UXO Team Leadership:
How a leader creates and handles an effective unexploded ordnance (UXO) team

by

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UXO TEAM LEADERSHIP:

HOW A LEADER CREATES AND HANDLES AN EFFECTIVE UNEXPLODED ORDNANCE (UXO) TEAM

A Final Dissertation

Presented to the

Faculty of the

School of Business Administration

Kennedy-Western University

In Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy in

Business Administration

by

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Abstract of the Study

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THE PROBLEM

The primary purpose of this study was to provide an analysis of the effectiveness of leadership through the interpersonal relationship between a team leader and a team. This research paper attempted to define "how" leaders create and handle effective teams. Specifically, this study was focused on UXO teams in a UXO environment performing a UXO clearance project still in progress. It was the aim of this study to provide information that will be beneficial to team leaders and will contribute to improvement of UXO team leadership techniques.

METHOD

This research evaluated the relationship between the leadership demonstrated by team leaders and the effectiveness and productivity of the teams. Adoption and use of Frank LaFasto and Carl Larson's (2001) six key dimensions (focus on the goal, ensure a collaborative climate, build confidence, demonstrate sufficient technical know-how, set priorities, and manage performance) provided the basis for this study. Frank LaFasto, Ph.D. and Carl Larson, Ph.D. developed the survey instrument adopted for this study, known as the "Collaborative Team Leader Instrument," from an evaluation of approximately 600 team leaders and measures team leader effectiveness across the six key dimensions.

FINDINGS

The findings identified in this study provide some empirical support and insight into the strengths and weaknesses found in one case study. The findings revealed positive correlation in many of the researched areas within each hypothesis in the relationships and perceptions between team leaders and team members. However, the findings also indicated considerable negative correlation within one of the dimensions, the demonstration of sufficient technical know-how, which was actually

expected to be one of the strongest.

Overall it is concluded that this research has made an important contribution towards defining: how a leader creates and handles an effective unexploded ordnance team. The findings of this study should be beneficial to team leaders and contribute to improvement of UXO team leadership techniques.

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Chapter 1

INTRODUCTION TO THE STUDY

The study of leadership is a widely documented subject. Many people today from various levels within an organization are seeking to understand the concepts of leadership. As organizations are reorganizing due to globalization and the need to be innovative in a constantly changing environment, the value of sound leadership skills, continuous performance improvement, and effectiveness are becoming more and more important at the team level. Csoka (1998) believes that “only human creativity and commitment – not technology – can deliver success” through sound leadership practices (p. 7).

The use of teams in the work environment has expanded within various industries, but is not new to the Unexploded Ordnance (UXO) industry involved in UXO clearance. Specifically, these teams are involved in UXO clearance projects throughout the nation and world. Typically, the work site is geographically separated from the corporate office by many miles. These work teams, composed of non-UXO qualified personnel and UXO qualified personnel, or just UXO qualified personnel all led by a UXO qualified team leader, perform the core work of the company. They convert

technical knowledge and labor into clearance services for a client. Cohen and Bailey (1997) reflect the traditional model for a work team as being led by a supervisor who directs what needs to be accomplished, how it is to be accomplished, and who will perform the task. The leadership of the work teams being addressed in this study is consistent with this traditional model.

Most of the UXO qualified personnel are former military Explosive Ordnance Disposal technicians and are graduates of the Naval School Explosive Ordnance Disposal. This school varies in length from 42 weeks for Army, Air Force and Marine Corps candidates to 51 weeks for Navy candidates. Navy candidates receive an additional nine weeks of dive school training at the Naval Diving and Salvage Training Center. Explosive ordnance disposal training common to all the services includes the following subject areas:

- Core classes: ordnance identification, safety precautions, publications and reconnaissance techniques
- Demolition of explosives
- Explosive ordnance disposal tools and methods
- Biological/chemical ordnance
- Ground ordnance: landmines, grenades, booby traps and projectiles, mortars and rockets

- Air ordnance: bombs, missiles, gun systems, and aircraft explosive hazards
- Improvised explosive devices: homemade bombs and terrorist devices
- Nuclear weapons: basic nuclear physics, radiation monitoring and decontamination procedures

Additional training provided to Navy candidates includes:

- Underwater ordnance: torpedoes, mines and underwater explosive devices
- Underwater tools and techniques: specialized diving and recovery techniques associated with underwater ordnance

Recently Texas A & M University established a civilian course of instruction that duplicates the military curriculum and will qualify UXO personnel at the apprentice level. After fulfilling time and on the job training requirements, these civilian-trained personnel will be promoted to the technician level. It is anticipated that this additional source of qualifying UXO personnel will alleviate the current shortfall within the industry due to the limited number (approximately 600) UXO technicians worldwide.

The targets of this research are UXO work teams involved in a UXO clearance effort of an isolated island that was used as a training range. It

was fired upon from the sea, land, and air for 45 years. The island is to be cleared of unexploded ordnance and environmentally restored.

Unexploded ordnance poses an extreme risk to human life and the environment. The UXO detection and clearance methods form the core of the UXO clearance process. These two methods are separate, but interrelated to complete the clearance process. The technical steps of the UXO clearance process are identified in Figure 1 UXO Clearance Process. This process incorporates the various regulatory, technical, and contractual requirements into a single, integrated process. All phases of the process are accomplished in accordance with approved work plans and standard operating procedures. The scope of the work effort may entail surface clearance only or both surface and subsurface clearance. The process starts with the pre-investigation archival search phase during which all existing published documentation in all functional areas is reviewed. Remediation of UXO contaminated areas consists of the following phases:

1. Establishment of work area boundaries and grid map unit work areas
2. Discovery and recording of UXO/OE (other explosive) concentrations, historic property surveys, and environmental conditions report
3. Area preparation and surface sweep
4. Subsurface geophysical detection

5. Excavation of anomalies
6. Clearance of all safe-to-move UXO, UXO-related remnants, target materials, and non-UXO-related materials from the designated work areas
7. Debris and remnant management
8. UXO disposal
9. Quality control
10. Quality assurance.

For surface or Tier I clearance, phases 1-3 and 6-10 are required; for subsurface or Tier II clearance, all the aforementioned phases are completed. Each one of these phases will be described briefly to establish an understanding of the purpose of each phase within the clearance effort and the potential impact of each phase on a team's effectiveness and success.

The establishment of the work area boundaries and grid map unit work areas phase involves the smallest team element within the clearance effort, two people - a surveyor and a UXO escort. The UXO escort guides the survey team, while identifying, marking, and avoiding encountered UXO. The surveyor utilizes a Global Positioning System instrument to establish grid map units that are typically 100 meters square. After the UXO escort determines the location to be clear of any surface UXO or

subsurface anomalies, the corners of the grid map unit are determined and marked with wooden stakes. The wooden stake is marked with an eight-digit number that represents the east/west and north/south coordinate values. Establishment of a grid map unit establishes a specific location on the island and facilitates command and control of teams dispersed throughout the island by Range Control.

The discovery phase consists of two activities: area assessment and data recording. Area assessment is a gross characterization of a field condition assessment completed by three personnel providing four functional area perspectives: UXO, historic properties, natural resources, and environment. The UXO supervisor directs the assessment of the grid map unit. The objective for the UXO supervisor is to identify, mark, and record surface UXO and other potential explosive hazards. The types and density of UXO, UXO-related remnants, target materials, and non-UXO related materials within the grid map unit are recorded.

The historic properties person identifies and marks previously recorded and new historic properties within the grid map unit. This information will enable the historic properties functional manager to determine impact and mitigation measures for the protection of historic properties from further clearance efforts.

One representative handles both the natural resources and environmental functional areas. The existing vegetation is documented by type, species, and density. Endangered species are marked and recorded. Additionally, the environmental conditions within the grid map unit, including soil conditions, slope, and terrain are noted.

The next phase is the data recording activity of the assessment phase, which involves further documentation of known historic properties and the initial recording of new sites. Site descriptions, maps, and records for each historic property are prepared. A data recording team consists of one archaeologist and one UXO escort.

Next is the area preparation and surface sweep phase. Activities include the manual removal or controlled burning of vegetation that impedes the ability of personnel to effectively sweep the surface of the ground with detection equipment. Then surface sweep operations are conducted, which entails the removal or clearance of UXO, UXO-remnants, non-UXO related material, and target materials from the surface of the island. Usually the same team, known as the area preparation team, consisting of one UXO supervisor and seven laborers, is responsible for conducting both the area preparation phase and surface sweep phase. For the heavily contaminated areas, a specialized range clearance team is formed and equipped with heavy equipment to better tackle these areas.

One UXO supervisor, five UXO specialists, ten laborers, and one heavy equipment operator for a total of 17 people comprise this team.

A subsurface geophysical detection operation involves detecting and marking subsurface anomalies with a geophysical detection instrument that provides its operator visual and audible signals. The development of new, more sensitive instrumentation has allowed the discovery of deeper and smaller targets. Unfortunately, this has led to an associated increase in project cost and level of effort as each object discovered must be excavated. This team consists of two personnel: a geophysicist and a geophysicist's assistant.

Excavations are conducted to investigate and identify subsurface target anomalies to a contract depth. For this project, the depth is four feet. With the improved detection technology, the result has been an increase in the number of UXO excavated and a dramatic increase in the amount of non-UXO excavated. The manning of an excavation team varies based on the tasking. Typically, it consists of one UXO team leader, five UXO specialists, and one UXO heavy equipment operator.

The next two phases involve the clearance of all safe-to-move UXO, UXO-related remnants, target materials, and non-UXO-related materials from the designated work areas and debris and remnant management. These material management operations involve the collection, inspection,

segregation, accounting, demilitarization, and thermal treatment of materials collected from the UXO clearance activities. Material management teams vary in size based on their tasking. Material management teams, responsible for collection of materials, consist of one UXO team leader, one UXO specialist, and one material management specialist. The material management team responsible for manning the explosive inspection point, where materials are inspected, segregated, and accounted, consists of one UXO team leader, two UXO specialists, four material management specialists, and two heavy equipment operators. The material management team responsible for demilitarization and thermal treatment consists of one material management specialist supervisor and four material management specialists.

The UXO disposal phase consists of two activities: UXO access and identification and destruction. Each UXO item is positively identified during the access and identification phase and a specific disposition made as to the most appropriate destruction method. In some instances UXO items can be safely moved and consolidated in a central location; other times the fuzing, size of the item, or location precludes transport, and the item is detonated where it is found.

Contractor quality control inspections and surveillances followed by client quality assurance activities validate quality of work and compliance

with the contract. Defects and re-works are managed through the clearance control process by establishing points of control, implementing measurements, regulating the process through feedback, and performing corrective action. The quality control team varies in size from three to five people each led by a UXO team leader. A quality assurance team is not a contractor team and belongs to the client. It will not be addressed in this study.

The performance measure for each phase of the UXO detection and clearance process is depicted in Table 1 below. These measures are specified further in the quality assurance project plan, which elaborates the periodicity of the checks. Immediate feedback to the UXO detection and clearance process enables further refinement to the phases.

Table 1 Performance Measures for Processes

Process	**Activity**	**Performance Measure**
Area pre-investigation	Documentation research	Accuracy
Establish grid map unit and work area boundaries	Survey stakeout	Safety, accuracy, speed Production goal
Area Assessment	Field surveillance	Safety, accuracy, speed Production goal
Assessment Review	Quality checks	Accuracy
Area Preparation	Brush removal and selective pruning of trees	Safety, speed Production goal

Process	Activity	Performance Measure
Surface Sweep	Surface UXO clearance	Safety, accuracy, speed No missed UXO items All large pieces of metal removed per contract specification Production goal
Subsurface Detection	Geophysical detector sweep and marking location of suspected UXO	Safety, accuracy in marking locations, speed Complete ground coverage No missed UXO items Production goal
Anomaly Review	Quality checks	Accuracy
Excavation	Excavation of UXO	Safety, accuracy, speed Locate and excavate all marked items Production goal
UXO Identification and Assessment	Identification and disposition assessment of all UXO found	Safety, accuracy, speed Positive identification Accurate disposition assessment
Disposition Review	Quality checks	Accuracy
UXO Destruction	Destruction of UXO	Complete destruction Safety, accuracy
Debris Remnant Management	Collect and sort all debris from UXO	Safety, accuracy, speed No UXO passes through sorting process
Survey/marking	Final land survey	Safety, accuracy Production goal
Records	Documentation of all activities	Accuracy
Certification	Quality checks	Accuracy