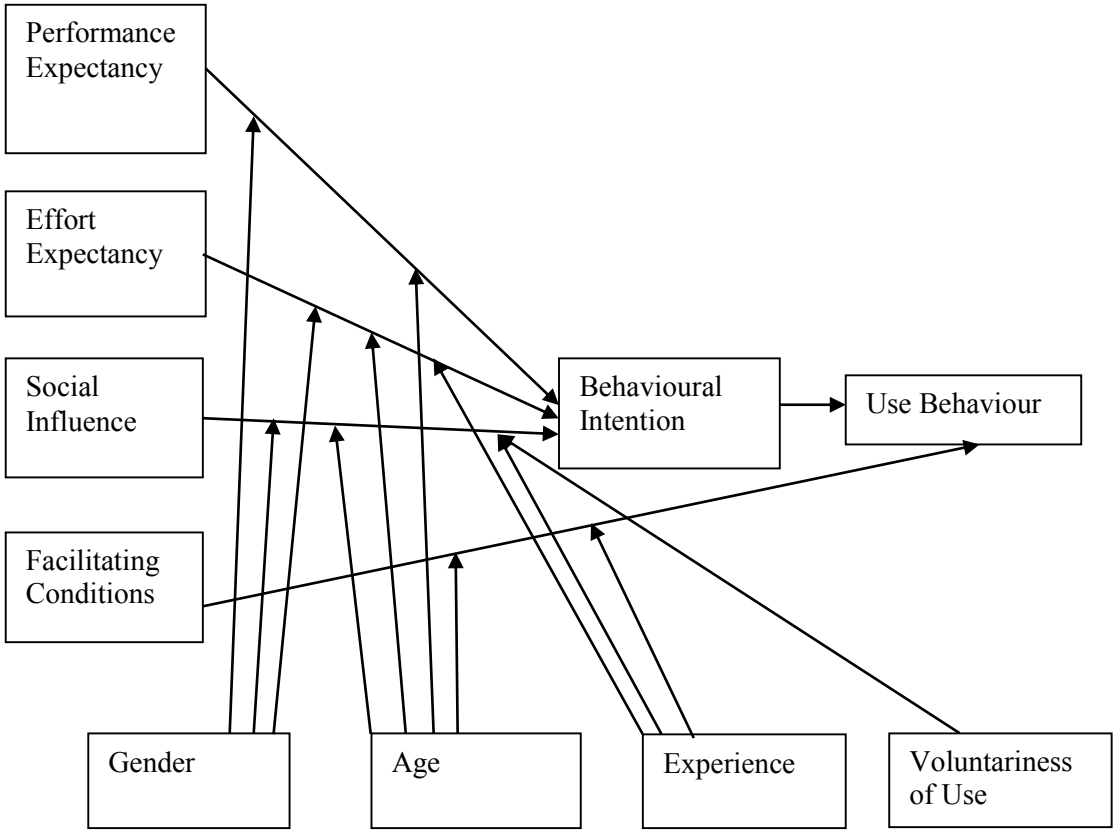
Adjustments:

1. Perceived Enjoyment
2. Objective Usability

The above factors explained in the range of 60% of the variance in PEOU (Venkatesh 2000). These two studies systematically extend TAM by delineating antecedent factors to both PU and PEOU but also add to the complexity of TAM which is a concern (Bagozzi 2007).

Subsequently, Venkatesh *et al*. (2003) published the UTAUT model, based on eight previous user acceptance theories (see Appendix A). It has been shown to account for 70% of the variance in intention to use technology. UTAUT postulates three primary determinants of intention to use technology: Performance Expectancy, Effort Expectancy, and Social Influence. Gender and Age were also confirmed as modifying factors (Venkatesh *et al.* 2003).

Figure 2-2 UTAUT Model (Venkatesh *et al*. 2003)



In the UTAUT model, Performance Expectancy corresponds to PU and Effort Expectancy to PEOU of the TAM models. "Perceived usefulness relates to user evaluations of functionality and perceived ease of use relates to user assessment of the interface" (Davis and Venkatesh 2004,

p. 34). As will be discussed further in chapter 3 entitled *Legal Technology and Intuition Literature Review* there is a strong link between the "intuitive" and the interface (Bullinger, Ziegler, and Bauer 2002).

Venkatesh and Bala (2008) presented a third version of the TAM: TAM3. The antecedent factors of PU and PEOU of TAM3 are displayed in Table 2-3 and the TAM3 model is displayed in Figure 2-3. It is striking that while PU and PEOU may have wide applicability, the specific antecedent factors described are not as generalizable. Notably, many legal firm positions would require good computer skills as a condition for employment; as such the factors identified of computer self-efficacy and computer anxiety may be of reduced relevance to legal technology.

Moreover, the factors that affect PU and PEOU will likely change to reflect the demographic and social changes that inevitably occur within the workplace. This is likely most evident in the effect of gender on the acceptance of technology. Venkatesh *et al.* (2003) found gender a significant factor in user acceptance of technology while similar research by Morris, Venkatesh, and Ackerman (2005) found the effect of gender rapidly declining; illustrating the strong contextual aspect of user acceptance research.

In TAM3, Venkatesh and Bala (2008) organize the theoretical framework of preceding factors of PU and PEOU into four categories:

1. Individual Differences
2. System Characteristics
3. Social Influence
4. Facilitating Conditions

While these categories are, at face value, quite robust, the relative effect of factors that can be allocated to each of these categories will likely vary based on the nature of the technology and the industry to which it relates. This analysis is supported in the work of Chau and Hu (2002a) on the relation of context in regards to technology acceptance.

Figure 2-3 TAM3 Model (Venkatesh and Bala 2008)

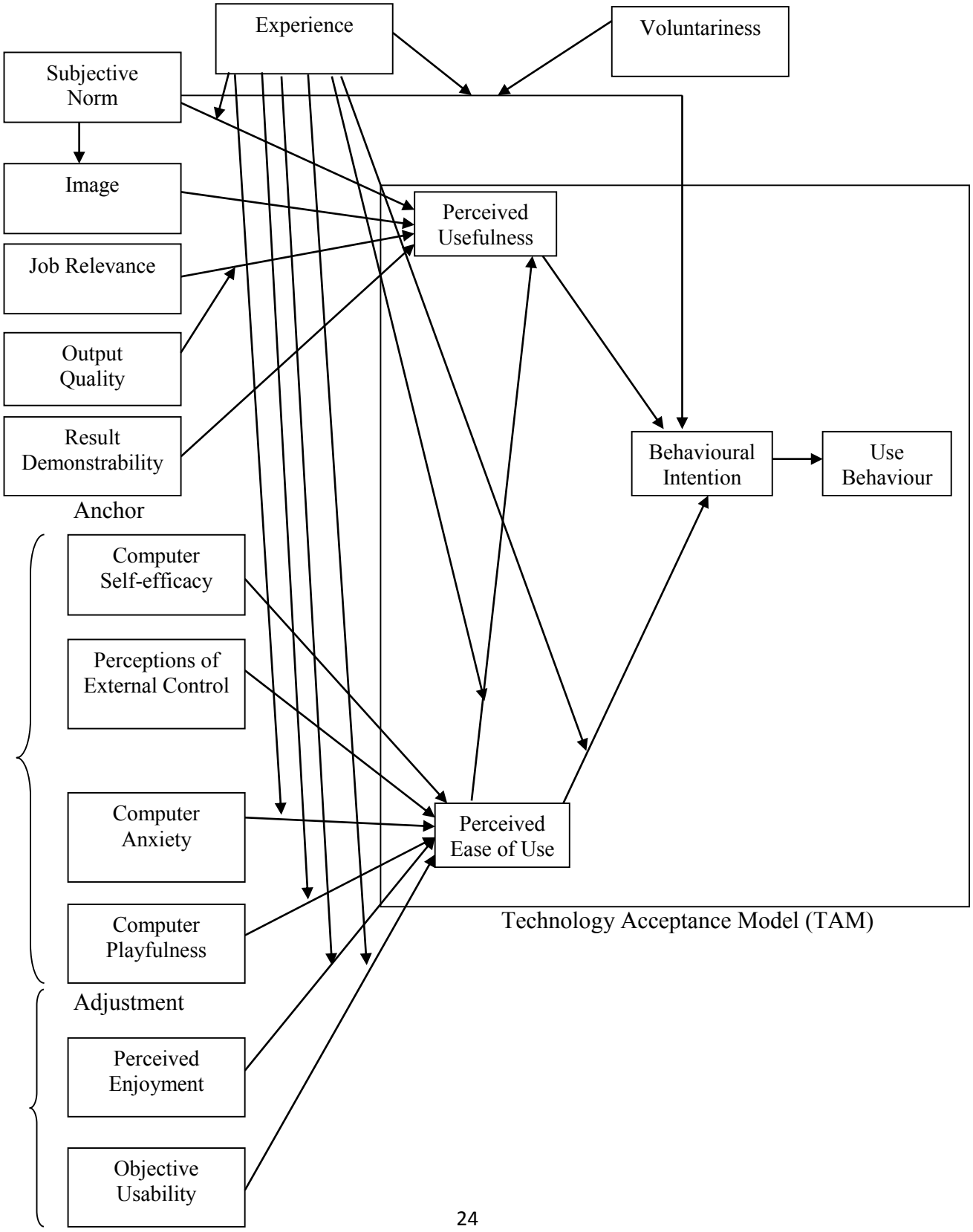


Table 2-3 TAM3 Antecedent Factors to PU and PEOU	
Determinants of Perceived Usefulness	Determinants of Perceived Ease of Use
Perceived Ease of Use	Computer Self-Efficacy
Subjective Norm	Perception of External Control
Image	Computer Anxiety
Job Relevance	Computer Playfulness
Output Quality	Perceived Enjoyment
Result Demonstrability	Objective Usability

Source: Venkatesh and Bala (2008)

As illustrated in Figure 2-3 and Table 2-3, one significant criticism of TAM3 is its complexity which broadly reflects the previously cited comments of Bagozzi (2007): "The study of technology adoption/acceptance/rejection is reaching a stage of chaos, and knowledge is becoming increasingly fragmented with little coherent integration" (p. 245).

This research addresses the call of Venkatesh and Bala (2008) which asks "What specific design characteristics will influence the determinants of perceived usefulness and perceived ease of use?" (p. 295). This research question will be investigated through the development and evaluation of the PI construct.

Beyond UTAUT and TAM3 there have been other efforts at theoretical extensions of TAM. Chau and Hu (2002a) investigated physicians' acceptance of telemedicine technology. The Technology Acceptance by Individual Professionals (TAIP) model, showed a number of the proposed relationships as non-significant. Most notably the effect of Peer Influence was found to be non-significant in this research. COM was also found to have no direct effect on PEOU (Chau and Hu 2002a). Chau and Hu (2002a) applied the TAIP model to a professional group – physicians – which likely have, at face value, similar characteristics to the professional group in the proposed research – members of the legal profession. The Chau and Hu (2002a) model has, in addition, the advantage of using a relatively small number of items to measure the component

constructs. The issue of questionnaire length is a concern in IS research (Venkatesh, Sykes, Morris, and Ackerman 2004).

An integration of the TAM model with the separate stream of research on user satisfaction with information technology was proposed by Wixon and Todd (2005). The article notes that "studies should systematically investigate various technologies that differ on important dimensions" (p.100) – research into the user acceptance of technology in law firms, performed in this dissertation, would be in line with this call.

Brown, Dennis and Venkatesh (2010) combined a model of collaboration technology and the UTAUT model to develop a model that explains adoption of collaboration technology. In doing so they elaborated the antecedents of PU and PEOU specific to collaboration technology and provided empirical evidence that PU and PEOU mediated these antecedents. In a similar manner the proposed research seeks evidence of the contextual nature of antecedent factors particular to user acceptance of legal technology, notably the perceived intuitiveness of the legal technology product.

Recently, Venkatesh, Thong, and Xu (2012) extended the UTAUT theory to consumer markets with the creation of UTAUT2 which modified the existing UTAUT theory to include hedonic motivation, price value and habit. The revised model explained 74% of the variance in behavioral intention and 52% of use.

The above research supports the conjecture, that because law firms have a culture based on billable hours (Fortney 2000), law firm culture may be a modifying factor in user acceptance of law office technology; consequently, results of research into the salient factors that influence adoption of law office technology may be different than other contexts. The acceptance of technology in law offices may be similar to the TAIP model utilized by Chau and Hu (2002a) to study telemedicine technology among physicians.

Chau and Hu (2002a) note a factor, inherent to medical practice, that would affect technology acceptance as "the extent to which attitude or peer influences affect physicians' technology acceptance decisions may differ from that common to their end user or business manager counterparts, in part because of specialized training, autonomous practices, and

professional work arrangements" (p. 192). Legal technology is likely used in a law office by lawyers, paralegal staff and law clerks whereas in the Chau and Hu (2002a) the use of telemedicine technology was likely by physicians only. Chau and Hu (2002b) evaluated alternative models and found TAM to best represent acceptance of telemedicine technology by Hong Kong physicians: in this research we use TAM with the addition of the PI and COM constructs.

A special issue of the *Journal of the Association for Information Systems* (2007, Volume 8 Number 4) was devoted entirely to an assessment of TAM and related models and on the way ahead for Technology Acceptance research. The special issue of *Journal of the Association for Information Systems* (JAIS) provided a forum for some of the most prominent IS academics researching technology acceptance to evaluate the research to date, to express their concerns, and outline the path ahead for IS technology acceptance research. Table 2-4 provides a brief précis of articles appearing in the issue and illustrates the need to reconceptualise technology acceptance.

The most focussed critique of TAM appearing in the JAIS special issue is to be found in *Quo Vadis TAM?* by Benbasat and Barki (2007). Benbasat and Barki (2007) see TAM as having resulted in the following:

> 1) the diversion of researchers' attention away from important phenomena. First, TAM-based research has paid scant attention to the antecedents of its belief constructs: most importantly, IT artifact design and evaluation. Second, TAM-based research has provided a very limited investigation of the full range of the important consequences of IT adoption, 2) TAM-based research has led to the creation of an illusion of progress in knowledge accumulation, 3) The inability of TAM as a theory to provide a systematic means of expanding and adapting its core model has limited its usefulness in the constantly evolving IT adoption context, 4) The efforts to "patch-up" TAM in evolving IT contexts have not been based on solid and commonly accepted foundations, resulting in a state of theoretical confusion and chaos (p. 212).

Table 2-4 Articles in Technology Acceptance Special Issue of *Journal of the Association for Information Systems* (2007, Volume 8 Number 4)	
Article	Summary
Introduction to the Special Issue on "Quo Vadis TAM – Issues and Reflections on Technology Acceptance Research" Rudy Hirschheim	The introduction provides brief summaries of the seven papers constituting the special issue on technology acceptance.
Implementation, Innovation, and Related Themes Over The Years In Information Systems Research Henry C. Lucas Jr., E. Burton Swanson, and Robert Zmud	This paper looks to the concern with implementation that emerged early on in academic IS research, pre-dating TAM.
Quo Vadis TAM? Izak Benbasat and Henri Barki	It is recommended that IT adoption/acceptance research be re-directed to (1) rethinking TRA/TPB as applied to technology acceptance/adoption; (2) extending conceptualization of system use; (3) additional longitudinal studies of IT adoption/acceptance; (4) identification of antecedents to constructs in IT adoption/acceptance models.
Comment on Benbasat and Barki's "Quo Vadis TAM" article Dale L. Goodhue	This article emphasizes two points: firstly, there is a need to look beyond just "use" and a need to evaluate the fit of a technology which ultimately influences performance; secondly there is a need to evaluate the task to which the technology should be put in order to better understand the usefulness of an IT artifact.
Veni, Vidi, Vici: Breaking the TAM Logjam Detmar Straub and Andrew Burton-Jones	They express broad concern that the relationships established by TAM may be a result of Common Method Variance (CMV) caused by the heavy reliance on self-reported usage in TAM research. To ensure parsimony, they recommend a meta-analysis of TAM to reduce the number of variables in TAM to only the most important.

T**able 2-4** Articles in Technology Acceptance Special Issue of *Journal of the Association for Information Systems* (2007, Volume 8 Number 4) (Continued)	
Article	Summary
Looking Forward: Toward an Understanding of the Nature and Definition of IT Acceptance. Andrew Schwarz and Wynn Chin	An etymological approach is used to develop alternative psychological concepts of acceptance centering on five identified dimensions of acceptance.
The Legacy of the Technology Acceptance Model and a Proposal for a Paradigm Shift. Richard P. Bagozzi	Bagozzi calls for a paradigm shift to a new model of technology acceptance derived from marketing theory to overcome the problems with TAM.
Post-positivist Review of Technology Acceptance Model. Leiser Silva	This article reviews TAM in relation to the work of Popper, Kuhn, and Lakatos.
Dead Or Alive? The Development, Trajectory And Future Of Technology Adoption Research V. Venkatesh, F. Davis, and M. G. Morris	A general recommendation is made for the extension of TAM research along similar lines as the extension of research that has occurred in job satisfaction research.

Source: *Journal of the Association for Information Systems* (2007, Volume 8 Number 4) Articles as indicated.

A significant concern of Benbasat and Barki (2007) is that "The extensive TAM research has reinforced our knowledge of the underlying TAM relationships without substantially extending that knowledge to a broader or more specific set of relationships, especially those about design." (p. 213). The PI construct investigated in this research offers the potential to link the design of "intuitive" technology both to TAM and technology acceptance.

Of particular interest is the comment of (Bagozzi 2007) on the need to reconceptualise the variables of the TAM model:

> Almost no research has <u>deepened</u> TAM in the sense of explaining PU and PEU, reconceptualising existing variables in the model, or introducing new variables explaining how the existing variables produce the effects they do. (p. 244 emphasis in original).

This research seeks to investigate a new construct that may provide a novel approach to technology acceptance that has yet to be explored: the PI of an IS technology product. PI is

investigated in the research and meets this call with a theoretical link of technology acceptance to the psychological process of "intuition".

In Bagozzi (2007) and Schwarz and Chin (2007) new approaches are presented to develop alternative bases for technology acceptance theory development. In Bagozzi (2007), a proposed alternative is the goal striving process derived from marketing research. In Schwarz and Chin (2007) the alternative is derived from five etymological dimensions identified for the word acceptance: Receive, Grasp, Assess, Be Given, and Submit.

The above alternative approaches would undoubtedly result in completely new streams of research, leading to an enhanced improvement in the understanding of technology acceptance. There are, however, aspects of this potential research that may potentially limit the ultimate benefit to IS practitioners: this is the lack of focus on prediction and explanation, leading to design and action.

The concerns with TAM are clearly identified and articulated in the special issue of *Journal of the Association for Information Systems.* There are, however, distinct advantages to TAM and the models derived from TAM: the most significant focus is on prediction of technology use, which has high value to IS practitioners. This prediction capability was the clear objective in the development of TAM (Davis 1986). In addition, the original TAM model was parsimonious – the research directions proposed by Bagozzi (2007) and Schwarz and Chin (2007) do not, at face value, share this focus on the parsimonious.

It is worthwhile to consider the role of theory in IS academic research both to evaluate TAM and the alternative approaches to technology acceptance research. Gregor (2006) developed a taxonomy for theory in IS research. Using a goal based approach to classifying theory Gregor (2006) identifies five types of theory found in IS academic research – these are outlined in Table 2-5.

Table 2-5 Theory Types in IS Academic Research	
Type	Characteristics
I. Analysis	Focus is on description and analysis (p. 620). Does not identify causal relationships or make predictions.
II. Explanation	Focus on "what is, how, when and where" (p. 620). Provides explanations, but no predictions or basis for testing of theory.
III. Prediction	Focus on "what is and what will be" (p. 620). Provides predictions and can be tested; no strong causal ability.
IV. Explanation and Prediction	Focus on "what is, how, why, when, where, and what will be" (p. 620). Provides predictions and can be tested, also has causal ability.
V. Design and Action	Focus on "how to do something" (p. 620). Provides methods, techniques for design.

Source: Adapted from Gregor, S. (2006) *The Nature of Theory in Information Systems*.

Using the above taxonomy Gregor (2006) classified articles appearing in *Management Information Systems Quarterly* (MISQ) and *Information Systems Research* (ISR) in the period March 2003 to June 2004. Of the 50 articles classified, 33 were classified as Type IV - Explanation and Prediction - and nine were classified as Type V - Design and Action. This indicates a strong emphasis in IS academic research to explanation, prediction and design. Hevner, March, and Park (2004) see IS as partially a "design science" (p. 76). Given the overall concern for relevance in IS academic research (Benbasat & Zmud 1999; Davenport and Markus 1999), this is not unexpected.

Notably one of the articles reviewed for above mentioned classification of articles was the Venkatesh *et al*. (2003) UTAUT article, which accounted for 70% of the variance in intention to use technology and is classified Type IV - Explanation and Prediction. Gregor (2006) also identifies TAM (Davis *et al.* 1989) as an example of Type IV.

This focus on explanation, prediction and design could be used to evaluate the proposed research directions proposed by Bagozzi (2007) and Schwarz and Chin (2007) which appear less directed to these theoretical goals than TAM. It is notable that the concern of Silva (2007) in regards to TAM potentially becoming normal science are also similar to comments found in Benbasat and Barki (2007):

> In many ways, the present situation reminds us of Kuhn's (1970) structure of scientific revolutions. While TAM initially helped tie together the inconsistent and scattered knowledge that existed regarding IT adoption and use, it also turned into a dominant paradigm that has led to the creation of lots of consistent knowledge about a narrow slice of the IT domain (p. 214).

Goodhue (2007) asks, "Who will be the first to borrow a distant theory and craft it to a new domain, or to use compelling logic to develop a prototype theory that will be the basis of other researchers' refinements?" (p. 221). It is hoped that the research presented in this dissertation partially address this call through the development of the PI construct and integrating it into TAM.

Straub and Burton-Jones (2007) raise the issue of CMV in TAM, expressing the concern that the variance explained by TAM studies may be significantly inflated because of the same instrument measures both the independent and dependent variables. They express further concern over the ability of the marker variable technique to measure CMV. In addition, they are concerned over the large number of variables found in models derived from TAM, most notably the UTAUT model, and call for more parsimony in TAM research suggesting that this could likely be achieved through a meta-analysis of TAM. Notably the concern with parsimony is further justified in regards to the TAM3 model of Venkatesh and Bala (2008) which exceeds the UTAUT model in complexity and number of constructs. In this research we return to the base parsimonious TAM model and seek to modify it with the PI construct. We also measure "USE" using a slide bar scale (1-100) to reduce the potential for CMV.

As noted by Lucas *et al.* (2007), the focus of implementation research has dramatically changed since implementation research began in the 70s; the original focus was implementation failure but the path ahead needs to focus on:

> the *deep use* of systems, which must surely come from *individual and collective learning* and the *institutional restructuring* that takes place long after systems are first adopted and receive initial acceptance (p. 209, emphasis in the original).

From the comments of Lucas *et al.* (2007) on the focus of implementation research we can infer that the nature of TAM research will also need to change; implementation research in IT began nearly 40 years go (Lucas 1975), however TAM is approaching 30 years of existence (Davis 1986).

Venkatesh *et al.* (2007) see the extension of TAM research as the solution to issues which permeate TAM research and compare the evolution of user acceptance theory to the development of job satisfaction theory - which has advanced far beyond the current level of development of user acceptance theory. A feature found in job satisfaction theory is the development of interventions that would influence job satisfaction.

Venkatesh *et al.* (2007) also review the literature to date and describe how the current user acceptance theory has been applied to various types of information systems - notably absent is law office technology, which is the basis of the research in this dissertation. While development of the user acceptance of technology theory has progressed substantially, the article identifies a need for more practical guidance on how managers could facilitate actual adoption of technology through interventions. The article concludes with a call for future research in user acceptance theory to "leverage current knowledge" (p. 279) and focus on "today's relevant business problems" (p. 279). The development of the PI construct in this research addresses the call to focus on current technology issues (Blacker and Popovic 2015) and could potentially lead to practical interventions to promote user acceptance of technology in the workplace.

It is notable that Venkatesh has continued to expand the range of technology that the UTAUT theory has been applied. This expansion includes collaboration technology (Brown *et al.* 2010) and consumer acceptance and use of IT (Venkatesh *et al.* 2012) in line with the call outlined in Venkatesh *et al.* (2007). In addition, Venkatesh and Goyal (2010) have extended the

technology acceptance theory to include expectation-disconfirmation theory using a polynomial model in line with polynomial models in job satisfaction (Venkatesh *et al.* 2007).

In summary, in the last twenty-five years user acceptance of technology theory based on the work of Davis (1986) has dramatically increased in exploratory power, yet there is concern that the theoretical developments that have occurred have not provided substantial interventions that could be used to promote user acceptance of technology and lead to practical interventions to promote user acceptance of technology in the workplace. The PI construct to be investigated by this research offers potential as a predictor of technology acceptance. A practical intervention would be an instrument to measure the PI of an IS product. In addition, there is potential to link technology acceptance to the design of intuitive technology.

2.3 Compatibility

Compatibility was one the most significant factors in Diffusion of Innovation Theory (Rogers 1983). Tornatzky and Klein (1982) found Compatibility the most studied attribute ahead of Relative Advantage (adapted by Davis as Perceived Usefulness) and Complexity (adapted by Davis as Perceived Ease of Use). Moore and Benbasat (1991) and Agarwal and Prasad (1997) also highlight the importance of Compatibility.

Chau and Hu (2002a) added Compatibility to the TAIP model they developed to study technology acceptance by Hong Kong physicians of telemedicine technology. Compatibility was added because it was their view that physicians would find technology desirable that fit with their practice style and preference (Chau and Hu 2002a). The decision to use Compatibility in the research model was based on assumption that this would also be true for legal professionals**.** Chau and Hu (2002a) found Compatibility explained 57% of the variance in the Perceived Usefulness with Perceived Usefulness accounting for 55% of variance of Behavioral Intention to use the technology (p. 210-211).

Moore and Benbasat (1991) provide the following definition of Compatibility: "the degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters" (p. 195). Chau and Hu (2002a) used the following definition of Compatibility in their research: "the degree to which the use of telemedicine technology is

perceived by the physician to be consistent with their practice style or preferences" (p. 200). In this research we define Compatibility as:

> The degree to which the use of technology used to do legal work is perceived by the legal professional to be consistent with their practice style or preferences.

This definition of Compatibility omits an additional component of Compatibility, "consistency with the values and norms of the potential adopters" (Chau and Hu 2002a, p. 222), which is derived from the Rogers' definition of Compatibility (Ramiller 1994). The decision has been made in this research to follow the definition used by Chau and Hu (2002a) because of the likely similarities between technology adoption in both the medical and legal professions.

Chau and Hu (2002a) measured Compatibility using three items:

1. …fits in with the way I work.
2. …does not fit in with my practice preferences.
3. …fits my service needs (p. 227).

In the TAIP model, which was used to research the acceptance of telemedicine technology, Compatibility is the sole significant antecedent to PU with a p-value < .0001. (Chau and Hu 2002a, p. 210). Compatibility was not found to have a significant determinant of PEOU.

In the doctoral research of Shaw (2011) "fit", which is the active verb in all the measurement items of the Compatibility construct, was used by a research respondent to describe the mechanism by which Electronic Medical Records was found to be "intuitive". Notably, the concept of "fit" will also prove important in relation to legal technology. As Chau and Hu (2002a) comment "…the link from compatibility to perceived usefulness is the most significant among the causal paths investigated (p. 213). Further they comment "compatibility may represent a necessary but insufficient condition for technology acceptance by individual professionals" (p. 213).

Notably PEOU has also shown to be related to the fit of the technology to the task (Mathieson and Keil 1998); this would indicate potential for correlation between the proposed PI construct and the COM and PEOU constructs. The correlation between COM, PEOU, and PI will be important in the analysis of the results of this research. In regards to the other

prominent models, only TAM3 (Venkatesh and Bala 2008) and Venkatesh (2000) specifically address antecedents of PEOU. The only design antecedent is Objective Usability defined as the "actual level (rather than the perceptions) of effort required" (Venkatesh and Bala 2008 p. 279) and measured "as the ratio of time spent by the subject to the time spent by the expert on the same set of tasks" (Venkatesh and Bala 2008 p. 314).

Goodhue and Thompson (1995) have been active researchers in the relation of task-technology fit to user acceptance of technology and performance improvements resulting from technology; Goodhue (2007) comments:

> …task-technology fit is a critical construct both before the decision about technology use and after the decision about technology use, i.e., as an antecedent to TAM and as a key construct between TAM and performance impacts (p. 221)

Goodhue (2007) emphasizes "fit" as of high importance to usefulness (p. 221). As mentioned "fit" is the active verb in the measurement items for Compatibility used in this research. Goodhue (2007) also links task-technology fit to design.

> Perhaps the proper larger question for the IS academic field now is how to design (and redesign) tasks at the same time as designing (and redesigning) information systems, or how to design the entire work system (Alter 2006), including task, technology, participants, work practices, etc. to meet the changing needs of the Organization" (p. 221).

The importance of design has already been discussed in relation to IS theory and will be important in the discussion of the results of this research.

In summary, Compatibility has been identified by researchers in both diffusion of innovation research and technology acceptance research as of high importance. Moore and Benbasat (1991) and Chau and Hu (2002a) included Compatibility in the research. Chau and Hu (2002a) found Compatibility to have a large significant effect in the TAIP model which investigated acceptance of telemedicine technology by physicians. There is a strong indication from the research of Shaw (2011) that Compatibility is related to the "intuitive" nature of telemedicine technology. Consequently, Compatibility will be included as one of the constructs in the research model designed to investigate acceptance of technology used by legal professionals to do legal work.

2.4 Degree of Voluntary Use

Research concerning voluntary use was not immediately forthcoming after the introduction of TAM; rather it has emerged gradually as an extension of the theory. The first exploration of voluntariness did not come from the TAM research stream directly but from the research of Moore and Benbasat (1991) which was focussed on technology acceptance from a diffusion of innovations perspective. Moore and Benbasat (1991) state: "… we felt that the issue of compulsory versus voluntary adoption was significant, and we therefore also undertook development of a scale to directly measure this factor." (p.194). Further, Moore and Benbasat (1991) comment: "It was developed because it was initially assumed that this construct is not binary, or in other words, that voluntariness is not an "either-or" perception. The results support this assumption" (p. 208).

Technology acceptance research using TAM and the models derived from TAM is based on TRA. Sheppard *et al.* (1988) analyzed 87 studies and found strong evidence for TRA's predictive ability. A central postulate of TRA is that performance of an act is voluntary; such that TRA:

> …will predict the performance of *any voluntary act, unless intent changes prior to performance or unless the intention measure does not correspond to the behavioral criterion in terms of action, target, context, time-frame and/or specificity* (p. 325, emphasis in the original).

Davis *et al.* (1989) researched technology acceptance using TAM and TRA using a longitudinal study of the use of a word processing program by 107 MBA students. In the MBA program, in question, the use of the word processing program was voluntary. Davis *et al.* (1989) acknowledged that in the workplace use of technology is often mandated:

> Although it is generally thought that computer use by managers and professionals is mostly voluntary (DeSanctis 1983; Robey 1979; Swanson 1987), in some cases people may use a system in order to comply with mandates from their superiors, rather than due to their own feelings and beliefs about using it (p. 986).

While the original TAM research was based on technologies which were used on a voluntary basis, non-voluntary use was gradually introduced into the technology acceptance research stream. Agarwal and Prasad (1997) researched technology acceptance from the

perspective of the perceived characteristics of a diffusion of innovations research of Moore and Benbasat (1991) and investigated use of the World Wide Web by MBA students (73 respondents). They note,

> Although not a part of the original set of innovation characteristics proposed by Rogers (1983), voluntariness was included by Moore and Benbasat as a determinant of usage behavior…Thus, this second research objective investigates if perceived voluntariness plays a significant role in acceptance behavior, that is, in the current and future use intentions. (p. 564).

Agarwal and Prasad (1997) found voluntariness significant in relation to current use but not future use intentions.

Brown, Massey, Montoya-Weiss, and Burkman (2002) were among the first to investigate the TAM model in relation to mandatory use. Based on 107 responses concerning use of a mandatory integrated banking system analyzed using Partial Least Squares (PLS), they found that PU and Attitude did not have a significant effect on BI; alternatively, PBC and SN were significant determinants of BI.

In Venkatesh *et al.* (2003) the UTAUT model shows Voluntariness of Use acting through SN. In Chau and Hu (2002a) SN (Peer Influence in their research) was found to be not significant. Chau and Hu (2002a) assumed voluntary use of telemedicine technology and did not include Voluntariness in the model. In this research, to evaluate the effect of Degree of Voluntary Use in absence of SN, Degree of Voluntary Use is hypothesized to moderate the effect the paths of all the exogenous variables on USE.

Wu and Lederer (2009) performed a meta-analysis of 71 empirical studies in technology acceptance and found that environment-based voluntary use moderates the effect of PU and PEOU on BI. They were also able to confirm their hypothesis that environment-based voluntary use did not modify the effect of PEOU on PU. There also did not find a significant moderating effect of environment-based voluntary use on the paths from PU and PEOU to USE: they identity the potential cause of this finding as the small sample size as well as other factors.

Subsequently, Kroenung and Eckhardt (2015) performed a meta-analysis of 119 articles from fourteen top IS journals over 25 years to identify significant factors that influence the

attitude-behavior relationship: one of the factors identified as having a significant effect on adoption was voluntariness.

This research uses the following definition of Voluntary Use from Moore and Benbasat (1991): "the degree to which use of the innovation is perceived as being voluntary or of free will" (p. 195).

Based on the above (Agarwal and Prasad 1997; Brown *et al.* 2002; Kroenung and Eckhardt 2015; Moore and Benbasat 1991; Wu and Lederer 2009), Degree of Voluntary Use is hypothesized in this research to have a moderating effect on the paths from the exogenous variables to the endogenous variable. In addition, consistent with the non-binary nature of voluntary use identified by Moore and Benbasat (1991), Degree of Voluntary Use will be measured in this research with a slide bar using a 1-100 scale.

2.5 The Davis (1986) PEOU Construct

Chuttur M.Y. (2009) notes that Davis (1989) found support for PEOU from the research of Swanson (1982) which related use of information reports to cost of access, from the meta-analysis of Tornatzky and Klein (1982) on the significance of complexity in innovation adoption, and from Bandura's (1982) concept of self-efficacy.

Davis (1986) created the initial measurement items for the PEOU construct from a review of existing literature of MIS and Human Factors research. In a pre-test of the measurement items, Davis (1986, p. 85-86), asked respondents to perform the following tasks for the fourteen TAM PEOU measurement items:

1. Rate the degree to which a statement corresponds in meaning to the PEOU definition with the objective of eliminating low rated items.
2. Rate the similarity of items to each other, with the objective of reducing the number of items.

Davis (1986) clustered the responses received into three categories:

1. Physical effort
2. Mental effort
3. Easy to learn

Davis dropped items that related to error recovery, unexpected behaviour, and error proneness which did not cluster into the above three categories and received low priority ratings by participants. The dropped items were:

1. I make errors frequently when using electronic mail.
2. I find it easy to recover from errors encountered when using electronic mail.
3. The electronic mail system often behaves in unexpected ways.

The dropped items would have correspondence to the item of the elements of "feedforward methods" and "lenient learning environments" which form part of the O'Brien *et al.* (2010) definition of "Intuitive Human-Computer Interaction (HCI)". An additional item was dropped – "The electronic mail system provides helpful guidance in performing tasks". This eliminated item "provides guidance" has some correspondence to the findings of the pilot study which identified "follows the manual process", "familiar", and "functions as if a lawyer designed it" as elements of the intuitive nature of technology. The concept of intuitive can be seen to be more inclusive than the existing TAM PEOU measurement items. This will be further discussed in Chapter 3 *Legal Technology and Intuition Literature Review.* Further, because of concerns about CMV, the number of PEOU measurement items was subsequently further reduced to the five items with the highest correlations (Davis 1986, p. 104). A sixth item, "Overall I find the electronic mail system easy to use" was added. The limited domain content of PEOU is additionally evident in reviewing the measurement items of PEOU utilized in the development of TAM3. The measurement items used by Venkatesh and Bala (2008) for PEOU are:

1. My interaction with the system is clear and understandable.
2. Interacting with the system does not require a lot of mental effort.
3. I find the system to be easy to use.

4. I find it easy to get the system to do what I want it to do. (p. 313)

In addition, research has shown that the effect of PEOU is insignificant as experience increases (Venkatesh *et al.* 2003 p. 433).

This significant reduction of measurement items for the TAM PEOU construct may have prevented full capture of the domain content of PEOU, which may indicate why elements related to the intuitive have not been included in the final PEOU measurement items. This may also be the partial cause for the relatively weak explanatory power of PEOU (Davis 1986, p. 108).

2.6 Summary of Technology Acceptance Literature Review

TAM, and the models derived from TAM, have dominated research into technology acceptance for almost 30 years. However, the robustness of TAM as a theory is restricted by the limited ability of TAM and related theory to provide interventions to improve technology acceptance. It addition, TAM and related models have not facilitated a link to technology design.

Additionally, in this section two closely related concepts to TAM and technology acceptance were discussed: Compatibility and Voluntariness of Use. These two constructs will be important in the design of the research model. In the final section of this chapter the development of the PEOU construct was reviewed and significant limitations of the existing construct identified.

The research model will include TAM and Compatibility. Degree of Voluntary Use is included as a moderator in this research. In the next chapter, the literature of intuition and the emergent literature on the application of intuitive interaction design of technology will be reviewed as the source of a potential novel construct, Perceived Intuitiveness, to be added to TAM, potentially linking technology acceptance to the design of technology perceived by the user as intuitive.

3. Legal Technology and Intuition Literature Review

3.1 Introduction

In this chapter a review is made of the origins and scope of legal technology with a particular focus on legal research technology. Literature concerning the nature of intuition is then reviewed followed by the literature on the relation of intuition to computer technology. A novel search of all available issues of two prominent academic information systems journals is described in regards to characteristics of intuitive technology. Brief information is also provided concerning two instruments identified for intuitive technology. Finally, the role of the "intuitive" in contemporary Information and Communication Technology (ICT) design in reviewed and "intuitive" design is related to the use of intuition in professional practice. This chapter is organized as follows:

3.1 Introduction
3.2 Legal Technology
  3.2.1 Origins and Context of Legal Technology
  3.2.2 Contemporary Legal Technology
3.3 Intuition in Psychology, Design, and Economics
3.4 Intuition and Information Systems
3.5 Characterizing Intuitive IS Technology from a Coding of IS Academic Literature
3.6 QUESI Instrument/INTUI Questionnaire
3.7 Importance of Intuition in Relation to Technology
3.8 Summary of Review of Intuition

3.2 Legal Technology

3.2.1 Origins and Context of Legal Technology

Kehl, Horty, Bacon and Mitchell (1961) undertook the first attempt that could be identified to develop computer technology for the legal profession: the statutes of Pennsylvania were recorded on punch cards and then converted to tape. A concordance was prepared such that the Pennsylvania statutes could be searched by key word in context enabling the preparation of a list detailing the location of specified keywords within the

statutes. This research work is a primitive precursor of the now prominent Westlaw (2013) system and similar systems currently widely used in the United States and Canada for legal research.

The nature of the legal profession was modified by the rapid economic and social changes that occurred throughout the 1990s; including the emergence of globalization. Arthurs and Kreklewich (1996) describe the stratification of law firms in which the leading firms in the profession became larger in North American markets and, in which, firms that emerged at the lower end of the professional strata rely heavily on "secretaries, computers and mass production techniques" (p. 46). Some large firms can be characterized as a "Law Factory" (p. 55) which includes a "single minded focus on billable hours" (p. 57). In summary, legal technology has emerged as important in the practice of law mirroring the omnipresence of technology in modern society.

3.2.2 Contemporary Legal Technology

In this research there was no expectation as to what products would be responded to by legal professionals. The majority of the responses received in this research (94 out of 154 usable responses) were in relation to products that are classified as legal research technology; the leading products of this category would be the Westlaw product and the LexisNexis (www.lexisnexis.ca) product. A review of legal technology is presented in this section with a focus on legal research technology.

Legal Research Technology

To understand the role of legal research technology it is necessary to understand what legal research is. A definition of legal research is provided by the Boris Laskin Law Library website (Undated, http://library.law.utoronto.ca/legal-reseach-tutorial/legal-research-process):

- Finding relevant cases and legislation (primary sources of law) using textbooks, journal articles, encyclopedias and other reference tools (secondary sources of law).
- Verifying that the law one has found is still valid and not overruled, repealed or otherwise questioned or criticized.
  (Undated, http://library.law.utoronto.ca/legal-reseach-tutorial/legal-research-process).

The Boris Laskin Law Library also notes the prominence of contemporary online legal research:

- Online resources are often more up-to-date than their print equivalents.
- LexisNexis/Quicklaw and Westlaw Canada have large up-to-date databases of case law, legislation, journal articles and newspapers and are particularly useful for noting up cases and legislation.
- CanLII is a free (online) source of case law and legislation.
- Online journal indexes such as the *Index to Canadian Legal Literatur*e (available on Westlaw Canada or QuickLaw) or full-text journal articles databases like Hein Online also provide useful resources.
  (Undated, http://library.law.utoronto.ca/legal-reseach-tutorial/legal-research-process)

The above excerpt mentions two specific online legal research tools, these are: LexisNexis/Quicklaw and Westlaw Canada. In this research Westlaw and LexisNexis/Quicklaw are the primary legal technology products used for the PLS-SEM model analysis. Three additional legal research products were the basis of a number of responses in this research: The CanLII product, as mentioned above, Casemaker, as well as the Fastcase product, which is a similar legal research tool in the United States which is made available by a number of local state bar associations to their membership. In this research there were 154 usable responses. Of these, 88 responses were answered based on the Westlaw, LexisNexis, and Fastcase products. In addition, there were six responses based on the Canlii, Casemaker, and WestlawNext online legal research products.

Also of note from the above excerpt from the Boris Laskin Law Library is the comment that online resources are also the most up-to-date resources. Lewis (2014) found in her research that electronic research was important to modern legal practice, "The advantages of using high quality electronic resources was raised as very important to law firms as it was seen to provide clients with a faster more efficient service" (p. 42).

Other Applications of Legal Technology to Legal Practice

Canada Lawyer Magazine, the predominant general publication for lawyers in Canada, published a survey of the top Canadian legal technology based on reader responses entitled *1st Annual Canadian Lawyer (2015) Readers' Choice Awards* (Canadian Lawyer Magazine 2015).

This survey is used to create a classification of the types of legal technology currently in use in Canada. This report would not be a comprehensive summary of various legal technology used in law firms but rather an overview of the most common legal technology used in Canada. The following are the relevant classifications appearing in the Canadian Lawyer Magazine article:

- Legal Research - Online Legal Research – Primary Law and Secondary Content & Analysis
- Calendar & Docketing Software/Solutions
- Case Management/Software Solutions
- Corporate Law Software/Solutions
- E-Discovery Software/Solutions
- Estates, Wills & Trusts Software/Solutions
- Family & Divorce Law Software/Solutions
- Immigration Law Software/Solutions
- Intellectual Property Law Software/Solutions
- Matter Management Software/Solutions
- Real Estate Law Software/Solutions
- Time & Billing Software/Solutions
  (2015, http://www.canadianlawyermag.com)

Further elaboration of the actual function of these products is provided using the DivorceMate product listed in the category Family & Divorce Law Software/Solutions. DivorceMate (www.divorcemate.com/Products) provides the following functionality which adds value to a legal practice, namely it provides:

- Support for complicated child and spousal support situations.
- The ability to efficiently create and manage court forms, including Applications, Financial Statements, Net Family Property statements.
- Facilitates the creation of customized domestic contracts, based on a selection of clauses from an extensive checklist (Undated, www.divorcemate.com/products).

Further, legal technology is also being used in the Courts. Manker (2015) researched the experiences of judges and lawyers concerning the use of technology in the State of Virginia court rooms. The research participants consisted of eleven lawyers and eleven judges. Manker (2015) found a variety of technologies were being used in court rooms including presentation software, video, and digital projectors (p. 88). In addition, there are applications specifically designed for courtroom presentations such as Sanction and Trial Manager (Manker 2015).

Despite being slow to do so, Manker (2015) notes courts are moving to the use of technology in the courtroom,

> U.S. courtrooms have long been defenders of decorum and its resistance to change has been continuously challenged by the revolution of technology. Therefore, the increasing use of technology within society has prompted courtrooms to incorporate some forms of technology (p. 64).

There are two significant factors Manker (2015) identified that will expectedly continue progress in the use of technology in the courtroom: Firstly, the generational change in members of the legal profession:

> Those who went to law school in recent years have a higher chance of using technology due to changes in training, but the older generation of lawyers may have been trained at a time when technology may not have been developed as it is today (p. 113).

Secondly, the economic benefit of technology to the legal profession as a whole:

> …the harsh economy that is a characteristic of the world today means that law firms have to try and become more responsive to their clients, as well as, being more efficient in the way they carry their operations (p. 113).

An article in Harvard Journal of Law & Technology envisions legal technology moving along the following paths (Jenkins 2008):

1. Technology that will be able to create legal arguments and predict outcomes of cases.
2. Technology that will engage in machine learning and be able to obtain information from data sets.
3. Technology that will combine with the emerging semantic internet, allowing the application of machine learning processes to legal cases and information available on the web.

It can be concluded that issues regarding legal technology will be of increasing importance to the legal profession. Intuition and intuitiveness, in relation to technology, are discussed in the next two sections of this chapter.

3.3 Intuition in Psychology, Design, and Economics

Intuition has long been recognized as an important factor in psychology. Jung (1923) defined intuition and elaborated on its characteristics:

> Intuition (from *intueri* = to look into or upon) is, according to my view, a basic psychological function (*v.* Function). It is that psychological function which transmits perceptions *in an unconscious way*…Intuition has this particular quality: it is neither sensation, nor feeling, not intellectual conclusion, although it may appear in any of these forms (p. 367-368).

Shirley and Langan-Fox (1996) reviewed the psychological literature and found limited research into intuition and note the increasing importance of intuition in the modern society "and particularly in business settings" (p. 563). They define intuition "as a feeling of knowing with certitude on the basis of inadequate information and without conscious awareness of rational thinking" (p. 564), and is used as the definition on intuition in this research. This definition adds aspects to the characterization of intuition of "certitude" and "inadequate information" not found in Jung's appreciation of intuition. As mentioned by Shirley and Langan-Fox (1996) these aspects are particularly relevant to modern business.

Similar to Jung, they see intuition as manifested in a variety of ways, including the physical, emotional, mental and spiritual aspects of human life; intuition can also be categorized using additional methods of analysis such as the study of creative intuition (Shirley and Langan-Fox 1996). Shirley and Langan-Fox (1996) also discuss the role of tacit knowledge (also referred to as implicit learning) in intuition and state "Intuitive thought is said to be "the end product of an implicit learning experience" (Reber, 1989, p. 232)" (p. 571). The above mentioned characterizations of implicit learning and tacit knowledge and their relationship to intuition can be viewed as closely related to the concept of the "familiar" that is identified in the IS literature – most emphatically by Raskin (1994) – as also closely related to the intuitive use of IS technology.

The concept of the "intuitive" has also been adopted into Design Studies among the Principles of Universal Design (Story 2011): Principle 3 of the seven principles is: "Simple and Intuitive Use…Use of the design is easy to understand, regardless of the user's experience, knowledge, language" (not paged, sections 4.5 – 4.7). The text of this principle notably characterizes the "intuitive use" as "easy to understand".

It is noteworthy that in the Principals of Universal Design, the concept of the "intuitive" is not elaborated upon. O'Brien *et al.* (2010) quote the observation of Blackler, Popovic, and Mahar (2003).

> Personal correspondence cited in Blackler, Popovic, and Mahar (2003b) with the authors at the Center for Universal Design indicates that there is no definition because "it makes so much sense that they never questioned it" (p. 492). Thus, the guidelines for universal access support the "individual differences" intuitive attribute, and the "intuitive use" requirement suggests that further research on intuitive use is needed. (p. 53).

In addition, Principle 5 of the Principals of Universal Design "Tolerance for Error… The design minimizes hazards and the adverse consequences of accidental or unintended actions." (Story 2011 not paged, sections 4.5 – 4.7) can be seen as closely related to an aspect of the "intuitive" that will be developed in this review – "lenient learning environments" (O'Brien *et al.* 2010 p. 107).

A further connection to design can be found in Norman's (2002) *The Design of Everyday Things*. Norman (2002) also focuses on several key aspects of successful design including the use of mental and conceptual models which can be conceived as being related to the "familiar" as well as social and cultural norms – items which are prominent in the emerging literature on intuition relating to IS technology. As noted, O'Brien *et al.* (2010) have proposed a definition of Intuitive Human-Computer Interaction which also reflects Norman's concern that design be tolerant of error. As Norman notes:

> Errors are an unavoidable part of everyday life. Proper design can help decrease the incidence and severity of errors by eliminating the causes of some, minimizing the possibilities of others, and helping to make errors discoverable, once they have been made…. We do not have to experience confusion or suffer from undiscovered errors. Proper design can make a difference in our quality of life (p. 216).

Kahneman (2002), in his Nobel Prize lecture on economics, also recognized the importance of intuition in human cognition:

> From its earliest days, the research that Tversky and I conducted was guided by the idea that intuitive judgments occupy a position – perhaps corresponding in evolutionary history – between the automatic operations of perception and the deliberate operations of reasoning (p. 450-451).

Insight into the nature of human cognition, the intuitive, design and computer technology can also be found in Simon's (1996) seminal work *The Sciences of the Artificial*. Simon, also a Nobel laureate in economics, defines Bounded Rationality as "The meaning of rationality in situations where the complexity of the environment is immensely greater than the computational powers of the adaptive system" (p. 166). As will be elaborated upon further in the discussion section of this dissertation, legal technology can be used by legal professionals to overcome issues related to Bounded Rationality in legal practice.

Simon (1996) also recognizes the role of intuition in human cognition: "Intuition is a genuine enough phenomenon which can be explained rather simply: most intuitive leaps are acts of recognition" (p. 89). As will be delineated further in this literature review these "acts of recognition" can be also characterized as the "familiar" which has been closely associated with the nature of intuitive technology (Bullinger *et al.* 2002; O'Brien *et al.* 2010; Raskin 1994).

In *The Sciences of the Artificial,* Simon (1996) provides a number of significant insights that relate to the exploration of the "intuitive" in the IS context. Simon sees computer technology potentially designed in the "image of man" (p. 21). By analogy we can consider the relationship of the characteristics of human psychology to computer technology – in the case of this research – the "intuitive". As Simon remarks:

> The computer is a member of an important family of artifacts called symbol systems. Another important member of the family (some of us think, anthropomorphically, it is the *most* important) is the human mind and brain (p. 21).

In this work Simon (1996) equates design to "Creating the Artificial" (p. 11) and also discusses the relation of design to the human condition:

> Everyone designs who devises courses of action aimed at changing existing situations into preferred ones. …Design, so construed, is the core of all professional training; it is the principal mark that distinguishes the professions from the sciences. Schools of engineering, as well as schools of architecture, business, education, law, and medicine, are all centrally concerned with the process of design. (p. 111).

From the above it can be postulated that the user acceptance of technology is a design problem and, as such, this research looks to the design of technology perceived as "intuitive" and which mimics the human cognitive function of intuition as a potential solution.

Research in the use of intuitive thinking among marketers is also emerging in a field which has been dominated by analytical methods (Patterson, Quinn, and Baron 2012). Among marketing academics there is an appreciation of the importance of the "intuitive" in technology design. Parasuraman and Colby (2001) see it as a component of "customer-focused" (p. 148) design and characterize "intuitive" technology as:

> The protocols for making the technology perform as desired tend to match what people would expect, and as such, there is maximum potential for learning it without seeking help…To be intuitive, controls must be easy to find and read. Careful attention is paid to location, size, hue, and feel (p. 149-150).

Despite the literature supporting the "intuitive" in technology design, there is significant criticism of the promotion of the "intuitive" in that it could lead to reliance on legacy interface design and restrict the emergence of truly novel designs (Raskin 1994).

Simon (1960) sees no restrictions on the capability of computer technology to parallel human problem solving:

> In principle, the potentialities of a computer for flexible and adaptive cognitive response to a task environment are no narrower or no wider than the potentialities of a human. By in principle I mean that the computer hardware contains these potentialities, although at present we know only imperfectly how to evoke them, and we do not yet know if they are equivalent to the human capacities in speed or memory size (p. 24).

Use of intuition is a method of human problem solving: this would, at least, allow us to speak of the "intuitive" in relation to computer technology. In this research we investigate the perceived intuitiveness of computer technology.

3.4 Intuition and Information Systems

The Canadian Oxford Dictionary provides the following example of the use of the word "intuitive": "*some computer programs are more intuitive than others*" (Barber 2004, p. 792). The importance of the intuitive was recognized early in the development of IS research particularly in the design of Decision Support Systems (Robey and Taggart 1982). Intuitive in relation to technology means more than "familiar, easy to use, or easy to understand" (O'Brien *et al.* 2010, p. 7). Blackler, Popovic, and Mahar (2010) state "intuitive interaction adds a further dimension than simple knowledge transfer or prior experience – that of non-conscious or implicit knowledge" (p. 13). Simon (1997) clearly envisaged "intuitive" computer technology:

> In medical diagnosis where there has been much study of both human intuition and expert systems, diagnosis systems like CADUCEUS and MYCIN consist of large numbers of such if-then pairs, combined with an inference machine of modest powers… Their recognition capabilities, the if-then pairs, account for their intuitive or judgement ability; their inferencing processes account for their analytical ability (p. 135).

As will be discussed later in this section, there are similarities to technology use in the medical profession as compared to the legal profession, as such, it would be reasonable to infer that the "intuitive" nature of technology would also be a desirable factor in the use of technology in the legal profession. The focus of the study of the intuitive will be in a profession – the legal profession – in hope of identifying measurement items for an intuitive technology construct that can lead to the design of intuitive technology used to do legal work.

O'Brien *et al*. (2010) provide the following definition for Intuitive Human-Computer Interaction,

> interactions between humans and high technology in lenient learning environments that allow the human to use a combination of prior experience and feedforward methods to achieve their functional and abstract goals. (p. 107).

This definition can be analysed into the following elements (O'Brien *et al.* 2010).

1. "lenient learning environments": The users should be able to use the technology product in an environment that will tolerate user error and prevent errors.

2. "prior experience": the technology is designed to make use of users' prior experiences.
3. "feedforward": the technology adapts based on the responses entered.
4. "achieve their functional and abstract goals"; the technology allows users to achieve what is required.

The elements of the Intuitive Human-Computer Interaction definition are general in nature. Elements of this definition that could be included as measurement items in the proposed PI construct for legal technology are as follows:

1. This legal technology product allows me to a make a mistake yet recover.
2. This legal technology product reflects my legal experience.
3. This legal technology product adapts to my responses.
4. This legal technology product allows me to see how I am progressing.
5. When I use this legal technology product in my practice, I can predict the results of my actions.

Additional items would be required to address the specific context of legal technology.

Prior to the work of O'Brien *et al.* (2010), the issue of intuitiveness in computer technology has been discussed primarily in reference to the design of the computer technology interface, but there has been recognition that the concept of what is intuitive is related to the specific technology in question. Bullinger *et al.* (2002) state:

> An intuitive interface … is not one that can be used without any prior knowledge or learning, but one that builds as much as possible on existing general and technology-specific user knowledge, requires minimum learning for a given task complexity or uses natural human modes of expression such as speech and gesture (p. 4).

The above supports the findings of the preliminary qualitative pilot study which identified "easy to learn" and "familiar" as conceptual elements of intuitive technology.

Shaw & Manwani (2011) found a link between the intuitiveness of a specific technology function and its adoption. Shaw (2011) also provides evidence to support the concept of intuitive in relation to the adoption of Electronic Medical Records (EMR) by physicians:

> It hasn‘t changed the way I worked.
> …it‘s very intuitive as far as the way the family physicians practice. Everything on the screen is – it just automatically fits in.
> The system works exactly the way I work. That‘s the beauty of that particular system (p. 159).

The above extract supports the finding from the pilot study that correspondence of technology to the manual process is an important factor to the intuitive use of technology. In the case of this research we are seeking to discover what constitutes perceived intuitiveness for legal technology. It is also notable that this research respondent in Shaw (2011, p. 159) highlights "fit" as related to "intuitive". This points to the importance of compatibility in technology acceptance of legal technology and to the perception of technology as "intuitive".

This concept from Shaw (2011) is re-enforced by the early work of (Robey and Taggart 1982): "Intuition support systems operate by evoking from decision makers something they already know" (p. 71). Further, graphical representations are more intuitive than tabular representations (Robey and Taggart 1982):

> Figure 5 also suggests that less structured tasks are best performed by non-analytic, intuitive problem solvers using a flexible, nonlinear, graphic system. These systems offer more potential for trying out intuitive insights and sparking creativity in the manager (p. 68).

As mentioned Simon (1996) relates intuition to recognition. The close relationship between the visual – the graphical being a component of the visual – and recognition was noted by Simon (1997):

> The primary evidence for this dichotomy is that (in right-handed people) the right hemisphere plays a special role in the recognition of visual patterns… For most right-handed subjects, when the brain is engaged in a task involving recognition of visual pattern, activity is stronger in the right than in the left hemisphere (p. 131-132).

The graphical array of stories and tasks on a Kaban or Agile programming methodology board can be interpreted as an extension of this observation (Perry 2008). It suggests an additional measurement item for the proposed perceived intuitiveness construct:

1. This legal technology allows me to see the overall picture.

While there has been a strong argument to link intuitiveness to familiarity (Raskin 1994) there are additionally strong arguments to link intuitiveness to two additional factors. Turner (2008) provides two examples to illustrate the tangible nature of intuitiveness and the cultural/ecological nature of intuitiveness:

1. Turner (2008) cites Mackay, Fayard, Frobert, and Medini, (1998) to illustrate the tangible nature of an intuitive system and describes the creation of a prototype augmented reality system to assist flight controllers to manage the previously paper-based flight strips used to track aircraft operations.
2. Intuitive systems also draw on social and cultural aspects. Turner (2008) provides the example of a Wii controller which, when used to play tennis or baseball, is drawing upon our ingrained knowledge of what tennis and baseball are and how they fit into the world. As mentioned by Turner, this also draws on a historical perspective.

Referencing the above illustrations, it can be postulated that legal technology that included processes with some degree of similarity to the traditional process of a legal procedure would contribute to the intuitiveness of the legal technology. This can also be conceived as related to use of metaphor in the design of the legal technology (Branscomb 1984; Carroll and Thomas 1982). In addition, the degree the legal technology product was in harmony with the social and cultural factors inherent in the legal profession would contribute to the intuitiveness of the legal technology product. This suggests the following measurement item for intuitive technology:

1. This legal technology product reflects the values of the legal profession.

A review of relevant literature outside of IS in regards to intuition and the intuitive indicates the development of constructs in this area is only starting to emerge (Hodgkinson, Langan-Fox, and Sadler-Smith 2008). Areas where intuitive and intuition constructs have been developed are counselling psychology and nursing; it is notable that the constructs developed in these fields are highly contextual (Smith 2007; Tylka 2006). An example of the contextual nature of an intuitive construct is a measurement item related to a nurse's spiritual connection to her patient: "I sense an energy field around my patient" (Smith 2007, p. 39).

The study of the intuitive is advancing in several disciplines including management studies (Mitchell, Friga, & Mitchell 2005; Smith 2007; Tylka 2006). Dane and Pratt (2007) identify four characteristics that make up the core of an intuition construct: "(1) non-conscious process (2) involving holistic associations (3) that are produced rapidly, which (4) result in affectively charged judgments" (p. 36). The first three factors identified have broad correspondence to the intuitive factors identified in the pilot study of "familiar", "follows the manual process", "function as if a lawyer designed it", and a consequent reduced level of training and ease of learning.

The investigation by Agarwal, Karahanna (2000) of "cognitive absorption" in relation to IS technology can be also seen as related to the study of the "intuitive" as they are both non-rational cognitive processes. Agarwal, Karahanna (2000) relate cognitive absorption to "flow" (Csikszentmihalyi 2008). Cooper (2007) identifies "flow" as important to software interaction design (p. 128). Anderson, McRee, and Wilson (2010) relate intuitiveness to engagement (p. 19).

There is also a relationship between intuition and habit (Frantz 2003). Habit has been explored in relation to user acceptance of technology research (Burton-Jones, Hubona 2003; Gefen 2003; Polites, 2005; Venkatesh, Morris, and Ackerman, 2000). There is a great deal of literature on habit (Polites 2009), whereas the study of the intuitive is only an emerging area even in psychological studies (Hodgkinson *et al.* 2008).

Intuitive interaction design is an emerging area of research (Blackler 2006; Blackler, Hurtienne 2007; Blacker, Popovic 2015; O'Brien *et al*. 2010). In human-computer studies there is a movement towards a more interdisciplinary focus on interaction design (Sharp, Rogers, and Preece 2011) and User Experience Design (Hassenzahl 2010). The convergence of elements of cognitive psychology, design, marketing, the focus on accessibility design with the Principles of Universal Design, and the insights from the work of Kahneman and Simon provides an opportunity for the intuitive to be introduced into information systems theory and, in particular, in this research, into user acceptance of technology theory. There is as yet no widely accepted test for the "intuitive" nature of technology comparable to the Turing test for the ability of computers to think (Turing 1950), but methods of evaluating the nature of

intuitive technology are emerging (Naumann and Hurtienne 2010; Ulrich and Diefenbach 2010) and will be investigated further in this research.

There is an opportunity to integrate the concept of intuitive technology into user acceptance of technology research. As will be discussed later, instruments are emerging to measure the intuitive nature of technology (see section 3.6). A potential intervention utilizing an intuitive construct would be the evaluation of acceptance/usability prior to implementation in line with the original application of the Davis (1986) TAM model.

3.5 Characterizing Intuitive IS Technology from a Coding of IS Academic Literature

During a preliminary review of the literature, particularly in the review of MISQ and ISR, it was noted that there were a number of articles which used the term "intuition", "intuitive" or related terms in the text of the article. The use of these terms was most often not related directly to the subject matter of the articles, but appeared, at first analysis, to be related to the writing style of the author. Upon further review and reflection, it became apparent that a more significant interpretation could be made of the use of these terms.

Using PDF copies of articles available through EBSCO, a review was made of issues of MISQ from the commencement of publishing in 1977 to the end of 2012. A similar review was made for ISR starting with the commencement of publication to the end of 2009. See Appendix B for details of this research and also McAran, Manwani (2013; 2014).

In Appendix B, a comparison is also presented of the components of "intuitive technology" identified in the preliminary exploratory pilot study, the review of literature specific to intuition, the emergent literature specific to intuitive technology and the concepts that emerged from the specific process of scanning and coding the literature. There are broad similarities across all four sources of factors related to "intuitive technology" which results in triangulation of results across the components of the literature review and the pilot study.

3.6 QUESI Instrument/INTUI Questionnaire

Naumann and Hurtienne (2010) developed the *Questionnaire for the Subjective Consequences of Intuitive Use* (QUESI) instrument which has been demonstrated to possess

reliability and validity. The QUESI instrument is used to triangulate the characteristics of "intuitive" technology independently of the four previously mentioned sources of information identified in this literature review – See Appendix D. The factors identified for "intuitive use" in the QUESI instrument (Naumann and Hurtienne 2010) are listed in Table 3-1.

Table 3-1 QUESI: Summary of Questions and Corresponding Factors

Item Number	Item	QUESI Factors
1.	I could use the system without thinking about it.	Perceived Mental Workload.
2.	The system was not complicated to use.	Perceived Mental Workload.
3.	I barely had to concentrate on using the system.	Perceived Mental Workload.
4.	I achieved what I wanted to achieve with the system.	Perceived Achievement of Goals.
5.	I was able to achieve my goals in the way I had imagined to.	Perceived Achievement of Goals.
6.	The system helped me to completely achieve my goals.	Perceived Achievement of Goals.
7.	The way the system worked was immediately clear to me.	Perceived Effort of Learning.
8.	The system was easy to use from the start.	Perceived Effort of Learning.
9.	How the system is used was clear to me straight away.	Perceived Effort of Learning.
10.	I could interact with the system in a way that seemed familiar to me.	Familiarity.
11.	It was always clear to me what I had to do to use the system.	Familiarity.

Table 3-1 QUESI Instrument: Summary of Questions and Corresponding Factors (Continued)		
Item Number (Cont'd)	Item	QUESI Instrument Factors
12.	I automatically did the right thing to achieve my goals.	Familiarity.
13.	No problems occurred when I used the system.	Perceived Error Rate.
14.	The process of using the system went smoothly.	Perceived Error Rate.

Source: Naumann and Hurtienne (2010)

Although closely associated with the research of Naumann and Hurtienne (2010), Ulrich and Diefenbach (2010; 2015) developed a distinct but related measure of intuitive interaction they have named the INTUI Questionnaire. The 16 item INTUI Questionnaire identifies the following factors: (1) Gut Feeling, (2) Magical Experience, (3) Effortlessness, and (4) Verbalizability.

There is similarity between two of the factors appearing in the INTUI questionnaire and QUESI instrument. On face value the Effortlessness factor in the INTUI questionnaire has strong correspondence to four of the factors in the QUESI instrument: (1) Familiarity, (2) Perceived Achievement of Goals, (3) Perceived Ease of Learning, and (4) Perceived Mental Workload. Gut Feeling from the INTUI questionnaire also has correspondence to the QUESI instrument factors of Familiarity and Perceived Mental Workload.

The INTUI questionnaire factor of Verbalizability is related to the method by which Blackler (2006) measured intuitive use as non-verbalization using the talk-aloud protocol. The factor of Verbalizability does not seem appropriate as legal professionals would need a degree of understanding of any technology used in professional practice. Similarly, the Magical Experience factor of the INTUI questionnaire would not appear appropriate to legal technology. Chau and Hu (2002a) noted that physicians took a "tool-orientated" (p. 212) and "pragmatic" (p. 212) approach to technology used in medical practice: the same is likely true

of technology use by legal professionals. As such, the INTUI questionnaire has not been used to develop items for the PI construct.

3.7 Importance of Intuition in Relation to Technology

A recent special issue of the *Interacting with Computers: the interdisciplinary journal of Human-Computer Interaction* was devoted to "Intuitive Interaction". Intuitive Interaction is an emergent research stream but highly relevant to practice, as Blacker and Popovic (2015) comment "Designers and marketers and users talk about it everyday. If researchers are using different terms from the rest of the world, how can we hope to have any impact and to improve the design of everyday interfaces?" (p. 203).

The prevalence of the "intuitive" nature of technology in practice can be seen in the YouTube video entitled *Designing Intuitive User Interfaces* (Stern 2015) in which Mike Stern, User Experience Evangelist at Apple (www.linkedin.com/in/mistern) states:

> The more apps behave as we expect them to, the more intuitive they are to us. The more intuitive apps are to us the more easy for us to concentrate on our true objectives. … The very best user interfaces are so intuitive ... so natural… that they just sort of disappear and allow us to focus on what truly matters. (2015, www.youtube.com/watch?v=HAITh41jNX8).

Stern also outlines what he sees are the top 5 characteristics of "intuitive" apps:

1. Platform Savvy/Platform Conventions
2. Easy to Navigate
3. Clear
4. Simple
5. Focused – perfected suited to context (2015, https://www.youtube.com/watch?v=HAITh41jNX8)

The elements listed above of "Easy to Navigate", "Clear", "Simple", and "Focused/Suited to Context" can be related to the factors of "Easy-to-use", "Easy to Understand", "Simple", and "Achieve Goals/Uses Implicit Knowledge" identified in the preliminary qualitative pilot study, the literature review, and the novel scan of IS academic journals. In addition, Apple Design Guidelines state "Before you consider onboarding, make every effort to design your app so that all its features and tasks are intuitive and easily discoverable" (Apple 2016,

https://developer.apple.com/library/ios/.../StartingStopping.html). This further emphasizes the importance of intuitive design to practitioners.

It can be seen that intuitive design and intuitive interaction are of high importance in the development of modern ICT. The inference can be made that the degree to which an IT product is optimized to maximize intuitive interaction will have an effect on the user acceptance of the technology, in the particular instance of this research, on the acceptance of technology used to do legal work by legal professionals.

Simon (1997) clearly identifies the nature of decisions of professionals as "intuitive":

> When we ask the grand master how good moves can be found under these circumstances, we get the same answer that we get from other professionals when they are questioned about rapid decisions: It is done by "intuition," by applying professional "judgement" to the situation" (p.133).

Notably the legal profession, like many professions, utilizes intuition, particularly in the decision of difficult legal cases (Glockner and Erbert 2011; Klein 2011). The "intuitive" nature of professional judgment makes technology used by professionals – in the case of this research, legal professionals – of interest in regards to the effect of the "intuitive" on the adoption of technology. The inference being that professionals who utilize intuition to make professional decisions will prefer ICT technology that they use in their professional practice to be characterized as "intuitive" and, furthermore, the degree that the technology is "intuitive" will increase the potential acceptance and use of ICT technology in their professional practice.

This is also evidenced by the quote of the research respondent in Shaw (2011, p. 159) highlighting "fit" as related to "intuitive". In the Discussion section we will elaborate on the potential use of legal technology as a mechanism to overcome Bounded Rationality and the framing effects associated with the use of intuition in legal practice (Kahneman 2002).

3.8 Summary of Review of Intuition

As has been demonstrated "intuitive interaction" is an emerging area of academic research. In addition, the design of "intuitive" technology is an important contemporary issue for ICT technology designers. A search of the relevant literature has failed to locate research that applies formal user acceptance of technology theory to law office technology or has investigated the "intuitive" in relation to technology acceptance.

Research has been called for the identification of interventions to facilitate user acceptance of technology (Venkatesh *et al.* 2007). The nature of professional practice uses processes which Schön (1983) has explored in his seminal work *The reflective practitioner: how professionals think in action*; these processes are very similar to intuition. It can be inferred that practitioners who use intuition-like processes in their professional practices would find benefit from technology that has been designed for "intuitive interaction".

Venkatesh and Bala (2008) have called for research on "what specific design characteristics will influence determinants of perceived usefulness and perceived ease of use" (p. 295) and "How can users be helped so that they develop accurate perceptions of design characteristics" (p. 295). Evidence exists in the literature to justify investigation of a new construct related to the intuitiveness of the technology and the evaluation of this new construct in relation to TAM and user acceptance theory. Because of support in the literature for a PI construct as a potential factor that will address these calls, the creation of the PI construct is an objective of this research.

The next step in this research is to discuss the methodology that will be used to test the hypothesis that the perceived intuitiveness of a computer technology product has significance in the acceptance of the product by a user. The process of testing this hypothesis will involve the creation and testing of a PI construct comprised of measurement items derived from the factors appearing in Table 3-2 below and the evaluation of the new construct in relation to the TAM model.

Table 3-2 Summary of Potential Factors Comprising a Perceived Intuitiveness Construct

ID	Factor	Description
1	Minimal training required	Minimal training required means to require minimal training to use the computer application at a satisfactory level of use (McAran, Manwani 2013, 2014; Pilot Study).
2	Easy-to-learn	Easy-to-learn means to require minimal learning (Bullinger *et al.* 2002, p. 4).
3	Familiar/Uses implicit knowledge	Familiar is that which has already been learned either implicitly or explicitly (O'Brien *et al.* 2010 p. 89; Shaw 2011).
4	Draws on experience of user in the 'real world'	Draws on experience of user in the "real world" is the degree to which the technology draws on existing mental models (Norman 2002) and draws on the user's experience (O'Brien, *et al*. 2010 p. 107; Shaw 2011).
5	Achieves Goals	Achieve Goals is the degree to which the computer technology product facilitates achievement of the users' desired goals and objectives in using the product (McAran, Manwani 2013, 2014; O'Brien *et al.* 2010 p. 107).
6	Easy-to-use	"…the degree to which an individual believes that using a particular system would be free of physical and mental effort" (Davis 1986, p. 26; McAran, Manwani 2013, 2014; Pilot Study).
7	Feelings and emotions the technology elicits	Feelings and emotions the technology elicits is the degree to which the technology elicits appropriate affect and is in harmony with the social and cultural environment of the user. (Anderson *et al.* 2010; Cooper 2007; Csikszentmihalyi 2008; Turner 2008)
8	The simplicity of the technology	The simplicity of the technology is the degree to which the technology is simple (McAran, Manwani 2013, 2014; Story 2011).

Table 3-2 Summary of Potential Factors Comprising a Perceived Intuitiveness Construct (Continued)		
ID	Factor	Description
9	The ease of understanding.	Ease-of-understanding means ease of understanding regardless of the user's experience, knowledge, language (McAran, Manwani 2013, 2014; Story 2011).
10	The "naturalness" of the technology	The "naturalness of the technology" is the degree to which the technology uses natural modes of expression (Bullinger *et al.* 2002, p. 4; McAran, Manwani 2013, 2014).
11	The degree to which the technology is adaptive	Adaptive technology is technology which changes the data entry required or processes going forward based on data that has already been provided as well as the user (McAran, Manwani 2013, 2014; O'Brien *et al*. 2010 p. 107).
12	The degree to which the technology is visual/graphical	The degree to which the technology is visual/graphical is the degree to which the technology uses effective visual and graphical representations, and visual cues (McAran, Manwani 2013, 2014; Robey and Taggart 1982).
13	The degree to which the technology is tolerant of error	Tolerant of error means the degree to which the technology "minimizes hazards and the adverse consequences of accidental or unintended actions." (O'Brien *et al.* 2010; Story 2011 not paged, sections 4.5 – 4.7).

Sources: Articles as indicated.

4. Research Methodology Review

4.1 Introduction

Self-reflection is important for a researcher (Remenyi, Williams, Money and Swartz 1998). While, upon first approach, research methodology does not seem highly relevant to research, it is in reality of the greatest importance. As has been demonstrated by Kahneman (2002), the perceptions of phenomena can be greatly affected by processes related to human cognition. It is therefore of high importance in research to reflect on what we can know, and how we can know it, and what are the appropriate research methods to use to gather the data for research. This chapter seeks to answer these questions with reference to the current research. This review is organized into the following sections:

4.1 Introduction

4.2 Overview of Research Philosophy

4.3 Reliability, Validity and Generalizability

4.4 Statistical Research Methods in Business and Management

- 4.4.1 Statistical Methods
- 4.4.2 Measuring USE in User Acceptance of Technology Research

4.5 Structural Equation Modeling - Partial Least Squares

- 4.5.1 Selection of PLS-SEM and SmartPLS3
- 4.5.2 Evaluating a PLS-SEM model

4.6 Summary

4.2 Overview of Research Philosophy

This section presents an overview of the philosophical roots of research methodology. There are four basic levels of discussion in the philosophy of research: ontology, epistemology, axiology and methodology. Epistemology and axiology follow from the chosen ontology but different methodologies can be used with varying ontological views (Lee and Lings 2008).

The overriding schema of research methodology is ontology, which is the basis by which we understand and perceive the world. The most common question is: does reality exist external

to our own existence or is reality a construction within our minds? While this question may seem far from the issue of management research, it is central to the question of how we perform research (Easterby-Smith, Thorpe and Jackson 2005).

The second level of discourse concerning research methodology is epistemology, which concerns how we can gain knowledge about the world. If we view the world as independent of the researcher, and not affected by the process of research, we can construct experiments to draw conclusions; this is the approach used in the physical sciences (Easterby-Smith *et al.* 2005).

Axiology refers to the overall values of the research (Collis and Hussey 2009). The axiology of interpretivist research would be to understand, rather than use theory to predict as in Positivist research (Lee and Lings 2008).

The most practical level is the methodology level which are the processes used to execute research. A basic characterization of research methods is Quantitative and Qualitative; both these research methods can be used in either Positivist or Interpretivist (Phenomenological) research. Quantitative research is primarily associated with a Positivist approach (Easterby-Smith *et al.* 2005).

Insight into the issues surrounding research methodology can be obtained by review of the integrating definition of paradigm provided by Mingers (2001):

> A paradigm is thus a construct that specifies a general set of philosophical assumptions covering, for example, ontology (what is assumed to exist), epistemology (the nature of valid knowledge), ethics or axiology (what is considered right) (p. 242).

There is considerable variation in terminology used in research methodology. As an example, the following are examples of ontological positions: Realist (also referred to as Positivist, or as Objectivism) and Social Constructionist (also referred to as Constructionist) (Bryman and Bell 2003; Lee and Lings 2008). Further, the terms Interpretivist and Phenomenological have related, but not identical meanings. Phenomenology is a specific philosophical movement while Interpretivist is a categorical classification of research methods (Lee and Lings 2008). Thus it is imperative that terminology be used carefully as differing terms in research methodology can cause confusion (Mingers 2001).

A general distinction that can be made between Quantitative and Qualitative research is that Quantitative research uses numbers and Qualitative research uses words (Remenyi *et al.* 1998). There are, however, more profound differences between Quantitative and Qualitative research. Denzin and Lincoln (2005) comment:

> Qualitative researchers stress the socially constructed nature of reality, the intimate relationship between the researcher and what is studied, and the situational constraints that shape inquiry...In contrast, quantitative studies emphasize the measurement and analysis of causal relationships between variables, not processes (p.10).

Another basic dichotomy that can be used to classify research is the difference between theoretical (based on intellectual creation) and empirical research (based on observation or experiment). Most research in business is empirical research. Additionally research can be classified as cross-sectional (over different organizations or research units) or longitudinal (over time) (Remenyi *et al*. 2009).

As recommended by Karl Popper, verifying a research hypothesis is best approached by seeking evidence that the hypothesis is invalid, or null. In research practice this would mean seeking evidence to support the Null hypothesis; the Null hypothesis asserting the research hypothesis is invalid. If the Null hypothesis is rejected, the research hypothesis must be accepted until it can be disproved (Lee and Lings 2008).

In IS research there is another perspective that can be taken to relate the type of theory to which the research is directed. Gregor (2006) identifies five types of theory found in IS academic research – (1) Analysis, (2) Explanation, (3) Prediction, (4) Explanation and Prediction, and (5) Design and Action. There is an increasing focus in IS research to the development of theory related to Design and Action (Gregor 2006) which addresses the calls for relevance in IS academic research (Benbasat and Zmud 1999; Davenport and Markus 1999). This indicates a strong emphasis in IS academic research on explanation, prediction and design. As mentioned in the Literature Review, Hevner *et al.* (2004) see IS as partially a "design science" (p. 76).

These perspectives can be viewed as representing a further dichotomy in IS research methodology: that between behavioural science and design science (Hevner *et al.* 2004). In addition, Hevner *et al.* (2004) relate design considerations to the polarities of rigor and relevance

prominent in IS research and call "to align design-science research with real-world production experience" (p. 98). The importance of relevance in IS research is discussed later in this section.

The Positivist ontology and epistemology used in this research relates to the desire to provide explanation/prediction and design recommendations as an outcome: a theme commonly found in IS research (Gregor 2006) and a theme also found in the thesis of Davis (1986) in which TAM was developed.

Relevance of Research as a Methodological Dimension

The perspective of this dissertation is that research in information technology must be relevant to be of value (McAran 2011a). In addition, as this research is for a DBA rather than a PhD, concerns about the relevance of research performed are of increased importance.

The issue of research relevance has concerned IS researchers for many years. In the first issue of MIS Quarterly, the editorial policy is identified as "attempting to provide a journal which is useful for the practitioner and at the same time appeals to those interested in theory and research" (Dickson 1977, p. iii). An Issues and Opinions piece by Lynda M. Applegate (1999), Senior Editor of MIS Quarterly, focused on requirements for relevant research, asking:

- Does IS research produce the knowledge that today's IS professionals can apply in their daily work?
- Does it address the problems or challenges that are of concern to IS professionals?
- Does it focus on current technological and business issues?
- Are IS research articles accessible to professionals? (p. 1)

To further crystallize the issue, Benbasat and Zmud (1999) characterize relevance in IS research using the following defining questions:

- Is the topic of the article of interest to practitioners?
- Are the implications of the article implementable?
- Does the article synthesize information on a subject or field?
- Does the article stimulate critical thinking?
- Is the style and tone of the article accessible? (p. 4-5)

The concern with the relevance of IS research has not been limited to MIS Quarterly. As J. L. King (1993) wrote in an Editorial Note of ISR: "This, then, is and has been the goal of *ISR:* to stimulate the information systems research community and disseminate new information in the process" (p. 296). Chris Kemerer, (2002), another editor of ISR, advocated that IS research look to the model of medicine, where research articles in prominent medical academic journals are directed at practicing physicians and are even profiled in the general media.

A key objective of this research is to do relevant research. Creating a PI construct and integrating into the TAM could lead to a resolution of the issue identified as the "TAM logjam" (Straub and Burton-Jones 2007, p. 223) and also link individual acceptance of technology research to the emergent research stream of intuitive technology design (Blackler 2006; Naumann and Hurtienne 2010; O'Brien *et al*. 2010). Intuitive interaction is an important issue in contemporary technology design (Blackler, Popovic 2015). Success at this undertaking could contribute to progress in the conceptualization of the "IT Artifact" (Weber 2003, p. iii).

4.3 Reliability, Validity and Generalizability

Regardless of the research methodology there is a need to address the issues of reliability and validity as these criteria are related to the quality of the research (Miles and Huberman 1994). According to Fink (2008), "a reliable measure is reproducible and precise: Each time it is used it produces the same value" (p. 188). In addition, Fink (2008) states that, "Validity refers to the degree to which a measure assesses what is supposed to measure" (p. 195) and concludes all reliable measures may not be valid, but all valid measures can be said to be reliable.

Characteristics of reliability, validity and generalizability identified by Easterby-Smith *et al.* (2005) for Positivist epistemologies appear in Table 4-1. As this is Positivist research, only aspects of reliability and validity related to Positivist research are discussed.

Table 4-1 Perspectives of Reliability, Validity and Generalizability	
Measure	Perspective
Validity	Do the measures correspond closely to reality?
Reliability	Will the results yield the same results on other occasions?
Generalizability	To what extent does the study confirm or contradict existing findings in the same field?

Source: Adapted from Easterby-Smith *et al.* (2005).

Validity can be analyzed into several facets. Construct validity determines if a variable measures the existence of a specific characteristic. Convergent validity measures if a construct correlates with other constructs that also measure the same characteristic. Discriminant validity measures a construct's correlation with constructs which do not measure the specified characteristic (Fink 2008). Internal validity is the degree to which the results obtained are true representations of the data. External validity is the degree to which the results of the research can be generalized (Easterby-Smith *et al.* 2005). Validity and reliability in Positivist research using Quantitative methods are demonstrated using statistical methods (Remenyi *et al.* 1998). When Quantitative research methods are used, four ways are used to assess reliability:

Table 4-2 Four Ways of Assessing Reliability in Quantitative Research with Specific Tests		
Type of Reliability	How Assessed	Specific Tests
Within Measure	Test-retest	Evaluation of correlation across different samples.
	Internal Consistency	Cronbach's Alpha, and the related Kuder-Richardson Reliability formula.
		Composite Reliability **(**Hair, Hult, Ringle, and Sarstedt 2014).
	Split-half	Spearman-Brown prediction formula.
Between Measures	Alternate Form (Different instruments used in longitudinal studies)	Pearson product-moment correlation to determine equivalency of instruments.
Within Observer	Intra-rater	The degree to which scores are consistent for one research participant over time.
Between Observers	Inter-rater	The degree to which the research participant scores agree with one another. Measured by Cohen's *kappa* and related statistics.

Source: Adapted from Fink (2008); Composite Reliability has been added from Hair *et al.* (2014).

In summary, reliability and validity are important concepts in Positivist research and specific methods, tests and considerations have been identified which gauge reliability and validity.

4.4 Statistical Research Methods in Business and Management

This section briefly reviews the quantitative research methods used in business and management research.

4.4.1 Statistical Methods

Table 4-3: Quantitative Research Methods in Business		
Research Method	Description	Comments
Descriptive Statistics	Descriptive statistics describe data, this would include measures of central tendency such as mode, median, and mean. Descriptive statistics would also include measures of dispersion, such as range, quartiles, variance, and standard deviation. Also included would be skewness and kurtosis (Hair, Babin, Money and Samuel 2003).	We calculate the following descriptive statistics for Likert scale questions used in the PLS-SEM model: 1. Mean 2. Standard deviation 3. Skewness and kurtosis
Inter-rater Agreement Methods	Inter-rater methods can be used to evaluate validity. See Gwet (2012) for a detailed discussion of inter-rater methods.	In this research an extension of the Brennan-Prediger coefficient is used to quantify inter-rater agreement between three sources of characteristics of intuitive technology.
Principal Components and Common Factor Analysis	Principal Component and Common Factor Analysis is a method of reducing a set of variables to a smaller number of variables based on the correlations existing between the initial set of variables to a reduced set of variables (Hair *et al.* (2010), p. 16).	Principal Component and Common Factor Analysis are used to analyse the results of the second quantitative pilot study.
Multiple Regression	Multiple Regression uses the values of two or more independent variables to predict the value of an independent variable. (Hair *et al*. 2010, p. 16).	Multiple Regression is not used directly in this research, although it forms part of the PLS-SEM algorithm used in this research.
Covariance Structural Equation Modelling	Covariance base structural equation modelling compares the observed covariance matrix and the model generated covariance matrix. It is generally used to confirm theory (Hair *et al.* 2014).	As this exploratory research is concerned with the evaluation of a new construct with the existing TAM model, PLS-SEM is used in this research.

Table 4-3: Quantitative Research Methods in Business (Continued)		
Research Method	Description	Comments
Partial Least Squares Structural Equation Modelling	PLS-SEM is a variance based approach. It is preferred over covariance structural equation modelling when the objective is theory development (Hair *et al.* 2014).	As this exploratory research is concerned with the evaluation of a new construct with the existing TAM model, PLS-SEM is used in this research.
The following additional quantitative research methods are discussed by Hair *et al.* (2010) but are not used in this research: Univariate Methods Multiple Discriminant Analysis and Logistic Regression Canonical Correlation Multivariate Analysis of Variance and Covariance Conjoint Analysis Cluster Analysis Perceptual Mapping Correspondence Analysis		

Sources: Hair *et al.* (2003); Hair *et al.* (2010); Hair *et al.* (2014); Gwet (2012).

4.4.2 Measuring USE in User Acceptance of Technology Research

System usage has been traditionally the preferred dependent variable of technology acceptance research. Support for system use as the dependent variable can be found in the literature:

Straub, Limayem, and Karahanna-Evaristo (1995) note:

> System usage, the utilization of information technology (IT) by individuals, groups and organizations, is a core variable in MIS research. Indeed, there is widespread agreement among researchers that system usage is *the* primary variable through which IT affects white collar performance (Sharda et al 1988; Davis 1989; Swanson 1982; Robey 1979) because it is a necessary, albeit in-sufficient, requisite for deriving the benefits of IT (p. 1328, emphasis in the original).

They additionally comment,

> Davis and others have been perfectly justified to this time in assuming self-reported and computer-reported usage are close correlates. As Ajzen (1988) points out, researchers have found that subjective and objective measures of neutral activities (such as computer use) are highly consistent (p. 1332).

Straub *et al.* (1995) did find in their research on voicemail usage that self-reported usage and computer recorded system usage were not related to each other. They acknowledge, however, that the results could potentially be "artifactual" (p. 1338).

In addition, Likert scale surveys have been used almost exclusively for research on user acceptance of technology. There are, however, issues with the use of the Likert scale (Chin, Johnson, and Schwarz 2008):

1) Likert scale surveys may be subject to acquiescence bias in which there is a bias for the user to respond positively to the statement made.
2) Likert scale surveys may have CMV (almost all research in this field has used Likert scale surveys).
3) Likert scale survey respondents may experience fatigue when answering a long survey, leading to non-representative answers to questions.
4) In Likert scale surveys, the use of negation questions may not be effective in countering acquiescence bias because negation questions may not be intuitive.

While Likert Scales are used in this research, the dependent variables (Degree of Use and Degree of Feature Use) are measured using a slide bar scale with a rating scale of 1-100 to reduce the risk of CMV.

Using a meta-analysis of 195 studies Wu and Du (2012) found "PU and PEOU together explain 17% of the variance of assessed usage, 9% in reported usage, and 7% in actual usage" (p. 690). They state "reported usage is commonly measured by asking research participants to report on their duration and frequency of using a target system" (p. 682). Assessed usage "refers to the ordinal-scale measured intensity and extent of using a system" (p. 683). In this research we use a combination of two usage variables (Degree of Use and Degree of Feature Use) measured using a slide scale ranging from 1 to 100. This method of measuring use would most closely correspond

to “reported usage” (p. 682) rather than assessed usage measured using an ordinal-scale and, consequently represent a better proxy for actual usage.

Recently there have been calls to reconceptualise system usage. Goodhue (2007) in a short response to the Benbasat and Barki’s (2007) “Quo Vadis TAM" article emphasize two points: there is a need to look beyond just “use” and a need to evaluate the fit of a technology which ultimately influences performance; secondly there is need to evaluate the task to which the technology should be put in order to better understand the usefulness of an Information Technology (IT) artifact. While this research does not extend the dependent variable beyond “use” to performance, the use of a slide scale rather than an ordinal scale does represent an extension of “use”.

4.5 Structural Equation Modelling - Partial Least Squares

4.5.1 Selection of PLS-SEM and SmartPLS3

PLS-SEM analysis was chosen to analyze the quantitative data obtained by this research for four reasons:

1. PLS-SEM analysis has been utilized more in IS academic research than any other discipline with a substantial number of papers in top IS journals using PLS to evaluate research models (Marcoulides, Chin, and Saunders 2009).
2. PLS-SEM is suitable for exploratory research.
3. There has been a great improvement in the statistical software packages available for PLS analysis, most notably the release of the latest version of SmartPLS – SmartPLS 3 (www.smartpls.com); and
4. A recent text on PLS, *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (Hair *et al.* 2014), has become available.

There are two dominant software packages used for PLS-SEM analysis: PLS-Graph 3 (Chin 2002) and SmartPLS 3 (Ringle, Wende, Becker 2015; Hair, Ringle, and Sarstedt 2013). Because of recent release of SmartPLS 3, and the use by Hair *et al.* (2014) of SmartPLS in their authoritative text on PLS-SEM, SmartPLS 3 (Ringle *et al.* 2015) is used in the research.

This research is exploratory. The theoretical conjecture is that the PI construct developed in this research will have a significant positive effect on the process of individual technology adoption, which has been most commonly represented in IS academic literature using the TAM model and related models. The specific nature of the effect is not known or, if there is any effect at all. The comment of Chin (1998) supports the use of PLS for research of this nature: "Although PLS can be used for theory confirmation, it can also be used to suggest where relationships might or might not exist and to suggest propositions for testing later" (p. 295).

The PI construct is modeled as a reflective construct. This is done primarily for the following reasons:

1. The existing exogenous latent variables of the TAM model – PU and PEOU are modeled as reflective (Davis 1986).
2. The characteristics that have been identified as measurement items for PI are likely significantly correlated.

4.5.2 Evaluating a PLS-SEM model

As Chin (1998) notes, because PLS makes no distributional assumption, "traditional parametric-based techniques for significance testing/evaluation would not be appropriate" (p. 316). Rather Chin (1998) suggests "evaluation of PLS models should apply prediction-orientated measures that are also non-parametric" (p. 316) and recommends the following evaluation measures:

1. R-Square: evaluation of the R^2 for each dependant latent variable.
2. f^2: The effect size f^2 can be used to evaluate the impact of a particular Latent Variable (LV).
3. Q^2 predictive relevance is derived from a cross-validation approach that seeks to validate a statistic for a sample into two parts: deriving the statistic for one of sample parts and then for the second part: Predictive relevance is derived from the work of Stone (1974) and Geisser (1974), who both developed cross-validation methods separately (Geisser 1974). Stone (1974) comments:

> The concept of such assessment is an old one. In its most primitive but nevertheless useful form, it consists in the controlled or uncontrolled division of the data sample into two subsamples, the choice of a statistical predictor, including any necessary estimation, on one subsample and then the assessment of its performance by measuring its predictions against the other subsample. (p. 111).

There are two basic cross-validation methods: cross-validated redundancy and cross-validated communality. Hair *et al.* (2014) recommend cross-validated redundancy as best suited to PLS-SEM: it is consequently used in this research.

Predictive relevance is evaluated in PLS-SEM using the blindfolding procedure. The use of blindfolding in PLS-SEM is only used to determine predictive relevance for endogenous constructs with reflective measurement items (Hair *et al.* 2014).

4. Jackknifing: In the jackknife procedure a section of the data is selected, sample parameters are calculated; allowing a standard deviation and standard error to be calculated (Chin 1998). Bootstrapping is used in this research rather than the Jackknifing procedure.
5. Bootstrapping: The bootstrap procedure is similar to the jackknife procedure except that the samples are drawn and then the selected items are replaced. The number of bootstrap samples recommended is 5,000 (the value used in this research). For each of the bootstrap samples, parameter estimates are calculated; these parameter estimates enable the calculation of a standard error. Using the *t*-distribution, *t*-values and confidence intervals can be created to indicate the significance of the path coefficients in the structural model. In addition, the bootstrap *t*-values, and confidence intervals are reported in the research.
6. Composite Reliability: calculation of the composite reliability of the indicators for each LV. Composite reliability weights the indicators in the calculation process based on the indicator loadings of each indicator. In the analysis of the results of this research we will also calculate Cronbach's alpha. Chin (1998) notes:

> For LVs with reflective indicators, the loadings should be inspected for determining the appropriateness of the indicators. Essentially, each loading represents the correlation between the indicator and the component score. Indicators with low loadings essentially imply that they have little relationship in terms of shared variance with the LV component score (p. 306).

Hair *et al.* (2013) recommend reporting on the following:

1. Skewness and kurtosis;
2. Mean values, variance and descriptive statistics;
3. The scales of the variables;
4. List the indicators for the variables;
5. Correlation/covariance matrix;
6. Missing data and missing data replacement methods;
7. Potential non-response bias;
8. Methods used to analyze unobserved heterogeneity;
9. Indirect, direct and total effects of constructs.

4.6 Summary

This chapter has reviewed the overall ontology, epistemology, axiology and methodology perspectives used in this research. This research uses a Positivist approach. In addition, the axiology of this research has been identified as relevance with an orientation towards design. PLS-SEM has been selected as the method of analysis. The next task is to describe the specific methodology used in this research: this is performed in Chapter 5 – Scale Development.

5. Scale Development

5.1 Introduction

The research objective is to develop and integrate a new construct called PI for a computer technology product used to perform legal work into the TAM of Davis (1986). PLS-SEM will be applied to validate the revised model that includes the new construct.

The creation of the definition of the perceived intuitiveness of computer technology used to do legal work is step 1 of the scale development procedure, as outlined by MacKenzie, Podsakoff, and Podsakoff (2011). The following definition of the Perceived Intuitiveness of computer technology used to do legal work is used in this research:

Perceived Intuitiveness: *The degree to which use of the legal technology product is perceived by the legal technology user as capable of being used without conscious awareness of rational thinking* (Adapted from Shirley and Langan-Fox 1996, p. 564).

In the research we execute the following stages of the MacKenzie *et al.* (2011) procedure: Conceptualization, Development of Measures, Model Specification, Scale Evaluation and Refinement, and Validation. We do not, in this research, undertake Norm Development. The scale development procedure outlined by MacKenzie *et al.* (2011) is shown in Table 5-1. In addition, Table 5-1 keys the MacKenzie *et al.* (2011) stages of scale development to the components of this research.

Table 5-1 Overview of the Scale Development Procedure			
Stage	Step	Description	Correspondence to Present Research
Conceptualization	Step 1	Develop a Conceptual Definition of the Construct	1. Section 5.4 Qualitative Exploratory Pilot Study. 2. Section 5.5 Scale Development – Perceived Intuitiveness.
Development of Measures	Step 2 Step 3	Generate Items to Represent the Construct Assess the Content Validity of the Items	1. Section 5.5 Scale Development – Perceived Intuitiveness. 2. Section 5.6 Pre-tests of Perceived Intuitiveness Measurement Items. 3. Section 5.8 QUESI Instrument.
Model Specification	Step 4	Formally Specify the Measurement Model	Section 5.3 Research Model
Scale Evaluation and Refinement	Step 5 Step 6	Collect Data to Conduct Pretest Scale Purification and Refinement	1. Section 5.6 Pre-tests of Perceived Intuitiveness Measurement Items. 2. Section 5.9 Quantitative Pilot Study and Scale Refinement.
Validation	Step 7 Step 8 Step 9	Gather Data from New Sample and Re-examine Scale Properties Assess Scale Validity Cross-Validate the Scale	These steps are performed as part of the main research of this dissertation.
Norm Development	Step 10	Develop Norms for the Scale	This step is not performed in this research, but is left to future research.

Source: MacKenzie *et al.* (2011, p. 29)

The Scale Development chapter of this dissertation is organized into the following sections:

5.1 Introduction

5.2 Hypotheses

5.3 Research Model

5.4 Qualitative Exploratory Pilot Study

5.5 Scale Development – Perceived Intuitiveness

5.6 Pre-tests of Perceived Intuitiveness Measurement Items

5.7 Measurement Items: Perceived Usefulness, Perceived Ease of Use, and Compatibility

5.8 QUESI Instrument

5.9 Quantitative Pilot Study and Scale Refinement

5.9.1. Introduction
5.9.2 Quantitative Data Analysis and Scale Refinement
5.9.3 Summary of Pilot Study

5.10 Summary

5.2 Hypotheses

The hypotheses for this research are derived as follows:

Chau and Hu (2002a), who researched the acceptance of telemedicine technology by Hong Kong physicians, found COM as the sole significant antecedent to PU with a *p*-value < .001 (p. 210). Chau and Hu (2002a) found "physicians resist changing their traditional long standing practice patterns when their organizations implement information systems that interfere with their routines" (p. 201). A similar resistance to change is found among legal professionals (Manker 2015).

Further, in the doctoral research of Shaw (2011) "fit", which is the active verb in all the measurement items of the Compatibility construct, was used by a research respondent to describe the mechanism by which Electronic Medical Records were found to be "intuitive". It can therefore be expected that there be will correlation between PI and COM through the concept of "fit"; this correlation likely would result in the PI also correlating with PU. This argument leads to the hypothesis:

H1 Perceived Intuitiveness is positively related to Perceived Usefulness.

PEOU has been shown to be related to the task/technology fit (Mathieson and Keil 1998); this would indicate potential for correlation between the PEOU construct and COM. As "fit" was related to the "intuitive" by Shaw (2011) and "fit" is also related to the Compatibility construct (Chau and Hu 2002a). It can therefore be expected that the will correlation between PI and PEOU through the concept of "fit". This argument leads to the hypothesis:

H2 Perceived Intuitiveness is positively related to Perceived Ease of Use.

Similarly, because in the research of Shaw (2011) a research respondent identified the mechanism by which Electronic Medical Records was found to be "intuitive" as related to "fit", which is the active verb in all the measurement items of the Compatibility construct, we create the hypothesis:

H3 Perceived Intuitiveness is positively related to Compatibility.

Goodhue and Thompson (1995) link task-technology fit to user acceptance of technology and performance improvements resulting from technology. Tornatzky and Klein (1982) also found Compatibility and Ease of Use as affecting adoption of technology. The effect of PEOU on USE was investigated by Davis (1989) but found to be non-significant. However, several meta-analyses of TAM have found conflicting evidence as to the effect of PEOU on USE (King and He 2006; Lee *et al*. 2003; Legris *et al*. 2003).

Shaw & Manwani (2011) found the intuitiveness of a specific technology function was linked to its adoption. In addition, there is an inferred relationship between PI, PEOU, and COM through the concept of "fit". As COM has been shown to affect USE (Moore and Benbasat 1991) and because some TAM studies have found PEOU affecting USE. We postulate that PI will affect USE; hence the hypothesis:

H4 Perceived Intuitiveness is positively related to the combined measure of USE (consisting of Degree of Use and Degree of Feature Use).

The research of Moore and Benbasat (1991), which focused on technology acceptance from a diffusion of innovations perspective, supported the effect of voluntariness on adoption and identified the non-binary nature of voluntary use. Wu and Lederer (2009) performed a meta-analysis of 71 empirical studies in technology acceptance and found that environment-based voluntary use moderates the effect of PU and PEOU on BI. Kroenung and Eckhardt (2015) performed a meta-analysis of 119 articles from 14 top IS journals over 25 years to identify significant factors that influence the attitude-behavior relationship: one of the factors identified as having a significant effect on adoption was voluntariness. We, therefore, offer the hypothesis:

H5 The degree to which the technology use is voluntary will have a significant moderating effect on the paths from Perceived Intuitiveness, Perceived Usefulness, Perceived Ease of Use, and Compatibility to USE (consisting of Degree of Use and Degree of Feature Use).

There are two assumptions in this research:

1. That there are no boundary conditions evident within legal technology or the legal profession that will make the general principles of user acceptance theory and the Theory of Reasoned Action (Ajzen and Fishbein 1980), on which is it based, not applicable.

2. That Perceived Intuitiveness construct will not be 100% correlated with the existing exogenous constructs of the TAM model which are: (1) Perceived Usefulness, (2) Perceived Ease of Use, and (3) Compatibility.

Definitions

Compatibility is defined as the degree to which the use of technology used to do legal work is perceived by the legal professional to be consistent with their practice style or preferences (Adapted from Chau and Hu 2002a).

Perceived Ease of Use is defined as "the degree to which an individual believes that using a particular system would be free of physical and mental effort" (Davis 1986, p. 26).

Perceived Intuitiveness is defined as the degree to which use of the legal technology product is perceived by the legal technology user as capable of being used without conscious awareness of rational thinking (Adapted from Shirley and Langan-Fox 1996, p. 564).

Perceived Usefulness is defined as “the degree to which an individual believes that using a particular system would enhance his or her job performance” (Davis 1986, p. 26).

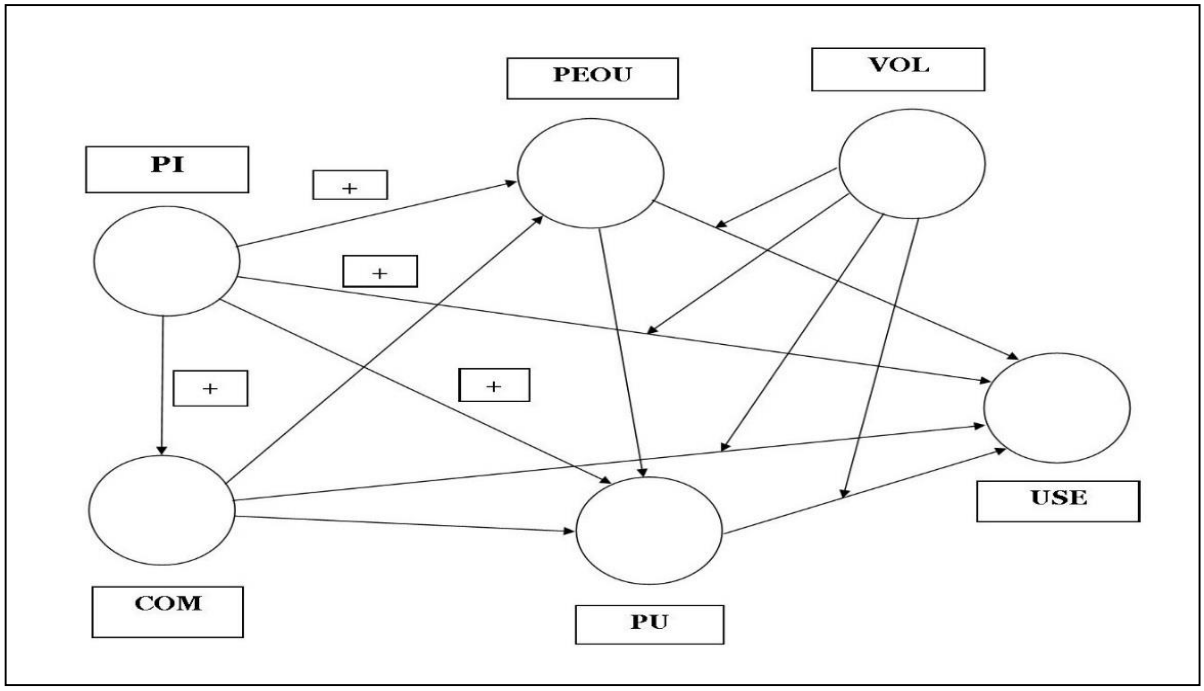
Voluntary Use is defined as “the degree to which use of the innovation is perceived as being voluntary or of free will” (Moore and Benbasat 1991, p. 195).

The unit of analysis is the individual legal technology user.

5.3 Research Model

This model is the TAM model of Davis (1986) with the addition of the COM construct from Chau and Hu (2002a), which itself was adapted from Moore and Benbasat (1991), and the proposed PI construct. COM in included because of its prominence in technology acceptance research (Chau and Hu 2002a; Moore and Benbasat 1991; Tornatzky and Klein 1982). “Fit”, the main measurement component of COM, was also found of high importance in Shaw (2011). PI is shown as having a direct effect on PU, PEOU, COM, and USE. The Dependent variable USE is comprised of two reflective components Degree of Use and Degree of Feature Use.

Figure 5-1 Original Research Model



COM – Compatibility; PEOU – Perceived Ease of Use; PI – Perceived Intuitiveness; PU – Perceived Usefulness; VOL – Degree of Voluntary Use

As noted by Davis (1986) "Perceived ease of use is hypothesized to have a significant direct effect on perceived usefulness, since, all things being equal, a system which is easier to use will result in increased job performance (i.e., greater usefulness) to the user" (p. 26). This would also be true for technology that is perceived as "intuitive". The advantage of this model is that it is simple but still likely captures most of the significant relationships.

In user acceptance of technology research, all constructs traditionally have been characterized as reflective. The PI construct is modeled as reflective, as well as all the other constructs. This is in agreement with the perspective of Davis (1986) that used reflective measurement items for the PU and PEOU constructs of TAM. MacKenzie *et al.* (2011) provide a good discussion of the relationship between the ontology and reflective/formative constructs.

> As noted by Borsboom (2005, p. 63), latent variable theory is ontologically ambiguous depending on whether a reflective or formative indicator model is assumed: "the realist interpretation of a latent variable implies a reflective model, whereas constructivist, operationalist, or instrumentalist interpretations are more compatible with a formative model". Several authors (e.g. Borsboom 2005; Howell et al. 2007b) have reasoned that measurement models with reflective indicators imply the latent construct (1) is a *real entity* that exists independently of a person and the way in which s/he finds out about it, and (2) *causes* that observed variation in the responses to the items used to measure it (p. 303).

These arguments support the creation of PI as a reflective construct. The approach of adding the additional constructs as antecedent factors to PU and PEOU is consistent with the approach that has been taken in the exploration and extension of TAM (Karahanna and Straub 1999). Placing the PI construct into the existing TAM model is a test of its nomological validity (Polites 2009).

In summary, this has been done for the following reasons:

1. The existing exogenous latent variables of the TAM model – PU and PEOU are modeled as reflective (Davis 1986).
2. The characteristics that have been identified as measurement items for PI are likely significantly correlated. An example of this would be the measurement item related to "familiar", which will likely correlate with the measurement items related to "easy

to use" and "easy to learn". Where there are measurement items which correlate, formative indictors are not indicated (Chin 1998).

3. PI is a new phenomenon under investigation in IS research as such it would be difficult to identify all measurement items which could comprise the PI construct.

The Dependent Variable

Traditionally the dependent variable in user acceptance of technology research has been either BI or USE. BI was the dependent variable used in the TAIP model (Chau and Hu 2002a) and also used in Davis *et.al.* (1989). The origins of the BI dependent variable are found in the TRA (Ajzen and Fishbein 1980). There has been significant research in user acceptance of technology which has utilized "Use" as the dependent variable (Brown *et al.* 2010; Venkatesh and Bala 2008; Venkatesh *et al.* 2003).

Use has been identified as preferred dependent variable (Wu and Du 2012). In this research, the dependent variable USE is measured using two reflective indicators: Degree of Use and Degree of Feature Use. These are both measured, in the second quantitative pilot study and the dissertation research, using a slide bar (sliding) scale allowing responses from 1 to 100 as an indication of the degree of Use (Hair, Celsi, Money, Samouel, and Page 2016). The slide bar scale, ranging from 1 to 100, is also used to solicit responses concerning the Degree of Voluntary Use.

Demographic Questions

Demographic questions are added at the end of the survey in regards to gender, occupation, and years of legal experience. The approximate geographic location of the respondents is provided by the Qualtrics online survey tool (Qualtrics 2015, www.qualtrics.com).

Recruiting Survey Participants

In the quantitative pilot study survey respondents were solicited using an online Qualtrics survey and consisted partly of paid Qualtrics data. In addition, respondents were solicited using social media (LinkedIn legal profession related groups: www.linkedin.com); a second social

media service Technolawyer (www.technolawyer.com), and personal contacts. Respondents were free to choose any legal technology as the basis for their response.

Use of Personal Experiences with Legal Technology for Survey Completion

The questionnaire for the pilot study and the main research requested respondents to complete the questionnaire based on their perceptions of a software product they were currently using. In reference to the available options for measuring system usage outlined by the Burton-Jones and Straub (2006) research, we choose "somewhat rich" (p. 233) conceptualization of use seeking to identify "Duration: extent of use" (p. 233) and "Breadth of use (number of features)" (p. 233). This method of measuring system usage could also be characterized as "reported usage" (Wu and Du 2012). The questions regarding usage in this research are as follows:

Please rate the degree of your use of this legal technology product on the scale below where 0 on the scale is no use at all and 100 on the scale is constant use or a degree of use that you would consider as completely integral to your practice of law.

Please rate the percentage of the features available in this legal technology product which you would use on the scale below, where 0 on the scale would be use of none of the features and 100 would be use of all of the features.

Each of the above questions seeks a response using a slide bar scale with a range of 1 to 100. As far as the author is aware this is the first use of a slide bar scale to measure degree of use and degree of feature use in user acceptance of technology research. In addition, each of the respondents was requested to rate the degree to which use was voluntary using a similar question with a slide bar scale with a range of 1 to 100.

5.4 Qualitative Exploratory Pilot Study

The scale development process used to explore the potential for intuitiveness as a factor in understanding technology acceptance commenced with a qualitative exploratory pilot study conducted in the period July through September 2011. Open-ended questions were developed from the literature and the existing elements of technology acceptance. This was consistent with

the recommendation of MacKenzie *et al.* (2011) to "Conduct preliminary research using inductive approach with subject matter experts or practitioners" (p. 299).

The pilot study received eleven usable responses: seven from lawyers, three from law clerks, and one from a legal assistant. Eight of the eleven respondents (72%) had more than twenty years of legal experience. Notably in the final research 49% of the respondents have over twenty years of legal experience. Twenty-two responses were received from LinkedIn group members (LinkedIn 2015) with two usable questionnaires obtained; in the final research the social media site LinkedIn was the source of the large majority of usable responses. The LinkedIn responses for the qualitative pilot study were not included in the final research. The large majority of responses were from US residents, again similar to the final research.

The factors associated with "intuitive" technology identified in the pilot study were:

1. The level of training required to use the technology.
2. The difficulty in learning the technology.
3. The degree to which the technology is similar to other technology.
4. The degree to which the technology is similar to the manual legal process.
5. The degree to which the technology has the correct perspective of the legal profession "it should function as if a lawyer designed it…" (McAran 2011b, p. 10).
6. Ten respondents felt it was important that legal technology use the correct legal terminology.

The above identified factors were the basis of the creation of related measurement items for PI. Notably one respondent in the exploratory qualitative pilot commented: "From my point of view the "intuitive aspect" is the biggest factor in trying and then buying new technology" (McAran 2011b, p. 42).

5.5 Scale Development – Perceived Intuitiveness

MacKenzie *et al.* (2011) note,

> Indeed, as lamented by Nunnally and Bernstein, "no precise method can be stated to outline the domain of variables for a construct properly… the theorizing process is necessarily intuitive" (p. 88). However, even though this may be an intuitive process, we believe that there are ways to structure and guide this theorizing… (p. 295).

Moore and Benbasat (1991) transformed the Rogers (1983) factors of innovation diffusion into "perceived" factors of using a computer innovation. They cite Ajzen and Fishbein (1980) on the importance of considering attitudes to using an object as compared to attitudes towards an object itself:

> Primary attributes are intrinsic to an innovation independent of their perceptions by potential adopters. The behaviour of individuals, however, is predicated by how they **perceive** these primary attributes (Moore and Benbasat 1991 p. 194, emphasis in original).

The approach used by Moore and Benbasat (1991) is broadly comparable with the approach used by Davis (1986) in the development of the TAM items. It is notable that Moore and Benbasat (1991) include the PU items (Davis 1986) into the Relative Advantage construct they created. They also used a similar approach in adopting items from PEOU (Davis 1986) into their Ease of Use construct. Following the precedent of Davis (1986) and Moore and Benbasat (1991), the proposed intuitive construct is conceptualized as "Perceived Intuitiveness".

Moore and Benbasat (1991) also argue that measurement items should include reference to the elements of behaviour, target, and context – this approach has been used in the creation of the measurement items of the PI construct:

> Ajzen & Fishbein (1980) also point out that the various **elements of behaviour** must be delineated in order to develop an accurate indication of respondents' perceptions. In addition to an **actual behaviour** (using a PWS), these elements include the **target** at which the behaviour is directed (the PWS), a **context** for the behaviour (in one's job), and a time frame (now and into the future). While both the target and the behaviour were defined in all items, the latter two elements did not have to be explicitly included as the general instructions for completing the eventual questionnaire made these elements implicit (p. 199, emphasis in original).

The focus on behavior is also found in Likert (1967): "It is essential that all statements be expressions of desired behavior and not statements of fact" (p. 90). As suggested (Nunnally 1978 as cited in Bhattacherjee 2001), three or more items are created for the new PI technology construct. Items for the PI construct were developed from the results of the pilot study, from the literature, and from a novel method of scanning the literature.

The measurement items for PI were developed to isolate and characterize as much as possible of the domain content of the new construct. The literature review describes this process. Fifteen measurement items (for use with a Likert scale) have been developed for PI:

1. When I use this legal technology product in my practice, I find the user interface of the legal technology product familiar (Bullinger *et al.* 2002, p. 4; Raskin 1994).
2. When I use this legal technology product in my practice, I find the process of completing the task in the legal technology product similar to the manual legal process (Qualitative Exploratory Pilot Study: McAran 2011b; Shaw 2011).
3. When I use this legal technology product in my practice, I find the terminology used to be consistent with the use in the profession (Qualitative Exploratory Pilot Study: McAran 2011b).
4. When I use this legal technology product in my practice, I find it reflects the values of the legal profession (Turner 2008).
5. When I use this legal technology product in my practice, I find the user interface of the product is similar to other legal technology products (Qualitative Exploratory Pilot Study: McAran 2011b; Raskin 1994).
6. When I use this legal technology product in my practice, I find it functions as if a lawyer designed it (Qualitative Exploratory Pilot Study: McAran 2011b).
7. I find this legal technology product can be used in my practice with minimal training (McAran, Manwani 2013, 2014; Qualitative Exploratory Pilot Study: McAran 2011b).
8. I find this legal technology product, when used in my practice, easy to learn (Bullinger *et al.* 2002 p. 4; Qualitative Exploratory Pilot Study: McAran 2011b).
9. When I use this legal technology product in my practice, I find it allows me to a make a mistake yet recover (O'Brien, *et al.* 2010, p. 107; Story 2011, not paged, sections 4.5 – 4.7).
10. When I use it in my practice, this legal technology product adapts to my specific goals as I enter responses (McAran, Manwani 2013, 2014; O'Brien, *et al.* 2010, p. 107).
11. When I use this legal technology product in my practice, I can predict the results of my actions (O'Brien, *et al.* 2010, p. 107).
12. When I use this legal technology product in my practice, it reflects my legal experience (McAran, Manwani 2013, 2014; O'Brien, *et al.* 2010, p. 107).

13. When I use this legal technology product in my practice, I can see the overall picture (Perry 2008; Robey and Taggart 1982).
14. Using this legal technology product is engaging (Anderson *et al.* 2010).
15. When I use this legal technology product in my practice, this legal technology product flows (Cooper 2007; Csikszentmihalyi 1991).

The process used by Davis (1986) to develop the original TAM constructs and to evaluate the reliability and validity of the TAM constructs is reviewed in the section. Davis (1986) used the domain sampling method to generate items (p. 79). In development of TAM the conceptual definitions of PU and PEOU and the literature were the basis for the development of the initial measurement items (Davis 1986, p. 35-36).

There were fourteen initial scale items for PEOU in the TAM model (Davis 1986): a similar process of measurement item development, as utilized by Davis (1986), is followed in this research. In addition, Davis (1986) used Likert scales noting that "Consistent with Ajzen and Fishbein (1980), perceptions will be measured using Likert-type ('agree-disagree') rating formats" (p. 78-79): Likert scales are similarly used in this research.

Davis (1986) estimated that 10 measurement items would be needed to obtain a reliability of .80 (p. 83). The estimate of the number of items required was constructed "to achieve a Cronbach alpha reliability of .80 … estimated using the Spearman-Brown Prophecy formula" (Davis 1986, p. 82-83). Davis (1986) then added 4 extra items to provide for items that would be eliminated (p. 82-83). Based on this calculation by Davis (1986), the fifteen items generated here for the PI construct are adequate to achieve the needed satisfactory value for Cronbach's alpha: these fifteen measurement items are reduced in number during the process of model specification, scale evaluation/refinement, and establishing content validity (MacKenzie *et al.* 2011) in the pre-tests and quantitative pilot study.

Subsequent to the development of these fifteen measurement items for PI, the QUESI instrument entitled was identified (Naumann and Hurtienne 2010). As discussed in Section 5.8, thirteen measurement items from this instrument were adapted to the current research and included among the measurement items for PI evaluated in the second quantitative pilot study.

5.6 Pre-tests of Perceived Intuitiveness Measurement Items

Davis (1986) performed a pre-test of the items that had been generated using 15 people (p. 85-89). Two pre-tests were used:

1. Rate the degree to which a statement corresponds in meaning to the PEOU definition with the objective of eliminating low rated items.
2. Rate the similarity of items to each other, with the objective of reducing the number of items (p. 85-86).

The method used was index cards with the individual items appearing on separate index cards. Pre-test 1 and Pre-test 2 used in this research are direct adaptations of the pre-test used by Davis (1986). Appendix C provides the instruments used for Pre-test 1 and Pre-test 2:

Pre-test 1 – The respondent is provided with the definition of the PI construct and asked to rank the proposed measurement items of the PI construct based on the importance of item to the construct (item # 1 being the most important) – adapted from Davis (1986).

Pre-test 2 – The respondent is provided with the measurement items of the proposed PI construct and asked to group the items into similar categories using in the range of 3 to 5 categories – adapted from Davis (1986).

There were ten respondents to pre-test 1 and twelve respondents to pre-test 2. The items listed below were dropped based on pre-test 1 as low rated. No additional items were dropped because of pre-test 2.

Item # 4: When I use this legal technology product in my practice, I find it reflects the values of the legal profession (ranked 15th).

Item # 5: When I use this legal technology product in my practice, I find the user interface of the product is similar to other legal technology products (ranked 12th).

Item #12: When I use this legal technology product in my practice, it reflects my legal experience (ranked 13th).

Item # 13: When I use this legal technology product in my practice, I can see the overall picture (ranked 11th).

Item # 14: Using this legal technology product is engaging (ranked 14th).

PI Measurement Items remaining after Pre-tests

1. When I use this legal technology product in my practice, I find the user interface of the legal technology product familiar.
2. When I use this legal technology product in my practice, I find the process of completing the task in the legal technology product similar to the manual legal process.
3. When I use this legal technology product in my practice, I find the terminology used to be consistent with the use in the profession.
4. When I use this legal technology product in my practice, I find it functions as if a lawyer designed it.
5. I find this legal technology product can be used in my practice with minimal training.
6. I find this legal technology product, when used in my practice, easy to learn.
7. When I use this legal technology product in my practice, I find it allows me to a make a mistake yet recover.
8. When I use it in my practice, this legal technology product adapts to my specific goals as I enter responses.
9. When I use this legal technology product in my practice, I can predict the results on my actions.
10. When I use this legal technology product in my practice, this legal technology product flows.

5.7 Measurement Items: Perceived Usefulness, Perceived Ease of Use, and Compatibility

The measurement items for PI, PEOU, and COM used in this this research have been adapted from Chau and Hu (2002a). Table 5-2 below provides the adapted questions used in this research.

Table 5-2 Measurement Items for Perceived Usefulness, Perceived Ease of Use, and Compatibility Adapted for Current Research from Chau and Hu (2002a)	
Item	Question Reformatted for Current Research
	Perceived Usefulness
1	Using this legal technology product in my practice cannot improve the service I provide to my clients.
2	Using this legal technology product in my practice will enhance my effectiveness in client service.
3	Using this legal technology product in my practice can make providing service to my clients easier.
4	Using this legal technology in my practice would be useful in providing service to my clients.
	Perceived Ease of Use
1	Learning to use this legal technology product in my practice would be easy for me.
2	I would find it easy to get this legal technology product in my practice to do what I need to do in my service to clients.
3	It is easy for me to become skillful in using this legal technology product in my practice.
4	In my practice, I find this legal technology product easy to use.
	Compatibility
1	Using this legal technology product in my practice fits with the way I work.
2	Using this legal technology product in my practice does not fit with my practice preferences.
3	Using this legal technology product in my practice fits with my client service needs.

Source: Chau and Hu (2002a, p. 226-227)

5.8 QUESI Instrument

Subsequent to the development of these fifteen measurement items for PI Intuitiveness, the instrument entitled QUESI was identified (Naumann and Hurtienne 2010). These questions were included among the measurement items for PI in the quantitative pilot study. The questions in Table 5-3 are reformatted as specified by Moore and Benbasat (1991) to correspond to the requirements of the TRA (Ajzen and Fishbein 1980).

Table 5-3 QUESI Instrument: Corresponding Measurement Items Created

Item	Measurement Item Included for PI in Quantitative Pilot Study
1.	When I use this legal technology product in my practice, I can use the product without thinking about it.
2.	Pilot: When I use this legal technology product in my practice, the product is <u>not</u> complicated to use. Main Research: When I use this legal technology product in my practice, the product <u>is</u> complicated to use.*
3.	When I use this legal technology product in my practice, I barely have to concentrate on using the product.
4.	When I use this legal technology product in my practice, I achieve what I want to achieve with the product.
5.	When I use this legal technology product in my practice, I am able to achieve my goals in the way I had imagined.
6.	When I use this legal technology product in my practice, the product helps me to completely achieve my goals.
7.	When I use this legal technology product in my practice, the product is easy to use from the start.
8.	When I use this legal technology product in my practice, how the product is used is clear to me right away.
9.	When I use this legal technology product in my practice, I can interact with the product in a way that seems familiar to me.

Table 5-3 QUESI Instrument: Corresponding Measurement Items Created (Continued)	
Item	Measurement Item Included for PI in Quantitative Pilot Study
10.	When I use this legal technology product in my practice, it is always clear to me what I have to do to use the product.
11.	When I use this legal technology product in my practice, I automatically do the right thing to achieve my goals.
12.	When I use this legal technology product in my practice, no problems occurred when I use the product.
13.	When I use this legal technology product in my practice, the process of using the product does not go smoothly.

Source: Naumann and Hurtienne (2010) *In the main research this question was rephrased.

McAran (2015) used a novel adaptation of the Brennan-Prediger coefficient to measure the degree of agreement of the characteristics of intuitive technology derived from the preliminary qualitative pilot study, the literature review, and the novel method of scanning the literature utilized to identify attributes of intuitive technology, and found fair agreement. For the comparison of the three aforementioned sources of characteristics of "intuitive" technology and the measurement items from the QUESI instrument there is low to fair agreement. See Appendix D for details of this procedure**.**

5.9 Quantitative Pilot Study and Scale Refinement

5.9.1 Introduction

The quantitative pilot study used an online Qualtrics survey and consisted partly of paid Qualtrics data. In addition, respondents were solicited using LinkedIn social media legal profession related groups, the TechnoLawyer (TechnoLawyer 2015) email news service, and personal contacts.

A total 131 responses were received to the web-based Qualtrics pilot study. The survey was conducted from April to August 2014. After review, 74 (56.49%) responses were identified as usable. The respondents by source are shown below in Table 5-4.

Table 5-4 Respondents by Source				
Source	Total Responses	% Total Responses	Usable Responses	% Usable Responses
Qualtrics (purchased panel data)	77	58.78%	34	45.95%
LinkedIn (the LinkedIn InMail service and legal groups) and TechnoLawyer email news service*	47	35.88%	33	44.59%
Personal Contacts**	7	5.34%	7	9.46%
Total	131	100.00%	74	100.00%

*Calculated as residual amount after deducting identified personal contact responses. Emails were also sent directly to legal professionals who had posted on a legal technology email news service called TechnoLawyer.
**The number of personal contact responses is estimated as it cannot be known for certain which responses were solicited personal contact responses rather than responses originated through LinkedIn.

Summary of Product Analysis

Unexpectedly, there was a wide array of products reported on in the pilot study (111). Thirty-eight of these products were reported only once. In addition, there were 13 reports of product use in which a specific product was not mentioned, only the generic type of product: examples of these include a litigation product, a billing product, and a document management product. There were 15 products that were reported by more than one respondent: the top responses were in regards to Westlaw (16 responses, 14.41%), PC Law (9 responses, 8.11%), Fastcase and Lexis (5 responses, 4.50%). Summation, Timeslips, and The Conveyancer were each reported on by 4 respondents (3.60%).

The above analysis supported the decision to limit the products on which responses were to be made in the main research. The respondents were also permitted to enter a legal technology product of their own choice. Because of the high cost of Qualtrics panel data and the relatively low percentage of usable responses to the total responses it was decided to use LinkedIn to solicit responses in the dissertation research.

Pilot Study Demographics of Usable Responses

Table 5-5 Gender		
Gender Analysis	Number	Percentage
Male	31	41.9%
Female	43	58.1%
Total	74	100%

Table 5-6 Occupation		
Occupation	Number	Percentage
Lawyer	32	43.2%
Paralegal	20	27.0%
Law Clerk	8	10.8%
Legal Assistant	6	8.2%
Other	8	10.8%
Total	74	100%

Table 5-7 Experience		
Legal Experience	Number	Percentage
Less than 1 year	5	6.8%
1-10 years	24	32.4%
11-20 years	16	21.6%
21-30 years	14	18.9%
Over 30 years	15	20.3%
Total	74	100%

Table 5-8 Geographic Area of Respondents			
United States			
North East	8		10.81%
South	21		28.38%
Mid-West	7		9.46%
West	17		22.97%
Total United States		53	71.6%
Canada			
Ontario	16		21.62%
Quebec	1		1.35%
Alberta	1		1.35%
Total Canada		18	24.3%
Other			
Australia	2		2.70%
United Kingdom	1		1.35%
Total Other		3	4.1%
Total		74	100.00%

5.9.2 Quantitative Data Analysis and Scale Refinement

Overview

> MacKenzie *et al.* (2011) provide guidance on the process of scale refinement:
>
> Problematic Indicators are ones that have low validity, low reliability, strong and significant measure error covariances, and/or non-hypothesized cross-loadings that are strong and significant (p. 316).

They also provide guidance on removal of problem items:

> For first-order constructs … Provided that all of the essential aspects of the construct domain are captured by the remaining indicators, consider eliminating indicators that have (1) nonsignificant loadings on the hypothesized construct, (2) squared completely standardized loadings that are less than .50, and (3) large and significant measurement error covariances with other measures. Nonsignificant or weak loadings are an indication of a lack of validity, and measurement error covariances may be a sign of multidimensionality (Gerbing and Anderson 1984) (p. A3).

In the pilot study it was decided to delete eight measurement items for Perceived Intuitiveness; the items deleted and the basis for the deletions are shown in Table 5-9.

Table 5-9 Measurement Items Deleted Based on Pilot Study Results

Question	Reason for Deletion
When I use this legal technology product in my practice, I barely have to concentrate on using the product.	- Cronbach's alpha increases to .913 if the item is deleted.
When I use this legal technology product in my practice it functions as if a lawyer designed it.	- The Measure of Sampling Adequacy is low at .558 - The item loads primarily on the eighth factor (Uses Implicit Knowledge), which has a loading less than that indicated for the eighth factor in the Parallel Analysis.
When I use this legal technology product in my practice, the product helps me to completely achieve my goals.	- In Principal Component Varimax cross-loads on Achieve Goals (.463) and Adapts/Flows (.522).
When I use this legal technology product in my practice, how the product is used is clear to me right away.	- In Principal Component Varimax cross-loads on Familiar (.644) and Perceived Ease Use (.444). - This concept is better represented by PI20: *When I use this legal technology product in my practice, it is always clear to me what I have to do to use the product*, which loads on Familiar at .745.
When I use this legal technology product in my practice, the product is easy to use from the start.	- In Principal Component Varimax cross-loads on Familiar (.559), Perceived Ease of Use (.509), and Minimal Training (.421).

Table 5-9 Measurement Items Deleted (Continued)	
Question	Reason for Deletion
When I use this legal technology product in my practice I find the process of completing the task in the legal technology product similar to the manual legal process.	- Cronbachs's alpha increases to.923 if the item is deleted - The Measure of Sampling Adequacy is low at .403 - The item loads primarily on the eighth factor (Uses Implicit Knowledge), which has a loading less than that indicated for the eighth factor in the Parallel Analysis.
When I use this legal technology product in my practice, the process of using the product does <u>not</u> go smoothly. **(reverse coded)**	- In Principal Component Varimax cross-loads on Familiar (.409), Achieve Goals (.330), and Adapts/Flows (.316).
When I use this legal technology product in my practice, <u>no</u> problems occur when I use the product.	- In Principal Component Varimax cross loads on Familiar (.497), Minimal Training (.364), and Adapts Flows (.330).

SPSS Factor Analysis Performed

Four distinct SPSS Factor Analyses were run:

1. Principal Component Factor Analysis with Varimax Rotation
2. Principal Component Factor Analysis with Oblimin Rotation
3. Common Factor (Maximum Likelihood) with Varimax Rotation
4. Common Factor (Maximum Likelihood) with Oblimin Rotation

The Principal Component Factor Analyses with Varimax Rotation and Oblimin Rotation are shown below. The results of the Principal Component Factor analysis with Varimax rotation show eight factors representing 72.093% of total variance. With the Oblimin rotated solution a similar result was obtained again representing 72.093% with eight factors.

With Principal Component Factor Analysis with Oblimin Rotation the same factors are obtained but the ranking of the factors is significantly different. Notably the "Uses Implicit

Knowledge" remains the factor with the smallest loading. When the Common Factor (Maximum Likelihood) analysis was run, the same first seven factors emerged. For both rotations there were differences in rankings based on sum of squares loadings. An eighth factor also emerged for both the rotations but it was not identifiable.

Table 5-10 Summary Results Principal Component Factor Analysis with Varimax Rotation

Component	Initial Eigenvalues		Rotation Sums of Squared Loadings	
	Total	Cumulative %	Total	Ranking
1 – Familiar	12.256	36.048	5.571	1
2 – Perceived Usefulness	4.116	48.153	4.424	2
3 – Perceived Ease of Use	1.787	53.411	3.502	3
4 – Achieve Goals	1.735	58.515	2.907	4
5 – Minimal Training Required	1.273	62.258	2.683	5
6 – Adapts/Flows	1.197	65.778	2.236	6
7 – Tolerant of Error	1.129	69.100	1.931	7
8 – Uses Implicit Knowledge	1.018	72.093	1.257	8

Table 5-11 Summary Results Principal Component Factor Analysis with Oblimin Rotation

Component	Rotation Sums of Squared Loadings
	Total
1 – Familiar	6.641
2 – Perceived Ease of Use	6.610
3 – Adapts/Flows	6.475
4 – Perceived Usefulness	5.641
5 – Minimal Training	5.200
6 – Achieve Goals	4.297
7 – Tolerant of Error	3.124
8 – Uses Implicit Knowledge	1.869

Note on Compatibility

In all of the rotated solutions the Compatibility construct cross loaded. The details for Principal Component Factor Analysis with Varimax Rotation are shown below:
COM1 .355 Perceived Usefulness; .518 Perceived Ease of Use; .315 Achieve Goals
COM2 .537 Perceived Usefulness; .321 Perceived Ease of Use; .551 Achieve Goals
COM3 .621 Perceived Usefulness; .304 Perceived Ease of Use; .345 Achieve Goals

These results indicate Compatibility has high correlation with PU and PEOU. This result will be important in the analysis of the PLS-SEM model. As Compatibility has been of long standing importance in user of acceptance research (Chau and Hu 2002a; Moore and Benbasat 1999) and diffusion of innovation research (Tornatzky and Klein 1982), it is retained in the research model. In addition, in the literature review, the relationship of "fit", closely related to Compatibility was identified as related to "intuitive" technology (Shaw 2011).

Parallel Analysis

In addition, a Parallel Analysis was run to determine the number of factors (O'Connor 2000). Parallel Analysis calculates random eigenvalues based on a Monte Carlo simulation (Ledesma and Valero-Mora 2007). When the factors generated from the Varimax rotation are compared to the 95% percentile factors generated from the Parallel Analysis a seven factor solution is supported. Based on these results, a decision was made to remove items associated with the eighth factor "Uses Implicit Knowledge" in the Principal Component factor analysis.

Table 5-12 Comparison of Principal Component Rotation and Parallel Analysis			
Factor	Initial Eigenvalues	Varimax Rotation Sums of Squared Loadings	Parallel
	Total	Total	95th Percentile
1 – Familiar	12.256	5.571	2.800
2 - Perceived Usefulness	4.116	4.424	2.508
3 – Perceived Ease of Use	1.787	3.502	2.289
4 – Achieve Goals	1.735	2.907	2.131
5 – Minimal Training Required	1.273	2.683	1.981
6 – Adapts/Flows	1.197	2.236	1.860
7 - Error Tolerant	1.129	1.931	1.755
8 – Use Implicit Knowledge	1.018	1.257	1.646

Source: O'Connor, B. P. (2000). SPSS, SAS, MATLAB, and R Programs for Determining the Number of Components and Factors Using Parallel Analysis and Velicer's MAP Test. (Online). Available from: https://people.ok.ubc.ca/brioconn/nfactors/nfactors.html.

5.9.3 Summary of Pilot Study

One pilot respondent noted, "this was an easy survey that wasn't too long. The questions weren't too redundant." Six of the respondents indicated they found there were too many questions or that the questions were redundant, repetitive, or that the questions overlapped.

A common suggestion for improvement was for questions to focus on a particular type of legal technology. This was reported by five respondents and coded as "Finer Product/Product Category Focuses". One of these respondents commented, "your research could be made more specific (i.e.) by forming different questions based on the type of legal technology specified by the survey taker. Perhaps at least have categories (legal research, case management, billing etc.)".

Three respondents felt that the wording of the questions could be improved. The comments mentioned, "…have to reread them a couple of times…", "… could be worded a little better…" and "…a little bit wordy…"

Based on the above comments and the detailed analysis performed on the qualitative and quantitative results, the following overall changes were made in regards to the finalized research instrument:

1. Based on the analysis performed it was decided to reduce the number of PI measurement items from 23 to 15.
2. It was decided to list six commonly used legal technology products as a basis for user responses: (1) Westlaw, (2) PCLaw, (3) LexisNexis – Quicklaw, (4) Fastcase, (5) AccessData – Summation, (6) Sage – Timeslips. Respondents were also able to "write-in" a technology of their choice.

It was also decided to retain the Compatibility construct in the model despite the fact that in all rotated solutions the Compatibility construct cross loaded on the factors identified. The decision was based on the historical prominence of Compatibility in technology acceptance research, particularly the work of Chau and Hu (2002a).

In the main dissertation research respondents were solicited using the social media site LinkedIn. Posts were made to LinkedIn legal related groups. The LinkedIn message system (InMails) was also used to solicit respondents. Emails were also sent directly to legal professionals who had posted on a legal technology email news service called TechnoLawyer. The population solicited was legal professionals (lawyers, paralegals, law clerks, and legal assistants).

5.10 Summary

The final measurement items for the Perceived Intuitiveness construct used in the research (in randomized order as they appear in the final research instrument) are:

1. When I use this legal technology product in my practice, I find the user interface of the legal technology product familiar.

2. I find this legal technology product can be used in my practice with minimal training.
3. When I use this legal technology product in my practice, I automatically do the right thing to achieve my goals.
4. I find this legal technology product, when used in my practice, easy to learn.
5. When I use this legal technology product in my practice, I can predict the results of my actions.
6. When I use this legal technology product in my practice, it is always clear to me what I have to do to use the product.
7. When I use it in my practice, this legal technology product flows.
8. When I use this legal technology product in my practice, I achieve what I want to achieve with the product.
9. When I use this legal technology product in my practice, I find the terminology used to be consistent with the use in the profession.
10. When I use this legal technology product in my practice, I can use the product without thinking about it.
11. When I use it in my practice, this legal technology product adapts to my specific goals as I enter responses.
12. When I use this legal technology product in my practice, I can interact with the product in a way that seems familiar to me.
13. When I use this legal technology product in my practice, I am able to achieve my goals in the way I had imagined.
14. When I use this legal technology product in my practice, I find it allows me to a make a mistake yet recover.
15. When I use this legal technology product in my practice, the product is complicated to use.

6. Quantitative Results

6.1 Introduction

Total responses received to the Qualtrics online survey were 218 with 154 usable responses. The research was conducted in the eight-month period from October 2014 to May 2015. Respondents were solicited using the following methods:

- Postings to the LinkedIn social media website in 160 groups related to the legal profession.
- Use of the LinkedIn InMail service. InMails were sent to 958 LinkedIn members who are legal professionals (lawyers, paralegals, law clerks, and legal assistants).
- Posts on the Technolawyer email news service were reviewed and emails were sent to 180 individuals (mainly lawyers) soliciting participation in the research.

The response rate was 19.15% (based on InMails and emails sent). The gender distribution of the respondents was 46.6% male and 53.4% female. Among the respondents, 47.4% were lawyers and 33.7% were paralegals. Notably, the respondents had extensive legal experience: 22.1% had over 30 years of experience; 26.6% had 21-30 years; 29.2% had 11-20 years; and 20.8% had 1-10 years. The summary of the geographic location of the respondents is as follows: 66.9% United States; 24.6% Canada, and 8.5% other international. Detailed demographics of the responses are presented in Appendix E.

Of the 154 usable responses received, 88 responses were provided based on the Westlaw, LexisNexis, and Fastcase products. In addition, there were six additional responses based on other similar online legal research technologies: Canlii, Casemaker, and WestlawNext. In the remaining portion of this chapter, to provide clarity and to avoid repetition, this group of 94 (88 + 6) responses are referred to as the "Westlaw data set". Because these responses represent 94 of the total 154 usable responses and because of the relative homogeneity of these products it was decided to evaluate them as the primary sample of this research.

Again to provide clarity and to avoid repetition, the group of remaining 60 responses are identified henceforth as the "non-Westlaw data set". Hair *et al*. (2013) recommend using 30% of

the data as a holdout sample (p. 6): the 60 responses constituting the non-Westlaw data is a hold-out sample which represents 39% of the total 154 responses.

The original research model is shown in Figure 5-1 (page 83). As will be discussed in the next section, it was decided to modify the original research model to add a second level construct identified as User Experience (UE).

The data preparation process, evaluation of outliers, and normality of the data is outlined. Details of the results for the measurement model and the structural model are provided. Further, in this chapter potential CMB and non-response bias are also discussed. Finite Mixture Segmentation (FIMIX) and Multi-Group analysis are also performed. This chapter is organized as follows:

6.1 Introduction
6.2 Preliminary Model Exploration
6.3 Data Characteristics
6.4 PLS Model Results
    6.4.1 Introduction
    6.4.2 Measurement Model Results
    6.4.3 Structural Model Results
    6.4.4 Exploring Alternatives: TAUE Model with Westlaw Data Set (*n*=94)
    6.4.5 Exploring All the Data
6.5 Complementary PLS Analysis
    6.5.1 Finite Mixture (FIMIX) Segmentation
    6.5.2 Multi-Group Analysis
    6.5.3 Moderator Analysis
6.6 Analysis of Non-Westlaw Data Set
6.7 Common Method Variance/Non-Response Bias
    6.7.1 Common Method Bias
    6.7.2 Non-Response Bias
6.8 Comparing the TAUE Model to the TAM and Summary

6.2 Preliminary Model Exploration

It was decided to perform the primary analysis of the results on a subset of the data that consisted of responses concerning legal research technology such as the Westlaw and LexisNexis products (henceforth identified as the Westlaw data set). When the Westlaw data set (n=94) was run in the original research model (without the moderator variable Degree of Voluntary Use and Interaction terms), the results show a negative path coefficient of -.254 from PEOU to PU. Further, the Bootstrap test found only 3 of 10 paths in the model significant. The Fornell-Larcker Criteria analysis revealed a violation of the discriminant validity criteria for PI with the square root of AVE (0.7894) less than the correlation between PEOU and PI (0.8343). In addition, reviewing the latent variable correlations, COM exhibits a high correlation with PEOU (.7015) and PI (.7898). This has been interpreted as indicative of the "suppressor effect" (Hair *et al.* 2010, p. 203). Hair *et al.* (2014) comment "In situations characterized by collinearity among constructs, a second-order construct can reduce such collinearity issues and may solve discriminant validity problems" (p. 229-230).

Based on these indications of collinearity it was decided to re-organize the model using a second order construct. In addition, the literature review suggested the emergence of an overall evaluative concept related to use of computer technology identified as UE (Laugwitz, Held, and Schrepp 2008). This emergent concept was created as a second order construct with the existing first order reflective constructs (PEOU, PI, COM) of the model as its components. To create the UE second order construct using the repeated indicators method (Hair *et al.* 2014) the "best" three PI items were determined based on contribution to R^2 (See Appendix J). This revised model showed only positive paths and had acceptable R^2; further the bootstrap analysis showed all paths as significant except for the paths for the moderator variable Degree of Voluntary Use (VOL) to USE and the related interaction term for PU to USE. This second model is shown in Figure 6-1.

The next step in the analysis was the evaluation of the effect size (f^2) of the revised model. Removing the UE construct gave an f^2 of .1509 (medium); removing the PU construct gave an f^2 of .1310 (medium). An attempt was also made to evaluate the f^2 effect of removing each of the component first order constructs of UE from the model: this procedure gave unexpected results (Tables 6-1 and 6.2). Removing PEOU resulted in an increase in R^2: the consequent f^2 was negative: -.0109. When the COM construct was deleted, the R^2 was slightly

increased with an f^2 of negative: -.0001. A similar analysis was performed in regard to the Predictive Relevance, Q^2 and q^2, and showed similar results. This analysis introduces the idea of a partial f^2 and q^2 analysis for component first order constructs related to a second order construct.

Table 6-1 R^2 and f^2 for Model with User Experience Second Order Construct with Perceived Intuitiveness, Perceived Ease of Use, Compatibility Constructs

User Experience and Perceived Usefulness Effect Size: Model R^2 .3490	
Excluded Construct	R^2 : f^2
User Experience	R^2 .2509 : f^2 .1509 (medium)
Perceived Usefulness	R^2 .2637 : f^2 .1310 (medium)
Perceived Intuitiveness, Perceived Ease of Use, and Compatibility Effect Size	
Excluded Construct	R^2 : f^2
Perceived Intuitiveness	R^2 .3224 : f^2 .0409 (small)*
Perceived Ease of Use	R^2 .3612: f^2 -.0187 (reverse signed)*
Compatibility	R^2 .3491 : f^2 -.0001 (reverse signed)*

*Hair *et al.* (2014, p. 198): f^2 Results: .02 low, .15 medium, and .35 high.

Table 6-2 Q^2 and q^2 for Model with User Experience Second Order Construct with Perceived Intuitiveness, Perceived Ease of Use, Compatibility First Order Constructs	
User Experience and Perceived Usefulness Effect Size: Model Q^2 : .1831	
Excluded Construct	Q^2 : q^2
User Experience	Q^2 .1360 : q^2 .0576 (small)
Perceived Usefulness	Q^2 .1544 : q^2 .0351 (small)
Perceived Intuitiveness, Perceived Ease of Use, and Compatibility Effect Size	
Excluded Construct	Q^2 : q^2
Perceived Intuitiveness	Q^2 .1694 : q^2 .0167 (small)
Perceived Ease of Use	Q^2 .1929 : q^2 -.0120 (reverse signed)
Compatibility	Q^2 .1789 : q^2 .0051 (small)

*Page 199 of Hair *et al.* (2014): "The q^2 effect size of a selected construct and its relationship to an endogenous construct in the structural model uses the same critical values for assessment used for the f^2 effect size evaluation". Hair *et al*. (2014, p. 198): f^2 Results: .02 low, .15 medium, and .35 high.

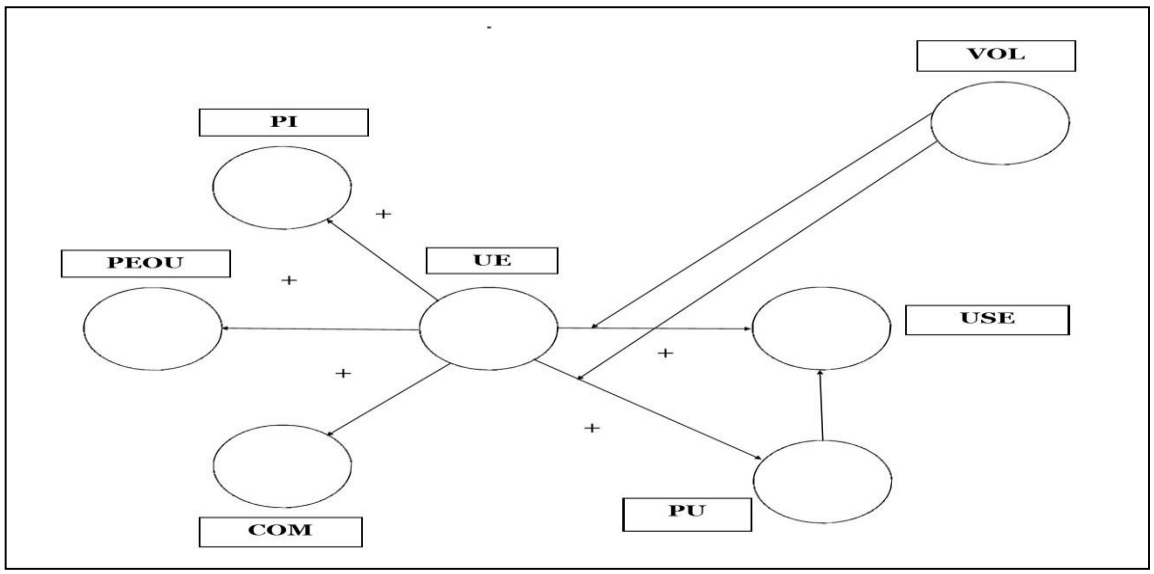
In a post on forum.smart.pls.com the issue of a negative f^2 and q^2 is discussed and the advice provided that f^2 and q^2 should be reported as 0 – meaning the variable had no impact (Nitzi 2011). Removing PEOU from the model increased the explanatory ability of the model (increasing R^2) and makes the model more parsimonious. Further research should investigate the phenomena.

The resulting model now identified at the TAUE model is shown in Figure 6-2. The revised model shows only positive values in regards to f^2, Q^2, and q^2 and is used as the final research model. All of the remaining PLS-SEM analysis is presented with regard to this model only.

In addition, the designated holdout sample of the non-Westlaw data set (n=60) was evaluated using this model. The results for the non-Westlaw data, consisting of a heterogeneous

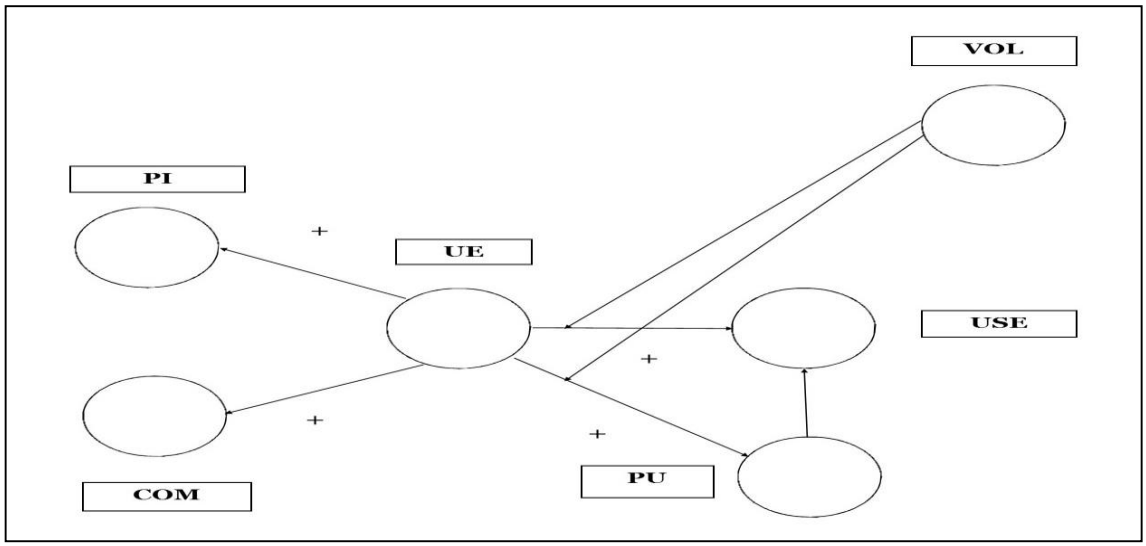
set of 36 legal technology products, are not as robust as with the primary Westlaw data set with the UE to USE path having a value of only .034 and not significant. These results are discussed further in section 6.6.

Figure 6-1 First User Experience Second Level Construct Model



COM – Compatibility; PEOU – Perceived Ease of Use; PI – Perceived Intuitiveness; PU – Perceived Usefulness; VOL – Degree of Voluntary Use

Figure 6-2 Final Model: Technology Acceptance User Experience Model



COM – Compatibility; PI – Perceived Intuitiveness; PU – Perceived Usefulness; UE – User Experience; VOL – Degree of Voluntary Use

6.3 Data Characteristics

As discussed, because of the apparent correlation in the original research model between the exogenous constructs, a second order reflective construct was created identified as UE and comprised of the three reflective exogenous constructs: PI, PEOU, and COM. In this revised model there is a maximum of two arrows pointing to one construct: the USE construct with two arrows pointing to it from UE and PU. The second revised model, the TAUE model, also has two arrows pointing to the USE construct. Referencing Hair *et al*. (2014, p. 21), 94 respondents would represent Statistical Power somewhat in excess of 80% with 1% significance for a minimum R^2 of .25.

Data Preparation and Cleaning of Data

The survey data was collected using the Qualtrics survey tool. The responses were downloaded using an Excel export tool available from Qualtrics. Each of the questionnaires was then individually printed and compared to the exported data file. After cleaning and review the data was imported into SmartPLS3 as a text file for statistical analysis.

There were a total of 218 responses to the survey. Five respondents did not consent to participate, and 42 indicated that they did not use legal technology; after these responses were removed, 171 responses remained. Of these, seventeen were rejected for the following reasons:

- Nine responses were rejected because of the nature of the product responded in regards to: either the product was a not a legal technology product (such as a generic accounting program or other technology like Salesforce); or the product they describe was a self-created product (using SQL or similar technology); or the product mentioned could not be identified.
- Five responses were rejected because of the job description provided by the respondent: responses such as “project manager” and “technology consultant” were not part of the target response group of legal professionals and were excluded.
- Three responses were rejected because of the response patterns: these were straight line responses of the same value or another suspect pattern of responses.

The final number of usable responses was 154.

Review for Outliers

Each individual set of responses was reviewed for potential outliers. As the responses for all questionnaire items except Degree of Use, Degree of Feature Use, and Degree of Voluntary Use were Likert scale questions with a scale of 1 to 7 (agree/disagree), there were few items that appeared as outliers. The only set of responses that could be potentially identified as outliers were individual sets of responses where there was little or no variation in the Likert scale values selected. As mentioned, these sets of responses were removed as part of the data preparation process. Similarly, a review of the responses for the Degree of Use, Degree of Feature Use, and Degree of Voluntary Use variables – rated on a scale of 1-100 – did not reveal outliers that should be removed from the data set.

Missing Values

There were no missing values among the 154 responses: forced responses were used in the Qualtrics online survey.

Scale of Variables

Degree of Use, Degree of Feature Use, and Degree of Voluntary Use are measured using a continuous slide scale from 1 to 100. The measurement items for both the exogenous and endogenous variables in the model are measured using a 7-item (1-7) Likert scale; these two very different methods were part of the questionnaire design to reduce the risk of CMB in this research. As far as the author is aware, this is the first use of continuous slide scales (1-100) to record use in user acceptance of technology research, but it has been described in other research (Hair, Wolfinbarger Celsi, Ortinau, and Bush 2013). In this research we test for CMB using the Harman single factor test.

Westlaw Data Set Descriptive Statistics and Normality Plot

Appendix F provides means, standard deviations, and variances for the Westlaw data set. In reviewing the descriptive statistics for the Westlaw data set, the dependent variables Degree of Use, Degree of Feature Use do not show significant skewness or kurtosis. A review of the histogram and the Q-Q plot for Degree of Voluntary Use show it as right skewed. FeatUse (Degree of Feature Use) has the closest to normal distribution followed by Use (Degree of Use). Degree of Voluntary Use is quite non-normal: this can be seen in a review of the histogram, the Q-Q plot, and in the skewness statistic which has a value of -.955.

The measurement items for PU, PEOU, and COM show items with excessive skewness: PU – 3 of 4 items; PEOU – all items; COM – all items; PI – 8 of 15 items. Similarly, the measurement items for PU, PEOU, and COM show items with excessive kurtosis: PU – 2 of 4 items; PEOU – 3 of 4 items; and PI – 2 of 15 items (Hair *et al.* 2003 p. 243-244). These results indicate potential issues in regards to the normality of the data.

Degree of Voluntary Use has a much higher variance than Degree of Use and Degree of Feature Use. Degree of Voluntary Use also has a higher mean than Degree of Use and Degree of Feature Use. In addition, the majority of items for PI have lower means and higher variances than the items for PU, PEOU, and COM. Moreover, the means and variances for PU, PEOU, and COM are much more consistent than the means and variances for the PI measurement items.

Normality of Dependent Variables

Summary of Normality Statistics: Westlaw Data Set (*n*=94)

Table 6-3 Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Degree of Feature Use	.133	94	.000	.946	94	.001
Degree of Use	.147	94	.000	.918	94	.000
Degree of Voluntary Use	.281	94	.000	.722	94	.000

[a]Lilliefors Significance Correction

The Kolmogorov-Smirnov and the Shapiro-Wilk statistic shows Degree of Use, Degree of Feature Use, and Degree of Voluntary Use as non-normal with significance values less than .05 (Schwab 2005). PLS-SEM does not require normality of data as it is based on regression; however, extremely non-normal data may reduce the possibility the bootstrap process will show relationships as significant (Hair *et al.* 2014, p. 54).

6.4 PLS Model Results

6.4.1 Introduction

The results of the PLS model are presented in this section. The PLS Measurement and Structural model results are presented only for the Westlaw data set (*n*=94). In addition, this section evaluates potential additional models and the all the data (*n*=154). This section is organized as follows:

6.4.1 Introduction
6.4.2 Measurement Model Results
6.4.3 Structural Model Results
6.4.4 Exploring Alternatives: TAUE Model with Westlaw Data Set (*n*=94)
6.4.5 Exploring All the Data

Note: For the remaining tables Interaction Terms have been removed to simplify the table.

6.4.2 Measurement Model Results

Table 6-4 Indicator Reliability and AVE Westlaw Data Set (*n*=94)

	Composite Reliability	Cronbach's Alpha	Average Value Extracted
COM	0.9160	0.8612	0.7847
PI	0.8477	0.7318	0.6517
PU	0.9059	0.8596	0.7084
UE	0.8936	0.8549	0.5891
USE	0.8527	0.6548	0.7432

Cronbach's Alpha for USE is less than .70 at .6548; however, Composite Reliability is over .70 with a value of .8527. Hair *et al.* (2014) advise values over .60 are acceptable for exploratory research. The AVE for all constructs exceeds .50 as recommended by Hair *et al.* (2014, p.107).

Table 6-5 Fornell-Larcker Criteria
Westlaw Data Set (n=94)

	COM	VOL	PI	PU	UE	USE
COM	0.8858					
VOL	0.1636	1.0000				
PI	0.6441	0.2148	0.8073			
PU	0.6394	0.1457	0.2675	0.8417		
UE	0.9370	0.2023	0.8703	0.5378	0.7675	
USE	0.3712	0.0568	0.3022	0.4107	0.3804	0.8621

Diagonals are the square root of the AVE.

The square root of the AVE for UE (.7675) is less than the correlation between COM and UE (.9370) and the correlation between PI and UE (.8703). The cause can be related to the high correlations between COM1 and the PI6 measurement item "It is always clear what I have to do…" (.6517) and COM2 and this same item (.6144). Because of the importance of the domain content of PI6 it is retained.

Table 6-6 Outer Loadings
Westlaw Data Set (*n*=94)

	COM	PI	PU	UE	USE	VOL
COM1	0.9404					
COM1				0.8934		
COM2	0.8891					
COM2				0.8232		
COM3	0.8241					
COM3				0.7685		
PI11		0.7791				
PI11				0.6930		
PI2		0.7288				
PI2				0.5334		
PI6		0.9039				
PI6				0.8385		
PU1			0.7004			
PU2			0.8759			
PU3			0.8589			
PU4			0.9155			
FeatUse					0.8521	
USE					0.8719	
VOL						1

Hair *et al.* (2014, p. 102) recommend values over .70 are acceptable for outer loadings. All the values for the first order reflective constructs are over .70 as recommended. However, for the second order construct PI11 loads at .6930 on UE. In addition, PI2 loads on UE at .5334. While the PI11 outer loading at .6930 is just below the recommended value of .70, the outer loading of PI2 is quite below the recommended value of .70 at .5334. However, because of the importance of the content of PI2 – I find this legal technology product can be used in my practice with minimal training – it is retained in this research.

Table 6-7 Cross-loadings
Westlaw Data Set (*n*=94)

	COM	PI	PU	UE	USE	VOL
COM1	**0.9404**	0.6352	0.5827	0.8934	0.3493	0.2235
COM1	**0.9404**	0.6352	0.5827	0.8934	0.3493	0.2235
COM2	**0.8891**	0.5596	0.5103	0.8232	0.2798	0.0916
COM2	**0.8891**	0.5596	0.5103	0.8232	0.2798	0.0916
COM3	**0.8241**	0.5105	0.6109	0.7685	0.3595	0.1117
COM3	**0.8241**	0.5105	0.6109	0.7685	0.3595	0.1117
PI11	0.5091	**0.7791**	0.3366	0.6930	0.3666	0.1526
PI11	0.5091	**0.7791**	0.3366	0.6930	0.3666	0.1526
PI2	0.3286	**0.7288**	-0.0402	0.5334	0.0874	0.2075
PI2	0.3286	**0.7288**	-0.0402	0.5334	0.0874	0.2075
PI6	0.6658	**0.9039**	0.2853	0.8385	0.2492	0.1740
PI6	0.6658	**0.9039**	0.2853	0.8385	0.2492	0.1740
PU1	0.3770	0.1184	**0.7004**	0.2986	0.3637	0.0467
PU2	0.5106	0.1212	**0.8759**	0.3868	0.4388	0.0815
PU3	0.5874	0.3250	**0.8589**	0.5321	0.2486	0.2005
PU4	0.6450	0.3088	**0.9155**	0.5593	0.3449	0.1465
USE	0.2545	0.1326	0.3843	0.2286	**0.8719**	0.1014
FeatUse	0.3902	0.3974	0.3221	0.4343	**0.8521**	-0.0070
VOL	0.1636	0.2148	0.1457	0.2023	0.0568	**1**

All the cross-loadings are higher on their respective constructs than any other construct, supporting the discriminant validity of the COM, PI, and PU constructs (Hair *et al*. 2014).

6.4.3 Structural Model Results

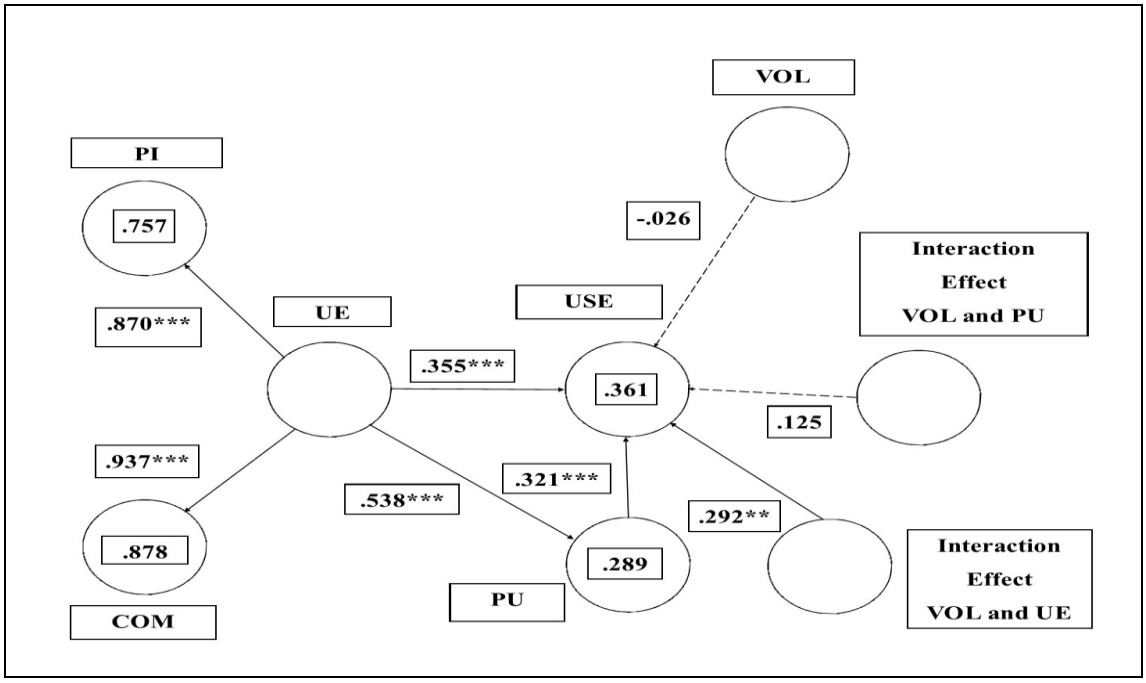
Table 6-8 R^2 Values TAUE Model Westlaw Data Set (n=94)		
	R^2	R^2 Adjusted
COM	0.8780	0.8767
PI	0.7575	0.7548
PU	0.2892	0.2814
USE	0.3612	0.3249

R^2 values of 0.67 are substantial; 0.33 moderate, and 0.19 weak (Henseler, Ringle, and Sinkovics 2009, p. 303). The results obtained for R^2 for USE would be classified as moderate. The explanatory results for USE are in line with the level of explanatory results obtained in technology acceptance research (Burton-Jones and Straub 2006).

Table 6-9 Total Effects TAUE Model Westlaw Data Set (n=94)						
	COM	VOL	PI	PU	UE	USE
COM	1.0000					
VOL		1.0000				-0.0264
PI			1.0000			
PU				1.0000		0.3209
UE	0.9370		0.8703	0.5378	1.0000	0.5276
USE						1

Notably the total effect of UE on USE is .5276 and the total effect of PU on USE is .3209.

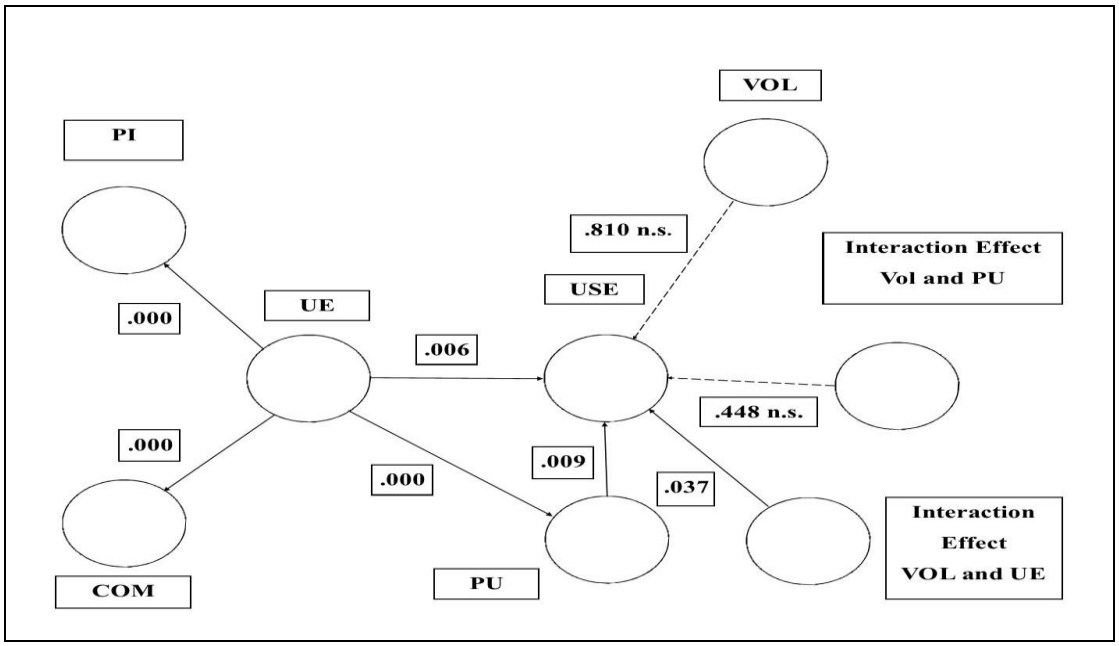
Figure 6-3 Structural Model Paths



*** $p < .01$ ** $p < .05$

In the above it is notable that UE has a path coefficient to USE of .3550, while PU has a path coefficient to USE of .3209. It is also notable that UE has a path coefficient to PU of .5378.

Figure 6-4 Structural Model Bootstrap



COM – Compatibility; PI – Perceived Intuitiveness; PU – Perceived Usefulness; UE – User Experience; VOL – Degree of Voluntary Use: Dotted lines indicate non-significant paths.
For details of Bootstrap results see Table F-2 Bootstrap Results (5,000 samples) in Appendix F.

Notably all paths are significant except for VOL to USE and the interaction term for PU to USE. A number of the hypotheses related to PI are supported. The hypothesis that VOL has a significant effect on USE is not supported. A detailed analysis of the results related to the hypotheses is provided in Chapter 7, Discussion. Hair *et al.* (2014, p. 138) also recommend reporting bootstrap confidence intervals. This is reported below in Table 6-10.

Table 6-10 USE Confidence Interval Table PLS Bootstrap (5,000 samples) Westlaw Data Set (*n*=94)

	Original Sample	Sample Mean	Bias	Confidence Interval Low	Confidence Interval Up
VOL: USE	-0.0264	-0.0318	-0.0054	-0.2562	0.1699
Interaction: PU to USE	0.1250	0.1378	0.0128	-0.1698	0.5046
Interaction: UE to USE	0.2923	0.2971	0.0048	0.0393	0.5658
PU to USE	0.3209	0.2798	-0.0410	-0.0419	0.4400
UE to COM	0.9370	0.9382	0.0012	0.9159	0.9631
UE to PI	0.8703	0.8679	-0.0024	0.7886	0.9297
UE to PU	0.5378	0.5469	0.0092	0.4231	0.7023
UE to USE	0.3550	0.3858	0.0307	0.1913	0.7064

It is notable that the confidence interval for PU to USE includes 0.00, whereas the UE to USE path does not.

Hair *et al.* (2014) advise: "In the context of PLS-SEM, a tolerance value of 0.20 or lower and a Variance Inflation Factor (VIF) value of 5 or higher respectively indicate a potential collinearity problem" (p. 125). There does not appear to be any significant collinearity between the exogenous constructs and USE. All Inner VIF values but are below 1.6; for the Outer VIF

values, COM1, COM2, and PU4 have the highest VIF values but are below 4 (See Appendix F). Collinearity appears most evident in relation to the interaction terms with VOL. It can be concluded there is no significant collinearity among the constructs in the model.

The f^2 measures when the omitted construct has "a substantive impact" (Hair *et al*. 2014, p. 177). Correspondingly q^2 indicates predictive relevance which is an assessment of the model's ability to predict: an important method of evaluating the structural model (Henseler *et al.* 2009). The calculation of f^2 is based on the removal of one exogenous construct and the determination of the resultant change in R^2. The formula is $f^2 = (R^2_{\text{included}} - R^2_{\text{excluded}})/(1-R^2_{\text{included}})$ (*Hair et al.* 2014, p. 177).

In PLS, predictive relevance is implemented using the blindfolding procedure. The blindfolding procedure uses an omission distance to select each data point to be omitted: the default omission difference of seven provided by SmartPLS3 is used for the blindfolding procedure in this research. In the blindfolding procedure each data point will be omitted and recalculated based on the remaining data using the missing data procedure (*Hair et al.* 2014). The difference between the estimated value, determined using the missing data procedure, and the original deleted value is used to calculate the Q^2 statistic which in indicative of predictive relevance: values greater than 0 indicate predictive relevance (*Hair et al.* 2014).

The contribution of each construct of the model in relation to the Q^2 value obtained for the model can be determined using the q^2 statistic which is calculated using the following formula: $q^2 = (Q^2_{\text{included}} - Q^2_{\text{excluded}})/(1-Q^2_{\text{included}})$ (*Hair et al.* 2014, p. 183). The value of q^2 would be calculated for each endogenous construct. A q^2 value, of .02 would indicate low predictive relevance, .15, medium predictive relevance, and .35, large predictive relevance (*Hair et al.* 2014, p. 184). For the second revised model R^2, f^2 and Q^2, q^2 are evaluated Table 6.11 and 6.12:

Table 6.11 R^2 and f^2 for Model with User Experience Second Order Construct with Perceived Intuitiveness and Compatibility First Order Constructs: Model R^2 .3612

Excluded Construct	R^2 : f^2
User Experience	R^2 .2509 : f^2 .1726 (medium)*
Perceived Usefulness	R^2 .2896 : f^2 .1120 (small)*

*Hair *et al.* (2014, p. 198): f^2 Results: .02 low, .15 medium, and .35 high.

Table 6.12 Q^2 and q^2 for Model with User Experience Second Order Construct with Perceived Intuitiveness and Compatibility First Order Constructs: Model Q^2 .1929

Excluded Construct	Q^2 : q^2
User Experience	Q^2 .1360 : q^2 .0705 (small)*
Perceived Usefulness	Q^2 .1778 : q^2 .0187 (small)*

*Hair *et al*. (2014, p. 199): "The q^2 effect size…uses the same critical values for assessment used for the f^2 effect size evaluation". Hair *et al.* (2014, p. 198): f^2 Results: .02 low, .15 medium, and .35 high.

6.4.4 Exploring Alternatives: TAUE Model with Westlaw Data Set (*n*=94).

Removing PU1 from Measurement Items of PU

PU1 has a kurtosis of 9.041 well in excess of the recommended limit of +3 kurtosis recommended by Hair *et al.* (2003, p. 243-244). To evaluate the result of removing PU1 from the TAUE model with the Westlaw data set (*n*=94) it was decided to re-run the PLS-SEM model without PU1. Notably with PU1 removed the R^2 value for USE decreases to .3397 from 0.3612. However, with PU1 removed the R^2 value for PU increases to 0.3019 from 0.2892. Based on this result PU1 has been maintained in the analysis.

Isolating the Effect of Use and FeatUse on the TAUE Model

In order to isolate the effect of TAUE model on each of the two component parts of the USE latent variable, each of the two measurement items for USE was removed and then the model was run with the remaining measurement model. When the TAUE model is run with FeatUse (Degree of Feature Use) only, R^2 value for USE increases to 0.3619 from 0.3612. However, when the bootstrap is run with this model, the *p*-value for the path PU to USE is now not significant at .1836. When the TAUE model is run with Use (Degree of Use) only, the value for USE decreases to 0.3065 from 0.3612. In addition, when the bootstrap is run with this model, the *p*-value for the path UE to USE is now not significant at .3785.

From the above analysis it can be concluded that Degree of Feature Use is closely related to UE. Support for this finding can be related to the work of Shaw and Manwani (2011) that

found a link between the intuitiveness of a specific technology function and its adoption. In addition, it can be concluded that both the Degree of Use and the Degree of Feature Use are important in relation to the Latent Variable USE.

Testing an Alternative Model to TAUE

In reviewing the TAUE model the question arose as to whether the second level UE construct is required or whether the two remaining first level constructs, COM and PI, would by themselves provide a similar result. Consequently, an alternative PLS model was run with PI and COM as first order constructs using only the 3 PI measurement items used in the TAUE model: PI2, PI6, and PI11. The Westlaw data (n=94) set was used.

The results of this model showed an R^2 value for USE of 0.3826. In addition, in the bootstrap analysis two paths were not significant: COM to USE and PI to PU. The Fornell-Larcker criteria did not show any values where the square root of the AVE for any constructs exceeded the correlations between the constructs.

The model was run again with PI consisting of all fifteen measurement items from the original model. The bootstrap analysis showed only two significant paths: COM to PU and PU to USE. The Fornell-Larcker criteria showed the square root of the AVE for PI (.7856) was less than the correlation between the COM and PI constructs (.8002). It can be concluded from the above that the TAUE model is the best model to represent the relationships and to understand the technology acceptance of legal technology by legal professionals.

6.4.5 Exploring All the Data

The TAUE model was also run with all the combined Westlaw data set (n=94) and the non-Westlaw data set. The results show a lower R^2 of .2731 but the bootstrap shows all paths in the model as significant except for the interaction terms between Degree of Voluntary Use/Perceived Usefulness to USE and Degree of Voluntary Use/User Experience to USE. Notably the path Degree of Voluntary Use to USE is significant for this data set ($p < .05$) and negative in value (-.1738). This indicates that the degree to which use is mandatory directly affects USE for the data set of all products.

6.5 Complementary PLS Analysis

6.5.1 Finite Mixture (FIMIX) Segmentation

FIMIX Mixture segmentation is emerging as important in research. Money, Hillenbrand, Henseler, and Da Camara (2012) used FIMIX-PLS segmentation to investigate patterns in the reactions of segments of the UK taxpayer population to strategies of the UK revenue agency. They found unexpected results among certain segments of the population. A FIMIX analysis was run using the Westlaw Data Set (n=94) using two groups and identified one group with an R^2 of .4561 in which UE had much higher total effect on USE (.9381). Further investigation could not characterize the specific data set related to this segment. A three group FIMIX segmentation was also evaluated but did not provide meaningful results, likely because of the small size of the segments.

6.5.2 Multi-Group Analysis

Perhaps the other area of most interest is whether number of years of legal experience has an effect on the relevant degree respondents alternatively rate UE and PU as important in the combined measure of USE (Degree of Use and Degree of Feature Use). An analysis was performed using the method outlined by *Hair et al.* (2014, p. 244-255) and using the Excel spreadsheet provided by *Hair et al.* (2014, www.pls-sem.com/PLS-MGA_Parametric.xlsx). The Westlaw data set (94 responses) was divided into two parts: respondents with less than 20 years of legal experience (48 respondents) and respondents with more than 20 years of legal experience (46 respondents). The results appear in Table 6-13 below:

Table 6-13 Multi-Group Analysis by Years of Legal Experience						
Path	Less Than 20 Years' Experience (48 Respondents)		More Than 20 Years' Experience (46 Respondents)		Group Comparison	
	Path Coefficient	Standard Error	Path Coefficient	Standard Error	*t*-value	*p*-value
PU to USE	.1090	.1888	.2968	.1617	.761*	.449
UE to USE	.7037	.1819	.3156	.1796	1.534**	.129

Adapted from Hair *et al.* (2014, p. 254)
*Levine's test value = .118: reject test that variances are not equal.
**Levine's test value = .409: reject test that variances are not equal.

The results do not indicate significant differences between the two groups based on years of experience. This may, however, be due to the small number of respondents in each group.

6.5.3 Moderator Analysis

There is only one moderator in this research, the Degree of Voluntary Use. The effect of Degree of Voluntary Use has been discussed throughout the analysis performed and is also reviewed in the discussion section.

6.6 Analysis of Non-Westlaw Data Set

When the 60 responses that represent the non-Westlaw data set (n=60) are run, the R^2 value obtained for is USE .3758, which compares favorably with the R^2 value .3612 for the Westlaw data set (94 responses). When the bootstrap is run, the UE to USE path is not significant with a *t*-value of .1663 and *p*-value of .8684.

It was also noted in a review of the normality plot for Use in the SPSS output for the non-Westlaw data set (60 responses) that the data was much less normal than the Westlaw data set. Several transformations of the Use variable did not provide improved results. The diversity of these products may also be the cause of the non-significance of the UE to USE path. The non-Westlaw data set responses were made in regards to the following products:

- Sage TimeSlips: 6 responses
- PCLaw: 11 responses

- AccessData Summation: 10 responses
- Other individually specified (write-in) products: 33 responses.

It could be that for types of products that comprise the non-Westlaw data set, the user experience of the product is not as important as the usefulness of the product. In addition, the cause of the non-significance of the path UE to USE could be that the size of the effect is small and the sample size of 60 responses is not large enough to result in a significant bootstrap result.

6.7 Common Method Bias/Non-Response Bias

6.7.1 Common Method Bias

The main concern with CMB is that Use is measured with the same method within the same instrument. In user acceptance of technology research this is commonly a Likert scale. In this research there is only one instrument, but the method of measuring USE (Degree of Use and Degree of Feature Use) is not the same method, but a slide scale from 1-100 whereas the remaining portion of the instrument consists of Likert scales. Consequently, the risk of CMB may be reduced.

Chin, Thatcher, Wright and Steel (2012) discuss two methods for detecting CMB in PLS-SEM research: The Unmeasured Latent Marker Construct (UMLC) and the Measured Latent Marker Variable (MLMV). Chin *et al.* (2012), however, conclude "UMLC approach had limited utility for detecting CMB using ML SEM, the same technique applied to PLS had **no ability to detect and control** for CMB" (slide 13, emphasis in original).

As an alternative Chin *et al.* (2012) recommends the MLMV method that requires additional non-related constructs be added to the model prior to the execution of the research. As this was not done, it would not be possible to execute the MLMV test in this research; consequently, the method used in this research to test for CMB is the Harman Single Factor Test, which is considered a good method of assessment (Babin, Hair, and Griffin 2016; Fuller, Dickerson, Atinc, Atinc, and Babin, 2016).

Table 6-14 Harman Single Factor Test Westlaw Data Set (*n* = 94) Using TAUE Model: Degree of Voluntary Use Not Included. Extraction Method: Principal Component Analysis

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.325	44.377	44.377	5.325	44.377	44.377
2	1.950	16.247	60.624			
3	1.188	9.902	70.526			
4	.799	6.662	77.188			
5	.621	5.178	82.365			
6	.521	4.338	86.704			
7	.470	3.916	90.619			
8	.370	3.086	93.706			
9	.264	2.204	95.909			
10	.191	1.595	97.505			
11	.168	1.398	98.903			
12	.132	1.097	100.000			

The Harman Single Factor Test was run to evaluate the presence of CMB using several sets of data used in this research. The above one factor non-rotated factor extraction was done with the Westlaw data set (*n*=94). The measurement items used were USE, FEATUSE, PI2, PI6, PI11, COM1, COM2, COM3, PU1, PU2, PU3, and PU4. The measurement items for PI were the optimized items determined in Appendix J.

The Harman Single Factor Test was re-run including the VOL construct. It would be expected that if there was common method variance that the addition of the Degree of Voluntary Use construct to the Harman Single Factor Test would not result in the change in the amount of variance extracted for the single factor: the assumption being that the Degree of Voluntary Use construct would also be affected by the use of the common method. However, the variance

extracted for the single factor decreases with the addition of the Degree of Voluntary Use construct to 41.31% from 44.37%. Since the threshold for CMB using the Harman Single Factor Test is 50%, the result obtained of 44.37% indicates CMB is not a problem. The Harman Single Factor Test was also run for all the data and the non-Westlaw data set and showed similar results.

6.7.2 Non-Response Bias

As Montaquila, and Olson (2012) note, "Low response rates can be an indicator of potential problems such as – Nonresponse bias– Underestimated variances" (slide 8). While the exact response rate cannot be determined because of the postings to legal groups in the LinkedIn social media site, an estimate can be made based on the total LinkedIn InMails and the direct emails sent to individuals. A total of 958 LinkedIn InMails were sent and 180 emails were sent directly to individuals who had posted on Technolawyer: the total of participants who were directly solicited was 1,138. Total responses received were 218 (with 154 usable responses); the response rate can then be estimated as 218/1138 = 19.15%. It would therefore be appropriate to consider non-response bias.

This research uses **"**Nonresponse bias for estimates based on variables available on sample" (Montaquila and Olson 2012, slide 22). One technique of this type mentioned by Montaquila and Olson (2012) is "External data that can be matched to the entire sample" (slide 34). Specifically, we will compare the gender distribution of lawyers responding to the dissertation research and lawyers responding to the pilot study to external demographic data on lawyer gender.

The American Bar Association (2014) provides statistics concerning the gender distribution of lawyers in the United States. These are compared to the gender distribution found in this research and in the pilot study in table 6-15.

Table 6-15 Gender Distribution Lawyers					
Gender	American Bar Association Gender Distribution of Lawyers	Research Responses by Gender for Lawyers (Number)*	Research Responses by Gender for Lawyers (Percentage)	All Pilot Study Responses by Gender for Lawyers (Number)	All Pilot Study Responses by Gender for Lawyers (Percentage)
Male	66%	62	66.6	24	68.6
Female	34%	31	33.3	11	31.4
Total	100%	93	100%	35	100%

Source**:** American Bar Association, Statistics from the ABA Commission on Women, a Current Glance at Women in the Law 2014 (2014, http://www.americanbar.org/content/dam/aba/marketing/women/current_glance_statistics_july2014.authcheckdam.pdf).

*There were 76 usable responses from lawyers. There were also 17 responses from lawyers which were not usable where gender was provided. The remaining responses were not from lawyers, or from others who did not consent or did not use legal technology (in which case data on gender was not collected).

The similarity of the breakdown of responses by gender for the pilot study is notable because a significant portion (58.8%) of the pilot study data was purchased as Qualtrics panel data. On the basis of the gender distribution of lawyers, it can be argued that the sample correctly represents lawyers based on gender, supporting the representativeness of the sample.

Another argument can be made based on the comparison of the occupation, and years of experience of the respondents in the pilot study and the main research. These were independent samples. In addition, as already mentioned, the pilot received the majority of its responses from paid Qualtrics panel data. As outlined in the tables appearing in Appendix E, the overall comparison between these two samples based on these demographic factors is similar, again supporting the representativeness of the sample. The Spearman Rank Correlation for the comparison of occupation of respondents in the main research and the pilot study is .975 ($p <$ .05): for the experience of respondents the Spearman Rank Correlation is .30 (not significant).

6.8 Comparing the TAUE Model to the TAM and Summary

Table 6-16 compares the results obtained for the Westlaw data set used in this research using the TAUE model and the TAM model (Davis 1986).

Table 6-16 Comparative Results TAUE and TAM Models*

Data Set	TAUE	TAM	Comments
Westlaw Data Set (*n*=94)	R^2 .3612 Bootstrap paths significant: (*p*<.01) UE to USE** UE to PU PU to USE**	R^2 .3063 Bootstrap paths significant: (*p*<.01) PU to USE** PEOU to PU Bootstrap path not significant PEOU to USE** *p* = .1935	The TAUE model has better R^2 than the TAM model. In addition, all bootstrap paths are significant with the TAUE model but in the TAM model the path PEOU to USE** is not significant.
All Data (*n*=154)	R^2 .2731 Bootstrap paths significant: (*p*<.01) UE to USE** UE to PU Bootstrap paths significant: (*p*<.05) PU to USE**	R^2 .2145 Bootstrap paths significant (p<.01) PU to USE** PEOU to PU Bootstrap paths not significant PEOU to USE** *p* = .1557	The TAUE model has better R^2 than the TAM model. In the TAM model the path PEOU to USE** was not significant.

*In this comparison for the TAUE and TAM models, the three same three measurement items for PI are used for both sets of data.
**USE is comprised of two reflective components Degree of Use and Degree of Feature Use.

The evaluation of the quantitative findings of this study has shown unexpected results. The TAUE model has an acceptable R^2 value for the endogenous variable USE and all paths in the model from the exogenous latent variables are significant with $p < .05$. It has been shown to provide improved R^2 value as compared to the results obtained using the TAM model and the same data. We will now proceed to the discussion of the findings of this research. A detailed analysis of the results related to the hypotheses is provided in Chapter 7 - Discussion.

7. Discussion

7.1 Introduction

7.1.1 Overview

The overall objective of this research was to undertake the creation of a perceived intuitiveness of legal technology construct and to integrate the proposed construct into the TAM model with a view to developing an approach to resolving the "TAM Logjam" (Straub and Burton-Jones 2007, p. 223). Based on a preliminary qualitative pilot study, review of the technology acceptance literature, intuition literature, and literature related to emergence of intuition in relation to IS technology acceptance, a set of measurement items were created. A second quantitative pilot study facilitated the process of scale refinement.

The PI construct was evaluated in the TAM model resulting in a revised model now designated as the TAUE model, in which PEOU is no longer a component. The TAUE model consists of the second order UE construct, which consists of two first order reflective constructs: – PI and COM – the PU construct, and USE as the dependent variable. The TAUE model was found to have improved explanatory power over the TAM model. In this chapter a detailed discussion of the results is provided in relation to the original hypotheses as well as limitations, future research, and management implications. The emphasis in this chapter is to relate the results of this research to emerging topics in IS academic research, literature concerning professional practice, and related practitioner concerns. This chapter is organized, using the format of West (2011), as follows:

7.1 Introduction
- 7.1.1 Overview
- 7.1.2 Contribution to Theory, Methodology and Practice

7.2 Discussion of Results and Evaluation of Hypotheses
- 7.2.1 Introduction
- 7.2.2 Study Proposition 1 – Can a Perceived Intuitiveness construct for legal technology be created?

7.2.3 Study Proposition 2 and Related Hypotheses – Assuming a Perceived Intuitiveness construct can be created; can it be explored and evaluated in the TAM model?
7.2.4 Study Proposition 3 and Related Hypothesis – What are the conclusions that can be drawn in regards to technology acceptance and use by integrating and testing the Perceived Intuitiveness construct in the TAM model?
7.2.5 Study Proposition 4 and Related Hypothesis – What is the effect of the degree of voluntary use of legal technology on technology acceptance?
7.2.6 Relation of Findings to Literature and Practice
7.2.7 Summary

7.3 Limitations of the Research

7.4 Potential Areas of Future Research

7.5 Management Implications

7.6 Summary and Conclusion

7.1.2 Contribution to Theory, Methodology and Practice

Whetten (1989) addresses what constitutes a contribution to theory: "theoretical insights come from demonstrating how the addition of a new variable significantly alters our understanding of the phenomena by reorganizing our causal maps" (p. 493). Three broad criteria for a theoretical contribution are required (Whetten 1989):

1. The contribution should focus on more than one element of the theory.
2. The contribution should contain compelling evidence.
3. A correction to the theory should be offered.

The objective of this research is to make a contribution to theory, methodology and to explore user acceptance of technology as it relates to the legal profession, a particular context of user acceptance of technology that has not been previously investigated.

Contribution to Theory

The contribution to theory is as follows:

1. A Perceived Intuitiveness of legal technology construct is developed in this research.

2. A revision to the TAM model is created and now identified as the Technology Acceptance User Experience model. This model introduces a second level construct identified as User Experience and which consists of two first level reflective constructs: Compatibility and Perceived Intuitiveness, Perceived Usefulness, and the dependent variable USE.
3. The research develops the concept of a partial f^2 and q^2 analysis for component first order constructs related to a second order construct.
4. The development of the Perceived Intuitiveness construct and the creation of the TAUE model provides a link between technology acceptance and design, specifically the emergent research on the design of intuitive technology, potentially contributing to a resolution of the "TAM Logjam" (Straub and Burton-Jones 2007).
5. This research has identified the convergence of the psychological concepts of ease of use and intuitiveness.

Contribution to Methodology

1. As far as the author is aware this is the first research study related to technology acceptance that has used social media (LinkedIn) to solicit respondents.
2. As far as the author is aware this is the first quantitative model of technology acceptance that uses legal technology as the basis for the evaluation of the model.
3. In this research there are two endogenous constructs for USE: Degree of Use and Degree of Feature Use. In addition, Degree of Voluntary Use is a modifier variable. These three variables are measured using a continuous slide scale ranging from 1 to 100. As far as the author is aware this is the first use of a continuous slide scale ranging from 1 to 100 to measure endogenous constructs in TAM and related acceptance research.

Contribution to Practice

1. This research has identified 15 measurement items that can be adapted by legal technology providers and by potential users of legal technology to rate the relative degree to which a specific legal technology is perceived by the legal technology user as being intuitive.

2. The research has identified the three most important measurement items for the perceived intuitiveness of a legal technology product, these are: (1) the degree the technology can be used without training, (2) the degree that the technology adapts based on user input, and (3) the degree to which the user is always clear in what they have to do when using the product. These findings can be integrated into user acceptance testing in order to measure the degree to which a legal technology product (or other technology) is perceived as being intuitive.
3. The research has linked academic research on technology acceptance to the requirement that technology be "intuitive" as articulated by practitioners and providers of technology.

7.2 Discussion of Results and Evaluation of Hypotheses

7.2.1 Introduction

This section relates the results to specific propositions identified for the research. Each of these propositions can be related to specific hypotheses; an evaluation of the results for each specific hypothesis is presented. In this section the convergence of the perceptions of the ease of use and intuitiveness of technology is detailed. The results are contextualized in relation to the Apple Guidelines, the concept of feedforward control, and the role of the "intuitive" in the marketing of technology. Further analysis of the results is provided in relation to the work of Susskind, Schön, and Khaneman. Finally, a summary of the results and discussion is presented.

7.2.2 Study Proposition 1 – Can a Perceived Intuitiveness construct for legal technology be created?

In this research the first conjecture was that it was possible to create a Perceived Intuitiveness construct for technology use to legal work. At the beginning of the research, no existing constructs or instrument were identified for "intuitive" technology. As a consequence, a construct development process was undertaken based on the recommendations of MacKenzie *et al.* (2011). The first steps undertaken to develop the proposed PI construct were (1) an exploratory qualitative pilot study and (2) a review of the literature. A set of thirteen potential factors characterizing "intuitive" technology was identified and fifteen measurement items were created. These were subsequently refined to ten items based on pre-tests.

Subsequently the existing QUESI instrument (Naumann and Hurtienne 2010) was identified: thirteen items from this instrument were combined with the ten items that remained after the pretests. These 23 items were then reduced to fifteen items based on a quantitative pilot study and resultant factor analysis.

While the creation of a perceived intuitiveness construct for technology use to legal work was not a formal hypothesis in this research, the creation and scale refinement of the PI construct enabled the research to proceed to Study Proposition 2 and to the eventual evaluation of the formal hypotheses of this research.

7.2.3 Study Proposition 2 and Related Hypotheses – Assuming a Perceived Intuitiveness construct can be created; can it be explored and evaluated in the TAM model?

As no known relationships were identified concerning the potential relationship of Perceived Intuitiveness related to the existing TAM model and COM, hypothesized relationships were developed based on the literature review. The proposed PI construct was hypothesized as having a positive effect on all the existing constructs in TAM and the COM construct. As already discussed COM was added to the model based on the work of Chau and Hu (2002a).

Investigating the original research model (without interaction terms) with the entire Westlaw data set (n=94) showed a violation of the Fornell-Larcker criteria for PI-PEOU and high latent variable correlations for COM, PI, and PEOU. In addition, seven paths were not significant in the PLS-SEM model. Hair *et al.* (2014) recommend consideration of a second level construct to resolve collinearity issues. Based on the above it was then decided to utilize a second level construct identified as User Experience with COM, PEOU, and PI as the corresponding first level constructs.

As discussed in in section 6.2, the inclusion of PEOU in this model as a first order reflective construct related to the second order construct User Experience resulted in reduced R^2 and negative partial f^2 and q^2 values. When PEOU was removed from the model, the new model, now identified as the TAUE model, showed reasonable R^2 of .3612 and the bootstrap showed all paths as significant except for Degree of Voluntary Use to USE and the Interaction Term: PU to USE.

As outlined in section 6.2, when this revised model was created with the UE construct consisting of two reflective constructs PI and COM, the concern arose that perhaps a second level construct was not required. Investigation of an alternative model confirmed the TAUE model as the most desirable model. The reasoning behind the identification of the second level construct as User Experience is described in Section 7.2.6.

In the TAUE model, PI has subsumed PEOU. There is support in the literature for the increasing importance of intuitive use of technology. Writing concerning the emergent Internet of Things (which they refer to as "IoT") Fantana, Riedel, Schlick, Ferber, Hupp, Miles, Michahelles, and Svensson (2013) comment:

> Simple, intuitive use and (almost) self-explaining are important for the overall IoT application acceptance. The IoT application should ideally be context aware and adapt to the skills of the user and location or environment aspects (p. 159).

The references to technology that is "self-explaining", "context aware" and "adapt to the skills of the user and location or environment aspects" (p. 159) are similar to the final three measurement items identified for the first level reflective construct of PI associated with the second level UE construct. These three measurement items are:

1. I find this legal technology product can be used in my practice with minimal training.
2. When I use this legal technology product in my practice, it is always clear to me what I have to do use the product.
3. When I use it in my practice, this legal technology product adapts to my specific goals as I enter responses.

The above measurement items for the new PI construct were found to be the most important in regards to specific legal technology products (Westlaw, LexisNexis, Fastcase, WestlawNext, Casemaker, and CanLII); however, it is possible they would not be the most important in regards to other technology.

It is also notable that these items have a high degree of correspondence to the minimal training, familiar, and adapts factors that were identified in the factor analysis performed as part of pilot study quantitative analysis. In the literature review, ease of learning was associated with

perceived ease of use and ease of training associated with perceived intuitiveness. Kumar and van Dissel (1996) note "intuitive interfaces that reduce the costs of training or re-training can reduce this risk substantially" (p. 292). Anderson *et al.* (2010) comment that "a focus on intuitiveness also yields…lower longer term costs to training and support" (p. 18). These findings will be discussed further in relation to the additional literature in section 7.2.6.

In this research PEOU was dropped from the model as adding no additional explanatory power. This finding is partially supported by the research of Chau and Hu (2002a) in regards to the use of telemedicine technology by physicians in which the total effect on PEOU on BI was .05.

In summary the conjecture that it would be possible to integrate PI in the TAM model (with the addition of COM) was supported. The specific hypotheses related to this conjecture are evaluated below.

H1 Perceived Intuitiveness will have a positive effect on Perceived Usefulness.

In the TAUE model the UE construct, which consists of PI and COM as first order reflective constructs, was found to have a positive effect on PU. This hypothesis is supported.

H2 Perceived Intuitiveness will have a positive effect on Perceived Ease of Use.

In the TAUE, PEOU was not present as a construct. This hypothesis was not supported.

H3 Perceived Intuitiveness will have a positive effect on Compatibility.

In the TAUE model, COM was combined with PI as a second order construct identified as UE. This hypothesis was not supported.

7.2.4 Study Proposition 3 and Related Hypotheses – What are the conclusions that can be drawn in regards to technology acceptance and use by integrating and testing the Perceived Intuitiveness construct in the TAM model?

The total path effect of PI on USE was .5276. The R^2 for USE obtained in the TAUE model using the Westlaw data set (n=94) was 0.3612. The explanatory power of this model is similar to the overall level of explanation found in IS research. As Burton-Jones and Straub (2006) note:

> Despite this long-standing investigation of system usage, studies of its relationship with other constructs often report weak effects. With system usage as a DV, researchers have carefully examined a large number of antecedents (Adams *et al.* 1992) but explained is in a middling range, averaging around 30% (Meister and Compeau 2002) (p. 230).

H4 Perceived Intuitiveness will have a positive effect on the combined measure of USE consisting of Use and Feature Use.

In the TAUE the UE construct, which consists of PI and COM as first order reflective constructs, was found to have a positive effect on the combined measure of USE consisting of Degree of Use and Degree of Feature Use. This hypothesis is supported.

7.2.5 Study Proposition 4 and Related Hypotheses – What is the effect of the degree of voluntary use of legal technology on technology acceptance?

H5 The degree to which the technology use is voluntary will have a moderating effect on the paths from PI, PU, PEOU, and the combined measures of USE (Degree of Use and Degree of Feature Use).

In the TAUE model with the Westlaw data set (n=94), Degree of Voluntary Use did not have a significant effect on the combined measures of USE (Degree of Use and Degree of Feature Use). In addition, the interaction term for Degree of Voluntary Use on the path from PU to the combined measures of USE (Degree of Use and Degree of Feature Use) was not significant. The interaction term for Degree of Voluntary Use on the path from UE to the combined measures of USE (Degree of Use and Degree of Feature Use) was significant (p=.0355) and a path coefficient of .2923. The hypothesis is partially supported.

There are three possible causes why the Degree of Voluntary Use was found not to have a significant effect on USE. The first reason may be that the question was not clearly understood. It was noted that some respondents in the pilot study confused the direction of the question. An effort was made in the final research to ensure there could be no doubt in the meaning and the method the slide bar scale was to be used to represent mandatory use, but nonetheless it may be that the question or the manner of use of the slide bar was not understood.

The modifier Degree of Voluntary Use was set up to moderate the effect of the two exogenous constructs PU and UE. This was done because SN was not included in the model as it was not found to be of significance by Chau and Hu (2002a). In the UTAUT model Degree of Voluntary Use was a modifier of SN. It may be that Degree of Voluntary Use as a modifier does not act directly on the paths of exogenous constructs to USE, but only acts through SN as previously investigated. This could be one reason for the non-significance of Degree of Voluntary Use as a modifier in this research

Alternatively, it is possible that the Degree of Use is not directly related to whether use of the technology is mandatory or not. Even in a mandatory environment the respondents may use a technology at the absolute minimum because the user experience is poor or they do not find it useful. It is notable that the Degree of Voluntary Use interaction term for UE to USE is positive and significant. This can be interpreted as meaning people will use technology with good user experience more often if they are free to choose the technology.

For the non-Westlaw data set the path Degree of Voluntary Use to USE is significant for this data set ($p < .05$) and negative in value (-.1738). The non-Westlaw data set represents a wider variety of legal technology products, at least some of which could be essential to the operation of the law office and effectively mandated, such as the firm time and billing software: consequently, in the non-Westlaw data set mandatory use would directly affect USE.

7.2.6 Relation of Findings to Literature and Practice

Introduction

In this section we return to the literature and attempt to understand the meaning of the results through a review of additional literature not included in the original literature review. This review is organized in the following cluster of topics.

1. (a) The convergence of ease of use and "intuitiveness", and (b) user experience.
2. (a) The meaning of feedforward control, (b) Apple design, and (c) technology marketing.
3. (a) The work of Richard Susskind on legal technology, (b) Schön on professional practice, and (c) Kahneman on the limitations of human cognition.

The convergence of ease of use and "intuitiveness", and secondly, user experience discusses the emergent concept of intuitive interaction and technology. Intuitive interaction can be contrasted to the more established summative term "user experience" for human-computer interaction.

Feedforward control, Apple design, and technology marketing are separate areas that have arisen outside of academic IS research that relate the "intuitive" to technology. Feedforward control is an engineering concept; Apple design and technology marketing are from the current IS marketplace.

The work of Susskind on legal technology, Schön on professional practice, and Kahneman on the limitations of human cognition focuses on professional practice. Susskind has been writing on legal technology for over thirty years, his work can be related to that of Schön on the nature of decision making in professional practice, and additionally to the work of Kahneman on human decision making.

For each of these sections a separate summary is prepared. An overall integrated summary is also presented. The attempt is to establish as many connections as possible between the research findings and these three clusters of additional literature as well as some of the inter-relationship amongst the three clusters of literature themselves.

Convergence of Ease of Use and "Intuitiveness"

As has been outlined already in Section 7.2.3, the degree technology is "intuitive" is emerging as a design standard. This can be seen in excerpt from Shaw (2011); a physician comments concerning the use Electronic Health Records in practice:

> It hasn't changed the way I worked.
> …it's very intuitive as far as the way the family physicians practice.
> Everything on the screen is – it just automatically fits in.
> The system works exactly the way I work. That's the beauty of that particular system (p. 159).

Evidence exists in the literature to support convergence of the psychological constructs of intuitiveness and ease of use. Kappelgaard and Bala (2011) investigated intuitiveness and ease of use at the same time for three growth hormone injection devices. Members of an "intuitiveness" group were given minimal instruction and compared to a second group who were given full instruction. The data gathered was time taken to dose and dose accuracy. Questionnaires were also used to measure intuitiveness and ease of use. Both groups rated one device as most intuitive and easiest to use.

Marchal, Moerman, Casiez, and Roussel (2013) in their paper on multi-touch 3D navigation techniques mention intuitiveness and ease of use as jointly desirable design objectives; notably they did not delineate any differences between these two concepts. A similar joint evaluation of intuitiveness and ease of use can be found in Lohmann, Negru, and Bold (2014) who performed a comparative evaluation of the ProtegeVOWL plugin for ontology representations used in the Semantic Web with other available plugins for the Protégé ontology editor. A PDF search of the recent text *Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems* (Vermesan and Frie (Eds.) 2013) for "ease of use" returned no results indicating the declining importance of the concept. In this research, the PEOU construct has replaced by the PI construct.

The research on intuitive interaction with technology products is a developing field; work was commenced separately by Blacker (2006) in Australia and Hurtienne (2009) in Germany in their respective doctoral dissertations. There are differences in the research approaches of Blacker (2006) and Hurtienne (2009). Blackler (2006) focused on task completion time as an

indication of intuitive use. Hurtienne (2009) focused his research on the relationship of image schemas to intuitive use. Also prominent in the emerging research stream are O'Brien *et al.* (2010) in the United States and Ulrich and Diefenbach (2010) in Germany. As detailed by Blackler and Popovic (2015) intuitive interaction research continues to expand.

User Experience

We have identified the second level construct used in the TAUE model as User Experience because it has emerged as a summative term for user interaction with technology. It would be rational to state that perceived intuitiveness and compatibility would be subsumed in User Experience. In this research, however, the UE construct does not contain any of the hedonic sub-dimensions also associated with the user experience (Laugwitz *et al.* 2008).

Laugwitz *et al.* (2008) developed the User Experience Questionnaire (UEQ-Online 2015) which consists of 26 items with the following scales: (1) Attractiveness; (2) Perspicuity; (3) Dependability; (4) Efficiency; (5) Novelty; and (6) Stimulation.

This questionnaire uses a semantic differential design. Some of the items from the original fifteen measurement items of the PI construct developed in this research would have a significant degree of correspondence to items in the User Experience Questionnaire (2015). The following are examples of this correspondence:

- When I use this legal technology product in my practice, I can predict the results of my actions: corresponds to User Experience questionnaire item "unpredictable…predicable".
- When I use this legal technology product in my practice, the product is complicated to use: corresponds to User Experience questionnaire item "complicated…easy".
- When I use this legal technology product in my practice, it is always clear to me what I have to do to use the product: corresponds to User Experience questionnaire item "clear…confusing" (2015, www.ueq-online.org).

The exclusion of the hedonic elements of user experience in this research would likely relate to the nature of technology and the context in which it is used. In the case of legal technology, typically used in a law office, to do legal work, such technology would likely be very

low in hedonic related content. This is consistent with the Chau and Hu (2002a) finding of the pragmatic use of technology by physicians: this finding would likely also be true for legal professionals. It may well be with other technology used in other contexts that a second level UE construct developed in a similar process, as to the process used in this research, would have a hedonic first level reflective construct such as Perceived Enjoyment.

Summary: (1) The convergence of ease of use and "intuitiveness", and (2) user experience.

In the review of the items of the User Experience questionnaire there is correspondence with a number of developed items for the PI construct; this supports the construction of the second level UE construct used in this research with a reflective first order PI construct. As well in this research, the PEOU construct was removed and replaced by the PI construct; the additional literature reviewed also supports the convergence of the concepts of ease of use and intuitiveness. There is an emergent growing literature on intuitive interaction.

Analysis Related to Feedforward

The concept of 'feedforward' which is central to the definition of Intuitive Human-Computer Interaction provided by O'Brien *et al* (2010) can also be found in what many consider the most intuitive of all technologies: The Smartphone. As PC World notes "iPhone OS is easily the most enjoyable and intuitive phone operating system in existence" (McCracken 2008, not paged).

One feature that uses feedforward methods in Smartphones is predictive text, "The next effect of predictive text is that "the keyboard "learns" the word immediately, and will offer it up the next time you enter a spelling pattern that's close to those keys" (Henry 2014, not paged).

The concept of feedforward has been identified in several fields. The concept is used in control engineering (Control Engineering 2003) and has been found to improve performance. Feedforward is also found in biology (Feedforward 2007). The use of feedforward designs can be seen in line with the findings of this research that identified technology that adapts to the user as "intuitive".

Analysis Related to Apple Design

A review of Apple OS X Human Interface Guidelines (Apple 2015, 2016) reveals User Experience as the summative term used to characterize human-computer interaction. Further, as discussed in section 3.*7 Importance of Intuition in Relation to Technology*, Apple has a strong focus on "intuitive" technology design. As already detailed, Mike Stern elaborates on factors that make user interfaces "intuitive" in the YouTube video entitled *Designing Intuitive User Interfaces* (2015, www.youtube.com/watch?v=HAITh41jNX8).

In the Apple OS X Human Interface Guidelines (Apple 2015, 2016) intuitive technology is characterized as (1) easily discoverable, (2) enjoyable, (3) effortless, and (4) convenient. A "great software design" is characterized as incorporating "a number of timeless principles for human-computer interaction. The principles described here form the foundation of elegant, efficient, intuitive, and delightful apps" (Apple 2015, DesignPrinciples.html).

Analysis Related to Technology Marketing

Another illustration of the importance of "intuitive" technology is its use in the marketing of technology. An example of the use of "intuitive" in marketing of technology is *Intuitive Surgical, Inc.* (www.intuitivesurgical.com) which markets surgical robotics technology and includes the word "intuitive" directly into the corporate name. A second example would be the promotional text for the WordPress.org (https://en-ca.wordpress.org) Maps Builder – Google Maps Plugin: "Maps Builder isn't just another Google Maps plugin. It's built from the ground up to be the easiest, most intuitive and fastest Google Maps plugin for WordPress" (Wordpress.org undated, plugins/google-maps-builder/). These are only two examples of the common use of the concept of "intuitive" in technology marketing.

Summary: (1) The meaning of feedforward control, (2) Apple Design, and (3) Technology marketing.

Feedforward control can be related to Apple design, and technology marketing as follows. The concept of feedforward is a control engineering term which appears in the O'Brien *et al.* (2010) definition of Intuitive Human-Computer Interaction. Feedforward control is also a design feature of the smartphone with the inclusion of predictive text. Apple emphasises the importance

of intuitive design and, further, many technological products are marketed as intuitive. In summary, the common link that can be traced through feedforward control, Apple design, and technology marketing is the intuitiveness of technology.

Analysis related to Susskind

Richard Susskind has been writing about technology and the law for the last thirty years: his books include *Expert Systems in Law* (1987), *The Future of Law* (1996), *Transforming the Law* (2000), *The End of Lawyers?* (2008), *Tomorrow's Lawyers* (2013), and (co-author) *The Future of the Professions* (2015). Despite the resistance of the legal profession to change, Susskind (2012) sees change accelerating:

> We live in times of unprecedented economic and technological upheaval. My own research and writings suggest that the next two decades will see more change than the past two centuries in the way in which lawyers and the courts function (p. 41).

One key aspect of professional practice is standardization. Susskind and Susskind (2015) note "lawyers have templates and precedents" (p. 200); other commonly used tools are "checklists, procedure manuals, and standard guides" (p. 200). The current view of Susskind and Susskind (2015) is that even more fundamental change is on the horizon in relation to the application of technology to the traditional professions like medicine and law, Susskind and Susskind (2015) comment:

> A system that makes diagnosis of a comparison between a particular patient's symptoms and a database of 10 million past patients is not carrying out a differential diagnosis like a regular human doctor. Nor does a system that predicts the decision of a court by comparing the facts of a case with a database of hundreds of thousands of past cases operate like a normal practicing lawyer (p.163-164).

This insight of Susskind can be related to Simon's (1996) seminal work *The Sciences of the Artificial*. Simon (1996) defines Bounded Rationality as: "The meaning of rationality in situations where the complexity of the environment is immensely greater than the computational powers of the adaptive system" (p. 166). It can be inferred from Susskind and Susskind (2015) that technology in the professions can be used as an extension of the human mind – to overcome bounded rationality among professionals; it can also be postulated that technology used by

professionals should be designed to facilitate this process. In can be inferred that the design of legal technology perceived as intuitive would facilitate the use of legal technology as an extension of human cognition and be congruent with this objective.

Analysis related to Schön

Schön (1983) notes the similar importance of intuition in business: "Indeed, they are sometimes aware that even management technique rests on a foundation of non-rational, intuitive artistry" (p.239). Technology designed to be perceived by the user as intuitive can be seen as related to this observation. It is an artifact but it is also "intuitive artistry" (p.239) designed to match the true nature of professional practice. As Schön elaborates:

> In management as in other fields, "art" has a two-fold meaning. It may mean intuitive judgment and skill, the feeling for phenomena and for action that I have called knowing-in-practice. But it may also designate a manager's reflection, in a context of action, on phenomena which he perceives as incongruent with his intuitive understandings … It consists in on-the-spot surfacing, criticizing, restructuring, and testing of intuitive understanding of experienced phenomena… (p. 241).

The nature of professional work, as described by Schön, points to a design objective of technology used by professionals: it should be designed so that it is perceived as intuitive by the professional. Intuitive interaction with a computer application designed to do legal work would be in harmony with the use of intuitive cognitive processes by professionals in legal practice.

Analysis Related to Kahneman

As has been discussed, professional decision making often relies on intuition. Kahneman (2002) demonstrates that intuition can be wrong: professionals need to be on guard against the biases and errors than intuition can introduce into decision making. As will be discussed, "intuitive" legal technology can help overcome limitations of the human mind such as Bounded Rationality (Simon 1996) and the negative cognitive effects associated with the use of intuition.

Kahneman (2002) identifies two types of cognitive processes: System 1 and System 2 (p. 481). System 1 would be what is commonly called intuition and System 2 would be human reason. Concerning decision making in organizations Kahneman (2011) notes: "Whatever else it

produces, an organization is a factory that manufactures judgments and decisions" (p. 418). In a similar fashion, professional practices can be seen as decision making artifacts. There is potential for technology used by professionals to guard against the potential errors which use of intuition in professional practice can undesirably introduce. We will discuss the limitations of System 1 in the following paragraphs.

Framing effects occur when decisions are made based on subjective and opportunistic perceptions of a situation. Framing results in the closely related phenomena of anchoring and heuristics. Kahneman (2002) comments:

> The effects of salience and anchoring play a central role in treatments of judgment and choice. Indeed, anchoring effects are among the most robust phenomena of judgment, and overweighting of salient values is likely to be the mechanism that explains why low-probability events sometimes loom large in decision making (p. 482).

Heuristics, attribute substitution, and the effect of salient features are closely related and affect the nature of decisions made by intuition. These three cognitive processes also affect the quality of decisions made by human intuition. Also of concern is that these processes are most often not brought into the conscious mind for review. Kahneman (2002) details the "Availability" (p. 130) heuristic - examples of which would be:

- "A salient event that attracts your attention will be easily retrieved from memory;
- A dramatic event temporarily increases the availability of its category;
- Personal experiences, pictures, and vivid examples are more available than incidents that happened to others, or mere words, or statistics" (p. 130).

The mind creates stories on which to make decisions. Kahneman (2011) says: "The most coherent stories are not necessarily the most probable, but they are *plausible* and the notions of coherence, plausibility, and probability are easily confused by the unwary" (p. 159, emphasis in the original). Kahneman (2002) notes that while there are often notable defects in the decision making processes of System 1, the use of System 2 does not guarantee the correct decision: "The rules that people apply in deliberate reasoning are sometimes false" (p. 472).

The addition of an affect heuristic, the effect of emotions of decision making, is a recent and significant contribution to the study of heuristics which Kahneman (2011) describes as "Emotional Framing" (p. 364). Kahneman (2011) provides a practical illustration, documented in the literature, concerning the effect of extraneous factors on the decisions of Parole Board judges: "The prospects of a convict being granted parole may change significantly during the time that elapses between successive food breaks in a parole judges' schedule" (p. 225).

Kahneman (2002) also identifies factors that affect the functioning of System 2:

1. "Time pressure;
2. Concurrent involvement in a different cognitive task;
3. Performing the task in the evening for 'morning people' and in the morning for 'evening people';
4. Being in a good mood" (p. 473).

The research of Paul Meehl, who concludes simple rules or algorithms often produce more consistent and correct results than professionals, is discussed at length by Kahneman (2011). Kahneman (2011) states: "The research suggests a surprising conclusion: to maximize predictive accuracy, final decisions should be left to formulas, especially in low-validity environments" (p. 225).

In this sense, legal technology can act as an artificial System 2, acting to: (1) reduce the effects of confusion in a viewing of a particular context; (2) reduce problems related to irrelevant features; (3) overcome framing effects; (4) reduce the problem of affect; and, generally (5) mitigate the failure of system 2 to identify the important cues related to the situation at hand. Consequently, "intuitive" legal technology can be characterized as of benefit to legal professionals in legal practice.

Summary: (1) The work of Richard Susskind on legal technology, (2) Schön on professional practice, and (3) Kahneman on the limitations of human cognition.

Richard Susskind has spent 30 years writing about the potentialities of use of computer technology in legal work. The focus of Susskind is the practical effect of legal technology upon legal practice which he envisages as nothing short of revolutionary. Schön carefully detailed the

processes used by professionals in making decisions and related these decision making practices to intuition. Kahneman studied the nature of intuitive decision making and documented the limitations of decision making using intuition. He also discussed decision making among professionals and the cognitive biases that could be introduced into these decisions. The chain connecting Susskind, Schön, and Kahneman is professional decision making, the increasing use of computer technology to help make these decisions, and the use of intuition in making these decisions.

Integrative Summary

The storyline of these three clusters of additional literature reviewed is: intuitiveness is an increasingly important factor in the use of technology including computer technology. Intuitive design is major design consideration in the most successful and well-designed technology; correspondingly, in technology marketing the "intuitiveness" of the technology is a major focus.

In professional practice, decision making processes use intuition but are subject to cognitive errors related to intuition. Technology is used more and more in professional practice and has the potential to help limit cognitive errors related to the use of intuition in decision making while at the same time appearing intuitive to the user to facilitate use.

The question that can be asked is what does this research contribute to this nexus of inter-related scholarship? The answer is that professionals use intuition in making decisions. When they use technology to help make decisions in their professional practice the inference is that they would prefer technology that uses mental models they are familiar with, is inclusive of the tacit knowledge they possess, and is compatible with the way that they practice.

This set of requirements refers back to the comments made by a respondent in the research of Shaw (2011) on the use of Electronic Health Records by physicians:

> It hasn't changed the way I worked.
> …it's very intuitive as far as the way the family physicians practice. Everything on the screen is – it just automatically fits in.
> The system works exactly the way I work. That's the beauty of that particular system (p. 159).

This quote identifies "intuitive" as summative term for (1) "mental models they are familiar with", (2) "inclusive of the tacit knowledge they possess, and (3) "compatible with the way they practice". This research identifies the primary factors that make technology used by professionals in practice perceived as "intuitive". These are:

1. The legal technology product can be used in practice with minimal training.
2. It is always clear what a legal professional has to do to use the product.
3. The legal technology product adapts to the specific goals of the user as the user enters responses.

Legal technology perceived as "intuitive" can help prevent cognitive errors such as heuristics, attribute substitution, emotional framing, and the effect of salient features, related to System 1. As demonstrated in this research, "intuitive" technology (1) requires minimal training, (2) adapts to the user and the input provided to the user, (3) and allows the user to be always clear as to what is required.

- Requiring minimal training: means that the technology is consistent with the existing mental models related to a law practice: this reduces confusion and allows focus on the specific legal task at hand rather than extraneous factors.
- By adapting: providing appropriate context for the particular legal task in question.
- By always being clear what is required: thus reducing errors related to complexity.

Moreover, in this research it has been demonstrated that these factors significantly influence adoption of computer technology used by professionals to do legal work.

7.2.7 Summary

The evaluation of the quantitative findings of this study showed unexpected results. The original research model, when it was evaluated, showed evidence of collinearity. Consequently, the model was modified to create a second level construct identified as User Experience, consisting of the first order reflective constructs of PEOU, PI, and COM.

Evaluating this model revealed negative f^2 and q^2 values relating to PEOU, resulting in the removal of PEOU completely from the final model which is now identified as the TAUE

model. The TAUE model had an acceptable R^2 value for the endogenous variable USE and all paths in the model from the exogenous latent variables are significant with $p < .05$. In future research it is suggested that a marker variable be included in the design of the research.

The TAUE model was developed for a subset of the data that was based on a segment of responses based on similar legal technology products. The final research model is shown in Figure 6-2. The TAUE model has the advantage of being parsimonious.

It is likely that there will be significant variation in the final models obtained for different technologies. For some technologies the creation of a second level construct – such as UE – will be warranted. In this research the final model removed the PEOU construct; this may not be the case with other technologies where PEOU is still of high importance. Again for other technologies the importance of COM may be significantly different. Moreover, additional constructs like Perceived Enjoyment may need to be added to the model.

With the focus on designing technology acceptance for a technology and a specific context we build the "IT Artifact" (Weber 2003, p. iii) that has been sought. We also bring IS academic research closer to design. As Simon notes (1996):

> Everyone designs who devises courses of action aimed at changing existing situations into preferred ones. …Design, so construed, is the core of all professional training; it is the principal mark that distinguishes the professions from the sciences. Schools of engineering, as well as schools of architecture, business, education, law, and medicine, are all centrally concerned with the process of design. (p. 111).

This comment of Simon concerning design supports the increasing interpretation of IS research as a design science (Hevner *et al*. 2004). Along this line it has been possible to link the results of this research to the work of Kahneman, Schön, Simon, and Susskind. In addition, the results can be related to the Apple Design Guidelines, feedforward design, and the marketing of technology as "intuitive".

7.3 Limitations of the Research

This research has been limited to the contextual factors of technology adoption that relate to one specific technology: technology used by legal professionals to do legal work. Legal technology is a specialized area of technology that operates in the specific cultural environment of legal practice. This is exploratory research. To extend this research and to create generalizations it will be necessary to perform additional research using different technologies.

There are limitations to this research:

1. This research is a cross sectional study and does not study the effects of the TAUE model over an extended period of time (longitudinally).

2. The research provides limited extension of the dependent variable USE in regards to the extent of use and to the degree to which specific features are utilized. In addition, this research uses self-reported use.

3. The research reached a segment of the target population (lawyers, paralegals, law clerks, and legal assistants) who had sufficiently good skills to use internet social media; they may not be representative of the total target population.

4. TAM has been found to vary in robustness across different cultures; TAUE may similarly vary in robustness across cultures.

5. There may be other moderating variables that have not been included in this model but are important in technology acceptance of legal technology by legal professionals. In addition, there may be other salient beliefs that mediate technology acceptance and use that have not been identified in this research.

7.4 Potential Areas of Future Research

1. It is appropriate that the TAUE model proceed through the similar process of replication, and comparison to existing models of technology acceptance – such as TAM, TPB, UTAUT – to establish the validity and generalizability of the TAUE model. In addition, the TAUE model needs to be evaluated in a wide array of contexts. TAM has found wide

application in many disciplines; the validity, robustness, and scalability of TAUE can similarly only be evaluated by comparing it to TAM in the many disciplines in which TAM has been found to have utility. Similarly, as to TAM, TAUE should be explored across other cultures. Finally, the TAUE model will need to be extended in much the manner that TAM has been extended.

2. The traditional professions, such as law and medicine, have been dramatically affected by the emergence of technology specific to their practice. The study of the effects of technology on work in general is an important area of research. An important part of the study of technology is user acceptance of technology. Further research could be conducted in differences in user acceptance of technology among various professions and the reasons for these differences. It would be particularly interesting to explore the differences in factors that influence user acceptance of technology among law, medicine, engineering, and accounting practitioners.
3. An extension of the present research would be to include in the UE construct, as developed, additional measure items related to the hedonic aspect of user experience.
4. Further research could be conducted to determine if there is a relationship between Perceived Intuitiveness of the legal technology and the Personal Innovativeness of the user of the technology (Agarwal and Prasad 1998).
5. Finally, further research could investigate the effect of continued use of the legal technology on the Perceived Intuitiveness of the legal technology, as there is evidence that experience increases ease of use (Hackbarth, Grover, and Yi 2003). Similarly, intuitive use of technology may increase with experience.

7.5 Management Implications

The Perceived Intuitiveness construct instrument could be used in the usability stage of testing to evaluate the extent to which the technology is perceived as intuitive by the user. It meets the following call by Bagozzi (2007) on the need to reconceptualise the variables of the TAM. In this research PEOU has been reconceptualised as PI.

Legal technology used to do legal work is becoming essential to legal practice and replacing traditional methods of doing legal work; this is particularly evident in regards to legal

research. The increased insight that has been developed in this research into the cognitive aspects of technology used by the legal profession to do legal work is of value both to members of the legal profession and the suppliers of technology to the legal profession.

The most significant management implication of the development of the TAUE model is that individual technology acceptance can now be linked to the degree to which legal technology used to do legal work has been designed so that it appears to be intuitive to the user; that is, the degree to which it is perceived as intuitive. Considerable research is emerging on intuitive technology design.

The most significant factors that determine the perceived intuitiveness of legal technology are (1) the degree the technology can be used without training, (2) the degree that the technology adapts based on user input, and (3) the degree to which the user is always clear in what they have to do to use the product. These are practical concerns for which metrics can be developed for a legal technology product (or other technology) and included in user acceptance testing in order to measure the degree to which a legal technology product (or other technology) is perceived as being intuitive. Nonetheless, it may be that for other technologies and other contexts in which the technology is used that different measurement items, other than the three specified, are of the most importance.

Increased understanding of the dynamics of technology acceptance of legal technology will allow management of law firms to develop plans to facilitate acceptance of new legal technology by legal professionals.

7.6 Summary and Conclusion

When TAM was first developed by Davis (1986) the emerging revolution was the desktop personal computer. At present we are well into the age of the smartphone and on the brink of the next revolution in technology with the emergence of the Internet of Things and the potential convergence of the Internet of Things, Big Data and the Semantic Web (Díaz, Ortega, García, Rodríguez-Molina, Cifuentes, and Jara 2013). This research has identified PI as an emergent latent construct in technology acceptance. As far as can be determined no research has been performed on intuitiveness in relation to TAM.

Technology Acceptance research can be seen as an evolving continuum. Defining the nature of an MIS system was a concern in the emergence of MIS research (Benbasat and Schroeder 1977). Concerns were raised about the significant failure rate of information systems and the need to focus on users (Lucas 1975). Davis (1986) developed TAM during the time period when personal workstations were an emerging technology.

This research has highlighted the concept of "intuitiveness" as related to technology. This has a number of practical applications both to professional legal practice and to the suppliers of legal technology. It points the way ahead for further integration of legal technology into practice assisting in the extension of human cognition which is limited by Bounded Rationality and related cognitive effects (Kahneman 2002).

The TAUE model developed in this research, like TAM, is parsimonious. The TAUE model may be of utility for a period of time, but inevitably will become normal science as society, technology, and people change and will be replaced by other ways of understanding technology acceptance (Kuhn 1970).

While this research has focused on what constitutes "perceived intuitiveness" in legal technology, the investigation of the intuitive in relation to technology can be further explored in relation to other technologies and refined to determine the elements of the intuitive across all technology. It would also be useful explore the intuitive in relation to other business related areas such as marketing.

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Appendix A TAM Literature Review

Table A-1 TAM Replication Articles	
Article	Summary
(Adams, Nelson, and Todd 1992)	Tested reliability and validity of TAM using email, voicemail, WordPerfect, Lotus 123, and Harvard Graphics. MBA students were used in the study with the dependant variable measured by self-reported use. The results supported TAM.
(Hendrickson, Massey, and Cronan 1993)	This research performed Test-Retest reliability of the PU and PEOU scales using student subjects: 51 students used a spreadsheet package and 72 used a database management package. Both scales exhibited test-retest reliability.
(Segars and Grover 1993)	This research re-examined the data used by Adams *et al*. (1992) in their replication study of TAM using confirmatory factor analysis. They found a poor fit of the data to the TAM model but find support for a re-specified model, adding a third factor identified as Effectiveness.
(Subramanian 1994)	In contrast to Segars and Grover (1993), Subramanian (1994) found support for the two factor TAM model in research using voice mail and dial-up systems. They found no significant relationship between ease of use and usefulness.
(Szajna 1994)	This research evaluated choice as an alternative dependent variable to intentions in the TAM model: 47 MBA students completed the TAM instrument requiring selection of a database management system. TAM was found to predicate choice.
(Davis and Venkatesh 1996)	Tested grouping of measurement items for PU and PEOU in random order and alternatively grouped by the respective construct. Found no difference in results between the two different grouping methods.

Source: Chuttur M.Y. (2009, p. 11) Overview of the Technology Acceptance Model: Origins, Developments and Future Directions. Segars and Grover (1993), Subramanian (1994) and Szajna (1994) - not included by Chuttur (2009) – have been added (Sources as indicated).

The research on replication of TAM has found support for the model. The three factor model re-specified by Segars and Grover (1993) has not been substantiated by additional research (Chin and Todd 1995). As outlined by Subramanian (1994) the non-significant relationship between ease of use and usefulness may have been an artifact of the specific technologies evaluated in the research in question.

Table A-2 Comparison of TAM with the TRA and the TPB

Article	Summary
(Davis *et al.* 1989)	Compared TAM with TRA using research with MBA students and a word processing package. Both theories were found to predict intention to use. Very little correlation was found for SN and BI. TAM was found to be the more parsimonious than TRA.
(Mathieson 1991)	Compared TAM with the TPB using a spreadsheet application with 262 respondents. Both theories were found to predict technology use. As with the comparison of TAM to TRA, TAM was found to be more parsimonious than TPB, although TPB provided more detail as to specific user beliefs influencing technology use.
(Taylor and Todd 1995b)	Compared TAM, the TPB and the decomposed TPB. Data on student use of computer resource center was collected for a 12-week period using a 786 user student population. While the results from all three models were comparable, the TPB provided a better understanding of BI and decomposed TPB provided moderate additional explanation of BI.

Source: Chuttur M.Y. (2009, p. 11-13) Overview of the Technology Acceptance Model: Origins, Developments and Future Directions, Taylor and Todd (1995b) - not included by Chuttur (2009) – has been added.

Table A-3 Selected Research Extending TAM	
Article	Summary
(Venkatesh and Davis 2000)	Added five factors to TAM affecting PU and two moderating variables: Experience and Voluntariness. The research used 156 knowledge workers, in a longitudinal study with four different systems with mandatory and voluntary use. The revised TAM model is now identified as the Technology Acceptance Model 2.
(Venkatesh 2000)	Added seven individual factors grouped into two sets of factors (Anchors and Adjustments) to TAM affecting PEOU. The research used 246 respondents in a longitudinal study with three different organizations.
(Venkatesh *et al.* 2003)	UTAUT is based on eight previous user acceptance theories. UTAUT postulates three primary determinants of intention to use technology: Performance Expectancy, Effort Expectancy, and Social Influence. Gender and Age were also confirmed as modifying factors. It has been shown to account for 70% of the variance in intention to use technology.
(Chau and Hu 2002a)	This research presented a modified TAM model to investigate physicians' acceptance of telemedicine technology which included Peer Influence and COM as antecedent factors to PU, PEOU, Attitude and PBC. The primary endogenous variable was BI.
(Wixon and Todd 2005)	This research provides an integration of the TAM model with the separate stream of research on user satisfaction with information technology.
(Venkatesh and Bala 2008)	Technology Acceptance Model 3 presented a model of technology acceptance utilizing the TAM model and previously identified antecedent factors of PU and PEOU identified in TAM research.

Table A-3 Selected Research Extending TAM (Continued)	
Article	Summary
(Brown *et al.* 2010)	In this research, the model of collaboration technology and the UTAUT model are used to develop a model that explains adoption of collaboration technology. This research elaborated the antecedents of PU and PEOU specific to collaboration technology.
(Venkatesh *et al.* 2012)	In research on consumer acceptance and use of Information Technology, the UTAUT theory was extended to consumer markets with the creation of UTAUT2 which includes the following constructs: hedonic motivation, price value and habit.

Source: Chuttur M.Y. (2009). Overview of the Technology Acceptance Model: Origins, Developments and Future Directions and articles as indicated. Additional extensions of TAM not included by Chuttur (2009) have been added, Venkatesh *et al.* (2003); Chau and Hu (2002a); Wixon and Todd (2005); Venkatesh and Bala (2008); Brown *et al.* (2010); Venkatesh *et al.* (2012) (Sources as indicated).

Table A-4 Other Notable Articles Related to TAM, TAM2, TAM3, and UTAUT	
Article	Summary
(Morris and Venkatesh 2000) (Venkatesh and Morris 2000) (Morris *et al*. 2005)	Morris and Venkatesh (2000) explored age differences in the acceptance of IT systems. They found older workers more likely to use technology because of social factors and ease of use. Gender differences were also investigated by Venkatesh and Morris (2000). Further research found for younger workers differences based on gender were not significant (Morris *et al*. 2005).
(Brown *et al*. 2002)	This article indicates mandatory use has significant effects on relationships within TAM – making aspects of TAM function differently. PEOU becomes the primary determinant of BI. If the Attitude construct is added to the model, it does not have a significant effect on BI.
(Sykes, Venkatesh and Gosain 2009**)**	The quality and extent of existing social networks in an organization at the time of initiation of a new system can explain new system use over and above the explanatory power of the previously discussed UTAUT theory. The nature of social networks within a law office would consequently influence user acceptance of technology.
(Srite 2006)	Researched user acceptance of technology between China and US users using the TAM model of Davis (1989) found significant differences between China and US users. For Chinese users SN was significant and PU was not significant; the opposite was true of the US sample.
(Venkatesh and Zhang 2010)	This research found that the UTAUT theory was supported in China except that Social Influence was different in China as compared to the US; they postulate that culture functions as a boundary condition indicating that "culture is an important contingency factor in the study of technological adoption" (p. 20).

Source: Articles as Indicated

Table A-5 Models Incorporated into the UTAUT Model		
ID	Model	Constructs
1	Theory of Reasoned Action (Fishbein and Ajzen 1975)	Attitude Towards Behavior Subjective Norm Behavioral Intention
2	Technology Acceptance Model (Davis *et al.* 1989)	Perceived Usefulness Perceived Ease of Use Subjective Norm
3	Motivational Model (Davis, Bagozzi, and Warshaw 1992)	Extrinsic Motivation Intrinsic Motivation
4	Theory of Planned Behavior (Mathieson 1991) (Taylor and Todd 1995b)	Attitude Towards Behavior Subjective Norm Perceived Behavioral Control
5	Combined TAM and TPB (Taylor and Todd 1995a)	Attitude Towards Behavior Subjective Norm Perceived Behavioral Control Perceived Usefulness
6	Model of PC Utilization (Thompson, Higgins, and Howell 1994)	Job-fit Complexity Long-term Consequences Attitude Towards Using Social Factors Facilitating Conditions
7	Innovation Diffusion Theory (Moore and Benbasat 1991)	Relative Advantage Ease of Use Image Visibility Compatibility Results Demonstrability Voluntariness of Use
8	Social Cognitive Theory (Compeau and Higgins 1995a) (Compeau and Higgins 1995b)	Outcome Expectations – Performance Outcome Expectations – Personal Self-efficacy Affect Anxiety

Source Adapted from: Venkatesh *et al.* (2003) p. 428-432.

Appendix B

Summary of Codes and Extracts from MISQ and ISR Related to "Intuitive Technology"

The PDF versions of the text of MISQ and ISR articles was searched three times for the text "intu" in order to identify the word "intuition" and related terms. For ISR, the embargo for online issues was increased to 60 months from 35 months during this research resulting in the 2009 issues of ISR being only searched twice. Codes were assigned to text using a method consistent with Grounded Theory (Glaser and Straus 2009) and reviewed several times. A summary of the codes assigned by time period is presented in Table B-1.

Table B-1 Codes Assigned by Period and by Publication (ISR and MISQ)

Period	ISR	MISQ	Total	Percentage of Total
1977-1989 (MISQ Only)*	-	159	159	16.1%
1990-2009	321	360	681	69.1%
2010-2012 (MISQ Only)**	-	146	146	14.8%
Total	321	665	986	100.0%

* MISQ began publishing in 1977

** ISR began publishing in 1990; there was a 35-month embargo (now increased to 60 months) for online issues of ISR. At the time of this research, online issues for the years 2010, 2011 and 2012 were not available.

The process of code generation resulted in 21 codes. The details of this research can be found in (McAran, Manwani 2013; 2014). Of the 986 codes identified in Table B-1, 44 were assigned to the "Intuitive Technology" code, representing 4.5% of total codes assigned; these codes are analyzed over time and by publication in Table B-2. As can be seen, the number of "intuitive" codes assigned has been fairly consistent in the range of 0.4 to 0.8 codes per year/per publication in the period 1977 to 2009. However, for MISQ in the period 2010-2013, there has been a significant increase to 4.3 codes per year; this time period can then be identified with the emergence of the concept of "intuitive" technology.

Table B-2 "Intuitive Technology" Codes Assigned by Period and by Publication		
Time Period/Publication	Number of Codes Assigned	Codes Assigned/Year
MISQ 1977-1989	6	0.5
MISQ 1990-1999	8	0.8
ISR 1990-1999	5	0.5
MISQ 2000-2009	8	0.8
ISR 2000-2009	4	0.4
MISQ 2010-2012	13	4.3
Total Codes Assigned	44	1.2

Source: McAran, Manwani (2013; 2014).

It is noteworthy that TAM was developed in 1985/1986 by Davis (1986) in his doctoral thesis with the first article announcing TAM published in MISQ in 1989. As can be seen in Table B-2, the main emergence of the concept of "intuitive technology" in IS research occurred after this time. This explains, in part, why the concept of the "intuitive" was not part of the original formation of TAM by Davis**.**

Table B-3 Codes Assigned and Characterizations of "Intuitive" by Time Period

Period	Codes Assigned for "Intuitive"	Concepts Associated with "Intuitive"*
1977-1989 MISQ only	MISQ: 6 codes in 2 articles	MISQ Intuitive as (or related to): 1. Familiar. 2. As "fiction" in regards to IS technology. 3. Associated with "Right Brain". 4. Natural Process. 5. As having "Focus on user needs" (2)*.
1990-2000 MISQ and ISR	MISQ: 8 codes in 7 articles. ISR: 5 codes in 4 articles	MISQ Intuitive as (or related to): 1. "ease of use" (2)*. 2. "user experience" (2)*. 3. "seductive". 4. Icons. 5. Graphical User Interface. 6. Sound. 7. *not* "Functions" and "Macros". 8. "Feedback". 9. Interfaces (2)*. 10. Reducing the cost of training (2)*. 11. "user-friendly". 12. "Richer Media". 13. Natural ways of communication (i.e. talking) more natural and intuitive than typing. ISR Intuitive as (or related to): 1. the "Visual" (2)*. 2. the "interface". 3. the "direct". 4. "ease of use". 5. "Spatial Cognition". 6. "Perceptual Processing". 7. facilitating "creativity".

Table B-3 Codes Assigned and Characterizations of "Intuitive" by Time Period (Continued)

Period	Codes Assigned for "Intuitive"	Concepts Associated with "Intuitive"*
2000-2009 MISQ and ISR	MISQ: 8 codes in 8 articles. ISR: 4 codes in 3 articles.	MISQ Intuitive as (or related to): 1. Interfaces. 2. "user-orientated". 3. increasing productivity. 4. easy navigation. 5. "being in command". 6. help menus and hot keys. 7. search, retrieval and display. 8. enhancing quality (2)*. 9. "user-friendly". 10. "flexible". 11. "iterative". 12. "not-sequential". 13. enhancing usability. 14. an objective of interface design (2)*. 15. having correspondence to reality. 16. an objective of navigation schemes. 17. of benefit to even novice users. 18. "Layout". 19. facilitating ease of accomplishing user goals. ISR Intuitive as (or related to): 1. facilitating "creativity" (2)*. 2. "ease of use" (2)*. 3. "web-site layout". 4. "simplicity" (2)*. 5. "consistency of design". 6. "consistency of navigation" (2)*. 7. "proper use of interaction principles". 8. "efficient access of commonly used data". 9. "leverage of understanding of real world".

Table B-3 Codes Assigned and Characterizations of "Intuitive" by Time Period (Continued)		
Period	Codes Assigned for "Intuitive"	Concepts Associated with "Intuitive"*
2010, 2011, 2012 MISQ only	MISQ: 13 codes in 7 articles.	MISQ Intuitive as (or related to): 1. easy (ease of) adaption of technology to user requirements (2)*. 2. logical organization. 3. "Tree view". 4. "familiar". 5. eliminating need for "mental model". 6. allowing "quick content scanning and skimming". 7. usability (2)*. 8. navigation (2)*. 9. "natural mappings". 10. "familiar mental models". 11. *not* related to "Symbolic behavior". 12. "self-comprehensive". 13. "understanding". 14. "interactivity". 15. "reduction of personal effort involved". 16. "leverage of understanding of real world". 17. "ease of use" (2)*. 18. "real world". 19. "natural". 20. "easy to customize". 21. "simple"(2)*. 22. "graphics".

Source: (McAran, Manwani 2013, 2014) *Where the same characterization of "intuitive technology" appears more than once in the extracts of a publication in a specific time period, an annotation appears in brackets indicating the number of times the item was mentioned.

In summary, the method of scanning the entire text of MISQ and ISR, since these publications began publication, for references to intuition and related terms enabled identification of factors related to and the effects of intuitive technology. In addition, this section has characterized the emergence of the concept of "intuitive technology" in the period 1997 to 2012.

Table B-4 Comparison of Characteristics of "Intuitive": the Preliminary Exploratory Qualitative Research, Review of Literature Related to the Intuitive, and the Coding of MISQ and ISR.

	Concept from Preliminary Exploratory Qualitative Research	Concept from Intuition Literature	Concept from Intuitive Technology Literature	Concept from Coding of MISQ and ISR	Summary Concept
1	The level of training required to use the technology.			Reducing the cost of training.	Minimal training required.
2	The difficulty in learning the technology.		"lenient learning environments" (O'Brien *et al.* 2010, p. 89). "requires minimum learning" (Bullinger *et al.* 2002 p. 4).		Easy to learn.
3	The degree to which the technology is similar to other technology.	As familiar (Raskin 1994; Norman 2002; Parasuraman and Colby 2001).	"prior experience" (O'Brien *et al.* 2010 p. 89).	Familiar Familiar mental models.	Familiar.

Table B-4 Comparison of Characteristics of "Intuitive" (Continued)					
	Concept from Preliminary Exploratory Qualitative Research	Concept from Intuition Literature	Concept from Intuitive Technology Literature	Concept from Coding of MISQ and ISR	Summary Concept
4	The degree to which the technology is similar to the manual legal process. Respondents felt it was important legal technology use the correct legal terminology.	Use of mental and conceptual models which can be conceived as familiar as well as social and cultural norms (Norman 2002). "acts of recognition" (Simon 1996, p. 89).	the tangible nature of intuitive tech. (Turner (2008) cites Mackay *et al.* (1998)). "prior experience" (O'Brien *et al.* 2010, p. 89). Intuitive systems draw on social/ cultural aspects. (Turner 2008). "builds as much as possible on existing general and technology-specific user knowledge" (Bullinger *et al.* 2002, p. 4).	corresponds to reality. leverage of understanding of real world. "real world". "natural".	Draws on experience of user in the "real world".

Table B-4 Comparison of Characteristics of "Intuitive" (Continued)					
	Concept from Preliminary Exploratory Qualitative Research	Concept from Intuition Literature	Concept from Intuitive Technology Literature	Concept from Coding of MISQ and ISR	Summary Concept
5	The degree to which the technology has the correct perspective of the legal profession. Does it function "as if a lawyer designed it"?	Use of mental and conceptual models which can be conceived as being related to familiar as well as social and cultural norms (Norman 2002).	"achieve their functional and abstract goals" (O'Brien *et al.* 2010, p. 89). "The system works exactly the way I work" (Shaw 2011, p. 159). Intuitive systems also draw on social and cultural aspects (Turner 2008).	facilitating ease of achieving user goals.	Achieve Goals
6	Two responses of "intuitive" in response to "In what way is the legal technology product easy to use or not easy to use?"	"controls must be easy to find and read" (Parasur-aman and Colby 2001, p. 149-150).		"ease of use" (2)*.	Easy-to-use.

Table B-4 Comparison of Characteristics of "Intuitive" (Continued)					
	Concept from Preliminary Exploratory Qualitative Research	Concept from Intuition Literature	Concept from Intuitive Technology Literature	Concept from Coding of MISQ and ISR	Summary Concept
7		As related to feelings (Shirley and Langan-Fox 1996).	"affectively charged judgments" Dane and Pratt (2007, p. 36). "flow" (Csikszent-mihalyi 2008).	"being in command".	The emotions and feelings the technology elicits.
8		Simple (Story 2011, not paged sections 4.5 - 4.7).		"simplicity" (2)*. "simple" (2)*.	Simple.
9		Easy to understand (Story 2011, not paged, sections 4.5 - 4.7).		self-comprehen-sive. understand-ing.	Easy to understand.
10			"uses natural human modes of expression such as speech and gesture" (Bullinger *et al.* 2002, p. 4).	Natural Process. Natural commun-ication (i.e. talking) more natural/ intuitive than typing. Natural mappings.	Natural.

Table B-4 Comparison of Characteristics of "Intuitive" (Continued)					
	Concept from Preliminary Exploratory Qualitative Research	Concept from Intuition Literature	Concept from Intuitive Technology Literature	Concept from Coding of MISQ and ISR	Summary Concept
11			uses feedforward methods to achieve their functional and abstract goals. (O'Brien *et al.* 2010, p. 89).	easy (ease of) adaption of technology to user requirements. (2)*.	Adapts/ Adaptable.
12			Graphical represent-ations are more intuitive (Robey and Taggart 1982).	Icons/ Graphical User Interface. "Richer Media". the "Visual" (2)*. "graphics".	Visual.
13		"minimizes hazards and the adverse conse-quences of accidental or unintended actions" (Story 2011, not paged sections 4.5 - 4.7).	"lenient learning environ-ments" (O'Brien *et al.* 2010 p. 89).	"user-friendly". "reduction of personal effort involved".	Tolerant of Error.

Table B-4 Comparison of Characteristics of "Intuitive" (Continued)					
	Concept from Preliminary Exploratory Qualitative Research (Continued)	Concept from Intuition Literature	Concept from Intuitive Technology Literature	Concept from Coding of MISQ and ISR	Summary Concept
		intuition of "certitude"; "inadequate information" (Shirley and Langan-Fox 1996, p. 564).			No common theme.
14		"without conscious awareness" (Shirley and Langan-Fox 1996 p. 564). "Intuitive thought is said to be "the end product of an implicit learning experience" (Reber, 1988, p. 232) as quoted in Shirley and Langan-Fox (1996, p. 571).	"non-conscious or implicit knowledge" (Blackler *et al.* 2010 p. 13). "(1) non-conscious process" (Dane and Pratt 2007, p. 36). "Everything on the screen – it just automatically fits in" (Shaw 2011, p. 159).	of benefit to even novice users. eliminating need for "mental model". reduction of personal effort involved.	Uses Implicit Knowledge.

Source: References as indicated. See McAran, Manwani (2013; 2014).

Appendix C Pre-tests of Perceived Intuitiveness Measurement Items

Pre-Test Package 1 - Rank Order Pre-Test

Rank the 15 statements below as to how well each statement matches the definition of Perceived Intuitiveness of a Legal Technology product.

(The statements to be ranked are the 15 measurement items for the PI construct as listed on pages 104-105. They are not repeated here to avoid repetition)

The statements should be ranked in descending order; that is, the statement that best matches the definition should be ranked number 1 (first) the statement that least matches the definition should be ranked number 15 (last).

The definition of the Perceived Intuitiveness of a Legal Technology Product is:

Perceived Intuitiveness: The degree to which use of the legal technology product is perceived by the legal technology user as capable of being used without conscious awareness of rational thinking.

Use the table below to rank the statements above. The statements should be ranked in descending order; that is, the statement that best matches the definition should be ranked number 1 (first) the statement that least matches the definition should be ranked number 15th (last).

Ranking number The statement that best matches the definition should be ranked number 1 (first) the statement that least matches the definition should be ranked number 15 (last).	**Statement** Enter the number of the chosen statement. Alternatively copy and paste the statement into the selected rank.
1st	
2nd	
3rd	
4th	
5th	
6th	

Ranking (Continued)	Statement
7th	
8th	
9th	
10th	
11th	
12th	
13th	
14th	
15th	

Pre-Test Package 2 - Create Categories Grouping the Perceived Intuitiveness Construct Measurement Items

Thank you for participating in this pre-test.
This research focuses on legal technology which is defined as: *Technology specifically designed for the legal profession and used by lawyers or legal staff to perform legal work.*

Group the 15 statements below into categories based on similarity of meaning of the individual statements to each other; that is, place the statements in categories so that the statements that are most similar in meaning are in the same categories. Try to use 3 to 5 categories.

(The statements to be grouped are the 15 measurement items for the PI construct as listed on pages104-105. They are not repeated here to avoid repetition)

Category 1	**Statement Items Grouped - As Having Similar Meaning - in Category 1** (either enter the statement number or copy and paste the statement)

Category 2	**Statement Items Grouped - As Having Similar Meaning - in Category 2** (either enter the statement number or copy and paste the statement)
Category 3	**Statement Items Grouped - As Having Similar Meaning - in Category 3** (either enter the statement number or copy and paste the statement)
Category 4	**Statement Items Grouped - As Having Similar Meaning - in Category 4** (either enter the statement number or copy and paste the statement)
Category 5	**Statement Items Grouped - As Having Similar Meaning - in Category 5** (either enter the statement number or copy and paste the statement)
Category 6	**Statement Items Grouped - As Having Similar Meaning - in Category 6** (either enter the statement number or copy and paste the statement)

	Use as many or as few categories as you wish
	Use as many or as few categories as you wish
	Use as many or as few categories as you wish
	Use as many or as few categories as you wish

Pre-Test 1 – Rank Measurement Items of PI Construct Based on Importance

Table C-1 Summary of Rankings by Median: Lawyers/Legal Staff/Legal Academics

Item #	Perceived Intuitiveness Measurement Items						
	Mode	Median	Mean	Priority Mode*	Priority Median	Priority Mean	Ranked Median (tie-breaker)**
1	2	2.5	5.2	1	1	3	1
2	1, 12	7	7.3		6/7	6	6
3	10	5.5	6.2	4/5	5	4	5
4	15	13	13	8	15	15	15
5	10, 14	10	9.3		12	10	12
6	3,14	5	6.9		4	5	4
7	3	3	3.7	2	2	1	2
8	1, 3, 6	3.5	4		3	2	3
9	10	9	8.5	4/5	10	9	10
10	4, 7, 8, 15	8	9.3		8/9	12	9
11	7, 8, 9	8	8.5		8/9	8	8
12	14	10.5	10.6	7	13	13	13
13	11	9.5	9.2	6	11	11	11
14	6, 9, 11, 12	11.0	10.5		14	14	14
15	7	7	7.8	3	6/7	7	7

Adapted from Davis (1986); Mode has been added in this analysis.
*Because 6 items had multiple modes, the multiple modes are eliminated from the rankings leaving only 9 items to be ranked. This does however still provide useful information about the relative rankings.
** Where there was a tie in regards to median value, the mean was used as a tie-breaker.

Items to be dropped: 5 lowest ranked items:

Item # 4: When I use this legal technology product in my practice, I find it reflects the values of the legal profession (ranked 15th).

Item # 5: When I use this legal technology product in my practice, I find the user interface of the product is similar to other legal technology products (ranked 12th).

Item #12: When I use this legal technology product in my practice, it reflects my legal experience (ranked 13th).

Item # 13: When I use this legal technology product in my practice, I can see the overall picture (ranked 11th).

Item # 14: Using this legal technology product is engaging (ranked 14th).

Pre-Test 2 – Group the Items into Similar Categories

Table C-2 Summary of Category Groups: Lawyers/Legal Staff/Legal Academics (Table entries represent the number of times individual items were grouped together)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1		3	3		**10**	1	3	3	1			3	2		1
2		3	6	2	6	2						**7**			1
3				5	3	6						5			2
4						**7**					1	4	1	2	1
5						1	2	2	1			3	2		1
6												4		1	
7								**12**	4	2	2	1	4	2	5
8									4	2	2	1	4	2	5
9										**8**	3	1	4	2	2
10											5		4	5	5
11												1	**8**	4	5
12													2		1
13														2	2
14															6
15															

Adapted from Davis (1986)

In this pre-test the objective was to identify items that had been grouped by respondents into the same category. Items that had been most frequently grouped together would be candidates for elimination as they represented the same element of the domain content of the construct and were therefore redundant. The results of this analysis are presented below.

Items Appearing in Table C-2 with Seven or More Groupings:

Item #1 and Item # 5 – ten times:

Item # 1: When I use this legal technology product in my practice, I find the user interface of the legal technology product familiar.

Item # 5: When I use this legal technology product in my practice, I find the user interface of the product is similar to other legal technology products.

Comments: Item # 5 was already a low ranked item from Pre-Test 1: the pretest sorting task. As such item # 5 is already eliminated.

Item # 7 and Item # 8 – twelve times:

Item # 7: I find this legal technology product can be used in my practice with minimal training.

Item # 8: I find this legal technology product, when used in my practice, easy to learn.

Comments: In Pre-Test 1, the sorting task, item # 7 was ranked 2nd and item # 8 was ranked 3rd. These items appear to be very closely related. However, because of apparent importance of "learning" and "training" in technology acceptance as evidenced by the preliminary qualitative pilot study, the literature review, and the novel PDF scan of the literature, it was decided to retain both of these measurement items.

Item # 9 and Item # 10 – eight times:

Item # 9: When I use this legal technology product in my practice, I find it allows me to a make a mistake yet recover.
Item # 10: This legal technology product adapts to my specific goals as I enter responses.

Comments: In Pre-Test 1, the sorting test item # 9 was ranked 10th and item # 10 was ranked 9th. In this case it has been decided to keep both item # 9 and item # 10. This was done for the following reasons – (1) while there are 2 items in the QUESI instrument that measure "Perceived Error Rate", they do not directly relate to the process of "make a mistake yet recover" which appears to be a distinct process not directly comparable to "Perceived Error Rate". Item # 10 is the only item that includes among the pre-test items developed that refers to "goals". In addition, item # 10 refers to adaptation ("adapts"). The domain content related to adaptation is not covered by the QUESI measurement items.

Item # 11 and Item # 13 – eight times:

Item # 11: When I use this legal technology product in my practice, I can predict the results on my actions.
Item # 13: When I use this legal technology product in my practice, I can see the overall picture.
Comments: Item # 13 was already a low ranked item from the first pre-test sorting task. As such item # 13 is already eliminated.

Item # 4 and Item # 6 – seven times:

Item # 4: When I use this legal technology product in my practice, I find it reflects the values of the legal profession.
Item # 6: When I use this legal technology product in my practice, I find it functions as if a lawyer designed it.
Comments: Item # 4 was already a low ranked item from the first pre-test sorting task. As such item # 4 is already eliminated.

Item # 2 and Item # 12 - seven times:

Item # 2: When I use this legal technology product in my practice, I find the process of completing the task in the legal technology product similar to the manual legal process.
Item # 12: When I use this legal technology product in my practice, it reflects my legal experience.
Comments: Item # 12 was already a low ranked item from the first pre-test sorting task. As such item # 12 is already eliminated.

Appendix D - Quantifying the Triangulation of Characteristics of Intuitive Technology

1. Introduction

A novel approach is used to quantify the triangulation of four sources of information concerning the attributes of "intuitive" computer technology. The results of a preliminary qualitative pilot study, a literature review, and a novel method of scanning the literature are utilized to identify attributes of intuitive technology. Using these three sources a set of characteristics of "intuitive" technology is developed. The characteristics identified are treated as categorical data. In order to quantify the degree of inter-rater agreement from these three sources of information in regards to the characteristics of "intuitive" computer technology, a measure is proposed, based on the Brennan-Prediger coefficient; now identified as the Categorical Agreement by Multiple Raters (CAMR) statistic.

In addition, an existing instrument, the *Questionnaire for the Subjective Consequences of Intuitive Use* (QUESI; Naumann and Hurtienne 2010), which is closely related to research to develop a Perceived Intuitiveness of Information Systems construct, is used to triangulate the resulting characteristics identified for "intuitive" technology from the previously mentioned three sources. A second adaptation of the Brennan-Prediger coefficient is utilized to quantify this triangulation.

2. Agreement Value Rating System for Three Sources of Information on Intuitive Technology

A rating system has been adapted from the suggested method of Gwet (2012):

> An intuitive approach for generalizing this notion to the case of three raters, for example, is to consider all three pairs of raters that can be formed out of a group of three raters. Only 0, 1 or all three pairs can be in agreement (it's impossible for only 2 of the 3 pairs to be in agreement). Therefore, the relative number of pairs in agreement takes on the 3 values (0, 1/3, 1). The group of 3 raters receives a full agreement credit (i.e. 1) only when they classify the subject into the exact same category. They will receive no agreement credit when each classifies the subject into a category from a different category than the other 2 raters, and they will receive a third credit when only 2 of the 3 raters use the same category. The average of all these agreement credits over all subjects yields the overall percent agreement p_a in the case of multiple raters (p. 29).

In our particular circumstance, we compare the agreement on characteristics of intuitive technology identified from three sources: the preliminary qualitative pilot study, the literature review, and the novel method of scanning the literature, and assign the following agreement values:

Where all three sources agree on a specific characteristic, an agreement value of 1 is assigned. Where two sources agree on a specific characteristic, an agreement value of 1/3 is assigned. Where only one source chooses a particular characteristic, an agreement value of 0 is assigned. The calculation appears in Table D-1.

Table D-1 Analysis of Agreement: 3 Sources; 16 Factors
(An "X" indicates specific characteristic was identified by one of three sources)

Characteristic of Intuitive Technology	Pilot Study	Literature	MISQ/ISR	Agreement Value
Familiar	X	X	X	1
Easy-to-use	X	X	X	1
Minimal Training	X		X	1/3
Achieve Goals		X	X	1/3
Easy to Learn	X	X		1/3
Draws on Experience of User in the "Real World"	X	X	X	1
Simple		X	X	1/3
Easy to Understand/Understandable		X	X	1/3
The Emotions and Feelings the Technology Elicits		X	X	1/3
Natural		X	X	1/3
Uses Implicit Knowledge	X	X	X	1
Adaptable		X	X	1/3
Visual		X	X	1/3
User Friendly			X	
Inadequate Information		X		
Tolerant of Error		X		
Total				7

It is argued that the best approximation of "chance agreement" in this particular circumstance would be the 1/n factor found in the Brennan-Prediger coefficient (Brennan and Prediger 1981).

$k_{bp} = (p_a\text{-}1/n)/(1\text{-}1/n)$

From Table D-1 above the simple agreement score would be 7 out of a possible 16 or .4375.

Using the Brennan-Prediger coefficient,

$k_{bp} = (p_a\text{-}1/n)/(1\text{-}1/n)$

$= (7/16\text{-}1/16)/(1\text{-}1/16) = (6/16)/(15/16) = .3750/.9375 = .4000$

Comparing this result to the Landis and Koch (1977) standard for Cohen's kappa would indicate fair agreement although the results obtained are not directly comparable.

To provide insight into the result obtained, we calculate the values of this adaptation of the Brennan-Prediger coefficient when there is 100% agreement and, alternatively, no agreement. In the above Table D-1:

If 100% agreement: $(16/16\text{-}1/16)/(1\text{-}1/16) = (15/16)/(15/16) = 1$

If no agreement: $(0/16\text{-}1/16)/(1\text{-}1/16) = (-1/16)/15/16) = -.0667$

This modification of the Brennan-Prediger coefficient is now identified as the CAMR statistic.

3. Using the Brennan-Prediger coefficient to Measure Agreement Between Two Sets of Characteristics

Using the Brennan-Prediger coefficient

In this section an adaptation of the Brennan-Prediger coefficient is used to measure the agreement between the set of characteristics of intuitive technology derived from the three sources (the preliminary qualitative pilot study, the literature review, and the novel method of scanning the literature) identified in Table D-1 and the factors for intuitive technology identified by the QUESI instrument.

Contingency Table Adapted from Gwet

An analysis is made adapting the contingency table used by Gwet (2012, p. 27) concerning missing ratings. The concept of missing ratings has application by analogy to the analysis presented here. Essentially, where there is no agreement between the two sources in Table D-2, the non-agreements are treated as missing or "other" ratings. However, significant modifications are made to the calculation of p_a (simple agreement) and p_e (agreement by chance).

Gwet (2012) calculates the simple percentage agreement "based on the set of subjects rated by both raters" and chance agreement using "all subjects classified by either rater" (Gwet 2012, p 22). In this adaptation, the "other" category is a category where no agreement was achieved rather than a category which represents "subjects" which were not available to be rated by both raters.

The construction of the contingency table used below adapts the contingency table used by Gwet (2012, p. 27 Table 2.90) to calculate Cohen's kappa with missing ratings. We modify Gwet's (2012) contingency table for the circumstances particular to this research. In Table D-2, simple agreement and chance agreement are calculated over the number of all characteristics of intuitive technology identified:

1. p_a (simple agreement) is calculated over the entire population of potential characteristics which, in this case, is 17. This provides a more interpretable result.
2. For Cohen's kappa the marginal probabilities are calculated for each of the agreed six characteristics as 1 divided by the total population of characteristics which in this case is 1/17.
3. As there are 6 agreed characteristics, for Cohen's kappa, p_e (agreement by chance) is calculated as $6x(1/17x1/17) = 6/289 = .0208$

Table D-2 Agreement of Characteristics of Intuitive Technology with QUESI Instrument

First Pilot Study, Literature Review, Review of MISQ and ISR	QUESI Instrument							Total
	Familiar	Achieve Goals	Easy to use	Easy to Learn	Simple	Uses Implicit Knowledge	All Other Character-istics Where There is No Agreement (See Table D-3)	
Familiar	1							1
Achieve Goals		1						1
Easy to Use			1					1
Easy to Learn				1				1
Simple					1			1
Uses Implicit Knowledge						1		1
All Other Character-istics Where There is No Agreement (See Table D-3)							11	11
Total	1	1	1	1	1	1	11	17

Table D-3 Characteristics of Intuitive Technology Where There is No Agreement	
ID	Categories
1	Minimal training required.
2	Draws on experience of user in the "real world".
3	The emotions and feelings the technology elicits.
4	Easy to understand.
5	Natural.
6	Adaptable.
7	Visual.
8	Tolerant of Error.
9	User-Friendly.
10	Inadequate Information.
11	Reliable*.

*Reliable is added as a category because it is only identified in the QUESI Instrument and was not found in the first three sources (the preliminary qualitative pilot study, the literature review, and the novel method of scanning the literature) as a characteristic of intuitive technology.

If we define $P_a = (1+1+1+1+1+1)/(17) = 6/17 = .3529$

$p_e = 6x(1/17x1/17) = 6x(1/289) = 6/289 = .0208$

Cohen's kappa is then calculated as:

$k_c = (p_a-p_e)/(1-p_e)$

$= (.3529-.0208)/(1 -.0208) = .3321/.9792 = .3392$

The Brennan-Prediger coefficient is calculated as:

$k_{bp} = (p_a-1/n)/(1-1/n)$

$= (.3529-1/17)/(1-1/17) = (.3529-.0588)(1-.0588) = .2941/.9412 = .3125$

Again, to provide insight into the result obtained, we calculate the values of this adaptation of the above construction of p_a and the consequent construction of the modified Brennan-Prediger coefficient when there is 100% agreement, and where there is no agreement.

If there was 100% agreement:

p_a would be $17/17 = 1$

The Brennan-Prediger coefficient would be calculated as:

$k_{bp} = (p_a\text{-}1/n)/(1\text{-}1/n)$

$= (1\text{-}1/17)/(1\text{-}1/17) = 1$

If there was no agreement, the Brennan-Prediger coefficient is then calculated as:
$k_{bp} = (p_a\text{-}1/n)/(1\text{-}1/n)$

$= (0\text{-}1/17)/(1\text{-}1/17) = (-.0588)/(1\text{-}.0588) = -.0588/.9412 = -.0625$

It is notable that the calculated values, as above, of Cohen's kappa and the Brennan-Prediger coefficient are similar.

4. Discussion

The results show low to fair agreement. As the different sources of the characteristics of intuitive technology are essentially independent of each other, the element of chance which Cohen's and Fleiss kappa (Fleiss 1981) are designed to compensate are not applicable given that these measures adjust for chance agreement based on the classification of an identical population. However, in this circumstance, there still exists a chance element because of the interpretative aspect to identifying characteristics of "intuitive technology". As an example, consider the following extract:

> To the extent backups must be set up or initiated by human operators, is the system easy to understand and use with minimal training? Ease of use both promotes reliability…and saves money in training costs (Henderson 2009, p. 37)

In the above text, ease-of-use can be seen as closely related to easy-to-understand, reliability and reducing training required. While the various words used to describe "intuitive technology" are assumed to be distinct, there would appear to be significant overlap in the content of the terminology used to describe "intuitive technology". The much lower level of agreement between the first three sources (the preliminary qualitative pilot study, the literature review, and the novel method of scanning the literature) identified in Table D-2 and the factors for intuitive technology identified by the QUESI instrument could be because the QUESI instrument only includes the most salient factors related to intuitive technology while additional, less prominent factors, were identified in the first three sources.

5. Conclusion

For the comparison of the preliminary qualitative pilot study, the literature review, and the novel method of scanning the literature, using the proposed CAMR statistic, a value of .4000 is obtained (100% agreement yields a value for CAMR of 1). For the comparison of the three aforementioned sources of characteristics of "intuitive" technology and the QUESI instrument, a value is obtained for the Brennan-Prediger coefficient of .3125 (100% agreement yields a value for the Brennan-Prediger coefficient of 1).

While no detailed analysis has been made as to the meaning of the values obtained for level of agreement, the results indicate a low to fair level of agreement. The much lower level of agreement between the first three sources (the preliminary qualitative pilot study, the literature review, and the novel method of scanning the literature) and the factors for intuitive technology identified by the QUESI instrument could be caused by the QUESI instrument only representing the most salient factors related to intuitive technology while additional, less prominent factors, were identified from the first three sources.

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Appendix E Demographics

Table E-1 Gender Usable Responses				
	Main Research		Pilot	
Gender Analysis	Number	Percentage	Number	Percentage
Male	72	46.7%	31	41.9%
Female	82	53.3%	43	58.1%
Total	154	100%	74	100%

Table E-2 Occupation Usable Responses				
	Main Research		Pilot	
Occupation	Number	Percentage	Number	Percentage
Lawyer	73	47.4%	32	43.2%
Paralegal	52	33.7%	20	27.0%
Law Clerk	11	7.2%	8	10.8%
Legal Assistant	8	5.2%	6	8.2%
Other	10	6.5%	8	10.8%
Total	154	100%	74	100%

Table E-3 Experience Usable Responses				
	Main Research		Pilot	
Legal Experience	Number	Percentage	Number	Percentage
Less than 1 year	2	1.3%	5	6.8%
1-10 years	32	20.8%	24	32.4%
11-20 years	45	29.2%	16	21.6%
21-30 years	41	26.6%	14	18.9%
Over 30 years	34	22.1%	15	20.3%
Total	154	100%	74	100%

Table E-4 Geographic Area of Respondents (Main Research)			
United States			
North East	18		11.7%
South	44		28.6%
Mid-West	22		14.3%
West	19		12.3%
Total United States		103	66.9 %
Canada			
Alberta	4		2.8%
British Columbia	1		0.8%
Ontario	31		20.2%
Quebec	2		0.8%
Total Canada		38	24.6%
Other			
Australia	2		1.0%
Barbados	1		0.8%
India	2		1.0%
Ireland	1		0.8%
Netherlands	1		0.8%
Puerto Rico	1		0.8%
Russia	1		0.8%
South Africa	1		0.8%
Thailand	1		0.8%
United Kingdom	2		0.9%
Total Other		13	8.5%
Total		154	100%

Appendix F Results

Table F-1 Descriptive Statistics Westlaw Data Set (*n*=94)
(Items exceeding recommended values are highlighted with bold text)

Item	N	Range	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
USE	94	96	62.52	29.789	887.371	-.315	.249	-1.241	.493
FeatUse	94	90	59.66	26.112	681.818	-.292	.249	-1.053	.493
VOL	94	100	71.74	37.950	1440.171	-.955	.249	-.771	.493
PU1	94	6	6.32	1.060	1.123	**-2.613**	.249	**9.041**	.493
PU2	94	3	6.36	.701	.491	-.830	.249	.234	.493
PU3	94	5	6.22	.918	.842	**-1.657**	.249	**4.204**	.493
PU4	94	3	6.23	.835	.697	**-1.033**	.249	.666	.493
PEOU1	94	6	5.89	1.196	1.429	**-2.144**	.249	**5.899**	.493
PEOU2	94	6	5.49	1.366	1.865	**-1.310**	.249	1.752	.493
PEOU3	94	6	5.71	1.197	1.433	**-1.922**	.249	**4.845**	.493
PEOU4	94	6	5.61	1.313	1.725	**-1.793**	.249	**3.812**	.493
COM1	94	6	5.49	1.350	1.822	**-1.384**	.249	1.948	.493
COM2	94	6	5.55	1.657	2.744	**-1.183**	.249	.357	.493
COM3	94	6	5.81	1.110	1.232	**-1.346**	.249	2.981	.493
PI1	94	6	5.59	1.282	1.643	**-1.367**	.249	2.327	.493
PI2	94	6	4.90	1.593	2.539	-.834	.249	-.071	.493
PI3	94	6	4.73	1.297	1.681	-.698	.249	.784	.493
PI4	94	6	5.19	1.354	1.834	**-1.392**	.249	1.912	.493
PI5	94	6	4.70	1.302	1.695	-.590	.249	.157	.493
PI6	94	6	4.99	1.485	2.204	**-1.069**	.249	.752	.493
PI7	94	6	5.01	1.387	1.925	-.735	.249	.414	.493
PI8	94	6	5.52	1.189	1.414	**-1.621**	.249	**3.839**	.493
PI9	94	6	5.85	1.261	1.590	**-2.178**	.249	**5.939**	.493
P10	94	6	4.39	1.718	2.951	-.596	.249	-.670	.493
PI11	94	6	4.34	1.610	2.593	-.274	.249	-.607	.493
PI12	94	6	5.12	1.487	2.212	**-1.026**	.249	.468	.493
PI13	94	6	5.33	1.315	1.729	**-1.244**	.249	1.447	.493
PI14	94	6	5.36	1.106	1.223	**-1.055**	.249	1.926	.493
PI15	94	6	4.70	1.516	2.297	-.690	.249	-.042	.493

Table F-2 Bootstrap Results (5,000 samples)
Westlaw Data Set (*n*=94)

	Original Sample	Sample Mean	Standard Error	*t*-statistic	*p*-value
VOL to USE	-0.0264	-0.0366	0.1104	0.2391	0.8111
Interaction: PU to USE	0.1250	0.1337	0.1685	0.7416	0.4484
Interaction: UE to USE	0.2923	0.2943	0.1390	2.1030	0.0365
PU to USE	0.3209	0.2847	0.1234	2.6006	0.0093
UE to COMP	0.9370	0.9385	0.0129	72.4085	0.0000
UE to PI	0.8703	0.8688	0.0370	23.5443	0.0000
UE to PU	0.5378	0.5474	0.0723	7.4400	0.0000
UE to USE	0.3550	0.3836	0.1324	2.6821	0.0063

Table F-3 Inner VIF Values
Westlaw Data Set (*n*=94)

	COM	VOL	Interaction: VOL to PU	Interaction: VOL to UE	PI	PU	UE	USE
COM								
VOL								1.0503
Interaction: VOL to PU								1.3355
Interaction: VOL to UE								1.4470
PI								
PU								1.4176
UE	1				1	1		1.5444

Table F-4 Outer VIF Values Westlaw Data Set (*n*=94)	
	VIF
COM1	3.6704
COM1	3.9902
COM2	2.8487
COM2	3.0065
COM3	1.8289
COM3	1.9765
FeatUse	1.3104
PI11	1.4245
PI11	1.5855
PI2	1.4988
PI2	1.5267
PI6	1.9346
PI6	2.6680
PU1	1.5524
PU2	2.4676
PU3	2.8858
PU4	3.5634
USE	1.3104
VOL	1
VOL * COM1	7.0210
VOL * COM2	6.7315
VOL * COM3	1.6767
VOL * PI11	1.6832
VOL * PI2	1.9760
VOL * PI6	3.8968
VOL * PU1	1.6239
VOL * PU2	2.2124
VOL * PU3	3.5738
VOL * PU4	3.7605

Table F-5 TAUE Model with All 154 Responses: R^2
(With Interaction Terms: PI Items PI2, PI6, PI11)

	R Square	R Square Adjusted
Compatibility	0.8903	0.8895
Perceived Intuitiveness	0.7799	0.7785
Perceived Usefulness	0.3375	0.3332
USE	0.2731	0.2485

Table F-6 TAUE Model with All 154 Responses: Bootstrap Results
(With Interaction Terms: PI Items PI2, PI6, PI11)

	Original Sample	Sample Mean	Standard Error	*t*-statistic	*p*-value
VOL to USE	-0.1738	-0.1650	0.0783	2.2177	0.0270
Interaction: VOL: PU to USE	0.1123	0.0617	0.1057	1.0617	0.2888
Interaction: VOL: UE to USE	0.2335	0.1620	0.1542	1.5144	0.1305
PU to USE	0.1930	0.1900	0.0893	2.1617	0.0311
UE to COMP	0.9435	0.9436	0.0084	111.4303	0.0000
UE to PI	0.8831	0.8803	0.0266	33.1180	0.0000
UE to PU	0.5810	0.5848	0.0530	10.9450	0.0000
UE to USE	0.3062	0.3327	0.1116	2.7424	0.0063

Appendix G Consent Form and Research Questionnaire

Note: The results for the open-ended questions appearing in this questionnaire are not reported in this dissertation.

Thank you for taking the time to review this questionnaire.

This research explores how individuals use technology in the workplace to do legal work (legal technology). This study is designed to be completed on-line. It is also available by email or using a paper based form.

Please use the procedure below when completing this questionnaire.

Please complete the questionnaire below with reference to a technology product you are currently using to perform legal work. You will be asked if you use specific legal technology products. You can select one of the products identified. You may also respond in regards to a different legal technology product you personally identify.

The survey will take approximately fifteen minutes and will be completely confidential. Please click the ">>" button below to continue.

Henley Business School
University of Reading

School of Management

Research Information Sheet

1. My contact information is as follows:

Dan McAran

Henley Business School, University of Reading, United Kingdom

Telephone: +44 (0) 1491 571 454

Email: danmca@hotmail.com

The academic supervisors for this project are:

Dr. Sharm Manwani

Email: sharm.manwani@henley.reading.ac.uk

Dr. Joe F. Hair

Email: joefhair@gmail.com

2. The proposed research seeks to expand user acceptance of technology research to include additional significant factors that affect user acceptance of technology. Through the use of new perspectives on user acceptance of technology and the addition of open ended questions designed to capture qualitative data, it is hoped to provide additional insights into as yet unexplored facets of user acceptance theory. The research has as its focus technology used to do legal work (legal technology).

3. No payments for expenses will be made to participants in this research project.

4. You may withdraw from this research at any time.

5. Audio and/or video recording may be made during interviews or focus groups in this research. Hand written notes will also be made of the research.

6. The interview notes, questionnaires and other related documents will be kept secured by the researcher and destroyed after the research is complete.

7. No reference will be made to any specific individual in the research report. The research results will only be used for qualitative and statistical analysis.

8. The results of the research will be available from the researcher on request.

9. This application has been reviewed by the School of Management Research Ethics Committee and has been given a favorable ethical opinion for conduct.

Henley Business School

University of Reading

Consent Form

1. I have read and had explained to me by Dan McAran the accompanying Information Sheet relating to the project on: *Integrating the Intuitive into User Acceptance of Technology Theory*.

2. I have had explained to me the purposes of the project and what will be required of me, and any questions I had have been answered to my satisfaction. I agree to the arrangements described in the Information Sheet in so far as they relate to my participation.

3. I understand that participation is entirely voluntary and that I have the right to withdraw from the project at any time, and that this will be without detriment.

4. This application has been reviewed by the School of Management Research Ethics Committee and has been given a favorable ethical opinion for conduct.

5. I have received a copy of this Consent Form and of the accompanying Research Information Sheet.

6. I confirm I am eighteen years of age or older.

Please click the ">>" button below to continue.

Radial button selection feature appears here

I consent to the above

I do not consent to the above

Are you a lawyer, paralegal, law clerk or legal assistant who uses a computer technology product (examples of such products would be *Westlaw, PCLaw, Fastcase, LexisNexis Quicklaw, AccessData Summation, Sage Timeslips*) to do legal work?

A computer technology product to do legal work would be a product specifically designed for law practice management, such as a time and billing product, or a product specifically designed for an area of legal practice, such as a litigation support product. It would not include general purpose office productivity products such as email, the *Microsoft Office* suite, the *WordPerfect* suite, or similar products.

Yes

No

Radial button selection feature appears here

In this questionnaire a *technology product used to do legal work* will be referred to as a *legal technology product.*

This survey asks questions about a legal technology product you have used in your legal practice. A legal technology product would be a product specifically designed for law practice management, such as a time and billing product, or a product specifically designed for an area of legal practice.

Six commonly used products appear below. It is requested, that if you use one of these products, that you select one of these products and answer the questions of this survey in regards to the product you have selected.

You could also provide the name of a particular product you use by selecting "Other" and entering the name of the product in the box provided. It should not include general purpose office productivity products such as email, the *Microsoft Office suite*, the *WordPerfect suite*, or similar products.

When the survey questions refer to a "legal technology product" think of the product you selected (or entered) and answer the questions relative to your experiences and knowledge from using that legal technology product.

Radial button selection feature appears here for all items

Westlaw

PCLaw

LexisNexis – Quicklaw

Fastcase

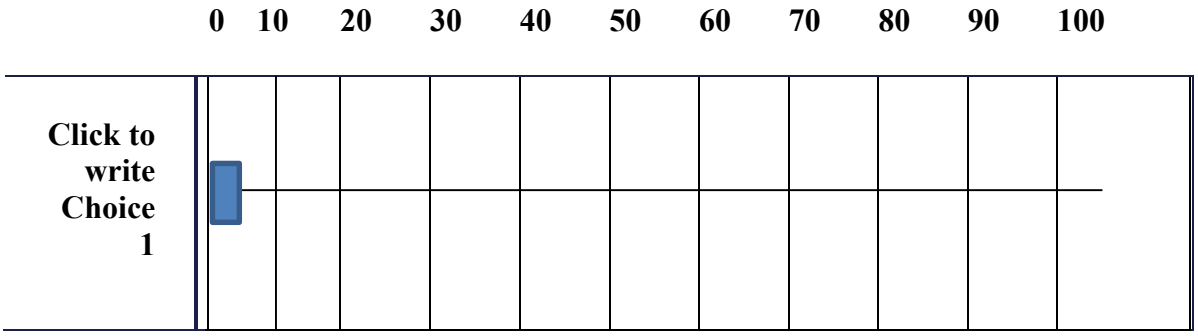
AccessData - Summation

Sage - Timeslips

Other (enter the name of the legal technology product in regards to which you are responding)

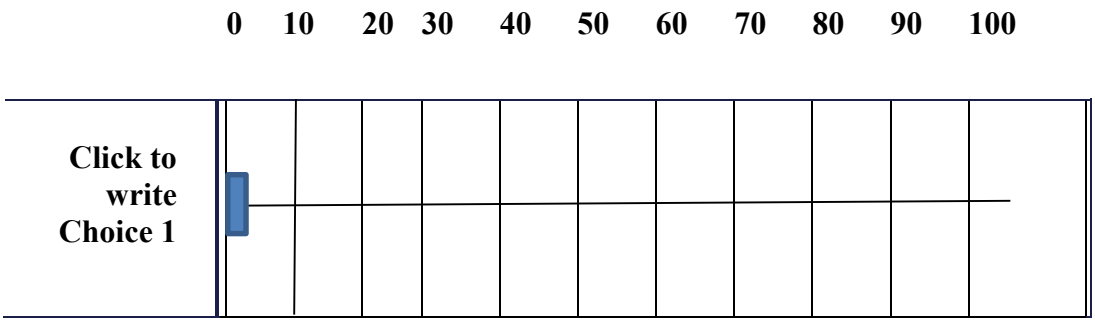
Please rate the degree of your use of this legal technology product on the scale below where ***0 on the scale is no use at all and 100 on the scale is constant use*** or a degree of use which you would consider as completely integral to your practice of law.

Degree of use of this legal technology product



Note: This is a slide bar scale from 1-100

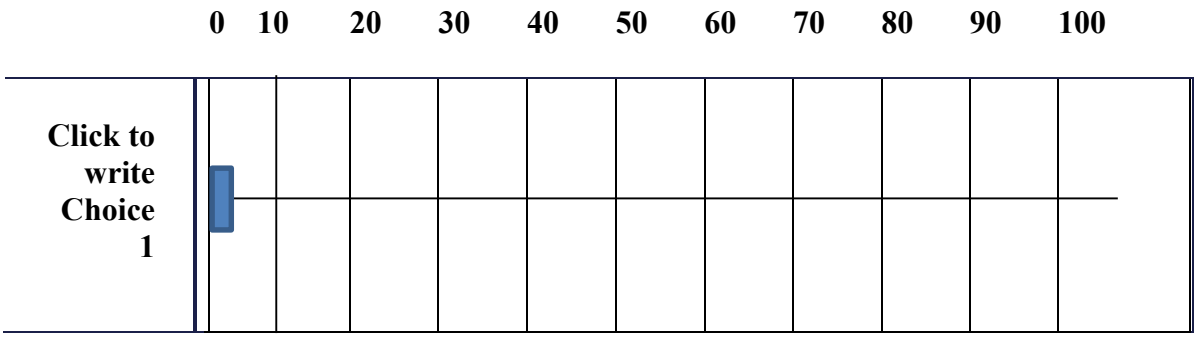
Please rate the percentage of the features available in this legal technology product which you would use on the scale below where ***0 on the scale would be use of none of the features and 100 would be use of all of the features.***



Note: This is a slide bar scale from 1-100

Please indicate the degree to which your use of this legal technology product in your practice is voluntary:
0 on the scale would indicate the use of this legal technology product is mandatory.
100 on the scale would indicate use of this legal technology is completely voluntary.

0 on the scale indicates mandatory use required
100 on the scale indicates completely voluntary use.



Note: This is a slide bar scale from 1-100

Please respond to the following series of questions by choosing the response that best represents your level of agreement to the statement.

Using this legal technology product in my practice cannot improve the service I provide to my clients.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

Radial button selection feature

appears here for all questions

Using this legal technology product in my practice will enhance my effectiveness in client service.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

Using this legal technology product in my practice can make providing service to my clients easier.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

Using this legal technology in my practice would be useful in providing service to my clients.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

Learning to use this legal technology product in my practice would be easy for me.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

Please respond to the following series of questions by choosing the response that best represents your level of agreement to the statement.

I would find it easy to get this legal technology product in my practice to do what I need to do in my service to clients.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

It is easy for me to become skillful in using this legal technology product in my practice.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

In my practice, I find this legal technology product easy to use.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

Using this legal technology product in my practice fits with the way I work.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

Using this legal technology product in my practice does <u>not</u> fit with my practice preferences.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

Please respond to the following series of questions by choosing the response that best represents your level of agreement to the statement.

Using this legal technology product in my practice fits with my client service needs.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

When I use this legal technology product in my practice, I find the user interface of the legal technology product familiar.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

I find this legal technology product can be used in my practice with minimal training.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

When I use this legal technology product in my practice, I automatically do the right thing to achieve my goals.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

I find this legal technology product, when used in my practice, easy to learn.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

Please respond to the following series of questions by choosing the response that best represents your level of agreement to the statement.

When I use this legal technology product in my practice, I can predict the results of my actions.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

When I use this legal technology product in my practice, it is always clear to me what I have to do to use the product.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

When I use it in my practice, this legal technology product flows.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

When I use this legal technology product in my practice, I achieve what I want to achieve with the product.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

When I use this legal technology product in my practice, I find the terminology used to be consistent with the use in the profession.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

Please respond to the following series of questions by choosing the response that best represents your level of agreement to the statement.

When I use this legal technology product in my practice, I can use the product without thinking about it.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

When I use it in my practice, this legal technology product adapts to my specific goals as I enter responses.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

When I use this legal technology product in my practice, I can interact with the product in a way that seems familiar to me.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

When I use this legal technology product in my practice, I am able to achieve my goals in the way I had imagined.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

Please respond to the following series of questions by choosing the response that best represents your level of agreement to the statement.

When I use this legal technology product in my practice, I find it allows me to a make a mistake yet recover.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

When I use this legal technology product in my practice, the product is complicated to use.

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

Are there factors specific to you personally that influence your decision on whether to use or not to use a legal technology product? Please provide an example or additional information.

Are there factors specific to the people you work with or the social situation where you work that influence your decision on whether to use or not to use a legal technology product? Please provide an example or additional information.

Are there factors specific to the information system or other technology you use at work that influence your decision on whether to use or not to use a legal technology product? Please provide an example or additional information.

Are there factors specific to the work environment, technical support available, other help available, or other related factors at work that influence your decision on whether to use or not to use a legal technology product? Please provide an example or additional information.

Radial button feature appears for all questions

Please indicate your gender.

Male

Female

Please indicate your occupation.

Lawyer

Paralegal

Law Clerk

Legal Assistant

Other

Please indicate the years of legal experience you have.

Less than 1 year

1 to 10 years

11 to 20 years

21-30 years

More than 30 years

Thank you for completing this survey.

Please click the “>>” button below to submit the survey.

Appendix H Ethics Review Form

Henley Business School

School of Management
Research Ethics Committee

Application for Research Project Approval

Introduction

The University Research Ethics Committee allows Schools to operate their own ethical procedures within guidelines laid down by the Committee. The University Research Ethics Committee policies are explained in their Notes for Guidance (see the link to "Guidance Notes (PDF – 299kb)" which can be found at http://www.reading.ac.uk/internal/res/ResearchEthics/reas-REethicshomepage.aspx) .

The School of Management (SoM) has its own Research Ethics Committee and can approve project proposals under the exceptions procedure outlined in the Notes for Guidance. Also note that various professional codes of conduct offer guidance even where investigations do not fall within the definition of research (e.g. Chartered Institute of Marketing, Market Research Society, etc). A diagram of the SoM Research Ethics process is appended to this form.

Guidelines for Completion

- If you believe that your project is suitable for approval by the SoM's Research Ethics Committee you should complete this form and return it to the Chair of the Committee. Note that ethical issues may arise even if the data is in the public domain and/or it refers to deceased persons.
- Committee approval must be obtained before the research project commences.
- There is an obligation on all students and academic staff to observe ethical procedures and practice and actively bring to the attention of the SoM's Research Ethics Committee any concerns or questions of clarification they may have.
- Records will be maintained and progress monitored as required by the University Research Ethics Committee, overseen by the School Ethics Committee
- This form should be completed by the student/member of academic staff as appropriate. **All forms must be signed by a member of the academic staff before submission.**
- This form is designed to conform to the University's requirements with respect to research ethics. Approval under this procedure does not necessarily confirm the academic validity of the proposed project.
- All **five** parts of the form and **all** questions must be completed. Incomplete forms will be returned. Students should submit forms to their supervisor, who together with staff should pass these to the SoMREC.
- **Student research projects** - initial approval may be given by the academic supervisor. **At the completion of the project students should submit a further copy of the form** to confirm that the research was conducted in the approved manner. **The project will not be marked until this form is received**. If in the course of work the nature of the project changes advice should be sought from the academic supervisor.

1. Project details

Date of submission October 20, 2014 Student No:

Title of Proposed Project: - **Integrating the Intuitive into User Acceptance of Technology Theory**

Responsible Persons

Name & email address of ~~principal researcher/student~~/programme member (*delete as appropriate*)

Dan McAran

Date:- October 20, 2014

Name and email address of supervisor (*if applicable*)

Dr. Sharm Manwani sharm.manwani@henley.reading.ac.uk

Nature of Project (mark with a 'x' as appropriate)

Staff research	☐	Masters	☐
Undergraduate	☐	Doctoral	☒
MBA	☐	Other	☐

(Student research projects should be signed off in **section 2. 3** below by the supervisor)

(Staff research projects should be signed off in **section 2. 4** below by the Research Ethics Committee)

Brief Summary of Proposed Project and Research Methods

The proposed research seeks to expand user acceptance of technology research to include additional significant factors that affect user acceptance of technology and to explore personal, social and technological factors that influence a person's acceptance of technology specific to the performance of legal work, in particular the intuitive design of the legal technology product.

This research uses participants who may be solicited using the following methods (not all methods may be used):

1) Posting to social media legal technology groups (www.linkedIn). See Appendix B.
2) Use of social media member message service (LinkedIn InMails -www.linkedin.com) – See Appendix C.
3) By use of a Qualtrics panel (www.qualtrics.com) with payment made to Qualtrics for solicitation of the panel.
4) Direct solicitation at professional conferences directing qualified potential participants to the study questionnaire on the internet using an iPad or similar technology.
5) Paper hand-outs directing qualified potential participants to links to the study questionnaire on the internet. The paper hand-outs will be distributed at public locations or at professional conferences frequented by the target population (lawyers, paralegals, law clerks, and legal assistants). See Appendix D and E.
6) To the members of the Institute of Law Clerks on Ontario by email (if solicitation agreed to by the Institute of Law Clerks on Ontario).
7) Direct distribution of the links to the web-based questionnaires by email to legal professionals whose email information is available on the internet.
8) If requested by potential respondents obtained from any of the solicitation methods described in points 1) to 7) above, distribution of email or paper questionnaires with corresponding Word document format or paper format Research Information Sheet and Consent Form.
9) For respondents who complete the on-line questionnaire consent will be indicated by selecting the "I consent" radial button appearing in the questionnaire. Please see Appendix A.

X I confirm that where appropriate an information sheet and consent form has been prepared and will be made available to all participants. This contains details of the project, contact details for the principal researcher and advises subjects that their privacy will be protected and that their participation is voluntary and that they may withdraw at any time without reason.

X I confirm that research instruments (questionnaires, interview guides, etc) have been reviewed against the policies and criteria noted in The University Research Ethics Committee Notes for Guidance. Information obtained will be safeguarded and personal privacy and commercial confidentiality will be strictly observed.

X	I confirm that **any** related documents which would include any questionnaires, interview schedules etc, and, where appropriate, a copy of the **Information Sheet**, **Consent Form** are attached and submitted with this application.

2. School Research Ethics Committee Decision (*delete as appropriate)*

2.1 I have reviewed this application as **APPROVED** and confirm that it is consistent with the requirements of the University Research Ethics Committee procedures

2.2 This proposal is **NOT APPROVED** and is returned to the applicant for further consideration and/or submission to the University Research Ethics Committee

2. 3. <u>For student and programme member projects</u>

SUPERVISOR – AT START OF PROJECT	***STUDENT – ON COMPLETION OF PROJECT***
Date:-	Date:- July 9. 2015
Signed (Supervisor)	Signed (programme member or student)
& Print Name	& Print Name
Dr. Sharm Manwani	Dan McAran
(*before start of project*)	(*on completion of project*)

2. 4. <u>For staff research projects</u>

Signed:

(School Research Ethics Committee Chair or member)

COMMENTS (where application has been refused)

If these questions cannot be confirmed please contact your supervisor.

Please confirm that at the conclusion of the project primary data will be:-

		Yes	No
1.	Are the participants and subjects of the study patients and clients of the NHS or social services to the best of your knowledge?		**X**
2.	Are the participants and subjects of the study subject to the Mental Capacity Act 2005 to the best of your knowledge (and therefore unable to give free and informed consent)?		**X**
3.	Are you asking questions that are likely to be considered impertinent or to cause distress to any of the participants?		**X**
4.	Are any of the subjects in a special relationship with the researcher?		**X**
5.	Is your project funded by a Research Council or other external source (excluding research conducted by postgraduate students)?		**X**

If you have answered **YES** to **any** of these questions, refer to the University's Research Ethics Committee. If you are unsure about whether any of these conditions apply, please contact the secretary of the University Research Ethics Committee, Nathan Helsby (n.e.helsby@reading.ac.uk), for further advice

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4. Please respond to **all** the following questions concerning your proposed research project

		Yes	No
1.	The research only involves archival research, access of company documents/records, access of publicly available data, questionnaires, surveys, focus groups and/or other interview techniques.	**X**	
2.	Arrangements for expenses and other payments to participants, if any, have been considered.	**X**	
3.	Participants will be/have been advised that they may withdraw at any stage if they so wish.	**X**	
4.	Issues of confidentiality and arrangements for the storage and security of material during and after the project and for the disposal of material have been considered.	**X**	
5.	Arrangements for providing subjects with research results if they wish to have them have been considered.	**X**	
6.	The arrangements for publishing the research results and, if confidentiality might be affected, for obtaining written consent of this have been considered.	**X**	
7.	Information Sheets and Consent Forms had been prepared in line with University guidelines for distribution to participants.	**X**	
8.	Arrangements for the completed consent forms to be retained upon completion of the project have been made.	**X**	

If you have answered **NO** to **any** of these questions, contact your supervisor if applicable, staff members should refer to the SoM Research Ethics Committee.

X

If the research is to be conducted outside of an office environment or normal place of work and/or outside normal working hours please note the details below and comment on how the personal safety and security of the researcher(s) has been safeguarded.

Destroyed Submitted to the Research Ethics Committee ☐

FOR SoM Research Ethics Committee use

Comments

Appendix A – Research Questionnaire

Already provided separately as Appendix F

Appendix B

Posting to be made to LinkedIn legal related groups

Seeking respondents for academic research into technology used by legal professionals

Seeking respondents for academic research into technology used by legal professionals (lawyers, paralegals, law clerks and legal assistants) to do legal work. This research explores how individuals use technology in the workplace to do legal work.

The survey will take approximately fifteen minutes and will be completely confidential and is available on-line at:

https://qtrial.qualtrics.com/SE/?SID=SV.....

Appendix C

InMail to be sent to LinkedIn member who are part of the target population of respondents

Research on technology used to do legal work

Hello (name),

I wonder if you would be interested in participating in academic research on technology used to do legal work. This research explores how individuals use technology in the workplace to do legal work.

The survey will take approximately fifteen minutes and will be completely confidential and is available on-line at:

https://qtrial.qualtrics.com/SE/?SID=.....

Regards, Dan McAran

Appendix D

Personal hand held sign (8.5" by 11'') to be used to solicit participants for the survey in public places and conferences frequented by legal professionals (lawyers, paralegals, law clerks and legal assistants).

Seeking respondents for academic research into technology

used by legal professionals (lawyers, paralegals, law clerks and legal assistants) to do legal work.

Appendix E

Flyer (8.5" by 11'') to be provided to potential respondents solicited in public places and conferences frequented by legal professionals (lawyers, paralegals, law clerks and legal assistants).

Text of Flyer

This research seeks to explore personal, social and technological factors that influence a person's acceptance of technology specific to the performance of legal work.

The survey will take approximately fifteen minutes and will be completely confidential. The survey is available on-line at:

(Link to location of questionnaire)

You can also send me an email and I will send you the link to the questionnaire.

My contact information is:

Appendix I Correlation Matrix TAUE Model Westlaw Data Set (*n*=94 Responses)

Table I-1 Correlation Matrix Westlaw Data Set (*n*=94 Responses) Cross-Loadings

	COMP	Degree VOL	Interaction: VOL to PU	Interaction: VOL to UE	PI	PU	UE	USE
COM1	0.9404	0.2235	-0.1846	-0.3251	0.6352	0.5827	0.8934	0.3493
COM2	0.8891	0.0916	-0.1979	-0.2654	0.5596	0.5103	0.8232	0.2798
COM3	0.8241	0.1117	-0.1562	-0.2529	0.5105	0.6109	0.7685	0.3595
FeatUse	0.3902	-0.0070	0.0129	0.1265	0.3974	0.3221	0.4343	0.8521
PI11	0.5091	0.1526	-0.0634	-0.2006	0.7791	0.3366	0.6930	0.3666
PI2	0.3286	0.2075	-0.0877	-0.1945	0.7288	-0.0402	0.5334	0.0874
PI6	0.6658	0.1740	-0.1910	-0.3102	0.9039	0.2853	0.8385	0.2492
PU1	0.3770	0.0467	-0.0638	-0.0193	0.1184	0.7004	0.2986	0.3637
PU2	0.5106	0.0815	-0.0366	-0.0830	0.1212	0.8759	0.3868	0.4388
PU3	0.5874	0.2005	-0.2696	-0.3443	0.3250	0.8589	0.5321	0.2486
PU4	0.6450	0.1465	-0.1698	-0.2637	0.3088	0.9155	0.5593	0.3449
Use	0.2545	0.1014	0.2744	0.2428	0.1326	0.3843	0.2286	0.8719
VOL	0.1636	1.0000	-0.0028	-0.1015	0.2148	0.1457	0.2023	0.0568
VOL * COM1	-0.2763	-0.1246	0.5456	0.9045	-0.3441	-0.2229	-0.3337	0.1350
VOL * COM2	-0.2498	-0.0300	0.5818	0.8843	-0.2695	-0.2323	-0.2850	0.1385
VOL * COM3	-0.2941	0.0238	0.5520	0.7397	-0.1487	-0.1391	-0.2567	0.2183
VOL* PI11	-0.2068	-0.1512	0.2801	0.7299	-0.2102	-0.1113	-0.2277	0.1549

Table I-1 Correlation Matrix TAUE Model (*n*=94 Responses) Westlaw Data Set (Continued)								
Westlaw Data Set (*n*=94 Responses) Cross-Loadings (Continued)								
	COMP	Degree VOL	Interaction: VOL to PU	Interaction: VOL to UE	PI	PU	UE	USE
VOL * PI2	-0.2056	-0.1839	0.0866	0.6956	-0.2085	-0.1557	-0.2270	0.1800
VOL * PI6	-0.2841	-0.0622	0.3471	0.8938	-0.2979	-0.2289	-0.3173	0.1825
VOL * PU1	-0.0536	0.1050	0.8653	0.1768	0.0022	-0.0771	-0.0339	0.2134
VOL * PU2	-0.0559	-0.0201	0.7638	0.3345	-0.1561	-0.0580	-0.1060	0.0180
VOL * PU3	-0.3316	-0.1296	0.7771	0.6599	-0.2864	-0.2629	-0.3425	0.0501
VOL * PU4	-0.2878	-0.1054	0.8239	0.6760	-0.2363	-0.1799	-0.2904	0.0994

Appendix J Determining Optimum Measurement Items

Determination of Measurement Items for User Experience – Westlaw data set

As it was decided to create a second level UE construct consisting of COM, PEOU, and PI as first level constructs, it was necessary to determine which of the measurement items of PI would be used. As COM has only three measurement items using the repeated indicators approach (Hair *et al.* 2014, p. 230), this requires the reduction of the number of indicators for PI and PEOU to three.

The approach that was used is as follows. It will be discussed for PI, but the process was also used to determine the optimal three measurement items for PEOU. The process used for PI was as follows:

1. The measurement items for PI were processed starting with PI1, PI2, and PI3. Using the first research model (Figure 6-1) an initial value of R^2 for USE was determined by running the PLS Algorithm.
2. The next PI measurement item was then substituted for each of the PI measurement items identified in point 1. In the initial procedure PI4 would be substituted for PI1, then PI2, and finally PI3. For each of these substitutions the PLS Algorithm would be run and an R^2 for USE determined.
3. Based on the results of the R^2 calculated for each of the substitutions of measurement items determined in point 2, as compared to an initial value of R^2 for USE calculated, the combination of PI measurement items with the highest value of R^2 for USE would be determined.
4. The items identified from point 3 would be used as a starting point and then the next measurement item (in the next instance PI5) would be used in an identical process. This procedure would then continue until the optimum measurement items have been selected.

Table J-1 illustrates this process for PI. The optimum measurement items selected for PI are determined as PI2, PI6, and PI11. Table J-2 illustrates this process for PEOU. The same process is used to select the best PI and PEOU measurement items for the non-Westlaw data set (60 responses).

Table J-1 First Research Model: Selecting Optimum Perceived Intuitiveness Measurement Items Westlaw Data Set (*n*=94)

Start with PI1, PI2, PI3		Substitute PI4	R^2 for USE
PI 1	PI 2	PI3	.3315
PI 1	PI 2	PI4	.3281
PI 1	PI4	PI3	.3210
PI4	PI 2	PI3	.3269
Start with PI1, PI2, PI3		Substitute PI5	R^2 for USE
PI 1	PI 2	PI3	.3315
PI 1	PI 2	PI5	.3303
PI 1	PI5	PI3	.3219
PI5	PI 2	PI3	.3279
Start with PI1, PI2, PI3		Substitute PI6	R^2 for USE
PI 1	PI 2	PI3	.3315
PI 1	PI 2	PI6	.3343
PI 1	PI6	PI3	.3267
PI6	PI 2	PI3	.3323
Start with PI1, PI2, PI6		Substitute P17	R^2 for USE
PI 1	PI 2	PI6	.3343
PI 1	PI 2	P17	.3275
PI 1	P17	PI6	.3265
P17	PI 2	PI6	.3327
Start with PI1, PI2, PI6		Substitute PI8	R^2 for USE
PI 1	PI 2	PI6	.3343
PI 1	PI 2	PI8	.3277
PI 1	PI8	PI6	.3272
PI8	PI 2	PI6	.3332

Table J-1 Selecting Optimum Perceived Intuitiveness Measurement Items (Continued) Westlaw Data Set (*n*=94)			
Start with PI1, PI2, PI6		Substitute PI9	R^2 for USE
PI 1	PI 2	PI6	.3343
PI 1	PI 2	PI9	.3216
PI 1	PI9	PI6	.3216
PI9	PI 2	PI6	.3272
Start with PI1, PI2, PI6		Substitute PI10	R^2 for USE
PI 1	PI 2	PI6	.3343
PI 1	PI 2	PI10	.3253
PI 1	PI10	PI6	.3250
PI10	PI 2	PI6	.3309
Start with PI1, PI2, PI6		Substitute PI11	R^2 for USE
PI 1	PI 2	PI6	.3343
PI 1	PI 2	PI11	.3372
PI 1	PI11	PI6	.3361
PI11	PI 2	PI6	.3429
Start with PI11, PI2, PI6		Substitute PI12	R^2 for USE
PI11	PI 2	PI6	.3429
PI11	PI 2	PI12	.3340
PI11	PI12	PI6	.3338
PI12	PI 2	PI6	.3322
Start with PI11, PI2, PI6		Substitute PI13	R^2 for USE
PI11	PI 2	PI6	.3429
PI11	PI 2	PI13	.3384
PI11	PI13	PI6	.3375
PI13	PI 2	PI6	.3350

Table J-1 Selecting Optimum Perceived Intuitiveness Measurement Items (Continued) Westlaw Data Set (*n*=94)			
Start with PI11, PI2, PI6		Substitute PI14	R^2 for USE
PI11	PI 2	PI6	.3429
PI11	PI 2	PI14	.3281
PI11	PI14	PI6	.3278
PI14	PI 2	PI6	.3263
Start with PI11, PI2, PI6		Substitute PI15	R^2 for USE
PI11	PI 2	PI6	.3429
PI11	PI 2	PI15	.3357
PI11	PI15	PI6	.3355
PI15	PI 2	PI6	.3325

Table J-2 Table Selecting Best Perceived Ease of Use Measurement Items Westlaw Data Set (*n*=94)
(These items were used in the first stage model with second order UE construct before removal of PEOU and creation of the TAUE model)

Start with PEO1. PEOU2, PEOU3		Substitute PEOU4	R^2 for USE
PEOU1	PEOU2	PEOU3	.3478
PEOU1	PEOU2	PEOU4	.3434
PEOU1	PEOU4	PEOU3	.3490
PEOU4	PEOU2	PEOU3	.3446

Determination of Measurement Items for User Experience: non-Westlaw data set.

The same process used to select the best PI and PEOU measurement items for the Westlaw data set is used in this appendix to select the optimum three measurement items for each of PI and PEOU for the non-Westlaw data set (60 responses). For the non-Westlaw data set the optimum measurement items selected are PI2, PI9, and PI15. As the results of this process are not referenced in the text of the dissertation, the details of the calculations are not provided here.