CORPORATE ENTREPRENEURSHIP ASSESSMENT INSTRUMENT (CEAI): REFINEMENT AND VALIDATION OF A SURVEY MEASURE

THESIS

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Abstract

The study of corporate entrepreneurship has established itself as a valuable area of research for both public and private-sector organizations. The measurement instrument known as the Corporate Entrepreneurship Assessment Index (CEAI) has been designed to tap the climate-related organizational factors that represent and potentially encourage corporate entrepreneurship. This study is an attempt to refine the CEAI. The core constructs of the CEAI are redefined, the items are tested for content validity, the factor structure is analyzed, and the CEAI is correlated to other known measures to validate the CEAI. Through this testing, the CEAI was refined and found to be a useful measure for predicting an innovative, entrepreneurial environment.

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Michael S. Cates

Table of Contents

Page

List of Tables

Page

CORPORATE ENTREPRENEURSHIP ASSESSMENT INSTRUMENT (CEAI): REFINEMENT AND VALIDATION OF A SURVEY MEASURE

I. Introduction

Traditional ideas of entrepreneurship revolve around recognizing and exploiting new opportunities with new products, markets, and technologies (Sathe, 1989). It has been recognized that in the fast-paced, dynamic, global economy, established businesses can gain competitive advantage through entrepreneurial activity. That activity in turn has been shown to be especially effective when initiated at mid-business unit or division level (Antoncic & Hisrich, 2001;Sathe,1989) The manifestation of this idea within the corporate environment as a business strategy or function of culture has been identified using several terms, including corporate entrepreneurship, intrapreneurship, and entrepreneurial mindset (Hornsby, Kuratko, Zahra, 2002; Antoncic & Hisrich 2003). In essence, however, they all represent the pursuit of entrepreneurial behavior from employees within a larger corporate environment to achieve such goals as innovation and increased profitability (Kuratko, Ireland, Covin, Hornsby, 2005).

This innovative behavior is the goal of a corporate entrepreneurial process. Kuratko et al (2005) offered a specific definition of corporate entrepreneurship (CE) by adapting Sharma and Christman's (1999) definition of this phenomenon. They state that, CE is "…the process whereby an individual or a group of individuals, in association with an existing organization, create a new organization or instigate renewal or innovation within that organization." (p.11) The literature is replete with examples of how

companies and individuals benefit from the use of corporate entrepreneurship as a business process where the entrepreneurial mindset has been established and flourished. Organizationally, there is a demonstrated link existing between this cultural orientation and increased growth and profitability (Covin & Slevin, 1989; Zahra & Covin, 1995). Beyond this idea, Ireland, Kuratko, and Covin (2003) state that besides financial gain, a company's employees gain increased knowledge and skills.

Corporate entrepreneurship researchers have attempted to isolate the antecedents necessary to describe its existence. In general, the antecedents have been described as belonging to environmental and organizational categories (Antoncic & Hisrich, 2004). Environmental factors are characteristics external to the organization such as industry growth, general economic conditions, regulatory influences, and environmental hostility (Covin & Slevin, 1989). Organizational factors are characteristics internal to the organization itself such as organizational structure, culture, and systems (Zahra & Covin, 1995). The latter category is of particular interest because organizations rarely have control over environmental factors, but being able to measure and manipulate organizational factors internal to the organization would be useful for the encouragement of entrepreneurialism.

Based on this, Hornsby et al (2002) developed an instrument called the Corporate Entrepreneurship Assessment Instrument (CEAI) that measured five internal organizational conditions conducive to corporate entrepreneurship. The factors were: management support, work discretion and autonomy, rewards and reinforcement, time availability, and organizational boundaries. The CEAI and the five antecedents are

important because they provide a simple, easy to administer measure for practitioners, consultants, and researchers who wish to implement, enhance, or measure entrepreneurial behavior within their organization and study the mechanisms that diffuse this throughout the organization.

The CEAI has enjoyed only limited application in field (Adonisi, 2003; Brizek, 2003). Davis (2006) sought to build on Hornsby et al's (2002) research by refining and validating the CEAI. Using Hinkin's (1998) framework for measure development, Davis, however, took a step back and evaluated the content validity of the CEAI items, reducing the number items from 48 to 21. Then, Davis, with field data analyzed using exploratory factor analysis, found that the items could be represented with a five factor solution. This solution was similar to Hornsby et al.'s analysis with one notable exception. The organizational boundaries dimension identified by Hornsby et al. did not emerge. Instead, a factor representing role clarity emerged that seemed to be consistent with the literature, including the literature from which Hornsby et al. developed their research (Zahra, 1991).

In closing, Davis (2006) suggested that further work be done on the CEAI. Specifically, she recommended that the definitions of the construct be revised to ensure that each construct was distinct and the items be revised to be consistent with any revisions to those definitions. Accordingly, this effort is a response to this call where this stream of research on the CEAI is continued by defining the CEAI constructs more clearly and adding items to measure each construct (to further ensure reliability). Consistent with Davis, these objectives will be fulfilled using Hinkin's framework to

develop, test, and refine measures for the organizational sciences. After the constructs are clearly defined and items added, content validity will be tested. Following this, the revised instrument will be administered in a field setting. The data will be subjected to factor analysis with estimates of reliability determined. Extending this further, convergent validity will be assessed by correlating this measure with other known scales.

Corporate Entrepreneurship

Definition

Although this research effort is strictly a refinement of a Hornsby et al's (2002) CEAI measure, it is appropriate to discuss not only his definition of corporate entrepreneurship, but other researchers' attempts to clarify the definitions within this field. The concept of corporate entrepreneurship has many parallel concepts with large areas of overlap, including entrepreneurial mindset, internal corporate entrepreneurship (Shollhamer, 1982), intrapreneurship (Nielson, Peters, & Hisrich, 1985; Pinchot, 1985), corporate venturing (Block & McMillan, 1993; Ellis & Taylor, 1987), internal ventures (Roberts & Berry, 1985), and strategic and organizational renewal (Guth & Ginsberg, 1990; Zahra, 1993) however all have the concept of the entrepreneur and entrepreneurship at their core.

Sharma and Chrisman (1999) synthesized the existing literature on entrepreneurship in corporate environments and extracted the following definition in an attempt to provide focus to the discipline: *Corporate Entrepreneurship* (CE) is "the process whereby an individual or a group of individuals, in association with an existing organization, create a new organization or instigate renewal or innovation within that

organization." (p.12) The definition was written to be intentionally broad so as not to exclude unidentified problems or issues in the early developmental stages of this field. Under the veil of CE, Sharma and Chrisman suggest that there are three forms of corporate entrepreneurship: Corporate Venturing, Innovation, and Strategic Renewal.

The ideas conveyed by Sharma and Chrisman (1999) were adapted by Hornsby et al. (2002). Instead of using, however, the idea of process, Hornsby et al. focused on the internal environment of an organization centering on the "development and implementation" of new ideas and then integrating these ideas into the organization. This idea was used as the guiding conceptualization of CE for this research

Antecedents

In addition to working towards a cohesive definition of CE, researchers have been working to find the dimensions of CE that encourage workers to be entrepreneurial. Researchers have tried to identify antecedents in relation to a firm's external environment (Miller, 1983; Zahra, 1991, Stopford & Baden-Fuller, 1994; Antoncic & Hisrich, 2004), organizational structure (Covin & Slevin, 1988; Miller, 1983; Hornsby et al, 2002; Kuratko et al, 2005), strategic posture (Covin & Miles, 1999), leadership governance and style (Zahra, 1996; Day 1994, Kuratko et al, 2001), and culture (Day, 1994; Morris, Davis & Allen, 1994) as well as other antecedents. Despite the large amount of research to date, much remains unanswered or investigated. Without oversimplifying the issue, it is appropriate to group the antecedents as they apply to an established firm as either external or internal to the firm, understanding that some concepts can cross the boundary.

Zahra and Oneil (1998) highlight this pointing out that there is interaction between external and internal factors which causes managers to act innovatively.

External Environment

Corporate entrepreneurship efforts can be focused both internally and externally (McMillan, Block, Narashima, 1986) and it is therefore expected that the external environment is the driver for some of that need. Keats and Hitt (1988) describe dynamism in an external market as a firms' perception of instability due to social, political, technological and economic changes. This dynamism combined with competition is hypothesized to lead to corporate entrepreneurial efforts, both in product innovation as well as market niche exploitation, especially as the environment is perceived to be more hostile (Zahra, 1991).

Zahra's (1991) results were in line with Miller (1983) who found that organic firms respond with CE adaptive techniques as required by the hostility of the environment. The three types of firms identified by Miller (1983) were (1) *organic,* characterized as striving to adapt to the environment, emphasizing expertise-based power and open communications, (2) *simple,* characterized by small size and power being centralized at the top of the organization, and (3) *planning,* characterized by larger size and efficiency through use of formal controls and plans. This finding was not echoed by Antoncic and Hisrich (2004) however, it is worth noting that Miller (1983) found that only *organic* firms were significantly correlated with entrepreneurship. *Planning* and *simple* firms did not develop innovative or entrepreneurial responses to the environment in his study.

Antoncic and Hisrich (2004) showed that the exponential growth of technology was a catalyst for organizations to respond with corporate entrepreneurial activities. Another driver for CE activities seen by Antoncic and Hisrich (2004) was the external market's demand for new products. This demand for new products was directly related to CE activities and performance measures for organizations.

The external environment that a firm participates within certainly has been shown to be relevant and important to corporate entrepreneurship activities. For the establishment of CE activities, however, the external environment is probably less important than the internal or strategic environments of the firms (Zahra, 1986). This internal environment is the focus of this effort.

Internal Environment

The internal environment covers a broad scope of ideas relative to entrepreneurship antecedents. Included are strategic and organizational orientations and structure (Zahra 1991; Miller, 1983, Covin & Slevin, 1989), management style (Day, 1994), locus of control (Miller, 1983), culture (Shane, Venkataraman, & MacMillan, 1995), and internal organizational factors (Lumpkin & Dess, 1996; Hornsby et al, 2002; Kuratko et al, 2005). Strategic orientations of firms were postulated by Zahra (1986) to align with the corporate entrepreneurship posture of the firms. Although his data were inconclusive, in part due to the difficulty in assigning a singular corporate strategy (stability, growth or retrenchment) to a firm, the concept shouldn't be discounted. Covin and Slevin (1989) similarly classified small firms as to their overall competitive

orientation and found that firms with a competitive strategic posture were indeed highly correlated with entrepreneurial activity in hostile environments.

Management style and culture of an organization have also been identified as antecedents of corporate entrepreneurship. Although CE was assumed to be an event initiated from the bottom up, Day (1994) showed that CE could flourish in any environment where the appropriate management system was in place. That is, CE actuality existed with top-down champions, bottom-up champions, and in many cases, a dual role champion and organization sponsor for innovations that are of high risk. Shane, Venkataraman and MacMillan (1995) found that the national culture was influential as well through a study of organizations from over 30 countries. Not surprisingly, in societies high in uncertainty avoidance (where members feel threatened by uncertain or unknown outcomes, for example, Japan) champions were preferred to work within organizational norms and procedures. Power distant societies, characterized by the extent to which the less powerful members of institutions accept that power is not distributed equally, (i.e. hierarchical societies such as India, Mexico) preferred champions to seek and gain support for the innovative effort from authority before action was taken. Within a collectivist society (societies in which people form strong, lifetime long, cohesive groups in which protection is exchanged for loyalty, for instance, China), champions worked to gain cross-functional support for the innovation effort.

Internal organizational factors such as autonomy (Lumpkin & Dess, 1996), managerial support, incentive and reward systems supportive of innovation (Hornsby et al, 2002), organizational values supportive of innovation (Zahra, 1991), and

organizational structure (Hornsby et al, 2002) have shown to be important factors to entrepreneurial activity. Many of these antecedents are particularly interesting because of their proximity and ability to be influenced by organizational leaders. Finding these variables is important in not only understanding how CE works, but in promoting its existence in firms that are growth stagnant.

Measures of CE and the Corporate Entrepreneurship Assessment Instrument

The history of measures in Corporate Entrepreneurship is fairly short and sparsely documented, however their importance is of great significance. Morris and Kuratko (1999) stated, "At the organizational level, measures can be used to benchmark and track entrepreneurial performance, establish norms and draw industry comparisons, establish entrepreneurship goals, develop strategies and assess relationships between entrepreneurial actions and company performance variables over time" (p. 290). Morris (1999) built upon Miller's (1985) entrepreneurial ideas to build an instrument which measured, innovativeness, proactiveness, and risk taking, as well as product, service and process innovation. The Entrepreneurial Performance Index is meant to describe the degree and frequency of entrepreneurship in an organization. Another measure of significance was created by Covin and Slevin (1986, 1989), which was designed to capture the entrepreneurial mindset or posture of the organization by centering on the core concepts of proactiveness, risk-taking, and innovation. Their 9-item scale was factor analyzed, indicating that it encompassed a single factor with a coefficient alpha of .87.

Lastly, initially developed as the Intrapreneurial Assessment Instrument (Kuratko, Montagno, Hornsby, 1990), the current version of the Corporate Entrepreneurship

Assessment Index evolved and was published by Hornsby et al (2002). This index is thus far the most promising of the attempts at capturing the environmental antecedents of corporate entrepreneurship. The CEAI measures antecedents that have proximity and use to the practitioner in an organizational setting. Additionally, the measurement is directed at individual level perceptions of CE which is important since entrepreneurial behavior is ultimately formed and acted upon by individuals within the organization.

The CEAI postulated that there were five factors related to the existence of CE in an organization. The five factors were formally defined as "(1) management support (the willingness of top-level managers to facilitate and promote entrepreneurial behavior, including the championing of innovative ideas and providing the resources people require to take entrepreneurial actions), (2) work discretion/autonomy (top-level managers' commitment to tolerate failure, provide decision-making latitude and freedom from excessive oversight, and to delegate authority and responsibility to middle-level managers), (3) rewards/reinforcement (developing and using systems that reward based on performance, highlight significant achievements, and encourage pursuit of challenging work), (4) time availability (evaluating workloads to ensure that individuals and groups have the time needed to pursue innovations and that their jobs are structured in ways that support efforts to achieve short- and long-term organizational goals), and (5) organizational boundaries (precise explanations of outcomes expected from organizational work and development of mechanisms for evaluating, selecting, and using innovations)" (Kuratko et al., 2005,p 703-704).

These five factors emerged through a comprehensive review and integration of the literature (Hornsby et al., 2002). As an initial test of the instrument designed to assess these five factors, Hornsby et al. (2002) administered the CEAI to two samples, testing the factor structure and estimating the internal reliability. As hypothesized, five factors emerged using both exploratory and confirmatory techniques and initial estimates of reliability were computed, with coefficient alphas for the five factors being .89, .87, .75, .77, .and .64 for management support, work discretion, rewards, time availability, and organizational boundaries, respectively. The organizational boundaries scale failed to meet Nunnally's (1978) recommended alpha level of at least .70.

Although this initial test was promising, the CEAI has yet to enjoy widespread use and evaluation. Only four instances in the literature were found that employed the CEAI, two were private sector studies (Adonisi, 2003; Brizek, 2003) and two were public study applications (Woods, 2004; Rhodes, 2005). Adonisi (2003) tested the factor structure and determined a five factor structure was appropriate, however he renamed the organizational boundaries factor "work improvement" in hopes of better describing the category that emerged. Brizek, (2003) also discovered issues with the organizational boundaries factor as well, evidenced by low internal consistency estimates. These findings were also replicated by Woods and Rhodes who found alpha coefficients of .61, .67 for the organizational boundaries category. Also it is worth noting that Brizek, perhaps realizing the difficulty with the organizational boundary factor, intermittently throughout his dissertation, renames the factor "Organizational Boundaries Involving Innovation" vs. the original "organizational boundaries".

Based on these findings, Davis (2006) used the CEAI data collected by Woods (2004) and Rhodes (2005), which were studies directed toward larger issues that revolved around corporate entrepreneurship, to further test the factor structure and reliability of the CEAI. Davis' (2006) effort was designed to fulfill several goals. First, it was an explicit response to Hornsby et al (2002) who called for additional tests. Second, Davis took a step back to assess the content validity of the CEAI items. And, finally, Davis was attempting to clarify the content and validity of the organizational boundary construct that appeared troublesome in previous administrations. In sum, Davis' found that five factors represented the items from the CEAI. Largely these were consistent with those reported by Hornsby et al. As with previous efforts, the organizational boundary construct did not emerge as intended. Instead, the analysis suggested that the items represented a role clarity construct where items indicated clearly defined job roles and sets of standard procedures. The concept of role clarity is not unknown to corporate entrepreneurship literature. For instance, clearly defined organizational values are positively correlated with corporate entrepreneurship (Zahra, 1991). Also, the original organizational boundaries definition given by Kuratko et al (2005) implies the role clarity concept with the phrase, "precise explanations of outcomes expected from organizational work" (p. 705). The concept of role clarity combined with the core concept of innovation may be a better antecedent in Hornsby's et al's (2002) model.

Another finding of Davis (2006) was that the definitions of the factors could be further refined. Her findings called for the adding of the ideas of financial support and tolerance of failure to the management support factor. The rewards and reinforcement

factor items indicated that items with an emphasis on "performance" were consistently more reliable.

Also among the findings and recommendation of Davis (2006) was that the construct definitions and some measure items were not necessarily consistent with Hornsby et al's (2002) intent of measuring an organization's climate. As defined by Patterson et al (2005), climate represents the shared or collective perceptions of an organizations general practices and procedures. The constructs and items should be crafted so as to measure CE in the context of organizational climate.

Summary

Corporate Entrepreneurship is a solid stream of research well studied and researched in the literature. As entrepreneurial behavior has shown to have significant benefits for organizations and corporations, the challenge is to identify the touch points where entrepreneurial behavior can be identified and or encouraged by employees. The CEAI by Hornsby et al. (2002) described five antecedents in the internal organizational environment that sought to identify the CE climate. The CEAI unfortunately has not been refined to the point where it is solidly reliable and valid. Davis (2006) presented several ideas for possible changes to the CEAI that are to be addressed and evaluated in the research effort of this paper in an attempt to address the reliability and validity of the CEAI.

II. Method

This project was designed to further refine the CEAI, evaluate the psychometric properties, and further validate the instrument. To this end, data were collected and analyzed in three phases. In the first phase, the definitions for the constructs and the items used to measure those constructs were refined. In the second phase, the content validity of the items was evaluated. Finally, in the third phase the study, data were gathered using the instrument in the field from a public sector organization. The data from this final phase were factor analyzed to assess initial levels of construct validity and assess the internal consistency of the factors that emerged. In addition, relationships between these factors and other known constructs were assessed to establish an initial level of convergent validity.

Phase I—Qualitative Evaluation of Constructs and Items

In the first phase, a qualitative reevaluation of the CEAI revisions suggested by Davis (2006) was completed. The definitions of the constructs measured by the CEAI were reevaluated against the existing literature and defined more clearly. Following this, the items were evaluated to ensure they reflected the intended constructs. Although Davis eliminated several of Hornsby et al.'s original items (reducing the item pool to 27), all of Hornsby et al.'s (2002) items were considered and evaluated to further ensure that no item was overlooked when the revised constructs were considered. Additional items were written based on Davis' (2006) findings to ensure that eventually each construct was measured by 4 to 6 items (see Hinkin, 1998).

Phase II—Empirical Evaluation of the Constructs and Items

The second phase of the study tested the content validity of the revised construct definitions and items. This was done with two tests. For both tests, a group of graduate students participated. Although a specific number of respondents are not specified in the literature, it is suggested that an appropriate number of respondents for these content validity assessments would be 12-30 people (Hinkin, 1998; Anderson & Gerbing, 1991). This recommendation was used to guide each of the content validity tests conducted. Age and gender were the only demographic data collected from the participants. It is of note that the participants were all military officers enrolled in graduate education programs. The demographics of the school's student body ensured that the participants were represented from various services (e.g., Air Force, Navy) with between 2-15 years of service, from a wide range of occupations (i.e., pilots, network administrators, logisticians, maintenance). Because this task was a cognitive exercise, this type of sample has been described as appropriate (Anderson and Gerbing, 1991).

Twenty-six military officers completed the first content validity assessment exercise; they were mostly male ($n = 21$) with an average age of 32.2 years. In this first test, the participants were asked to match the items with the appropriate construct definition, with an allowance where each item could reflect more than one construct (i.e., a "1" indicated the item most reflected a particular construct; a "2" indicated that the same item also appeared to reflect another construct, and so on). A column title "Not Applicable" was included for respondents to use if they felt the item did not reflective of any of the defined constructs. After recoding the scores such that higher scores indicated

correct classification, an agreement index was computed which represented the percentage of people that classified an item to each construct (Hinkin, 1995).

The second content validity test was done using a technique developed by Anderson and Gerbing (1991). A separate group of twenty military officers (average age 35.4 years) completed this task. Unlike the first test, participants indicated the extent to which each item represented a single factor. Using the data that were generated, two indices were created; the first index simply represented the proportion of respondents who assigned an item to its intended construct (termed the substantive validity index by Anderson and Gerbing and similar to the agreement index computed in the first test); the second index represents the degree to which each rater assigned an item to its intended construct, termed the substantive validity coefficient (formulas are reported by Anderson & Gerbing, 1991).

The items were screened using the first index where items were marked as invalid if 75 percent of the participants incorrectly classified the item. While this proportion provided a basic indication as to whether items were correctly categorized, it did not measure the extent to which participants felt that particular item might be better described by another construct. The second index made it possible to statistically test whether respondents assigned an item to another, unintended, construct in a systematic way.

In assembling the list of items that were to be considered content valid, the results of the content validity exercises from this research and the results of the content validity exercises of Davis' (2006) research were compared. In general, if an item was content valid in two or more of the tests, it was retained for the field measure.

Phase III—Field Administration of the Instrument

Phase III was designed to achieve a refined, parsimonious list of items that measured the constructs as intended. This phase was completed by employing the instrument that emerges from the content validity tests in a field setting.

Participants

A public sector organization in the midst of a transformational process was used for administration of the survey. The 72-item survey was made available to the participants via a web-based survey company. The participants were sent an electronic letter from their supervisor explaining the survey and requesting their voluntary participation. In all, 61 persons responded to the survey composing a mix of uniformed public service employees, civilian government employees, and civilian contractor personnel. The respondents were 87% male and had an average age between 41-50 years old.

Procedures

The 72-item questionnaire is provided at Appendix A. To maximize the survey response rate, one week prior to making the questionnaire available, an invitation message was sent to organizational members being invited to participate. This invitation explained the purpose of the study, provided advance notice of the survey, and explained that the survey would be completed anonymously. The message also contained contact information in case potential participants had questions. When the survey was ready to be administered, a letter accompanied the instrument reminding individuals of the research purpose, instructions, and anonymity of the findings. Two follow-up messages

were sent to each individual; the first one week after the questionnaire was distributed and the second approximately one month later.

Measures

The survey being evaluated in this research is a refinement of the Corporate Entrepreneurship Assessment Index by Hornsby *et al* (2002). The intent of the index is to assess the internal organizational factors that influence corporate entrepreneurship activities. The refined measure contains only 23 of Hornsby's original 43 CEAI items plus 2 additional items to represent the role clarity construct. The items were measured using a Likert-style , five-point response format that ranged from 1= *strongly disagree* to 5 = *strongly agree.* The hypothesized factors included in this refined measure were *management support, work discretion, rewards and reinforcement, role clarity, and time availability. Management Support* measured the extent to which managers encourage innovative and entrepreneurial behaviors by financially supporting projects knowing that some of the projects may fail. An example of this construct would be, "Money is often available to get new project ideas off the ground". *Work Discretion* measured the extent to which managers have provided broad decision making latitude, delegated authority, and have relaxed oversight. An example would be, "I have much autonomy on my job and am left on my own to do my own work". *Rewards and Reinforcement* measured the extent to which managers reinforce entrepreneurial and innovative behavior by explicitly linking performance and achievement to rewards. An example of this construct would be, "My supervisor will give me special recognition if my work performance is especially good." *Role Clarity* measured the extent to which personnel feel that their day-to-day

role is clear, unambiguous and has defined outcomes; a portion of that work includes innovation". An example of would be, "I have clear, planned goals and objectives for my job". *Time Availability* measured the extent to which personnel are able to pursue innovative efforts in support of short and long-term goals. An example would be, "I always seem to have plenty of time to get everything done". The full set of items aligned with their corresponding constructs are presented in Appendix C.

In addition to the CEAI items, three measures of other known constructs were included so that the convergent validity of the factors could be tested. The first measure assessed *corporate entrepreneurship* using Covin and Slevin's (1989) 9-item measure. The measure was shown by Covin and Slevin to have a coefficient alpha of .87. The instrument measures three facets of corporate entrepreneurship—innovativeness, proactiveness, and risk taking. Each of the nine items asked participants to characterize the entrepreneurial posture of their organization using a 7-point anchor-type response scale. For example, respondents were asked (1) whether the top managers of their organization favor, "a strong emphasis on supporting tried and true services and/or business practices or a strong emphasis on R&D, technological leadership, and innovations," (2) whether their organization, "typically responds to actions which other organizations initiate or typically initiates actions which other organizations respond to," and (3) whether the top managers of their organization have, "a strong preference for low-risk projects (with normal and certain outcomes) or a strong preference for high-risk projects (with chances of very attractive outcomes)." Higher scores indicate a greater degree of an entrepreneurial mindset.

The second measure used in this survey, incorporated portions of the Organizational Learning measure by Hult (1998) and Hult *et al* (2000). The instrument as a whole was intended to measure the extent to which an organizations strategic orientation was oriented toward learning. The four constructs being, *Team Orientation, Systems Orientation, Learning Orientation, and Memory Orientation*. For the purposes of this research effort, only the learning orientation and memory orientation scales were used. The *Learning Orientation* scale was a 4 item scale intended to measure the extent to which an organizational unit stresses the value of organizational learning for the long-term benefits of the organization. An example item would be, "The basic values of this organization include learning as a key to improvement". The *Memory Orientation* scale was a 4 item scale intended to measure Measures the extent to which an organizational unit stresses communication and distribution of knowledge. An example of this construct would be, "We have specific mechanisms for sharing lessons learned in our organization." Both of these constructs were measured using a 5-point Likert-type scale with 1= *strongly disagree* to 5= *strongly agree.* Hult *et al* (2000) estimated reliability of the Memory orientation scale at .87, and the reliability of the Learning Orientation scale at .92.

The third measure included in this survey was the Watson, Clark and Tellegen (1988) Positive Affect and Negative Affect Scale (PANAS). The *positive affect* scale measured the extent to which respondents are disposed to feel enthusiastic, active, and alert. Sample positive affect words would be "interested", "inspired", and "determined". The words are scored on a 5-point Likert-type scale with high scores indicating higher

levels of energy, full concentration, and pleasurable engagement. The *negative affect* measured the extent to which respondents are disposed to feel a variety of adverse mood states that include anger, contempt disgust, fear, and nervousness. Sample negative affect words would be "distressed", "nervous", and "guilty". The words were also scored on the same 5-point Likert type scale, where high scores indicate general levels of distress. The timeframe disclosed in the instructions has implications on how respondents will answer the questions using the PANAS scale. The instructions were for respondents to score items based on how the items "best reflects the way you generally feel, that is, how you feel on average". Using this timescale, Watson, Clark and Tellegen (1998) found alpha coefficients for the positive affect and negative affect scales to be .88 and .87 respectively.

An inclusive list of the measures, constructs and items used in the survey is presented in Appendix A.

Analysis

Before the factor structure was explored, an interitem correlation matrix was computed. Items that demonstrated correlations less than .4 with other items were removed from the sample (Ford, MacCallum,& Tait, 1986). After this analysis was completed, an exploratory factor analysis was done using the recommendations made by Hinkin (1998) and Ford et al. (1986). That is, a principal components analysis and an oblique rotation was conducted. The oblique rotation was appropriate for this data since, "if factors really are correlated (a likely situation), then orthogonal rotation forces an unrealistic solution that will probably distort loadings away from simple structure,

whereas an oblique rotation will better represent reality and produce better simple structure" (Conway & Huffcutt, 2003, p.153). As suggested (Hinkin, 1998), the Kaiser method of extraction (i.e., retain all factors with an eigenvalue greater than 1) combined with an analysis of the number of factors that accounts for the most variance (Conway & Huffcut, 2003) was used to interpret the factor structure. Because the instrument was a refinement of the Hornsby *et al* (2002) and Davis (2006) CEAI, five factors were expected to emerge. Factor loadings were interpreted such that loadings that are .4 or greater on the primary factor with small cross loadings are retained. As problematic items were eliminated from the pool, the analysis was repeated until a clear factor structure explaining a high percentage of total item variance was achieved. After the factor structure was determined, the internal consistency of each factor will be determined by computing Cronbach's coefficient alpha where an alpha coefficient of .70 was considered to be an acceptable standard.

Finally, an analysis of convergent validity was used to compare the revised CEAI to the measures presented previously to determine how well the construct seemed to converge or diverge from instruments that measured similar or dissimilar constructs. To accomplish this analysis, SPSS was used to simply create a correlation matrix to analyze the 2-tail correlations between measures for significance.

Summary

As discussed, this study utilized a 3 phase approach to refining the CEAI. First, a qualitative assessment of the constructs, the definitions, and the items was completed to ensure the construct definitions and their associated items are in alignment with their

intended construct. Next the items were quantitatively analyzed to determine their content validity. In the first content validity exercise, the items were categorized by a group of graduate students to see if they reflected their intended constructs. In the second exercise, another group of graduate students performed a similar exercise, but the results were subjected to a more rigorous calculation to determine if the items were measuring an unintended construct. These results were compared with the content validity exercises of Davis (2006) to make a determination of which items would be retained in the final data set for field administration. The third phase of this study administered the remaining items in a field setting and completed an exploratory factor analysis on the results. Additionally, the data was tested for correlation with similar measures to test for convergent and divergent validity. The next section presents the results of the testing.

III. Results

This research continued the efforts initiated by Davis (2006) to refine and improve the CEAI as introduced by Hornsby et al (2002). To that end, the construct definitions were revised and the items tested for content validity. Although there is not a definitive "test" per se for content validity, the methods recommended by Hinkin (1998) were used (see also Schriesheim, Powers, Scandura, Gardiner, & Lankau, 1993). Additionally, the content validity tests performed were directly compared with the content validity determinations of Davis as a separate data set to confirm that content adequacy had been achieved. After the testing and comparisons, the items that were inconsistent were removed from the item set. Finally, data were collected in the field using the instrument at a public sector organization. A factor analysis was conducted to demonstrate initial levels of construct validity and internal consistency. The factors that emerged were correlated with other known constructs to establish an initial level of convergent validity. Table 1 - Study Demographic Data presents the demographic data for all phases of this study. In all, 107 participants completed the content validity assessments and the questionnaire. The participants for the content analysis were all public service employees enrolled at a graduate institution. The study participants for the factor analysis were a mix of government employees (uniformed and civilian) and civilian contractors. The average age for the respondents was between 35 and 50 with approximately 85% of the participants being male.

Table 1 - Study Demographic Data

Variables	Content Validity		Exploratory Factor Analysis
	Phase I	Phase II	
	n=26	*n*=20	*n*=61
Average Age (yrs)	32	35	41 to 50
Sex			
Male (%)	81	95	87
Female (%)	19	5	8

Phase I—Qualitative Evaluation of Constructs and Items

Following the recommendations of Davis (2006), the five factors of Hornsby et al. (2002) CEAI were revised. The definitions of the constructs were reworded to express a uniform structure and provide clarity. Another goal of the rewording and redefining the constructs was to present them in, what Anderson and Gerbin (1991) term, "everyday language." The constructs along with the items are presented in Appendix A and Table 2.

The most significant change made revolved around the construct that was originally said to reflect organizational boundaries. This construct was redefined to reflect role clarity. Consistent with the literature, role clarity was defined as a measure of clear job procedures, goals, criteria, and knowledge of consequences (Rizzo, House, Lirtzman, 1970). The existing literature supports a positive relationship between role clarity and job performance, theorizing that role clarity allows employees to focus their energy on their job. Because many of Hornsby et al.'s original items did not reflect this more specific construct, three items were added based on Rizzo, House, Lirtzman (1970) measure of a similar construct. These items were: "I am permitted to buck a rule or

policy in order to carry out an assignment", "I have clear, planned goals and objectives for my job", and "I have the authority to 'try new ideas'".

Additionally, in accordance with Davis' (2006) recommendations, several Hornsby et al (2002) items were reworded to more explicitly reflect the intended construct. For management support three items were reworded. "Individual risk takers are often recognized for their willingness to champion new projects, whether eventually successful or not" was changed to, "Individual risk takers are encouraged to champion new projects, whether eventually successful or not". "Senior managers encourage innovators to bend rules and rigid procedures in order to keep promising ideas on track" was changed to, "Innovators are encouraged to bend rules and rigid procedures in order to keep promising ideas on track". And "The term "risk taker" is considered a positive attribute for people in my work area" was changed to, "Our managers consider the term "risk taker" a positive attribute". One time availability construct item was changed from "My job is structured so that I have very little time to think about wider organizational problems" to "I have very little free time to think about wider organizational problems". Lastly, one organizational boundary item was changed to reflect the new construct role clarity. The item was changed from "There are many written rules and procedures that exist for doing my major tasks" to "Written rules and procedures clearly define my major tasks". The definitions and items as presented to the respondents are presented in Appendix B.

Phase II—Empirical Evaluation of the Constructs and Items

Content Validity Assessment I

There is varying guidance regarding what percentage of agreement is required for content validity; Hinkin (1998) recommends as high as 75% whereas, Davis (2006) used 50% as a cutoff. For this study, an agreement index of 70% was initially used which allowed the retention of 22 of the 51 items. Two additional items were retained on this assessment which marginally failed the 70% cutoff score (68%) but seemed to reflect their intended construct for a total of 24 items. Since the assessment was to be used in conjunction with another content validity assessment from this study and two other content validity assessments from Davis (2006), the lower (70%) agreement index was justified. The results of this content validity exercise are presented in Table 2. Retained items were categorized as expected by participants. In particular, the item, "Individuals with successful innovative projects receive additional reward and compensation for their ideas and efforts beyond the standard reward system," which was intended by Hornsby et al (2002) to measure management support, was classified as a rewards and reinforcement item as indicated by Davis (2006) results.

Unlike Davis (2006), all of the items were presented to the participants in each of the tests. This way, no single test eliminated an item, but the combination of tests allowed a more insightful decision as to which items to retain. When reading the table below, The intended categorical assignment from Davis(2006) and Hornsby et al (2002) is underlined. The highest assignment for each item is indicated by **bold**. If the number is **bold and underscored**, then it is the largest number of the population classified the item

in accordance with its a priori category. Items marked by an asterisk (*) did not meet the validity criteria.

Table 2 - Content Validity Assessment I

Item No	Item	MS	WD	RR	TA	RC	None
Management Support: Refers to the extent to which managers encourage innovative and entrepreneurial behaviors by financially supporting projects knowing that some of the projects may fail.							
1*	The "doers" are allowed to make decisions on projects without going through elaborate justification and approval processes.	16	**67**			13	
3	Money is often available to get new project ideas off the ground.	**98**					
5	There are several options within the organization for individuals to get financial support for their innovative projects and ideas.	**73**	12				
12	Upper management is aware and very receptive to my ideas and suggestions.	**72**	17				
15*	There is a considerable desire among people in the organization for generating new ideas without regard to crossing departmental or functional boundaries.	33	**40**			11	
16	Promotion usually follows the development of new and innovative ideas.	12		**86**			
17*	A worker with a good idea is often given free time to develop that idea.	14	23		**52**		
18*	Individual risk takers are encouraged to champion new projects, whether eventually successful or not.	**53**	26	10			
19*	Innovators are encouraged to bend rules and rigid procedures in order to keep promising ideas on track.	21	**53**				15
31*	My organization is quick to use improved work methods that are developed by workers.	**46**		17			31
35*	Our managers consider the term "risk taker" a positive attribute.	**37**	34	18			
36*	In my organization, developing one's own ideas is encouraged for the improvement of the organization.	34	**35**	12			12
38*	People are often encouraged to take calculated risks with new ideas around here.	**41**	28	19			
43	This organization supports many small and experimental projects realizing that some will undoubtedly fail.	**89**	11				
44*	My organization is quick to use improved work methods.	**41**		15			35
45*	People are encouraged to talk to workers in other departments of this organization.	13	37				**38**
50*	Many top managers have been known for their experience with the innovative process.	**33**		29			28
51*	Those employees who come up with innovative ideas on their own often receive management encouragement for their activities.	31		**59**			
Work Discretion/Autonomy: Refers to the extent to which managers have provided broad decision making latitude, delegated authority, and have relaxed oversight.							
21*	This organization provides the chance to do something that makes use of my abilities.	15	**28**			25	20
25	I feel that I am my own boss and do not have to double check all of my decisions.		**74**			18	
30	I have much autonomy on my job and am left on my own to do my own work.		**74**			20	
32*	Harsh criticism and punishment result from mistakes made on the job.	10		**54**			24
39	I have the freedom to decide what I do on my job	10	**70**			19	

Item No	Item	MS	WD	RR	TA	RC	None
40*	This organization provides freedom to use my own judgment.	20	**64**			12	
46*	This organization provides the chance to be creative and try my own methods of doing the job.	17	**67**			10	
47*	I seldom have to follow the same work methods or steps for doing my major tasks from day to day.		**62**			17	
49	I almost always get to decide what I do on my job		**69**			26	
Rewards / Reinforcement: Refers to the extent to which managers reinforce entrepreneurial and innovative behavior by explicitly linking performance and achievement to rewards.							
6*	My supervisor will increase my job responsibilities if I am performing well in my job.	11		**65**		14	
10	My supervisor will give me special recognition if my work performance is especially good.	10		**81**			
22*	My manager helps me get my work done by removing obstacles.	**57**	24				
33*	There is a lot of challenge in my job.		24			11	**56**
7	Individuals with successful innovative projects receive additional reward and compensation for their ideas and efforts beyond the standard reward system.	16		**74**			
41	The rewards I receive are dependent upon my work on the job.			**83**		12	
42	My manager would tell his boss if my work was outstanding.	24		**68**			
Time Availability: Refers to the extent to which personnel are able to pursue innovative efforts in support of short and long-term goals.							
9	I have just the right amount of time and work load to do everything well.				**77**	14	
11	I always seem to have plenty of time to get everything done.				**84**	14	
13	I feel that I am always working with time constraints on my job.				**68**		10
23	During the past three months, my work load was too heavy to spend time on developing new ideas.				**80**		
28	I have very little free time to think about wider organizational problems				**72**	11	10
34	My co-workers and I always find time for long-term problem solving.		10		**72**		
37*	It is basically my own responsibility to decide how my job gets done.		**67**			29	
Role Clarity: Refers to the extent to which personnel feel that their day-to-day role is clear, unambiguous and has defined outcomes; a portion of that work includes innovation.							
2	On my job I have no doubt of what is expected of me.					**93**	
4	I clearly know what level of work performance is expected from me in terms of amount, quality, and timeliness of output.					**85**	
8	There is little uncertainty in my job.					**93**	
26*	During the past year, my immediate supervisor discussed my work performance on which my job is evaluated.			30		**48**	13
27	My job description clearly specifies the standards of performance on which my job is evaluated.			12		**84**	
29*	In the past three months, I have always followed standard operating procedures or practices to do my major tasks.		37			**40**	17
48	Written rules and procedures clearly define my major tasks		17			**71**	10
14	I have clear, planned goals and objectives for my job					**91**	
20*	I am permitted to buck a rule or policy in order to carry out an assignment		**65**				13

Item No	Item	MS	WD	RR	TA	RC	None
24*	I have the authority to "try new ideas."	18	**65**			15	

Note. The Factors are labeled as follows: MS = Management Support, WD = Work Discretion, RR = Rewards / Reinforcement, TA = Time Availability, and OB = Organizational Boundaries.
*The intended categorical assignment from Davis(2006) and Hornsby et al (2002) is underlined. The highest assignment for each item is indicated by **bold**. If the number is **bold and underscored**, then it is the largest number of the population classified the item in accordance with its a priori category. Items marked by an asterisk (*) did not meet the validity criteria.*

Content Validity Assessment II

While no specific cut off value was recommended by Anderson and Gerbin to determine the sufficient level of agreement, they suggested that known measures were "high" scores when the mean $C_{sv,}$ (the proportion of respondents who categorized an item to its intended construct) was .90 and items were "moderate" when the mean C_{sv} was .70%. In general this standard was applied, with twenty-two of the 51 original items deemed useable and one additional item retained that fell below this standard. Table 3 shows the C_{sv} scores for the second content validity exercise. Four items that Hornsby et al (2002) had originally classified as organizational boundaries seemed to align with the role clarity construct. The work discretion items which had problems in the first content validity assessment were appropriately classified in the second analysis, with the exception of two marginally low scores (Csv = .70) for the items, "I feel that I am my own boss and do not have to double check all of my decisions" and "I almost always get to decide what I do on my job."

Because the two content validity assessments in this research effort were run in parallel not sequence, the elimination of an item in one assessment did not eliminate it in the other. This allowed a comparison of the two content validity assessments to narrow

in on what specific items should be retained. To determine what items would be retained as the instrument was administered in the field setting, the results of all the content adequacy tests done by this effort and by Davis (2006) were compared. Items that seemed to have a problem in more than two tests (either Davis or this study) were eliminated from the item set. A total of 25 items were retained from the original 51 items. The items represented an acceptable spread across the 5 constructs with at least 4 items per construct being retained (Management Support = 4, Work Discretion = 5, Rewards and Reinforcement = 4, Time Availability = 7, and Role Clarity = 5).

Table 3 - Content Validity Assessment II

Item No.	Item	Psa	Csv
Management Support: Refers to the extent to which managers encourage innovative and entrepreneurial behaviors by financially supporting projects knowing that some of the projects may fail.			
34*	The "doers" are allowed to make decisions on projects without going through elaborate justification and approval processes.	.25	-.50
1	Money is often available to get new project ideas off the ground.	**.80**	**.60**
22*	There are several options within the organization for individuals to get financial support for their innovative projects and ideas.	.65	.30
15	Upper management is aware and very receptive to my ideas and suggestions.	**1.00**	**1.00**
18*	There is a considerable desire among people in the organization for generating new ideas without regard to crossing departmental or functional boundaries.	.35	-.30
39	Promotion usually follows the development of new and innovative ideas.	**.95**	**.90**
47*	A worker with a good idea is often given free time to develop that idea.	.25	-.50
31*	Individual risk takers are encouraged to champion new projects, whether eventually successful or not.	.58	.16
13*	Innovators are encouraged to bend rules and rigid procedures in order to keep promising ideas on track.	.35	-.30
29*	My organization is quick to use improved work methods that are developed by workers.	.60	.20
20*	Our managers consider the term "risk taker" a positive attribute.	**.70**	.40
25*	In my organization, developing one's own ideas is encouraged for the improvement of the organization.	.45	-.10
45*	People are often encouraged to take calculated risks with new ideas around here.	.50	.00
33*	This organization supports many small and experimental projects realizing that some will undoubtedly fail.	**.75**	.50
5*	My organization is quick to use improved work methods.	**.68**	.37

Item No.	Item	Psa	Csv
37*	People are encouraged to talk to workers in other departments of this organization.	.30	-.40
27*	Many top managers have been known for their experience with the innovative process.	.**70**	.40
43*	Those employees who come up with innovative ideas on their own often receive management encouragement for their activities.	.25	-.50
Work Discretion/Autonomy: Refers to the extent to which managers have provided broad decision making latitude, delegated authority, and have relaxed oversight.			
2*	This organization provides the chance to do something that makes use of my abilities.	0.25	-0.50
8*	I feel that I am my own boss and do not have to double check all of my decisions.	.**75**	.50
36	I have much autonomy on my job and am left on my own to do my own work.	.05	-.**90**
6	Harsh criticism and punishment result from mistakes made on the job.	.**90**	.**80**
44	I have the freedom to decide what I do on my job	**1.00**	**1.00**
19	This organization provides freedom to use my own judgment.	**.95**	**.90**
12*	This organization provides the chance to be creative and try my own methods of doing the job.	.65	.30
24	I seldom have to follow the same work methods or steps for doing my major tasks from day to day.	**.95**	**.90**
16	I almost always get to decide what I do on my job	**.90**	**.80**
Rewards / Reinforcement: Refers to the extent to which managers reinforce entrepreneurial and innovative behavior by explicitly linking performance and achievement to rewards.			
32	My supervisor will increase my job responsibilities if I am performing well in my job.	**.75**	.50
38	My supervisor will give me special recognition if my work performance is especially good.	**.95**	**.90**
9*	My manager helps me get my work done by removing obstacles.	.00	**-1.00**
14*	There is a lot of challenge in my job.	.35	-.29
39	Individuals with successful innovative projects receive additional reward and compensation for their ideas and efforts beyond the standard reward system.	**.95**	**.90**
41	The rewards I receive are dependent upon my work on the job.	**1.00**	**1.00**
26*	My manager would tell his boss if my work was outstanding.	.55	.10
Time Availability: Refers to the extent to which personnel are able to pursue innovative efforts in support of short and long-term goals.			
3	I have just the right amount of time and work load to do everything well.	**1.00**	**1.00**
23	I always seem to have plenty of time to get everything done.	**.95**	**.90**
7	I feel that I am always working with time constraints on my job.	.**89**	**.79**
40	During the past three months, my work load was too heavy to spend time on developing new ideas.	**.95**	**.90**
35	I have very little free time to think about wider organizational problems	**.95**	**.90**
48	My co-workers and I always find time for long-term problem solving.	**.90**	**.80**
6	It is basically my own responsibility to decide how my job gets done.	**.90**	**.80**

Role Clarity: Refers to the extent to which personnel feel that their day-to-day role is clear, unambiguous and has defined outcomes; a portion of that work includes innovation.

Item No.	Item	Psa	Csv
4	On my job I have no doubt of what is expected of me.	**1.00**	**1.00**
42	I clearly know what level of work performance is expected from me in terms of amount, quality, and timeliness of output.	**.85**	**.70**
46	There is little uncertainty in my job.	**.95**	**.90**
30*	During the past year, my immediate supervisor discussed my work performance on which my job is evaluated.	.20	**-.60**
17	My job description clearly specifies the standards of performance on which my job is evaluated.	**.90**	**.80**
21*	In the past three months, I have always followed standard operating procedures or practices to do my major tasks.	.65	.30
10	Written rules and procedures clearly define my major tasks	**.95**	**.90**
50	I have clear, planned goals and objectives for my job	**.90**	**.80**
49*	I am permitted to buck a rule or policy in order to carry out an assignment	.00	**-1.00**
51*	I have the authority to "try new ideas."	.00	**-1.00**

Note. The items are grouped according to the categorical assignment from Davis(2006) and Hornsby et al (2002). Psa and Csv numbers greater than .75 are marked in bold. Items marked by an asterisk (*) did not meet the validity criteria. Underlined item numbers represent the 25 items retained for the field administration.

Phase III—Field Administration of the Instrument

As noted previously, the sample size (*N*=61) for this study is not ideal. Suggestions for adequate sample size for factor analysis range from a minimum of 50 observations with a 5:1 observation to variable ratio to much higher 20:1 ratio (Hair, Anderson, Tatham, Black, 1995, p. 373). Hinkin (1998) recommends a minimum of 150 observations, and the standard acceptable ratio of cases to variables is 10:1 (Nunnally, 1978, Hair et al, 1991). This study has 61 observations with 25 variables, a paltry 2.4:1 ratio.

Despite the small sample size, preliminary tests were performed to see whether the data were adequate for factor analysis. These tests included: (a) observation of the anti-image partial correlation (b) Bartlett's test of sphericity, and (c) Kaiser-Meyer-Olkin measure of sampling adequacy.

Table 4 presents the anti-image correlation values for the measure items. A review of this data shows the correlation values to be small, indicating it is appropriate for factor analysis. The Bartlett's test of sphericity value was significant ($\chi 2$ (153) =524.3, $p < .01$), however the measure of sampling adequacy (KMO = .72) can be interpreted as only "middling" on Hair's (1995) acceptability scale (p. 374) because it did not reach the desired value of .80 or above—still, it exceeded the minimum of .5.

Because the CEAI, upon which this variation is based, has been factor analyzed by multiple researchers (Hornsby et al., 2002, Adonisi, 2003, Davis, 2005) and found to consistently contain 5 dimensions, this measure was revised to support 5 factors.

Table 4 - Anti-Image Correlation

Item No.	Item	Q2	Q3	Q5	Q7	Q8	Q11	Q12	Q13	Q14
2.	This organization provides freedom to use my own judgment.	-								
3.	On my job I have no doubt of what is expected of me.	-.073	-							
5.	I have just the right amount of time and work load to do everything well.	-.284	.170	-						
7.	Money is often available to get new project ideas off the ground.	-.233	-.154	.077	-					
8.	It is basically my own responsibility to decide how my job gets done.	-.102	.195	.130	.105	-				
11.	I feel that I am always working with time constraints on my job.	.134	.093	-.024	-.048	.031	-			
12.	I almost always get to decide what I do on my job.	.164	-.014	-.062	-.101	-.136	-.086	-		
13.	There are several options within the organization for individuals to get financial support for their innovative projects and ideas.	-.079	.243	-.086	-.359	-.013	.200	-.209	-	
14.	I clearly know what level of work performance is expected from me in terms of amount, quality, and timeliness of output.	-.091	-.406	-.232	.174	-.196	-.349	-.149	-.275	-
15.	My supervisor will give me special recognition if my work performance is especially good.	.013	-.063	.128	-.249	-.065	-.080	-.005	.092	-.045
16.	I always seem to have plenty of time to get everything done.	.312	-.128	-.700	-.200	-.156	-.215	.213	.007	.177
17.	I have the freedom to decide what I do on my job.	-.295	-.115	.022	.083	-.459	.088	-.262	.092	.100
18.	This organization supports many small and experimental projects realizing that some will undoubtedly fail.	-.325	.069	.301	.059	.121	-.208	.036	-.281	.024
20.	The rewards I receive are dependent upon my work on the job.	-.068	-.053	-.243	.205	-.093	.000	-.070	-.073	.268
21.	I have very little free time to think about wider organizational problems.	-.464	-.245	.004	.211	-.030	-.189	-.294	-.088	.317
22.	I have clear, planned goals and objectives for my job	.134	-.222	.058	-.205	.015	.432	-.003	.174	-.564
23.	During the past three months, my work load was too heavy to spend time on developing new ideas.	.278	.064	-.119	-.064	-.007	.159	.137	.182	-.262
25.	My co-workers and I always find time for long-term problem solving.	-.129	.058	-.060	-.116	.049	-.102	-.008	-.123	.121

	Item	Q15	Q16	Q17	Q18	Q20	Q21	Q22	Q23	Q25
2.	This organization provides freedom to use my own judgment.									
3.	On my job I have no doubt of what is expected of me.									
5.	I have just the right amount of time and work load to do everything well.									
7.	Money is often available to get new project ideas off the ground.									
8.	It is basically my own responsibility to decide how my job gets done.									
11.	I feel that I am always working with time constraints on my job.									
12.	I almost always get to decide what I do on my job.									
13.	There are several options within the organization for individuals to get financial support for their innovative projects and ideas.									
14.	I clearly know what level of work performance is expected from me in terms of amount, quality, and timeliness of output.									
15.	My supervisor will give me special recognition if my work performance is especially good.	-								
16.	I always seem to have plenty of time to get everything done.	-.056	-							
17.	I have the freedom to decide what I do on my job.	-.332	-.047	-						
18.	This organization supports many small and experimental projects realizing that some will undoubtedly fail.	-.042	-.127	-.123	-					
20.	The rewards I receive are dependent upon my work on the job.	-.503	-.008	.157	-.081	-				
21.	I have very little free time to think about wider organizational problems.	.057	-.169	.080	.157	.061	-			
22.	I have clear, planned goals and objectives for my job	.098	-.095	.078	-.162	-.334	-.137	-		
23.	During the past three months, my work load was too heavy to spend time on developing new ideas.	-.270	.008	.168	-.194	.150	-.653	.212	-	
25.	My co-workers and I always find time for long-term problem solving.	.235	-.125	-.283	-.153	-.040	.224	-.211	-.472	-

Exploratory Factor Analysis

In accordance with the methods suggested by Conway and Huffcutt (2003), exploratory factor analysis was accomplished on the data set. The principal components factor analysis used an oblique rotation to obtain the final structure. When the 25 items were analyzed, as expected, five factors with eigenvalues greater than one emerged. Together these factors accounted for 63.3% of the observed variance. Seven items were cross-loaded or were deemed unsuitable, and were removed from the data set.

With the 18 remaining items, the factor structure was again analyzed. The emerging factor structure was more parsimonious and congruent with previous research. The five factors now accounted for 70.7% of the observed variance. The items, factor structure, and eigenvalues, and percent variance explained are presented in Table 5. The factors presented in the table are inline with the research of Hornsby et al (2002) and Davis (2006).

Table 5 – Principle Components Analysis Results

Item No.	Item	Original Construct	Intended Construct	MS	WD	RR	TA	OB
13.	There are several options within the organization for individuals to get financial support for their innovative projects and ideas.	MS	MS	.81				
7.	Money is often available to get new project ideas off the ground.	MS	MS	.70				
18.	This organization supports many small and experimental projects realizing that some will undoubtedly fail.	MS	MS	.68				
25.	My co-workers and I always find time for long-term problem solving.	TA	TA	.62			.50	
17.	I have the freedom to decide what I do on my job.	WD	WD		.81			
8.	It is basically my own responsibility to decide how my job gets done.	WD	WD		.79			
12.	I almost always get to decide what I do on my job.	WD	WD		.69			
2.	This organization provides freedom to use my own judgment.	WD	WD	.52	.58			
20.	The rewards I receive are dependent upon my work on the job.	RR	RR			.84		
15.	My supervisor will give me special recognition if my work performance is especially good.	RR	RR		.52	.62		
23.	During the past three months, my work load was too heavy to spend time on developing new ideas.	TA	TA				.83	
21.	I have very little free time to think about wider organizational problems.	TA*	TA				.78	
16.	I always seem to have plenty of time to get everything done.	TA	TA				.77	
5.	I have just the right amount of time and work load to do everything well.	TA	TA				.74	
11.	I feel that I am always working with time constraints on my job.	TA	TA				.63	
3.	On my job I have no doubt of what is expected of me.	OB	RC					.85
22.	I have clear, planned goals and objectives for my job	**	RC					.84
14.	I clearly know what level of work performance is expected from me in terms of amount, quality, and timeliness of output	OB	RC					.82
	Eigenvalue			1.81	2.47	1.09	5.91	1.34
	Percent Variance Explained			10.0	13.7	6.07	32.8	7.41
	Estimated Internal Consistency			.678	.800	.718	.843	.827

*Note: The factors are labeled as follows: MS = Management Support, WD = Work Discretion, RR = Rewards/Reinforcement, TA = Time Availability, and RC = Role Clarity. * Indicates item reworded by Davis (2005). ** Indicates item added by Cates.*

Four items loaded on Factor 1 named *management support*. Three of these items were originally designed to measure this construct by Hornsby et al. One item was designed and tested content valid as a time availability item. This same item however did cross-load on the time availability construct. The items seemed to represent the idea of financial and resource support as well as tolerance for failure. The measure of internal consistency for this construct was computed using Cronbach's coefficient alpha (α) with a result of .68. This was the lowest measure of reliability for all the constructs, perhaps owing to the inclusion of the item that was intended to measure time availability. Four items loaded on Factor 2 termed *work discretion.* All the items were concerned with autonomy, decision making freedom, and delegated authority. The reliability estimate for this construct was .80. Only two items loaded on the *rewards and reinforcement* factor. The sample size, as well as sample composition, probably contributed to the weak showing of items from this category. The sample was composed of uniformed government employees (n=16), government service employees (n=12), and civilian employees (n=22), all operating under different pay and reward systems although they were working together on the same project. The reliability of the construct was measured at .72. *Time availability* was reflected well with five items being retained in the factor analysis. All the items related to time and resources being available for innovative projects or concepts. The Cronbach's alpha score for this construct measured at .843. The last factor that emerged was the *role clarity* factor that was designed by Davis (2006) to replace Hornsby et al.'s *organizational boundaries* factor. Three items emerged to represent this construct. Two of the items were originally organizational boundary items,

the third was a role clarity item derived from House et al.'s measure of Role Clarity. The internal consistency of this measure was .827.

Convergent Validity Tests

Convergent validity was assessed by testing the relationships between the factors of the CEAI and other relevant dimensions. As expected, the CEAI was correlated significantly with all of the intended measures. The results of the convergent validity correlation analysis are presented in Table 6. .The most directly comparable measure was the Covin and Slevin (1999) entrepreneurial mindset 9-item measure. The correlation to this instrument was shown to be significantly correlated ($r=.415, p<.01$). The dimensions of the CEAI were also strongly correlated with Hult's (1998) measure of memory orientation scale ($r=.405$, $p<.01$) and was strongly negatively correlated to Watson et al.'s (1988) Negative Affect scale ($r = -.352$ $p < .01$).

Table 6 - CEAI correlation matrix

		CEAI	CE	LO	MO	PA	NA
CEAI	Pearson Correlation	-					
a=.735	Sig. (2-tailed)	-					
	N	-					
Entrepreneurial Mindset	Pearson Correlation	.415**	-				
a=.918	Sig. (2-tailed)	.001	-				
	N	60	-				
Learning Orientation	Pearson Correlation	.281*	.389**	-			
a=.678	Sig. (2-tailed)	.029	.002	-			
	N	61	60	-			
Memory Orientation	Pearson Correlation	.409**	.368**	.570**	-		
a=.897	Sig. (2-tailed)	.001	.004	.000	-		
	N	61	60	61	-		
Positive Affect	Pearson Correlation	.281*	.107	.376**	.471**	-	
a=.904	Sig. (2-tailed)	.030	.420	.003	.000	-	
	N	60	59	60	60	-	
Negative Affect	Pearson Correlation	-.352**	-.103	-.280*	-.444**	-.502**	-
a=.905	Sig. (2-tailed)	.006	.439	.030	.000	.000	-
	N	60	59	60	60	60	-

**Correlation is significant at the p < 0.01 level (2-tailed).

*Correlation is significant at the p < 0.05 level (2-tailed).

Descriptive Statistics

	Mean	Std. Deviation	N
CEAI	2.863388	0.515531	61
CE	3.549702	1.310426	60
LO	3.803279	0.67718	61
MO	2.877049	0.891655	61
PA	3.663333	0.736452	60
NA	1.800926	0.743679	60
TC	2.754098	0.570986	61
SC	3.348361	0.428852	61
IA	2.163934	0.830268	61

Summary

The intent of this research was to build upon the refinements suggested by Davis (2006) to Hornsby et al.'s (2002) CEAI. The refinements were an attempt to ensure the

constructs were correctly representing the items as written, and to ensure that the factor structure was in line with previous research.

The content validity testing of the items was conducted and used holistically with Davis (2006) research to decide upon a final parsimonious 25-item scale intended to capture the entrepreneurial climate construct. The factor analysis of the follow-on field study was successful, showing five factors did exist as predicted which accounted for 70% of the variance. The following chapter interprets the results of this chapter with its limitations, suggests revision of specific items, implications for practicioners and recommendations for future research.

IV. Discussion

This study was designed to revise Hornsby et al.'s (2002) Corporate Entrepreneurship Assessment Index instrument based on recommendations put forth by Davis (2006) by testing the measure in a pilot study. The study contributes to the body of knowledge by refining and redefining the theorized constructs that compose the entrepreneurial climate of an organization. The remainder of this chapter will be devoted to interpretation of the study's results, its limitations, and recommendations for future research.

Conclusions and Interpretation

For this study, an effort was made to revise the CEAI definitions originally presented by Kuratko et al (2005). All definitions were reworded (see Appendix A) to focus on the innovative aspect of the construct and provide more succinct wording. The concept of "tolerance of failure" was moved from the Work Discretion definition to the Management Support definition. This change was warranted based on Davis' (2006) content validity exercises as well as content validity exercises of this study. The most significant change was the renaming and redefining of the Organizational Boundaries construct to Role Clarity. This change appears to be an improvement, providing a more reliable construct that accounted for more of the variance over the original CEAI.

The revision of the CEAI presented favorably compares to Hornsby et al.'s original CEAI in content, construct definition, and reliability. Table 7 shows a comparison for significant statistical data from the factor analysis by Hornsby et al

(2002) of the original measure and the 25 revised items and constructs of the measure tested in this study. The revised and reworded items by this study and by Davis (2006) in general showed improvement over the original measure with the revision showing significant improvement in accounting for variance in the model and in the internal consistency of the *time availability* and *role clarity* constructs. It is worth noting that the model did regress more than would have been expected in the *management support* construct. Suggestions for improving that factor are addressed later in this chapter.

Table 7 - Comparison of Hornsby et al (2002) CEAI to revision

Dimension	Internal Consistency		Eigenvalue		Percent of Variance	
	Original	Revision	Original	Revision	Original	Revision
Management Support	0.89	0.68	10.68	5.91	22.2	32.8
Work Discretion	0.87	0.80	3.07	2.47	6.4	13.7
Rewards and Reinforcement	0.75	0.72	2.90	1.81	6	10.0
Time Availability	0.77	0.84	2.53	1.33	5.3	7.4
Org Boundries / Role Clarity*	0.64	.83*	1.59	1.09*	3.34	6.07*

*Note: "Original" is the data from Hornsby et al. (2002) for the CEAI. "Revision" is the data from the final 18-item measure of this study. *Indicates Role Clarity construct.*

In addition, the revised CEAI was compared to other known measures and findings indicated some initial levels of convergent validity. The CEAI and Covin and Slevin's (1989) Entrepreneurial Orientation measure were positively correlated, suggesting that these climate measures would likely be related to the desired outcome in a meaningful way. These findings were consistent with Wood's (2004) findings that

indicated strong relationships with Hornsby et al.'s original constructs and an abbreviated measure of corporate entrepreneurship. The results also suggest that the revised CEAI correlated well to Hult et al's (1998, 2000) measures of the organization's memory ($p<.01$) and learning orientation ($p<.05$). Again, these finding were consistent with others that have argued that that entrepreneurship is integral to organizational learning (Slater and Narver, 1995). Lastly, the revised CEAI was related to dispositions in expected ways as well. Presumably, those with specific traits would likely view a climate as more entrepreneurial than others. In this case, a relationship was expected between Watson et al.'s (1998) positive and negative affect where the findings supported these hypotheses. Watson and Clark (1997) argued that PA reflects differences in boldness and adventurousness, whereby "high scorers desire change and variety in their lives, and become bored or dissatisfied when [change] is absent" (p. 776). Entrepreneurial endeavors within an established corporate culture would require one to be bold, challenging the status quo and developing new innovative ideas.

Limitations

The field data collected presents as the most significant limitation for this study not only in size, but also in composition. The sample that completed the study was well below some of the recommendations for factor analysis (i.e., a 10:1 ratio of observations to variables has been suggested; Hair et al, 1996). In this study, the final observation to variable ratio this study was 3.33:1. With that said, statistical test of the data for factor analysis did show the data were suitable. Lending credence to the emergence of the 5-factor model is the fact that this study was conducted in the latter stages of this scale's

development. That is, this study followed another (Davis, 2006) where items that did not reflect the construct definitions were removed. Then, an exploratory factor analysis was conducted to further refine the measure. Taking the results from that study, the items were further scrutinized by two additional samples, leaving a set of items that had been evaluated by four different samples and factor analyzed by another. Thus, the sample size concerns may prevent one from drawing definitive conclusions; researchers and practitioners would still be encouraged to apply the scale in a field setting.

Another concern was the sample was not necessarily homogenous with regard to the participants' employer. The participants for this sample were members of a governmental "development team." The team members were composed people from different career specialties throughout the governmental organization as well as members from industry who were under contract with the government. Of those employed by the government, some were government civil servant employees and some were uniformed employees. This left a sample that was considering at least three different pay and reward systems and organizational climates as they completed the questionnaire. The method of administering the questionnaire should have helped mitigate this problem because members were instructed, at the beginning of the survey, to answer questions regarding their "organization", "employer" and "management" to be relative to the developmental team. But, these teams' management did not directly influence some members' pay and reward system (i.e., civilian and contract personnel). This made it difficult to measure the *rewards and reinforcement* element of the CEAI. Still, this factor emerged and had an estimate of internal consistency that was similar to the value reported

by Hornsby et al. (2002). A larger sample would still be recommended to ensure that the results would not differ as a consistent frame of reference is used by the participants.

Comparison to Davis (2006)

Since this work built upon Davis' (2006) work, a comparison of results is appropriate. Table 8 summarizes which items are common to both her final results and the resulting factor analysis from this research. Of the 21 items that remained after Davis completed her factor analysis, 17 passed the more rigorous content validity exercises of this effort to be included in the 25-item field instrument. After factor analyzing the field instrument, 14 of the remaining items were common to Davis' factor analysis results. The other 4 items were items that didn't pass the screening standards of Davis (2006) and were reworded or were completely new items added to reflect the role clarity construct.

Table 8 - Final items common to Davis (2006) factor analysis

	Item	Construct
13	There are several options within the organization for individuals to get financial support for their innovative projects and ideas.	Management Support
7	Money is often available to get new project ideas off the ground.	Management Support
18	This organization supports many small and experimental projects realizing that some will undoubtedly fail.	Management Support
17	I have the freedom to decide what I do on my job.	Work Discretion
8	It is basically my own responsibility to decide how my job gets done.	Work Discretion
12	I almost always get to decide what I do on my job.	Work Discretion
2	This organization provides freedom to use my own judgment.	Work Discretion
20	The rewards I receive are dependent upon my work on the job.	Rewards/Reinforcement
15	My supervisor will give me special recognition if my work performance is especially good.	Rewards/Reinforcement
25	My co-workers and I always find time for long-term problem solving.	Time Availability
23	During the past three months, my work load was too heavy to spend time on developing new ideas.	Time Availability
16	I always seem to have plenty of time to get everything done.	Time Availability
5	I have just the right amount of time and work load to do everything well.	Time Availability
14	I clearly know what level of work performance is expected from me in terms of amount, quality, and timeliness of output	Organization Boundaries Role Clarity

Recommendations

In sum, the revision of the CEAI as presented shows evidence of being a powerful indicator of an innovative and entrepreneurial climate. The key to strengthening this version of the measure will be application in a larger sample for further testing. The content validity of the questions has been fairly well established through the combination of testing by Davis (2006) and the testing of this effort.

Although the items removed in the factor analysis had tested well in the content validity exercises, several did appear to cross-load on other constructs. Table 9 is suggested rewording of removed items with the intent of making the items better reflect their intended construct.

Table 9 - Suggested CEAI item revisions

Item	Intended Construct	Revised Item	Rationale
Q1	MS	Management is aware and receptive to my ideas and suggestions.	In hierarchical organizations, the term 'upper management' may be too distant to effect organizational unit level climate.
Q4	RR	The pay and reward system of this organization supports additional pay or rewards for those individuals with successful innovative projects.	Original item crossloaded with Management Support. Item was reworded to target the Rewards construct.
Q10A	RR	Promotion (salary or status) usually follows the development of new and innovative ideas.	Promotion' by itself is not a term that may apply universally as a Reward, but could also indicate Management Support.
Q10B	MS	Leadership would strongly consider employees with innovative ideas for promotion.	Kept the concept of promotion but linked it with the Management Support construct.
Q6	WD	I feel that I am my own boss and do not have to double check all of my decisions with my supervisor.	Reworded to provide clarity.
Q24	WD	I often am bound by inflexible work methods or rules for doing my major day to day tasks.	Reworded to prevent cross-loading with Time Availability construct.

Summary

The CEAI is beneficial to both academics and practitioners. By having a parsimonious and brief measure the practitioner can easily sample and comprehend the level, or "intensity" of corporate entrepreneurship within an organization. The CEAI by defining the underlying constructs well also provides the practitioner with direction in identifying areas for improvement in the organization to ameliorate the transition to a more entrepreneurial climate. Creating a CEAI that works equally well in both the private and public sectors would be especially useful. This refinement to the CEAI has helped improve the measure in both ease of use and transportability across public and private organizations.

Appendix A

List of Variables & Items

Refined CEAI Items (Hornsby et al, 2002; Davis, 2006) [Five-point Likert-type scale ranging from "strongly agree" to "strongly disagree"]

Management Support – Measures perception of the extent to which to which managers encourage innovative and entrepreneurial behaviors by financially supporting projects knowing that some of the projects may fail [Five-point Likert-type scale ranging from "strongly agree" to "strongly disagree"].

Q7 MS Money is often available to get new project ideas off the ground.

Q1 MS Upper management is aware and very receptive to my ideas and suggestions.

Q13 MS There are several options within the organization for individuals to get financial support for their innovative projects and ideas.

Q18 MS This organization supports many small and experimental projects realizing that some will undoubtedly fail.

Role Clarity – Measures perception of the extent to which personnel feel that their day-to-day role is clear, unambiguous and has defined outcomes; a portion of that work includes innovation [Five-point Likert-type scale ranging from "strongly agree" to "strongly disagree"].

Q3 RC On my job I have no doubt of what is expected of me.

Q9 RC My job description clearly specifies the standards of performance on which my job is evaluated.

Q14 RC I clearly know what level of work performance is expected from me in terms of amount, quality, and timeliness of output.

Q19 RC There is little uncertainty in my job.

Q22 RC I have clear, planned goals and objectives for my job

Rewards / Reinforcement – Measures perception of the extent to which managers reinforce entrepreneurial and innovative behavior by explicitly linking performance and achievement to rewards [Five-point Likert-type scale ranging from "strongly agree" to "strongly disagree"].

Q4 RR Individuals with successful innovative projects receive additional reward and compensation for their ideas and efforts beyond the standard reward system.

Q10 RR Promotion usually follows the development of new and innovative ideas.

Q15 RR My supervisor will give me special recognition if my work performance is especially good.

Q20 RR The rewards I receive are dependent upon my work on the job.

Time Availability – Measures perception of the extent to which personnel are able to pursue innovative efforts in support of short and long-term goals [Five-point Likert-type scale ranging from "strongly agree" to "strongly disagree"].

Q5 TA I have just the right amount of time and work load to do everything well.

Q11 TA I feel that I am always working with time constraints on my job.

Q16 TA I always seem to have plenty of time to get everything done.

Q21 TA I have very little free time to think about wider organizational problems.

Q23 TA During the past three months, my work load was too heavy to spend time on developing new ideas.

Q25 TA My co-workers and I always find time for long-term problem solving.

Work Discretion/Autonomy – Measures perception of the extent to which managers have provided broad decision making latitude, delegated authority, and have relaxed oversight [Five-point Likert-type scale ranging from "strongly agree" to "strongly disagree"].

Q6 WD I feel that I am my own boss and do not have to double check all of my decisions.

Q8 TA It is basically my own responsibility to decide how my job gets done.

Q12 WD I almost always get to decide what I do on my job.

Q17 WD I have the freedom to decide what I do on my job.

Q2 WD This organization provides freedom to use my own judgment.

Q24 WD I seldom have to follow the same work methods or steps for doing my major tasks from day to day.

Strategic Posture/Entrepreneurial Orientation Scale (Covin and Slevin, 1989; Woods,2005) Measures the organization's reliance on innovation, proactive orientation, and risk-taking propensity. [Seven-point response scale with anchor statements].

Q26 In general, the top managers of my organization favor…

A strong emphasis on supporting tried and true services and/or business practices.	1 2 3 4 5 6 7	A strong emphasis on R&D, technological leadership, and

innovation.

Q27 How many new services and/or business practices has your organization developed in the past 5 years?

No new services and/or business practices.	1 2 3 4 5 6 7	Very many new services and/or business practices.

Q28 Changes…

In services and/or businesspractices have been mostly of a minor nature.	1 2 3 4 5 6 7	In services and/or business practices have usually been quite dramatic.

Q29 My Organization…

Typically responds to actions which other organizations initiate.	1 2 3 4 5 6 7	Typically initiates actions which other organizations then respond to.

Q30 My Organization…

Is very seldom the first organization to introduce new administrative techniques, operating technologies and business practices.	1 2 3 4 5 6 7	Is very often the first organization to introduce new admini9strative techniques, operating technologies and business practices.

Q31 My Organization…

Typically seeks to avoid change preferring a "live-and-let-live" posture.	1 2 3 4 5 6 7	Typically adopts a very aggressive, "undo-the-status-quo" posture.

Q32 In general, the top managers of my organization have…

A strong preference for low-risk projects (with normal and certain outcomes)	1 2 3 4 5 6 7	A strong preference for high-risk projects (with chances of very attractive outcomes).

Q33 In general, the top managers of my organization believe that…

It is best to explore options gradually via timid, incremental behavior.	1 2 3 4 5 6 7	Bold, wide-ranging acts are necessary to achieve the unit's objectives.

Q34 When confronted with decision-making situations involving uncertainty, my organizations

leadership…

Typically adopts a cautious "wait-and-see" posture in order to minimize the probability of making costly decisions	1 2 3 4 5 6 7	Typically adopts a bold, aggressive posture in order to maximize the probability of exploiting potential opportunities.

Organizational Learning (Hult, 1998; Hult et al, 2000). Measures the extent to which an organization is oriented toward learning. Two dimensions (learning Orientation and memory Orientation) are measured [Seven-point Likert-type scale ranging from "strongly agree" to "strongly disagree"].

Learning Orientation. Measures the extent to which an organizational unit stresses the value of organizational learning for the long-term benefits of the organization.

Q35 We agree that our ability to learn is the key to improvement.

Q36 The basic values of this organization include learning as a key to improvement.

Q37 Once we quit learning, we endanger our future.

Q38 The sense around here is that employee learning is an investment not an expense.

Memory Orientation. Measures the extent to which an organizational unit stresses communication and distribution of knowledge.

Q39 We have specific mechanisms for sharing lessons learned in our organization.

Q40 We audit unsuccessful organizational endeavors and communicate the lessons learned.

Q41 Organizational conversation keeps alive the lessons learned from history.

Q42 Formal routines exist to uncover the faulty assumptions about the organization.

Positive affect (Watson, Clark, & Tellegen, 1988). Measures the extent to which respondents are disposed to feel enthusiastic, active, and alert. High scores indicate higher levels of energy, full concentration, and pleasurable engagement.

Q68 Interested	Q83 Determined
Q79 Alert	Q84 Attentive
Q70 Excited	Q76 Enthusiastic

Q81 Inspired	Q86 Active
Q72 Strong	Q77 Proud

Negative affect (Watson et al., 1988). Measures the extent to which respondents are disposed to feel a variety of adverse mood states that include anger, contempt disgust, fear, and nervousness. High scores indicate general levels of distress.

Q78 Irritable	Q73 Guilty
Q69 Distressed	Q74 Scared
Q80 Ashamed	Q75 Hostile
Q71 Upset	Q85 Jittery
Q82 Nervous	Q87 Afraid

Work-Team Cohesion (Carless, De Paola, 2000) [Five-point Likert-type scale ranging from "strongly disagree" to "strongly agree"]

Task Cohesion – Measures a general orientation a group towards unified tasks or goals. [Five-point Likert-type scale ranging from "strongly disagree" to "strongly agree"].

Q43 Our team is united in trying to reach its goals for performance.

Q44 I'm unhappy with my team's level of commitment to the task.

Q45 Our team members have conflicting aspirations for the team's performance.

Q46 This team does not give me enough opportunities to improve my personal performance.

Social Cohesion – Measures a general orientation or motivation to develop and maintain social relationships within a group. [Five-point Likert-type scale ranging from "strongly disagree" to "strongly agree"].

Q47 Our team would like to spend time together outside of work hours.

Q48 Members of our team do not stick together outside of work hours.

Q49 Our team members rarely party together.

Q50 Members of our team would rather go out on their own than get together as a team.

Individual Attraction to the Group – Measures individual perception of attraction or

belongingness to a group. [Five-point Likert-type scale ranging from “strongly disagree” to “strongly agree”].

Q51 For me this team is one of the most important social groups to which I belong.

Q52 Some of my best friends are in this team.

Appendix B

Innovative Climate Survey

Purpose: Our research team is investigating the innovative climate of the Air Force.

Confidentiality: We would greatly appreciate your completing this survey. Your input is important for us to completely understand factors regarding organization innovation. ALL ANSWERS ARE STRICTLY CONFIDENTIAL. No one outside the research team will ever see your questionnaire. Findings will be reported for large groups in aggregate only. We ask for some demographic and unit information in order to interpret results more accurately, and in order to link responses for an entire unit. Reports summarizing trends in large groups may be published.

Contact information: If you have any questions or comments about the survey contact Major Michael S. Cates at the number, fax, mailing address, or e-mail address.

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INSTRUCTIONS

1. Base your answers on your own feelings and experiences
2. Read directions carefully and mark only one answer for each question
3. Please write clearly making dark marks (feel free to use a blue or black ink pen that does not soak through the paper)
4. Avoid stray marks and if you make corrections erase marks completely

MARKING EXAMPLES

Right ● Wrong ⊗ ⃠ ⊙

Section I
PERCEPTIONS OF THE ORGANIZATION

We would like to understand how you feel about the innovativeness of your organization and its leadership (consider your organization to be the Wing or Center where you work). The following questions will help us do that. For each statement, please fill in the circle for the number that indicates the extent to which you agree the statement is true.

① Strongly Disagree	② Disagree	③ Neither Agree nor Disagree	④ Agree	⑤ Strongly Agree

Upper management is aware and very receptive to my ideas and suggestions.	①	②	③	④	⑤
This organization provides freedom to use my own judgment.	①	②	③	④	⑤
On my job I have no doubt of what is expected of me.	①	②	③	④	⑤
Individuals with successful innovative projects receive additional reward and compensation for their ideas and efforts beyond the standard reward system.	①	②	③	④	⑤
I have just the right amount of time and work load to do everything well.	①	②	③	④	⑤
I feel that I am my own boss and do not have to double check all of my decisions.	①	②	③	④	⑤
Money is often available to get new project ideas off the ground	①	②	③	④	⑤
It is basically my own responsibility to decide how my job gets done.	①	②	③	④	⑤
My job description clearly specifies the standards of performance on which my job is evaluated.	①	②	③	④	⑤
Promotion usually follows the development of new and innovative ideas.	①	②	③	④	⑤
I feel that I am always working with time constraints on my job.	①	②	③	④	⑤
I almost always get to decide what I do on my job.	①	②	③	④	⑤
There are several options within the organization for individuals to get financial support for their innovative projects and ideas.	①	②	③	④	⑤
I clearly know what level of work performance is expected from me in terms of amount, quality, and timeliness of output.	①	②	③	④	⑤
My supervisor will give me special recognition if my work performance is especially good.	①	②	③	④	⑤
I always seem to have plenty of time to get everything done.	①	②	③	④	⑤
I have the freedom to decide what I do on my job.	①	②	③	④	⑤
This organization supports many small and experimental projects realizing that some will undoubtedly fail.	①	②	③	④	⑤
There is little uncertainty in my job.	①	②	③	④	⑤
The rewards I receive are dependent upon my work on the job.	①	②	③	④	⑤
I have very little free time to think about wider organizational problems.	①	②	③	④	⑤
I have clear, planned goals and objectives for my job	①	②	③	④	⑤
During the past three months, my work load was too heavy to spend time on developing new ideas.	①	②	③	④	⑤
I seldom have to follow the same work methods or steps for doing my major tasks from day to day.	①	②	③	④	⑤
My co-workers and I always find time for long-term problem solving.	①	②	③	④	⑤

Section II
ASSESSMENT OF THE ORGANIZATION

The following questions are similar to the set you have just completed regarding the innovativeness of your organization. There are two question sets in this section. The first are structured with a scale between two anchor point statements. For each statement, choose a point along the scale that you think would closest represent your organization. For the second set fill in the circle that represents the extent to which you agree with the statement.

Part I - For each statement, <u>choose a point along the scale that you think would closest represent your organization</u>.

26. *In general, the top managers of my organization favor…*								
A strong emphasis on supporting tried and true services and/or business practices.	①	②	③	④	⑤	⑥	⑦	A strong emphasis on R&D, technological leadership, and innovation.
27. *How many new services and/or business practices has your organization developed in the past 5 years?*								
No new services and/or business practices.	①	②	③	④	⑤	⑥	⑦	Very many new services and/or business practices.
28. *Changes…*								
In services and/or business practices have been mostly of a minor nature.	①	②	③	④	⑤	⑥	⑦	In services and/or business practices have usually been quite dramatic.
29. *My Organization…*								
Typically responds to actions which other organizations initiate.	①	②	③	④	⑤	⑥	⑦	Typically initiates actions which other organizations then respond to.
30. *My Organization…*								
Is very seldom the first organization to introduce new administrative techniques, operating technologies and business practices.	①	②	③	④	⑤	⑥	⑦	Is very often the first organization to introduce new admini9strative techniques, operating technologies and business practices.
31. *My Organization…*								
Typically seeks to avoid change preferring a "live-and-let-live" posture.	①	②	③	④	⑤	⑥	⑦	Typically adopts a very aggressive, "undo-the-status-quo" posture.
32. *In general, the top managers of my organization have…*								
A strong preference for low-risk projects (with normal and certain outcomes)	①	②	③	④	⑤	⑥	⑦	A strong preference for high-risk projects (with chances of very attractive outcomes).
33. *In general, the top managers of my organization believe that…*								
It is best to explore options gradually via timid, incremental behavior.	①	②	③	④	⑤	⑥	⑦	Bold, wide-ranging acts are necessary to achieve the unit's objectives.
34. *When confronted with decision-making situations involving uncertainty, my organizations leadership…*								
Typically adopts a cautious "wait-and-see" posture in order to minimize the probability of making costly decisions	①	②	③	④	⑤	⑥	⑦	Typically adopts a bold, aggressive posture in order to maximize the probability of exploiting potential opportunities.

Part II - Fill in the circle that represents the extent to which you agree with the statement.

① **Strongly Disagree**	② **Disagree**	③ **Somewhat Disagree**	④ **Neither Agree nor Disagree**	⑤ **Somewhat Agree**	⑥ **Agree**	⑦ **Strongly Agree**

35. We agree that our ability to learn is the key to improvement.	①	②	③	④	⑤	⑥	⑦
36. The basic values of this organization include learning as a key to improvement.	①	②	③	④	⑤	⑥	⑦
37. Once we quit learning, we endanger our future.	①	②	③	④	⑤	⑥	⑦
38. The sense around here is that employee learning is an investment not an expense.	①	②	③	④	⑤	⑥	⑦
39. We have specific mechanisms for sharing lessons learned in our organization.	①	②	③	④	⑤	⑥	⑦
40. We audit unsuccessful organizational endeavors and communicate the lessons learned.	①	②	③	④	⑤	⑥	⑦
41. Organizational conversation keeps alive the lessons learned from history.	①	②	③	④	⑤	⑥	⑦
42. Formal routines exist to uncover the faulty assumptions about the organization.	①	②	③	④	⑤	⑥	⑦

Section III
PERCEPTIONS OF THE TEAM

We would like to understand how you feel about the team you work on. Consider your Team to be the functional IPT you are working with). The following questions will help us do that. For each statement, please fill in the circle for the number that indicates the extent to which you agree the statement is true. As will all sections, this section will remain completely anonymous.

① **Strongly Disagree**	② **Disagree**	③ **Neither Agree nor Disagree**	④ **Agree**	⑤ **Strongly Agree**

Our team is united in trying to reach its goals for performance.	①	②	③	④	⑤
I'm unhappy with my team's level of commitment to the task.	①	②	③	④	⑤
Our team members have conflicting aspirations for the team's performance.	①	②	③	④	⑤
This team does not give me enough opportunities to improve my personal performance.	①	②	③	④	⑤
Our team would like to spend time together outside of work hours.	①	②	③	④	⑤
Members of our team do not stick together outside of work hours.	①	②	③	④	⑤
Our team members rarely party together.	①	②	③	④	⑤
Members of our team would rather go out on their own than get together as a team.	①	②	③	④	⑤
For me this team is one of the most important social groups to which I belong.	①	②	③	④	⑤
Some of my best friends are in this team.	①	②	③	④	⑤

Section IV
SELF-ASSESSMENT

This is the final section of the questionnaire. This part, as with the previous parts is <u>completely anonymous</u> and cannot be linked in any identifiable way to you. Below are a number of statements that may or may not apply to you. <u>Please indicate on the scale how much you agree or disagree with each statement.</u>

The following scale consists of a number of words that describe different feelings and emotions. Please read each item and then fill in the circle that best reflects the way you generally feel, that is, <u>how you feel on average.</u> Use the following scale to indicate your answers.

①	②	③	④	⑤
Very slightly Or not at all	**A little**	**Moderately**	**Quite a bit**	**Extremely**

53. Interested	①	②	③	④	⑤	63. Irritable	①	②	③	④	⑤
54. Distressed	①	②	③	④	⑤	64. Alert	①	②	③	④	⑤
55. Excited	①	②	③	④	⑤	65. Ashamed	①	②	③	④	⑤
56. Upset	①	②	③	④	⑤	66. Inspired	①	②	③	④	⑤
57. Strong	①	②	③	④	⑤	67. Nervous	①	②	③	④	⑤
58. Guilty	①	②	③	④	⑤	68. Determined	①	②	③	④	⑤
59. Scared	①	②	③	④	⑤	69. Attentive	①	②	③	④	⑤
60. Hostile	①	②	③	④	⑤	70. Jittery	①	②	③	④	⑤
61. Enthusiastic	①	②	③	④	⑤	71. Active	①	②	③	④	⑤
62. Proud	①	②	③	④	⑤	72. Afraid	①	②	③	④	⑤

Section V

This final section contains items regarding your personal characteristics. These items are very important for statistical purposes. Respond to each item by WRITING IN THE INFORMATION requested or CHECKING THE BOX ☑ that best describes you.

1. Describe your primary career field or profession (e.g., programmer, personnel specialist, etc.)? _____

2. Are you a supervisor? **Yes (How many people do you supervise? _____)**
No

3. How many levels of management separate you from your organization's leader (i.e., Wing Commander or Center Director)? ____

4. How long have you worked for this organization? _____ years _____ months

5. How long have you been in your current job? _____ years _____ months

7. What is your age? _____ years

8. What is your gender?

Male **Female**

PLEASE FEEL FREE TO MAKE ANY ADDITIONAL COMMENTS ABOUT THE ORGANIZATION OR THE SURVEY ON THE BACK PAGES

Thank you for your participation!

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Vita

Major Michael S. Cates completed his undergraduate studies at the University of Texas at Austin, Texas where he graduated with a Bachelor of Arts in Psychology in May 1992. He was commissioned into the United States Navy through the NROTC program in May 1992.

After completion of flight school in 1994, Major Cates was assigned to Helicopter Antisubmarine Squadron Light Four Two, Naval Station Mayport, Florida until 1999 where he flew the SH-60B Seahawk. His next assignment was as an undergraduate flight instructor in Traron Two Eight at Naval Air Station Corpus Christi, Texas, where he instructed in the T-34C Mentor. At the end of this assignment, Major Cates applied for and was granted an interservice transfer to the United State Air Force. He was commissioned as a Captain in April 2002.

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14. ABSTRACT

The study of corporate entrepreneurship has established itself as a valuable area of research for both public and private-sector organizations. The measurement instrument known as the Corporate Entrepreneurship Assessment Index (CEAI) has been designed to tap the climate-related organizational factors that represent and potentially encourage corporate entrepreneurship. This study is an attempt to refine the CEAI. The core constructs of the CEAI are redefined, the items are tested for content validity, the factor structure is analyzed, and the CEAI is correlated to other known measures to validate the CEAI. Through this testing, the CEAI was refined and found to be a useful measure for predicting an innovative, entrepreneurial environment.

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