Understanding the Impact of Individual Creativity with Information Technology upon the Deep Usage of IT Systems

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ABSTRACT

In today's competitive business world, creativity is an important component in enhancing an organization's ability to retain its competitive advantage and stay ahead of competitors. In order to exploit creativity, firms must learn to identify and leverage it across all levels of the organization. Nonetheless, despite the importance of creativity, no work to date has conceptualized individual creativity with IT, nor studied the impact of creativity with IT upon the deep usage of IT systems. In this paper, we report the results of a study involving 111 users of an Electronic Document System that finds creativity to be a stronger driver of the creation of novel and useful ideas about IT than innovation or self-efficacy. By extension, it was a stronger predictor of the deep usage of IT even after accounting for perceptions towards the IT.

KEYWORDS

Creativity, Personal Innovativeness in the domain of IT, Self-Efficacy

INTRODUCTION

In today's competitive business world, innovation, or the knowledge of how to create new value (de Sousa 2006), is a key to growth for organizations. As such, creativity is an important component to enhancing an organization's ability to retain competitive advantage and stay ahead of competitors (Pipinich 2006). Successful organizations encourage creative work (Hennessey et al. 2010) by creating mechanisms to tap into employees' creative potential. To do so, organizations require tools that enable the identification of creative individuals who are capable of generating innovative solutions to business problems.

Successful firms use employee-driven innovation to generate novel and useful products, processes, and approaches (Shalley et al. 2004), however, research suggests that employee-driven creativity remains a scarce resource. Many individuals fail to realize their creative potential or to transform it into a source of personal or business value (Florida 2004).

To exploit creativity, firms must learn how to identify and leverage it across the organization (Vicenzi 2000; Zhang et al. 2010). The history of creativity research indicates that some people are more creative than others (Amabile 1983; Ford 1996; Guildford 1959; Woodman et al. 1993). To leverage creativity, a necessary first step for managers is to acquire tools that identify creative individuals and provide them with the opportunities and resources to leverage their ideas through time allocation (Mumford et al. 1988), resources (Amabile 1996), and appropriately-designed work groups (Amabile et al. 1996; Milliken et al. 1996). Through examining how to identify creative individuals, we provide guidance to our colleagues-in-practice about how to foster creativity within firms.

Despite creativity's importance, IS research has left the topic largely unexplored. Creativity has been studied extensively in psychology (Eysenck 1993; Hennessey et al. 2010), management (Amabile et al. 2005; Ford 1996; Oldham et al. 1996; Zhang et al. 2010), and sociology (Straus 1968; Uzzi et al. 2005). Studies have found that individuals possess creativity in specific areas (Silvia et al. 2009).Individuals may be highly creative in one realm and less creative in another. Rather than focus on individual creativity, the IS literature focuses upon tools (e.g. Garfield et al. (2001)) with an emphasis on the creation of a product rather than the person who created it, leaving opportunities for research that examine how to define and encourage creativity with IT in the workplace (Couger et al. 1993).

The objective of our paper is to *develop a conceptual and operational definition of Individual Creativity with Information Technology (ICIT).* We develop a theory that explains differences between individuals in how they think about IT and their ability to create novel ideas about IT. To accomplish our objective, we apply Amabile's (1996) creativity framework to the domain of IT. We propose ICIT as a multidimensional construct that influences post-adoption IT use. Our work advances IS research by affording a better understanding of: (a) what constitutes an individual who is highly creative with IT, (b) the impact of creativity on the depth of IT use and (c) offering a theoretical explanation for how an individual who possesses creativity in the domain of IT generates novel uses of IT.

THEORETICAL DEVELOPMENT

Drawing on literature that suggests creativity can be domain-specific, across technologies, and relatively stable, we present a three-fold conceptualization of individual creativity in the domain of IT (ICIT) (Amabile 1996; 1983) that integrates Task Motivation, Domain Relevant Skills, and Creativity Relevant Processes. The Component Models of creativity has been empirically validated (Conti et al. 1996; Hennessey et al. 2010; Ruscio et al. 1998; Taggar 2002) and has been widely adopted (Amabile 2001; Amabile 2013; Conti et al. 1996; Guildford 1959; Jeffries 2007; Ruscio et al. 1998; Sternberg et al. 2003; Taggar 2002) thus providing us with justification for extending this work within the IS domain.

DIMENSION #1: TASK MOTIVATION

Task motivation refers to intrinsic interest in a particular domain. A highly creative individual is motivated to accomplish a task due to his/her own level of intrinsic motivation and not based upon an extrinsic motivation to engage in creative behavior (Hennessey et al. 2010). In fact, previous research has found that intrinsic motivation facilitates creativity, whereas extrinsic motivation can be detrimental[1] (Amabile 1983). Once intrinsically engaged, a person enjoys thinking (Cacioppo et al. 1982) about the domain of interest. Thus, creative individuals are driven to pursue the challenge out of sheer enjoyment (Amabile 1998; Florida et al. 2005).

Within the context of IT, task motivation is manifest when an individual *enjoys thinking about new applications of technology*. This dimension reflects the intrinsic enjoyment of interacting with technology and not the extrinsic rewards gleaned from technology use. An individual who exhibits high ICIT enjoys thinking about IT because it is pleasurable (Amabile 1998). For example, if she is a computer programmer, she may enjoy spending her free time developing new programs, motivated by the work itself (Amabile 1998). Individuals who demonstrate high ICIT work with IT out of love of a challenge and enjoy the feeling of accomplishment they achieve from cracking a riddle, whether it be technological, logistical, or social (Florida et al. 2005).

DIMENSION #2: DOMAIN-RELEVANT SKILLS

Domain-relevant skills refer to the competencies of the use of the task domain under investigation. These competencies may include knowledge, technical skills, and special talents that are relevant or can be applied to the task domain (Lubart et al. 2004). For example, knowledge of technical skills in the context of a laboratory or knowledge of acrylics for an artist would constitute domain-relevant skills. These domain-relevant skills need to be contextualized to the specific task domain.

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[1] Although extrinsic motivators appear to undermine intrinsic motivation and creativity, exceptions have been discovered. If rewards confirm a creative individual's competence or enable them to become more deeply involved with work in their domain of creativity, intrinsic motivation and creativity may be enhanced (Amabile 2013).

Domain relevant skills refers to more than knowledge, it integrates the *individual's perception that they have the capacity to gain new knowledge about technology through both formal and informal education* (Amabile 1983). For example, if an individual does not possess full knowledge of a particular programming language, they need to have the ability to gain knowledge of the new language. Then, if they are internally motivated to solve a problem utilizing this new programming language, they will learn the new language necessary to develop their creative product. Therefore, although they do not necessarily possess knowledge of every technology, hardware, and programming language, they need only possess the ability to learn it. When the opportunity becomes available, the highly creative individual will gain knowledge of the necessary technology that can be used as a tool in their quest to build their creative product. We posit that highly creative individuals are able to absorb new knowledge about technology and we conceptualize the second dimensions as the *perceived capability of an individual to gain knowledge about technology*.

It is important to note that knowledge is a necessary for an individual to be creative with technology. While previous knowledge or experience with technology can discourage some individuals from developing creative solutions by leading to "functional fixedness", creative individuals overcome such barriers because they demonstrate a fluid capacity to gain and use knowledge about an IT.[2] When they demonstrate the capacity to gain knowledge about the potential of an IT's impact or capabilities, creative individuals are more apt to generate new innovations within the organizational context (Cooper 2000). We postulate that highly creative individuals possess a baseline propensity to be creative and the ability to leverage this characteristic requires knowledge in the domain of interest.

DIMENSION #3: CREATIVITY-RELEVANT PROCESSES

Creativity-relevant processes refers to domain-specific thought processes that highly creative individuals possess (Amabile et al. 1996). We posit that these thought processes can be abstracted to an underlying view that highly creative individuals are open to think differently about their domain (Amabile refers to this concept as *thinking widely*). A person who exhibits high creativity possesses a cognitive style favorable to developing new perspectives on problems (Amabile 1998; Cooper 2000; Hogarth 1987), with the individual possessing a unique capacity to combine existing ideas in new ways (Amabile 1998; Sawyer 2006) and recombining known components imaginatively into something new (Ciardi 1956). While a conventional thinker may approach a problem with certain traditional tools that have been used in the past, a person with high levels of creativity thinks differently about the problem. We term this as *open to new ways of thinking about information technology*.

Within the context of IT, a person who displays high ICIT employs a cognitive process that differs from conventional people. This individual does not view the world in the same way that everyone else does (Pipinich 2006); they organize their perceptions using a more complicated schema (Tuckman 1966) than conventional thinkers. An individual who is highly creative with IT is not stagnant in their thinking but develops ideas that transcend the traditional methods of solving problems. Although certain problems may appear daunting or unsolvable, a highly creative person is open to new solutions and are not constrained by the available resources; instead, they solve problems by utilizing new methods. They are more likely to forge a new path when developing ideas rather than relying on the typical solutions that conventional individuals have always employed. They actively approach the problem with a new way of thinking, which allows them to develop more efficient ideas to difficult problems. Essentially, when developing a solution to a particular problem, the highly creative individual's mind will produce a greater number and breadth of idea possibilities, increasing the population of unusual solution options from which to choose in the selection process (Amabile et al. 2005; Simonton 1999). Indeed, the solution is often a bricolage, in which individuals with high ICIT develop new ideas by utilizing the materials on hand and incorporating them in a new manner (Ferneley et al. 2006; Levi-Strauss 1966).

When compared to their less creative counterparts, people who demonstrate high ICIT produce unusual and original associations (Eysenck 1993). In addition, a person with high ICIT has the ability to explore and invoke these unique associations in constructing a response to a problem (Mednick 1962). They see new ways of applying technology to existing problems, they conceive of ways that technology can improve existing products, and they even envision new technology.

[2] We acknowledge that this is somewhat malleable as we know that experience will factor into the capacity to gain knowledge, as well as the individuals willingness to activate or use that capacity to gain knowledge through/during technology use

SUMMARY OF DIMENSIONS

We conceive ICIT as a superordinate construct, with each of the first order dimensions (or components, as termed by Amabile) serving as manifest indicators of the underlying construct. As such, the dimensions of ICIT are single order constructs that function as specific manifestations of the second order construct of ICIT. In the table below, we display each component and description provided by Amabile (1996; 1983) as well as our adaptation of the components within the context of IT. This conceptualization serves the basis for Hypothesis #1:

Hypothesis 1: Individual Creativity in IT is a superordinate second-order dimensions consisting of the three first-order dimensions of enjoys thinking about IT, the perceived capability to gain more knowledge about IT, and open to new ways of thinking about IT

Dimension	Description	ICIT Definition
Task Motivation	A pervasive and general orientation toward one's work	Enjoys thinking about IT
Domain-Relevant skills	The perceived ability to gain certain types of domain-specific knowledge	Perceived capability to gain more knowledge about IT
Creativity-Relevant processes	A cognitive style which tends to take new perspectives on problems	Open to new ways of thinking about IT

Table 1. Dimensions of ICIT

OUTCOME OF INDIVIDUAL CREATIVITY WITH INFORMATION TECHNOLOGY

Individuals possessing a higher degree of ICIT will generate a higher frequency of novel and useful ideas about technology. Creative individuals are able to depart from the status quo as well as diverge from their peers to suggest something *novel* about technology (Audia et al. 2007; Barron 1969; Hennessey et al. 2010). Moreover, high ICIT persons will generate *useful* ideas (Amabile 1983; Audia et al. 2007). This distinguishes ICIT from eccentric or schizophrenic thoughts, which are original but not useful (Feist 1998). A highly creative person develops new ideas or problem solutions utilizing information technology for changing products, processes, and services, in an effort to better achieve the organization's goals (Amabile et al. 2005). This discussion leads us to our second hypotheses:

Hypothesis 2: An individual higher in Individual Creativity in the domain of IT (ICIT) will be more likely to generate novel and useful ideas about IT

We further hypothesize that an individual who creates novel and useful ideas about IT will contextualize these ideas within an IT system and use the features of that IT in a deeper manner. As adoption researchers have begun to move beyond IT usage frequency to focus on usage behavior, certain factors regarding usage behavior have emerged in importance. Burton-Jones and Straub (2006) presented a re-conceptualized usage model, decomposing usage to include cognitive absorption and deep structural usage of the technology. We suspect that ideas generated by the user will impact how the user behaviorally uses the technology, manifested in the user employing more (and more obscure) aspects of the IT system in order to accomplish tasks.

Hypothesis 3: The more a user generates novel and useful ideas about IT (in general) will lead a user to more deeply use a deployed IT

CONFOUNDING EFFECTS

The central focus of our research involves examining the role of ICIT in the creation of novel and useful ideas and the impact on deep usage of IT systems. To rule out other possible confounding effects, we included two other constructs in our theoretical model (Figure 1) to control for other personality-level variables: Personal Innovativeness in the Domain of IT (PIIT) and Self-Efficacy. PIIT and ICIT differ on theoretical grounds and outcomes. While PIIT attempts to measure an individual's willingness to try a new IT when it is provided to them, the three dimensions of ICIT do not indicate a willingness to try, but rather demarcate the personal characteristics that facilitate the generation of creative ideas about IT. ICIT precipitates innovation (Audia et al. 2007), which in turn leads to the creation of immature technologies (Young 2007). Therefore, ICIT constitutes a necessary but not sufficient condition for innovation (Amabile et al. 1996). Therefore, we evaluate the discriminant validity between PIIT and ICIT to evince that ICIT more strongly predicts the creation of novel and useful ideas than PIIT.

We also evaluate whether Computer Self-Efficacy (CSE), which refers to "an individual's perception of efficacy in performing specific computer-related tasks within the domain of general computing" (Marakas et al. 1998, p. 127) is a confounding effect. Bandura (1986) notes that "Through their capacity to manipulate symbols and to engage in reflective thought, people (with high self-efficacy) can generate novel ideas and innovative actions that transcend their past experiences" (page 1182). Thus, although researchers postulate that CSE significantly relates to the creation of novel ideas, we posit that ICIT exerts an even greater impact on the creation of novel and useful ideas. Hence, we compare the ICIT and CSE to predict the creation of novel and useful ideas.

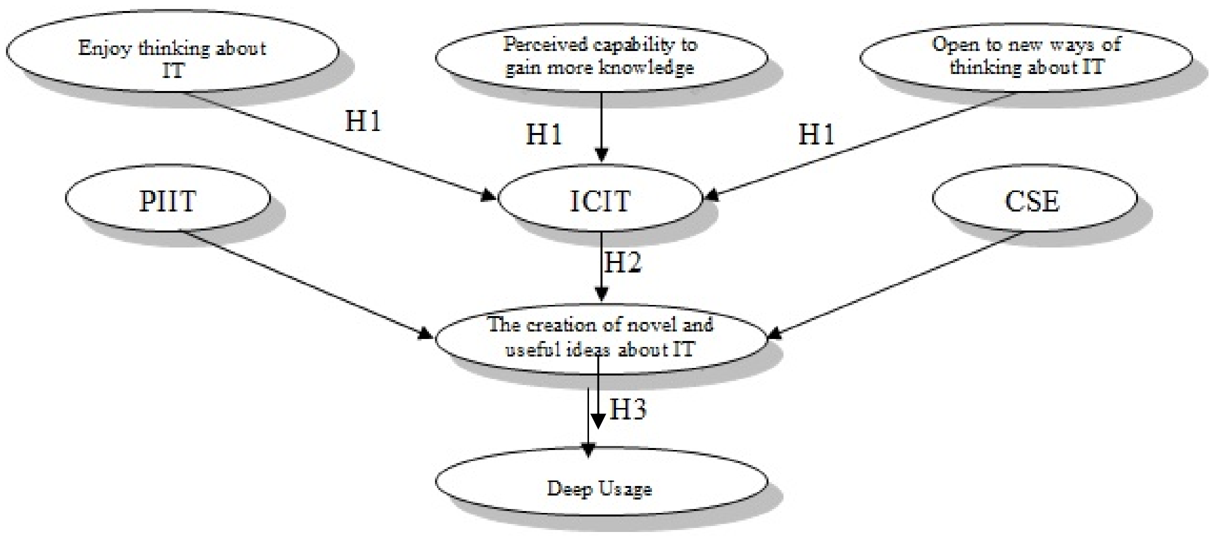

Figure 1. Proposed Research Model

METHOD

To test our hypotheses, we collected data from 111 users of an electronic document management system within a public organization. The organization tracks documents for the state and provides internal users (other state employees) and external users (the public and media) with documents regarding the safety of the environment. The organization had deployed an electronic document management system (EDMS) to facilitate document storage and retrieval eight years prior to our study. This technology was well into the post-adoption phase within the organization with users well positioned to see positive performance gains from the technology. This context is useful to understand creativity, as it provides us with a generalizability – if our findings are significant in this context, then it provides us with empirical evidence that ICIT works even in non-creative contexts. The head of the Records Management section sent a survey invitation to 200 users of the system, with 111 completing our online survey (a response rate of 55.5%). In addition to our research model, we collected data on perceived ease of use and perceived usefulness as a means to control for "noise" associated with perceptions of the technology (all items appear in Appendix A).

DATA ANALYSIS

We analyzed the data utilizing partial least squares (PLS). We discuss our measurement and structural model in turn.

MEASUREMENT MODEL

Following the procedures outlined by Chin et al. (2012), we evaluated the first-order measurement model. First, we analyzed the loadings and cross-loadings of all items to ensure that they each loaded on their respective constructs (see Appendix B). All loadings were greater on the intended construct than on any other constructs.

Next, we evaluated the reliability, as well as discriminant and convergent validity of the first-order measurement model for ICIT. Using the item loadings, we calculated the internal composite reliability (ICR) to evaluate the measure's reliability, finding that all the dimensions exceeded the .70 threshold (Chin, et al 2012) and were all above 0.88 (Table 2). Also, with each dimension's average variance extracted (AVE) exceeding 0.50 (Barclay et al, 1995), our findings support convergent validity (Barclay et al. 1995).

	AVE	ICR	Cronbachs Alpha
CSE	0.8489	0.9439	0.9119
Deep usage	0.8321	0.9369	0.8989
Enjoys Thinking about IT	0.6519	0.8815	0.8231
New ways of thinking	0.9612	0.9867	0.9798
Novel ideas	0.9351	0.9774	0.9652
PEOU	0.7731	0.9532	0.9410
PIIT	0.7635	0.9063	0.8462
PU	0.8758	0.9769	0.9716
Perceived Capability	0.7878	0.9368	0.9106

Table 2. First-Order Reliability and AVE

To evaluate discriminant validity we examined the correlations between the dimensions as well as the items (Table 3). As the square root of the AVE exceeded the correlation between each dimension for all of the other dimensions, we concluded that we had established discriminant validity of the measures.

	CSE	Deep usage	Enjoys Thinking about IT	New ways of thinking	Novel ideas	PEOU	PIIT	PU	Perceived Capability
CSE	0.9214								
Deep usage	0.3060	0.9122							
Enjoys Thinking about IT	0.3852	0.2524	0.8074						
New ways of thinking	0.3972	0.3163	0.4669	0.9804					
Novel ideas	0.4709	0.3393	0.7040	0.5152	0.9670				
PEOU	0.4310	0.3757	0.1161	0.3085	0.2002	0.8793			
PIIT	0.5308	0.4076	0.6196	0.6229	0.6911	0.3388	0.8738		
PU	0.0886	0.3071	-0.0178	0.1368	-0.0249	0.6833	0.0954	0.9356	
Perceived Capability	0.5736	0.3918	0.4104	0.6146	0.5298	0.4970	0.6193	0.2616	0.8876

Table 3. First-Order Correlations of Constructs

Then, we then conducted a test of common method bias. We adjusted the correlation matrix to partial out the effects of method variance (Malhotra et al. 2006) and then tested the significance of the correlations within the adjusted matrix. The correlations that had been significant prior to the adjustment were also significant following the adjustment, while the nonsignificant correlations remained non-significant. The results from this analysis indicate that common method variance is not likely to confound our results.

After establishing discriminant validity in our measurement model, we estimated our second order model. We used the standardized latent variable scores for each of ICIT's dimensions as indicators of the second-order construct (as outlined by Wright et al 2012) and then re-specified the model. We first analyzed the second-order loadings and cross-loadings for all of the items (Table 4). All loadings were greater on the intended construct than on any other construct. Consequently, on determining that none of the items loaded higher on any construct other than the intended construct, we included all the items.

	CSE	Deep Usage	ICIT	Novel ideas	PEOU	PIIT	PU
SE1	**0.9288**	0.2665	0.4978	0.4638	0.2982	0.4254	-0.0095
SE2	**0.9515**	0.2932	0.5618	0.4812	0.4183	0.5902	0.1097
SE3	**0.8824**	0.2920	0.4417	0.3302	0.5115	0.4393	0.1701
DEEP2	0.2719	**0.8848**	0.2776	0.2520	0.3238	0.2932	0.2819
DEEP3	0.2509	**0.9465**	0.3616	0.3204	0.3714	0.3685	0.3379
DEEP4	0.3182	**0.9041**	0.4099	0.3519	0.3300	0.4487	0.2164
Enjoys Thinking about IT	0.3852	0.2524	**0.8170**	0.7041	0.1161	0.6196	-0.0178
New ways of thinking	0.3972	0.3163	**0.8225**	0.5157	0.3086	0.6229	0.1368
Perceived Capability	0.5736	0.3918	**0.7985**	0.5302	0.4970	0.6193	0.2616
IDEA1	0.4560	0.3471	0.7432	**0.9530**	0.1966	0.6640	0.0067
IDEA2	0.4537	0.3105	0.6729	**0.9721**	0.1872	0.6696	-0.0389
IDEA3	0.4559	0.3258	0.7073	**0.9756**	0.1965	0.6711	-0.0409
EOU1	0.4467	0.2484	0.2892	0.2342	**0.8114**	0.2598	0.4905
EOU2	0.3789	0.3310	0.3310	0.1440	**0.8957**	0.3175	0.6603
EOU3	0.3771	0.3557	0.2881	0.1775	**0.9245**	0.3205	0.6396
EOU4	0.1970	0.3581	0.2561	0.0809	**0.8195**	0.2722	0.6702
EOU5	0.4927	0.3800	0.4056	0.2657	**0.9018**	0.3642	0.5485
EOU6	0.4029	0.2655	0.2827	0.1606	**0.9156**	0.2204	0.5632
PIIT1	0.4023	0.3029	0.6228	0.5528	0.3227	**0.8744**	0.1495
PIIT2	0.4764	0.3603	0.5509	0.5304	0.2960	**0.8428**	0.0669
PIIT4	0.5060	0.3975	0.7936	0.7040	0.2772	**0.9030**	0.0444
PU1	0.1155	0.2829	0.1429	-0.0153	0.6404	0.0848	**0.9193**
PU2	0.0398	0.2653	0.1057	-0.0605	0.6096	0.0697	**0.9343**
PU3	0.1038	0.2815	0.1478	0.0110	0.6327	0.1113	**0.9512**
PU4	0.0464	0.2912	0.1095	-0.0559	0.6173	0.0857	**0.9428**
PU5	0.0557	0.2385	0.1057	-0.0377	0.6343	0.0683	**0.9551**
PU6	0.1217	0.3416	0.1538	0.0097	0.6851	0.1069	**0.9114**

Table 4. Second-Order Loadings and Cross Loadings

We then evaluated the properties of the second-order measurement model for ICIT, with each dimension being modeled as a superordinate construct. Using the item loadings, we calculated the internal composite reliability (ICR) to evaluate the measure's reliability, finding that all dimensions exceeded the .70 threshold, with the second-order ICIT construct being 0.854 (Table 5). Moreover, to estimate convergent validity, we evaluated each dimension's average variance extracted (AVE). Using the threshold value of 0.50 for AVE (Barclay, et al, 1995), our analysis indicates that our findings support convergent validity (Barclay et al., 1995).

	AVE	ICR	Cronbachs Alpha
CSE	0.8489	0.9439	0.9119
Deep Usage	0.8321	0.9369	0.8989
ICIT	0.6605	0.8537	0.7479
Novel ideas	0.9350	0.9774	0.9652
PEOU	0.7731	0.9532	0.9410
PIIT	0.7635	0.9063	0.8462
PU	0.8758	0.9769	0.9716

Table 5. Second-Order Reliability and AVE

To evaluate discriminant validity we examined the correlations between the dimensions as well as the items. As the square root of the AVE exceeded the correlation between each dimension and all other dimensions, we concluded that we had established discriminant validity of the measures.

	CSE	Deep Usage	ICIT	Novel ideas	PEOU	PIIT	PU
CSE	0.9214						
Deep Usage	0.3060	0.9122					
ICIT	0.5483	0.3856	0.8127				
Novel ideas	0.4709	0.3395	0.7330	0.9669			
PEOU	0.4309	0.3757	0.3545	0.2002	0.7893		
PIIT	0.5308	0.4076	0.7632	0.6912	0.3388	0.8738	
PU	0.0886	0.3071	0.1382	-0.0247	0.6833	0.0954	0.9358

Table 6. Second-Order Correlations of Constructs

STRUCTURAL MODEL

Our results indicate that all three sub-dimensions of ICIT are significant in the formation of the second-order construct of ICIT. Open to new ways of thinking about IT ($\beta = 0.823$, t=20.238, $p < 0.001$), enjoys thinking about IT ($\beta = 0.817$, t=24.717, $p < 0.001$), and perceived capacity to gain more knowledge ($\beta = 0.798$, t=16.896, $p < 0.001$) were all significant dimensions of ICIT. ICIT was the most significant driver of the creation of novel and useful ideas about IT ($\beta = 0.475$, t=4.133, $p < 0.001$). PIIT was a less significant driver of the creation of novel and useful ideas about IT ($\beta = 0.302$, t=2.577, $p < 0.01$), while CSE ($\beta = 0.050$, t=0.657) was not significant. Finally, the creation of novel and useful ideas was the only significant factor in predicting deep usage ($\beta = 0.307$, t=2.989, $p < 0.01$), with ease of use ($\beta = 0.186$, t=1.32) and usefulness ($\beta = 0.187$, t=1.44) being non-significant.

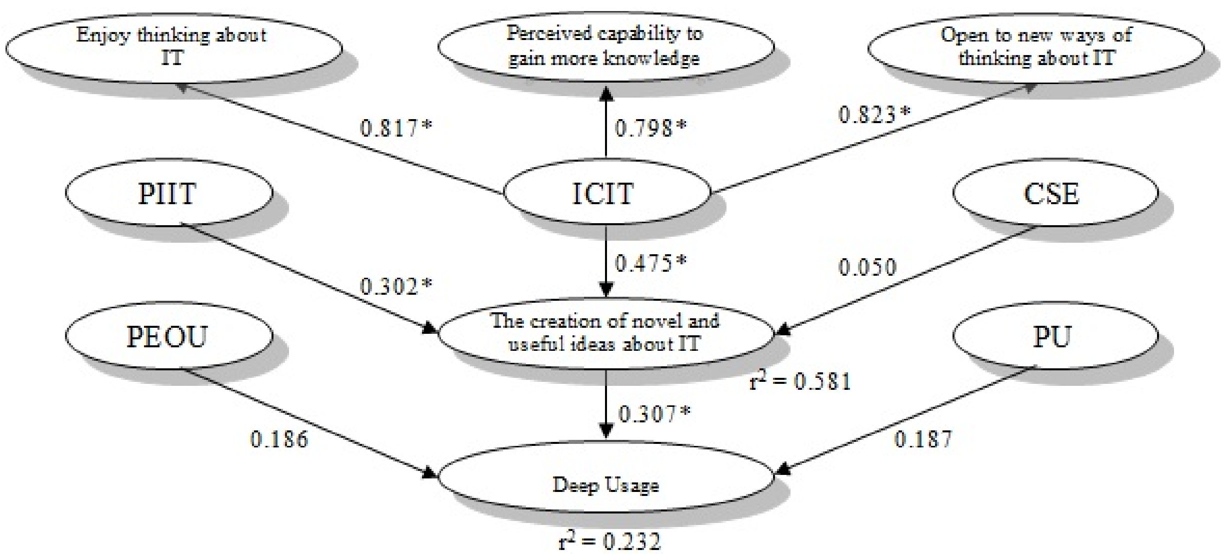

Figure 2. Research Results
* indicates $p < 0.01$

DISCUSSION

In this paper, we propose a new concept to the IS literature: Individual Creativity with Information Technology (ICIT). With the competitive pressures on business to increasingly leverage IT as a dynamic capability within the context of an ever-shrinking budget, it is essential that firms identify individuals with the capability of creating novel and useful ideas about IT. Our research has demonstrated that self-efficacy, or confidence in one's IT ability, does not drive these ideas. Furthermore, the genesis of these ideas is not one's willingness to try IT, or PIIT. Our findings demonstrate that the most significant driver of the creation of novel and useful ideas about IT is creativity.

While the issue of creativity as a global versus domain specific concept remains a subject of debate, our work has demonstrated that there is value in contextualizing within our IT context. Creative individuals generate novel and useful ideas and these novel and useful ideas result in deep usage of a deployed IT solution. Furthermore, the deep usage is driven more by creativity than it is by the perception of the IT itself. And while we have provided initial evidence for ICIT, we urge other researchers to investigate our findings across a variety of situations, devices, and technologies.

In conclusion, we posit that creativity is a vital asset for innovative firms. However, despite the need to study highly creative people, there has been little research undertaken in order to better understand individuals who are creative with IT. We postulate that organizations can benefit by increasing our understanding of individuals who demonstrate high ICIT and that academic work needs to assist in this undertaking. This research purposes to advance our body of knowledge as we seek to increase our understanding of these highly creative people who represent one of the most important assets to modern organizations.

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Appendix A. Measurement Items for Constructs

Construct	Items	Source
ICIT: Open to new ways of thinking about IT	NEW1: I am open to new ways of thinking about information technology NEW2: I have an open mind about information technology NEW3: My mind is open to new ways of thinking about information technology	New items
ICIT: The creation of novel and useful ideas about IT	IDEA1: I have many novel and useful ideas about information technology IDEA2: I can envision many new and useful ideas about information technology IDEA3: I can imagine many new and useful ideas about information technology	New items
ICIT: Perceived capability to gain more knowledge about IT	LEARN1: I have the ability to learn more about information technology LEARN2: It would be easy for me to gain increased knowledge about information technology LEARN3: With a little effort, I could learn more about information technology LEARN4: I could easily learn more about information technology	New items
ICIT: Enjoy thinking about IT	COG1: I often find myself thinking about information technology COG2: The notion of thinking about information technology is not appealing to me COG3: I would rather do something that requires little thought than something that is sure to involve my thinking abilities about information technology COG4: I only think as hard as I have to about information technology COG5: Spending my time thinking about information technology does not appeal to me	New items
PIIT	PIIT1: If I heard about a new information technology, I would look for ways to experiment with it. PIIT2: Among my peers, I am usually the first to try out new information technologies. PIIT3: In general, I am hesitant to try out new information technologies [reverse] PIIT4: I like to experiment with new information technologies.	Agarwal and Prasad, 1998
Internal CSE	For each condition, respondents rated confidence by writing in a number from 1 to 10, where 1 indicate "Not at all confident" and 10 indicates "Totally confident." I could complete my job using the technology if… SE1: There was no one around to tell me what to do SE2: I had never used a package like it before. SE3: I had only the software manuals for reference.	Thatcher, et al 2008
Perceived Ease of Use	EOU1: Learning to operate [technology] was easy for me EOU2: I find it easy to get [technology] to do what I want it to do EOU3: My interactions with [technology] are clear and understandable EOU4: I find [technology] to be flexible to interact with EOU5: It is easy for me to become skillful at using [technology] EOU6: I find [technology] easy to use	Davis, 1989
Perceived Usefulness	PU1: Using [technology] in my job enables me to accomplish tasks more quickly PU2: Using [technology] improves my job performance PU3: Using [technology] in my job increases my productivity PU4: Using [technology] enhances my effectiveness on the job PU5: Using [technology] makes it easier to do my job PU6: I find [technology] useful in my job	Davis, 1989
Deep usage	In a typical one-month period, what is the likelihood of you… DEEP1: Using all of the features of [the technology] DEEP2: Using more features than the average user of [the technology] DEEP3: Using more obscure aspects of [the technology]	Self-developed based upon Burton-Jones and Straub, 2006

Appendix B. First-Order Loadings and Cross Loadings

	CSE	Deep usage	Enjoys Thinking about IT	New ways of thinking	Novel ideas	PEOU	PIIT	PU	Perceived Capability
SE1	**0.9288**	0.2665	0.3750	0.3413	0.4637	0.2982	0.4254	-0.0095	0.5057
SE2	**0.9515**	0.2932	0.3939	0.4089	0.4812	0.4183	0.5902	0.1097	0.5867
SE3	**0.8824**	0.2920	0.2756	0.3441	0.3302	0.5115	0.4393	0.1701	0.4845
DEEP2	0.2719	**0.8847**	0.1219	0.2310	0.2516	0.3238	0.2932	0.2819	0.3582
DEEP3	0.2509	**0.9465**	0.2276	0.2915	0.3204	0.3714	0.3685	0.3379	0.3847
DEEP4	0.3182	**0.9041**	0.3327	0.3390	0.3517	0.3300	0.4487	0.2164	0.3285
COG1	0.4496	0.3898	**0.8410**	0.4289	0.7247	0.1560	0.7219	-0.0104	0.4878
COG2	0.0838	0.0068	**0.7202**	0.2879	0.3913	-0.1444	0.2273	-0.1782	0.0834
COG4	0.3629	0.1700	**0.7629**	0.3222	0.4820	0.2070	0.4225	0.1545	0.3566
COG5	0.2618	0.1419	**0.8942**	0.4328	0.5884	0.0867	0.4933	-0.0492	0.2966
NEW1	0.3800	0.3143	0.4440	**0.9790**	0.5049	0.3087	0.6177	0.1461	0.5696
NEW2	0.3839	0.3000	0.4813	**0.9852**	0.5217	0.2706	0.5954	0.0838	0.6097
NEW3	0.4051	0.3166	0.4468	**0.9770**	0.4876	0.3303	0.6200	0.1755	0.6291
IDEA1	0.4560	0.3471	0.6833	0.5510	**0.9523**	0.1966	0.6640	0.0067	0.5510
IDEA2	0.4537	0.3105	0.6742	0.4586	**0.9726**	0.1872	0.6696	-0.0389	0.4643
IDEA3	0.4559	0.3258	0.6842	0.4829	**0.9759**	0.1965	0.6711	-0.0409	0.5196
EOU1	0.4467	0.2484	0.1044	0.2165	0.2342	**0.8114**	0.2598	0.4905	0.4269
EOU2	0.3789	0.3309	0.1053	0.2775	0.1440	**0.8957**	0.3175	0.6603	0.4786
EOU3	0.3771	0.3557	0.0572	0.2592	0.1776	**0.9245**	0.3205	0.6396	0.4452
EOU4	0.1970	0.3581	0.1137	0.2273	0.0808	**0.8195**	0.2722	0.6702	0.3150
EOU5	0.4927	0.3800	0.1568	0.3696	0.2656	**0.9018**	0.3642	0.5485	0.5207
EOU6	0.4029	0.2655	0.0627	0.2514	0.1605	**0.9156**	0.2204	0.5632	0.4308
PIIT1	0.4023	0.3029	0.5173	0.4984	0.5529	0.3227	**0.8745**	0.1495	0.4996
PIIT2	0.4764	0.3603	0.4134	0.4694	0.5303	0.2960	**0.8428**	0.0669	0.4728
PIIT4	0.5060	0.3975	0.6606	0.6407	0.7039	0.2772	**0.9030**	0.0444	0.6293
PU1	0.1155	0.2829	-0.0077	0.1192	-0.0156	0.6404	0.0849	**0.9193**	0.2777
PU2	0.0398	0.2653	-0.0244	0.1094	-0.0607	0.6096	0.0697	**0.9343**	0.2097
PU3	0.1038	0.2815	0.0073	0.1459	0.0107	0.6327	0.1113	**0.9512**	0.2450
PU4	0.0464	0.2912	-0.0103	0.1237	-0.0561	0.6173	0.0857	**0.9428**	0.1872
PU5	0.0557	0.2386	-0.0251	0.0968	-0.0379	0.6343	0.0684	**0.9551**	0.2228
PU6	0.1217	0.3416	-0.0372	0.1594	0.0095	0.6851	0.1069	**0.9114**	0.3071
LEARN1	0.4844	0.3316	0.3520	0.5317	0.3801	0.4757	0.4885	0.3037	**0.8490**
LEARN2	0.5428	0.3727	0.3698	0.5720	0.5107	0.4109	0.5533	0.1595	**0.9011**
LEARN3	0.4208	0.3113	0.2922	0.4981	0.4181	0.4101	0.4726	0.2507	**0.8773**
LEARN4	0.5696	0.3682	0.4279	0.5738	0.5416	0.4749	0.6558	0.2392	**0.9212**