Capturing Insights from Firefights to Improve Training

DARPA Phase I Final Report

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Key Personnel

- ## Scott Scheff
  - Principal Human Factors Engineer (HF Designworks)
  - Principal Investigator

- ## Angie Sebok
  - Principal Human Factors Engineer (Alion Science)
  - Associate Investigator

- ## Charles Hutchins, PhD.
  - Subject Matter Expert (HF Designworks)
  - Licensed Therapist

- ## Tyler Herman
  - Subject Matter Expert (HF Designworks)
  - Recent combat tours in Iraq and Afghanistan

Agenda

- Project Overview

- Database

- Interviews

- Integrated Performance Modeling (IPME) Results

- Critical Findings and Recommendations

- Conclusions

Project Overview

- Information Gathering
  - SME Discussions
  - Fatality Databases
  - Soldier Interviews

- Data Analyses
  - Statistical coding and analyses of databases and interviews
  - Modeling and simulation
  - Identification of survivability factors

- Identify Current Soldier Issues
  - Critical fatality time periods
  - Training gaps
  - Information gaps
  - Equipment gaps

- Path Forward: Sharing our findings and Phase II

Databases

- **US database** encompasses all publicly available US Military Fatalities in Iraq and Afghanistan from 1 January 2007 to 1 September 2009
  - 1,770 total fatalities tracked; Complete data set for 1,654 individuals
  - Soldier information (name, age, gender, rank)
  - Date and location of fatality
  - Unit information & Branch of Military
  - Cause of fatality
    - Combat – direct firefight
    - Hostile – IEDs, suicide bombers, car bombs, etc.
    - Non-combat – accidents, suicides, etc.
  - Time in tour before fatality
  - Miscellaneous
    - Number of tours (when available)

When we could not find the databases we needed, we developed our own

- **UK database** encompasses all publicly available UK Military Fatalities in Iraq and Afghanistan from 1 January 2007 to 1 September 2009
  - 215 total fatalities tracked; Complete data set for 206 individuals
  - Each entry includes data similar to that found in US database
    - Name, Date of fatality, Age, Gender, Rank, Unit information, Military branch, location of fatality, cause of fatality, time in tour before fatality
  - UK database helps to corroborate statistical findings and offer additional useful information

Databases

All fatality database entries were created from data found through a combination of various public websites

Shown below: screen captures of The Washington Post Faces of the Fallen website and Zeitlangers.com war fatality database

Overall Database Findings

- Analyses explored for both US and UK forces:

  - Number and percent of fatalities by **time in tour**

  - Number and percent of fatality by **service branch**

  - Number and percent of fatalities by **season**

  - Number of fatalities by time in tour by **branch**

  - Mean **ages** of fatalities by **branch**

  - Number of fatalities by **rank**

  - Cause of fatalities

  - Cause of fatalities by time in tour

  - Fatality **by country** of occurrence

  - **Trend analysis** - top causes of US Soldier fatalities from 2004 data and HFDW 2007-2009 data

For a complete list of database graphs see Final Report or Backup Slides section of this presentation

	2004 Data	HFDW Data
Improvised Explosive Device	22.9%	45.96%
Small-Arms Fire	23.3%	14.06%
Helicopter Downed	4.4%	4.23%
Grenade/ Rocket Propelled Grenade	4.2%	2.65%
Rocket/Mortar	1.2%	1.30%
Sniper	1.4%	0.51%

2004 Data Source: http://www.centcom.mil/CENTCOMNews & http://casualties.org/oif/stats.aspx, 5 OCT 04

HFDW Data Sources: http://www.globalsecurity.org/ & http://antiwar.com/casualties/list.php & http://iraq.pigstye.net & www.zeitlangers.com & http://projects.washingtonpost.com/fallen/ & http://www.defenselink.mil, 1 MAY 09

Final Statistical Findings: US Database

Fatalities by Time Into Tour by Branch

Fatality by Time into tour by Branch of Military

Final Statistical Findings: UK Database

Fatalities by Time in Tour by Branch (UK)

Fatality by Time into tour by Branch of Military
*Note that the majority of British deployments are approximately six months long

Final Statistical Findings: US vs. UK

Fatality by Branch (combined US and UK)

Number of fatalities by branch for US and UK soldiers.

Soldier Interviews

- Individual and group interviews with US combat veterans
  - 25 total participants
    - Representing Army, Marines, and Navy
    - All with small arms combat experience
  - 18 individual interviews with combat veterans
  - Group interview with 7 combat veterans
  - 54 tours of duty total combined experience of participants

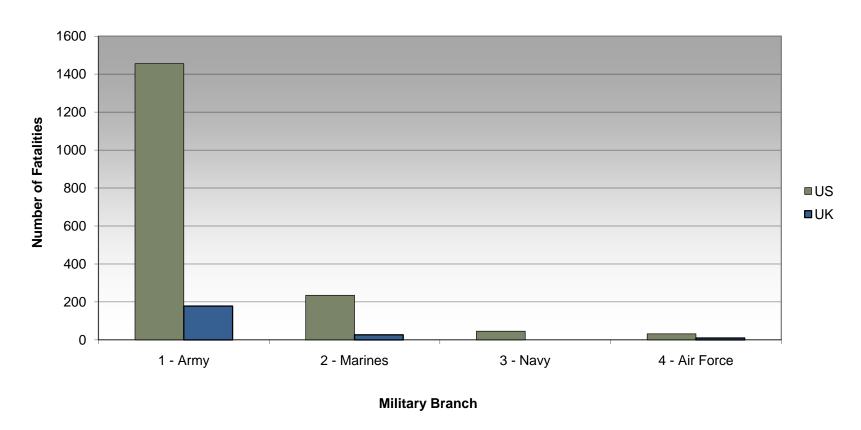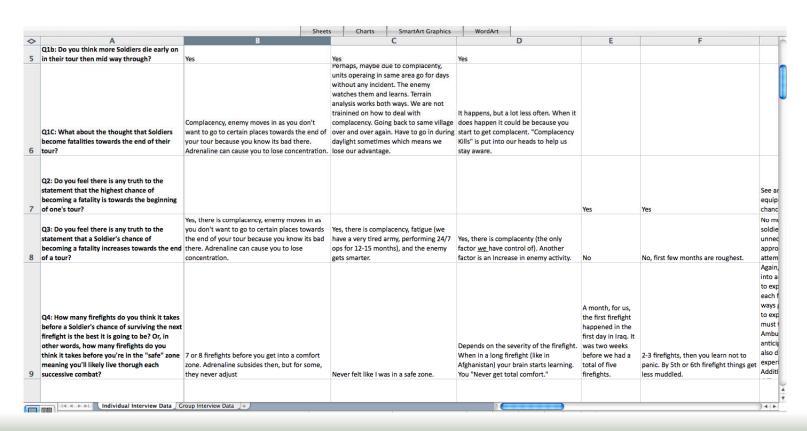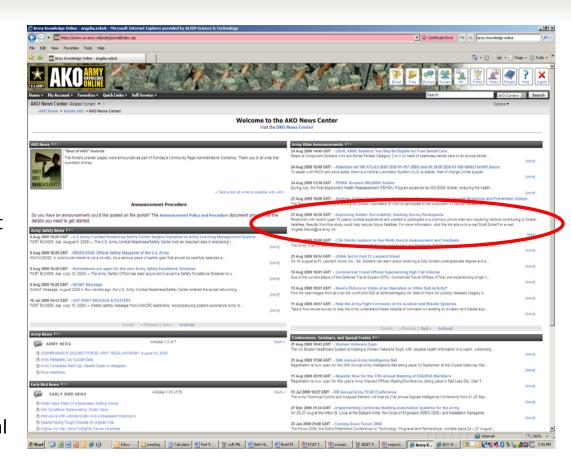|	A	B	C	D	E	F	
5	**Q1b: Do you think more Soldiers die early on in their tour then mid way through?**	Yes	Yes	Yes			
6	**Q1C: What about the thought that Soldiers become fatalities towards the end of their tour?**	Complacency, enemy moves in as you don't want to go to certain places towards the end of your tour because you know its bad there. Adrenaline can cause you to lose concentration.	Perhaps, maybe due to complacency, units operaing in same area go for days without any incident. The enemy watches them and learns. Terrain analysis works both ways. We are not trainined on how to deal with complacency. Going back to same village over and over again. Have to go in during daylight sometimes which means we lose our advantage.	It happens, but a lot less often. When it does happen it could be because you start to get complacent. "Complacency Kills" is put into our heads to help us stay aware.			
7	**Q2: Do you feel there is any truth to the statement that the highest chance of becoming a fatality is towards the beginning of one's tour?**				Yes	Yes	See ar equip chanc
8	**Q3: Do you feel there is any truth to the statement that a Soldier's chance of becoming a fatality increases towards the end of a tour?**	Yes, there is complacency, enemy moves in as you don't want to go to certain places towards the end of your tour because you know its bad there. Adrenaline can cause you to lose concentration.	Yes, there is complacency, fatigue (we have a very tired army, performing 24/7 ops for 12-15 months), and the enemy gets smarter.	Yes, there is complacency (the only factor _we_ have control of). Another factor is an Increase in enemy activity.	No	No, first few months are roughest.	No m soldie unneo appro attem
9	**Q4: How many firefights do you think it takes before a Soldier's chance of surviving the next firefight is the best it is going to be? Or, in other words, how many firefights do you think it takes before you're in the "safe" zone meaning you'll likely live thorugh each successive combat?**	7 or 8 firefights before you get into a comfort zone. Adrenaline subsides then, but for some, they never adjust	Never felt like I was in a safe zone.	Depends on the severity of the firefight. When in a long firefight (like in Afghanistan) your brain starts learning. You "Never get total comfort."	A month, for us, the first firefight happened in the first day in Iraq. It was two weeks before we had a total of five firefights.	2-3 firefights, then you learn not to panic. By 5th or 6th firefight things get less muddled.	Again, into a to exp each f ways i to exp must t Ambu anticij also d experi Additi

Individual Interview Data — Group Interview Data
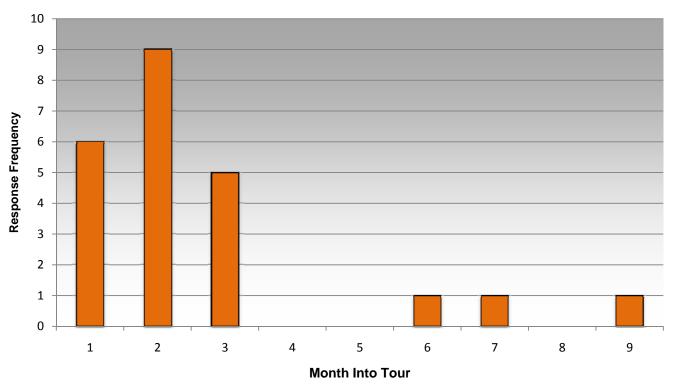
Soldier Interviews

- Offered a first-hand account of the conditions and needs on the ground

- Interviews gave insight into possible fatality causes and methods of improving warfighter survivability

- Allowed those who have seen combat to voice their opinions and concerns about current issues such as training, equipment, and practices

- Participants were recruited from several sources, such as Army Knowledge Online (AKO), Soldier centric websites, Walter Reed Medical Center, and HF Designworks SMEs
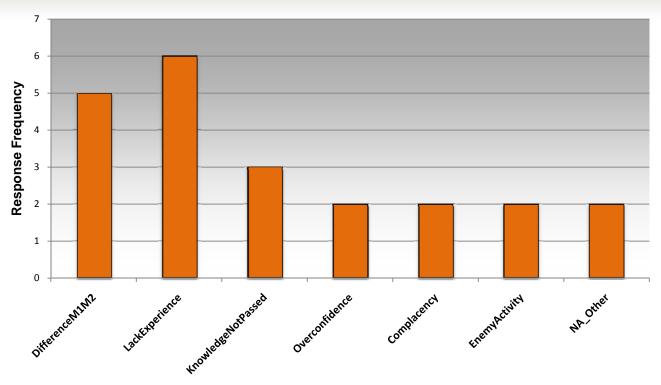
Soldier Interviews

Months in Which Soldiers Feel the Most Firefight Related Fatalities Occur

Of 23 Soldiers interviewed, 20 felt that the months at which the most firefight related casualties occur was either month one, two, or three. Month two was the most frequent response, with nine Soldiers responding with this month.

Soldier Interviews

Cause for Increased Fatalities at 2nd Month of Tour

Lack of experience was most often cited as the cause for an increase in fatalities (six Soldiers felt this way). Five Soldiers attributed this increase in fatalities to a change between months one and two in combat, such as Soldiers becoming more comfortable in their second month of deployment and more likely to push boundaries; also that the old unit returns home in the new unit's second month, leaving the new unit more vulnerable

Soldier Interviews

Cause for Increased Fatalities at 6th Month of Tour

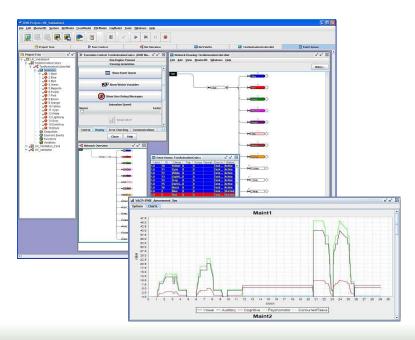The most common cause mentioned for the six-month spike in fatalities was complacency. Eight Soldiers felt that there is high amount of complacency at this time. The next most common response was that the enemy observes and learns about tactics and adapts to them.

Integrated Performance Modeling Environment (IPME)

- Integrated Performance Modeling Environment (IPME)
  - Provides a realistic representation of humans in complex environments
  - Interoperability with other models and external simulations
  - Enhanced usability through a user friendly graphical user interface

- Supports Manpower and Personnel Integration (MANPRINT) and Human Systems Integration (HSI)

- Dynamic event network modeling tool designed to help assess warfighter performance

- Scenarios that were developed and modeled
  - IED
  - Two separate sniper scenarios provided by SME

- Factors that were investigated
  - Fatigue
  - Time of day
  - Training
  - Complacency

Scenario from SME:
A platoon conducts a 7-day rotation inside a city.
* Do a rolling observation
* Every 24 hours the platoon occupies a new house
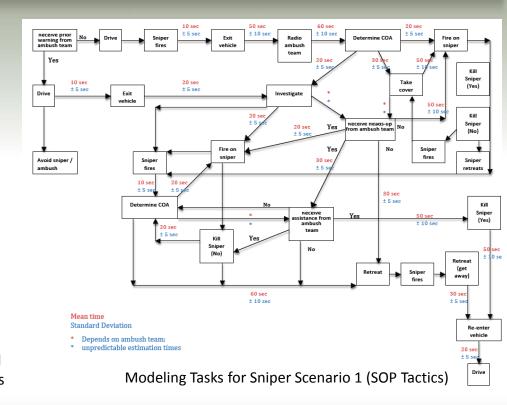* Repeat this every morning at 0600

The enemy
* watches and learns the pattern
* identifies places for an ambush or sniper attack

To counter this, the platoon continue the routine, while setting up US Sniper locations.
The enemy does not know of the US sniper teams.

When the enemy sets up a sniper attack/ambush
US snipers see their actions and ambush (preempt) their attack.

The model captures the Soldier tasks and outcomes for the period immediately after leaving the house until the sniper encounter has ended (either with a retreat, sniper kill, or Soldier kill).

Modeling Tasks for Sniper Scenario 1 (SOP Tactics)

The sniper scenarios provide a glimpse into the tasks and decisions that determine the outcome of a firefight and allow us to examine the factors that affect Soldier Survivability in a combat situation.

Each condition (Soldier factor) run 160 times (16 scenario conditions, 10 times each).

Variables of sniper skill, sniper concealment, Soldier concealment, and visibility (ability to see sniper) run against each Soldier factor of Fatigue, Complacency, Training, and Experience.

Summary of Findings and Recommendations

Finding #	Finding	Source	Recommendations
1	US Soldiers have the highest likelihood of becoming a combat fatality during their second and third month of a tour.	FD, II, GI	Consider greater overlap or consider keeping key individuals in theater longer to better transition new unit personnel and to reinforce the relationship with locals (local intelligence).
2	In addition to the second and third month of a tour, US Soldiers also have an increased likelihood of becoming a fatality mid-way through their tour, and near the end of their tour.	FD, II, GI	Consider in-deployment training to reduce complacency, break up monotony, and maintain focus. Add variety, change up troop movements and everyday activities to break up monotony and avoid insurgent adaptability.
3	Fatalities most commonly due to IEDs, Snipers, and Small-arms fire.	FD	Ensure that Soldiers know the most common/likely causes of fatalities in their area of operations and how to best avoid these types of fatalities. Ensure latest information regarding enemy tactics is flowed down to Soldiers.
4	US tactics might not be changed fast enough, allowing enemy to adapt.	II, GI	Push changes in tactics and latest reports [Tactics, Techniques, Procedures (TTPs), lessons learned, After Action Reviews (AARs)] out to troops in the field as *frequently and quickly as possible*. Update and change TTPs frequently to avoid predictability/enemy adaptability.
5	Soldiers are unhappy with current Rules of Engagement (ROEs).	II, GI	Re-examine ROEs, allow fielded troops to have input. Allow ROEs to be updated by combat veterans and those in the field. 25% of Soldiers interviewed expressed concern with Rules of Engagement.
6	Communication structure and communication equipment is in need of revision.	II, GI	Update communication structure in order to get the most recent and useful information and tactics to the Soldiers heading into combat. Review the communication equipment in the field to replace outdated and ineffective equipment.
7	Soldiers feel that leadership selection needs altering.	II, GI	Examine leader selection process. 33% of Soldiers that were interviewed expressed displeasure with leadership. Soldiers were concerned that some leaders' priorities lie in their career, not their unit. Perhaps allow some leaders to stay in theater even after their unit rotates out to keep up with local Intel and provide a support network for Soldiers rotating in.

A complete write up of each finding is included in the Phase I Final Report.

Source Key:
FD: Fatality Databases
LV: Lit Review
II: Individual Interview
GI: Group Interview

Summary of Findings and Recommendations

Finding #	Finding	Source	Recommendations
8	Field manuals can be outdated and oftentimes might not be applicable to current combat situations.	II, GI	Ensure that the latest and most crucial lessons and tactics are being integrated into field manuals and that these manuals get to the field quickly so they are relevant to the current environment. "Takes about 10 years to update Army manuals" (Group Participant).
9	Training needs to be more current and should more closely reflect the environments and situations in which Soldiers are being deployed.	II, GI	Increase the amount of immersion training done before a tour, and include recent combat veterans in the training process so they can interact with and share lessons learned with novices.
10	Soldiers would like in-theater training to help stay focused and remain current on latest TTPs.	II, GI	Perform current, applicable in-theater training that includes current TTPs and incorporates the most recent experiences from Soldiers in the field.
11	Many useful technologies are not being pushed to troops in the field, and training on current technology is lacking.	II, GI	Supply troops with better technology and equipment and the training to use it. For instance, 21% of Soldiers interviewed specifically requested more IED and chemical detection technology.
12	Soldiers feel that there is a current cookie cutter approach to equipment selection and fielding.	II, GI	Ensure that equipment and weapons that are fielded are specific and customized to the environment for where troops are deployed. Allow more flexibility in equipment selection- allowing units to make decisions on what to carry.
13	Complacency kills.	FD, II, GI	96% of Soldiers interviewed stated that complacency is a factor in Soldier survivability. Implement training and routines to help Soldiers stay focused and reduce complacency.
14	Too much equipment, weighs too much, and is not necessarily needed.	II, GI	Eliminate unnecessary equipment that will be a burden to troops on the ground. Ensure that all equipment and weapons are specific and useful for area of deployment.
15	Desire for sharing of Soldier survival strategies.	II, GI	Share experiences of veterans with Soldiers going to combat zones and give them an outlet to discuss their strategies for coping. Ensure Soldiers know the importance of keeping focus, staying determined, etc.
16	Some Soldiers experienced "non-traditional, out-of-the-box" training styles that they appreciated.	II	To avoid a cookie-cutter approach to training, allow units to customize their training and utilize non-traditional training programs that are appropriate to the area to which they are being deployed. Units desired some flexibility in training programs based on their area of deployment.

A complete write up of each finding is included in the Phase I Final Report.

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Conclusions

- "First Five" concept
  - Many fatalities occur early in tour, however "First Five" is not explicitly supported by data
  - Limited traceability for number of firefights before a fatality
    - First 100 days better gauge
    - Still, many fatalities occur during middle of tour (six month mark for Army personnel)
  - Firefights are not the largest cause of fatalities: IEDs currently cause most fatalities

- Multiple vulnerable periods
  - 2 Month point
  - Middle point of tour is critical for all branches
  - Although databases do not reflect this, interviewed Soldiers consistently stated there is vulnerability in the months leading up to the end of their tour
    - Complacency
  - Far fewer fatalities second half of tour compared with first half of tour
    - Possible explanation for this is that TTPs are often updated by second half of tour, based on fatalities and lessons learned during first half of tour
    - Currently may take a fatality before TTPs are updated

- Training *needs* updating
  - Must be current and realistic
  - Include in-deployment training to reduce complacency
  - Just-in-time training and more up-to-date information to combat ever-changing enemy tactics

- Soldiers *recommend improvements* to non-training elements as well
  - Communication structure
  - Leadership selection
  - Equipment and technology dispersal

Conclusions, Continued

- IED fatalities on the rise
    - IED training might not be keeping up with IED development and execution
    - IED scenario model suggests considerations for improved/different training

- Likely factors contributing to combat fatalities include:
    - Insufficient experience
    - Loss of local intelligence due to old units rotating out
    - Limited capabilities due to strict Rules Of Engagement (ROE)
    - Failure to change tactics in a timely manner
    - Lack of familiarity with the enemy and the environment
    - Complacency

- There exists a need for Soldiers to discuss their experiences, emotions, and needs in an anonymous manner (so as not to fear command backlash)

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23