



Assessing the parts that combat modelling cannot reach

Risk Assessment for Soldier Performance (RASP)

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FIST programme – current equipment



FIST programme – key areas for improvement

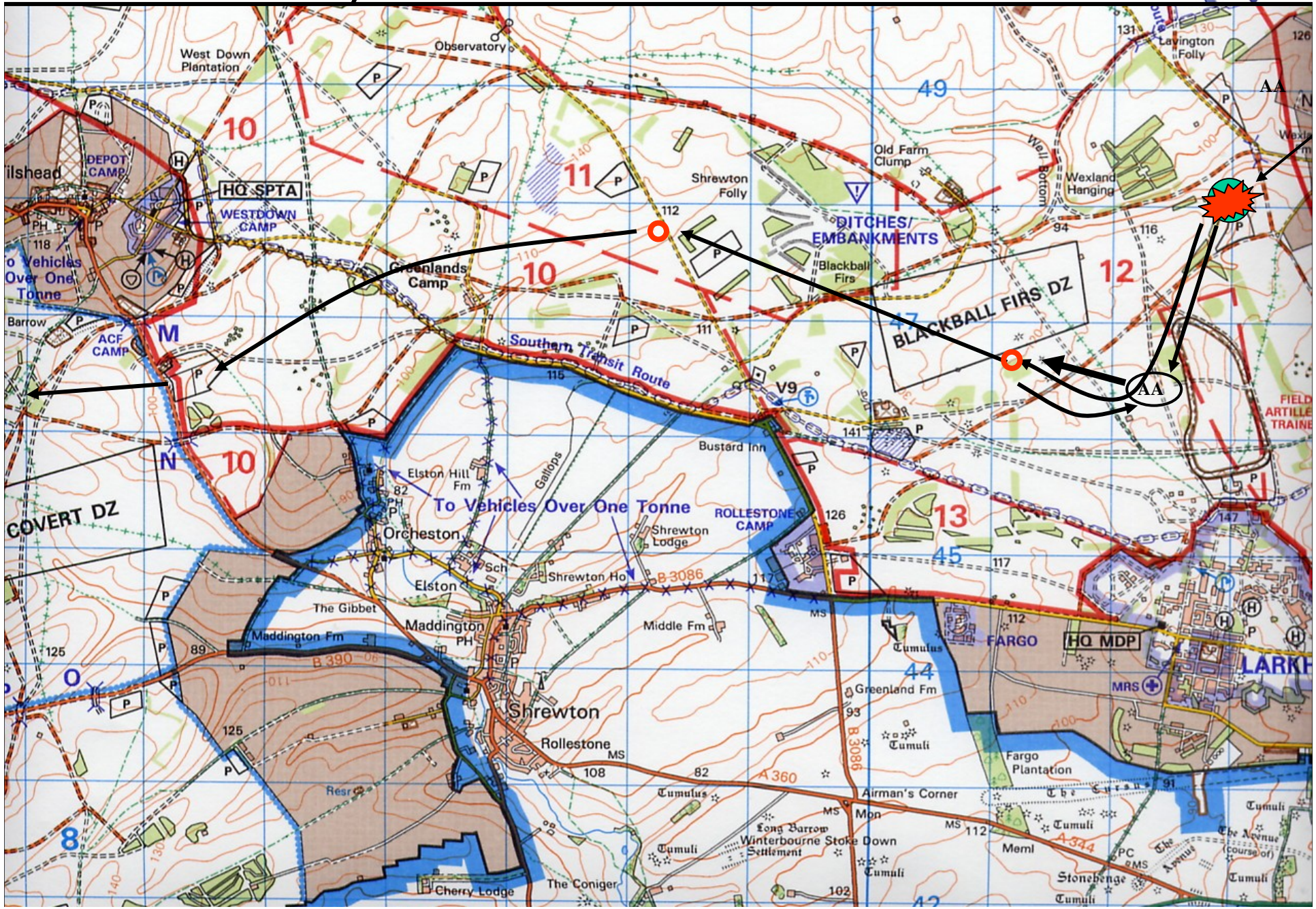


FIST is to provide light role (non mech) infantry, Royal Marines, RAF Regt (~29000) with a totally integrated fighting system for dismounted close combat.

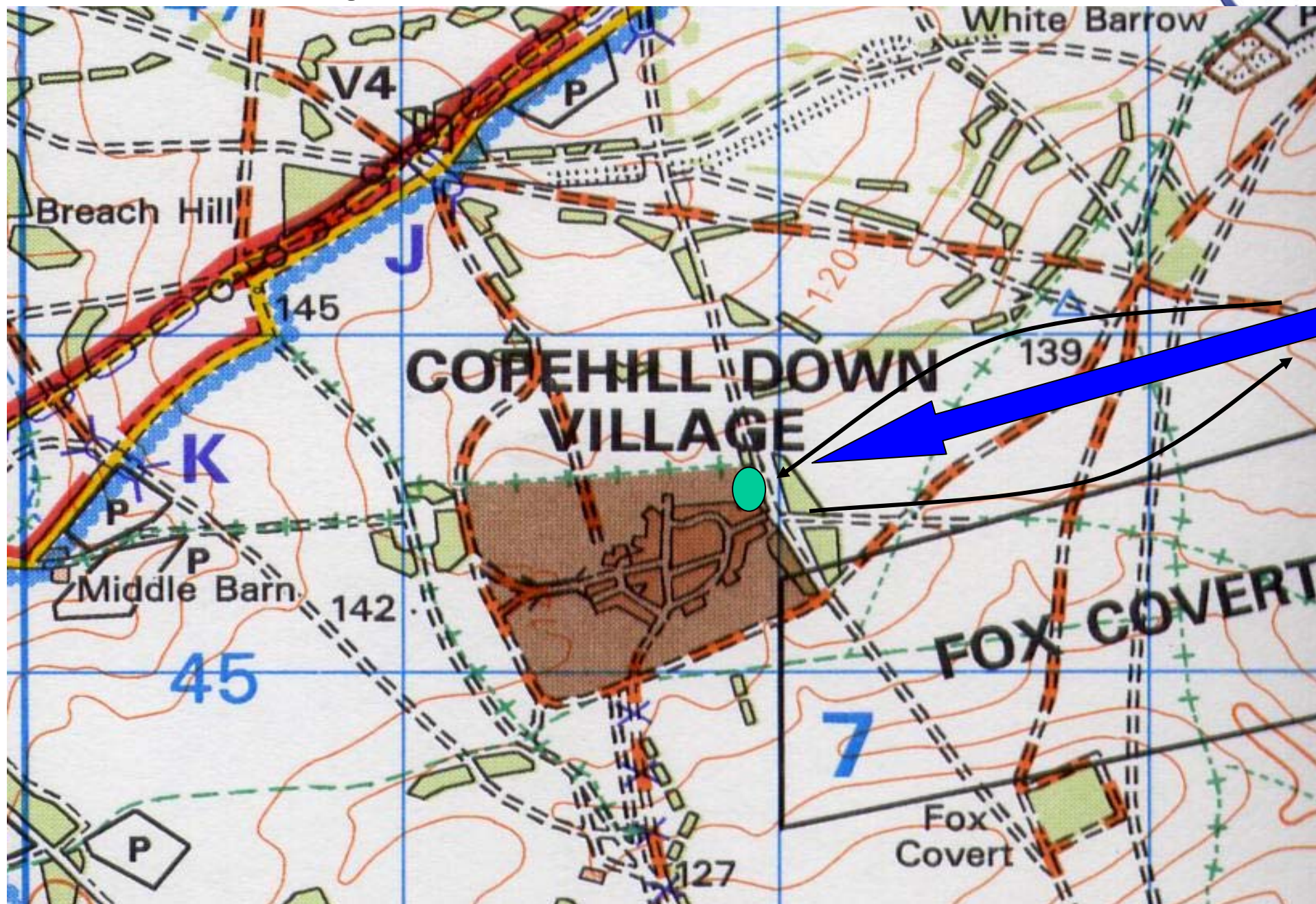
Areas for improvement on baseline:

- 1. C4I** – comms, situational awareness (both enemy and own forces), planning, orders
- 2. Lethality** – weapons, sighting systems, target acquisition, hand-off of targets (with C4I)
- 3. Mobility** – weight, navigation
- 4. Survivability** – protection, stealth
- 5. Sustainability** – logistics, power sources
- 6. Integration of all of above**

HQ Infantry 48 hour battlefield mission



HQ Infantry 48 hour battlefield mission





Limitations of CAEn and ABEL in assessing FIST effectiveness

1. **CAEn** models short vignettes of DCC combat – gives vignette success, cas, and ammo used. Limited representation of C4I
2. **ABEL** addresses:
 - Non combat activities – gives combat readiness and timings.
 - Combines these with output from CAEn to give cas, time saved or gained, ammo used, readiness at end for 48 hour BFM

Neither assess the capability to reduce risk in areas such as:

- Getting lost (on recce patrol, move to FUP)
- Being attacked unexpectedly (unless scripted in the BFM)
- BLUE on BLUE incidents
- Loss of recce data before return to assy area
- Quality of planning, orders etc

Or the opportunities to do things differently. Eg.

- Go straight from assy area to SL, thus avoiding concentration in FUP where vulnerable to attack
- Early detection of enemy combined with target handoff and swift use of accurate indirect fire, allowing bypass rather than direct attack

FIST operational benefits that may be missed in CAEn and ABEL, or quantified insufficiently



- **Command agility** eg. recce patrol diverted to new assy area
- **Data transfer** eg. recce patrol ability to transfer data direct from CTR site, routine logistic traffic on reorganisation
- **Complex operations such as passage of lines and relief in place** made easier by C4I, particularly through positional data and data transfer between units involved
- **Movement from place to place** more guaranteed – less likely to get lost, less risk of BLUE on BLUE
- **Ability to move straight from assy area to SL**, without gathering first in FUP – reduced risk of BLUE on BLUE, enhanced survivability if do away with vulnerable FUP
- **Ability to bypass**, covering with indirect fire, thus reducing risk of BLUE cas
- **Quality of planning and orders** afforded by C4I, particularly data transfer – speeds up process and potentially increases accuracy
- **Location of cas** made easier by positional data



Risk OA tool – the requirement

- **Requirement.** A better way to:
- quantify risks to the baseline – identification and probability of occurrence
- exploration of the impact that risks unmitigated will have on battle outcome
- opportunity offered by FIST to do things better or differently to reduce probability and/or impact of risk



Risk OA Methodology - Introduction

- Military Judgment Panel (MJP) combined with online spreadsheet model
- BFM broken down into vignettes, vignettes divided into activities
- Each activity has an associated set of risks assessed by MJP :
 - Probability of each risk occurring for (1) baseline and (2) FIST systems
 - Impact if event occurs assessed for each system in terms of principal FIST MOE: Casualties, Time, Consumables, Readiness. [worst impact is taken]
 - Severity of Risk combines Probability and Impact
- Process continues with MJP assessing risks in each activity for complete BFM. Risk severities are aggregated across BFM
- FIST opportunity score = Difference in Severity between Baseline and FIST



Risk Probability/Impact Scoring Metrics

- The Probability (P) of a risk occurring scored in a pre-determined 6 point scale:
 - Nil
 - Very Low (less than/equal to 5%)
 - Low.....
 - Moderate
 - High
 - Very High (greater than/equal to 25%)

- The impact (I) if it occurs scored on same scale:
 - Nil
 - Very Low (less than: 5% of the force for casualties; 15 mins in 4 hours; 5% of total ammo carried; and some degradation in 1 or more function)
 - Low
 - Moderate
 - High
 - Very High (greater than: 30% of the force for casualties; 50% more than BFM schedule allows; 35% of total ammo carried; degraded 2 levels in two of readiness functions:)

- Risk Impact = Worst possible impact of casualties, time, ammo used, readiness



Combining probability and impact into severity

Severity of Risk (S) will be determined by a function combining Probability and Impact

Probability	Very High	Nil	Low	Moderate	High	Very High	Very High
	High	Nil	Low	Moderate	High	Very High	Very High
	Moderate	Nil	Very Low	Low	Moderate	High	Very High
	Low	Nil	Very Low	Very Low	Low	Moderate	High
	Very Low	Nil	Very Low	Very Low	Low	Moderate	High
	NIL	Nil	Nil	Nil	Nil	Nil	Nil
	NIL	Very Low	Low	Moderate	High	Very High	
	Impact						



BFM Vignette 1 - Section Recce Patrol (1)

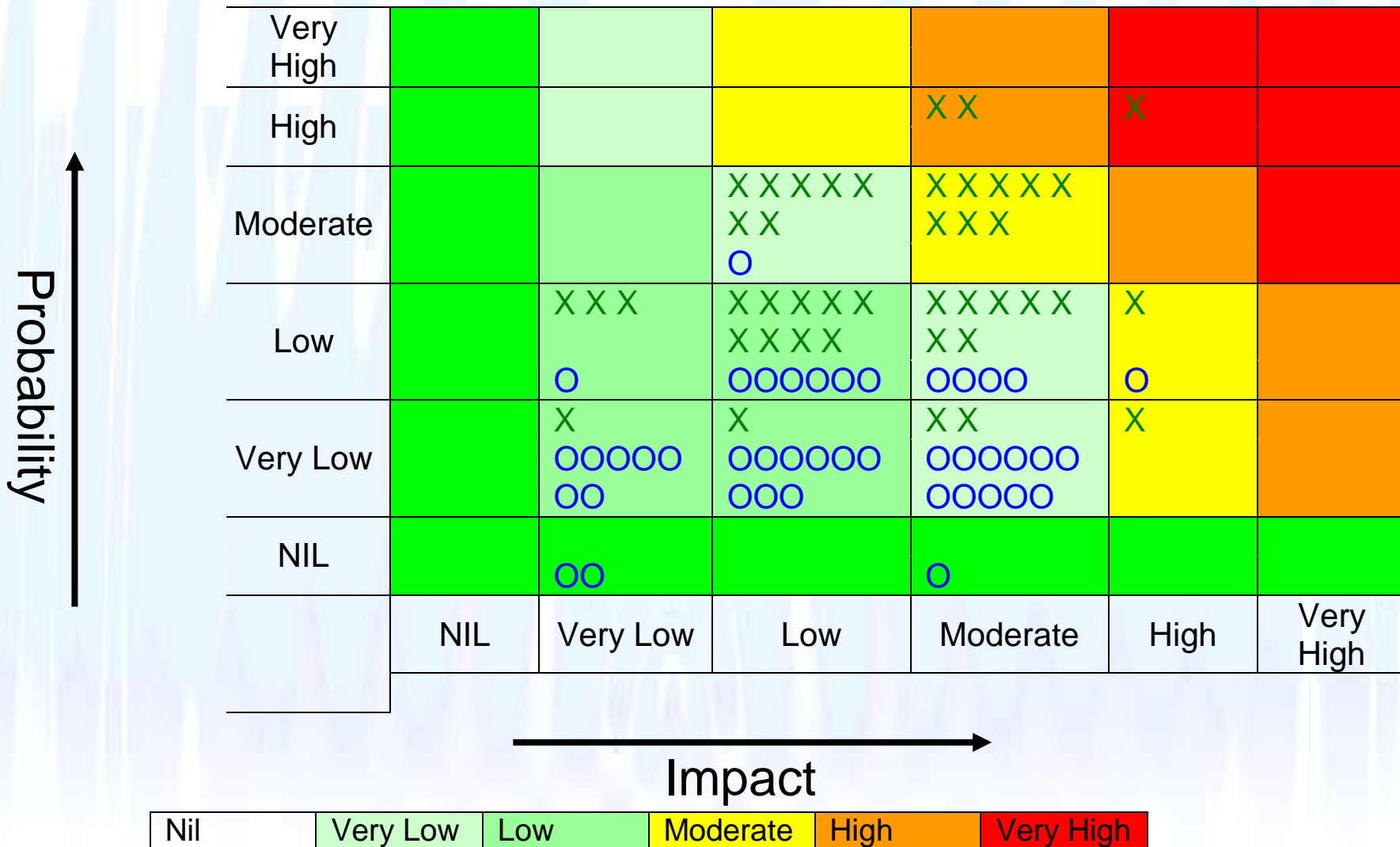
Risk 1. Getting Lost on way out	Baseline		FIST	
	Probability of Occurrence (P)	Impact if event happens (I)	Probability of Occurrence (P)	Impact if event happens (I)
Casualties	Moderate	Nil	Low	Nil
Time		Moderate		Moderate
Consumables		Nil		Nil
Readiness		Low		Low
Summary	Moderate	Worst Impact = Moderate	Low	Worst Impact = Moderate



BFM Vignette 1 - Section Recce Patrol (2)

Risk 2. Being attacked at OP	Baseline		FIST	
	Probability of Occurrence (P)	Impact if event happens (I)	Probability of Occurrence (P)	Impact if event happens (I)
Casualties	Moderate	Low	Low	Low
Time		Moderate		Low
Consumables		Nil		Nil
Readiness		Low		Low
Summary	Moderate	Worst Impact = Moderate	Low	Worst Impact = Low

Test aggregated Baseline (X) and FIST (O) Risk P v. I Severity Matrix



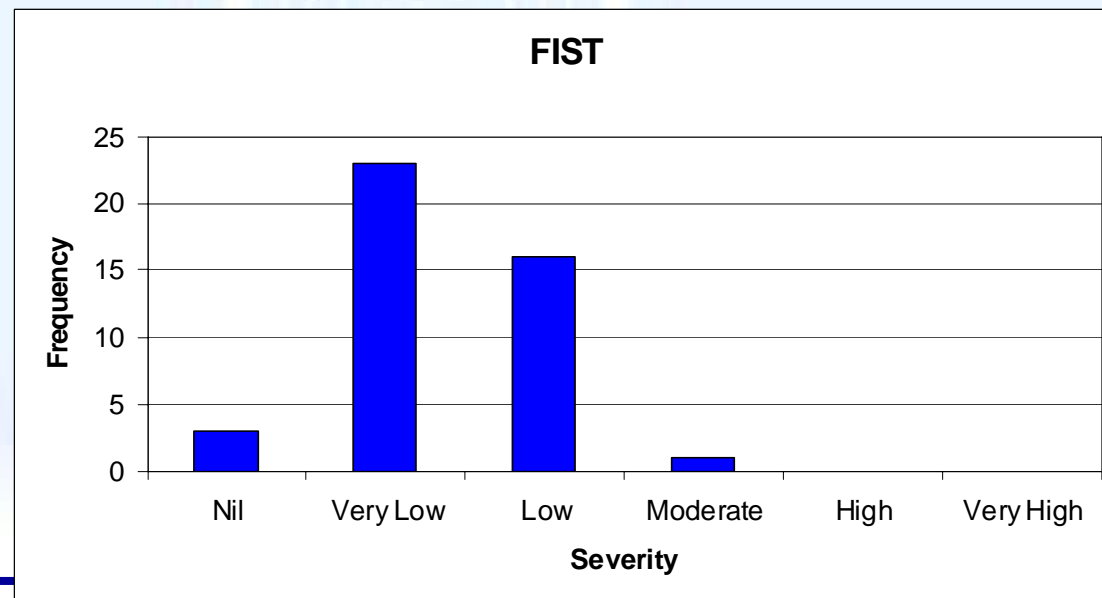
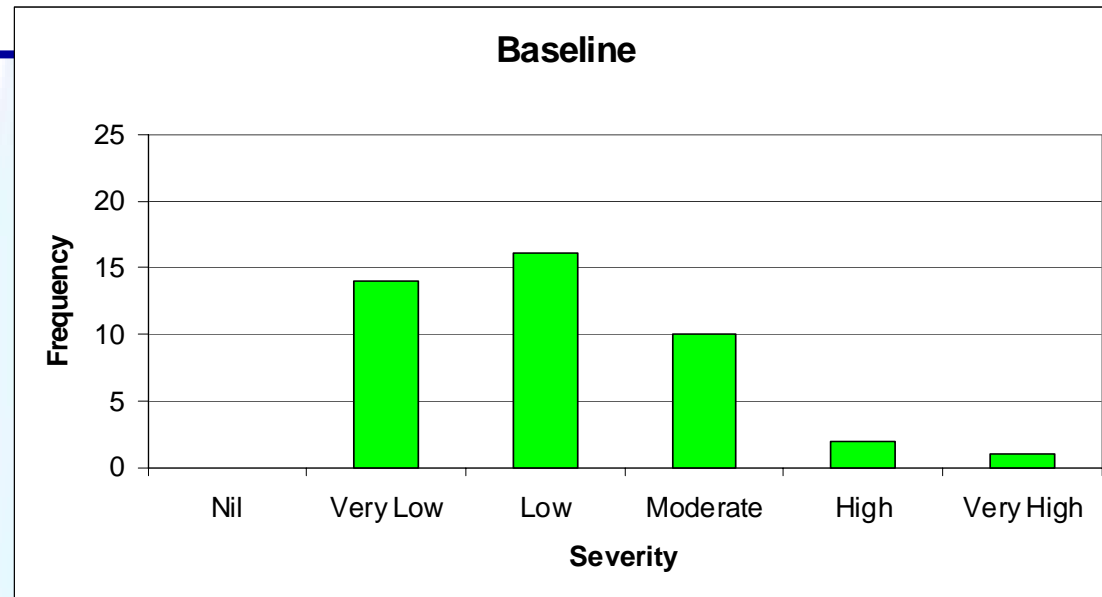


Test – risks identified for BFM – and mitigation achieved by FIST system

Risk Type	Total Frequency	Severity Reduction				
		-1	0	1	2	3
Being attacked	8	0	4	3	1	0
Delay for other reasons	5	0	1	2	2	0
Fratricide	5	0	4	1	0	0
Getting lost	4	0	0	2	2	0
Poor reconnaissance	4	0	2	2	0	0
Delay in ammo re-supply	3	0	3	0	0	0
Delay in CASEVAC	3	0	1	2	0	0
Insufficient planning time	3	0	0	3	0	0
Poor defensive position	2	0	1	1	0	0
Failure to identify approaching enemy	2	0	0	1	0	1
Insufficient manpower	1	0	1	0	0	0
Total exhaustion	1	0	1	0	0	0
Inability to fit through restricted areas	1	1	0	0	0	0
Comms failure	1	0	0	0	1	0
Totals	43	1	18	17	6	1



Test Aggregated risk severity scores





Conclusions

- For FIST, demonstrated that there is
 - reduction in risk exposure in areas such as getting lost and being attacked plus
 - benefit to be had in doing things differently eg. C4I used in planning, data transfer of recce data,
 - in situations difficult to model, simulate or trial.
- RASP useful to highlight potential benefits for closer examination and/or to complement assessment by more detailed modelling
- However remains a judgemental exercise, and as such of limited value for eg. FIST COEIA at Main Gate [DG(S&A) initial view]



Risk OA tool – potential quantitative approach - ?wishful thinking?

- Combination of the qualitative approach with the existing ABEL model would allow statistically robust assessment of the impact of operational risks in a simulation (ABORT – ABEL Operational Risk Tool).
- Risk assessment would be changed to capture quantitative three point estimates for the impacts (time, casualties, readiness).
- ABEL Spreadsheet model would be adapted to allow incorporation of these three point estimates and @Risk functions to provide a mechanism for simulating all potential outcomes.
- Simulation would provide S-Curves for each of time taken to complete mission, readiness and blue casualties.
- S –Curves interpreted in the same way as in time and cost risk analysis to determine risk exposure ie 10%, 50% and 90% values for each of the MOE
- Development would represent a challenge ! **AND where is the data to support it?**