

The Army Combat Fitness Test (ACFT) Leg Tuck Event

Front End Analysis Plan



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IDDE 712-Analysis for Army Human Performance Technology Leg Tuck Decision

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History and Overview

Physical readiness of each soldier in the United States Army is a basic individual responsibility. The ability for a soldier to be physically fit is imperative to mission accomplishment and the lifestyle of a soldier. Every soldier that enlists in the United States Army is bound by a code in the warrior ethos. Those ethos embed a critical set of values that expect each soldier, regardless of gender, to always place the mission first, never accept defeat, never quit, and never leave a fallen comrade. This ethos is strengthened in the soldier's creed with an expectation that every soldier will be according to the U.S. Army, (2020) "disciplined, physically and mentally tough, trained and proficient in my warrior tasks and drills." The expectation for every soldier regardless of gender is that you are extremely physically fit and can meet the demands of combat when the nation calls.

The reason for soldiers and the United States Army to invest in fitness is obvious. The physical fitness test relates to the job performance, condition of service, and promotion potential within the ranks. History will show us that costly lessons have been learned as it relates to soldier's fitness in combat and all soldiers must be trained, conditioned, and expected to operate effectively in a hostile environment. Whether it is in wartime or peacetime the most important thing a soldier will do every day is physical fitness training. The impact of lack of physical fitness for soldiers within the United States Army during peacetime or wartime is too costly, and therefore, the Army over the years has implemented official physical training programs that are codified by manuals and doctrine.

The United States Army has progressed its physical fitness model starting with the original five-event physical fitness test in World War II requiring a 300-yard run, push-ups, pull-ups, sit-ups, and squat jumps. The original model in World War II has modernized and changed within the operational environment. According to the website "Women in the Army" U.S. Army (2021), a change was required after in 1975 President Gerald Ford signed a bill allowing women to serve in the armed forces. This change formed the physical fitness test known as the Army Physical Fitness Test (APFT), a three-event test including push-ups, sit-ups and the 2-mile run. The APFT remained the Army test of record for soldiers and their fitness requirements until the year 2020. As with previous wars the redeployment from the Global War on Terrorism allowed the Army to take a holistic look at how the soldiers physical condition measured in combat. After many years of analysis, design, development, implementation, and evaluation (ADDIE), the Army determined it needed to completely change the current physical fitness test of record to what is now known as the Army Combat Fitness Test (ACFT). This change was critical to the future physical rigors of combat for soldiers. In 2020, the new ACFT became the official test of record. Due to some data discrepancies, the ACFT is under further review with diagnostic tests required. A final implementation plan is set for 2022, and it will become the official test of record for soldier's physical fitness while serving in the United States Army.

Introduction

The Army Combat Fitness Test (ACFT) is a six-event test that is designed with the core tenants of improving soldier and unit readiness, transforming the fitness culture, reducing injuries, and enhancing stamina and mental toughness. The six events contained in the ACFT are the 3-repetition maximum deadlift (MDL), the standing power throw (SPT), hand release push-up-Arm Extension (HRP), sprint drag-carry (SDC), leg-tuck (LTK), and the two-mile run (2MR). The grading scale is on a 600-point maximum scale with 100 points in each event.

Though 100 points in each event is the maximum, there is also a minimum performance standard for each event that is mandatory for each soldier to continue service. Failure to complete the minimum standards for each event will affect the individual, unit readiness, promotion, and ability for continued service.

Due to the nature of lessons learned in combat the Army has designed the Army Combat Fitness Test (ACFT) to be both gender and age neutral. This culture change is due to the understanding that the physical requirements of combat does not discriminate based on age or gender, so the test to measure fitness for combat should mirror this concept. The ACFT six-event test was purposefully designed to measure and test the physical requirements needed in combat from many lessons learned. It serves as a better guide for commanders to assess the physical readiness of their units prior to deployment into a theater of operation. The components of the ACFT strength, endurance, agility, and mobility directly correlate to the tasks that soldiers will do in a combat operational environment.

As stated earlier the Army Combat Fitness Test (ACFT) has hit some analysis and statistical speed bumps along the way. According to (Cox M., 2021) “the U.S. Army will conduct a congressionally mandated independent study of the Army Combat Fitness Test, or ACFT. The Fiscal 2021 National Defense Authorization Act-directs the Army to stop units from administering the ACFT until an independent study can be conducted to determine its impact on certain populations in the service.”

Identify a Human Performance Problem

Current human performance of the female soldier in the United States Army Studies show that 28 percent of female soldiers successfully pass the leg tuck (LTK) event for the Army Combat Fitness Test (ACFT). This event is one of six-events that are required for promotion, affects unit readiness in all operational environments, and is a requirement for condition of service. Although the desired performance is that 100 percent of female soldiers in the United States Army can successfully pass the minimum required number of leg tuck (LTK) repetitions as part of the Army Combat Fitness Test (ACFT), that percentage requirement is unrealistic. We will establish a realistic desired human performance goal of 85 percent of all female soldiers in the United States Army successfully pass the minimum required number of leg tuck (LTK) repetitions as part of the Army Combat Fitness Test (ACFT). Given these statistics, there is a current 57 percent negative result in the desired human performance gap by female soldiers in the leg-tuck (LTK) event.

Why is this a Problem that Warrants a Solution

The ACFT is now the official physical fitness readiness and condition standard for all soldiers enlisted in the United States Army. The leg tuck is a mandatory event within the ACFT and must be passed for all assigned soldiers to continue service in the United States Army. The above-mentioned performance gap of 57 percent failures for female soldiers in the leg tuck (LTK) event have contributed to stopping the full implementation of the Army Combat Fitness Test (ACFT) and require a congressionally mandated review and analysis. The continued current human performance on the leg-tuck event (LTK) will erode Army readiness, not allow many female soldiers for continued service, further degrade public relations, and hinder the United States Army’s ability to accomplish its mission.

Whose Performance Problem is it

The following chart in Table 1 will depict all the stakeholders and contributors that are affected by this performance problem and a detailed description of the roles and responsibilities that each stakeholder contributes to within the system.

Demographic	Functions and Duties
Female soldiers Junior Enlisted E1-E4 (PVT-SPC)	The primary demographic that is required to successfully pass the leg-tuck (LTK) event in the Army Combat Fitness Test (ACFT). In addition, the junior enlisted soldier serves as an ambassador to the community and serves as an Army representative to the civilian population.
Female soldiers NCO's E5-E9 (SGT-CSM)	The primary demographic that is required to successfully pass the leg-tuck (LTK) event in the Army Combat Fitness Test (ACFT). In addition, the NCO in the Army serves as a primary trainer of junior enlisted soldiers and is responsible for any training and conditioning programs. The female NCOs not only serve as primary trainers but also serve as mentors across the entire Army formation.
Female soldiers Officers O1-O10 (2LT-GEN)	The primary demographic that is required to successfully pass the leg-tuck event (LTK) in the Army Combat Fitness Test (ACFT). Female officers serve as leaders and commanders in units across the Army formation. In addition, female officers support higher level commanders' directives and execute mission command to accomplish designated orders.
U.S. Army Certified Master Fitness Trainers All ranks	Master Fitness Trainer (MFT) duties across the Army formation include delivering any unit training as it pertains to US Army Physical Readiness Training (APRT). The Master Fitness Trainer assists commanders at all echelons to develop and execute physical readiness programs with the goal of reducing injuries and improving operational readiness.
HQ Department of the Army Staff	Assists the United States Army commanders with organization, mission command, and resourcing to enhance their ability to meet mission requirements in any theater of operation. In addition, works directly for the Chief of Staff and Command Sergeant Major of the Army by direction and control of the Secretary of Defense for the United States.
Commanders and Senior Enlisted Command Teams across the Army organization	All echelons of command teams execute mission orders of higher echelons using mission command. In addition, command teams execute adjacent unit coordination to successfully meet mission requirements. Command teams are responsible for subordinate unit success by providing orders, direction, and resourcing to meet mission requirements. Command teams are responsible for the health, welfare, and readiness of both soldiers and families across the formation.
United States Army Medical Command	The United States Army Medical Command (MEDCOM) provides medical, veterinary, and dental support in all phases in the Army. In addition, MEDCOM provides medical research, development, and training to the total Army Force. The preventive care of the entire Army community to include soldiers, families, contractors, and retirees falls under the MEDCOM umbrella.
United States Army Training and Doctrine Command	The United States Army Training and Doctrine Command (TRADOC) focuses on supporting the Army through training and doctrine. It is responsible for all phases of Army training to include basic training, professional development, and schools. TRADOC is also responsible for all phases of recruiting, lessons learned, and centers of excellence within the Army. Lastly, TRADOC also helps to oversee any modernization initiatives and programs within the United States Army.

Table 1. Target Audience

The Size of the Performance Problem

As stated earlier, the current performance versus desired performance has caused several problems for the United States Army. Currently the Army Combat Fitness Test (ACFT) has been halted by order of the congress until further data and analysis can be collected on its efficiency, fairness, and effectiveness within the total force structure. The Army must have a test of record for commanders to effectively measure the readiness of their soldiers to deploy worldwide into contingency operations. The Army Combat Fitness Test (ACFT) aids commanders with not only a measurement for their units' physical readiness, but it also aids the soldier in ensuring that they can perform the tasks required of them in combat. The ability for the female soldier to pass the leg tuck (LTK) event is critical to the soldier's ability to deploy and can be directly attributed to the Army's ability to meet its national security threats. In addition, this human performance gap has the potential to hinder a female soldier's ability to gain favorable actions such as awards, retention, and promotions. This degradation of performance will ultimately hinder the female soldiers who cannot perform the task performance and place them in a negative position for career progression. All these factors ultimately lead to a lack of confidence in the soldier, unit, and the American people.

Project Front End Analysis Context

According to my professor (Push, R., 2021) the term front-end-analysis is simply "the systematic study of a problem or innovation, incorporating data and opinions from various sources to make effective decisions." Joe Harless is widely known as the father of front-end analysis and in a recent article I read (Ripley, D., 2016) "the concept came about because a follow-up evaluations by Harless Performance Guild associates were showing that the skills learned in training were not being transferred to the workplace despite the training having been well designed in accordance with the standards of the time." It is important to note that one of the main ideas of this systematic process is that it happens in the beginning (*front*) of the design process to properly determine or identify the main problem and determine the best available solution to meet the desired performance. According to a recent article there are many reasons why needs assessments should be conducted (Watkins, 2008), "needs assessments provide a systematic process to guide decision making in organizations, needs assessments provide justification for decisions before they are made, needs assessments are scalable for any project, time-frame or budget, needs assessments offer a replicable model that can be applied by novices or experts, and needs assessments allow for interdisciplinary solutions for complex problems" (page 1-2).

During the scope of this project, I will look at developing a diagnostic Front-End Analysis (FEA) plan to help the United States Army with the congressionally mandated study to codify the concerns the body has. I have chosen a diagnostic Front-End Analysis because current service members are not meeting the minimum standards. Although there are many requirements of the ACFT that have been mandated to be looked at, I will look to focus in only one area that I feel is the most critical for the Army to solve. Within the six-event Army Combat Fitness Test (ACFT), I will focus on the leg-tuck event (LTK). The leg-tuck event for female soldiers has a significant failure rate and a diagnostic Font-End Analysis (FEA) plan will help the Army to determine whether the deficiency falls under skills/knowledge, environmental, incentive/motivation or a combination of any.

This project will capture a FEA plan that will help the instructional designer in producing tools, a training program, and instructional design products to target the current human performance technology gap. The idea behind the plan will enable the instructional designer to identify the current state, the desired state, and the gap that exists for female soldiers to meet the minimum training and conditioning requirements of the leg-tuck (LTK) event. The plan will focus on not only the individual (micro) component but will also look at helping to improve the holistic organizational (macro) component. The look into these two system components will aide in improving the human performance technology gap by providing improved physical fitness results for female soldiers and units in future combat operations. The individual (micro) focus within the FEA plan will focus on an individual training plan for female soldiers to meet the minimum requirements of the leg tuck (LTK) event, while the organizational (macro) focus will look at providing the training, resources, tools, or attitude changes necessary for females to successfully meet the minimum requirements of the leg-tuck (LTK) event. In addition, the organizational (macro) focus will help to determine alternate plans for another event if required.

- **Goal:** This FEA plan project will provide the instructional designer with a systematic analysis to help determine the human performance problem, determine the performance discrepancy, and provide a systematic model for the desired outcome and solution.

Project Front End Analysis Purpose

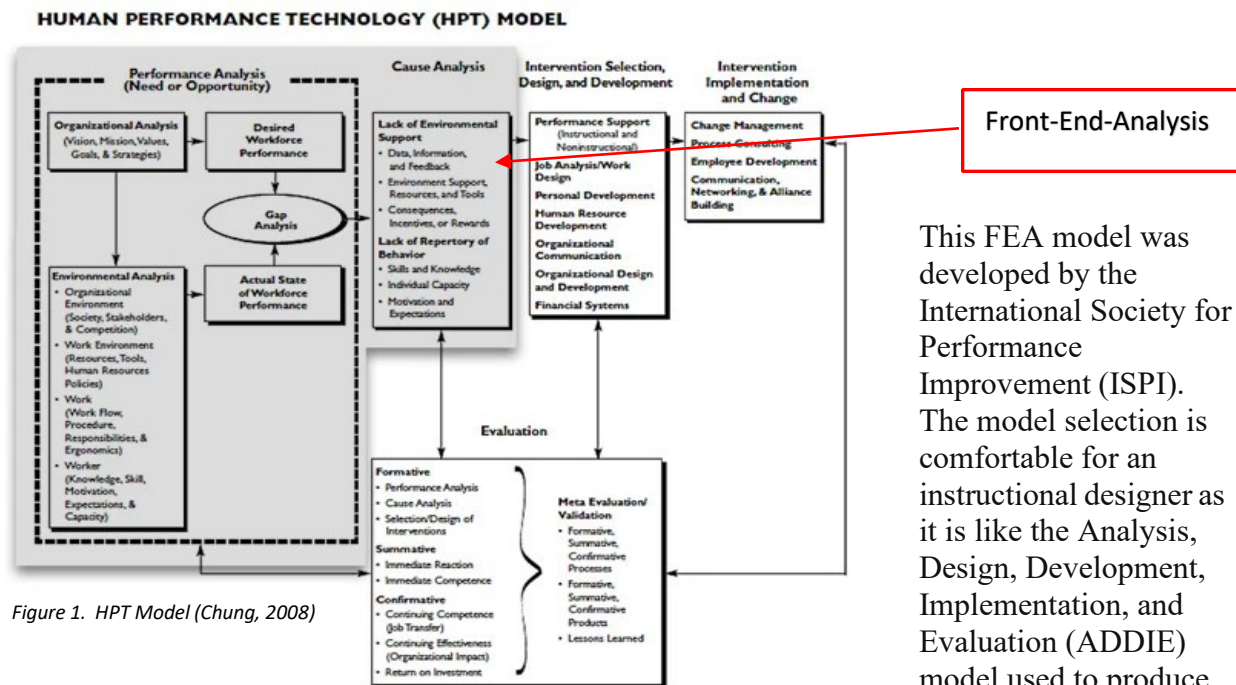
The purpose of this project is to provide development, direction, and motivation through instructional design to the female soldiers within the United States Army. Females within combat arms career management fields is a culture change for the Army. There is a growing need for female commanders and enlisted soldiers within the profession. Female soldiers have for many years strengthened our military readiness and helped to fulfill gaps in social and cultural demographics all over the world. The female soldier is an invaluable asset to the United States Army. We are in a period of cultural change in a gender and age neutral environment and with any change we must look at providing the right instruction, training, and education to meet the new requirements. The Army must professionally train its force to meet its expectations, and both the organization and the individual have a responsibility to ensure females can continue to successfully contribute to the Army.

The professional development of soldiers within the United States Army is an enduring task, and it must establish training plans, procedures, regulations, and policies that govern this behavior. The leg-tuck (LTK) event in its diagnostic phase has proven to be a difficult obstacle and physical fitness event for the female population. The Front-End Analysis (FEA) plan will take a deep look at the current training plan and improve on it in a systematic approach to help bridge that human performance technology gap. The current imbalance of statistics between male and female success rates in the United States Army can lead us to believe that there is a human performance problem that requires a solution. In this project a deeper look at the performance discrepancies will help determine what they are and how to fix them.

Front End Analysis Model Selection

There are various FEA models that Instructional designers can use to assist them in identifying performance gaps and needs. For this project, I will look to use the framework of the

Human Performance Technology (HPT) Model because it puts a greater emphasis on the front-end-analysis phase.



This FEA model was developed by the International Society for Performance Improvement (ISPI). The model selection is comfortable for an instructional designer as it is like the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model used to produce

education and training programs in the field of study. The HPT model and the ADDIE process are both systematic, but the HPT model uses more depth and range within its framework. The HPT model includes many components to include organizational analysis, environmental analysis, current performance, desired performance, gap analysis, cause analysis, design and development, implementation, and evaluation. During this report I will solely utilize this models front-end-analysis section as seen in Figure 1 above. In the following sections you will see a heavy influence in my front-end-analysis as it correlates to the organizational, cause, and environmental analysis within the HPT model. The model selection I have made and its similarity to the analysis phase in the ADDIE process makes it a natural sequential process to help define the problem and the causes that are associated with it.

Front End Analysis Tools Selection and Procedures

Front End Analysis Procedures

Organizational Analysis

The foundation conducting the front-end analysis procedures as stated earlier in this report will use the front-end analysis Human Performance Technology (HPT) Model. The model will start with a systematic process in the organizational analysis section of the HPT model as depicted in Table 2. The organizational analysis will look to focus on the following subcomponents:

U.S. Army Leg Tuck (LTK) Organizational Analysis	
<i>Vision</i>	Analysis on what the Army sees as the <u>end state</u> for female soldier's human performance potential for the leg-tuck event.
<i>Mission</i>	<p>Conduct analysis and codify <u>existing</u> mission as it pertains to the leg tuck event and how it applies to combat performance.</p> <p>Current mission statement is: (US Army, 2021) "<i>The LTK assesses the strength of the soldiers grip, arm, shoulder, and trunk muscles. These muscles assist soldiers in load carriage and in avoiding injuries to the back.</i>"</p>
<i>Values</i>	Conduct analysis on status of the leg tuck event by currently assigned (ACFT project management team) for congressionally mandated review. Ensure current project management team process is aligned with current Army Values (<i>Leadership, Duty, Respect, Selfless-Service, Honor, Integrity, Personal Courage</i>) and the expectation of the American people.
<i>Goals</i>	Review and codify <u>current and future percentage</u> goals for the United States Army ACFT leg tuck (LTK) event to meet physical readiness standards for deployment into worldwide contingency operations.
<i>Strategies</i>	<p>Conduct analysis and codify current leg tuck event conditioning strategies and application to combat related tasks.</p> <p><u>Current Combat Related Strategies:</u> (US Army, 2021) The application of common tasks for soldiers includes:</p> <ol style="list-style-type: none"> <u>Surmounting of obstacles and walls</u> <u>Rope climbing, descending, or traversing</u> <p><u>Current Conditioning Events:</u> (US Army, 2021) The current condition events IAW FM 7-22.1 for soldiers includes:</p> <ol style="list-style-type: none"> <u>Bent-Leg Raise</u> <u>Leg Tuck and Twist</u> <u>Alternating Grip Pull</u>

Table 2. Organizational Analysis

The analysis and information gained within the *organizational analysis* step will foundationally aim to clearly identify, codify, and define the current performance and the optimal performance that the United States Army desires for the female standard for the ACFT leg tuck (LTK). The ability to conduct *organizational analysis* will help the Army with a holistic look at what the entire service department looks to achieve in the future.

Environmental Analysis

The next step in the systematic process will involve the Environmental Analysis section of the HPT model. The following information will be analyzed as seen in Table 3.

U.S. Army Leg Tuck (LTK) Environmental Analysis	
Organizational Environment	<p>Conduct analysis on Units Standard of Operating Procedures(SOP) across the formation to include sensing sessions for ACFT leg tuck event. Climate Sensing session will focus on the unit environment.</p> <ul style="list-style-type: none"> ➤ Who are the current unit stakeholders? Are they engaged? ➤ Are there unit physical readiness competitions that include the leg tuck event?
Work Environment	<p>Conduct analysis by duty location and compare available resources. Ensure number of training aids and resources meet the needs of the female soldiers.</p> <p>Current Resources needed to conduct the event:</p> <p>Army approved Climbing Bar</p> <p><i>U. S. Army (Army PRT, 2021) Current Specifications:</i></p> <p><u>Five Posts</u></p> <p>Each of the five posts measures 6 inches square by 12 feet long. Each post is sunk 3 feet into the ground</p> <p><u>Two bars</u></p> <p>Each of the two bars is a threaded water pipe Each bar measures 1.5 inches outside diameter by 12 feet long Each bar has two 1-inch-deep end caps The bars are through the 6 x 6 at 7.5 and 8 foot above the ground.</p>
Work	<p>Conduct analysis on Units Standard of Operating Procedures(SOP) across the formation to include:</p> <ul style="list-style-type: none"> ➤ Unit Master Fitness Programs ➤ Unit Physical Readiness Programs ➤ Height/Weight Programs ➤ Army Fitness Triad Programs ➤ Unit Rehabilitative Medical Physical Readiness Programs ➤ Unit Retention Programs ➤ Unit Promotion Programs
Worker	<p><u>Knowledge/Skills-</u></p> <ul style="list-style-type: none"> ➤ Has the female soldier been formally trained in the leg tuck event? ➤ Is there a specific skill needed for a female soldier to successfully complete the leg tuck event? ➤ Is there a biological performance deficiency for female soldiers in the leg tuck event? <p><u>Motivation/Incentive-</u></p> <ul style="list-style-type: none"> ➤ Does the female soldier population know how this affects career progression? ➤ What are the incentives for a female to meet gender neutral standards for the Army leg tuck? ➤ How do the female soldiers feel about the leg tuck event? ➤ Do female soldiers like to compete against males in the gender-neutral leg tuck event for the ACFT? ➤ Do female Soldiers feel current education and training will allow them to pass the leg tuck event? ("It is impossible, I will never pass mentality"). ➤ Do female soldiers want to pass the leg tuck because they feel it applies to their job requirements in combat?

Table 3. Environmental Analysis

The information gathered in the environmental analysis step will play a critical role by helping to analyze and identify the performance gap. This will be measured by providing a wholistic look at the current performance and desired performance and helping to start to provide detailed analysis into the actual need.

Cause Analysis

The third step in the process is to conduct the cause analysis within the HPT model. The following is a breakdown of some of the cause analysis areas and questions that will aim at finding the root cause of the problem. The breakdown can be seen in Table 4.

U.S. Army Leg Tuck (LTK) Cause Analysis	
Lack of Environmental Support	<p><u>Data/Information-</u></p> <ul style="list-style-type: none"> ➤ Current diagnostic results for the female soldier during the leg tuck event ➤ Current record diagnostic results for female performance during the Army leg tuck event <p><u>Feedback-</u></p> <ul style="list-style-type: none"> ➤ Interviews ➤ Performance Surveys ➤ Subject Matter Analysis ➤ Climate Surveys <p><u>Environment Support/Resources/Tools-</u></p> <ul style="list-style-type: none"> ➤ PRT Manual ➤ Unit PRT Programs ➤ Approved Climbing Bars and Facilities to support the leg tuck event.
Lack of Repertory of Behavior	<p><u>Skills/Knowledge-</u></p> <ul style="list-style-type: none"> ➤ <i>Has the female soldier been formally trained in the leg tuck event?</i> ➤ <i>Is there a specific skill needed for a female soldier to successfully complete the leg tuck event?</i> <p><u>Individual Capacity-</u> <i>Is there a biological performance deficiency for femalesoldiers in the leg tuck event?</i></p> <p><u>Motivation/Expectations-</u> <i>Does the female soldier population know how this affects careerprogression?</i> <i>What are the incentives for a female to meet gender neutralstandards for the Army leg tuck?</i> <i>How do the female soldiers feel about the leg tuck event?</i> <i>Do female soldiers like to compete against males in the gender-neutral leg tuck event for the ACFT?</i> <i>Do female Soldiers feel current education and training will allow them to pass the leg tuck event? (“It is impossible, I will never pass mentality”).</i> <i>Do females’ soldiers want to pass the leg tuck event?</i> <i>because they feel it applies to their job requirements in combat?</i></p>

Table 4. Cause Analysis

As you can see from Table 4 much of the information conducted in the *cause analysis* step can be applied to determine the cause of the problem. This information can lead to deciding if there is an instructional “need” and begin to design the necessary instructional components. Although many of the same information collected applies, the addition of the following front-end analysis tools will be used within the cause analysis to gain depth and breadth into the root cause of the problem.

Front End Analysis Tools and Instrumentation

Tool Selection

Like a variety of front-end-analysis models, there are also numerous front-end-analysis tools that are available to the instructional designer to help in the systematic process. According to Rossett (1987) “there is an important relationship between techniques, tools, and purposes”. The following section of this report will aim to use the various selected tools within this project including (interviews, extant data analysis, surveys, performance observations, and working groups) to achieve desired performance (optimal), current performance (actual), causes, feelings, and solutions.

The following is Table 5 of Front-End Analysis tools that will be discussed and how they will be incorporated into the front-end analysis procedures including:

Front End Analysis Tools Used				
<i>Extant Data Analysis</i>	<i>Surveys</i>	<i>Interviews</i>	<i>Formal Observations</i>	<i>Subject Matter Analysis</i>

Table 5. FEA Tools Used

- **Extant Data Analysis**- The extant data analysis as seen in Table 6 will focus on the current performance state of female soldiers in the United States Army for the leg tuck event. This data will include all historical files, records, scoring data, and medical statistics that pertain to the United States Army organization in its entirety. The extant data analysis will capture the following data and analysis points:

Extant Data Analysis			
A.	Collect and compare male versus female metrics for both pass and failure rates for the leg tuck event.	E.	Conduct analysis of unit Physical Readiness Training and conditioning plans in different gender related environments (all male vs. hybrid) with focus on training for the leg tuck event IAW FM 7-22.1
B.	Collect and organize all relevant past and current official record ACFT leg tuck event scoring data.	F.	Conduct pattern analysis on the leg tuck event by separate installations and unit echelon structures.
C.	Collect and analyze all current leg tuck event diagnostic scoring records by unit and compare.	G.	Collect and analyze injury reports across the Army for training and testing associated with the leg tuck event.
D.	Analyze current Physical Readiness Manual FM 7-22.1 for gender specific training requirements on the leg tuck event.	H.	Analyze pass and failure rates for female soldiers by age category for the ACFT leg tuck event.

Table 6. Extant Data Analysis

- **Surveys-** The survey tool will serve as a way for aide in uncovering the answers to questions that may lead to solutions within the performance problem. The surveys can also help to evoke discussion among the service members and talk about many of the key topics in relation to the current performance problem. This approach will aide in an unbiased method to assist in the decision-making process. The collection of this unbiased data will help to streamline the potential issues from all echelons within the United States Army. The survey will be developed and catered in formatting that meets the various rank structures and responsibilities of the different demographics within the service department. This will include unit surveys, leader surveys, gender surveys, and individual soldier surveys. Some of the main discussion points will include:
 - Thoughts on the leg tuck event within the ACFT.
 - Degree of difficulty for the leg tuck event within the ACFT.
 - Applicability of the ACFT leg tuck event as it relates to combat focused tasks.
 - Thoughts on the gender neutral ACFT leg tuck event.
 - Available training resources to practice and conduct the leg tuck event within the ACFT.
 - Effectiveness of unit training programs for the leg tuck event within the ACFT.
 - Amount of time dedicated to training for the leg tuck event within the ACFT.
 - MEDCOM targeted surveys with health care professionals within the system focusing on injuries related to female soldiers during training and testing for the leg tuck event within the ACFT.
- **Interviews-** The motivation and mental wellness of the Army organization are imperative for mission accomplishment. Interviews can assist with gauging the current culture of the organization. In addition, the interviews can provide insight to the micro, macro, and mega environmental factors by sampling individuals and facilities that are part of those systems. The greatest strength of the United States Army comes from its most valuable resource...the soldier. These interviews can look to build upon the extant data that has been collected and provide a unique look through the lens of the soldier and environmental factors to codify the culture/environment versus extant data analysis results. Interviews will include some of the following characteristics:
 - Variety of sample questions catered to each specific group of targeted individuals.
 - Questions would be pooled by gender, age, career management field, and rank to ensure the full perspective from various demographics.
 - Provide a comfortable environment with questions designed to encourage discussion without retribution of honest answers.
 - MEDCOM targeted interviews with health care professionals within the system.
- **Formal Observations**

According to Rosset (1987) “observations help find out optimal and actual performance, the environmental factors.” The use of observations will assist in providing a FEA resource tool aimed at securing accurate analysis of the current performance versus the desired performance within the context of the environment for the ACFT leg tuck (LTK) event.

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The direct observations of soldiers conducting the leg tuck event will help analyze and confirm extant data and provide real time feedback as to why female soldiers are not performing well within the ACFT leg tuck (LTK) event. In addition to analyzing and visualizing the problem value, information will be gained on the proper grader certification and administration of the ACFT leg tuck event. During the observation period a tailored checklist will be created to ensure the right analysis and metrics are being captured during the human performance of the task. The following components and methods will be used during the observation period.

- a) Have a clearly resourced method (*checklist*) of recording leg tuck (LTK) analysis.
 - b) Ensure checklist have clearly defined objectives for the observation.
 - c) Checklist will include proper relevant assessment questions and clearly defined observation techniques.
 - d) Checklist will contain additional notes columns for any observations not covered in the leg tuck event checklist.
 - e) Checklist will include section to record any interruptions and behaviors during the leg tuck event for the ACFT.
- **Subject Matter Analysis**

The ability to utilize subject matter experts in both the medical and physical fitness fields will be critical to providing the expert knowledge and insight for the human performance problem. Within this subject matter analysis, interviews of soldiers who have become experts at the leg tuck event by virtue of ACFT score, will be conducted to gain insight on the process and resources they used. Interviews of relevant profiling medical staff will be conducted to gain any possible contributing medical factors that may exist. Document examination will also be provided to subject matter experts to review (policy, procedures, manuals, etc.), ensuring the right foundation has been set for the leg tuck event. All relevant literature will be reviewed by the right subject matter expert as it pertains to their field of study.

Potential Causes and Solutions to the Performance Problem

On the surface the Army Combat Fitness Test Leg Tuck Event (LTK) seems like a simple task. Afterall, the current Army Standards only requires as seen in the following Figure 2, a minimum of one repetition to pass for those strenuous career management fields such as (*paralegal, human resources*), and five repetitions for the most strenuous career management fields such as (*infantry and special forces*).

Appendix 3 to Annex A, HQDA EXORD 219-18
Army ACFT FY20 Standards (As of 1 Oct 19)

Points	100	120	140	160	180	200	220	240	260	280	300
100	340	12.5	60	1.33	20	13.30					
99	340	12.4	59	1.36	19	13.39					
98	340	12.3	58	1.39	18	13.48					
97	330	12.1	57	1.41	18	13.57					
96		11.9	56	1.45	18	14.06					
95		11.8	55	1.48	17	14.15					
94	320	11.6	54	1.48	17	14.24					
93		11.5	53	1.51	17	14.33					
92	310	11.3	52	1.48	16	14.42					
91		11.2	51	1.48	16	14.51					
90	300	11.0	50	1.51	15	15.00					
89		10.9	49	1.51	14	15.09					
88	290	10.7	48	1.53	14	15.18					
87		10.6	47	1.53	13	15.27					
86	280	10.4	46	1.54	13	15.36					
85		10.3	45	1.55	13	15.45					
84	270	10.1	44	1.56	12	15.54					
83		10.0	43	1.57	12	15.63					
82	260	9.8	42	1.58	11	15.72					
81		9.7	41	1.59	11	15.81					
80	250	9.5	40	2.00	10	16.30					
79		9.4	39	2.01	9	16.39					
78	240	9.2	38	2.02	9	16.48					
77		9.1	37	2.03	8	16.57					
76	230	8.9	36	2.04	8	17.06					
75		8.8	35	2.05	7	17.15					
74	220	8.6	34	2.06	7	17.24					
73		8.5	33	2.07	7	17.33					
72	210	8.3	32	2.08	6	17.42					
71		8.2	31	2.09	6	17.51					
70	200	8.0	30	2.10	5	18.00					
69		7.9	29	2.11	4	18.09					
68	190	7.7	28	2.12	4	18.18					
67		7.6	27	2.13	3	18.27					
66	180	7.4	26	2.14	3	18.36					
65		7.3	25	2.15	3	18.45					
64	170	7.1	24	2.16	2	18.54					
63		7.0	23	2.17	2	18.63					
62	160	6.8	22	2.18	2	18.72					
61		6.7	21	2.19	1	18.81					
60	150	6.5	20	2.20	1	18.90					
59		6.4	19	2.21	1	19.00					
58	140	6.2	18	2.22	1	19.09					
57		6.1	17	2.23	1	19.18					
56	130	5.9	16	2.24	1	19.27					
55		5.8	15	2.25	1	19.36					
54	120	5.6	14	2.26	1	19.45					
53		5.5	13	2.27	1	19.54					
52	110	5.3	12	2.28	1	19.63					
51		5.2	11	2.29	1	19.72					
50	100	5.0	10	2.30	1	19.81					
49		4.9	9	2.31	1	19.90					
48	90	4.7	8	2.32	1	20.00					
47		4.6	7	2.33	1	20.09					
46	80	4.4	6	2.34	1	20.18					
45		4.3	5	2.35	1	20.27					
44	70	4.1	4	2.36	1	20.36					
43		4.0	3	2.37	1	20.45					
42	60	3.8	2	2.38	1	20.54					
41		3.7	1	2.39	1	20.63					
40	50	3.5	1	2.40	1	20.72					
39		3.4	1	2.41	1	20.81					
38	40	3.2	1	2.42	1	20.90					
37		3.1	1	2.43	1	21.00					
36	30	2.9	1	2.44	1	21.09					
35		2.8	1	2.45	1	21.18					
34	20	2.6	1	2.46	1	21.27					
33		2.5	1	2.47	1	21.36					
32	10	2.3	1	2.48	1	21.45					
31		2.2	1	2.49	1	21.54					
30	0	2.0	1	2.50	1	21.63					
29		1.9	1	2.51	1	21.72					
28	0	1.7	1	2.52	1	21.81					
27		1.6	1	2.53	1	21.90					
26	0	1.4	1	2.54	1	22.00					
25		1.3	1	2.55	1	22.09					
24	0	1.1	1	2.56	1	22.18					
23		1.0	1	2.57	1	22.27					
22	0	0.8	1	2.58	1	22.36					
21		0.7	1	2.59	1	22.45					
20	0	0.5	1	2.60	1	22.54					
19		0.4	1	2.61	1	22.63					
18	0	0.2	1	2.62	1	22.72					
17		0.1	1	2.63	1	22.81					
16	0	0.0	1	2.64	1	22.90					
15		0.0	1	2.65	1	23.00					
14	0	0.0	1	2.66	1	23.09					
13		0.0	1	2.67	1	23.18					
12	0	0.0	1	2.68	1	23.27					
11		0.0	1	2.69	1	23.36					
10	0	0.0	1	2.70	1	23.45					
9		0.0	1	2.71	1	23.54					
8	0	0.0	1	2.72	1	23.63					
7		0.0	1	2.73	1	23.72					
6	0	0.0	1	2.74	1	23.81					
5		0.0	1	2.75	1	23.90					
4	0	0.0	1	2.76	1	24.00					
3		0.0	1	2.77	1	24.09					
2	0	0.0	1	2.78	1	24.18					
1		0.0	1	2.79	1	24.27					

2:09		17:51	
2:10	5	18:00	HVY
2:14		18:12	
2:18	4	18:24	
2:22		18:36	
2:26		18:48	
2:30	3	19:00	SIG
2:35		19:24	
2:40		19:48	
2:45	2	20:12	
2:50		20:36	
3:00	1	21:00	MOD

Figure 2. Army ACFT 2.0 Standards

The act of hanging from a bar and pulling your knees up to near your shoulders does not seem to be exceedingly difficult. So why are so many female soldiers failing at this event within the Army Combat Fitness Test (ACFT)? The answer might not be as simple as it appears and can come from several different causes. During my time in the military as an infantry soldier both in and out of combat I have become a subject matter expert on the rigors of combat and the fitness that is needed to be successful. There are often various causes that influence and affect human performance problems. These human performance problems can be attributed to the following three categories and will be explained in the following sections:

- Skills/Knowledge
- Environmental
- Motivation/Incentives

While I acknowledge that all three factors can contribute and influence human performance in my research and determination there is heavy influence from both the skills/knowledge and environmental categories. In this section, the project will provide perspectives from the soldier (Micro) perspective, unit (Macro) perspective, and finally Army (Mega) perspective.

U.S. Army Leg Tuck (LTK) Possible Causes and Solutions			
Performance Problem	System Level	Potential Cause	Potential Solution
Knowledge/Skills, Incentives/Motivation	Micro, Macro, Mega	Lack of education and new conditional training on leg-tuck event.	Create an Army Troop school at each installation to certify all Army Team Leaders and above to become subject matter “train the trainer” experts on proper education and conditioning of the event.
Knowledge, Skills, Environmental	Macro, Mega	Lack of proper research and data collection from platoon level units through the Headquarters Department of the Army.	Headquarters Department of the Army (HQDA) institute mandatory unit data collection within the DTMS training and readiness dashboards.
Knowledge/Skills Environmental	Macro, Mega	Lack of trained and certified female Unit Mater Fitness Trainers.	Headquarters Department of the Army (HQDA) institutes mandatory policy requirement to ensure MFTs are both trained and certified using Quarterly Training Briefs as reportable compliance.
Environmental	Macro, Mega	Number of Resources (Bars) not present within unit footprints to professionally train for the leg tuck event.	Headquarters Department of the Army (HQDA) conducts Army Procurement Management Review and ensures budget is instituted to unit level for proper equipment for each installation.

Table 7. Possible Causes and Solutions Army Leg Tuck Event for Female soldiers

U.S. Army Leg Tuck (LTK) Possible Causes and Solutions Cont'd			
Environmental, Knowledge/Skills	Micro, Macro	Messaging campaign of fitness culture change to new ACFT is not being accepted by the force structure.	Headquarters Department of the Army (HQDA) must create Army Regulation (350-1) Training Requirement for all units that is reportable through DTMS training dashboard with focus on importance and reason on Army fitness culture change.
Knowledge/Skills, Incentives/Motivation	Micro, Mega	Elderly female soldier population was not asking in years of previous service to train the upper body strength required of the leg tuck event.	Headquarters Department of the Army (HQDA) must "Grandfather" in current older population with a data supported phase out timeframe to not require older female population to adhering to new leg tuck event standard. Train all new female recruits and determine appropriate age cut off based on statistical data collection.

Table 7. Cont'd Possible Causes and Solutions Army Leg Tuck Event for Female

Lack of Education and Training

There is a clear and concise lack of education and new conditional training on how a female performs on leg-tuck event. The subordinate units and Army both make assumptions that the female soldier simply needed to train and no special variables needed to be considered for the leg tuck event during the Army Combat Fitness Test (ACFT). This was not the case based on the statistical data previously mentioned and there should be an immediate solution within the knowledge/skills category of the human performance problem.

The solution is for the United States Army to leverage its installation troop school program and create a course that can be taken by all leaders in the leadership position of Team Leader and above. This troop school would have special emphasis on female performance within the event to include training techniques, biological facts, and implementation methods for female soldiers during the execution of the event. All levels within the system must be responsible to ensure that the female soldier (micro) performs successfully increasing (incentive/motivation), the unit (macro) sends soldiers to required troop school (knowledge/skills), and the Army (Mega) establishes the applicable school (knowledge/skills) to increase the overall human performance across the total force structure.

Lack of Research and Data

Within the research of this project the indication is that there was a lack of proper research and data collection from the Army to its subordinates' units from inception of the program until mandatory congressional review. The Army again assumed that all that was required from implementation was unit level training and allowance of proper time to train the event.

During its phase in of the total force structure conditioning phase the Army did not have effective reportable statistical data and research collection methods to understand the results of the leg tuck event. Without accurate research and statistical data for female performance in the leg tuck event the proper performance analysis was not conducted. To mitigate this cause in human performance the Army must get an honest and realistic data and research collection to determine if the event is both practical, obtainable, and possible based on the current expectations of standards for human performance.

A possible solution would be to have the Army leverage its already established Digital Training Management System (DTMS). The Army G-1 must institute rigorous and accurate data implementation reporting into the system based its diagnostic Army Combat Fitness Test training standards. The units (macro) must execute diagnostic reporting requirement within the DTMS in accordance with Army requirements (environmental) so that the Army (Mega) can collect the research and data to adjust its (knowledge/skills) associated with the leg tuck event. This research and data will help the Army (Macro) with the necessary adjustments to the event to increase the human performance of the female soldier.

Lack of Trained and Certified Master Fitness Trainers

During the research in this project, it was determined that a potential cause of degradation of the female soldier in the leg tuck event is a lack of unit female Master Fitness Trainers. There is a disproportioned number of male Master Fitness Trainers as compared to female within subordinate units in the Army. This is mainly because more males find themselves in those more rigorous career management fields where physical fitness is the foundation of job performance. Many of our female soldiers find themselves in low density career management fields where physical fitness excellence is not the norm. The new Army Combat Fitness test is more combat driven and rigorous than that of its predecessor the Army Physical Fitness Test. To mitigate this possible cause the Army must establish and require an appropriate female to male ratio for Master Fitness Trainers within the total force structure.

The Army can provide a solution by utilizing its existing Digital Training Management System (DTMS) and subordinate Quarterly Training Briefs (QTB) to ensure ratio compliance. Subordinate units (Macro) must ensure the proper ratio of female Master Fitness Trainers (MFT) are trained and certified to assist with the human performance for their fitness programs (Knowledge/Skills). The Army (Macro) needs to ensure an increased number of female Master Fitness Trainers effectively and efficiently are within subordinate units to place subject matter experts at the point of friction to increase the human performance.

Proper Resourcing

The proper resourcing for this event is not only necessary but it is critical to the success of the event. During research of this project, it has been determined that not enough of the required bars exist within unit footprints across the entirety of Army installations. You might ask yourself how does this solely affect the female population? Should it not affect the entire force? The short answer lies within the career management fields and demographics for females assigned to those units with rigorous physical standards. Long before the establishment of the Army Combat Fitness Test was the implementation of pull-up bars in unit footprints. The priority of establishing where bars would be placed in the Army procurement process was determined to be in those types of units whose physical daily demands are high. For obvious reasons before the establishment of the new physical fitness test decision has both validity and good reasoning. The Army is still using its procurement process to establish the necessary bar resourcing for proper training of the leg tuck event. Due to the high percentage of female soldiers

that do not have access to the right equipment can be a potential cause in the human performance problem.

The possible solution to this problem falls within the Army management procurement process review. The Army should leverage this process to increase budgeting for the proper resources for its subordinate installations and units. A review of current resources must be conducted and even distribution of budgeting must be allocated to those lower density career management field footprints to ensure the right tools are present for the desired human performance. The subordinate units (Macro) must accurately report resource deficiencies (environmental) to its higher headquarters so that the Army (Mega) can use its procurement management review to allocate the right proportion of resources (environmental) across the total force.

Messaging Campaign

The culture of the Army is all about history and traditions. With that culture comes a stern resistance against change. A possible cause of performance problem comes from Army history and traditions. In the past the female soldier had no need to compete against the male soldier in physical fitness as there has always been two different standards. The Army holistically has had a fundamental change in the fitness culture and in turn has tried a vigorous messaging campaign about the need to move to a gender and age neutral physical fitness testing standard. Unfortunately, this messaging campaign is either lost as subordinate unit level or simply not being accepted within the Army culture. There is a stern resistance from lack of understanding of the reasoning, methodology, and importance of a gender and age neutral physical fitness test. This lack of acceptance is leading to a lack of training and implementation of the leg tuck event. The event itself is difficult and requires an increased training focus for the female soldier. The lack of acceptance is leading to a lack of training which in turn is leading to a lack of human performance.

To mitigate this possible cause to the human performance problem, the Army must utilize its quarterly, semi-annual, and yearly Army Regulation (350-1) training requirement for the force. Every soldier in the Army has mandatory training requirements that range on a multitude of things such as (*Sexual Harassment, Equal Opportunity, Anti-Terrorism, Ethics, Army Values Training, Army Culture, Safety, etc.*). The creation of an interactive micro eLearning course with a foundation in training the reasoning, methodology, and importance of a gender and age neutral physical fitness test should be instituted to help change the Army culture. The creation of this course by the Army (Mega) can provide training (knowledge/skills) and provide the education to incorporate “buy in” (incentives/motivation) throughout the total force. The subordinate units (Macro) must ensure all soldiers within the formation conduct mandatory Army Regulation (350-1) training (knowledge/skills) regardless of gender to help fundamentally change Army history and traditions culture (incentives/motivations) to the increase and close the human performance gap.

Elderly Female Soldier Population

With a new change in physical requirements must come the understanding of how it affects the entire female population with the Army force. A possible cause for the current human performance comes from those in the elderly female population. A sudden change in physical requirements has caused issues, due to the Army not asking in years of previous service, for a female soldier to train the upper body strength required of the leg tuck event. This new requirement is causing injuries for older female soldiers within the shoulder and arm areas of the body. As a female soldier ages in the Army so does her body and not conditioning the physical upper body strength requirements of the leg tuck event is not only difficult, but not meeting the goals of the new Army Combat Fitness Test (ACFT) of reducing injuries. At some point in the aging process the training for the leg tuck event becomes counterproductive for the Army Combat Fitness Tests (ACFT) overall goals and objectives.

This specific possible cause is an exceedingly difficult one to overcome as there is not a way to stop the aging process. A possible solution to the cause may come in the form of conducting research to determine the appropriate age to “grandfather” in the existing elderly female soldier population. The research should drive the point at which negative gains are determined for the performance of the leg tuck event. The “grandfathered” population would be exempt from the leg tuck event and eventually fade out of the Army service. Consequently, the Army (Macro) could focus on conditioning and training (knowledge/skills) the new recruits from the start of service for the increased upper body strength requirements of the leg tuck event. The new recruits (Miro) would be conditioned and trained to execute proper form, reduce injury, and compete fairly (incentives/motivation) within the requirements of an age and gender-neutral physical fitness test.

Conclusion

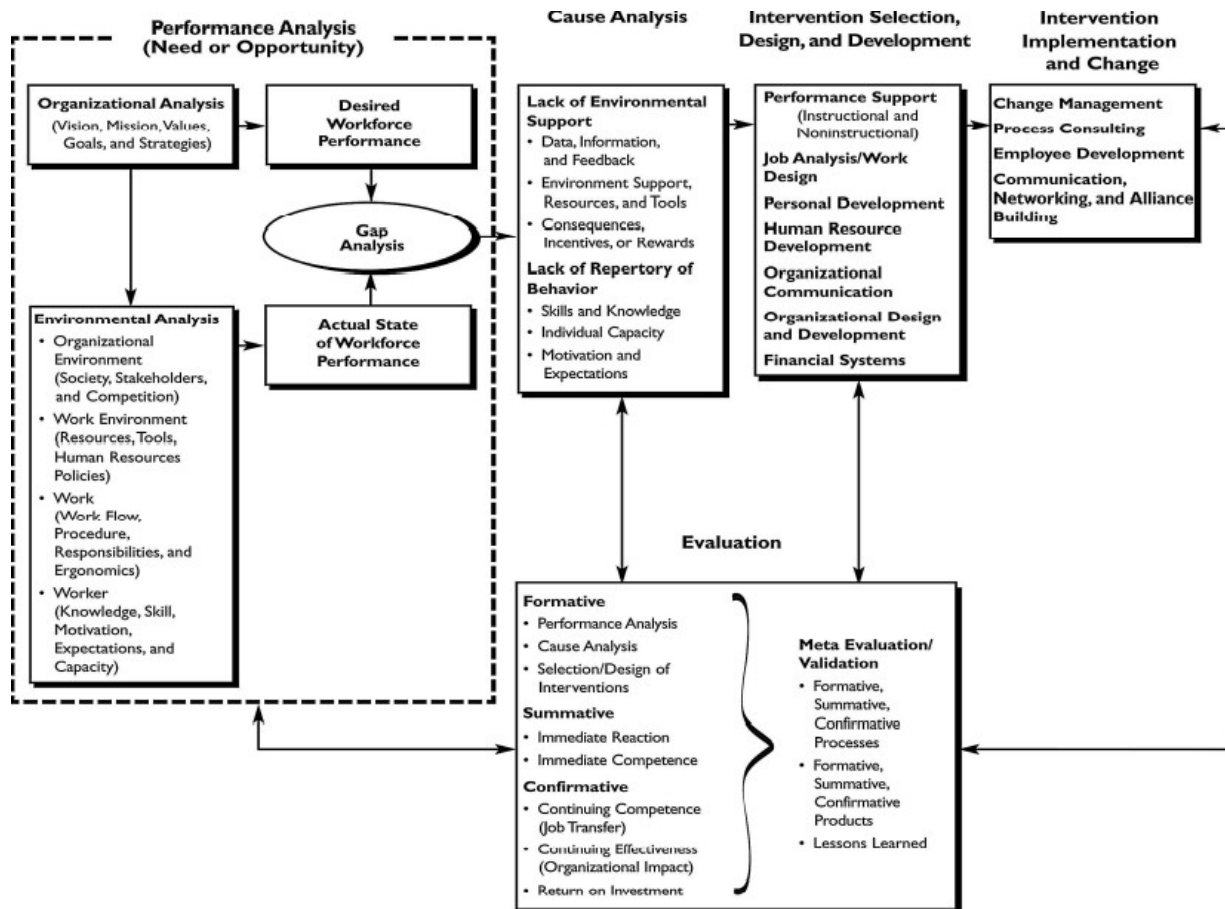
In conclusion, the possible causes and solutions outlined within this project through the front-end analysis process can help close the current human performance gap of 57% of negative results for the leg tuck event in the Army Combat Fitness Test (ACFT). It is vitally important that the Army take a holistic and systematic approach at solving this human performance deficiency from its current state to the desired state. Without coming up with a systematic way to closing the gap it will continue to erode Army readiness, not allow many female soldiers for continued service, further degrade public relations, and hinder the United States Army’s ability to accomplish its mission. The Army stands on the being able to deploy, fight and win our nations wars by providing a resilient, capable, and physically fit force to defeat any enemy on the modern battlefield.

The female soldier plays a critical role in meeting the Army vision. The Army would not be able to accomplish its assigned mission without the unique skill set the female soldier brings to the fight. The diversity and experience they bring contributes invaluable talents, knowledge, skills, and motivation to the entire force. The bottom line is that the Army is a much better force with women than without.

As a future instructional designer this project has allowed me the opportunity to apply the Human Performance Technology Model (HPT) to this unique problem. The Human Performance Technology Model (HPT) and its application within this project has proven to be an outstanding front-end analysis tool in helping the organization to determine the best possible causes and solutions. The use of other tools such as extant data analysis, surveys, interviews, formal observations, and subject matter analysis in combination with the Human Performance Technology model have help demonstrate the importance and value in the systematic front-end analysis process. I hope this project ultimately leads the Army organization to helping achieve a reduction in the human performance gap so that the female soldier may

Appendix A

Human Performance Technology Model



Source. From *Fundamentals of Performance Technology: A Guide to Improving People, Process, and Performance* by D.M. Van Tiem, J.L. Moseley, and J. C. Dessinger, 2004, p. 3. Reprinted with permission of John Wiley & Sons, Inc.

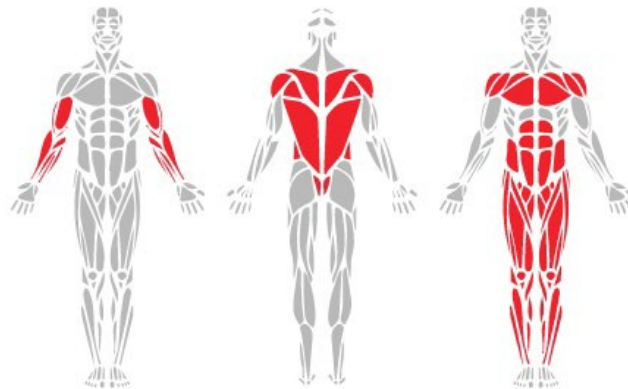
FIGURE 1. 2004 HUMAN PERFORMANCE TECHNOLOGY MODEL

Appendix B

Army Leg Tuck Event Breakdown

LEG TUCK: Complete as many leg tucks as possible; maintain a relative vertical posture while moving the hips and knees up and down without excessive swinging.

The LTK assesses the strength of the Soldiers grip, arm, shoulder and trunk muscles. These muscles assist Soldiers in load carriage and in avoiding injuries to the back.



FITNESS COMPONENTS

Muscular strength and endurance



STANDARD EQUIPMENT

LEG TUCK: Climbing bar



FIELD TEST

60 and 100 point scores

LEG TUCK: One and 20 reps

Appendix C

ACFT 2.0 Scoring Standards

Army ACFT FY20 Standards (As of 1 Oct 19)						
Points	MDL	SPT	HRP	SOC	LTK	2MR
100	340	12.5	60	1:33	20	13:30
99		12.4	59	1:36		13:39
98		12.2	58	1:39	19	13:48
97	330	12.1	57	1:41		13:57
96		11.9	56	1:43	18	14:06
95		11.8	55	1:45		14:15
94	320	11.6	54	1:46	17	14:24
93		11.5	53	1:47		14:33
92	310	11.3	52	1:48	16	14:42
91		11.2	51	1:49		14:51
90	300	11.0	50	1:50	15	15:00
89		10.9	49	1:51		15:09
88	290	10.7	48	1:52	14	15:18
87		10.6	47	1:53		15:27
86	280	10.4	46	1:54	13	15:36
85		10.3	45	1:55		15:45
84	270	10.1	44	1:56	12	15:54
83		10.0	43	1:57		16:03
82	260	9.8	42	1:58	11	16:12
81		9.7	41	1:59		16:21
80	250	9.5	40	2:00	10	16:30
79		9.4	39	2:01		16:39
78	240	9.2	38	2:02	9	16:48
77		9.1	37	2:03		16:57
76	230	8.9	36	2:04	8	17:06
75		8.8	35	2:05		17:15
74	220	8.6	34	2:06	7	17:24
73		8.5	33	2:07		17:33
72	210	8.3	32	2:08	6	17:42
71		8.2	31	2:09		17:51
70	200	8.0	30	2:10	5	18:00
69		7.8	28	2:14		18:12
68	190	7.5	26	2:18	4	18:24
67		7.1	24	2:22		18:36
66		6.8	22	2:26		18:48
65	180	6.5	20	2:30	3	19:00
64	170	6.2	18	2:35		19:24
63	160	5.8	16	2:40		19:48
62	150	5.4	14	2:45	2	20:12
61		4.9	12	2:50		20:36
60	140	4.5	10	3:00	1	21:00

HVY

SIG

MOD

Appendix D

FM 7-22 Approved Climbing Bar Specifications

LAYOUT

Figure B-1 shows the climbing bar layout required for toughening and sustaining phase PRT drills.



Figure B-1. Climbing bars

SPECIFICATIONS

The specifications for the climbing bars follow:

- Five posts.
 - Each of the five posts measures 6 inches square by 12 feet long.
 - Each post is sunk 3 feet into the ground.
- Two bars.
 - Each of the two bars is a threaded water pipe.
 - Each bar measures 1.5 inches outside diameter by 12 feet long.
 - Each bar has two 1-inch deep end caps.
 - The bars are through the 6 by 6s at 7.5 and 8 feet above the ground.
- The distance from inside post edge to inside post edge is about 62 inches (Figure B-2). This is to allow enough bar space to conduct all exercises safely.
- The step-ups (16 inches long) are cut from 4 by 4 inches by 8-foot posts and secured to the 6 by 6s with 3-inch screws that are countersunk.
- The step-ups on the outside 6 by 6 posts are 18 inches from the ground; the step-ups on the inside post are 24 inches above the ground (Figure B-3).

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