Teamwork: Status Memorandum

This document provides a brief update of the activities that have been recently completed for the purpose of developing measures to assess teamwork as part of ALL. It is intended to serve as an addendum to the ALL Teamwork Framework. Specifically, this document describes the procedures and available results from a feasibility study that is currently being conducted on the teamwork measures. It should be emphasized that the feasibility tests described herein are presently underway and therefore the data reported provide a first look at the effectiveness of the teamwork measures. Only when complete data are collected will final decisions be made regarding which teamwork measures are included in the ALL pilot test. Below, the purpose, procedures, and preliminary results from the feasibility test are described followed by a discussion of future tasks and activities planned for ALL – Teamwork.

Feasibility Study: Purpose

The purpose of the ALL – Teamwork feasibility study is to collect data on the teamwork measures from a minimum of two ALL countries with different language requirements. For teamwork, feasibility study data will be collected in Canada and Sweden. Data from the feasibility study will be used to assess the psychometric effectiveness of the teamwork measures and to identify items that are suitably designed for administration to adults in different countries. In addition, the feasibility study for teamwork presents a significant opportunity to examine the extent to which the important requirements of teamwork are similar or different across distinct cultures. ALL – Teamwork will contribute significantly to the research on teams and what is currently known about the cross-cultural nature of teamwork.

Feasibility Study: Procedure

To date, feasibility study data have been collected in Canada and plans are currently underway to administer the teamwork measures in Sweden. Regarding the Canadian administration, the teamwork measures were administered to a sample of 297 English-speaking Canadian adults that ranged in age (i.e., 16 to 68), income (i.e., under $20,000 to over $100,000), and education (i.e., less than primary school to completed graduate school). Each respondent completed a short background questionnaire, a past experience in teams questionnaire, the team attitudes scale (i.e., Belief in the Importance of Teamwork Scale and Collective Orientation Scale), and the team knowledge test (see the Teamwork Framework for a detailed discussion of each of these measures). In addition, each participant filled out a post-survey questionnaire that asked several questions about respondent perceptions of the teamwork measures. Feasibility study data were collected during several sessions in which a survey administrator (equipped with a detailed survey administrator's guide) administered the teamwork measures to 15 to 20 adults per session. Each session lasted approximately 60 minutes.

Feasibility Study: Results

Results from the analyses that were completed prior to the ALL National Study Managers meeting are presented below. It should be noted that these results are preliminary. Additional analyses are planned for the future and similar analyses will be conducted on the Swedish data when these data become available. In addition, the Swedish data will provide initial insight regarding the extent to which the teamwork skills specified in our framework and their behavioral manifestations generalize across nations or are culturally specific.

Post-Survey Questionnaire

With respect to the post-survey questionnaire, 50 questionnaires were selected at random from the larger sample and responses to the survey questions were coded and analyzed. Of these responses, 92% reported having sufficient time to complete the teamwork measures; 92% reported that the instructions were clear and easy to understand; 83% indicated that they did not encounter any problems with the teamwork measures; and 80% found the scenarios presented in the team knowledge test to be realistic.

Team Attitudes Scale

The team attitudes scale and its component subscales were found to be reliable. Cronbach's alpha for the total scale was .85 (i.e., the combination of the two subscales). For the Belief in the Importance of Teamwork (i.e., eight items total) and Collective Orientation subscales (i.e., seven items total), Conbach's alpha was .76 and .78, respectively. An examination of the correlation between these two subscales found them moderately correlated (r = .59) indicating the measurement of distinct constructs. Finally, respondent attitudes about teamwork and their desire to be part of a team were found to span from highly positive to negative suggesting that the team attitudes scale was sensitive to different respondent attitudes and perceptions of teamwork.

Team Knowledge Test

Analyses for the team knowledge test have specifically focused on trying to determine the most effective and informative approach for scoring this measure. To date, a profile matching system has been tested in which respondent answers were compared to a country-specific profile that was generated for Canada. This approach yielded reasonably high reliabilities for the entire knowledge test (Cronbach's alpha was in excess of .80) but not for the specific skill measures (i.e., Group Decision Making/Planning, Adaptability/Flexibility, Interpersonal Relations, and Communication). Presently, we are investigating the plausibility of scoring each item on the knowledge test as right or wrong. The Swedish feasibility study data will provide significant insight into the viability of this scoring approach by providing information on the cross-cultural nature of the teamwork skills and behavioral manifestations specified in our framework.

In summary, three primary conclusions can be drawn from the ALL – Teamwork feasibility study conducted in Canada. First, participants were found to have positive reactions to the teamwork measures. The measures were easy to administer and participants reported few problems when answering the questions. Second, the results support the efficacy of the team attitudes scale and its continued use in ALL. This measure was found to be reliable and to

capture detailed information about respondent attitudes toward teamwork. Finally, the results for the teamwork knowledge test were encouraging. Generally speaking, results for the profile matching scoring system were positive and provide initial insight into the viability of the knowledge test for ALL. These results will be leveraged to explore the possibility of scoring items on the knowledge test as right or wrong. Data collect from Sweden will be critical in answering this question.

Future Activities

Two primary activities are planned for the near future for ALL – Teamwork. First, as noted earlier, we plan to administer the teamwork measures to a small sample of adults (i.e., approximately 300) in Sweden. Responses for the Swedish sample will be compared to the Canadian sample to examine the extent to which culture influences responses to the teamwork items. Items found to generalize across cultures will be included in the pilot test. Second, we plan to continue development and refinement of the team knowledge test. Specifically, we plan to explore the degree to which these items can be scored right or wrong to allow for cross-country comparisons. Again, data collected in Sweden will shed additional light on the effectiveness of this measure and its long-term viability for ALL.

Teamwork

Executive Summary

Governments, businesses, and community groups are increasingly relying on work teams to streamline processes, enhance participation, and improve performance. Teamwork is of worldwide importance; individuals who wish to participate fully in community and professional life must increasingly possess the skills necessary to work in teams.

Although teams are diverse and can take on many forms, all teams are defined by four characteristics. They have two or more individuals; they share a common goal(s); they are task-interdependent; and they have a desired productive outcome(s). These characteristics serve as the basis for developing a working definition of a "team," a definition that the ALL can use to provide insight regarding the prevalence and the expression of teamwork skills across various cultures.

The Teamwork scale of ALL seeks to assess the core skills associated with teamwork. To this end, three primary skills required for effective teamwork —Group Decision Making/Planning, Adaptability/Flexibility, and Interpersonal Relations—are proposed, each represented by distinct behavioral manifestations. Group Decision Making/Planning refers to the ability to identify problems and gather, evaluate, share and link information. Adaptability/Flexibility implies using a variety of task-relevant strategies, providing assistance, adjusting to task reallocation and accepting feedback. Interpersonal Relations reflects supporting team decisions, sharing work, helping others, and seeking mutually agreeable solutions. Communication skills—including providing complete and concise information, listening effectively, and asking questions—underlie the other three skills and serve as a bridge among them. In addition, two other factors play key roles in teamwork: attitudes toward teamwork and past experience with teams.

By definition, teamwork skills can only be observed directly in a teamwork setting. However, because direct observation is not consistent with ALL methodology, respondent teamwork skills will be assessed indirectly. Specifically, knowledge of teamwork skills, attitudes towards teamwork, and past experience in teams will be measured, and links will be drawn between these constructs and team performance.

Finally, teamwork, more than other life skills, is likely to be affected by culture. Although the team skills described in this framework are assumed to define teamwork generally, the behavioral manifestation of these skills is likely to vary across cultures. Respondent performance will be interpreted relative to the effective teamwork behaviors defined for a given country, thereby providing information regarding national attitudes toward teamwork and regarding the degree to which behavioral expressions of teamwork skills vary across nations. This information can be used by employers and educators alike, to assess and improve teamwork in a nation's workforce and general population.

Teamwork

This document presents a framework for assessing Teamwork as part of the Adult Literacy and Lifeskills survey (ALL). The framework was developed from the literature on teams and what is currently known about teamwork. Overall, the framework serves three purposes. First, it bounds the problem domain by clearly specifying the critical components of teamwork to assess. Our goal here is to target the most fundamental aspects of teamwork. Second, the framework drives our approach to measurement. Strategies that are most effective for assessing team knowledge, skills, and attitudes will be identified and selected. Finally, based on the measurement strategies identified, the framework serves as the template for item development. Items will be developed to target key aspects of teamwork that are specified in this framework.

The framework is divided into five sections. The first presents a detailed discussion of the literature on teams and what is currently known about the knowledge, skills, and attitudes required for effective team performance. Here, we present our definition of a team and clearly delineate the core facets of teamwork. Rather than including all variables, we present the core dimensions that characterize what teams do. These dimensions are assumed to be central to all teams, regardless of culture.

In the second section, we draw on the results of our literature review to build a model of teamwork. The purpose of this model is to identify key areas for measurement in ALL. In particular, we propose that the teamwork measure should assess what team members bring to a team (e.g., attitudes, past experience, etc.) and what team members do in a team (e.g., interact, coordinate, etc.).

Our proposed framework is intended to target the most fundamental aspects of teamwork and recognizes that the primary goal of the teamwork measure is not to assess differences in culture. Nonetheless, given the interpersonal nature of teamwork, we anticipate cultural differences. The third section of this framework addresses this issue. In particular, relevant cultural research is reviewed, and the implications of these studies are discussed in light of our objective (i.e., measuring team knowledge, skills, and attitudes internationally).

Once the key facets of teamwork are identified and the possible effects of culture are discussed, the fourth section of this framework presents specific strategies for measuring teamwork. We first present the theoretical and practical assumptions that guide our approach. Next, we describe each proposed teamwork measure with respect to the measurement approach employed, the process by which items were developed, and the procedures for scoring.

Finally, the fifth section of this framework briefly discusses social and economic indicators that may affect teamwork. Here, variables are proposed for the respondent background questionnaire. Information on these variables, which are expected to moderate participant responses on the teamwork measure, should also provide insights into the determinants of teamwork in different nations.

Why Measure Teamwork?

Organizations (both work and non-work) are increasingly using teams to streamline processes, enhance participation, and improve quality (Cohen & Bailey, 1997). Hence, teams are becoming the primary building block of

most organizations (Brooks, 1993; McGrath, 1997). In fact, a recent study by Gordon (1992) found that 82% of U.S. companies with 100 or more employees utilize some form of teams. Teams are found in such diverse fields as education, religion, science, manufacturing, and consulting.

Because teams span both private and public life, individuals must be able to work and perform in a team context to function effectively in today's society. Both the Secretary's Commission on Achieving Necessary Skills (SCANS; U.S. Department of Labor, 1991, 1992a, 1992b) and the Conference Board of Canada Employability Skills Profile (1993) cite the importance of interpersonal skills (or teamwork) in work and everyday life.

Due to its prevalence in society, teamwork has been identified as an important life skill. Consistent with the goals of ALL, the teamwork measure will provide information as to how teamwork skills are distributed in the adult population internationally. Information on the nature of teamwork skills associated with a particular nation and the social and economic factors that influence the development of teamwork skills are of particular interest. This information should prove valuable to employers and educators who wish to improve teamwork in the workforce and elsewhere.

Challenges of the Project

Although there is little doubt that teamwork is an important life skill, the measurement of teamwork in ALL presents specific challenges. First, ALL will be the initial attempt to provide a large-scale international assessment of teamwork skills. As a result, a limited number of methods and approaches exist as precedents. Past international assessments have focused on adult literacy (i.e., see IALS) as opposed to interpersonal skills like teamwork. Therefore, we expect to learn a great deal about teamwork skills and their distribution in the adult population across nations.

Second, unlike other life skills measured by ALL, teamwork will likely be affected by culture. Although we believe that a certain set of core skills defines teamwork across all cultures, the way in which these skills are manifested within a team is likely to vary. Therefore, we will not attempt to develop an invariant set of items to be translated for use in each nation. Rather, items will be modified as necessary to take known cultural differences into account.

Finally, and perhaps most challenging, is the fact that most methods of assessing teamwork skills require direct observation of team performance (D. Baker & Salas, 1992; 1997; Brannick, Prince & Salas, 1997; Ilgen, 1999). Typically, team members are placed in a scenario. Experts observe team behaviors and provide performance ratings on specific teamwork skills. This measurement approach differs substantially from the approach to be used in ALL. Here, the teamwork measure will be a short paper-based instrument; no opportunity for directly observing the teamwork skills of the respondent will be available. Thus, respondents' teamwork skills will have to be assessed indirectly instead of directly. For ALL, we propose to measure the knowledge of teamwork skills, attitude towards teamwork, and past experience in teams and then attempt to draw links between these variables and team performance.

With these challenges in mind, we turn to a discussion of the key components of teamwork underlying our framework. Because these domains will drive development of the teamwork measures for ALL, we draw heavily from the literature on teams and on what is currently known about teamwork.

Teams and Teamwork

What Is a Team?

Although a widespread consensus acknowledges the prevalence of teams in society, the research literature reflects only marginal agreement concerning the definitional components of teams. The variance in definitions is due in part to the diversity of team types. Teams carry a variety of purposes (e.g., learning, producing a product, solving problems, gaining acceptance), forms (e.g., virtual, co-located), and sizes and longevity (e.g., adhoc, long term) (Cohen & Bailey, 1997).

In an attempt to extract key features of teams and develop a working definition of teams for ALL, we reviewed several often-cited definitions (Dyer, 1984; Guzzo & Shea, 1992; Mohrman, Cohen, & Mohrman, 1995; Salas, Dickinson, Converse & Tannenbaum, 1992). This process produced four common characteristics of a "team."

- Two or more individuals
- A shared or common goal(s)
- Task interdependency
- A desired productive outcome(s)

These characteristics serve as the basis for developing our working definition of a "team." A clear definition of a team is essential because it provides measurement boundaries and clearly distinguishes teams from small groups, which do not necessarily connote interdependence. (A team is also a "small group," but a small group may or may not be a team.) Our definition of a team is as follows:

> *A team consists of two or more individuals who must interact to achieve one or more common goals that are directed toward the accomplishment of a productive outcome(s).*

In addition, the definition and core characteristics provide preliminary insight into the nature of teamwork and its key facets. For example, the characteristics of task interdependency and shared goals imply that team members must collectively decide on team goals (team decision making) and work cooperatively (coordination) to achieve these goals.

What Is Teamwork?

Teamwork has traditionally been described in terms of classical systems theory in which team inputs, team processes, and team outputs are arrayed over time. Here, team inputs include the characteristics of the task to be performed, the elements of the context in which teamwork occurs, and the attitudes team members bring to a team situation. Team process includes the interaction and coordination among members required for performing team tasks and achieving specific goals. Team outputs consist of the products that result from team performance (Hackman, 1987; Ilgen, 1999; McGrath, 1984). With regard to teamwork, the process phase is the defining point at which teamwork occurs; it is during this phase that team members interact and work together to produce team outputs.

Numerous theories have been proposed and extensive research has been conducted on the nature of team process (i.e., teamwork). Historically, this literature has sought to identify generic teamwork skills that are associated with most teams. More recently, the focus has shifted towards researchers identifying the specific *competency requirements* of team members (Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995; O'Neil, Chung, & Brown, 1997; Stevens & Campion, 1994). The term *competency* has a variety of meanings. However, it is generally used to denote the qualities needed by a jobholder (Boyatzis, 1982)[1]. Specifically,

[1] Boyatzis (1982), in his seminal work on competencies, defines a job competency as "an underlying

Parry (1998) defined the term "competencies" as a cluster of related knowledge, skills, and attitudes that affects a major part of one's job (i.e., one or more key roles or responsibilities); is correlated with performance on the job; can be measured against well-accepted standards; and can be improved through training and development.

Regarding teamwork, team competencies are the qualities needed by team members. Cannon-Bowers et al. (1995) identified three types of competencies that are central for effective teamwork: (1) team knowledge competencies, (2) team skill competencies, and (3) team attitude competencies.

Team Knowledge Competencies. Team knowledge competencies are defined by Cannon-Bowers et al. (1995) as the principles and concepts that underlie a team's effective task performance. To function effectively in a team, team members must know what team skills are required, when particular team behaviors are appropriate, and how these skills should be utilized in a team setting. In addition, team members should know the team's mission and goals and be aware of each other's roles and responsibilities in achieving those goals. Such knowledge enables team members to form appropriate strategies for interaction, to coordinate with other team members, and to achieve maximum team performance.

Team Skill Competencies. Team skill competencies, which have received considerable research attention, are defined as a learned capacity to interact with other team members at some minimal proficiency level (Cannon-Bowers et al., 1995). However, Cannon-Bowers et al. has reported that the literature on team skills is confusing and contradictory, as well as plagued with inconsistencies in terms of both skill labels and definitions. Across studies, different labels are used to refer to the same teamwork skills or the same labels are used to refer to different skills. In an attempt to resolve these inconsistencies, Cannon-Bowers et al., found that 130 skill labels could be sorted into eight major teamwork skill categories: adaptability, situation awareness, performance monitoring/feedback, leadership, interpersonal relations, coordination, communication, and decision making. Numerous investigations have shown that these skills are directly related to team performance (see for example, Morgan, Glickman, Woodward, Blaiwes, & Salas, 1986; Oser, McCallum, Salas, & Morgan, 1992; Salas, Bowers, & Cannon-Bowers, 1995; Salas, Fowlkes, Stout, Milanovich, & Prince, 1999).

Team Attitude Competencies. Team attitude competencies are defined as an internal state that influences a team member's choices or decisions to act in a particular way (Cannon-Bowers et al., 1995; Dick & Carey, 1990). Attitudes toward teamwork can have a significant effect on how teamwork skills are actually put into practice. Positive attitudes toward teamwork and mutual trust among team members are examples of critical attitudes related to team process (Gregorich, Helmreich & Wilhelm, 1990; Ruffell-Smith, 1979; Helmreich, Fushee, Benson, & Russini, 1986). For example, Vaziri, Lee, & Krieger (1988) found that higher levels of mutual trust among team members led to a more harmonious and productive team environment. Finally, an attraction to being part of a team (i.e., collective orientation) is critical (Eby & Dobbins, 1997). Driskell & Salas (1992) reported that collectively-oriented individuals performed significantly better than did individually-oriented team members because collectively-oriented individuals tended to take advantage of the benefits offered by teamwork. Furthermore, collectively-oriented individuals had the capacity to take other team

characteristic of a person, which results in effective or superior performance in a job."

members' behavior into account and believed that a team approach was superior to an individual one.

Refining the work of Cannon-Bowers et al. (1995), Cannon-Bowers and Salas (1997) delineated three types of team knowledge, skills, and attitude competencies. First, "*individual* competencies" are defined as the knowledge, skills, and attitudes required on the part of individual team members to perform position requirements. These competencies enable team members to perform tasks that are specifically assigned to them. For example, an individual in a marketing team assigned to purchase newspaper-advertising needs to possess specific knowledge and skills to successfully perform this task. Second, "*team* competencies held at the *individual level*" are defined as the knowledge, skills, and attitudes that are generic with respect to a team and its tasks. Essentially, these competencies are transportable to different teams and different team settings. For example, knowledge about teamwork skills and behaviors; skill in communication, team decision making, and interpersonal relations; positive attitudes toward teamwork, and a collective orientation enable team members to function effectively across a wide variety of teams. Finally, "*team* competencies held at the *team level*" are defined as the knowledge, skills, and attitudes that are specific to a particular team and task. Unlike team competencies at the individual level, these competencies are not transportable. They only have meaning within the team. For example, knowledge of teammate roles and responsibilities and specific teammate characteristics are only useful within a specific team context.

Given that the primary goal of ALL is to assess teamwork in the adult international population, teamwork measures will assess "*team* competencies held at the *individual level*." By definition, these competencies are of great interest to policymakers and educators because they enable individuals to function effectively in a wide variety of teams and a wide variety of team settings.

Core Team Skills, Knowledge, and Attitudes

A comprehensive review of teamwork models and research was conducted (e.g., Carnevale, Gainer & Meltzer, 1990; Commission on the Skills of the American Workforce, 1990) to identify core team knowledge, skills, and attitude competencies held at the individual level. From that broad review, we selected the most comprehensive and current team competency models (Cannon-Bowers et al., 1995; O'Neil et al., 1997; Stevens & Campion, 1994a) and used these models to identify core team competencies to measure in ALL. Competencies were selected based upon the following criteria: (1) the competencies were held at the individual level; (2) at least two of the three models delineated the competency (in some form); and (3) empirical research supported a positive relationship between the competency and performance.

Core Team Skills. Team skill competencies are discussed first because they represent the manifest, individual-level behaviors that the ALL measure is designed to assess. Four competencies were identified as "core" team skills competencies: communication, interpersonal relations (which includes cooperation and dealing with conflict), group decision making/planning, and adaptability/flexibility. Team leadership, an often-cited skill competency (see for example, Cannon-Bowers et al., 1995), was not included because our current focus is on the ability to *work* in a team, not to *lead* one. Each core team skill is defined below, along with behavioral examples that typify the skill's expression. Although this core is assumed to reflect teamwork in most cultures, it should be noted that the behavioral

exemplars presented here were derived from research conducted on teams in the U.S. (Cannon-Bowers et al., 1995; O'Neil et al., 1997; Stevens and Campion, 1994a). As such, they may or may not be consistent with the *expression* of the same core skills in other cultures. Thus, the cross-cultural generalizability of behaviors that manifest core team skills in the U.S. remains an empirical question that the ALL will address. However, should cultures to which these behaviors do not generalize be included in the ALL, other behaviors are expected to express the same core team skill competencies systematically.

Communication is defined as establishing effective communication between self and others; it involves the exchange of clear and accurate information and the ability to clarify or acknowledge the receipt of information.

Strong communication skills are demonstrated by team members who

- Provide clear and accurate information
- Listen effectively
- Ask questions
- Acknowledge requests for information
- Openly share ideas
- Attend to non-verbal behaviors

Interpersonal Relations is a broad area that encompasses cooperation and dealing with conflict within the team. Therefore, effective interpersonal relations include working cooperatively with others, working together as opposed to working separately or competitively, and resolving disputes among team members.

Strong interpersonal relations skills are demonstrated by team members who

- Share the work
- Seek mutually agreeable solutions
- Consider different ways of doing things
- Manage/Influence disputes

Group Decision Making/Planning is defined as the ability of a team to gather and integrate information, use logical and sound judgment, identify possible alternatives, select the best solution, and evaluate the consequences.

Strong group decision making and planning skills are demonstrated by team members who work with others to

- Identify problems
- Gather information
- Evaluate information
- Share information
- Understand decisions
- Set goals

Adaptability/Flexibility is defined as the process by which a team is able to use information gathered from the task environment to adjust strategies through the use of compensatory behavior and reallocation of intra-team resources.

Strong adaptability/flexibility skills are demonstrated by team members who

- Provide assistance
- Reallocate tasks
- Provide/Accept feedback
- Monitor/Adjust performance

Core Knowledge Competencies. Regarding the core knowledge competencies, team members must know how and when to use the teamwork skills listed above. Therefore, team knowledge competencies include knowing how to communicate with other team members, how to interact and resolve conflicts, how to plan and make team decisions, and how to adapt and provide assistance to other team members. Such knowledge enables individuals to execute critical teamwork skills and function effectively in a team environment.

The core team knowledge competencies identified above are considered as prerequisites to skill execution. These knowledge competencies are critical components of each team skill (i.e., they comprise the knowledge part of the skill). We present them separately to distinguish what we believe are two critical facets of teamwork: knowing what to do in a team versus doing it. Although the ALL measure focuses on the behavioral alternatives respondents choose in team situations, we believe that knowledge competencies, as defined, are directly related to team member skills and to the level of teamwork achieved.

Core Attitude Competencies. Finally, two attitude competencies were identified: Belief in the Importance of Teamwork and Collective Orientation. These attitudes are brought to the team setting by individuals and can influence the nature of teamwork within a team. As Driskell and Salas (1992) point out, individuals who tend to possess positive attitudes toward teamwork are most likely to take advantage of the benefits teamwork has to offer. Such individuals believe a team approach is better than an individual one; compared to individually-oriented team members, they are better at taking another team member's behavior into account. Each attitude competency is briefly defined below.

Belief in the Importance of Teamwork is defined as the belief that teamwork is critical for successful performance of team tasks.

Collective Orientation is defined as an attraction to, or desire to be part of, a team.

A Model of Teamwork

Based on the literature review and what is generally known about teamwork, Figure 1 presents a model for understanding teamwork for the purposes of ALL. Referring to Figure 1, several things should be noted. First, the skill competencies of Group Decision Making/Planning, Adaptability/Flexibility, and Interpersonal Relations are at the core of teamwork. We believe that team members must know how and when to use these competencies to function effectively within the team. Second, we propose that Communication spans each of the three core areas; it is the glue that holds the team together. For example, Group Decision Making/Planning cannot be accomplished within a team unless team members provide clear and accurate information, listen effectively, and ask questions. Finally, the model proposes that the extent to which an individual is drawn toward teamwork, believes in the importance of teamwork, and has experienced team activity will influence how effectively team skills and behaviors are executed.

Figure 1 also presents a starting point for developing measures for ALL by identifying specific variables to be measured. These include the skills of Group Decision Making/Planning, Adaptability/Flexibility, Interpersonal Relations and Communication, and the attitudes Belief in the Importance of Teamwork and Collective Orientation. Furthermore, Figure 1 presents specific behavioral examples of each skill, as discussed above. These behavioral indicators will be used to construct responses for items measuring teamwork skills. Items that tap respondents' belief in the importance of teamwork and their collective orientation will also be included in the ALL measure.

Figure 1. ALL Model for Understanding Teamwork

Attitudes and Experience	**Skills**		
Attitudes And Dispositions Experiences Implicit Theories About Teamwork	**Group Decision Making/Planning** Identify problems Gather information Evaluate information Share information Understand decisions Set goals	**Adaptability/ Flexibility** Provide assistance Reallocate tasks Provide/Accept feedback Monitor/ Adjust performance	**Interpersonal Relations** Share the work Seek mutually agreeable solutions Consider different ways of doing things Manage/Influence disputes
	Communication Provide clear and accurate information Listen effectively Ask questions Acknowledge requests for information Openly share ideas Pay attention to non-verbal behaviors		

Prior to discussing our method and approach for developing the Teamwork Scale for ALL, we briefly review the relevant literature on culture. More than other ALL measures, responses to the teamwork measure may be affected by the culture of the respondent. In the next section, we review research that specifically examines the relationship between societal culture and an individual's attitudes, values, beliefs, and behavior in a team. Based on this research and on our understanding of the factors that enhance teamwork, we propose a number of likely relationships that will be demonstrated in the ALL between culture and teamwork.

Culture and Teamwork

Culture is simply "*the values, beliefs, behavior, and material objects that constitute a people's way of life*" (Macionis, 1993). Research examining the relationship between culture and performance in organizations has tended to focus on people's attitudes, values, beliefs, sources of motivation, and satisfaction and is commonly assumed to predict behavior.

Although alternative categorizations exist (e.g., Trompenaars, 1993), the most commonly used description of cultural comparisons has been developed by Hofstede (1980; 1991). Hofstede conducted the most exhaustive cross-cultural study to date (questionnaire data from 80,000 IBM employees in 66 countries across seven occupations) and established four dimensions of national culture. The four dimensions are the following:

- **Power Distance**: The extent to which the less powerful members of institutions and organizations accept that power is distributed unequally.
- **Individualism/Collectivism:** The extent to which a society is a loosely knit social framework in which people are supposed to take care only of themselves and their

immediate families, as opposed to tight social frameworks in which people are integrated into strong cohesive groups that look after them in exchange for loyalty.

- **Uncertainty Avoidance:** The extent to which people feel threatened by ambiguous situations and have created beliefs and institutions that try to avoid them.
- **Masculinity/Femininity**: The extent to which the dominant values in a society tend toward achievement and success and away from caring for others and quality of life.

Research has shown that social dynamics vary according to the norms individuals hold concerning appropriate social behavior and that these norms vary across cultural settings (Triandis, 1989). For example, direct confrontation of one's boss may be acceptable in one culture and avoided in another (Adler, 1986). In fact, preliminary empirical studies have demonstrated large cross-national differences in attitudes regarding task performance across several work domains (Hofstede, 1980; Merritt, 1996; Merritt & Helmreich, 1996). Therefore, it is reasonable to suspect that societal culture exerts important effects on team members' knowledge of acceptable team skills, on members' attitudes toward teamwork, and on team behavior.

Research on Culture and Teamwork

Several notable studies have examined the attitudinal differences among workers of different cultures (Evan, 1993). Hofstede (1985) explored a matched sample of employees in a single, multinational corporation in 40 countries. He found wide differences in attitudes toward collaboration. Individualistic countries were more likely to reject collaborative work, preferring to work on their own, whereas collectivist cultures preferred collaborating with others. In related work, Kelly and Reeser (1973) examined the differences between American managers of Japanese ancestry and those of Caucasian ancestry. Similarly, a study by Pizam and Reichel (1977) examined the differences between Israeli managers of Oriental ancestry and those of Western ancestry. In both studies, cultural differences were observed in areas such as respect for formal authority, commitment to long-term employment, paternalism with respect to subordinates, and interest in teamwork.

Cross-national differences in attitudes toward interpersonal interactions have also been found in aviation teams (Helmreich, Merritt, & Sherman, 1996). Current research has demonstrated substantial variability among cultures concerning attitudes toward command responsibility and the captain's role on the flight deck. Cultures differ with respect to members' belief that junior crew members should question the actions of captains. Similarly, individuals from different cultures differ significantly in their endorsement of whether or not they should speak up when they perceive a problem with the flight. Overall, Anglos are more likely than non-Anglos to believe that it is acceptable for crew members to question the captain's decisions, that it is acceptable for the first officer to assume command of the aircraft under certain circumstances, that the captain should not automatically take physical control, and that successful flight deck management depends more than on the captain's individual proficiency.

Parallel findings were found in cross-cultural research, conducted at the Center for Creative Leadership, on teamwork and team leadership. More judicious use of personal prominence and power, greater openness to the ideas and interest of others, and mitigation of tough mindedness are more acceptable

among team leaders in Europe, as compared to those in the U.S. (Leslie & Van Velsor, 1998).

Finally, Gibson (1996) found that the relation between team beliefs and team performance differed between American and Indonesian work teams. A collective orientation enhanced team performance, whereas an individualistic orientation inhibited teamwork. Kirkman (1997) found that, in the U.S., Finland, Belgium, and the Philippines, the amount of resistance to working in a team varied, depending upon the cultural orientation of employees. Respondents with individualistic values resisted working in teams more than did respondents with collectivist values. Further, respondents who valued power distance reported higher levels of resistance to self-management than did those who placed a low value on power distance. Currently, Gibson and Zellmer (1997) are engaged in an intercultural analysis on the meaning of teamwork. Although their preliminary results demonstrate that teams have become a pervasive element across the world, the concept of teamwork itself seems to differ as a function of culture.

Implications for Measuring Teamwork Internationally

Based on the research cited above, it appears that culture can significantly affect the way in which individuals communicate, make decisions, and resolve conflicts in a team. For example, individuals from countries with low power distance (e.g., Austria, Israel, Ireland, and United States) try to minimize inequalities and favor less autocratic leadership and less centralization of authority in teamwork than do individuals from countries with high power distance (e.g., Malaysia, Philippines, Panama, Guatemala, and Puerto Rico). In addition, countries differ significantly in their expression of collectivism, a difference that is likely to affect an individual's desire to participate in teams (i.e., collective orientation) and the extent to which individuals take advantage of the benefits offered by teamwork.

From the standpoint of developing a measure of teamwork for ALL, the research on culture has two important implications. First, although it seems safe to conclude that the core dimensions of teamwork (see Figure 1) generalize to most countries, it also seems likely that the way in which these skills are manifested will vary by nation. For example, communication will be central to teamwork regardless of culture, but team members from different countries may employ somewhat different communication strategies. In an attempt to address this issue, we tried to identify behaviors representing each of the core teamwork skills that were least likely to vary. However, the extent to which we achieved this goal will only be known after testing the teamwork measure in several different countries. Second, because effective teamwork behaviors likely vary across countries, it may not be possible to construct teamwork items with one "correct" answer. What is considered appropriate team behavior in one country may not be considered appropriate in another. Therefore, our items will attempt to capture information about respondents' knowledge of teamwork across the countries participating in ALL. Norms on these measures will be produced for each country, thereby providing a wealth of information on the nature of teamwork within a country. To the extent that teamwork is manifested differently from culture to culture, cross-cultural comparisons will be neither possible nor appropriate. With these issues in mind, we now turn to a discussion of ALL teamwork measures.

ALL Teamwork Measures

The previous sections of this framework have presented our definition of a team and

have delineated the core knowledge, skills and attitudes that are associated with effective teamwork (see Figure 1). We have tried to identify individual-level competencies that are generalizable, although we recognize that culture may play a significant role in how individuals express these competencies while functioning in a team.

This section of the framework describes our strategies for assessing teamwork. We first present a series of theoretical and practical assumptions that will guide item development. We present these assumptions here because they have significantly influenced our measurement approach.

Theoretical Assumptions

- There are four distinguishing features of a team (two or more individuals; a shared or common goal; task interdependence; and a desired productive outcome).
- There are generic team competencies held at the individual level that we believe can be measured.
- The competencies defined in this framework represent key elements of teamwork that should be measured.
- The competencies defined in this framework are critical for successful teamwork.
- Attitudes toward teamwork and knowledge of teamwork skills directly affect teamwork.
- There are cultural differences associated with teamwork. All cultures will be familiar with the notion of teams, and the competencies reflected in the framework are likely to be common to all cultures. However, these competencies are not necessarily expressed in the same way.

Practical Assumptions

- Participants will have approximately 30 minutes to complete the Teamwork section of ALL.
- Teamwork will be assessed using paper-and-pencil measures.
- Although we expect cultural differences in teamwork, we are not trying to measure differences in culture; rather, we emphasize general factors of teamwork with strong cross-cultural relevance.
- The same measurement approach will be used to assess teamwork across cultures.
- Respondent experience with teams may be work or non-work related (e.g., sports, community, schools, etc.)
- Although team processes cannot be directly observed, knowledge about team skills, attitudes toward teamwork, and historical experience with teamwork can be measured.

Among these assumptions, the final practical assumption is most important. As mentioned in the Introduction, it will not be possible to measure respondent team skill competencies directly because the teamwork measure in ALL will be a short paper-and-pencil measure. Measuring team skills has historically required detailed simulations in which team member behaviors are observed and evaluated (D. Baker & Salas, 1992; 1997; Brannick et al., 1997; Ilgen, 1999). Such procedures are inconsistent with the measurement approach of ALL. However, even with these constraints, it is possible to learn a great deal about both the nature of teamwork, and about critical variables that can affect team performance. In particular, respondents' knowledge of teamwork skills (see Figure 1) and respondents' attitudes toward teamwork can be assessed in situation-based items that elicit behavior-oriented, rather than "textbook," responses. Our strategies for measuring each are detailed below.

Knowledge of Teamwork Skills

The primary goal of the ALL teamwork measure will be to measure respondent knowledge of teamwork skills, which have been shown to be positively related to team performance (Salas et al., 1999; Stevens & Campion, 1994b). In particular, respondent knowledge of Group Decision Making/Planning, Adaptability/Flexibility, Interpersonal Relations, and Communication will be assessed. Results from this measure will provide information as to how knowledge of teamwork skills is distributed in the adult population within nations.

Measurement Approach

In developing our approach for measuring knowledge of teamwork, we faced two significant challenges: (a) because ALL is the first attempt to assess knowledge of teamwork internationally, results from prior research were not available for guidance; and (b) due to practical constraints associated with ALL, the method of measurement was limited to a short paper-and-pencil instrument. Future large-scale assessments of teamwork may consider the use of computer-based simulations or other similar formats to assess team skills more directly (E. Baker, 1998); however, the necessary technology is not currently available to the ALL.

Based on our definition of teamwork, the relevant literature on knowledge tests (Borman, 1991; Dye, Reck & McDaniel, 1993; Hunter, 1986), the domain we sought to measure, and our desire to assess applied knowledge, our questions require respondents to make situational judgments. In personnel selection, both situational judgment questions for written tests and structured interviews have been shown to predict job performance (M. Campion, J. Campion, & Hudson, 1993). Specific to teams, Stevens and Campion (1994b) have reported significant criterion-related validities with supervisory and peer ratings of team performance for a thirty-five-item situational judgment test of teamwork knowledge (although this measure was also significantly correlated with respondent general mental ability). Finally, situational judgment tests have a high degree of face validity for the respondent.

Item Development

Initially, an item production grid was constructed to guide item development (refer to Annex A). The item production grid was derived from the team skill definitions and the behavioral facets representing each skill (i.e., the item production grid in Annex A represents the key facets of teamwork in the U.S. and will be modified for different ALL countries). The item production grid is used to ensure that an adequate number of items are developed to cover the skill domains of interest and to specify clearly what each item is intended to measure.

Regarding item construction, short vignettes were initially created. These vignettes describe a fictitious team performing a fictitious team task. Care was taken to ensure that vignettes were based on both work and non-work team situations. Each team described in the vignettes conformed to the definition and characteristics of a "team." To date, five vignettes have been created: one focusing on a toy manufacturing team, one focusing on a marketing team, one focusing on a customer service team and two focusing on community-based teams (one assigned to review school performance and one assigned to clean a park).

Situational judgment items were developed for each vignette. Each item presents a situation, and respondents are asked to rate the effectiveness of each response option on a 5-point scale where 1 indicates "Extremely Bad" and 5 indicates "Extremely Good." To date, eight items have been developed for each vignette, resulting in a

total of 40 items. Annex B presents several example items. Annex C lists all of the items developed thus far.

One issue that was considered, though not specifically accounted for during item development, was the notion of item difficulty. First, unlike other measures included in ALL (i.e., literacy, numeracy, problem solving, etc.), the assessment of teamwork skills (or knowledge of teamwork skills) in the adult population internationally is a new undertaking. Therefore, no research was available to help identify the attributes that might comprise a more difficult and less difficult teamwork item. Certainly, varying the degree to which it is easy to identify the best response from a series of distractors would affect item difficulty. Though this could be done, the ability to respond to more difficult items constructed in this manner would not necessarily reflect more knowledge of teamwork skills. Such responses may be more reflective of a test taker's ability to read, comprehend, and extract the correct information. More importantly, we must acknowledge that the difficulty of teamwork may lie in the execution of team behaviors rather than in the knowledge of what to do. All team members may know what to do in a given team situation, but only the best team members are willing and able to carry out these behaviors in a timely and appropriate fashion that maximizes teamwork. The paper-and-pencil measurement approach used in ALL does not allow for assessing a respondent's skills in terms of actual outcome criteria.

With these issues in mind, we tried to construct items of moderate difficulty. Psychometrically speaking, items of medium difficulty will provide maximum information on the distribution of knowledge of teamwork skills within each ALL country (Crocker & Algina, 1986). Items of medium difficulty were formulated by embedding the "best" alternative for each situational-judgment item ("best" in terms of U.S. research findings) among two alternatives that might reflect other cultures' expressions of team skills and one distracter that virtually no one would be expected to select. In addition, we plan to collect sufficient data during pre-feasibility and feasibility studies to determine each item's difficulty statistically. Item difficulty and other indicators of item performance will be used to select final items for the ALL teamwork measure.

Scoring

Several scoring procedures will be explored during feasibility testing. These range from a Thurstone-like scaling procedure (Anastasi, 1988) in which respondent ratings are compared to country-specific profiles generated for each ALL country to a dichotomous scoring procedure in which each situational judgment item is scored as right or wrong. Whether or not right versus wrong scoring is plausible will be determined by the extent to which rating profiles (i.e., respondent average ratings for the knowledge items) are similar across countries. The final scoring procedure for the team knowledge measure will be selected on the basis of these analyses and practical considerations associated with administration and scoring of ALL.

Attitudes toward Teamwork

Team attitudes are defined as an internal state that influences a team member's choices or decisions to act in a particular way (Cannon-Bowers et al., 1995; Dick & Carey, 1990). Attitudes toward teamwork can have a significant effect on how teamwork skills are actually put into practice. Positive attitudes toward teamwork (Gregorich et al., 1990; Ruffell-Smith, 1979; Helmreich et al.,1986) and an attraction to being part of a team (i.e., collective orientation) have been found to enhance team process and team performance

(Driskell & Salas, 1992; Eby & Dobbins, 1997). Therefore, each of these attitudes will be assessed as part of the ALL teamwork measure.

Measurement Approach

Unlike the knowledge of teamwork skills, a significant body of work exists on the assessment of attitudes toward teamwork both in the US and internationally (see for example, Eby & Dobbins, 1997; Gregorich et al., 1990; Helmreich et al., 1986). The vast majority of this work, however, has focused on commercial pilot attitudes toward teamwork in the cockpit. Nonetheless, this research provides an excellent starting point for structuring our measurement approach.

A review of past attitude measures indicated that all employed some form of Likert scaling. A similar approach is proposed for ALL. Likert-type scales typically include a series of positive and negative statements about teamwork, and respondents endorse one of a series of graded response options (e.g., strongly agree, agree, neutral, disagree, strongly disagree) for each item. Points are allocated to each response option (e.g., 5=strongly agree, 4=agree, etc.) and the sum of these values represent attitude strength.

Item Development

Positive and negative statements regarding Belief in the Importance of Teamwork and Collective Orientation were identified and extracted from the research on team attitude measurement (Eby & Dobbins, 1997; Gregorich et al., 1990). Some of these statements were rephrased because they were extracted from a measure designed to assess pilot attitudes toward teamwork in the cockpit. In addition, several new statements were prepared to ensure that a sufficient number of statements were included for reliable measures. In total, 16 statements were developed to measure Belief in the Importance of Teamwork and 15 statements were developed to measure Collective Orientation. Consistent with other approaches, all statements were scaled using a five-point Likert-type scale where 1 = strongly disagree and 5 = strongly agree.

Attitude measures were tested on 192 business students from a mid-western university. Of the cases in which complete demographic data were available, 173 were undergraduate students, 2 were graduate students, and 1 was a professor. The mean age of participants was 22 years old; 74 were female and 108 were male; 73.4% were Caucasian, 12% were Asian or Pacific Islander, 5.2% were African-American and 1% were Hispanic. Most participants (93.8%) also indicated that they had some experience working or participating in a team.

A principal components factor analysis, item-subscale correlations, and a qualitative review of the clarity and potential for cultural bias associated with each item were used to select final items for the two attitude scales. This process resulted in eight items being selected to measure Belief in the Importance of Teamwork ($\propto$=.79) and seven items being selected to measure Collective Orientation ($\propto$=.84). Annex D contains the final items for the Team Attitude Scale.

Scoring

The Belief in the Importance of Teamwork Scale and the Collective Orientation Scale will be scored in the same fashion. Total scores will be calculated by summing the points associated with the response alternatives selected by each respondent. Negative statements will be reverse-coded. Scores on the Belief in the Importance of Teamwork Scale can range from a low of 5 to a high of 40, whereas scores on the Collective Orientation Scale can range from a low of 5 to a high of 35. Norms will be developed on the basis of these scale scores, thereby providing information

regarding attitudes toward teamwork for countries participating in ALL.

Background Questionnaire

The Background Questionnaire presents an opportunity to collect information about demographic, social, and economic factors that affect teamwork. Such information should be of interest to policymakers and educators from countries participating in ALL because it will provide information on the determinants of teamwork. Results can be used for structuring policy and/or educational programs to improve the levels of teamwork in the workforce and elsewhere.

Based on what is currently known about teamwork and our approach to measuring teamwork in ALL, we hypothesize that several background variables may have an effect on a respondent's knowledge of team skills, and his or her belief in the importance of teamwork and collective orientation. Specifically, past experience in teams, whether or not the respondent has received formal or informal team training, and demographic variables like respondent age, gender, economic status, and educational level may have an effect. Each of these is briefly discussed in some detail below.

Experience in Teams

The nature and extent of respondents' experiences in teams are likely to significantly affect their attitudes toward teamwork and knowledge of what to do in teams. In addition to including questions about respondents' experiences in teams in the background questionnaire, we developed a short team experience measure (see Annex E). This scale asks respondents to rate their past experiences in teams on a series of bipolar adjectives. An initial version of this scale was tested on the sample of business students described earlier (refer to item development for the team attitude scales for a detailed description of the sample). Results indicated that the scale was reasonably reliable ($\propto$=.79).

Team Training

Whether or not respondents have received formal or informal team training is likely to have a significant effect on both knowledge of teamwork skills and attitudes toward teamwork. Sufficient research exists to support the efficacy of team training for improving attitudes toward teamwork, increasing knowledge, and enhancing teamwork skills (see for example, Salas et al., 1995; Salas et al., 1999). Collecting information on whether or not ALL respondents have received team training and the nature of training content should prove useful to policymakers interested in improving teamwork skills in the workforce. Data collected through ALL could provide significant insight into specific training strategies that are effective in different countries.

Demographics

Demographic characteristics such as age, gender, economic status, and educational level may also affect respondent knowledge and attitudes toward teamwork. Little, if any, research on the effects of these variables currently exists. ALL will present an opportunity to assess whether or not knowledge of teamwork skills and attitudes toward teamwork vary as a function of these and other demographic characteristics.

Overall Summary and Conclusions

In closing, this paper presented our framework for assessing teamwork as part of ALL. The framework was derived from the literature on teams and on what is currently known about effective team performance. We have tried to capture the fundamental constructs underlying effective teamwork, in the anticipation that these constructs will

generalize to a wide variety of countries, even if their expression may differ across cultures.

In addition to delineating the key facets of teamwork, this paper has also presented our approach to measurement. Although it will not be possible to measure team skill competencies through direct observation, we will nevertheless assess respondents' knowledge of teamwork skills and respondents' attitudes toward working in teams. The results will provide insight into the distribution of these constructs in the international adult population.

Finally, we view this framework as a work in progress for two reasons. First, as with all survey development, we envision conducting significant pilot testing on the approaches we have selected. This testing is likely to lead to revision of our measurement strategies. Although the strategies we have suggested have been effective in other domains, their efficacy for assessing teamwork on an international level has yet to be determined. Second, new information becomes available on teams and the nature of teamwork almost daily. The field is growing and changing concurrently with our efforts. In response, we view our framework as evolving as well; thus, we will incorporate relevant new findings as they become available.

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References

Adler, N. J. (1986). *International dimensions of organizational behavior*. Boston, MA: Kent.

Anastasi, A. (1988). *Psychological testing* (6th ed.). New York: Macmillan

Ayman, R., & Chemers, M. M. (1983). Relationship of supervisory behavior ratings to work group effectiveness and subordinate satisfaction among Iranian managers. *Journal of Applied Psychology, 68,* 338-341.

Baker, D. P. & Salas, E. (1992). Principles for measuring teamwork skills. *Human Factors, 34,* 469-475.

Baker, D. P. & Salas, E. (1997). Principles for measuring teamwork: A summary and look toward the future. In M. T. Brannick, E. Salas, & C. Prince (Eds.). *Team performance assessment and measurement* (pp. 331-355). Mahwah, NJ: Erlbaum.

Baker, E. L. (1998). *Draft final report for the validation of teamwork skills questionnaire using computer-based teamwork simulations.* University of California, Los Angeles: National Center for Research on Evaluation, Standards, and Student Testing.

Borman, W. C. (1991). Job behavior, performance, and effectiveness. In M. D. Dunnette & L. M. Hough (Eds.) *Handbook of industrial and organizational psychology* (pp. 269-313). Palo Alto, CA: Consulting Psychologists Press.

Boyatzis, R. E. (1982). *The competent manager*. New York: John Wiley & Sons.

Brannick, M. T., Salas, E., & Prince, C. (1997). *Team performance assessment and measurement*. Mahwah, NJ: Lawrence Erlbaum Associates.

Brooks, A. K. (1994). Power and the production of knowledge: Collective team learning in work organizations. *Human Resource Development Quarterly, 5,* 213-235.

Campion, M. A., Campion, J. E., & Hudson, J. P. (1994). Structured interviewing: A note on incremental validity and alternate question types. *Journal of Applied Psychology, 79,* 998-1002.

Cannon-Bowers, J. A., Tannenbaum, S. I., Salas, E., & Volpe, C. E. (1995). Defining competencies and establishing team training requirements. In R. Guzzo and E. Salas (Eds.), *Team effectiveness and decision making in organizations,* (pp. 333-380). San Francisco: Jossey Bass.

Cannon-Bowers, J. A., & Salas, E. (1997). A framework for developing team performance measures in training (pp. 45-62). In M. T. Brannick, E. Salas, & C. Prince (Eds.). *Team performance assessment and measurement* (pp. 331-355). Mahwah, NJ: Erlbaum.

Carnevale, A. P., Gainer, I. J., & Meltzer, A. S. (1990). *Workplace basics: The essential skills employers want*. San Francisco, CA: Jossey-Bass.

Cohen, S. G., & Bailey, D. E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of Management, 23,* 239-290.

Commission on the Skills of the American Workforce. (1990). *America's choice: High*

skills or low wages! Rochester, NY: Author.

Conference Board of Canada (1993). *Employability skills profile*. Ottawa, Ont., Canada: Author [The Conference Board of Canada, 255 Smyth Road, Ottawa, Ont. K1H 8M7, CANADA, 10/93]

Crocker, L., & Algina, J. (1986). *Introduction to classical & modern test theory*. New York: Holt, Reinhart, and Winston.

Dick, W., & Carey, L. (1990). *The systematic design of instruction* (3rd ed.). Glenview, IL: Scott Foresman.

Driskell, J. E., & Salas, E. (1992). Collective behavior and team performance. *Human Factors, 34,* 277-288.

Dye, D. A., Reck, M., & McDaniel, M. A. (1993). Moderators of the validity of written job knowledge measures. *International Journal of Selection and Assessment, 1,* 153-157.

Dyer, J. (1984). Team research and training: A state-of-the-art review. In F. A. Muckler (Ed.), *Human Factors Review: 1984* (pp. 285-323). Santa Monica, CA: Human Factors Society.

Eby, L. T., & Dobbins, G. H. (1997). Collectivistic orientation in teams: An individual and group level analysis. *Journal of Organizational Behavior, 18,* 275-2795.

Gibson, C. G. (1994). The implications of culture for organization structure: An investigation of three perspectives. *Advances in International Comparative Management, 9,* 3-38.

Gibson, C. B. (1996). *They do what they believe they can? Group-efficacy beliefs and group performance across tasks and cultures*. Paper presented at the National Academy of Management meetings, Cincinnati, OH.

Gibson, C. B. & Zellmer, M. E. (1997). *Intercultural analysis of the meaning of teamwork: Evidence from six multinational corporations*. Paper presented at the Academy of International Business Conference, Monterrey, Mexico.

Gordon, J. (1992). Work teams: How far have they come? *Training*, (October 1992), 59-65.

Gregorich, S. E., Helmreich, R. L., & Wilhelm, J. A. (1990). The structure of cockpit management attitudes. *Journal of Applied Psychology, 75,* 682-690.

Guzzo, R. A., & Shea, G. P. (1992). Group performance and inter-group relations in organizations. In M. D. Dunnette and L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (2nd ed., 3, 269-313). Palo Alto, CA: Consulting Psychologists Press, 1992.

Hackman, J. R. (1987). The design of work teams. In J. W. Lorsch (Ed.). *Handbook of Organizational Behavior* (pp. 315-342). Englewood Cliffs, NJ: Prentice Hall.

Helmreich, R. L., Foushee, H. C., Benson, R., & Russini, W. (1986). Cockpit management attitudes: Exploring the attitude-behavior linkage. *Aviation, Space, and Environmental Medicine, 57,* 1198-1200.

Helmreich, R.L., Merritt, A.C., & Sherman, P.J. (1996). Human factors and national culture. *International Civil Aviation Organization Journal, 51*, 14-16.

Hofstede, G. (1980). *Culture's consequences: International differences in work-related values*. Beverly Hills: Sage.

Hofstede, G. (1985). The interaction between national and organizational value systems, *Journal of Management Studies, 22,* 347-357.

Hofstede, G. (1991). *Cultures and organizations: Software of the mind.* UK: McGraw-Hill.

Hunter, J. E. (1986). Cognitive ability, cognitive aptitudes, job knowledge, and job performance. *Journal of Vocational Behavior, 29,* 340-362.

Ilgen, D. R. (1999). Teams embedded in organizations. *American Psychologist, 54,* 129-139.

Kirkman, B. L. (1997). The impact of cultural values on employee resistance to teams: Toward a model of globalized self-managing work team effectiveness. A*cademy of Management Review, 22,* 730-757.

Leslie. J. & Van Velsor, E. (1998). *A Cross-National Comparison of Effective Leadership and Teamwork.* Greensboro, NC: Center for Creative Leadership.

Macionis, J.J. (1997*). Sociology* (6th ed.) Upper Saddle River, NJ: Prentice Hall.

McGrath, J. E. (1984). *Groups: Interaction and performance.* Englewood Cliffs, NJ: Prentice Hall.

McGrath, J. (1997). Small group research, that once and future field: An interpretation of the past with an eye to the future. *Group Dynamics: Theory, Research, and Practice, 1(1),* 7-27.

McIntyre, R. M., & Salas, E. (1995). Measuring and managing for team performance: Emerging principles from complex environments. In R. Guzzo, E. Salas, & Associates (Eds.), *Team effectiveness and decision making in organizations,* (pp. 9-45). San Francisco, CA: Jossey-Bass.

Merritt, A. C. (1996). *National culture and work attitudes in commercial aviation: A cross-cultural investigation.* Unpublished doctoral dissertation. The University of Texas at Austin.

Merritt A. C., & Helmreich, R. L. (1996-a). Human factors on the flight deck: The influence of national culture. *Journal of Cross-Cultural Psychology, 27,* 5-24.

Morgan, B. B., Glickman, A. S., Woodward, E. A., Blaiwes, A., & Salas, E. (1986). *Measurement of team behaviors in a Navy environment* (NTSC Report No. 86-014). Orlando, FL: Naval Training Systems Center.

O'Neil, H. F., Chung, G. K. W. K., Brown, R. S. (1997). Use of network simulations as a context to measure team competencies. In H. F. O'Neil, Jr. (Ed.), *Workforce readiness: Competencies and assessment.* Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Oser, R. L., McCallum, G. A., Salas, E., & Morgan, B. B., Jr. (1992). Toward a definition of teamwork: Behavioral elements of successful teams (*NTSC Technical Report No. 89-018*). Orlando, FL: Naval Training Systems Center.

Parry, S. B. (1998). Just what is a competency (And why should we care?). *Training,* 58 – 64.

Pizam, A., & Reichel, A. (1977). Cultural determinants of managerial behavior. *Management International Review, 17,* 65-72.

Ruffell-Smith, H. P. (1979). A simulator study of the interaction of pilot workload with errors (NASA Technical Report No. TM-78482). Moffett Field, CA: National

Aeronautics and Space Administration-Ames Research Center.

Salas, E., Bowers, C. A., & Cannon-Bowers, J. A. (1995). Military team research: 10 years of progress. *Military Psychology, 7*, 55-75.

Salas, E., Dickinson, T., Converse, S. A., & Tannenbaum, S. I. (1992). Toward an understanding of team performance and training. In R.W. Swezey & E. Salas (Eds.), *Teams: Their training and performance*, (pp. 3-29). Norwood, NJ: Ablex.

Salas, E., Fowlkes, J. E., Stout, R. J., Milonvich, D. M., & Prince, C. (1999). *Does CRM training improve teamwork skills in the cockpit? Two evaluation studies*. Submitted for publication.

Stevens, M. J., & Campion, M. A. (1994a). The knowledge, skill, and ability requirements for teamwork: Implications for human resource management. *Journal of Management, 20*, 503-530.

Stevens, M. J. & Campion, M. A. (1994b). Staffing teams: Development and validation of the teamwork KSA test. Paper presented at the annual meeting of the Society for Industrial and Organizational Psychology, Nashville, TN.

Triandis, H. C. (1989). The self and social behavior in differing cultural contexts. *Psychological Review, 96*, 506-520.

Trompenaars, F. (1994). *Riding the waves of culture: Understanding diversity in global business*. Chicago, IL: Irwin Professional Publishing.

U. S. Department of Labor (1991, June). *What work requires of schools: A SCANS report for American 2000*. Washington, DC: US Department of Labor, The Secretary's Commission of Achieving Necessary Skills (SCANS).

U. S. Department of Labor (1992a). *Learning and living: A blueprint for high performance*. Washington, DC: US Department of Labor, The Secretary's Commission of Achieving Necessary Skills (SCANS).

U. S. Department of Labor (1992b). *Skills and tasks for jobs: A SCANS report for American 2000.* Washington, DC: US Department of Labor, The Secretary's Commission of Achieving Necessary Skills (SCANS).

Vaziri, M. T., Lee, J. W., & Krieger, J. L. (1988). Onda Moku: The true pioneer of management through respect for humanity. *Leadership and Organization Development Journal, 9,* 3-7.

Annex A: Item Production Grid

Teamwork Skill	***Behavioral Requirements***	***Items***
Group Decision Making/Planning	Identify problems	
	Gather information	
	Evaluate information	
	Share information	
	Understand decisions	
	Set goals	
Adaptability/Flexibility	Provide assistance	
	Reallocate tasks	
	Provide/Accept feedback	
	Monitor/Adjust performance	
Interpersonal Relations	Share the work	
	Seek mutually agreeable solutions	
	Consider different ways of doing things	
	Manage/Influence disputes	
Communication	Provide clear and accurate information	
	Listen effectively	
	Ask questions	
	Acknowledge requests for information	
	Openly share ideas	
	Pay attention to non-verbal behavior	

Annex B: Example Knowledge Items

The following survey describes a team and several situations that the team encounters. After each situation, there are several response options describing what the team could do. For each option listed, rate the quality of the option on the following 1-to-5 scale.

Rating Scale

1	**2**	**3**	**4**	**5**
Extremely Bad	*Somewhat Bad*	*Neither Bad Nor Good*	*Somewhat Good*	*Extremely Good*

Vignette 4

A team of volunteers cleans a community park each month. The park is so large that the team needs an entire day to clean it.

Item 1

Members of the team have always worked well together. Recently, the community requested that the park be cleaned more often. The team meets to discuss this requirement, but team members disagree about how to proceed. To help this situation, team members should:

a) _____ Act as though the differences in opinion are not very important.

b) _____ Write down the various opinions about how to proceed and have a team member select one at random.

c) _____ Ask someone from outside the team to act as a mediator at the next meeting.

d) _____ Conduct a candid discussion about the issues on which the team members disagree.

Item 2

The team is asked to periodically rake all the leaves in the park every few weeks during the fall. This situation places a new demand on the team. To cope with this increased demand on its time, the team should:

a) _____ Refuse to do the additional work.
b) _____ Distribute the additional work equally among team members.
c) _____ Assign the additional work to the newest team member.
d) _____ Ask another team to do half the work.

Item 3

One team member leaves the team and a new individual volunteers. The next month the park is cleaned, the team should:

a) _____ Assign the new team member his fair share of the work, but be willing to help out, if necessary.
b) _____ Assign the new team member only the easiest tasks.

c) _____ Encourage the new team member to learn the work by trial and error.
d) _____ Tell the new team member to stay out of the way and watch what the other team members are doing.

Item 4

No one on the team wants to clean the park bathrooms. To resolve this situation, the team should:

a) _____ Decide through a lottery who cleans the bathrooms each time.
b) _____ Have the newest team member clean the bathrooms.
c) _____ Rotate the responsibility of cleaning the bathrooms to a different team member each month.
d) _____ Refuse to clean the bathrooms, since no one on the team wants to do it.

Item 5

The team is requested to make a recommendation on how to improve the park. When the team meets to decide on its recommendation, the team should:

a) _____ Discuss a wide variety of recommendations before making a decision.
b) _____ Allow each team member to suggest one recommendation for consideration by the team.
c) _____ Assign the responsibility for making a recommendation to the team member who seems to know the most about parks.
d) _____ Tell the community it is not the team's job to make a recommendation.

Item 6

The next park cleaning is scheduled for a holiday and most team members will be out of town. The team meets to reschedule cleaning the park. During this meeting, team members should:

a) _____ Try to participate as much as possible in the decision making process.
b) _____ Hide their own feelings to promote good relationships.
c) _____ Anticipate and discuss potential problems with cleaning the park on a different day.
d) _____ Encourage quieter team members to go along with the most outspoken members in order to reach a quick decision.

Item 7

While cleaning the park, a team member is uncertain about what another team member has asked him to do. The team member should:

a) _____ Try to guess what the other team member wanted.
b) _____ Ignore the request; the other team member will ask again if it's important.
c) _____ Ask the other team member to repeat what he or she said.
d) _____ Tell the other team member to speak more clearly.

Annex C: Teamwork Situational Judgment Items

Teamwork Skill	***Behavioral Requirements***	***Items***
Group Decision Making/Planning	Identify problems	V4-I6
	Gather information	V3-I1
	Evaluate information	V1-I2; V1-I8; V2-I6; V3-I2
	Share information	V4-I5; V5-I1
	Understand decisions	V3-I6; V5-I5
	Set goals	V2-I2; V5-I2
Adaptability/Flexibility	Provide assistance	V1-I1; V4-I3
	Reallocate tasks	V2-I4; V4-I2
	Provide/Accept feedback	V1-I7; V3-I4; V5-I4
	Monitor/Adjust performance	V2-I5; V3-I3; V5-I3
Interpersonal Relations	Share the work	V4-I4
	Seek mutually agreeable solutions	V1-I3; V1-I4
	Consider different ways of doing things	V2-I1; V5-I6
	Manage/Influence disputes	V2-I3; V3-I5; V4-I1
Communication	Provide clear and accurate information	V3-I8
	Listen effectively	V2-I6; V4-I8
	Ask questions	V4-I7; V5-I7
	Acknowledge requests for information	V1-I5
	Openly share ideas	V2-I7; V2-I8
	Pay attention to non-verbal behavior	V3-I7; V5-I8

Note: V2-I8 indicates Vignette 2 — Item 8.

Annex D: Team Attitude Scale

For each item, please indicate your response by circling the appropriate number for each item in the scale below.

		Strongly Disagree		***Neither Agree or Disagree***		***Strongly Agree***
1.	Teamwork skills deserve more attention in the workplace.	1	2	3	4	5
2.	Teams make better decisions than individuals.	1	2	3	4	5
3.	Given a choice, I would rather work alone than do a job where I have to work in a team.	1	2	3	4	5
4.	It is impossible to function in today's society without being a good team player.	1	2	3	4	5
5.	I prefer to participate in team-oriented activities.	1	2	3	4	5
6.	Teams always outperform individuals.	1	2	3	4	5
7.	Everyone should be taught to be a good team player.	1	2	3	4	5

		Strongly Disagree		***Neither Agree or Disagree***		***Strongly Agree***
8.	I prefer to work on teams where team members perform their own tasks independently rather than working together.	1	2	3	4	5
9.	I find that working as a member of a team increases my ability to perform effectively.	1	2	3	4	5
10.	I find working in a team to be very satisfying.	1	2	3	4	5
11.	Teamwork is one of the most important skills in life.	1	2	3	4	5
12.	I prefer to be rewarded for my team's performance rather than my individual performance.	1	2	3	4	5
13.	People with strong teamwork skills will always be successful.	1	2	3	4	5
14.	Teams plan better than individuals.	1	2	3	4	5
15.	I prefer working as part of a team to working alone.	1	2	3	4	5

Annex E: Team Experience

For each word pair, please assess your <u>overall past experience</u> across all of the teams you have participated in by circling the appropriate number on the scale provided.

<u>Note</u>: If you have never worked/participated in a team, please provide your perceptions as to what you think working/participating in most teams would be like.

Example Items

1. *Competitive*	1 ------ 2 ------ 3 ------ ***Neutral*** 4 ------ 5 ------ 6 ------ 7	*Cooperative*
2. *Open*	1 ------ 2 ------ 3 ------ ***Neutral*** 4 ------ 5 ------ 6 ------ 7	*Closed*
3. *Rigid*	1 ------ 2 ------ 3 ------ ***Neutral*** 4 ------ 5 ------ 6 ------ 7	*Flexible*
4. *Trusting*	1 ------ 2 ------ 3 ------ ***Neutral*** 4 ------ 5 ------ 6 ------ 7	*Distrustful*
5. *United*	1 ------ 2 ------ 3 ------ ***Neutral*** 4 ------ 5 ------ 6 ------ 7	*Divided*