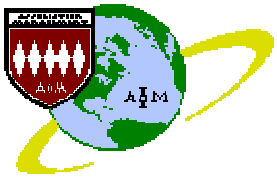

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SYSTEM DEVELOPERS' NATURE OF WORK CHARACTERISTICS AND THEIR RELATIONSHIP WITH ORGANIZATIONAL COMMITMENT AND JOB SATISFACTION

TIM KLAUS
TEXAS A&M UNIVERSITY-CORPUS CHRISTI
tim.klaus@tamucc.edu

CYNTHIA LEROUGE
SAINT LOUIS UNIVERSITY
lerougec@slu.edu

J. ELLIS BLANTON
UNIVERSITY OF SOUTH FLORIDA
eblanton@usf.edu

ABSTRACT

IT professionals' level of organizational commitment and job satisfaction is important in minimizing turnover, improving job performance, minimizing absenteeism, and increasing the level of job involvement. This study explores various nature of work characteristics as a contributing factor to IT professionals' organizational commitment and job satisfaction. Nature of work for the IT context of systems development is specified in this study as meaningfulness of work, task autonomy, task feedback, the level of group cohesion, and the level of role stress. Data were gathered from a survey of 124 IT professionals in systems development roles to capture perceptions regarding the specified nature of work constructs on job satisfaction and organizational commitment. The results of this study indicate that organizational commitment is positively related to job satisfaction and meaningfulness of work and negatively related to role stress. The results also indicate that job satisfaction is positively related to group cohesion and negatively related to role stress. Findings extend prior research by assessing the individual impact of specific nature of work characteristics on IT professionals' job satisfaction and organizational commitment and providing new insight into group cohesion for the IT context. IT managers can use this information to increase employee organizational commitment and/or job satisfaction by considering role stress, group cohesion, and job characteristics when making project assignment and job/work design decisions.

Keywords: Organizational Commitment, Nature of Work, Job Satisfaction, Job Characteristics Model, Group Cohesion, Role Stress

INTRODUCTION

IT professionals with organization-specific knowledge acquired through experience and training are valuable intellectual assets that can transcend system projects. The ability to capitalize on these assets is short-changed when IT professionals become dissatisfied with their work environments and lose motivation to perform effectively. Sometimes these IT professionals become less committed to the organization or leave the organization. In order to protect these intellectual assets, IT managers must provide IT professionals with work environments that positively affect their organizational attitudes and behaviors.

While significant IT personnel research focuses on extrinsic characteristics (e.g. pay, supervisor relationships, opportunities for advancement) that affect attitudinal and behavioral responses, there is a more limited body of work in IT that explores the specific, innate nature of work characteristics common to IT professionals that may serve as intrinsic motivators. This is somewhat perplexing, as even early studies using Herzberg [1] motivation characteristics find that "work itself" was ranked as the top motivator [2] and "meaningful work" as the highest motivator for IT Professionals [3].

IT managers typically oversee a work environment that includes diverse work forces with varied skill sets, fast-paced organizational cultures, and project-centric work assignments where significant assets can mean the difference between project success and failure. However, most job design models addressing intrinsic motivation traditionally have been context-free, assuming that intrinsic motivation can be predicted in any type of context [4-6]. Studies in the IT context have demonstrated the limits of context-free models [e.g., 7, 8]. For example, multiple inter-organizational IT studies indicate that IT managers perceive their jobs as having higher motivating potential than any other management group [2]. It is necessary, therefore, to root job design models in the context in which motivation occurs in order to explain possible antecedents of intrinsic motivation [4].

Job design characteristics define a particular work environment and are typically thought of as being internal characteristics (within the confines of the organization/job), rather than external market (i.e., competitive pay) or personal (i.e., home life) characteristics. There are numerous characteristics that could affect an employee's job satisfaction and organizational commitment, such as the IT labor market cycle, the threat of losing a job due to outsourcing, or conflicting interests with personal characteristics. The scope of this study focuses on characteristics internal to an organization and which managers are able to control through job redesign, or by making certain features of the job more salient to workers.

There are several reasons for researching the nature of work in an IT context. First, studies have shown that IT professionals have different work practices [9] and are different from population norms for nearly all personality scales [7]. The premise for IT personnel research is that IT professionals as well as their work settings are unique enough to merit specific study. It is also of note that past IT studies, which include nature of work constructs involve a limited sample restricted to one industry. Second, although these nature of work characteristics proposed in this study have been individually studied in various settings, only some have been examined in the IT setting and few studies have focused on the nature of work surrounding IT professionals. We know none focused on the systems development subdomain. Additionally, the systems development context has a project-centric focus, which may impose deviations from generalized nature of work models. It is possible that the gestalt (whole) effect of the systems development work practices may account for more variance in the dependent measures than the summed (individual) effects of the parts. Third, this research is focused on enabling recommendations that can be used by organizations to better manage their IT personnel.

This study extends previous research by proposing group cohesion as an antecedent to job satisfaction and organizational commitment for IT professionals across industries. Also, this study takes an expansive look at one particular IT work context. Cross-section analysis of IT systems developers was facilitated by sampling from multiple companies and industries. This study also extends past research by collectively exploring nature of work characteristics within the confines of job design (i.e., group cohesion, task autonomy, task feedback, meaningfulness of work, and role stress) to assess their combined effect on job satisfaction and organizational commitment. To this end, this study introduces a model of the relationships among nature of work characteristics proposed to capture the nuances of the IT systems development context, job satisfaction and organizational commitment (Figure 2). To statistically facilitate this exploration of antecedent nature of work characteristics, we use Partial Least Squares (PLS), a second- generation multivariate technique. PLS facilitates the simultaneous modeling of relationships among multiple independent and dependent

constructs and the ability to handle multicollinearity among the independent variables [10]. Despite advantages over first order multivariate techniques, PLS and other second-generation multivariate techniques have been used in relatively few studies that explore job characteristics [11 is a noted exception].

In summary, this study seeks to extend research insight regarding job satisfaction and organizational commitment antecedents and inform practice of potential means to exert some degree of control over job satisfaction and commitment issues.

RESEARCH MODEL DEVELOPMENT

The purpose of this study is to develop a job design model that identifies work characteristics that are intrinsic motivators among IT professionals. When looking within the IT profession, the assumption of homogeneity of motivations among IT employees is implicit in much of the literature [7]. However, considering the broad scope of what is classified as "IT work", studies focusing on intrinsic motivation of one or more homogeneous subgroups within the IT profession are appropriate. Goldstein [12] recognizes two prominent workgroups in IT (systems developers and systems support workers) and finds IT support workers more autonomous than those workers typically engaged in systems development (e.g. programmers and analysts). Therefore, this study focuses on developing a job design model for the systems development subgroup of the IT profession. In order to avoid repetition, the IT systems development context will be referred to as the "IT context" and IT systems development professionals as "IT professionals".

This study examines five tangible nature of work characteristics of which managers have some degree of control that are common to IT professionals within the systems development context: *Meaningfulness of Work, Task Autonomy, Task Feedback, Group Cohesion, and Role Stress.* IT managers can influence and control these characteristics through job redesign or by making certain features of the job more salient to workers. The first three constructs reference the Job Characteristics Model (JCM) [13-15], which we use as a platform for developing a more complete model of IT work motivation for systems developers (Figure 1).

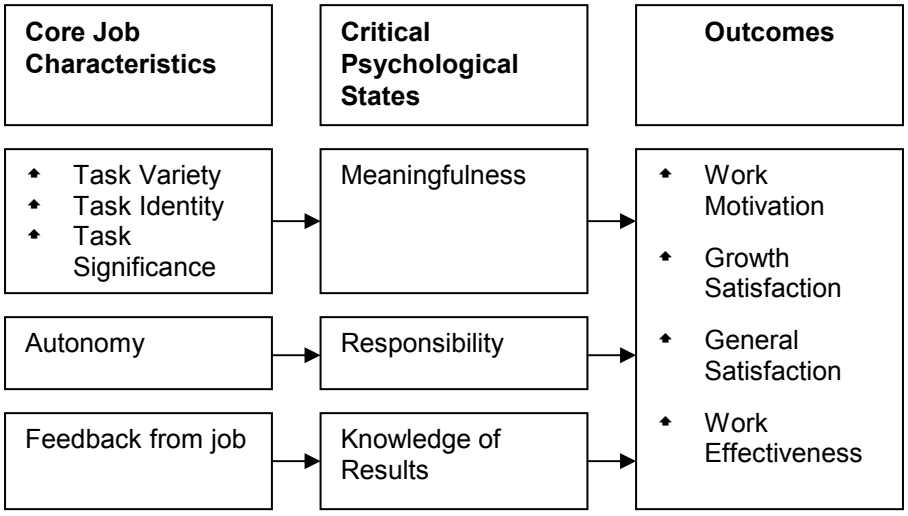


Figure 1: Job Characteristics Model

The JCM has five core job characteristics (task variety, task identity, task significance, task autonomy, and task feedback) which are seen as prompting three psychological states (*Meaningfulness of Work, Experienced Responsibility for Outcomes of the Work, and Knowledge of the Actual Results of the Work Activities)*, which in turn lead to a number of beneficial personal and work outcomes. The theory underlying the model posits that all three of the psychological states must be experienced by a worker to realize desired outcomes [15]. Therefore, when any of the desired psychological

states is not achieved that intrinsic job motivation and job satisfaction are compromised.

Three of the core JCM job characteristics (task variety, task identity, task significance) are expected to contribute to the Meaningfulness of Work. The JCM asserts that a job high in motivating potential and job satisfaction potential must score high on at least one of the characteristics that promote meaningfulness of work (to offset low scores on one or both of the other two characteristics) and high on both task autonomy and task feedback. These three-pronged requirements are an innate challenge in certain IT contexts and the underlying assertion that employees within these contexts have compromised job satisfaction and organizational commitment may be questioned.

To illustrate, the JCM specifies that autonomy, defined as freedom concerning work procedures and timing, is a sine qua non for the emergence of intrinsically motivating jobs. The IT context, though, is characterized by team projects, with interdependencies resulting from focus on dependent project deliverables, teamwork, and short cycle times (especially in systems development projects). Hence, in strictly following the JCM, an IT context dominated by teamwork, where autonomy is perceived as low, simply cannot be intrinsically motivating.

In continuing this illustration, it is the position of this study that workers perceiving reduced levels of autonomy might still be motivated if that perception is accompanied by other job-design characteristics that compensate for, justify, and overcome this apparent lack of internal motivation. For example, in an IT context group cohesion may compensate for or be more important than autonomy, given the fundamental existence of project-oriented teamwork in the IT context. Therefore, we include group cohesion in our model as a nature of work characteristic important in the IT context.

A project setting may not only mandate recognition of group cohesion as an IT nature of work characteristic, but also that the ambiguities, innovation, and team evolution associated with IT projects can create role stress. For example, numerous studies have reported IT project challenges (e.g. technical problems delay implementation; business process reengineering is resisted; customer service goals prove elusive) and failure rates [16-19]. Few would argue that the IT project context, with evolving dynamics, demands, and assignments can be the source of role stress. Indeed, research supports that technical professionals that deal directly with new technology are affected most by role stressors [20-22]. Accordingly, we include role stress in our model as another work characteristic suited to the context of interest important in the IT context and, in particular, to systems development work. Figure 2 depicts the study model.

As we will argue in this paper, intrinsic motivation is theoretically possible in IT settings, but the type of explicative model, namely the job characteristics specified, must correspond with the contextual forces, that act on the phenomenon observed. Since many IT professionals engaged in systems development work in teams to complete demanding projects, group cohesion and role stress are important contextual issues in considering how the IT professionals respond to their employer, along with the JCM constructs purported to be common to all employees.

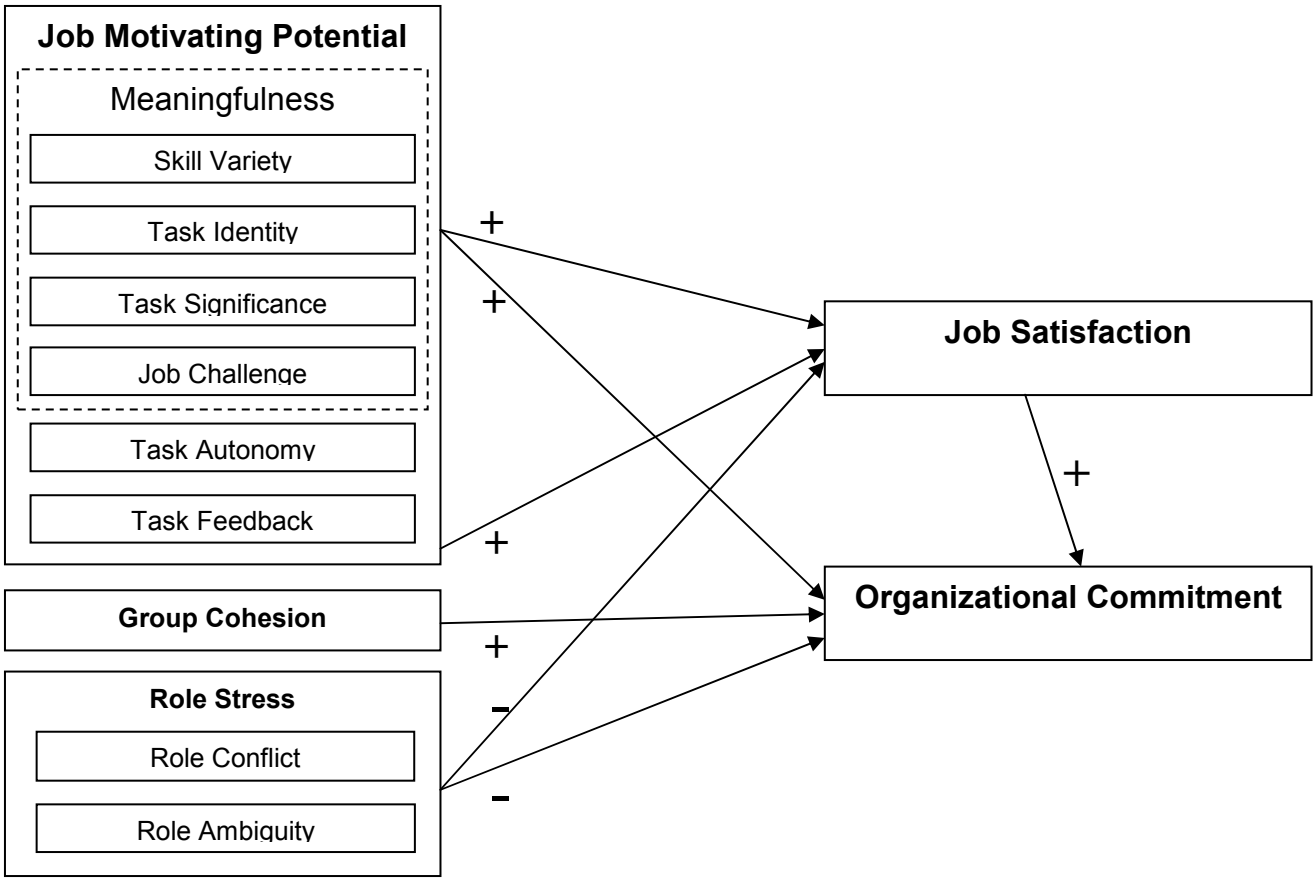


Figure 2: Research Model

RELEVANT LITERATURE AND HYPOTHESES

Job Satisfaction and Organizational Commitment

Job satisfaction and organizational commitment have been shown to ultimately affect absenteeism, turnover, and job performance [23]. This indicates that organizations that have an environment that positively affects job satisfaction and organizational commitment have experienced favorable results.

Job satisfaction has been studied across numerous disciplines and typically is defined as an employee's level of positive affect toward his job or job situation. Job satisfaction has also has been shown to positively affect an employee's mood, job involvement, and performance [23, 24] and is negatively related to absenteeism [25] and turnover [23, 26]. A meta-analysis of 78 studies covering 27,543 people demonstrated a negative relationship between job satisfaction and turnover [27]. A meta-analysis specifically on IT professionals yielded similar results [28]. Therefore, job satisfaction is an important construct to examine, as managers must strive to align the IT workforce with strategic goals for the long-term success of the organization and to reduce unexpected and undesired turnover. Sankar and Yeong [24] argues that job satisfaction is particularly important in technical workers because of the competitive edge they provide for an organization through facilitating effective processes. The antecedents of job satisfaction include job characteristics, social information processing and dispositions [11, 23].

Organizational commitment has been defined as the degree of an employee's identification and involvement in an organization and includes a belief and acceptance in the organization's goals and values, and a

willingness to exert effort for and maintain membership in the organization [23, 29]. It represents the behavioral tendencies and feelings employees have toward their employer [23, 30]. Research indicates that committed employees have better job performance and lower level of absenteeism [23, 31], are more satisfied with their job [23, 32], and are less likely to leave the organization [11, 33]. Organizational commitment is a common construct that has been used in management, marketing, psychology, and other disciplines as an antecedent of job involvement, job satisfaction, turnover, absenteeism, and organizational citizenship behavior [25, 34]. As with job satisfaction, research evidence demonstrates negative relationships between organizational commitment and turnover. Job satisfaction and organizational commitment are independently interesting and appropriate variables for this study. Furthermore, the relationship between these two variables is of interest. Job satisfaction has been found to have direct, positive effects on organizational commitment in numerous past studies [11, 21, 35, 36]. The relationship between these two variables and the effects each of these variables on turnover furthers their relevance and significance to the current study [11, 28]. IT professionals who choose to leave may be the best employees, which may delay or even compromise the completion of important IT projects [37]. The context of this study affords the opportunity to test the job satisfaction/organizational commitment relationship for systems developers using an inter-organizational data pool. Therefore, we pose the following hypothesis:

Hypothesis 1: *Job satisfaction will demonstrate a positive relationship with organizational commitment.*

Nature of Work Characteristics

Management theory and practice has traditionally focused on extrinsic motivators—pay, benefits, status, bonuses, pension plans, expense accounts and such [38]. While these are powerful motivators, they are not sufficient. Research has found that high performing employees identified prestige and advantage opportunities for staying while low performers much more frequently identified extrinsic rewards as the reason for staying [25].

The current work environment poses complex motivational issues. There is much evidence that employees, especially knowledge workers, tend to expect their work to be at least somewhat meaningful and rewarding [38]. These expectations may be driven by a modern workforce that is more educated than workers of preceding eras, have a higher standard of living, and see more opportunities for meaning in their work. Organizations may find themselves competing to attract and retain workers on the basis of jobs meaningfulness [39]. Additionally, the IT labor force has grown up in somewhat of a "free agency status", where IT professionals take considerable responsibility for their own careers and migrate to companies and work that allow them to develop skills that will guarantee employability in a competitive and ever changing IT marketplace. Recruiting and retaining IT professionals with the appropriate levels of experience continues to be an issue for employers as the most talented IT workers who may have more choices and opportunities may depart if not satisfied with their employer or job content [40]. Research supports that IT project leaders are more likely to leave the organization than other IT workers [26]. The impact of such a departure, especially mid-stream in an IT project, can derail project success. Thus, intrinsic motivators are crucial in today's IT labor market. Over time, the luster of extrinsic motivators may pale and intrinsic factors generally are more motivating [6]. Managing for intrinsic rewards, then, has become the crucial next step in keeping key systems development employees, which calls management to make the work itself so fulfilling and energizing that employees won't want to leave [39].

Discovering the motivating characteristics in work is key to understanding the motivation of today's employees. Outside the IT literature, it is argued that enriched jobs (i.e., jobs possessing a high motivating potential score) are generally associated with job satisfaction [14]. It would seem the benefits of enriched jobs would be as important to the nature of IT work as to other contexts. The importance of the selected nature of work characteristics in the IT context are discussed below. These constructs were chosen because they are well documented and are particularly relevant to the IT system developer's job context, which is of interest in this study.

Job Characteristics Model

The motivating potential of a job is often represented using the JCM [41]. The JCM postulates five core dimensions that affect the psychological state of employees, leading to certain personal and work outcomes [42]. The job dimensions include:

- *Meaningfulness of Work*, consisting of:
  - Task variety -The degree to which the job utilizes a range of employee skills and talents to accomplish diverse work activities.
  - Task identity – The degree to which the job allows the employee to complete a

work product from beginning to end with visible results.
- Task significance – The degree to which the job influences internal or external others

- *Autonomy* – The degree to which the job provides substantial freedom, independence, and discretion to the individual in scheduling the work and in determining work processes.
- *Feedback* – The degree to which an individual can obtain direct and clear information regarding the effectiveness of performing work tasks from actual job outcomes (the work product itself) or from agents (e.g. managers, co-workers, clients, customers)

As seen in Figure 1, a job's five core dimensions was originally proposed based on the psychological states of employees that the job characteristics were found to affect [14]. Furthermore, the model is intended to reflect the overall potential of a job to influence the feelings and behaviors of employees [43].

Past research has acknowledged the direct relationships between the model's core job characteristics and outcomes [44, 45] as well as potential mediating effects of psychological states between job characteristics and behavioral outcomes [43], such as organizational commitment and job satisfaction. For example, Pearson and Chong [46] reveal that some job characteristics were significant contributors to organizational commitment and job satisfaction. Likewise, Eby et al., [41] concludes that the job characteristics included in the JCM affected organizational commitment.

However, the propriety of the proposed nature of work characteristics and the comprehensiveness of the proposed characteristics in the IT context has long been a debated issue [47]. For example, Thatcher et al. [11] examines the five JCM job characteristics and finds that only task variety, task autonomy, and task significance had significant effects on job satisfaction and organizational commitment. Morris and Venkatesh [48] examines the JCM job characteristics model through a new system implementation. A few IT studies use alternative, but related sets of job characteristics. Igbaria [21] proposes two job characteristics (autonomy, and freedom/challenge) and finds autonomy and freedom/challenge as antecedents to job satisfaction and organizational commitment for IT professionals. It is of note that like many nature of work studies, the context of the aforementioned Thatcher et. al. (U.S state government IT workers) and Igbaria studies (sample of MIS employees of a utility company with extensive operations in the eastern part of the United States) are limited by industry. Preenen et al. [49] found that job challenge also is positively related to meaningfulness of work and as system developers regularly encounter new challenges to their job, we have decided to explore job challenge as a factor that affects meaningfulness of work.

We propose the following hypotheses with the intent to illuminate individual components of the job characteristics model, while keeping the integrity of the proposed latent construct, meaningfulness of work.

Hypothesis 2a: *Meaningfulness of work in the IT systems development context will be positively related to the level of Organizational Commitment.*

Hypothesis 2b: *Task Feedback in the IT systems development context will be positively related to the level of Organizational Commitment.*

Hypothesis 2c: *Task Autonomy in the IT systems development context will be positively related to the level of Organizational Commitment.*

Hypothesis 3a: *Meaningfulness of work in the IT systems development context will be positively related to Job Satisfaction.*

Hypothesis 3b: *Task Feedback in the IT systems development context will be positively related to Job Satisfaction.*

Hypothesis 3c: *Task Autonomy in the IT systems development context will be positively related to Job Satisfaction.*

Group Cohesion

The IT systems development context merits consideration of expansion with constructs that consider project-oriented teamwork. Though Hackman and Oldham [13] mention *dealing with others* as a potential supplemental dimension to their five core characteristics, dealing with others does not capture the spirit and nature of the IT development context. In contrast, group cohesion refers to the degree to which employees bond with a work group [23] and seems to be better suited to the IT development context.

IT professionals often work in groups to accomplish tasks and projects and have been studied frequently in IT research [50, 51]. Several items make group cohesion particularly important for systems developers: 1) the use of team-based projects; 2) the great number of shared job activities; and 3) work flexibility requirements. Systems development is project team-oriented and involves a great deal of social interaction. In

today's rapidly changing business functions and technologies, systems development also has transitory requirements from one project to another. As developers change project assignments, it becomes increasingly important for them to work effectively with others. Due to the high degree of interpersonal interaction, the idiosyncrasies of fellow developers, and the multiplicity of goals, systems development has the potential for both close and strained relationships. Moreover, research in other domains indicates that the level of group cohesion is positively correlated with the level of organizational commitment [52] as well as job satisfaction [53]. Non-IT studies that have examined this construct and have found that employees with strong ties to other employees rate higher on work group cohesion and were more inclined to stay at the company [53]. Iveron and Roy [53] also concludes that group cohesion affected organizational commitment by influencing an employee's attitude toward the company. Highly cohesive groups have also been shown to be more effective when the group norms support high performance [23].

Considering the importance of group projects in the IT environment, group cohesion may be an important factor in influencing the level of job satisfaction and organizational commitment of systems developers. Therefore, the following two hypotheses are proposed:

Hypothesis 4: *Group Cohesion in the IT systems development context will be positively related to Organizational Commitment.*

Hypothesis 5: *Group Cohesion in the IT systems development context will be positively related to Job Satisfaction.*

Role Stress

Systems developers generally move from one project to another, engaging in many types of activities, project assignments, and requirements, which may evoke role ambiguity and conflict. Furthermore, in today's competitive environment focused on lean operations, technical employees (among others) are often strained to the limit to get their jobs done, especially with increasing pressure to reduce overhead expense and to work effectively in a "virtual" world. Research has shown that IT professionals are particularly prone to a high level of role stress [54, 55]. Moore [56] indicates that approximately 20% of the IT work force experiences role strain to the point of exhaustion. Furthermore, the potential physiological (specifically, cardiovascular, biochemical, and gastrointestinal) and emotional consequences of role strain (e.g. high blood pressure), is evident in the literature [57].

Role stress has been associated with decreased levels of satisfaction, commitment and self-esteem [54]. Igbaria [21] found a negative correlation between role stress and both organizational commitment and job satisfaction in the IT context, although this study only surveyed employees from one utility company. Igbaria and Greenhaus [32] also examined IT professionals and found that role stressors affect work-related attitudes, such as causing the employees to feel less satisfied with their jobs and less committed to the organization. Although a certain level of stress is acceptable to employees, large amounts of stress lead to lower organizational commitment and job satisfaction, and can result in turnover and burnout [54, 55].

Role stressors, such as role ambiguity and role conflict, leads to decreased job satisfaction and organizational commitment of IT professionals when the stress results in strain[58-60]. Raghunathan, et al., [61] found both role stressors to be important predictors of organizational commitment. Role ambiguity is the extent that goals and responsibilities are unclear. The nature of work for most IT professionals performed in organizations inherently has ambiguity because of the numerous unstructured tasks. Role conflict is the extent to which an employee has difficulty achieving assigned tasks because of lack of resources or incompatible demands. Role conflict may be part of the IT work landscape due to the various teams to which IT professionals are assigned and the departments for which services are performed (e.g., users, technical personnel, etc.) from whom they frequently receive conflicting and ambiguous directives that may cause stress.

This study identifies role stress as one of the nature of work characteristics common to IT professionals and examines its combined effect alongside other nature of work characteristics on job satisfaction and organizational commitment. Therefore, the following two hypotheses are proposed:

Hypothesis 6: *Role Stress in the IT systems development context will be negatively related to Organizational Commitment.*

Hypothesis 7: *Role Stress in the IT systems development context will be negatively related to Job Satisfaction.*

RESEARCH METHODOLOGY

Surveys provide a means to capture perceptions and attitudes and have been used to capture the perceptions of IT professionals related to nature of work and related outcomes [21]. In this study, a survey was used to capture perceptions regarding job motivating

potential, group cohesion, role stress, job satisfaction, and organizational commitment from IT professionals and test research hypotheses. Survey items used in this study were derived from past job characteristics, role stress, group cohesion, organizational commitment, and job satisfaction literature deemed to be appropriate to system development practices [13, 21, 47]. The items used were pre-tested by several managers and IT professionals. Minor adjustments were made to a few items based upon pre-testing to increase comprehension and clarity. Each item was measured on a Likert scale of one to seven.

Twelve companies located throughout the Midwest and the East coast of the U.S. agreed to participate in this study. All of the companies were Fortune 500 firms, and represented diverse industries, including insurance, fast food, IT consulting, manufacturing, pharmaceutical, and telecommunications. An IT manager from each of these firms facilitated the study by distributing the survey to systems developers and supporting the return of the anonymous survey. Each respondent received an envelope with the survey and was instructed to return it in the sealed envelope to the manager. The manager put all the envelopes in a large envelope and mailed them back to the researchers.

A total of 158 system developers received the survey and 124 (78.4%) returned them (Table 1). The response rate was similar for each company.

Table 1: Survey Respondent Demographics

Gender	Male	54%
	Female	43%
	No Response	3%
IT Position	Programmer/Analyst	22%
	Systems Analyst	12%
	Senior Systems Analyst	17%
	Project Leader	15%
	Database Administrator	7%
	Other	27%
Highest Completed Education	Some College	21%
	Bachelor's Degree	52%
	Graduate Degree	23%
	Doctorate Degree	2%
	No Response	2%
Description	**Mean**	**Standard Deviation**
Age	36.8 years	8.5 years
IT Experience	12.5 years	7.0 years
Tenure – Current Position	3.4 years	3.0 years
Tenure – Organization	7.8 years	5.9 years

Partial Least Squares (PLS) was used for the data analysis, which estimates path models with latent constructs measured by multiple indicators. PLS was used in this study for several reasons. First, PLS is suggested to be used for causal-predictive analysis [10, 62]. Second, like other structural modeling techniques, PLS allows for the integration of both measurement and structural models. Third, PLS is robust for small and moderate sample sizes [63]. Fourth, PLS responds to the need to examine the dimensionality of job motivating potential called for in prior research while simultaneously testing the model.

Since bootstrapping is recommended for hypothesis testing [10], bootstrapping was used to estimate path coefficients by a large number of random samples. This method computes both the parameter estimates and standard errors based on the samples. Following common practice [64, 65], the composite reliabilites, the average variance extracted for the constructs, the construct to item correlations, and the inter-construct correlations are examined, shown in Table 2. The composite reliability (interpretation similar to Cronbach's alpha) of each construct is greater than the recommended 0.70 level [66], except for the second-order construct Meaningfulness of Work.

Table 2: Intercorrelation and Internal Consistencies of Constructs

	n	*Composite Reliability*	JS	OC	GC	RS	MW	AU	FE
Job Satisfaction	123	*0.827*	**0.55**						
Organizational Commitment	123	*0.925*	0.70	**0.64**					
Group Cohesion	123	*0.873*	0.43	0.27	**0.58**				
Role Stress	123	*0.854*	-0.39	-0.55	-0.19	**0.75**			
Meaningfulness of Work	123	*0.666*	0.34	0.47	0.34	-0.37	**0.24**		
Task Autonomy	123	*0.830*	0.19	0.08	0.38	-0.10	0.26	**0.71**	
Task Feedback	123	*0.833*	0.20	0.03	0.28	-0.01	0.09	0.26	**0.71**

* The numbers on the diagonal is the square root of the variance between the constructs and their measures. Off-diagonal elements are correlations among the latent constructs.

Convergent and discriminant validity was supported in two ways. First, the average variance extracted exceeds the square of the correlations [10], except for the relationship between Job Satisfaction and Organizational Commitment, which prior literature has shown that a strong correlation tends to exist [23]. This is shown on Table 2, in which the diagonal elements are greater than the off-diagonal elements. Second, the average variance extracted exceeds .50 for each construct [10], except for Meaningfulness of Work. The average variance was expected to have a lower value for Meaningfulness of Work since it is a second-order construct (for which average variance has little meaning) that combines the separate constructs of Task Variety, Task Identity, and Task Significance, as described in the literature review.

In order to assess construct validity, the factor loadings and weights were calculated for each of the indicators that comprised a latent variable. As shown in Table 3, most of the factor loadings are greater than 0.70, which represents a substantial correlation between the indicator and the latent variable [10]. The remaining loadings are between 0.60 and 0.70 and acceptable, except for Meaningfulness of work, which is understandable since it is comprised of three distinct job characteristics. Table 3 includes the questionnaire items for the each of the constructs. Based upon the factor analysis, no items were dropped from further analyses.

Table 3: Weight and Loading by Factor

Panel A – Meaningfulness of Work*	**Weight**	**Factor Loading**
Task Variety – I use a variety of skills and talents	0.23	0.40
Task Variety – This job is quite simple and repetitive	0.34	0.52
Task Identity – I have the opportunity to do a job from beginning to end	-0.08	0.39
Task Significance – My job is not very significant in the broader scheme of things	-0.06	0.54
Task Significance – Many people can be affected by how well my work gets done	-0.10	-0.04
Job Challenge – Quality of work required	0.46	0.74
Job Challenge – Difficulty of assignments	0.25	0.65
Job Challenge – Qualifications required	-0.12	0.54
Job Challenge – Demands on your ability	0.42	0.70

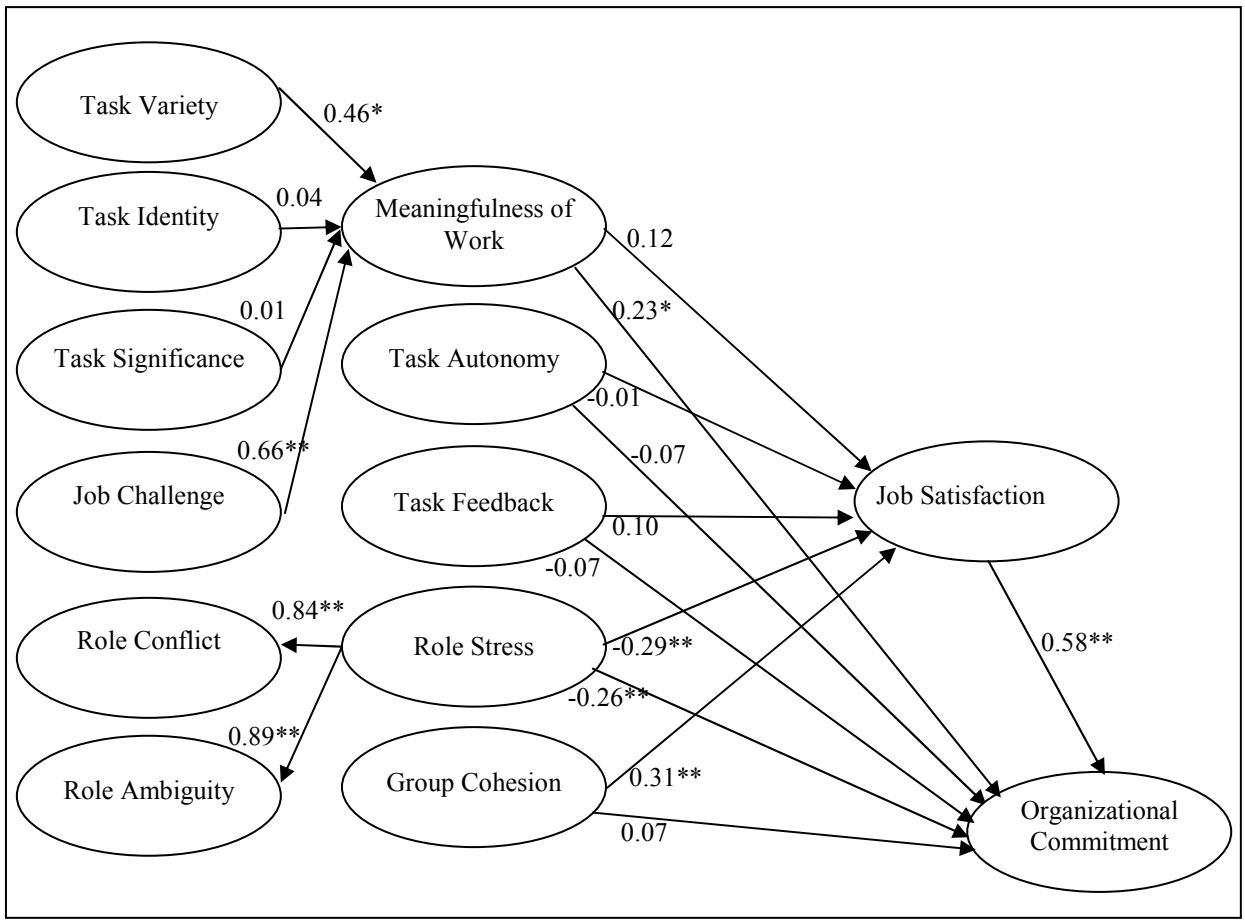
Table 3 (Cont.)

Panel B – Task Autonomy		
I have the opportunity for independent thought and action	0.73	0.93
This job denies me any chance to use my personal initiative in carrying out work	0.43	0.75
Panel C – Task Feedback		
The actual work itself provides clues about how well I am doing aside from any feedback co-workers or supervisors may provide	0.64	0.87
I know whether I am performing my job well or poorly	0.55	0.82
Panel D – Group Cohesion		
People in my immediate work group are friendly	0.43	0.86
People in my immediate work group are helpful to me in getting my job done	0.22	0.76
People in my immediate work group take a personal interest in me	0.08	0.63
I trust the members in my immediate work group	0.32	0.82
I look forward to being with the members of my immediate work group each day	0.21	0.72
Panel E – Role Stress*		
Role Ambiguity - I know what is expected of me - I know what my responsibilities are - I have clear planned goals and objectives for my job - I often have unclear orders from my boss - I am frequently unsure about how to do my work	0.63	0.89
Role Conflict - I have to buck a rule or policy to carry out an assignment - I work with two or more groups who operate quite differently - I do things that are apt to be accepted by one person and not by others - I receive assignments without adequate resources and materials to execute them - I work on unnecessary things	0.52	0.84
Panel F – Organizational Commitment		
I am willing to put in a great deal of effort beyond what is normally expected in order to help the organization be successful	0.17	0.78
I feel very little loyalty to this organization	0.20	0.87
I am proud to tell others that I am a part of this organization	0.18	0.83
I really care about the fate of this organization	0.20	0.90
There's not too much to be gained by sticking to this organization	0.17	0.79
For me this is the best of all possible organizations for which to work	0.15	0.65
Deciding to work for this organization was a definite mistake on my part	0.19	0.75
Panel G – Job Satisfaction		
My work gives me a feeling of pride in having done the job well	0.42	0.77
My work is a rewarding experience	0.34	0.79
I like the type of work that I am doing	0.33	0.75
My job gives me a chance to do the things I do best	0.25	0.64

* Second Order construct

RESULTS AND DISCUSSION

This research provides evidence that nature of work is an antecedent to system developers' attitudinal and behavioral outcomes. In this model, R-squared for Job Satisfaction is 31.7% and R-squared for Organizational Commitment is 59.3%, indicating that the nature of work characteristics affect IT professionals' job satisfaction and organizational commitment. Figure 3 displays the path loadings among the latent variables. Path loadings indicate that organizational commitment is negatively related to role stress and positively to job satisfaction in this context. Furthermore, job satisfaction is positively related to group cohesion, and negatively related to role stress. Consistent with prior research, a significant relationship was found between job satisfaction and organizational commitment. Contrary to expectations, there was no support found to suggest that autonomy or feedback is positively related to job satisfaction or organizational commitment. Table 4 recapitulates the results of hypotheses testing.



** Significant at p<0.01*
*** Significant at p<0.001*

Figure 3: Path Coefficients of Model

Table 4: Hypotheses

H1: Job satisfaction will demonstrate a positive relationship with organizational commitment.	Supported**
H2a: Meaningfulness of work in the IT systems development context will be positively related to the level of Organizational Commitment.	Supported*
H2b: Task Feedback in the IT systems development context will be positively related to the level of Organizational Commitment.	Not Supported
H2c: Task Autonomy in the IT systems development context will be positively related to the level of Organizational Commitment.	Not Supported
H3a: Meaningfulness of work in the IT systems development context will be positively related to Job Satisfaction.	Not Supported
H3b: Task Feedback in the IT systems development context will be positively related to Job Satisfaction.	Not Supported
H3c: Task Autonomy in the IT systems development context will be positively related to Job Satisfaction.	Not Supported
H4: Group Cohesion in the IT systems development context will be positively related to Organizational Commitment.	Not Supported
H5: Group Cohesion in the IT systems development context will be positively related to Job Satisfaction.	Supported**
H6: Role Stress in the IT systems development context will be negatively related to Organizational Commitment.	Supported**
H7: Role Stress in the IT systems development context will be negatively related to Job Satisfaction.	Supported**

** Significant at p<0.01*
*** Significant at p<0.001*

Most past studies in the IT domain have examined nature of work within the aggregated confines of Hackman and Oldham's 1975 model as discussed in the literature review section. Findings of the current study challenge complete acceptance of the job characteristics posed by Hackman and Oldham [13], yet do support some characteristics within this model as antecedents to job satisfaction (i.e. meaningfulness of work). Furthermore, findings augment the list of job characteristics relative to this context indicating that group cohesion is an IT nature of work characteristic that may enhance job satisfaction and role stress is a job characteristic that may decrease both job satisfaction and organizational commitment.

It is worth comparing the results of the current study to a study that looked at individual characteristics to better understand the contribution of this study to the current landscape and opportunities for work in this area. Thatcher et. al. (2003) recognized the individual characteristics in the Hackman and Oldham model. However, in comparing to the current study to Thatcher et al. [11], there are several distinctions regarding both the models and the results. First, Thatcher et al. [11] examined each of the five Hackman and Oldham job characteristics on job satisfaction rather than using meaningfulness of work as a second order construct as suggested by Hackman and Oldham [13] . Furthermore, Thatcher et al. [11] did not examine other nature of work characteristics potentially pertinent to the IT context, such as job challenge, role stress, and group cohesion. In contrast, we examined group cohesion and role stress as part of the job characteristics of system developers, which were both found to have significant relationships with outcome variables. Second, Thatcher et al. [11] examined U.S. State Government IT professionals focusing on job classifications and functions ranging from data center managers to computer operations personnel, rather than a sample across various industries focused on one sub-domain. Regarding similarities in study results, task feedback, task identity, and task significance were not significant in either study and task variety were significant in both studies. Though on the surface one may perceive a difference in the results related to autonomy, it should be noted that Thatcher used a 0.1 cut-off value, which would not have met the cut off value for significance (<.05) in the present study.

Management and Research Implications

The connection between the nature of work characteristics found as significant antecedents to organizational commitment and/or job satisfaction is particularly promising as corrective action may be within the capabilities of the IT manager or organization. In situations where the nature of work negatively influences organizational commitment or job satisfaction, managers could try to enact job redesign remedies such as job enrichment or job rotation. A discussion of each independent variable, recognizing both management and research implications, is included below.

Meaningfulness of Work

Organizational commitment increases as the meaningfulness of work increases. However, the two task variety questions were the only indicators which significantly loaded on meaningfulness of work. IT managers should have more committed workers through striving to design jobs that have an increased level of task variety. The variety of tasks required in a systems development project seem to provide a context in which managers can provide task variety by rotating task assignments among projects and perhaps forgoing assigning an employee the same task across projects to allow them to do a range of tasks within one project.

Task identity and task significance did not show a significant loading on meaningfulness, suggesting IT professionals engaging in the systems development context are not affected as much by task identity and task significance. Perhaps systems developers feel that milestones are the significant markers of project progress and do not attach special meaning to individual task identity. Milestones are tied to successful completion of a collection of inter-related tasks (a phase) and mask attention on individual tasks within the phase. Furthermore, regarding task significance, systems developers may feel that a project necessitates certain tasks that may be low-priority, though the project in entirety is very significant. Hence, given the nature of the project-oriented context, IT professionals may feel that low-priority tasks may be necessary and thus consider task significance to be irrelevant since certain tasks are required for the project. Future work may further acknowledge the team environment present in systems development and explore whether these task level characteristics are usurped by project identity and significance.

The relationship between meaningfulness and job satisfaction was shown to be significant. In contrast, the relationship between meaningfulness and organizational commitment (H2a) was not significant. Organizational commitment and job satisfaction, though related, should be recognized as distinct constructs. As such, antecedents to one are not necessarily antecedents to the other. However, in interpreting the results, one must consider individual links as well as the entire path model. Per the path model, meaningfulness of work may still benefit organizational commitment indirectly through the mediator, job satisfaction.

Task Autonomy

Task Autonomy does not have a significant relationship with either job satisfaction or organizational commitment. The nature of development projects requires some parts of the project to have little autonomy (i.e., need to fulfill a user's requirement) while other parts have much autonomy (i.e., how to meet the requirement). Because of varying levels of autonomy required for tasks, IT professionals may consider autonomy irrelevant to their job satisfaction and organizational commitment. IT managers should focus on some of the other nature of work characteristics rather than striving to increase or decrease autonomy.

Task Feedback

Although employee goal-setting and monthly job performance feedback are techniques selected by some managers, feedback was not shown to significantly affect the level of system developer's job satisfaction or organizational commitment. This may be because a systems developer's feedback is task-embedded and thus part of the project progress. For example, a software programmer can tell if the software has bugs, and therefore obtains feedback from the task.

Furthermore, feedback may be group-oriented in a project environment rather than individually distributed. Because of these contextual issues, IT professionals may consider feedback irrelevant to their job satisfaction and organizational commitment. Future work regarding the systems development context may want to explore feedback at the project level.

Group Cohesion

It seems little, if any, previous research has examined group cohesion as part of the nature of work for IT professionals. Group cohesion does have a significant relationship with job satisfaction. In recognizing these results, future research and practice should consider the desire to have a cohesive group when examining job satisfaction. IT managers can affect the job satisfaction of employees by affecting group cohesion in several ways. Because much of project development work is team-oriented, group cohesion may be increased through selecting workers that tend to be cohesive [67]. Furthermore, jobs and reward structures can be designed

to yield more cohesion among group members (i.e., base bonuses on the work of the team rather than the work of an individual). Managers can also develop ground rules or set the norms of group work, model facilitating behaviors, clarify the responsibilities of group members, and work with employees in establishing goals. IT managers that understand that group cohesion affects job satisfaction can better guide project assignment decisions and improve job design. Additionally, future research should explore whether this relationship holds for other IT subgroups that are heavily engaged in teamwork.

Though group cohesion significantly affected job satisfaction, group cohesion was not shown to affect the level of organizational commitment in the current study. One may reason that the context of systems development work influences perceptions towards group cohesion; the commitment of a systems developer may be to a manager, a team, a project, or a department rather than to the organization.

Role Stress

Role stress was shown to have a negative significant relationship with both job satisfaction and organizational commitment and should be considered a nature of work characteristics for systems developers. Past studies have shown that the level of role ambiguity and role conflict are indicators of role stress and precursors to job satisfaction [55, 68]. In this study, the significance between the components of role stress and the outcome variables seem to naturally follow from the nature of the IT project development context. Systems developers may have a greater degree of role conflict due to the variety of roles a developer may assume in complex projects (i.e., working with users, working as an individual, working with a project team, working for a project manager). The evolving nature of a project may contribute to role ambiguity.

Both role ambiguity and role conflict are nature of work characteristics that managers can potentially employ measure to reduce and should thus focus on lessening to enhance job satisfaction and organizational commitment. Rizzo et al. [69] identified two ways that organizations can reduce the level of role stress. First, in order to reduce role ambiguity, organizations need to have an effective transparent structure, such as clear lines of authority, jobs that are clearly defined, and clear goals. Workers that are aware of the way things work in the organization will have less role ambiguity. A greater attempt to more clearly define expectations and design job roles should decrease the level of role ambiguity. Second, in order to reduce role conflict, organizations need to have leadership practices such as training employees to work together, to tolerate an error, and seek to help employees understand the perspectives of each other. Furthermore, testing potential employees during the interview in regards to their ability to work in a diverse team, training employees on resolving conflict, and better assignment of teams should decrease the level of role conflict.

CONCLUSION

This study concludes that select nature of work characteristics (meaningfulness of work, group cohesion, and role stress) affect job satisfaction and organizational commitment within the systems development context. This study extends previous research by collectively exploring nature of work characteristics within the confines of the systems developer job design and assesses their combined effect on job satisfaction and organizational commitment. Given that some findings were not as expected, results imply that exploring nature of work characteristics in the modern, U.S. work environment should consider contextualizing within professional domains (e.g. IT) and subdomains (e.g. systems development). Furthermore, at the characteristic level, this study extends previous research by examining group cohesion as a nature of work characteristic in the systems development context (rather than across multiple contexts). Although there are numerous other characteristics that could be examined, this study has focused on characteristics common to the work of systems developers and has identified significant contributors that affect systems developers' job satisfaction and organizational commitment.

Though this study makes important contributions, it is important to consider the limitations to properly interpret the results and potential for future work. One limitation of this study is that an individual's commitment has only been examined towards the organization. As systems analysts tend to move from project to project (and sometimes work off-site), they may be somewhat detached from traditional organizational structures. This may result in commitment to alternative entities, such as commitment to a manager, a team, a project, or a department rather than to the organization. As such, the job characteristics explored in this study may have a greater impact on project commitment, commitment to a project manager or commitment to a team member than organizational commitment. Accordingly, possible future work could measure other forms of commitment as outcome variables to reflect this context. Another limitation in this study is that though the respondents represented a cross section of industries, all respondents worked for large, public sector Fortune 500

companies. Future work could expand on the current study by examining the smaller or private sector organizations.

With respect to practice, the study indicates that management should ensure that IT work is structured to positively affect their employees' attitudes and behaviors. The discussion on the independent variables offers suggestions that IT managers can implement to create a work environment that positively affects IT professionals' job satisfaction and organizational commitment. As the scope of this study is focused on tangible nature of work characteristics that managers can control in a systems development context, future work may extend this study by expanding the model to include employee social information processing and dispositions not included as antecedents to job satisfaction and commitment. For example, project team recognition and feedback by management and/or learning opportunity [47] may be potential additions that merit study. Alternatively, future work may explore motivating characteristics of work in other IT contexts.

Prevailing theories of motivation may not apply in a one size fits all manner to all work disciplines and sub disciplines. "Talented IT professionals can not be most productive and retained--unless they are satisfied and a proper symbiotic relationship is developed between themselves and the organization" [39, p. 65]. Managing for intrinsic rewards in light of pertinent nature of work characteristics is a vital step in keeping employees productive and deterring turnover.

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AUTHOR BIOGRAPHIES

Tim Klaus is an Associate Professor of Management Information Systems at Texas A&M University – Corpus Christi. He earned his PhD (Management Information Systems) from University of South Florida. His primary research interests are User Resistance, ERP implementations, IT personnel, and Web Usage. He has published papers in journals such as Communications of the ACM (CACM), Journal of International Technology (JIT), and European Journal of Information Systems (EJIS). He also is a consultant in the area of IT-enabled change, helping organizations better understand the process of change as well as the impact of user attitudes and behaviors.

Cynthia LeRouge, Ph.D., M.S., C.P.A. is an Associate Professor at Saint Louis University in the Department of Health Policy and Management at the College for Public Health and Social Justice. She holds a joint appointment in the Decision Sciences and Information Technology Management Department, John Cook School of Business and the Saint Louis University Center of Outcomes Research. She recently served as a visiting scholar at the Center of Disease Control with the Public Health Informatics Fellowship Program. She has over 60 publications including academic journal articles, edited chapters in research-based books, and peer-reviewed conference proceedings. Dr. LeRouge has been recognized with teaching, research, and service awards. Her primary research interests relate to telemedicine, consumer health informatics, and public health informatics. She is currently co-editor in chief of Health Systems journal. Dr. LeRouge has chaired health care mini-tracks for various information systems conferences and served as guest editor for multiple journal special issues on healthcare related topics. She is currently on the executive advisory committee for the American Telemedicine Association's Business and Finance Special Interest Group and has served as an executive officer of the Association of Information Systems Special Interest Group for Healthcare Research for four years. Dr. LeRouge has held various senior management roles in the accounting, software and healthcare industry prior to joining academe. Dr. LeRouge has served as a grant review panel member for health informatics for various organizations, including the Agency for Healthcare Research and Quality (AHRQ). She completed her Ph.D. at the University of South Florida.

J. Ellis Blanton is Professor of Management Information Systems in the Information Systems Decision Sciences Department at the University of South Florida. He earned a BS (Physics) from Georgia Institute of Technology, an MBA (MIS) from The University of Georgia, and a PhD (MIS) from The University of Georgia. His research interests include social and organizational impacts of IT and issues concerning IT professionals, such as professional development and competency. He has published more than seventy articles and papers concerning these and other topics in journals including Management Information Systems Quarterly, Journal of Management Information Systems, Communications of the ACM, Human Resources Management Journal, and the International Journal of Global Management.