

ARI Research Note 2004-05

**Promoting Realistic Self-Assessment as the Basis for
Effective Leader Self-Development**

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**United States Army Research Institute
for the Behavioral and Social Sciences**

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Promoting Realistic Self-Assessment as the Basis for Effective Leader Self-Development

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PROMOTING REALISTIC SELF-ASSESSMENT AS THE BASIS FOR EFFECTIVE LEADER SELF-DEVELOPMENT

Introduction

The U.S Army's leader development system relies on three modes of development: formal course instruction, operational assignments and developmental work experiences, and self-development. The most systematic of these modes is the school-based training, with schooling beginning typically prior to commissioning through Reserve Officer Training Corps, the U.S. Military Academy, and Officer Candidate School, and continuing through several established programs and schools throughout an officer's career. Leader development through experiences is grounded in a series of "typical" command and staff assignments that can occur at several key junctions of an officer's career. Leader self-development efforts are the least systematic and organized of these three modes of development. In a conceptual review of Army leader self development, Bryant (1994) noted:

Self-development based largely on self-education necessarily plays an inordinately important role in perfecting skills, maintaining competence, and promoting professional growth. Unfortunately, however, too much may be asked of self-development within the contemporary context. In this regard, the self-development pillar has become something of a residual category of professional education, a kind of "catch-all" mechanism, as it were. That which cannot be accommodated within the more formal educational mechanisms can be relegated to the informal mechanism. The self-education process, perhaps today is the object of unrealistic expectations. The Army recognizes that the professional has the responsibility and need to "continue to expand {his or her} knowledge base," and speaks of various means of accomplishing this. Included are such devices as correspondence courses, civilian education, and/or reading programs. In the absence of specificity, elaborate guidance and counsel, or purposive structure, the self-development pillar of the leadership program is probably not formidable enough to warrant a concerted strengthening and augmentation effort.

Bryant (1994) speaks to specific institutional issues regarding unrealistic demands on the Army leader self-development system and lack of any support program that targets individual attribute self-development. Compounding these issues are the kinds of self-biases and "self-distortions" that may hinder the effectiveness of even well designed and well-supported leader self-development programs. Various literatures on social cognition and the self are replete with references to biases and motives that contort how individuals perceive and evaluate themselves and their behavior (e.g., Bradley, 1978; Fiske & Taylor, 1991; Miller & Ross, 1975; Snyder, Stephan, & Rosenfield, 1978; Weary, 1980). Effective self-development begins with an accurate and realistic appraisal of one's own strengths and weaknesses. If such appraisals are distorted by self-defensive or self-enhancement biases, subsequent efforts are likely to be inconsequential or counterproductive.

These issues point to the need for development of (a) assessment tools that increase the U.S. Army's understanding of the enabling processes and individual attributes that foster effective leader self-development and (b) self-development support programs that can help Army leaders plan and maximize their own growth. The Small Business Technology Transfer (STTR) research effort will investigate and contrast several assessment strategies to measure leader attributes that contribute to realistic self-appraisal and self-insight. Our Phase I STTR effort described in this report focuses on the design of a leader self-development support program that also targets growth in certain social and emotional skills linked to leader effectiveness.

Purpose

The Phase I STTR research effort had several purposes. The first was to identify those cognitive and motivational processes that contribute to effective leader self development (enabling processes) and those processes, such as ego defensive and self-enhancement biases that interfere with effective self-learning (minimizing processes). Another purpose was to identify and develop assessment tools for attributes that promote realistic self-assessment and self-evaluation as a foundation of an effective leader self-development program. The third purpose was to design a leader self development support program that emphasized enabling processes, bypassed minimizing processes, and targeted (a) leader self-development skills, and (b) leader adaptability skills. These purposes were driven by a need to improve the self-development mode of leader development in the U.S. Army.

Objectives

Within the overall objectives of developing leader self-development assessment tools and a self-development support program, the Phase I STTR effort focused on the following specific tasks:

1. Define and investigate attributes that promote effective self development; define and investigate attributes that result in heightened tendencies for self-enhancement biases.
2. Investigate different tools and techniques for the assessment of these attributes; develop sample conditional reasoning and biodata items for selected attributes.
3. Investigate techniques and training interventions for facilitating realistic self-assessment and minimizing self-perceptual biases and distortions.
4. Design a prototype of an insight-induction program for leader self-development.
5. Establish potential sites for a Phase II effort.

The remainder of this report describes in detail the tasks completed during the STTR Phase I effort and presents (a) the prototypes of the proposed assessment tools, and (b) the designed training program of instruction.

Task 1: Identification of Attributes that Promote Effective Leader Self-development

Leader Self-development

Self-development is a process in which the learner has responsibility for establishing the conditions, content, context, and pace of training (Boyce, 2002; Manz & Manz, 1991; Noe, 1999; Piskurich, 1993). Goldstein and Ford (2002) defined an instructional systems model that specified effective training as containing a needs assessment, development of instructional objectives, selection and design of instructional programs, development of learning criteria, and evaluation of learning gains. The needs assessment centers on identification of task requirements, analysis of a self-developer's knowledge, skills, and abilities, and the deficiencies in the latter that need to be addressed for effective tasks accomplishment. This analysis leads to the specification of instructional objectives. Instructional design concerns the plan of learning, the delivery systems, feedback mechanisms, methods of evaluation. Evaluation follows from criteria established from the instructional objectives. In most training modes, these processes occur mostly independently of the targeted learner – they are completed prior to the learner's entry into the program. In self-development, learners must engage these processes on their own.

These ideas suggest that the individual engaged in *effective* self-development:

- Conducts a self needs assessment.
- Defines the attributes to be targeted in training.
- Establishes the learning goals and objectives.
- Identifies learning resources.
- Develops learning strategies and exercises.
- Defines the pace and time frame of learning.
- Establishes the criteria for evaluating growth.
- Evaluates gains, and makes adjustments.

Self-development is also grounded in principles of adult learning. In most educational and instructional systems, the conceptual focus has traditionally been on instructor-directed child learning (called pedagogy). Such learning treats the learner as relatively passive and having little direct experience in the knowledge domain being conveyed in education (Knowles, 1990; Noe, 1999). Andragogy (Knowles, 1990) defines adult learning as a system in which learners are more active in proactively shaping the learning experience, and bring a repertoire of experiences that help define the context and interpretation of the knowledge domain. Knowles (see also Noe, 1999, p. 87) argues that adult learners (a) need to know the rationale for learning, (b) need to be self-directed, (c) bring experience into the learning process, (d) take a problem-centered approach to learning, and (e) are motivated by growth needs, as well as extrinsic rewards. These characteristics of adult learning are similar to several qualities of self-development; they support the benefits of a structured self-development system for enhancing leader knowledge and skill acquisition.

The focus of the self-development program proposed in the STTR Phase I effort was on growth in leadership knowledge and skill. Leadership represents a complex performance domain reflecting a number of central processes and performance requirements (Zaccaro, 2001; Zaccaro

& Klimoski, 2001). These processes and requirements are grounded in a broad set of leader attributes (Zaccaro, Kemp, Bader, 2004). When applied to leadership, self-development refers to “the total of all deliberate activities that an individual undertakes in order to gain and retain a specific leadership, knowledge, skill, or ability (Boyce, 2002, p. 8). Accordingly, when engaged in self-development, the effective leader-learner engages in these processes throughout the learning episode.

Leader Self-regulation

Successful self-development is grounded in the effective use of self-regulation processes (Bandura, 1991; Markus & Wurf, 1987; Murphy, 2002). Self-regulation refers to a process of establishing performance goals, and planning and monitoring their accomplishment (Murphy, 2002). Several subprocesses define self-regulation. The first, a self-evaluation process, reflects an appraisal of one’s thoughts, behaviors, capabilities, needs, wants, and desires. This self-analysis yields a perception of how discrepant the perceived “actual self” is from the “possible self” (Markus & Nurius, 1986; Higgins, 1987, 1989). The actual self refers to how an individual defines and evaluates self in the present; possible self actually refers to several distinct future-oriented self-schemas, including an ideal self (what an individual would like to be), an “ought” self (what an individual should think he or she should be), and a feared self (what an individual is afraid of becoming) (Fisk & Taylor, 1991; Markus & Nurius, 1986; Higgins, 1987, 1989).

The existence of a significant perceived self-discrepancy motivates in turn an analysis of one’s capability to reduce perceived discrepancies (e.g., between actual and ideal self), or one’s “self efficacy” (Bandura, 1986, 1991). Bandura defines self-efficacy as “judgments of capabilities to organize and execute courses of action required to attain designated types of performance” (1986, p. 391). Such judgments or beliefs become important because they influence how self-developers will allocate attentional and other cognitive resources to actions directed toward change and self-discrepancy reduction (Kanfer & Ackerman, 1989). The allocation of cognitive resources organizes and energizes goal setting processes and the formulation of strategies and plans to accomplish these goals (Markus, Cross, & Wurf, 1990). Goal setting and strategy formulation becomes the basis for the final self-regulation subprocesses, which include goal strategy implementation, monitoring whether the discrepancy between actual and ideal self is changing, and adjustments to plans and actions if self-discrepancies are not changing or even worsening (Bandura, 1986, 1991; Carver & Scheier, 1998; Markus, et al., 1990).

Murphy (2002; see also Ashford & Tsui, 1991) recently applied these concepts to leader self-regulation. She argues that leaders have a prototype of the leader role (i.e., what are the requisite leadership actions, performance responsibilities, and corresponding capabilities and competencies) that can be construed as the “ideal leader-self.” This prototype in turn becomes the basis for the leader’s self-assessment of his or her capabilities to perform leader role requirements under certain situational challenges. The recruitment and deployment of possible selves, according to Murphy, motivates and organizes action and the initiation of self-management strategies. The result is effective leadership performance. We suggest that leader self-development activities may be motivated in part by a high-perceived discrepancy between the ideal leader-self and the actual leader-self.

These ideas suggest the leader self-regulation process, as a precursor to leader self-development, would be composed of several cognitive processes. These include:

- Specification of one's ideal leader-self.
- Assessment of one's actual leader-self.
- Perceived discrepancy between one's ideal and actual leader-self.
- Perceived capability to reduce this discrepancy.
- Monitoring after strategy implementation to identify any improvement in discrepancy between ideal and actual leader-self.

In sum, then, for leader self-development to be successful, it needs to be grounded in two related processes. The first is an accurate appraisal of the working self within the leader role. Here, the officer needs to be able to identify personal strengths and weaknesses, and understand the influence of both in his or her conduct of leadership. Thus, the leader self-appraisal would focus on such questions as, "*where am I strong, and how does that strength affect my performance*", as well as "*where am I weak, and how do these weaknesses deter me or interfere with my fulfilling the requirements of my job as a leader.*" The answers to questions such as these provide the frameworks for self-developers to establish developmental or learning goals.

The second set of processes concern the effective use of self-regulation mechanisms to set these goals, and to construct developmental action plans to meet them. The literature review conducted as part of the STTR Phase I effort resulted in the identification of the following leader self-regulation processes:

- Self-appraisal: This process includes the following subprocesses:
 - + Assessment of one's own leader role requirements and the nature of effective leadership.
 - + Specification of one's ideal leader-self within the context of current and anticipated leader roles.
 - + Assessment of one's actual leader-self.
 - + Perceived discrepancy between one's ideal and actual leader-self.
 - + Perceived capability to reduce this discrepancy.
 - + Monitoring and perceiving changes in discrepancies between ideal and actual leader-self.
- Setting goals that reduce the discrepancy between ideal and actual leader-selves.
- Developing self-learning plans.
- Identifying and utilization of self-learning and content-oriented (e.g., adaptive decision-making) resources.
- Effectively using coaches, mentors, and learning partners.
- Gaining self-insight from increasing self-learning activities.
- Monitoring goal progress.
- Correcting self-learning activities that are not resulting in goal progress.
- Evaluating training performance.
- Accomplishing and evaluating transfer of self-learning to current and anticipated leadership roles and activities.

The proposed self-development training program contains modules that define and describe these processes to the self-developer. It also provides practice exercises, with feedback, to facilitate growth in the skills that enable these processes. Finally, it contains organizing tools that help the self-developer engage these processes in other self-learning initiatives.

Self-Appraisal Biases

Leader self-appraisal within the process of self-development may be influenced and distorted by a number of biases identified in the social cognitive literature. These biases reflect a tendency to inflate one's strengths, minimize one's weaknesses, and attribute failure or negative events to situational (rather than dispositional or self causes). Simply, people tend to emphasize their positive qualities, describing themselves in positive and optimistic terms (Greenwald, 1980, 1988; Taylor & Brown, 1988). Fisk & Taylor (1991, p. 213) cited several such biases that would mitigate accurate self-appraisals. They suggest that self-perceivers who employ such biases are more apt to:

- Attend to more readily, process more efficiently, and recall more easily positive self information, and not attend to, process, or recall negative information;
- Regard negative self qualities as inconsequential;
- Demonstrate poorer recall for failure information than success information;
- Recall prior task performance as more positive than it actually was;
- Perceive one's poor abilities as common, but one's strengths as distinctive;
- Perceive as less important the tasks one is not proficient at, but regard tasks on which they are proficient as more important;
- Attribute success to one's own abilities and efforts, but failure to situational factors;
- Judge positive attributes to be more descriptive and negative attributes less descriptive of themselves than the average person;

These self-enhancement biases can interfere significantly with the formation of accurate self-appraisals that are necessary for effective self-development. For example, if leaders attend to, process, and recall positive self information more readily than negative information, or fail to recall negative performance information, then they cannot create a realistic appraisal of their developmental needs (that is, they perceived a smaller discrepancy between actual leader-self and ideal leader-self than actually exists); indeed, such biases would result in perceived diminished need for self-development and therefore less motivation or inclination to participate in such programs. If leaders recall negative self-information or failed performances, but regard them as inconsequential or unimportant, such perceptions or judgments will also hinder participation in self-development programs. Thus, Army self-development programs need to address the influences of such self-biases if they are to be successful.

The proposed training program will contain modules that define these biases and illustrate how they can distort self-appraisals. The feedback mechanisms that are built into the automated program are also designed to mitigate the instigation of self-enhancement biases.

Finally, certain personal attributes foster effective self-development and accurate self-appraisal. The proposed program begins with an assessment of these attributes — in turn these assessments serve as the basis for targeted training and feedback in subsequent training modules.

A major product of the STTR Phase I effort was a review of the literature on self-learning, and the identification of personal attributes that foster effective self-appraisals, self-regulation, and self-development (see also Boyce, 2002). Many of the attributes that are likely to predict accurate self-assessment are likely to be distorted when measured with traditional techniques. Nevertheless, we describe briefly the attributes themselves, leaving our description of proposed assessment strategies to Section B.3.

Individuals with a *learning goal orientation* have a stable desire to build task competence (Farr, Hofmann, & Ringenbach, 1993). Inherent in this desire is the recognition that one's competence is less than perfect. Individuals with a learning goal orientation are, therefore, uninjured by and unafraid of information suggesting that they are lacking in certain respects. In other words, the minimizing processes that impede the progress of others do not hamper such individuals.

Individuals who are high in *self-monitoring* tend to engage actively in cognition about their own behavior and its influence on the environment, particularly the social environment. This regular activity, by virtue of the information that it provides, allows high self-monitors to more accurately assess their own strengths and weaknesses.

Finally, individuals who are high in *emotional maturity* have a self-concept and self-regard that are not easily shaken (Bass, 1990). As a result, the accuracy of their self-assessment is unlikely to be compromised by the sorts of defense mechanisms that affect the self-assessment of others.

It should also be noted that these attributes relevant for accurate self-assessment are all related to the higher order notion of *core self-evaluation*, which has been shown to relate to outcomes such as job satisfaction and performance (Judge & Bono, 2001).

To summarize, successful self-development depends on accurate self-assessment, but self-assessment tends to be compromised for the very people who are most in need of self-development. Nevertheless, it is possible to identify attributes that are relevant for self-assessment.

Attributes of the Successful Self-developer

There are many factors that may contribute to an individual's potential success in a self-development training program (Boyce, 2002). We have divided these factors into three categories: dispositions and attitudes, experience and knowledge, and skills and abilities.

Dispositions and Attitudes. There are several stable dispositions and attitudes that may be predictive of an individual's propensity to self-develop in the workplace and their subsequent

success in such a program. Some of these dispositions and attitudes are related to learning styles, some to motivation, some to dedication, and still others are related to individual's attitudes toward their organization. Our purpose here was to be inclusive. Thus, many of these attributes are conceptually similar to one another. Nevertheless, each can be expected to explain a unique portion of the variance in self-development.

A person who is high in *adaptability* tends to embrace change and to acknowledge and work with differences among people, problems, and situations. People high in adaptability seek out new ways of performing tasks and new opportunities for retooling for job or workplace changes (Pulakos, Arad, Donovan, and Plamondon, 2000). Indeed, people high in adaptability would characterize such possibilities as opportunities rather than burdens. It should be noted that the construct referenced here is dispositional adaptability. This is as opposed to the adaptability outcome variable referenced later in the report.

Locus of control describes the degree to which individuals perceive events to be internally or externally controlled (Rotter, 1990). Because individuals with an internal locus of control feel they have more control over outcomes, they may exert more effort to achieve certain outcomes than those with an external locus of control (Baron, 1995). Also, those individuals with an internal locus of control will have more positive attitudes toward training opportunities and will remain motivated throughout the training (Noe, 1986; Stone, Gueutal, & McIntosh, 1984). These research findings suggest that an internal locus of control may be predictive of successful self-development.

As was mentioned previously, individuals who have a *learning goal orientation* are described as having an internal desire to build task competence (Farr, Hofmann, & Ringenbach, 1993). That is, these individuals are interested in learning new skills and gaining useful experiences. Individuals with learning goal orientation have been shown to exert more effort and to exhibit greater engagement in self-regulated learning (Fisher & Ford, 1998; Covington, 2000). Also, individuals who are learning goal oriented have been shown to be more likely to voluntarily engage in career planning activities (Birdi, Allan, & Warr, 1997). The propensities to engage in self-regulated learning and career planning activities suggest that learning goal orientation may work in a variety of ways to predict successful self-development.

Individuals who are high on *need for achievement* persistently strive to reach goals and are undeterred by setbacks (James, 1998; Phillips, Hollenbeck, & Illgen, 1996). These individuals also tend to seek out challenging tasks and to willingly take on responsibility (McClelland, 1975). These characteristics indicate that need for achievement may be predictive of individuals who are successful self-developers. Furthermore, research has indicated that need for achievement is not structurally related to the constructs of goal orientation and locus of control; this suggests that need for achievement could make a unique contribution in predicting successful self-development (Phillips & Gully, 1997).

A person who is high in *Conscientiousness* displays strong self-discipline and work reliability, persevering through difficult tasks (McCrae & Costa, 1987). Conscientiousness has been linked to job performance (Barrick & Mount, 1991) and to motivation to learn in a training program (Colquitt & Simmering, 1998). Motivation, self-discipline, and perseverance are

important components of successful self-development; therefore, conscientiousness may be a predictor of successful self-development.

An individual who is high on *emotional maturity* is likely to be aware of their strengths and weaknesses and is unlikely to deny categorically their weaknesses or to play up strengths. Similarly, these individuals are more likely to be willing to work toward self-development and success instead of imagining that success already exists (Bass, 1990). This suggests that emotional maturity may be predictive of successful self-development. While there does appear to be evidence that older age groups have greater emotional maturity, the evidence does not distinguish true longitudinal increase in individuals from cohort effects, as the evidence to date is cross-sectional in nature (Lawton, Kleban, Rajagopal, & Dean 1992).

Organizational commitment describes an individual's identification with the organization and the degree to which an individual chooses to become involved in the organization. Organizational commitment also encompasses an individual's willingness to exert effort on behalf of the organization and one's desire to remain a part of the organization (Allen & Meyer, 1990). These two characteristics suggest that organizational commitment may be predictive of an individual's decision to engage in self-development and also the effort they exert in order to be successful in that self-development. More generally, research has indicated that organizational commitment is related to motivation to learn and positive reactions to training in the workplace. Organizational commitment is not stable over time.

Job involvement describes the extent to which an individual psychologically identifies with work and the importance of work to a person's self-image (Brown, 1996). Research has demonstrated a positive relationship between job involvement and motivation to learn (Noe & Schmitt, 1986). Furthermore, individuals who have a high level of job involvement are more likely to be motivated to learn job-related tasks that will increase their job performance and subsequently lead to greater feelings of self-worth (Mathieu, Martineau, & Tannenbaum, 1993).

Career motivation describes an employee's willingness to overcome career obstacles and to adapt to changing work situations (London, 1993). Research has indicated that individuals with high levels of career motivation are more likely to participate in developmental activities at work (Noe & Wilk, 1993). Furthermore, since individuals who are high on career motivation feel a need and have the capability to adapt to changing work situations, these individuals may be more likely to engage in new types of training, i.e., self-development.

Perceived organizational support (POS) describes the global feelings employees have about the degree to which the organization values them and cares about their well being (Eisenberger, Huntington, Hutchinson, & Sowa, 1986). Research has indicated that when an employee perceives the organization to be more supportive he/she is more likely to engage in developmental activities (Maurer & Tarulli, 1994). Individuals who perceive higher levels of organizational support may view the opportunity to participate in new self-development activities more positively and may even be more successful.

Experience and Knowledge. In addition, to stable dispositions and work-related attitudes, certain types of knowledge and experiences can influence the degree to which self-development

attempts are successful. Past experiences, specifically developmental work experiences, can predict the level at which an individual will benefit from leader self-development (McCauley, Eastman, & Ohlott, 1995). Content knowledge, in the form of factual and process information, can increase the effectiveness and ease of learning (Goldstein & Ford, 2002).

Developmental work experience refers to professional experiences that have led to noticeable increases in work-related competencies. Such experiences can come in many forms including job transitions (novel situations), task changes, project initiation, unforeseen problems, increases in responsibility, and non-authority relationships (no assigned leader; McCauley, Eastman, & Ohlott, 1995).

The degree to which individuals have had developmental work experiences in the past will help determine whether or not they will learn from future developmental experiences (McCauley, Ruderman, Ohlott, Morrow, 1994). The quantity and quality of developmental work experiences an individual has can predict the likelihood that they will benefit from self-development programs (McCauley, Eastman, & Ohlott, 1995).

Knowledge refers to information organized in a manner that, if applied correctly, leads to strong performance at some task or behavior. In addition to being influenced by relevant experience, learning can be accomplished more efficiently when individuals have some degree of knowledge in the area being developed. This prior knowledge forms a framework on which training can build. It is easier to build onto, or assimilate, existing knowledge structures than to create new ones. Thus, having some knowledge in the area being developed will increase the benefits of self-development (Kraiger, Salas, & Cannon-Bowers, 1995).

Declarative knowledge refers to the ability to state or declare facts or concepts. In self-development, learning outcomes can include intellectual skills and cognitive strategies. Both of these outcomes are reliant on existing declarative knowledge in the content domain in question (i.e., leadership; Anderson, 1996). *Procedural knowledge* refers to the ability to apply declarative knowledge appropriately to perform a task. To learn a new task, an individual must have the requisite procedural knowledge in addition to the factual knowledge to which it applied. The specific type of procedural knowledge needed will depend on the skills or behavior change goals of leader self-development (McCloy, Campbell, & Cudeck, 1994).

Knowledge also contributes indirectly to leader self-development. Individuals who perceive that they have the prerequisite knowledge to succeed at self-development will have higher self-efficacy and motivation. As self-efficacy and motivation levels increase, learning from self-development will also increase (Gully, Payne, Koles, Whiteman, 2002).

Skills and Abilities. Research has identified several skills and abilities that are related to successful training and leader self-development. There are skills and abilities that appear to be relevant to all training situations, including self-development training (e.g. needs analysis, goal setting, and cognitive ability). In the context of self-development training in particular, certain aspects of self-regulation are believed to play a particularly important role (e.g. self-monitoring, and feedback seeking).

Research has indicated that one important factor in self-development is *needs analysis*, both at a personal level (i.e., identification of strengths and weaknesses, within the individual) (Mott, 1998) and at the organizational level (i.e., an assessment of the organization's strategic and tactical goals) (Confessore & Kops, 1998). Accurate needs analysis allows the individual to set appropriate self-learning goals that are congruent with the organization's needs. In a self-development context, the individual with the ability to accurately assess their own strengths and weaknesses has the ability to tailor their training to those aspects where they consider their need (and that of the organization) to be the greatest.

Research has consistently shown that as a general proposition, realistic and proper *goal setting* will lead to better performance (Locke & Latham, 1990). Proper goal setting may be defined as stating the goal with sufficient precision (Hughes, Ginnet, & Curphy 1998), and at an appropriate level of difficulty (Locke & Latham 2002). Precision, or specificity, of the goal allows one to focus both cognitively and behaviorally on goal relevant activity and leads to more efficient use of task-relevant knowledge in reaching the goal (Locke & Latham, 2002).

Process identification is a skill by which an individual assesses those learning resources available to them, specifies relevant learning activities, and establishes criteria for considering their training a success. Individuals who are better able to perform process identification are more likely to self-develop as a result of the use of all available resources. Such self-development resources are virtually unlimited in nature, and so, an individual who is able to identify them more easily may have greater success. (Brockett & Hiemstra, 1991).

Progress evaluation in this sense refers not simply to self-performance evaluation in the context of the training, but the individual's affective reaction to the training, and the learning effectiveness of the training as well (Pedler, Burgoyne, Boydell, 1986). It is a measure of one's perception of learning progress and the affective reaction to that judgment, as well as a utility judgment as to the relevance and value of the training activities and processes. Here again, such self-evaluation allows the individual in a self-development context to focus the training on their specific needs.

Cognitive ability has repeatedly been shown to have an impact on training performance. (Schmidt & Hunter, 1998). Cognitive ability plays an important role in virtually all types of performance with any cognitive elements; it is likely that cognitive ability would play a significant role in any self-development training program. There is evidence that, at least as of adulthood, cognitive ability remains fairly stable throughout the individual's lifespan, declining only in certain sub-categories in the elderly years. (Neisser, Boodoo, Bouchard, Boykin, Brody, Ceci, Halpern, Loehlin, Perloff, Sternberg, & Urbina, 1996).

Self-monitoring processes are believed to impact training success through meta-cognitive processes. Meta-cognition, or the ability to think about thinking (i.e. self-monitoring of one's cognitive processes) has been found to have some positive relationship to learning success (Ford, Smith, Weissbein, Gully, & Salas, 1998). This positive relationship is hypothesized to occur because such meta-cognitions allow individuals to assess cognitive learning problem areas and adjust the learning process accordingly, as a form of accurate progress evaluation. While it is

clear that meta-cognitive processes can be taught to some degree with success (Koch, 2001) the stability of such processes within individuals is unclear.

To summarize, the attributes that are expected to predict successful self-development were grouped into three categories: dispositions/attitudes, knowledge/experiences, and skills/abilities. Descriptions and justifications of these attributes were offered. The next step will be to collapse conceptually similar constructs into relatively homogenous and parsimonious clusters that can be measured with a feasible set of assessments.

Leader Attributes Relevant for Adaptability

The proposed training program fosters leader self-development skills while also targeting those attributes that contribute to effective leader adaptability. The development of self-development skills occurs best within a learning context that can provide a focus for the guided practice of such skills. The proposed effort targets leader adaptability skills because of the growing importance of such skills in the future operating environment of the Army. Prior research by members of the project team focused on the identification of attributes that contribute to effective leader adaptation. In the STTR Phase I effort, this research was reviewed, and specific attributes were selected for targeting within the proposed self-development support program.

These attributes follow from a consideration of key leadership processes that promote leader effectiveness in dynamic operating environments. For example, Pulakos, Arad, Donovan, and Plamondon (2000) specified the following eight dimensions of adaptive performance.

1. Handling emergencies or crisis situations.
2. Handling work stress.
3. Solving problems creatively.
4. Dealing with uncertain and unpredictable work situations.
5. Learning work tasks, technologies, and procedures.
6. Demonstrating interpersonal adaptability.
7. Demonstrating cultural adaptability.
8. Demonstrating physically oriented adaptability.

These dimensions reflected various meanings of adaptive performance in a variety of organizational situations. However, the behavioral dimensions that are denoted do not necessarily reflect leadership-specific responses – they generalize to any worker in a highly dynamic environment. Further, they represent work *behaviors*, rather than cognitive processes or skills. Hence, they do not include problem-solving processes that would form the basis or springboard of adaptive responses.

Banks, Zaccaro, and Bader (in preparation) defined adaptability as *a functional change in response to altered environmental contingencies*. Thus, adaptive leadership occurs in response to, or in anticipation of changing environmental forces, where changes are of sufficient

magnitude to decrease the alignment of the leader's unit or organization within its operating environment.

Banks, et al. (in preparation) describe six adaptive leadership processes. The first process refers to *monitoring environmental contingencies and organizational performance strategies*. Adaptive leaders are constantly scanning their operating environment, noting actual and possible changes. A key decision at this point is whether an observed change requires further analysis and response. The second process refers to *diagnosing the nature and meaning of observed changes in an organization's environment*. This process includes situational awareness and sense making. Adaptive leaders who note critical changes that are likely to need responses will develop an understanding of the change events, discerning their meaning for unit or organizational action.

The third adaptive leadership processes refers to *strategy formulation*. Here, the leader may be simply selecting a different known strategic or tactical response from his or her repertoire. If the changed situation is sufficiently unfamiliar, the leader will need to devise more innovative or novel solutions. The fourth process is *managing the implementation of the problem solution*. The leader needs to rearrange the roles and activities of individuals within his or her reporting unit. Also, because subordinates and stakeholders may not have the same awareness of the need for adaptation as the leader, or may resist necessary changes, a fifth adaptive leadership process refers to *motivating change in others*.

The final adaptation process returns the leader to the activities of environmental scanning and making sense of environmental dynamics. This process, called *affirming the realignment of the organization and its environment*, refers to the leader's activities in making certain that implemented changes are helping his or her unit respond effectively to the altered operating environment.

These processes suggest a number of cognitive, social, and dispositional attributes that contribute to leader adaptability, and therefore ought to be the focus of a leader adaptability-training program. Several of the processes point to the importance of *critical thinking and adaptive problem solving skills*. Leader adaptation requires analysis of dynamic environmental conditions, generation and evaluation of potential solutions, and, after solution implementation, an evaluation of whether a leader's unit is better aligned with its changed environment. Thus, analysis and complex problem solving skills contribute to effective leadership in these circumstances.

Complementing the application of these skills, though, are skills in evaluating and regulating one's thinking processes as they are used in problem solving. These represent skills in *metacognition*, defined as an individual's knowledge of and control over their cognitions or the ability to think about thinking (Flavell, 1979). It refers to "an awareness and control of one's thinking processes and problem solving strategies" (Clark & Palm, 1990, p. 333). Cognition and metacognition can be distinguished in that "cognition is involved in doing, whereas metacognition is involved in choosing, and planning what to do and monitoring what is being done (Garofalo & Lester, 1985, p. 164).

Several theorists have emphasized the critical role of metacognitive abilities in complex problem solving (Brown, 1978; Davidson, Deuser, & Sternberg, 1994, Gagné, 1985). Metacognitive thinking reflects skills in applying four fundamental problem-solving processes: understanding a problem, deriving possible solutions, implementing best-fitting solutions and strategies, and evaluating the solution and its consequences. Metacognitive skills include not only the cognitive skills that underlie these processes (e.g., inductive and deductive reasoning, divergent and convergent thinking, oral and written comprehension, verbal reasoning), but also the awareness and regulation of how these cognitive skills are being applied within a problem space.

For example, the process of problem construction involves the use of cognitive reasoning skills to generate a particular understanding of a problem from available information. Metacognitive skills help the problem solver (a) evaluate the constructed problem in terms of the processes that resulted in its derivation (e.g., “Is this the best way to construct this problem”), (b) evaluate the fit of a problem construction to a particular problem space (e.g., Is this the best or most accurate way to think about this problem”), and (c) determine if the problem solver committed any critical thinking errors (e.g., “Did I bias my thinking in one direction”, “Did I prematurely rush to particular answer in my thinking”). The value of metacognitive skills is to promote flexibility in leader problem solving, particularly in how leaders use information and select appropriate solution strategies.

The adaptation processes described above indicate that adaptive leaders need to enable the individuals under their command to react positively to change, and adapt accordingly. This performance requirement suggests that leaders need skills unique to team management in dynamic and uncertain environments. These would include team-restructuring skills (versus team-building skills) that reflect competencies in recognizing how teams need to be reordered in order to be more responsive to environmental changes. Such skills would also include competencies in persuading others of the need for change, of motivating change efforts in others, and of creating information networks within and outside of the team that can alert the leader of changing environmental conditions.

Based on the analysis conducted in the STTR Phase I effort, the following leader adaptability attributes were selected to be targeted in the prototype self-development instruction program.

- Critical thinking in dynamic performance environments.
- Metacognitive thinking.
- Adaptive problem solving.
 - + Sense-making.
 - + Sense-giving.
 - + Solution generation and evaluation.
 - + Solution implementation.
 - + Progress monitoring.
- Team leadership in dynamic environments.

Task 2: Identification and Development of Assessment Tools for Measuring Self-Development Attributes

The attached matrix contains a list of the attributes identified as part of Task 1 of the project along with prototypical approaches to measurement. Several things are worth noting. First, although adequate measures exist for some of the attributes, measures would need to be developed for others. Second, some of the attributes, particularly the dispositions, are conceptually similar. These overlapping constructs were retained in an effort to be inclusive. It could easily become apparent at a later stage that there is little to be gained by concerning ourselves with this entire list. Third, several of the dispositions are to be measured via conditional reasoning (CR).

Traditional Self-report Assessment

The measurement of dispositional variables has long been limited by the assumption that such measurement is necessarily subjective (cf. Guilford, 1954). The most common form of measurement for these sorts of variables is self-report. People are asked to respond to relatively straightforward questions about themselves and how they are likely to behave in certain situations. So, for example, a measure of dispositional adaptability might include items such as,

- a. I view novel situations as opportunities to learn new skills
- Or
- b. I often see value in “thinking outside the box”

Respondents are then asked to rate the degree to which they agree with this statement as it applies to themselves.

The problem with such items is obvious: It is very simple to determine what the “correct” answer is. This is true of most, if not all, self-report measures of dispositional variables. If such questions are asked in an employment setting, it is not difficult to guess which response option is the one that the organization wants to hear. And indeed, research has shown that people can (e.g., Hough, Eaton, Dunnette, Kamp, & McCloy, 1990) and do (Anderson, Warner, & Spector, 1984) distort their scores on such measures, particularly among respondents who have a personal stake in decisions that will be based on their scores (Michaelis & Eysenck, 1971; Douglas, McDaniel, & Snell, 1996). Although some authors have claimed that such distortion makes no difference in terms of the decisions that are likely to be based on such scores (e.g., Ones, Viswesvaran, & Reiss, 1996), most agree that such distortion severely compromises the construct validity of such measures (e.g., James, McIntyre, Glisson, Green, Patton, Mitchell, & Williams, 2000; Zickar, Rosse, Levin, & Hulin, 1997).

The most compelling evidence that the response distortion problems associated with self-report measures of dispositional variables are serious may be their lack of criterion-related validity. Although most managers, I/O Psychologists, etc. agree that dispositional variables are very important to the performance of most jobs, average uncorrected validity values for behavioral criteria are smaller than .15 (Barrick & Mount, 1991; Schmitt, Gooding, Noe &

Kirsch, 1984), and incremental validity values are often close to zero (e.g., Cortina, Goldstein, Payne, Davison, & Gilliland, 2000).

The solution to the response distortion problem has typically been to include measures designed to identify those respondents who are “faking good”. Examples of these measures are the Balanced Inventory of Socially Desirable Responding (Paulhus, 1984), the Unlikely Virtues scale (Hough, 1998), and the Validity Scale (Hough et al., 1990), all of which are similar to the Lie scales that have been incorporated into personality inventories like the MMPI. People who endorse items such as

- a. I never try to cover up my mistakes (Paulhus, 1984)
- Or
- b. I have never dropped litter on the street (Paulhus, 1984)

are flagged as trying to appear more virtuous than they actually are.

This sort of solution to the problem of response distortion on dispositional measures has two serious problems. First, even if one grants that scales such as these capture *intentional distortion*, it is unclear whether or not they capture *unintentional distortion*, also known as *self-deception*. Paulhus (1984) attempted to create a separate scale for self-deception, but it is so highly correlated with his intentional distortion scale that it is difficult to conclude that it is measuring a different construct (Barrick & Mount, 1996; McFarland & Ryan, under review).

Second, at best, these and other forms of faking measurement (e.g., appropriateness indices) only inform the researcher that there is likely to be a discrepancy between the respondent’s observed and true scores, when what is needed is *the true score itself*.

Self-report is the predominant approach to measurement for all dispositional variables including adaptability. The reasons for our reliance on self-report are that self-report measures are relatively easy to develop, easy to administer and score, and are face valid. They are also appropriate for some purposes and will be used in a STTR Phase II effort to measure variables such as epistemic beliefs and job involvement. Unfortunately, the problems associated with them are particularly complex, and the solutions that have been offered (e.g., administering faking scales) are rather simple.

Conditional Reasoning

James and his colleagues (James, 1998; James et al., 2000) have developed an alternative format to the traditional self-report. This format is called “conditional reasoning” and is based on the notion that perceptions of reasonableness are conditional upon one’s dispositions. Because people tend to (a) view as rational any reasoning that supports their motives, and (b) discount reasoning that supports motives inconsistent with their own, their judgment in ambiguous reasoning situations inclines them toward options that best reflect their motives (James et al., 2000).

James and his colleagues have developed measures of achievement motivation and aggressiveness comprised of items that appear to measure inductive reasoning, but that instead measure the disposition of interest. The construct that mediates the relationship between dispositions and responses to these faux reasoning items is the *justification mechanism*. James argues that human beings attempt to justify their own leanings and proclivities whenever possible and to such an extent that they will perceive as reasonable statements that are consistent with those leanings and proclivities. Conditional reasoning items are designed to elicit these justification mechanisms, thereby drawing out the respondent's true dispositions.

Tables 1 and 2 describe justification mechanisms for adaptability as a dispositional quality. Table 1 has examples of justification mechanisms for high adaptability. Examples of justification mechanisms for people low in adaptability are contained in Table 2.

Table 1. Justification mechanisms for a high adaptability person

<p>1. Inclination for Dynamic Ideas: Frames the use of unconventional ideas as crucial to successful problem solving. Sees other people with differing viewpoints as essential contributors within a group. Tends to consider people who “think out of the box” as the real ground breakers in society. Prefers problem situations where the answer is not readily apparent and several discrepant ideas must be considered or even integrated to produce the best solution.</p>
<p>2. Openness in Social Values: Attributes different ways of behaving as a good thing and frames this as “the individual having a mind of their own.” Tends to view others who are highly concerned with following a particular set of norms of etiquette as stuffy, uptight individuals. Is comfortable around other people who “do their own thing” and aren't afraid of whether others view their behavior as inappropriate or wrong. Most comfortable in situations where people are free to just be themselves regardless of what others think.</p>

Table 2. Justification mechanisms for a low adaptability person.

<p>1. Inclination for Static Ideas: Frames the use of unconventional ideas as misguided, wasteful, and potentially dangerous. Sees individuals who have ideas that are incompatible or even just different from their own, as ignorant and just plain wrong. Discounts the value of using novel, untested theories or ideas to solve problems. Considers other people who retain individualistic, unconventional ideas out of touch from current state of affairs.</p>
<p>2. Rigidity in Social Values: Feels there are obvious, clear-cut norms for behaving regardless of the situation. Sees other people who modify their behavior according to “local custom” as uncouth or odd. Most uncomfortable around people who fail to abide by the rules to which he/she is used.</p>

Conditional reasoning items could then be written that elicit these justification mechanisms. For example,

The Soviet gymnasts did particularly well in the 1968 summer Olympics. Although expectations for them had always been high owing to the talent on their teams, this was the first time that the Soviets had met those expectations.

When asked by reporters about the reasons for the teams' success, their new coach, who had a reputation for developing novel instructional techniques, said that he had not changed their training and preparation regimens at all. Nevertheless, unlike previous international gymnastics competitions, the 1968 Olympics showed Soviet teams that were rock solid while other favorites such as the French and Americans faltered.

This history of events suggests that

- (a) New training and preparation techniques gave the Soviets an advantage over their opponents.
- (b) The Soviets found the weather in Mexico City to be agreeable.
- (c) Although the Soviets trained and prepared in the same way as they always had, their execution was simply better.
- (d) The building in which the events were held was unusually loud for such events.

Note that two of the response options have nothing to do with the premises contained in the scenario. Two others, a and c, flow approximately equally well from the premises. Because the respondent is led to believe that this is an item measuring inductive reasoning, he/she is under the impression that there is a single correct answer. The way that the respondent frames situations such as the one described in the scenario is expected to lead the person to view as reasonable the response option that is consistent with his/her own motives. If the person is inclined towards dynamic ideas, then response option a will seem more "reasonable". If the person is inclined towards static ideas and views novel ideas with skepticism, then response option c will have much to recommend it.

There are several advantages of the conditional reasoning approach. First, the biases that actually distort self-reports become the very object of measurement in conditional reasoning. In other words, the sources of the ubiquitous problems with self-report measurement become the target of conditional reasoning-based measurement. Second, conditional reasoning based measures of aggressiveness and achievement motivation predict a variety of criteria much better than do self-report based measures, and do so over and above measures of cognitive ability. While aggression was not identified as a variable of interest, much of the foundational work on conditional reasoning was done in the context of it. The relative predictability of conditional reasoning measures should generalize to many of the self-development dispositions.

The third, and perhaps most important, advantage of the conditional reasoning approach is this: the conditional reasoning approach *forces the test developer to acquire a profound understanding of the cognitions that underlie the disposition in question*. This advantage cannot be overstated. Traditional self-report approaches stem from the behaviorist tradition in which individual differences are not only measured through behavior, but are actually *defined* by behavior. In other words, a person is said to be conscientious, extraverted, etc. if that person exhibits certain behaviors. While it may be the case that certain behaviors are associated with certain individual attributes, such descriptions tell us little about the cognitive processes that lead to those behaviors. The development of conditional reasoning based items requires the identification of justification mechanisms, and it is these justification-based frames, schema, etc.

that drive responses to the items. Such justification mechanisms can come only from a profound understanding of the ways that people at various points on the continuum of the construct of interest view the world.

There are also at least two disadvantages to a conditional reasoning based approach. First, although cognitive ability is only infrequently correlated with conditional reasoning based measures, the items can be difficult and must be tailored to the reading level of the respondent. Second, and perhaps more importantly, the items are very difficult to generate. James and his colleagues have offered several guidelines for generating such items. First, they must be based on justification mechanisms, which are themselves difficult to generate. Second, they must involve a context that is somewhat evocative. Third, they must include response options that represent different parts of the spectrum of possible values on the construct of interest *but that are equally valid given the premises*. Fourth, they must be actual reasoning items as opposed to social judgment items. These last two requirements can be very difficult to meet.

Because this assessment tool is purportedly resistant to self-distortion biases, it can be a very useful tool in self-development programs that rely on accurate self-appraisal. Conditional reasoning items can also be used to identify an individual's motivation to engage in self-development efforts. For example Table 3 contains the justification mechanism for two aspects of learning goal orientation, an attribute that contributes to such motivation. Immutability is believed to relate to low adaptability and diligence to high adaptability.

Table 3. Justification mechanisms for contrasting learning goal orientations.

1. Immutability Bias: Tendency to believe that success requires innate ability, that ability is fixed - whatever level of ability an individual has cannot be increased. Tendency to frame negative feedback as a negative evaluation of oneself, opportunities to demonstrate one's ability to others as crucial for demonstrating one's worth, and challenging tasks as personally threatening.
2. Positive Connotation of Diligence: Tendency to value initiative, taking action, and perseverance until meaningful change occurs. Tendency to value interaction with environment and individuals present in environment in order to enact change.

In STTR Phase II we will develop conditional reasoning based items for particular dispositional variables and explore the use of conditional reasoning assessment in self-development programs, contrasting its utility with more traditional measures, as well as with another assessment strategy, biodata assessment, that is also proposed as somewhat resistant to self-distortion biases.

Biodata Assessment

Biodata assessment is based on the premise that past behavior is an effective predictor of future behavior (Nickels, 1994; Owens, 1976). For example, Nickels argues that

Knowledge of previous experiences will allow some prediction of future behavior, given that the individual's prior learning history will make the occurrence of some forms of behavior more probable than others (Mumford & Owens, 1987). More

directly stated, biodata measures may predict performance across many aspects of behavior as well as they do because responses to biodata items may serve to capture previous manifestations of the constructs and mechanisms that ultimately predict relationships with criteria. (p. 2)

Biodata items ask respondents to indicate how they have typically responded in a series of situations likely to have occurred in their past. They may also ask respondents to give reports of past behavioral outcomes. The scales that reflect underlying constructs can be created through *empirical-keying procedures*, in which items are selected for scale inclusion based on their ability to differentiate individuals on some criteria, or through rational keying, in which items are developed a priori from construct definitions (Mumford & Owens, 1987, Owens, 1976). Research has shown biodata items used to assess temperament constructs may be somewhat resistant to self-distortions (e.g., Stokes, Mumford, & Owens, 1994). Also, several researchers have used biodata items to assess Army leadership (Connelly, et al., 2000; Kilcullen, 1993; Zaccaro et al., 1997).

All of these assessments (listed in Appendix A), along with any other assessments that emerge as targets of training, would be integrated with the POI. This would be done such that the strengths and weaknesses with regard to relevant leader attributes are identified and communicated initially to the trainee so that self-development efforts can be appropriately targeted.

Task 3: Investigation of Training Practices for Facilitating Realistic Self-assessment and Minimizing Self-perceptual Biases and Distortions

To review, the program will target two sets of skills. The first concerns self-regulatory skills that will help the self-developers construct a viable self-development curriculum. The second set of skills to be targeted includes critical thinking and problem solving skills that contribute to effective adaptive leadership. As noted earlier, the proposed program will provide instruction, practice, and feedback that focuses on the development of the following adaptive skills:

- Critical thinking in dynamic performance environments.
- Metacognitive thinking.
- Adaptive problem solving.
 - + Sense-making.
 - + Sense-giving.
 - + Solution generation and evaluation.
 - + Solution implementation.
 - + Progress monitoring.
- Team leadership in dynamic environments.

Before moving on to specifics of the POI however (under Task 4 below), various issues relating to attribute-treatment interactions must be discussed.

Attribute by Treatment Interaction

Here, we focused our attention on the implications of attribute-by-treatment interactions (ATIs) that might influence the effectiveness of the proposed self-development program. Such interactions, first described by Cronbach (1957), occur when a trainee attribute influences the subsequent utility and application of a particular training intervention or treatment. For example, research has shown that general cognitive ability can influence the effectiveness of programs that provide meaningful information regarding key concepts— such programs were more effective for low ability trainees (Cronbach & Snow, 1977). Snow and Lowman (1984) reported that high ability trainees benefit more from program having low structure and high complexity, while low ability trainees benefit from programs that have more structure and less complexity. Other researchers have reported that motivation to learn and goal orientation can influence trainee progress and success within a training program (Mathieu & Martineau, 1997; Noe, 1986).

We have considered how the attributes being measured early in the proposed training program may influence subsequent self-learning progress. An obvious example is that weak self-regulation skills will hamper self-learning. We also expect that motivation for learning, cognitive ability, and other individual variables will influence success of self-development.

While the discovery of consistent ATIs has remained elusive (Goldstein & Ford, 2002), cognitive ability has proven to be a durable predictor of the effectiveness of certain training or instructional design parameters. Highly structured, noncomplex instruction has been found to

increase the learning and motivation of low ability learners; such instruction, however, has had the opposite effect on high ability learners (Snow, 1986, 1989a, 1989b; Snow & Lohman, 1984). Snow (1989b) notes for example (p. 441), that

High structure appears to help less able learners but often seems to hurt more able learners, relative to less structure. It is noteworthy that students of high ability placed in a high structured condition, when interviewed, often gave evidence of both cognitive and conative problems; they say they experience cognitive interference or motivational turn-off trying to conform to a structured treatment that prevents them from learning in their own way.

In a highly structured instructional design, a high level of control is maintained over the type of learning activities offered, the pacing and sequencing of such activities, and how the learner is to respond to task requirements. The instructional material is decomposed into smaller units, offered in precise order, and made more concrete. In less structured programs the leader retains a greater degree of control over the content and nature of instructional activities, and the material to be learned is chunked in larger and more abstract units (Snow, 1989a).

Inherently, then, self-development may appear to be less structured, and therefore more palatable to those individuals with high levels of cognitive ability. Alternatively, one can argue that self-developers having low ability are more likely to benefit from the variety of self-regulation tools offered in the prototype instruction because it includes both high and low structure modes of self-development

Figure 1 contains a model of leader self-development that includes the self-regulatory and other skills to be targeted in the POI as well as the individual and situational variables that are likely to influence learning.

The model can be summarized as follows:

1. The instructional system has both direct and indirect influences on leader self-development. The direct influence stems from job relevant knowledge and skill acquisition. The indirect influence comes from its effect on metacognitive skills.
2. Both the direct and indirect effects of the instructional system are moderated by various motivational and cognitive variables.
3. The influence of the instructional system on the development of self-regulatory skills is also moderated by dispositional variables.
4. A variety of assessment strategies, including biodata, self-report, and conditional reasoning will be used to assess the variables included in this model

This model, based on the learning, training, leadership, assessment, and self-regulation literatures, guided the development of the POI described in the next section.

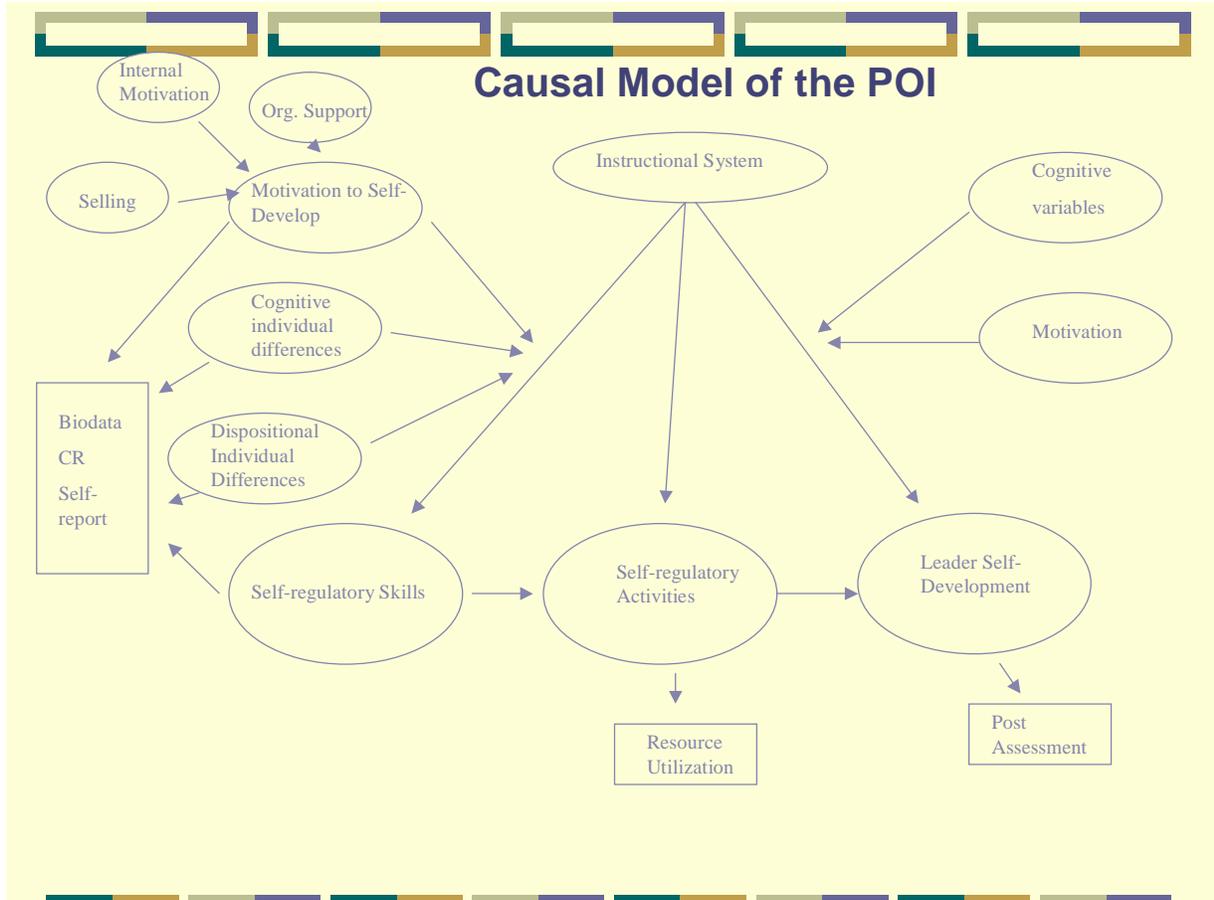


Figure 1. A causal model of the relationship between instructional system and leader self-development.

Task 4: Design of *Leader Adaptability Self-Training System (LASTS)*

This section presents the POI for the prototype self-development instruction program that we call the Leader Adaptability Self-Training System (LASTS). The section provides a brief description of its components.

LASTS: An Overview

The conceptual reviews pointed to the need for the construction of (a) self-development support programs that can help Army leaders plan and maximize their own growth, and (b) assessment tools that increase the U.S. Army's understanding of the enabling processes and individual attributes that foster effective leader self-development. The intent of the STTR Phase II effort will be to continue to develop training modules designed to teach leader self-development skills within a training program that also targets leader adaptability skills. The proposed training program will have the following features:

- Multiple types of assessment tools that provide self-developers with a basis for self-assessment and self-regulation.
- Modules that describe the nature of accurate self appraisal and the kinds of biases that can interfere with such appraisals.
- Modules that convey information about self-regulation processes that form the basis for effective self-development.
- Practice exercises and feedback to facilitate growth in self-appraisal and self-regulation skills.
- Modules that facilitate awareness and growth in leader attributes that contribute to leader adaptability.
- Mechanisms that tailor the delivery of self-development training to certain attributes of the self-developer.
- Computer-based and internet-compatible.

A unique feature of this training program is its inclusion of assessment tools that are constructed to measure leader self-development skills. The responses given by self-developers to these scales will then serve as the basis for (a) subsequent self-regulation processes constructed into the program, and (b) how the training program is to be structured in different ways for different self-developers. That is, the proposed program will contain a feature that tailors the delivery of instruction and feedback to certain attributes of the individual that may alter how he or she may respond to a prototypic leader training intervention. In essence, the program will be somewhat "customizable" to each self-developer. This feature, combined with training modules that promote growth in and use of self-regulation skills, answers the call for more structured self-development programs that guide learning in a format that is tailored to the individual's level of cognitive skill and learning disposition.

Components of LASTS

This section describes in greater detail the components of **LASTS**. Figure 2 contains a flowchart of the POI that will guide our description.

At the far left of the chart, we see that relevant officers, likely company or field grade, are introduced to the program. Those who choose to engage the program have a variety of skills and abilities assessed. This information is used to give feedback with respect to attribute profiles and to channel the officer into one of four paths. Although it is not feasible to tailor each program to each individual, it is possible to offer a small number of modifications of the program that cater to particular classes of profiles.

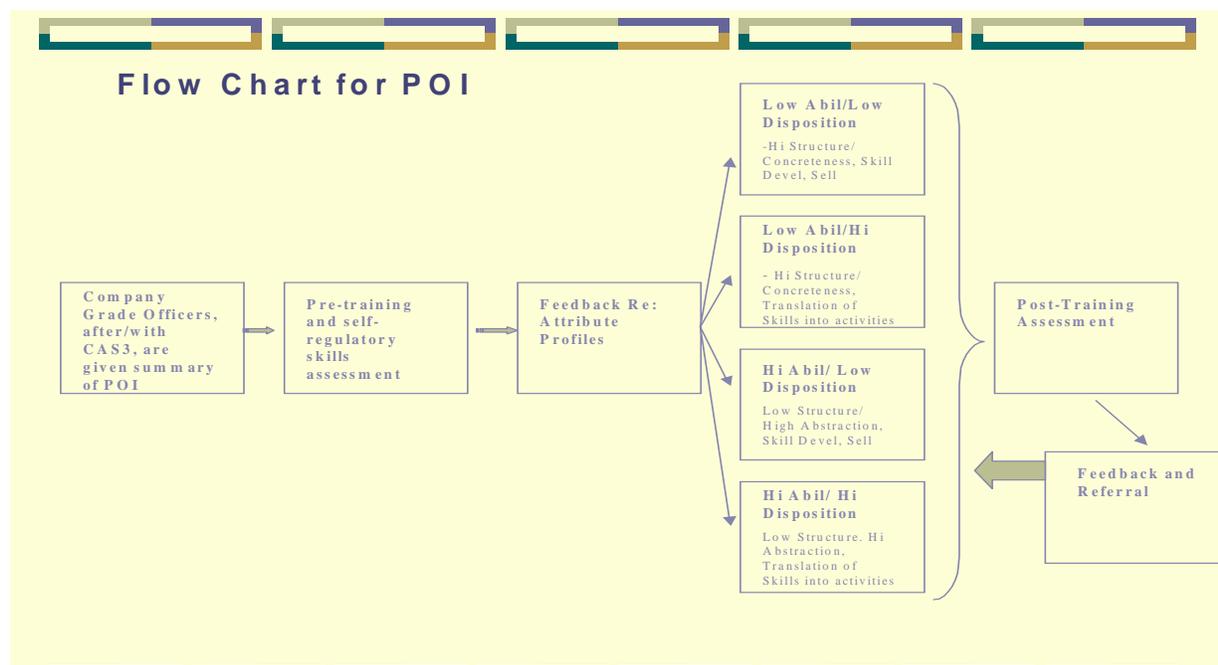


Figure 2. Flow chart for POI.

In STTR Phase II, we will design LASTS to offer different instructional activities and training parameters to different users, depending on their scores on the cognitive ability measures in the pre-training assessment battery. High ability self-learners will be provided with instructional strategies that promote a more abstract, less structured, and more independent learning approach. Low ability self-learners will be provided with strategies and activities that are more structured, concrete, and that step the individual explicitly through more learning steps. Such individuals will also be directed to more concrete resources that are more closely linked to the instructional material. Table 4 summarizes these differences.

Table 4. Instructional Design By Cognitive Ability Interaction

High Ability	Low Ability
Less emphasis on self-development structuring tools.	Greater emphasis on self-development structuring tools.
Construct presentation made more abstract.	Construct presentation made less abstract.
Instructional activities less sequenced.	Instructional activities highly sequenced.
Instructional material presented in larger chunks.	Instructional material presented in smaller and more discrete units.
The connections to other concepts and attributes are not made as explicitly in feedback.	The connections to other concepts and attributes are made very explicitly in feedback.
Resources that can be hyperlinked will have greater diversity and more tenuous connection to instructional material.	Resources that can be hyperlinked will be less diverse and more explicit connection to instructional material.

Most of the supportive work on ATIs has focused on cognitive ability. However, the effectiveness of self-development depends heavily upon a self-learner’s ability and willingness to make accurate appraisal of personal strengths and weaknesses. Such appraisals contribute to more appropriate goal setting and more effective use of self-regulation processes. The attributes of *emotional maturity*, *self-monitoring*, and *learning goal orientation* reflect various dimensions of an individual’s propensity to engage in honest, accurate, and effective self-appraisal, relatively free of biases and distortions. Accordingly, the instructional design of LASTS also varies according to composite scores of self-learners on the assessments of these attributes. Specifically, self-learners who show a propensity for distorted self-appraisals will be provided with a larger number of exercises and material in the self-appraisal module. They will also be prompted if their learning contracts do not appear consistent with the strengths and weaknesses identified in the attribute assessments. Feedback across exercises will be tailored in systematic ways to minimize perceptual distortions. Finally, the prompts for their self-reflection learning logs will elicit greater self-appraisals, and seek to draw greater connections to other similar self-events in the learner’s experience. Table 5 summarizes these differences.

Table 5. Instructional Design By Propensity for Accurate Self-Appraisal Interaction

High Propensity	Low Propensity
Lesser coverage of self-appraisal biases.	Greater coverage of self-appraisal biases and their consequences.
Fewer practice exercises in self-appraisal module.	More practice exercises in self-appraisal module.
Learning contracts receive normal review.	Learning contracts will be more closely scrutinized for conflicts with personal strengths and weaknesses, as indicated by attribute scores.
Feedback contains little corrective self-appraisal information.	Feedback to problem scenarios will contain corrective self-appraisal information.
Prompts in the self-reflection journal will not cue a greater focus on self-appraisal biases.	Prompts in the self-reflection journal will cue a greater focus on self-appraisal biases.

Thus, one program would be tailored to officers who are comparatively low in ability and who are disposed to steer away from the skills covered in the POI. This program would contain a high degree of structure commensurate with lower ability officers as well as a greater focus on skill development owing to what are likely to be lower levels of skills for officers who place less value on them. A second program, for lower ability officers who are likely to be more receptive to the program and its contents, contains a similarly high degree of structure but that places more emphasis on the translation of skills into activities that promote leader effectiveness. A third program, for higher ability officers who are not disposed to embrace the contents of the program, employs a higher level of abstraction but focuses on skill development and the importance of those skills. Finally, a fourth program contains a high degree of abstraction and focuses on translation of skills into behaviors.

Following training, there is a post-training assessment followed by feedback. The feedback delivery also contains referrals that facilitate further skill development.

Specifics of the POI

The POI for LASTS is shown in Table 6. This training program incorporates some of the best practices in training to build self-development and leader adaptability skills (e.g., Campbell & Kuncel, 2001; Ford, Kozlowski, Kraiger, Salas, & Teachout, 1997; Kraiger, 2002; Goldstein & Ford, 2002; Noe, 1999; Salas, Burke, & Cannon-Bowers, 2001, 2002; Salas & Cannon-Bowers, 2000). Gagné and his colleagues identified several possible learning outcomes for most training systems (Gagné & Briggs, 1979; Gagné, Briggs, & Wager, 1992; Gagné & Medsker, 1996). The attributes targeted in the proposed system reflect two of Gagné's outcomes, *intellectual skills* and *cognitive strategies*. Intellectual skills refer to the learned rules and procedures that are most often applied in problem solving. Adaptive problem solving skills, critical thinking skills, and team management skills reflect such skills. Cognitive strategies refer to increased understanding about the regulation and use of intellectual skills and declarative information. Metacognitive and self-regulation skills reflect these learning objectives because they regulate and facilitate the use of different cognitive and self-regulation strategies in different self-development contexts. Gagné et al. (1992) defined a series of instructional events and how they might be applied to training systems that have intellectual skills and cognitive strategies as the targeted learning objectives. These design considerations were considered carefully and incorporated into the POI.

The POI has 15 instructional components that can be grouped into three core components. The first core component contains 2 modules related to the self-assessment. One module presents the pre-training assessment tools. These measures will serve to tailor LASTS to individual self-learners, and contribute to self-appraisal and self-regulation. The second of the 2 modules contains the post-assessment tools – this module will include modified versions of the pre-assessment tools, and will add other appropriate training evaluation measures.

The second core component of LASTS contains 5 modules that target self-regulation and self-development skills. The first two modules in this set convey declarative and procedural knowledge about self-regulation and self-appraisal, respectively. A module that presents a

Table 6. Program of Instruction for a Leader Adaptability Self Training System (LASTS)

Purpose	
To develop in Army company grade officers expertise in self development skills, and skills in adaptive thinking and decision making in dynamic and complex military operating environments.	
Instructional Components and Learning Objectives (LO)	Description of Instructional Activities
<p>1. Pre-Training Assessment</p> <p>LO: Completion of a battery of measures assessing self-regulation, self-development and leader adaptability skills targeted in training.</p>	<p>Self-developers will complete a series of assessment tasks measuring skills in self-regulation and adaptive leadership. The purpose of these tasks is to initiate the self-developer's self-appraisal processes regarding adaptive leadership attributes by providing feedback to students regarding the nature of these skills and their current levels. A second purpose is to establish a baseline for training of both sets of skills. Students will receive feedback in the form of attribute profiles, with interpretative information, that will serve as the basis for subsequent self-regulation processes later in this program</p> <p>A resource and reference list will be paired with this module, and with all other modules in this self-development program. This list will refer self-developers to other computer-based and internet sites, and to other learning resources that will amplify and extend the ideas, concepts, and lessons learned in each module. This referral section will also contain guided reflective questions and ideas for extending lessons learned into the self-developers existing work and operational environment.</p>
<p>2. Self Regulation and Self Development</p> <p>LO: Understand key concepts related to self-regulation and self-development</p>	<p>Self-developers will receive, through computer-based presentation of textual material, descriptions of concepts and skills related to self-regulation processes, including self-appraisal, goal setting, developing goal strategies, identifying resources, monitoring goal progress, addressing discrepancies between intended and actual action paths, using coaches, mentors, and learning partners, and evaluating goal attainment. These concepts will be defined and illustrated through examples and short case studies. The presentation of each self-regulation concept/skill will include a definition, a specification of key components, and behaviors that denote high and low levels of skill application.</p>
<p>3. Self-Appraisal Biases</p> <p>LO: Understand the nature of self-appraisal and self-enhancement biases and to become aware of how such biases interfere with self-regulation processes.</p>	<p>Self-developers will receive through computer-based presentation of textual material, descriptions of self-appraisal biases that can distort perceptions of one's own weaknesses and strengths, particularly when setting self-development goals and monitoring self-development progress. These biases will be defined and described, then illustrated through cases studies and examples. Self-developers will be prompted to reflect upon and give examples of how these biases have distorted their own self-appraisals.</p>
<p>4. Knowledge Test</p> <p>LO: Demonstrate level of knowledge and understanding of self-appraisal, self-regulation, and self-development processes</p>	<p>Self-developers will complete a declarative knowledge test composed of multiple-choice items designed to assess their understanding of the concepts and skills presented in the previous two modules. When student responses indicate insufficient understanding of specific concepts, they will be directed to relevant textual presentations of the conceptual material for review.</p>

Table 6 continued.

Instructional Components and Learning Objectives (LO)	Description of Instructional Activities
<p>5. Self-Regulation Practice Exercises</p> <p>LO: Develop self-regulation skills by reviewing self-attribute measures, defining and establishing learning goals, and engaging in related self-learning processes</p>	<p>Self-developers will receive a series of prompts that asks them to review the information from the attribute measures and reflect upon their strengths and weaknesses as leaders. They will be prompted to identify possible self-development goals, and then will proceed through a series of exercises and hypothetical learning situations to practice application of self-learning skills. Thus, self-developers will establish learning objectives, then step through a number of learning scenarios that engage goal setting, resource identification, progress monitoring, and discrepancy-reduction processes. They will be asked to provide responses to hypothetical situations that require application of one or more self-regulation skills. These responses will be evaluated using standards established with experts, and feedback will be provided to self-developers</p> <p>Trainees will conclude this module by reflecting upon their learning into a journal or learning log. They will also be prompted to reflect upon their own attributes and how they might distort or interfere with self-regulation processes.</p>
<p>6. Constructing Self-development learning contracts</p> <p>LO: Develop a self-learning contract that will guide progress through the remainder of this program</p>	<p>Self-developers will be asked to again review their attribute responses and reflect upon their leadership experiences, particular their experiences in situations requiring adaptive problem solving. They will be asked to establish learning objectives and self-development goals. The program will then help the students shape these objectives and goals into a formal learning contract that will guide the remainder of the self-learning process in the program.</p>
<p>7. Leadership and Critical Thinking in Dynamic Environments</p> <p>LO: To understand leadership and decision making in dynamic, volatile, uncertain, complex, and ambiguous operating environments</p>	<p>Self-developers will learn about leadership and decision-making in the military environments of the present and future, in which information, task, and social complexity will be significantly greater. Trainees will also review military decision making models and reflect upon how these models are influenced by dynamic and volatile operating environments. The emphasis in this module will be on naturalistic decision-making and convergent reasoning skills. Trainees will also explore the elements of critical thinking in routine as well as novel problem scenarios. Trainees will receive computerized textual presentations of conceptual material along with case studies and examples</p>
<p>8. Critical Thinking in Dynamic Environments: Practice Exercises</p> <p>LO: To develop and practice skills in military critical thinking in dynamic environments</p>	<p>Self-developers will receive a series of case studies and problem scenarios from existing military simulations (e.g., "Think Like a Commander), and will be asked to develop solutions to posed problems. The responses will be compared to those of experts and feedback provided immediately to trainees. The feedback will be structured according to the attribute profiles submitted in module 1.</p> <p>Students will conclude this exercise by reflecting upon key concepts and learning gains in their journal/learning log. They will also be asked to reflect upon how this knowledge contributes to the achievement of their self-development learning goals.</p>
<p>9. Adaptive Problem Solving</p> <p>LO: To understand the elements of adaptation and adaptive problem solving</p>	<p>Self-developers will continue to explore the concepts presented in modules 7 and 8, by learning about the elements of adaptive problem solving. These elements include situational awareness, sense-making, sense-giving, divergent thinking and cognitive flexibility in solution generation, solution implementation, and progress monitoring. The emphasis in this module is on the concepts underlying creative and adaptive thinking. Trainees will receive computer-based textual presentations of concepts, followed by examples and case studies. They will be prompted to diagnose the elements of the case studies to discern the key elements of adaptive problem solving, and how they differ from more routine military problem solving scenarios.</p>

Table 6 continued.

Instructional Components and Learning Objectives (LO)	Description of Instructional Activities
<p>10. Adaptive Problem Solving Practice Exercises</p> <p>LO: To develop and practice skills in adaptive problem solving</p>	<p>Self-developers will be asked to develop creative solutions to a series of novel military problems. Their responses will be compared to those of experts and feedback provided immediately to trainees. The feedback will be structured according to the attribute profiles submitted in module 1.</p> <p>Students will conclude this exercise by reflecting upon key concepts and learning gains in their journal/learning log. They will also be asked to reflect upon how this knowledge contributes to the achievement of their self-development learning goals.</p>
<p>11. Metacognitive Thinking</p> <p>LO: To understand principles and concepts of metacognition</p>	<p>Self-developers will learn about metacognitive thinking, how such thinking is different from other cognition processes, and how such thinking facilitates complex problem solving. They will be presented with a series of critical thinking errors and biases. The presentation of these concepts will include a definition and examples of thinking errors. Trainees will be presented with videotaped problem scenarios and short case studies that illustrate the concepts</p>
<p>12. Metacognition Practice Exercises</p> <p>LO: Develop metacognitive skills by engaging in verbal protocol analysis while solving problem scenarios.</p>	<p>Self-developers will be asked to develop solutions to problem scenarios similar to those used in module 8 (e.g. Scenarios from “Think Like a Commander”). They will be asked to tape record themselves while solving the problem. They will be provided the rules for conducting a verbal protocol analysis. Next, they will be provided with a list and descriptions of typical critical thinking errors. Students then review their audiotaped solutions for the occurrence of these errors. They will be asked to reflect upon the nature of their thinking processes and errors while solving the problem.</p> <p>Students repeat this exercise multiple times. The degree of reflection upon thinking processes and the decreases in the occurrence of thinking errors should denote gains in metacognitive activities.</p> <p>Students will conclude this exercise by reflecting upon key concepts and learning gains in their journal/learning log. They will also be asked to reflect upon how this knowledge contributes to the achievement of their self-development learning goals.</p>
<p>13. Team Leadership in Dynamic Environments</p> <p>LO: To understand the issues and concerns leading units and teams in dynamic environments</p>	<p>Self-developers will learn about leading teams in turbulent and dynamic environments. They will be presented with conceptual material, examples, and case studies of problems associated with persuading and influencing Soldiers under one’s command to alter their routine ways of acting in the face of changing operational conditions.</p>
<p>14. Team Leadership in Dynamic Environments Practice Exercises</p> <p>LO: To develop and practice skills in leading teams in dynamic environments</p>	<p>Self-developers will receive a series of team problems in which leaders must redirect team activities and interactions along different tactical and strategic paths. Trainees will be asked to develop solutions to these problems that will then be compared to those of experts. Feedback is provided immediately to trainees. The feedback will be structured according to the attribute profiles submitted in module 1.</p> <p>Students will conclude this exercise by reflecting upon key concepts and learning gains in their journal/learning log. They will also be asked to reflect upon how this knowledge contributes to the achievement of their self-development learning goals.</p>

Table 6 continued.

Instructional Components and Learning Objectives (LO)	Description of Instructional Activities
<p>15. Post Training Assessment</p> <p>LO: Evaluate gains in targeted skills by completing a series of assessments similar to those completed at this beginning of this training program</p>	<p>Students will be given a series of assessments similar to those given at the beginning of this program. These tests are constructed to assess gains in self-regulation skills, self-appraisal skills, critical thinking skills, adaptive problem solving, and metacognitive skills.</p>

knowledge test follows these modules – unsatisfactory responses to this test will result in trainees being redirected to earlier presentations for review, as well as to hyperlinks that can provide additional resources for study. The fourth module in this set provides practice in using self-regulation processes to establish learning goals and objectives, identify relevant resources, establish learning plans, monitor progress, and redirect learning plans to reduce discrepancies between the intended subgoals and actual state. The final module in this core contains exercises and tools designed to help the self-trainer develop learning contracts for the remainder of LASTS. This section will also encourage the preparation of learning contracts for other self-development goals of the leader-participant.

The final core component of LASTS contains 8 modules devoted to leader adaptability skills. In some sense this part of LASTS conflicts with a fundamental premise of self-learning – that the self-learner selects the focus of self-development. However, the development of self-appraisal and self-regulation skills is likely to be maximized when they first can be utilized within a particular learning context. LASTS presents opportunities for the self-developer to test emerging self-learning skills within a domain that happens to target adaptability skills crucial for Army officer effectiveness. Indeed, prior research by members of the research team has indicated that leader adaptability represents a strong likely topic for officer self-development efforts. LASTS also reflects a number of other assumptions of self-learning – that the self-learner establishes the pace of learning, that the self-learner identifies appropriate alternate resources that can apply to target skills, that the self-learner monitors and regulates personal progress through the program, making adjustments where necessary, and that the self-learner identifies and hopefully puts into play the next steps in the learning process.

Thus, while LASTS chooses the content domain for a leader self-developer (i.e., leader adaptability), it provides, at its end, for the officer to select a focus for subsequent self-development.

The eight components of LASTS devoted to leader adaptability cover the four adaptability skills. For each skill, LASTS includes textual presentation of conceptual material that describes the targeted skill, and provides behavioral examples and illustrations of high and low levels of skill application. Trainees will receive knowledge tests to evaluate their

understanding of these concepts. Also, for each skill, LASTS provides scenario-based problem exercises that are intended to provide significant practice in skill application. Self-learners receive feedback in the form of responses from experts to the various problem scenarios from experts. They will be invited to compare their responses to those of the experts, and then reflect upon the comparison and gains in learning in an electronic learning log. Thus, the training program captures the fundamental elements of repeated practice, feedback, and self-reflection.

Features of LASTS

This section describes in greater detail several features of LASTS including

- Learning objectives
- Pre and post assessment batteries
- Presentation of concepts and knowledge tests
- Skills practice exercises
- Computer-based training

The modules and LASTS will contain precise learning objectives that specify what trainees will gain in the way of knowledge, skills, and behaviors from particular modules. Such objectives are designed to facilitate self and program regulation processes as trainees go through LASTS. The pre and post assessments will make use of the conditional reasoning items being developed as part of this research effort, as well as the biodata items and existing measures, where applicable. The purposes of this pre-assessment are (a) to serve as the basis for self-reflection and insight, (b) to provide the basis for a tailoring of subsequent training modules to particular patterns of a trainee's cognitive ability and disposition, and (c) to provide the basis for a post-training evaluation of gains in skills and knowledge.

Early in LASTS, trainees will receive a presentation, through text, sound, graphics, and behavioral examples, of each targeted skill. The goal of this presentation is to provide a framework and an advanced organizer for the trainee to help create the knowledge structures necessary to complete the self-development learning plans. Smith et al (1997) defined advanced organizers as (p.99),

Materials presented at the beginning of training that are at a high level of abstraction, generality, and inclusiveness (Ausubel, 1968). Advanced organizers provide an initial organizing structure or framework that clarifies trainees' expectations and allows them to organize and retain the material to be learned (Mayer, 1975). Advanced organizers can facilitate learning because they explicitly draw on relevant anchoring concepts already in the learner's cognitive structure and make them part of the organizing framework. This facilitates the integration of fundamental conceptual ideas with existing knowledge and can lead to transfer to new situations.

The skill concepts will be presented through definitions, behavioral examples, case histories and critical incidents. The concepts will also be illustrated with a combination of recommended readings, case histories, case studies (different from case history because trainees

are given questions to consider and respond to after reading the case), videotaped montages, and prompts to the trainee's own experience.

Repeated practice represents a fundamental component of effective training designed to grow the kinds of intellectual skills and cognitive strategies targeted by LASTS. In the proposed program, trainees will receive a number of different exercises to practice their new self-development skill. For the self-regulation and self-appraisal skills, self-developers are asked to review their attribute scores and provide hypothetical learning contracts that target particular skills. They will be asked to prepare appropriate and quantifiable hypothetical learning objectives, and identify the kinds of resources that can be used in subsequent learning plans. They will also step through a series of problem scenarios that present flawed learning plans and require the trainee to identify the errant components. Their responses will then be compared with answers provided by experts. In a follow-up module, self-developers will then develop a learning contract and plan for the leader adaptability modules, with feedback provided regarding its adequacy.

For critical thinking and adaptive problem solving skills, trainees will be presented with a variety of military problem scenarios and prompted to provide (a) the important issues and concerns that must be confronted in each scenario, (b) a listing of potential solutions with attendant advantages and disadvantages, and (c) a description of the final chosen solution, with a corresponding rationale. To target adaptive problem solving, several of the problem scenarios will contain novel and dynamic features, requiring trainees to present adaptive and innovative solutions. Again these responses will be compared to those offered by expert leaders. Finally, self-learners will be asked to reflect upon the lessons learned, and how the knowledge or skill gained contributes to the achievement of their self-development goals, in an electronic learning log.

The metacognition practice exercise will require trainees to solve a problem while using a "verbal protocol" analysis, or a "think aloud" approach (Clark & Palm, 1990; Zaccaro, et al., 2002). They may record themselves talking out their thoughts and ideas as they go through the stages of solving a problem. Then they review their tapes against a list of critical thinking errors given to them during the concepts delivery module. This training approach, repeated across several scenarios, is designed to routinize the metacognitive thinking approach (Brown & Ford, 2002; Clark & Palm, 1990; Smith, et al., 1997). LASTS will adapt similar training modules that have been developed in other research efforts by members of the research team (Zaccaro, et al., 2002; Zaccaro, Wood, & Kemp, in preparation)

The skills practice exercises will be designed to provide feedback both immediately and directly, or through the use of expert responses that can serve as a comparison base. Practice with feedback is an essential training strategy that is considered crucial for the effectiveness of LASTS (Azevedo & Bernard, 1995; Gagné & Medsker, 1996). Therefore the program will adopt a multi-media approach that utilizes frequent exercises with corresponding feedback.

Finally, LASTS is designed to be computer-based and internet-accessible. Such a format allows easy transportability of the program, a self-paced approach that is vital for a self-development program, and automatic tailoring of the training to particular characteristics of the

self-learners. Trainees with differing levels of skills may be directed to different levels and kinds of problems, varying in their degree of structure. Such automated tailoring can also structure the way feedback is provided to self-learners.

While we anticipate developing most of the computer-based features of the proposed training system, LASTS will incorporate, where possible, any appropriate off-the-shelf products that conform to the training assessment and instructional needs.

Before offering concluding remarks, we should mention that we have given thought to and acquired information about potential sites for test and implementation. Possible test sites include those involving resident education for captains and majors. Another possibility would be to introduce LASTS in the interim period between these two regimens as the time during which LASTS would actually take place.

Conclusion

This effort was intended to identify those cognitive and motivational processes that contribute to and interfere with leader self development, to identify and develop assessment tools for attributes that promote realistic self-assessment and self-evaluation, and to design a leader self development support program that emphasizes enabling processes, bypasses minimizing processes, and targets (a) leader self-development skills, and (b) leader interpersonal skills. These goals were driven by a need to improve the self-development mode of leader development in the U.S. Army.

The STTR Phase I effort yielded two main products. The first is a program of instruction (POI) for a leader self-development support program that targets distortion in self-appraisals and grows self-regulation skills needed in successful self-development. This program, labeled the *Leader Adaptability Self-Training System* (LASTS) also targets specific skills that promote effective leader adaptability. The second product is a set of assessment prototypes that measure attributes promoting a motivational orientation toward self-development, and skills needed to successfully engage self-development activities. These measures are used to tailor particular design features and delivery of the training system to attributes of an individual self-developer. The *Leader Adaptability Self-Training System* is intended to be a computer-based and internet-compatible.

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Appendix A

Attributes of the Successful Self-developer

Attributes of the Successful Self-Developer

The following matrix includes the attributes identified as predictors of successful self-development as well as characteristics of someone who has successfully self-developed with regards to various aspects of leadership. A brief description is provided of each attribute, and sample items which could potentially be used to assess each attribute. The column of sample items includes, where available, estimates of reliability and descriptions of action needed in to develop measures that are not currently established.

Attribute	Attribute Description	Sample Items
Dispositions and Attitudes		
Adaptability	<p>A person who is high in adaptability tends to embrace change and to acknowledge and work with differences among people, problems, and situations. People high in adaptability seek out new ways of performing tasks and new opportunities for retooling for job or workplace changes (Pulakos, et al., 2000).</p>	<p>Conditional reasoning (CR) items will be used to assess adaptability. A CR measure of adaptability has been constructed and is currently being tested for convergent and discriminant validity. Phase II will involve testing for criterion-related validity. The proximal intent of a CR item is to elicit a particular justification mechanism (JM)</p> <p>Example JM: Inclination for Static Ideas: Views novel approaches to problem solving and untested theories as risky and misguided. Perceives people with incompatible ideas as ignorant and threatening.</p> <p>Example item: Jack has been trading stocks online for a few months. Some of his decisions have been successful while others have not. His portfolio consists of large, well-established issues that don't produce large profits but are also very unlikely to crash. He has decided to make a single large purchase, and is trying to choose one of two stocks. One of them, ILA, was recommended by a friend with experience in stock trading. ILA is new and is trying to gain a share of its market. As with any new company, ILA is more likely to fail than succeed in this goal, but if it does succeed, its value will grow rapidly. Although Jack respects his friend's expertise, he is apprehensive about ILA because of the risk involved. Jack's apprehension grows until he decides to invest in a different stock, LTS, which has been around for a long time and has a track record of slow but consistent growth.</p> <p>Given the information, which scenario is most likely?</p> <ol style="list-style-type: none"> a. Jack didn't want to become yet another investor who lost a bundle betting on a longshot.* b. ILA is a subsidiary of a much larger company c. As online investors go, Jack is risk-avoidant. He fears going against the odds, even if the potential payoff is large.* d. Jack prefers the telecommunications sector to the retail sector
Locus of control	<p>Locus of control describes the degree to which individuals perceive events to be internally or externally controlled (Rotter, 1990). It has been</p>	<p>Conditional reasoning (CR) items will be used to assess this attribute. One justification mechanism has been developed for this attribute (and is included here); in Phase II, additional justification mechanisms, and items will be developed.</p> <p>Example JM: Deterministic World View Bias: Tendency to attribute one's life outcomes to the natural, predetermined course of events,</p>

Attribute	Attribute Description	Sample Items
	<p>found that those individuals with an internal locus of control will have more positive attitudes toward training opportunities and will remain motivated throughout the training (Noe, 1986).</p>	<p>rather than his/her own effort. Frames obstacles as barriers to success that cannot be overcome. Frames success as a function of innate and stable characteristics.</p> <p>Example item: Lynn is a nurse who lived and worked in New Orleans. One summer, a massive hurricane ripped through the city, causing many deaths and leaving thousands homeless. She was not directly affected, but she knew many people who were. Lynn feels that she should do her part in helping the city get back on its feet. A co-worker suggests that she volunteer her nursing services during her free time. When Lynn inquires about this possibility, she runs into constraints that she wasn't expecting. She needs to send a copy of her nursing license along with the names and phone numbers of three qualified people who could attest to her qualifications. In the end, Lynn decides that it isn't worth the trouble.</p> <p>Given the information, which is the most reasonable conclusion?</p> <ol style="list-style-type: none"> Lynn wasn't all that committed to helping out in the first place.* Lynn's work involves house calls to the elderly Lynn made a concerted effort to lend a hand, but sometimes bureaucratic "red tape" wins.* Lynn doesn't consider hurricanes to be all that dangerous

Attribute	Attribute Description	Sample Items
Learning goal orientation	<p>Individuals who have a learning goal orientation are described as having an internal desire to build task competence (Farr, et al., 1993). That is, these individuals are interested in learning new skills and gaining useful experiences. Individuals with learning goal orientation have been shown to exert more effort and to exhibit greater engagement in self-regulated learning (Fisher & Ford, 1998).</p>	<p>Conditional reasoning (CR) items will be used to assess this attribute. One justification mechanism has been developed for this attribute (and is included here); in Phase II, additional justification mechanisms, and items will be developed.</p> <p>Example JM: Failure Avoidance Bias: Tendency to view challenging or ambiguous opportunities in negative terms due to fear of failure or fear of being viewed as incompetent by others, even when confronting these prospects may be constructive or necessary. Frames goals which require intense effort to achieve as threatening and unnecessarily complicated.</p> <p>Example item: More and more colleges are using entrance exams to place students into core course requirements, such as math and English. The purpose of these exams is to ensure that all students learn the material covered in these courses at a level consistent with their abilities. At some colleges, students that score extremely poorly may be placed on academic probation for their first year of study. However, some parents, students, and even university faculty believe that these exams are poor indicators of students' actual ability level. The exams are stressful, and many students are poor test-takers. Because of this, they argue that entrance exams should be eliminated.</p> <p>Which of the following most weakens the argument against college entrance exams?</p> <ol style="list-style-type: none"> At 99% of colleges using entrance exams, students that do poorly have opportunities to re-take the exams.* Many studies show that entrance exams are good predictors of college success.* Many entrance exams are developed by outside testing consultants with little experience developing tests in educational settings. Too many colleges and universities are using entrance exams to place students.
Epistemic beliefs	<p>Epistemic beliefs describe an individual's beliefs about learning. Research has identified four individual learning beliefs that may be useful for predicting leader self-development: ability to learn is innate, knowledge is discrete and</p>	<p>Self-report items based on 1-5 (strongly disagree to strongly agree) response scale. (Alpha for entire scale = .68)</p> <ul style="list-style-type: none"> Successful students understand things quickly. The really smart student's don't have to work as hard to do well in school. Smart people are born that way. If you don't learn something quickly, you won't ever learn it. The most successful people have discovered how to improve their ability to learn. <p>Schraw, G., Bendixen, L.D., & Dunkle, M.E. (2002). Development and Validation of the</p>

Attribute	Attribute Description	Sample Items
	unambiguous, learning is quick or not at all, and knowledge is certain (Schommer, et al., 1997).	Epistemic Belief Inventory (EBI). In B.H. Hofer & P.R. Pintrich (Eds.) <i>Personal Epistemology</i> . (pp. 261-275). Lawrence Erlbaum Associates: Mahwah, NJ.

Attribute	Attribute Description	Sample Items
Need for achievement	Individuals who are high on need for achievement persistently strive to reach goals and are undeterred by setbacks (James, 1998). These individuals also tend to seek out challenging tasks and to willingly take on responsibility (McClelland, 1975).	<p>Conditional reasoning (CR) items will be used to assess this attribute. One justification mechanism has been developed for this attribute (and is included here); in Phase II, additional justification mechanisms, and items will be developed.</p> <p>Example JM: Efficacy of persistence: Tendency to assume that continued effort and commitment will overcome obstacles or any initial failures that might occur on a given task.</p> <p>Example Item: Hal has worked as a shift supervisor at KLB Communications for 20 years. Like any medium-sized company KLB frequently has a limited budget and so cannot always provide its employees with yearly raises as the company would like to do. Hal is becoming increasingly worried about this issue as many of his workers are depending on getting a raise this year. Hal has been trying to find a way to help his employees receive their raises. Hal often finds himself overwhelmed by all of the employment issues, but is genuinely worried about his employees.</p> <p>Which of the following best flows from the above information?</p> <ol style="list-style-type: none"> KLB Communications is taking advantage of their employees. Hal is a great shift supervisor, but it is the responsibility of the upper level management to find funds for employee raises.* Hal should ask for a promotion. Hal could present his concerns to the upper management and let them devise a plan.*
Openness to experience	Openness to experience refers to the degree to which one is willing to be open to new and different ideas or situations. Openness to experience is one of the Big Five dimensions of personality and has been shown to predict proficiency in training (Barrick & Mount, 1991).	<p>Conditional reasoning (CR) items will be used to assess this attribute. Three justification mechanisms have been developed for this attribute (one is included here); in Phase II, items will be developed.</p> <p>Example JM: Inclination for Stable Experiences: Tends to frame unstable or changing environments as personally threatening. Views routine experiences as optimal. Tends to be attracted to situations that are familiar and predictable.</p> <p>Example Item: In an effort to improve its elementary school student's ranking in math and science (which was 32 last year), the U.S. Department of Education has decided to implement a new but costly teaching method. The method was first implemented in a large sample of elementary schools around the nation. This year's rankings showed an increase in performance in first</p>

Attribute	Attribute Description	Sample Items
		<p>and second grade students, but no change in performance for third to sixth grade students. Overall, U.S. students' ranking this year increased to number 31.</p> <p>Based on the above information what is the most logical conclusion?</p> <ol style="list-style-type: none"> Some kids are as young as 5 years old when they first attend school. The new method was not as effective as it could have been, because older students did not have enough time to adjust to it.* The new method does not work very well, so an increase of one place in the rankings does not justify spending money on a high costly teaching system. * Students in Japan usually do very well in these rankings.
Self-efficacy	<p>An individual's self-efficacy describes the degree to which an individual believes in his or her ability to successfully perform some behavior in order to meet a certain goal. Self-efficacy is related to initiation of action, amount of effort expended, and the maintenance of that effort. (Bandura, 1977). Our focus would be on self-development self-efficacy</p>	<p>Self-report items based on 1–5 (strongly disagree to strongly agree) response scale. (Alpha for entire scale = .78)</p> <ul style="list-style-type: none"> I complete learning-related tasks successfully. I excel when it comes to developing my professional skills. I handle personal improvement-related tasks smoothly. <p>Adapted from Goldberg, L.R. (1998). International Personality Item Pool: A Scientific collaboratory for the development of advanced measures of personality and other individual differences [on-line]. Available at: http://ipip.ori.org/ipip/ipip.html</p>

Attribute	Attribute Description	Sample Items
Conscientiousness	<p>A person who is high in Conscientiousness, another of the Big Five dimensions, is reliable, hardworking, self-disciplined, and persevering (McCrae & Costa, 1987). Conscientiousness has been linked to motivation to learn in a training program (Colquitt & Simmering, 1998).</p>	<p>Self-report items based on 1–5 (strongly disagree to strongly agree) response scale. (Alpha for entire scale = .88)</p> <ul style="list-style-type: none"> • I pay attention to details. • I am exacting in my work. • I do things according to a plan. <p>Goldberg, L.R. (1998). International Personality Item Pool: A Scientific collaboratory for the development of advanced measures of personality and other individual differences [on-line]. Available HTTP:http://ipip.ori.org/ipip/ipip.html</p>
Emotional maturity	<p>An individual who is high on emotional maturity is likely to be aware of their strengths and weaknesses and is unlikely to categorically deny their weaknesses or exaggerate their strengths. Similarly, these individuals are more likely to be willing to work toward self-development and success instead of imagining that success already exists (Bass, 1990).</p>	<p>Conditional reasoning (CR) items will be used to assess this attribute. Included here is an example; in Phase II, items will be developed.</p> <p>Example JM: Values Catharsis: Views emotional catharsis as purposeful (e.g., a way to show others how he/she feels) and therapeutic. Interprets external attempts to silence emotional expression in professional situations as tyrannical. Believes that keeping one's emotions pent up, even for a short time is unhealthy. Attaches undue importance to his/her mood. Tends to vent when things go wrong and expects someone to help them out of the situation; leans heavily on others as sources of social and emotional support; seeks a "shoulder to cry on"; believes that if he/she feels bad, others should sympathize and feel bad too; wants people to feel how they are feeling, but tends to be unsympathetic to the problems of others because their own problems are perceived as being more serious.</p> <p>Example Item: Getting people to do something that they don't want to do is always difficult. Although convincing people of the need to perform an unpleasant task can be extremely useful, few people have the skills to do so. Those who are skillful in getting others to do things that they don't want to do manage to convey the value of compliance to other people in spite of whatever misgivings those other people might have.</p> <p>Which of the following is most accurate given these statements?</p> <p>a. People who are successful in getting others to do their bidding know the value of</p>

Attribute	Attribute Description	Sample Items
		<p>genuinely losing one's temper.*</p> <p>b. Most people quickly do whatever they are told to do, regardless of the person telling them to do it.</p> <p>c. Tall people are more persuasive than short people.</p> <p>d. The chances of convincing someone to do your bidding are slim if you don't keep control of your emotions.*</p>
Organizational commitment	<p>Organizational commitment describes an individual's identification with the organization and the degree to which an individual chooses to become involved in the organization. Organizational commitment also encompasses an individual's willingness to exert effort on behalf of the organization and their desire to remain a part of the organization (Allen & Meyer, 1990).</p>	<p>Self-report items based on 1-5 (strongly disagree to strongly agree) response scale. (Alpha for entire scale = .89).</p> <ul style="list-style-type: none"> • I feel a strong sense of belonging to this organization. • I am proud to tell others I work at this organization. • I would be happy to work at this organization until I retire. <p>Meyer, J. P., Allen, N. J., & Smith, C. A. (1993). Commitment to organizations and occupations: Extension and test of a three-component conceptualization. <i>Journal of Applied Psychology, 78</i>, 538-551.</p>

Attribute	Attribute Description	Sample Items
Job involvement	<p>Job involvement describes the extent to which an individual psychologically identifies with their work and the importance of that work to the individual's self-image (Brown, 1996). Research has demonstrated a positive relationship between job involvement and motivation to learn on the job (Noe & Schmitt, 1986).</p>	<p>Self-report items based on 1-5 (strongly disagree to strongly agree) response scale. (Alpha for entire scale= .73)</p> <ul style="list-style-type: none"> • The most important things that happen to me involve my work. • The major satisfaction in my life comes from my work. • I have other activities more important than my work. (Reversed coded) <p>Lodahl, T., & Kejner, M. (1965). The definition and measurement of job involvement. <i>Journal of Applied Psychology</i>, 49, 24-33.</p>
Career motivation	<p>Career motivation describes an employee's willingness to overcome career obstacles and to adapt to changing work situations (London, 1993). Research has indicated that individuals with high levels of career motivation are more likely to participate in developmental activities at work (Noe & Wilk, 1993).</p>	<p>Self-report items based on 1-5 (strongly disagree to strongly agree) response scale.</p> <ul style="list-style-type: none"> • I look for opportunities to interact with influential people. • I stay abreast of developments in my line of work. • I have joined professional organizations related to my career goals or maintained memberships in such organizations. <p>Noe, R.A., Noe, A.W., & Bachhuber, J.A. (1990). Correlates of career motivation. <i>Journal of Vocational Behavior</i>, 37, 340-356.</p>
Perceived organizational support (POS)	<p>Perceived organizational support (POS) describes the global feelings employees have about the degree to which the organization values them and cares about their well-being (Eisenberger, et al., 1986). Research has indicated that when an employee perceives the</p>	<p>Self-report items based on 1-5 (strongly disagree to strongly agree) response scale. (Alpha for entire scale = .97).</p> <ul style="list-style-type: none"> • The organization takes pride in my accomplishments. • The organization values my contributions to it's well-being. • The organization really cares about my well-being. <p>Eisenberger, R., Huntington, R., Hutchison, S., & Sowa, D. (1986). Perceived organizational support. <i>Journal of Applied Psychology</i>, 71, 500-507.</p>

Attribute	Attribute Description	Sample Items
	organization to be more supportive he/she is more likely to engage in developmental activities (Maurer & Tarulli, 1994).	
Perceived supervisor support (PSS)	Perceived supervisor support (PSS) describes the general views an employee develops concerning the degree to which supervisors value their employees' contributions and care about their well-being. PSS is related to POS; since supervisors are seen as agents of the organization, employees tend to view their supervisor's treatment of them as an indicator of the organization's support (Eisenberger, et al., 2002).	<p>Self-report items based on 1-5 (strongly disagree to strongly agree) response scale. (Alpha for entire scale = .88)</p> <ul style="list-style-type: none"> • My supervisor takes pride in my accomplishments. • My supervisor values my contributions to the organization's well-being. • My supervisor strongly considers my goals and values. <p>Eisenberger, R., Huntington, R., Hutchison, S., & Sowa, D. (1986). Perceived organizational support. <i>Journal of Applied Psychology</i>, 71, 500-507.</p>
Experience and Knowledge		
Developmental work experience	Developmental work experience refers to professional experiences that have led to noticeable increases in work-related competencies. Such experiences can come in many forms including job transitions (novel situations), task changes, project initiation, unforeseen problems, increases in responsibility,	<p>Self-report bio-data items. These items will need to be empirically validated in Phase II.</p> <ul style="list-style-type: none"> • How would your current supervisor rate your ability to handle unforeseen work-related problems? <ul style="list-style-type: none"> ○ Well above average ○ Above average ○ Average ○ Below average ○ Well below average • How many job role transitions have you had, whether with the same employer or different employers, in the last 3 years? <ul style="list-style-type: none"> ○ 0 ○ 1

Attribute	Attribute Description	Sample Items
	and increases in relationships with no assigned leader (McCauley, et al., 1995).	<ul style="list-style-type: none"> ○ 2-3 ○ 4-5 ○ More than 5
Skills and Abilities		
Needs analysis	Accurate needs analysis allows the individual to set appropriate self-learning goals that are congruent with the organization's needs. In a self-development context, the individual with the ability to accurately assess their own strengths and weaknesses has the ability to tailor their training to those aspects where they consider their need (and that of the organization) to be the greatest.	<p>Self-report bio-data items. These items will need to be empirically validated in Phase II.</p> <ul style="list-style-type: none"> • How would your supervisor rate your ability to accurately assess your strengths and weaknesses as an employee? <ul style="list-style-type: none"> ○ Well above average ○ Above average ○ Average ○ Below average ○ Well below average • In the past three years, how many times have you initiated a personal training activity to improve upon a work-related weakness? <ul style="list-style-type: none"> ○ 0 ○ 1 ○ 2-3 ○ 4-5 ○ More than 5
Goal setting	Research has consistently shown that as a general proposition, realistic and proper goal setting will lead to better performance. Precision, or specificity, of the goal allows one to focus both cognitively and behaviorally on goal relevant activity and leads to more efficient use of task-relevant knowledge in reaching the goal (Locke & Latham, 2002).	<p>Self-report items based on 1-5 (strongly disagree to strongly agree) response scale. (Alpha for entire scale = .71)</p> <ul style="list-style-type: none"> • Over the past year, I have set regular objective goals for my job performance. • The goals that I have set for myself are difficult to achieve. <p>Erez, A., & Judge, T.A. (2001). Relationship of core self-evaluations to goal setting, motivation, and performance. <i>Journal of Applied Psychology</i>, 86, 1270-1279.</p>
Process identification	Process identification is a skill by which an individual	Self-report bio-data items. These items will need to be empirically validated in Phase II.

Attribute	Attribute Description	Sample Items
	<p>assesses those learning resources available to them, specifies relevant learning activities, and establishes criteria for considering their training a success. Individuals who are better able to perform process identification are more likely to self-develop as a result of the use of all available resources.</p>	<ul style="list-style-type: none"> • In the past year, how many times have you taken advantage of voluntary training programs available to you in your work place? <ul style="list-style-type: none"> ○ 0 ○ 1 ○ 2-3 ○ 4-5 ○ More than 5 • How would you rate your ability to identify resources available for your professional growth and development? <ul style="list-style-type: none"> ○ Well above average ○ Above average ○ Average ○ Below average ○ Well below average
<p>Progress evaluation</p>	<p>Progress evaluation refers not simply to self-performance evaluation in the context of the training, but the individual's affective reaction to the training, and the learning effectiveness of the training as well (Pedler, et al, 1986). It is a measure of one's perception of learning progress and the affective reaction to that judgment, as well as a utility judgment as to the relevance and value of the training activities and processes.</p>	<p>Self-report bio-data items. These items will need to be empirically validated in Phase II.</p> <ul style="list-style-type: none"> • How would you characterize the success of your most recent training program in terms of skills and knowledge acquired? <ul style="list-style-type: none"> ○ Very successful ○ Successful ○ Somewhat successful ○ Not successful ○ Not at all successful • In general, how skilled are you in assessing whether a proposed training program will be useful on the job? <ul style="list-style-type: none"> ○ Well above average ○ Above average ○ Average ○ Below average ○ Well below average
<p>Cognitive ability</p>	<p>Cognitive ability has repeatedly been shown to have an impact on training performance (Schmidt & Hunter, 1998). Cognitive</p>	<p>Data already available</p>

Attribute	Attribute Description	Sample Items
	<p>ability plays an important role in virtually all types of performance with any cognitive elements; it is likely that cognitive ability would play a significant role in any self-development training program.</p>	
Career exploration	<p>There is some evidence that individuals with skills in career exploration may be better suited toward self-development training. Career exploration is defined as the self-assessment of skill strengths and weaknesses, career values, interests, goals, or plans, and the process of seeking out job-relevant information from various sources (Mihal, et al., 1984).</p>	<p>Self-report items based on 1-5 (little to a great deal) response scale. (Alpha for entire scale = .80)</p> <ul style="list-style-type: none"> • When you were exploring career options, to what extent were you certain of the specific job you would prefer? • When you were exploring career options, to what extent did you seek out information on specific areas of career interest? <p>Stumpf, S. A., Colarelli, S. M., & Hartman, K. (1983). Development of the Career Exploration Survey (CES). <i>Journal of Vocational Behavior</i>, 22, 191-226.</p>
Self-monitoring	<p>Self-monitoring processes are believed to impact training success through meta-cognitive processes. Meta-cognition, or the ability to think about thinking (i.e. self-monitoring of one's cognitive processes) has been found to have some positive relationship to learning success (Ford, et</p>	<p>Self-report items based on 1-5 (strongly disagree to strongly agree) response scale. (Alpha for entire scale = .82)</p> <ul style="list-style-type: none"> • I would make a good actor. • I am good at making impromptu speeches. • I use flattery to get ahead. <p>Goldberg, L.R. (1998). International Personality Item Pool: A Scientific collaboratory for the development of advanced measures of personality and other individual differences [on-line]. Available at: http://ipip.ori.org/ipip/ipip.html</p>

Attribute	Attribute Description	Sample Items
	<p>al., 1998). This is hypothesized to occur because meta-cognitions allow individuals to assess cognitive learning problem areas and adjust the learning process accordingly, as a form of accurate progress evaluation.</p>	
Feedback seeking	<p>Feedback has consistently been shown to impact training success by allowing individuals to adjust the level and direction of their effort or their training strategies. (Locke & Latham, 2002). Thus, individual feedback seeking skills are likely to perform the same function, and, in fact, research has shown a positive relationship between feedback seeking and congruence with goals and performance success (Kossek, et al, 1998).</p>	<p>Self-report bio-data items.</p> <p>Think about the last three months at work. In order to determine the behaviors and attitudes that your firm values and expects, how frequently, in general, have you done each of the following:</p> <ul style="list-style-type: none"> • Ask your direct supervisor. • Socialize with people in the firm in order to learn how they behave and what they value. • Observe what behaviors are rewarded and use this as a clue to what is desirable or expected. <p>Morrison, E. W. (1993). Longitudinal study of the effects of information seeking on newcomer socialization. <i>Journal of Applied Psychology</i>, 78, 173-183.</p>