Technology Work Session for the South African Army; Hosted by the CSIR

Mobility

Soldier Mobility

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Outline of presentation

- Introduction
- Soldiers burden and some major findings
- Mobility trends
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  - Body armour
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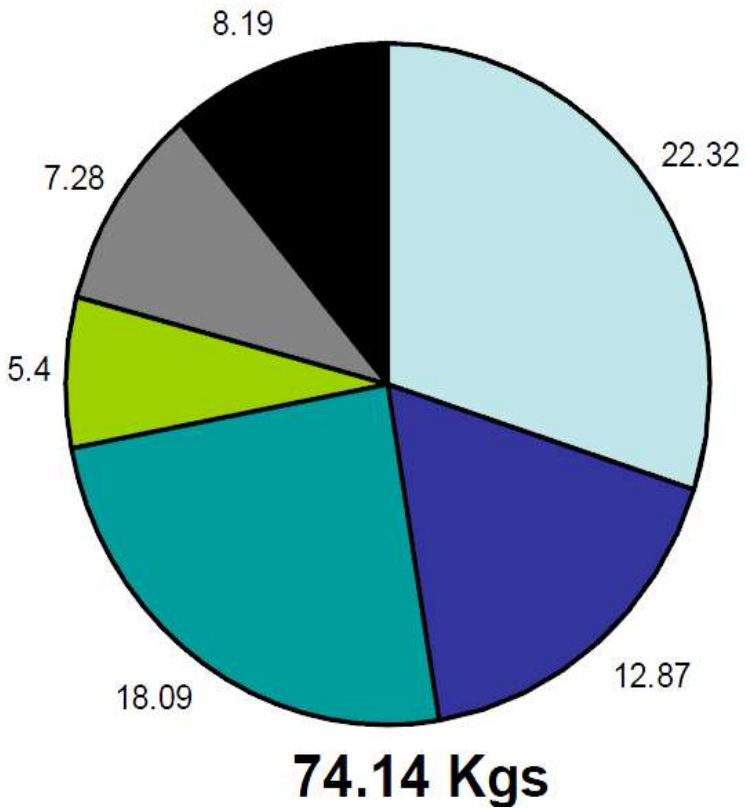
  - Vehicles
  - Individual transport
  - Future technologies
- Suggestions

Introduction

Operational scenarios

- Unfamiliar terrain
- Urban areas
- Extreme climatic conditions
- New asymmetric threats

Soldier burden



World war two	36Kg
Falklands	40Kg
Current	75Kg
Future	?

Major findings - U.S. Army Center

- Increased capabilities increase physical burdens.
- Fit soldiers are easily exhausted by their modern loads.
- Body armour needs to be lightened and flexible.
- More emphasis on modern load carriage.
- Small unit ground vehicles to carry the bulk of the Soldier's load.
- Small unit robot development needs to be accelerated.
- Reducing the combat load through doctrine and equipment changes.

Load-bearing system

Modular Lightweight Load-bearing Equipment (MOLLE) pack

With detachable patrol pack.

Trend:

- Modular system.
- Removable pockets.
- Load can be shift.
- Must be part of the bigger soldier system.

Body armour

Body armour is always a compromise:

Sacrifice mobility and comfort for greater protection.

If you ride in a vehicle you need protection from IED's and ambushes.

If you are dismounted, body armour can impair your mobility which could be fatal.

Batteries

Enhance tactical awareness, lethality and survivability translate to more electronic devices.

- The infantry soldier requires a high-energy power source for his equipment.
- Fuel cell technologies still have far to go.
- Battery technologies are improving every year.

Batteries – Tactical cost model

Battery type	Parameter	Replenishment interval (days)		
		1	7	14
Alkaline battery system	Number of batteries	187 715	187 715	187 715
	Mass of batteries – section level (kg)	8.8	49.0	96.0
	Total present cost (Million Rand)	11.7	11.7	11.7
New Generation Battery system	Number of batteries	476	1 880	3 518
	Mass of batteries – section level (kg)	4.0	18.4	35.2
	Total present cost (Million Rand)	1.5	5	8.9

Batteries – A43 rechargeable battery system

- With a rechargeable battery system, the user is responsible for his own power (no supply line).
- Li-ion battery technology could last three times longer than an alkaline battery.
- Fewer batteries, less weight.

Trend:

- Smart battery and a charger that can harvest energy from used batteries, solar panels and vehicles for charging.

Fire power

To reduce weight we need to look at lightweight materials technology:

- Projectiles.
- Cartridge Cases.
- Energetic Materials.
- Magazines.
- Ammunition belts.
- Ammunition belt carriers, charger clips and associated items.

Logistic vehicles

Innovative concepts are sought for enabling the dismounted soldier to more effectively transport their own supplies.

Three Canadian soldiers were killed in a unarmoured vehicle (M-Gator) when they hit an improvised explosive device.

Plasan Sand Cat armored vehicle based on a shortened Ford F350 platform and built from composite armour

Individual transport

Electric bicycle to enhance mobility of the individual soldier:

- Maximum speed 50 km/h.
- Range 25 km.

Equipment cart used by the infantry soldier for the deployment of heavy support weapons.

Vehicles – Unmanned ground

The Squad Mission Support System from Lockheed Martin

- 270 kg load.
- Ladar technology.
- Autonomous capabilities.

The CSIR developed a robotic platform with the main purpose to test a variety of sensors and autonomous algorithms

Future technologies

HULC advanced robotic exoskeleton is designed to augment Soldiers' strength and endurance, as well as reduce load carriage injuries.

DARPA has started to work on a flying Humvee, so that the soldiers could fly the vehicle over IEDs and rough terrain to make insertions into combat zones.

Suggestions

Reduce the weight to improve mobility by:

- Recognize that all Soldiers have different jobs and carry different loads.
- Look to lighten all the gear that soldiers carry, not just an item here or there.
- Make attempts to develop multi-functional gear to replace current one-task items.
- Follow industry and buy off the shelf, state-of-the art gear to replace Army clunkers (GPS as example). Throw it away when it dies.
- Re-invent many staple items to shed weight (machine gun tripods, ammunition (all types), batteries, body armour, and more).

Suggestions

Reduce the weight to improve mobility by:

- Take the weight off the soldier's back.
- Re-think the logistical practices that the Army has been using. Consider novel ways to resupply the dismounted soldier.
- Provide the platoon and section with small unit logistics vehicles that can follow closely behind the unit during combat operations.
- Develop robotic vehicles to replace manned logistic vehicles.
- Use new generation batteries with proper power management.
- Stick to one type of battery, for all radios, to reduce required charging equipment.

Thank You

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