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NATO ARMY ARMAMENTS GROUP

LAND CAPABILITY GROUP 1 SOLDIER
COMBAT CLOTHING, INDIVIDUAL EQUIPMENT AND PROTECTION

ALLIED COORDINATED ARMAMENTS REQUIREMENTS

1. This Allied Coordinated Armaments Requirements (ACAR) is the executive document of the Combat Clothing and Integrated Protection Group, a sub-group of LCG1. The process outlined below was designed as a result of the Long Term Capability Review (Reference 1). It is divided into 3 sections:

a. Priority Capability Gaps: This section should be used as a dynamic reference of the prioritisation of the capability gaps outlines in section 2. It will be reviewed at each CCIEP meeting and amended as required taking into account operational analysis and intelligence.

b. Threat and Capability Gap Tables: This section outlines the general and specific threat, counter-measures, constraints, references and specific capability gaps. It provides a ready reference to the threat area. Threats to the Dismounted Soldier are divided into 11 areas..

c.. Current Action Plan: This section shows the nations currently pursuing each threat area; it outlines the current actions being undertaken by the CCIEP to address the identified capability gaps. It references more detailed action plans, administrative instructions and reports\outcomes.

2. Capability gaps cannot be pursued in isolation from their impact on the soldier system. Three overarching themes endure must endure during work strands:

a. Human Factors and Integration: No single component should be assessed in isolation from other equipment or the soldier responsible for its use. Human Factors and equipment integration should be taken into account at every stage. This should include 'soft' factors such as user perception. Whilst some HFI issues will endure others will be nation specific and require separate assessment.

b. System Burden: The soldier as system is already overloaded to a degree not acceptable in a vehicle or air platform. The solution to any capability gap must be assessed against its impact on system burden, especially weight. The overarching focus for all CCIEP work must be to reduce the burden. Many of the factors that will contribute to this problem will be outside the control of the CCIEP. Contributions will come from:

- Training, Tactics and Procedures
- New materials
- Modularity

- Ground and air platforms
- Logistic support
- Dual purpose equipment

Solutions to capability gaps must be developed using the principle that any developed component must have a reduced burden compared to the one it is replacing, also that no new components in the soldier system be adopted unless a corresponding reduction is recommended. The short term aim will therefore be to stop weight increasing and then to drive down the soldier system burden.

c. Casualty Assessments: Current operational analysis assesses the number of individuals who are killed or injured in a battle and therefore can to take no further part. Whilst this allows Commanders to better understand the effect on the current operation it does not assess the post battle outcomes; the CCIEP must assess the long term effect on the individual.

3. This action plan will be reviewed at each CCIEP meeting and formally re-issued annually.

(Signed) R COOMBER
Maj
Chairmen LTCR

SECTION 1 – PRIORITY CAPABILITY GAPS

PRIORITY ONE			
Threat Area	**Task[1]**	**Key[2]**	**Capability Gap**
Ballistic	T1.1, T1.4, T1.5	1.1	The soldiers agility and mobility is degraded due to the excessive burden of the ballistic system (weight, form and fit)
Ballistic	T1.2, T1.3, T1.5	1.2	Inability to protect the soldiers head from the most likely threat rounds within weight constraints
Fragmentation	T2.1, T2.2, T2.3	2.2	The inability to provide systems that are modular and scalable to enable mission specific protection to vulnerable areas of the body
Flame, Flash & Heat	T3.2, T3.3, T3.4	3.1	Inability to provide FR protection without degrading other material properties
Flame, Flash & Heat	T3.2, T3.3, T3.4	3.2	Inability to stop heat transference without extra layers
Flame, Flash & Heat	T3.3, T3.4	3.5	Lack of military focused fire retardant standards at the system level
Noise	T6.1	6.1	No test regime for military hearing protection systems
Noise	T6.2, (T6.3)	6.2	Lack of effectiveness in an operational environment
Non-Ballistic Threats	T7.2, T7.3, T7.4	7.2	Lack of systems that can mitigate traumatic brain injury
Fratricide	T9.1, T9.2	9.1	Lack of a commonly accepted multi- spectral active and passive NATO Combat ID systems
Environmental	T10.2 (T10.3)	10.1	Inability to maintain optimal core body temperature in extreme climates
Environmental	T10.5	10.3	Degradation of other combat system capabilities when environmental systems are used i.e. tactility

PRIORITY TWO			
Threat Area		**Key**	**Capability Gap**
Ballistic	T1.5	1.3	The inability to protect against highly penetrative rounds within weight constraints
Blast	T4.2	4.1	No blast protection incorporated into current personal protective systems

[1] Action Plan Task number - See Section 3
[2] General Capability Gap reference number – See Section2

Blast	T4.1	4.2	Inability to rapidly provide threat specific protection due to undeveloped modelling techniques
Concealment	T8.2, T8.3, T8.4	8.1	Lack of systems that conceal across the EMS
Environment	T10.1, T10.2, T10.3, T10.5	10.2	Lack of integration between environmental protection systems
CBRN	T11.1	11.2	Inability to maintain high activity levels due to the high physiological burden of CBRN systems

PRIORITY THREE			
Threat Area		**Key**	**Capability Gap**
Ballistic	T1.5	1.4	The inability to provide ballistic protection to joints and limbs
Fragmentation	T2.1, T2.2, T2.3	2.1	The inability to provide complete protection without causing unacceptable HFI and weight issues
Flame, Flash & Heat	T3.1	3.3	Inability to protect exposed areas, such as the face, without donning FR specific components
Flame, Flash & Heat	T3.3, T3.4	3.4	Inability to match body areas to protective levels due to unrealistic testing regimes which hampers risk taking
Blast	T4.1	4.3	Inability to provide protection within HF constraints
Blast	T4.1	4.4	Only protection to torso developed
Laser	T5.2	5.1	No multi-frequency laser protection within required visual standards
Laser	T5.2	5.2	No protection against adversarial lasers
Non-Ballistic Threats	T7.1	7.1	No integrated blunt force trauma protection in torso systems
Non-Ballistic Threats	T7.3	7.3	No NATO/Industry standards for blunt force trauma protection
Concealment	T8.2	8.2	Inability to adapt camouflage patterns to changing environments
CBRN	T11.1	11.1	Poor integration between existing tactical uniforms and CBRN protection
CBRN	T11.1	11.3	Breathing apparatus is not ballistic compliant

SECTION TWO - THREAT AND CAPABILITY GAP TABLES

1. The CCIEP activities are divided into 11 threat areas. These threat areas are:

- Ballistics
- Fragmentation
- Flame, Flash & Heat
- Primary Blast
- Laser
- Noise
- Non-Ballistic Threats
- Concealment
- Fratricide
- Environmental
- CBRN

2. Each threat area comprises of:

- The lead, primary and secondary nations allocated to addressing the threat area.The scope of the threat
- The general threat statement
- Specific threats
- The requirement
- Basic current counter measures
- Constraints on solutions
- Key areas of integration
- References
- General Capability Gaps
- Specific Capability Gap areas

3. As initial assessment should be made of the length of time required to close a capability gaps. This should be recorded on the threat sheets as follows:

Time Frame	Years	Options for closing gaps	Outputs	Likely focus of effort
Short	0 – 2 Years	Limited or no new technology. Distributed or used in new ways	Rapid and structured information exchange	Design and material utilisation advances
Medium	3 – 8 Years	State of the art or high cost technology. The procurement or development of new systems	Joint programmes of work leveraging national programmes or the allocation of limited RTO\NAAG resources	Militarisation of new materials and their incorporation into current or planned systems
Long	8 – 10 Years	Require the development or research of new technology, systems or materials. Understanding the threat	Formal proposals to the research community	Analysing future threats and researching methods of addressing them.

4. The table below shows the Nations currently working on each threat area:

Threat Area	Lead Nation	Assisting Nation Primary	Assisting Nation Secondary
Ballistic	Canada	UK Belgium, France, Finland, Norway	Denmark, Greece
Fragmentation	Netherlands	Belgium, Canada, Switzerland	Lithuania, Czech Republic
Flame, Flash & Heat	US	Sweden,	
Blast (Overpressure)	UK	USMC,	
Laser	Germany	Finland,	UK
Noise	UK		Sweden
Non-Ballistic Threats	USMC	Netherlands	
Concealment	Netherlands	Austria, Finland, Sweden	Hungary, Czech Republic,
Fratricide	Canada		Austria
Environmental	Germany	Italy, Lithuania, Finland Belgium, Canada, Norway	Hungary, Denmark
CBRN	UK	France, Finland, Norway	JCG CBRN Group, Greece

5. The threat sheets are set out below and will be reviewed as required:

THREAT 1 – BALLISTIC

Lead Nation	Primary Task	Secondary Task
Canada	UK Belgium, France, Finland, Norway, Switzerland	Denmark, Greece

GENERAL THREAT STATEMENT	The threat of a soldier being injured, incapacitated or killed by direct or secondary ballistic material with an impact velocity of >= 650m/s

SPECIFIC THREATS	Most likely threat 7.62 x 39 mm ball –Kalashnikov
	Most Dangerous threat 7.62 x 54 mm Draganov
	Extreme threat – DF Platform Systems - 12.7mm
	AP - Steel Core APM2
	AP – Tungsten Core
	Fragmentation above 650 m/s

REQUIREMENT	Protect against a single incidence of the above threat
	Protect against multiple instances of the above threat
	Testing to a common standard (STANAG 2920)
	Performance to a common NATO standard

BASIC COUNTER MEASURES	Ballistic Plates (Hard armour)
	Soft Armour (performing in excess of 550m/s)
	Helmet protection systems
	Helmet mounted – Mandible Guards and visors
	Ocular Protection

	Constraints	**Time**
CONSTRAINTS ON SOLUTIONS (HURDLES)	Negative buoyancy	ST
	Material \ System weight on user	MT\LT
	Material properties increases thermal stress	MT
	Material inflexibility restricts agility	MT
	Systems hamper medical access	ST
	Behind armour blunt trauma (BABT)	ST\MT
	Penalties of increasing coverage	LT
	Current designs defeat max threat – no modularity	ST\MT
	Lack of testing and performance standards	ST
	Durability verification after use	ST

KEY AREAS OF INTEGRATION	Weapon and soft armour
	Helmet protection systems
	Load Carriage (Assault and Pack systems)
	Head mounted systems (communication and sensors)
	Combat clothing including cooling systems
	Integration with external systems (AFV crew positions)
	Personal weapon systems

REFERENCES	STANAG 2920

	Key	Capability Gap
GENERAL CAPABILITY GAPS	1.1	The soldiers agility and mobility is degraded due to the excessive burden of the ballistic system (weight, form and fit)
	1.2	Inability to protect the soldiers head from the most likely threat rounds within weight constraints
	1.3	The inability to protect against highly penetrative rounds within weight constraints
	1.4	The inability to provide ballistic protection to joints and limbs

	Key	Capability Gap	Potential Solutions	Tasks On Going	Period
SPECIFIC CAPABILITY GAP AREAS	1.1	Protection against heavier than APM2	High density materials New strike face materials New backplate materials		ST
	1.2	Enhanced coverage (torso, extremities)	Ballistic Knee\Elbow Pads 'Bolt on' armour augmentation		LT
	1.3	Flexible - Body movement (mobility)	Overlapping armour plates		MT
	1.4	Modular – Equipment optimised to mission	Common and scalable load carriage systems Enhanceable ballistic protection		ST
	1.5	Lightweight – Decrease physiological stress	Incremental advances in current armour Systems approach to testing New materials Area specific protection		MT
	1.6	Integration – Load carriage and hard armour solutions	Modular load carriage systems integrated with ballistic protection and carriage		ST
	1.7	Protection against other AP cores (TC)	High density materials New strike face materials New back plate materials		ST
	1.8	Enhanced coverage (Head)	Ballistic Visors Mandible guards Full face helmet solutions		MT

THREAT 2 – FRAGMENTATION

Lead Nation	Primary Task	Secondary Task
Netherlands	Belgium, Canada, Switzerland	Lithuania, Czech Republic

GENERAL THREAT STATEMENT	The threat of a soldier being injured, incapacitated or killed by direct or secondary material with an impact velocity of < 650m/s

SPECIFIC THREATS	Spheres – small to large
	FSPs - small to large
	NATO simulated fragmentation Projectile 1.102g
	Impact velocity <= 650 m/s

REQUIREMENT	Protect against single incidence of the above threat
	Protect against multiple instances of the above threat
	Testing to a common standard (STANAG 2920)
	Performance to a common NATO standard

BASIC COUNTER MEASURES	Fragmentation Material (Soft armour)
	Helmet protection systems
	Helmet mounted – Mandible Guards and visors
	Limited Enhanced coverage systems
	Ocular Protection

	Constraints	**Time**
CONSTRAINTS ON SOLUTIONS (HURDLES)	Material \ System weight on user	MT
	Material inflexibility and volume restricts agility	MT
	Material properties increases thermal stress	MT
	Systems hamper medical access	ST
	Integration with Hard Armour (BABT) requirements	ST
	Reduction of BABT requirements	MT
	Penalties of increasing coverage	MT
	Lack of testing and performance standards	ST
	Current designs defeat max threat – no modularity	MT

KEY AREAS OF INTEGRATION	Weapon and soft armour
	Helmet protection systems
	Load Carriage (Assault and Pack systems)
	Head mounted systems (communication and sensors)
	Combat clothing including cooling systems
	Integration with external systems (AFV crew positions)
	Personal weapons systems

REFERENCES	STANAG 2920

GENERAL CAPABILITY GAPS	Key	Capability Gap
	2.1	The inability to provide complete protection without causing unacceptable HFI and weight issues
	2.2	The inability to provide systems that are modular and scalable to enable mission specific protection to vulnerable areas of the body

	Key	Capability Gap	Potential Solutions	Tasks on Going	Period
SPECIFIC CAPABILITY GAP AREAS	2.1	Enhanced Coverage (Head, Torso, Extremities)	Ballistic Knee\Elbow Pads 'Bolt on' armour augmentation		MT
	2.2	Flexible - Body movement (mobility)	New materials Enhancement to current materials Area specific protection		ST
	2.3	Modular – Equipment optimised to mission	Modular load carriage systems integrated with ballistic protection and carriage		ST
	2.4	Lightweight – Decrease physiological stress	New materials Enhancement to current materials Area specific protection Systems approach to testing		MT
	2.5	Integration – Load carriage and hard armour	Incremental advances in current armour Systems approach to testing New materials Area specific protection		ST
	2.6	Enhanced Coverage (Head)	Ballistic Visors Mandible guards Full face helmet solutions		MT

THREAT 3 – FLAME, FLASH & HEAT

Lead Nation	Primary Task	Secondary Task
US	Sweden	

GENERAL THREAT STATEMENT	The threat of a soldier being injured, incapacitated or killed by the primary and secondary effects of flame, flash and heat transference including the inhalation of noxious fumes

SPECIFIC THREATS	Flame from burning materials
	Protection from hot surfaces (heat transfer)
	Incendiary particles
	Flash (High temperatures for very short durations)
	Smoke and Fumes

REQUIREMENT	Protect against burn injury (flame, flash & heat)
	Protect against noxious fumes and smoke inhalation
	Protect vision

BASIC COUNTER MEASURES	Inherent and treated FR textiles
	Fire fighting equipment and clothing
	Training, tactics and techniques
	External fire suppression systems

	Constraints	**Time**
CONSTRAINTS ON SOLUTIONS (HURDLES)	No known NATO or military standard	MT
	Lack of user acceptability (comfort and tactility)	ST
	Poor durability of practical FR materials	MT
	Increasing physiological burden (breathability)	MT
	Need to achieve signature management requirement	ST
	Legacy equipment hampers systems approaches	ST\LT

KEY AREAS OF INTEGRATION	External systems (load carriage, armour)
	Integration with thermal and environmental clothing layers
	Integration with external systems (AFV systems)

REFERENCES	

	Key	Capability Gap
GENERAL CAPABILITY GAPS	3.1	Inability to provide FR protection without degrading other material properties
	3.2	Inability to stop heat transference without extra layers
	3.3	Inability to protect exposed areas, such as the face, without donning FR specific components
	3.4	Inability to match body areas to protective levels due to unrealistic testing regimes which hampers risk taking
	3.5	Lack of military focused fire retardant standards at the system level

	Key	Capability Gap	Potential Solutions	Tasks on Going	Period
SPECIFIC CAPABILITY GAP AREAS	3.1	Practical protection against heat transference	New materials		MT
	3.2	Reducing the physical burden of FR materials	Incremental development of current materials	Initial performance target – 2.0 cal\cm^2 in 4 sec flashover with an acceptable burden	MT
	3.3	Current CBRN respiratory systems unsuitable	Limited tier 1 protection Alternative canisters Switchable canisters Combination canisters		LT
	3.4	Protection against short duration flame\ flash	Creams Hoods Minimum levels of FR		ST

THREAT 4 – BLAST (Overpressure)

Lead Nation	Primary Task	Secondary Task
UK	US (MC)	

GENERAL THREAT STATEMENT	The threat of a soldier being injured, incapacitated or killed by the overpressure produced by the direct effects of blast weapons or the secondary effects of conventional explosives.

SPECIFIC THREATS	Shoulder launched blast weapons
	Air delivered blast weapons
	Secondary effect of conventional weapons
	Secondary effect of IEDs

REQUIREMENT	Protect the user from damage to lungs
	Protect the user from damage to other organs
	Reduce head acceleration to less than 200g

BASIC COUNTER MEASURES	Stress Overpressure wave decoupling technology
	Helmet mounted protection
	EOD equipment

	Constraints	**Time**
CONSTRAINTS ON SOLUTIONS (HURDLES)	Current EOD systems do not allow DCC operations	LT
	Increased thermal load	MT
	Decreased agility	MT
	Integration with other torso mounted protection	ST
	No NATO standard for blast protection	ST
	No NATO standard for testing solutions	ST

KEY AREAS OF INTEGRATION	Hard armour
	Soft armour
	BABT requirements
	Helmet protection systems
	Load Carriage (Assault and Pack systems)
	Combat clothing including cooling systems

REFERENCES	

	Key	Capability Gap
GENERAL CAPABILITY GAP	4.1	No blast protection incorporated into current personal protective systems
	4.2	Inability to rapidly provide threat specific protection due to undeveloped modelling techniques
	4.3	Inability to provide protection within HF constraints
	4.4	Only protection to torso developed

	Key	Capability Gap	Potential Solutions	Tasks on Going	Period
SPECIFIC CAPABILITY GAP AREAS	4.1	No decoupler on general issue	Production of concept demonstrators		ST
	4.2	Lack of data and modelling	Modelling to support decoupling selection		ST
	4.3	EOD equipment not practical for DCC soldier	Technology watch of advances in EOD technology		MT
	4.4	Eye and Ear Protection	Integrated helmet systems, face shields		LT

THREAT 5 – LASER

Lead Nation	Primary Task	Secondary Task
Germany	Finland Special Interest Group	UK

GENERAL THREAT STATEMENT	The threat of a soldier being injured or affected by directed energy weapons. Currently this is restricted to the light emitted from commercial or battlefield lasers.

SPECIFIC THREATS	Dazzle (Nuisance) Lasers
	Targeting and range finding lasers
	Adversarial lasers

REQUIREMENT	Protect eyes against all laser threats

BASIC COUNTER MEASURES	Modified lens on existing ballistic eyewear
	Laser protection goggles
	Filters on optical equipment

	Constraints	Time
CONSTRAINTS ON SOLUTIONS (HURDLES)	Need to retain normal visual clarity	MT
	Need to retain ballistic performance	ST
	No performance or testing standards	ST
	Sensitive nature of threat data	MT

KEY AREAS OF INTEGRATION	Optical sights on weapons and STA systems
	Ballistic and fragmentation ocular protection
	Head mounted protection and systems

REFERENCES	

	Key	Capability Gaps
GENERAL CAPABILITY GAPS	5.1	No multi-frequency laser protection within required visual standards
	5.2	No protection against adversarial lasers

	Key	Capability Gap	Potential Solutions	Tasks on Going	Period
SPECIFIC CAPABILITY GAP AREAS	5.1	Protection against blue forces lasers	Modifications to existing Ballistic Eyewear		ST
	5.2	Protection against multi-frequency threats			MT
	5.3	Protection against adversarial lasers			LT
	5.4	Novel Directed Energy Weapons			LT

THREAT 6 – NOISE

Lead Nation	Primary Task	Secondary Task
UK		Sweden

GENERAL THREAT STATEMENT	The threat of a soldier being incapacitated or injured by the affect of continuous or impulse noise in the military environment.

SPECIFIC THREATS	Long term hearing damage
	Short term loss of hearing
	Impulse noise damage (weapon)
	Ambient noise damage (vehicle)

REQUIREMENT	Reduce impulse and ambient noise to non-damaging levels
	Retention or enhancement of situational awareness
	Retention or enhancement of command and control
	Active noise reduction (ear muff or inner ear design)

BASIC COUNTER MEASURES	Hard or soft plastic ear plugs
	Impulse protection only (ball block)
	Reversible plastic plugs
	Active or passive noise reduction ear muffs

	Constraints	**Time**
CONSTRAINTS ON SOLUTIONS (HURDLES)	Difficulty in filtering only unwanted sounds	ST
	Difficulty of reducing noise levels to acceptable levels	ST
	Need to gain user acceptance of the system	ST
	Lack of comfort for long periods	MT
	Need to gain medical acceptance	ST
	Lack of NATO performance and testing standards	ST
	STANAG 2899 not matched to DCC soldier needs	MT
	Hygiene issues	ST
	Difficulty in filtering only unwanted sounds	ST

KEY AREAS OF INTEGRATION	Helmet mounted protection systems
	Head mounted communication systems
	Wider C4i compatibility

REFERENCES	STANAG 2899

	Key	Capability Gap
GENERAL CAPABILITY GAP	6.1	No test regime for military hearing protection systems
	6.2	Lack of effectiveness in an operational environment

	Key	Capability Gap	Potential Solutions	Tasks on Going	Period
SPECIFIC CAPABILITY GAP AREAS	6.1	Retaining situational awareness	Electronic hearing protection systems		MT
	6.2	Allowing command and control	Electronic hearing protection systems		ST
	6.3	User discomfort and acceptance			MT
	6.4	False sense of security	Deep 'In ear' hearing protection		MT

THREAT 7 – NON-BALLISTIC

Lead Nation	Primary Task	Secondary Task
USA (MC)	Netherlands	

GENERAL THREAT STATEMENT	The threat of a soldier being injured, incapacitated or killed by blunt force trauma or edged weapons such as knifes.

SPECIFIC THREATS	Stab (puncture threat)
	Cut (slash threat)
	Blunt Impact (tertiary effects of explosions or vehicle movement)
	Blunt impact (stones, bricks, batons)

REQUIREMENT	Protect the user from stab and cut threats
	Reduce the damage caused by blunt impact
	Separate general from riot specific threats

BASIC COUNTER MEASURES	Riot control equipment – shields, visors, padding
	Helmet and associated equipment
	General and specialist Handwear
	Specific stab and cut resistance armour

	Constraints	**Time**
CONSTRAINTS ON SOLUTIONS (HURDLES)	Lack of mobility	MT
	Lack of agility	MT
	Increase physiological stress due to poor ventilation	MT
	Lack of novel non-lethal weapons	ST

KEY AREAS OF INTEGRATION	All combat clothing and equipment
	Key areas: gloves, torso systems, head systems
	Vehicle integration

REFERENCES	

	Key	Capability Gaps
GENERAL CAPABILITY GAPS	7.1	No integrated blunt force trauma protection in torso systems
	7.2	Lack of systems that can mitigate traumatic brain injury
	7.3	No NATO/Industry standards for blunt force trauma protection

	Key	Capability Gap	Potential Solutions	Tasks	Period
SPECIFIC CAPABILITY GAP AREAS	7.1	Enhancing coverage (torso, extremities)	New Materials in combination with fragmentation protection, Modular extremity armour		ST
	7.2	Flexible - Body movement (mobility)	New Materials in combination with fragmentation protection		MT
	7.3	Lightweight – Decrease physiological stress			MT
	7.4	Integration – All other sub-systems	New Materials in combination with fragmentation protection Redesign current combat clothing to allow the insertion of trauma protection		ST
	7.5	Currently delivered by specialist equipment only	Redesign current combat clothing to allow the insertion of trauma protection		LT

THREAT 8 – CONCEALMENT

Lead Nation	Primary Task	Secondary Task
Netherlands	Austria, Finland, Sweden	Hungary, Czech Republic

GENERAL THREAT STATEMENT	The threat of a soldier being identified, recognised or acquired with sensors using the electromagnetic or acoustic emissions.

SPECIFIC THREATS	Visual detection
	Near IR detection
	Thermal IR detection
	UV
	Acoustic detection
	Radar

REQUIREMENT	Not be detected by the above means
	Without degradation of operational capability

BASIC COUNTER MEASURES	Combat clothing and outer layers
	Personal concealment systems
	Camouflage paint or cream
	Noise reducing equipment (PRR)

	Constraints	Time
CONSTRAINTS ON SOLUTIONS (HURDLES)	Need to be identified by friendly forces	ST
	Slow development of technological solutions	LT
	Physiological stress of current TIR solutions	LT
	Increasing thermal signature due to DCC programmes	MT
	Variety of materials in the outer layer	MT
	Need for 'military' uniformity'	MT

KEY AREAS OF INTEGRATION	All outer clothing and equipment
	Inner clothing that can be externally detected

REFERENCES	

	Key	Capability Gap
GENERAL CAPABILITY GAPS	8.1	Lack of systems that conceal across the EMS
	8.2	Inability to adapt camouflage patterns to changing environments

	Key	Capability Gap	Potential Solutions	Tasks on Going	Period
SPECIFIC CAPABILITY GAP AREAS	8.1	TIR suit not practical for general DCC user	Development of new materials and coatings Development of individual TIR shelters		LT
	8.2	Systems do not match the changing environment	An avenue of exploitation for the vehicle and aircraft research programmes		LT
	8.3	NIR materials effective for 24/7			ST
	8.4	TIR materials effective for 24\7s			MT
	8.5	Equipment not optimised for noise reduction	New materials coupled to maximum permissible noise levels		ST
	8.6	Equipment and human radar signature			LT

THREAT 9 – FRATRICIDE

Lead Nation	Primary Task	Secondary Task
Canada		Austria

GENERAL THREAT STATEMENT	The threat of a NATO soldier being injured, incapacitated or killed by friendly forces.

SPECIFIC THREATS	Engaged, killed or injured by friendly forces

REQUIREMENT	To be identified as friendly forces
	Not to compromise concealment
	High degree of reliability in all environmental conditions

BASIC COUNTER MEASURES	Formation or National patches and insignia
	Recognition of friendly force uniforms and equipment
	Visual systems (panels, flags)
	Passive thermal and IR systems to aid visual recognition
	Active thermal and IR systems (IFF)
	Combat ID in C4I systems (blue force tracking)

	Constraints	**Time**
CONSTRAINTS ON SOLUTIONS (HURDLES)	Need for identification by third parties (civilians)	LT
	Need to maintain concealment	MT
	Rapidly changing national systems and equipment	LT
	No standardised STA equipment	LT

KEY AREAS OF INTEGRATION	Combat clothing
	Across National boundaries and coalitions
	Concealment systems
	External systems (C4I)

REFERENCES	STANAG

	Key	Capability Gaps
GENERAL CAPABILITY GAPS	9.1	Lack of a commonly accepted multi- spectral active and passive NATO Combat ID systems

	Key	Capability Gap	Potential Solutions	Tasks on Going	Period
SPECIFIC CAPABILITY GAP AREAS	9.1	Visual ID that does not compromise concealment	Combat ID that is frequency specific		LT
	9.2	Lack of standardisation for Land Forces (STANAG)	Development of a common methodology of identifying NATO forces and its incorporation into a STANAG		MT
	9.3	Lack of systems that operate across the EMS	Identify a suite of systems that cover the EMS Develop SOPs for using each element of the suite Develop a research proposal to scope the technical challenges of combining systems		LT
	9.4	Lack of a holistic understanding of current sensor and combat ID on which to base future systems			MT

THREAT 10 – ENVIRONMENTAL

Lead Nation	Primary Task	Secondary Task
Germany	Italy, Lithuania, Finland, Belgium, Canada, Norway	Hungary, Denmark

GENERAL THREAT STATEMENT	The threat of a soldier being injured, incapacitated or killed by manmade and natural environmental threats

SPECIFIC THREATS	Natural Climate (Heat) – Solar, temperature, humidity
	- Result: Heat stress, sunburn, dehydration,
	Natural Climate (Cold) – Wind, rain, snow,
	- Result : Hypothermia, FI & NFI,
	Environment – Mechanical, health
	- Result: Abrasion, puncture, disease, insect \ bites

REQUIREMENT	Protect the user against the effects of heat
	Protect against the effects of cold
	Protect against natural and manmade abrasion
	Protect against insects

BASIC COUNTER MEASURES	Clothing forming a heat management system
	Clothing forming protection against the elements
	Protective systems against mechanical threats - pads
	Insect repellents and nets

	Constraints	**Time**
CONSTRAINTS ON SOLUTIONS (HURDLES)	Lack of performance with active cooling systems	MT
	Weight and volume of a layered system	MT
	Legacy integration	MT
	Effects of full coverage body armour	LT
	Components only work in specific environments	MT
	Optimised to anthropometrical differences	MT

KEY AREAS OF INTEGRATION	Load carriage
	Ballistic systems
	Between layer integration

REFERENCES	

	Key	Capability Gap
GENERAL CAPABILITY GAPS	10.1	Inability to maintain optimal core body temperature in extreme climates
	10.2	Lack of integration between environmental protection systems
	10.3	Degradation of other combat system capabilities when environmental systems are used i.e. tactility

	Key	Capability Gap	Potential Solutions	Tasks on Going	Period
SPECIFIC CAPABILITY GAP AREAS	10.1	Multifunction layers and systems - Temperature	National layered systems		ST
	10.2	No active thermal management systems			MT
	10.3	Integrated systems – pads with environmental	Protective knee and elbow pads Scalable protective pads systems		ST
	10.4	Integrating environmental and ballistic systems	Cooling systems in ballistic vests		MT
	10.5	Protects user from environment (non-temp)	Study of the scope of the non-temperature environmental threats to outline the requirements to industry		MT

THREAT 11 – CBRN

Lead Nation	Primary Task	Secondary Task
UK	France, Finland, Norway	JCG CBRN Group, Greece

GENERAL THREAT STATEMENT	The threat of a soldier being injured, incapacitated or killed by chemical, biological or radiological threats

SPECIFIC THREATS	CBR Exposure (battlefield)
	CBR Exposure (industrial)
	'N' not currently covered

REQUIREMENT	Survive in a CBR environment to enable extraction
	Operate in a CBR environment
	(According to national policy)

BASIC COUNTER MEASURES	Charcoal Based Suit
	Chemically resistant material
	Respirators and canisters
	Gloves and Boots in a chemically protective material
	MVP\CBRN resistant outer clothing

	Constraints	**Time**
CONSTRAINTS ON SOLUTIONS (HURDLES)	STANAGS out of date	ST
	Lack of development in new materials	LT
	Need to maintain core body temperature	MT
	Need to consume water and food	ST
	Changing doctrine across international boundaries	MT
	Lack of technical integration between 'C' & 'B'	

KEY AREAS OF INTEGRATION	Helmet
	Load carriage and armour
	Combat clothing
	Waterproof \ Chem resistant layers
	Hydration system

REFERENCES	

	Key	Capability Gap
GENERAL CAPABILITY GAPS	11.1	Poor integration between existing tactical uniforms and CBRN protection
	11.2	Inability to maintain high activity levels due to the high physiological burden of CBRN systems
	11.3	Breathing apparatus is not ballistic compliant

	Key	Capability Gap	Potential Solutions	Tasks on Going	Period
SPECIFIC CAPABILITY GAP AREAS	11.1	Lack of suitable CBRN materials or systems to deliver a low physiological burden	MVP Chemical proof membranes		MT
	11.2	Inability to incorporate a basic level of CBR protection into normal combat clothing systems	Incorporation of a basic level of CBR protection into normal combat clothing		LT
	11.3	Durability of charcoal based clothing			MT
	11.4	Equipment and clothing conflicts with sights			MT
	11.5	No 'N' Protection			LT
	11.6	Limited protection against 'B' agents			LT

SECTION 3 – ACTION PLAN

Threat Area	Task Number	Objective	Estimated Time Frame	Remarks	Action\Ideas
Ballistic	T1.1	Investigate the weight savings available when risk is taken with AP threats and stand off distance – Market survey and limited testing of candidate systems based on Canadian draft requirements	S	Big task, controlled by Canada but work pushed out to supporting nations or the LTCR members (suggestion would be a core group of known worker bees!) Priority piece of work	Possible actions: • Major nation market survey • User meeting to establish common goals and acceptable performance standards (include the BABT draft conclusions) • Meeting with industry to explorer candidate systems (at a national level with subsequent consolidation or an international meeting? International meeting would attract LCG support) • Limited assessment of candidate plates • Pursue positive outcomes at the national level
	T1.2	Develop Helmet Systems to address the most likely ballistic threat	M (late)		Workshop with industry to explore the options for increasing helmet performance to achieve a system stop of the most likely round. Areas of interest will be: • Deformation characteristics

					• Materials • Stand off distances • Vulnerable areas • Maximum weights (with current and future helmet mounted systems)
	T1.3	Ballistic helmet standard consultation document	M (early)	Based on the Canadian standard	Draft document setting out the requirements for the next iteration of ballistic helmets: • Should include all aspects from fragmentation to impact resistance • Culminates in a STANAG
	T1.4	Consolidated and share research on BABT	S\M		See P1.1
	T1.5	Increase performance \ decrease weight through the use of novel technologies	L	Stage 1 - Draft, with industry, a technology roadmap outlining performance targets	Over arching objective? • New material tracking function to ensure new commercial industrial materials assessed for military application
Fragmentation	T2.1	Develop enhanced head coverage in a modular system – Promote information sharing amongst NATO members via the CCIEP (standing agenda item)	M	Linked to T1.2	Formal CCIEP agenda item: • National obligation to update CCIEP on progress including timelines • Develop project timeline that uses milestones to achieve the ultimate goal. This will allow nations procuring helmets to join the road map • Formal project to design and manufacture (to prototype) the best fragmentation coverage to the head in 2010, 2015 and 2020. Use NATO requirements and industry knowledge. Try to harness the need of the soldier today with the next industry can provide unconstrained by national commercial requirements.

	T2.2	Increase performance \ decrease weight through the use of novel technologies	L	Linked to T1.5	Over arching objective? • New material tracking function to ensure new commercial industrial materials assessed for military application
	T2.3	Increase fragmentation protection to the extremities	S	Leading to M	Project plan for all nations to contribute to understanding the requirement, benefits and technology roadmap: • Phase 1 investigate the frequency and severity of limb joint injuries
Flame, Flash & Heat	T3.1	Market survey to understand the current status of topical FR / Cam creams.	S		How? • Integration with industry (possible next CCIEP industry briefing) • National question consolidated by the US? • US completes independently?
	T3.2	FR Military\Industry conference to promote two way interaction	S		2 Day conference: Day 1 – Military\User only (including emergency services). • Current use of FR materials • National Policy • Injury statistics • Concept of Employment for FR components • Draft protection matrix (P3.4) Day 2 – Industry Day • The military\User requirements back brief to industry • Problems with current FR materials • Workshop to scope issues (coverage, heat transference) • Review the protection matrix (P3.4) • Industry assessment of the technology roadmap
	T3.3	Investigate, recommend and specify test methods to assess the performance	M		See P3.2

		of FR Materials			
	T3.4	Draft a flame, heat and flash protection category matrix and STANAG	S		See P3.2
Blast	T4.1	Develop mathematical modelling to allow the rapid delivery of weapon specific decoupling materials	M	Link to T7.2	Review current work (US\Canada\US) and examine the potential for a basic releasable document
	T4.2	Issue an information note that outlines the requirements of a ballistic plate and backing that delivers blast overpressure protection	S		Draft an information note for NATO that sets out the requirements of a ballistic plate system if it is to be modified to protect against blast (coverage issue)
Laser	T5.1	Highlight Systems using frequencies outside of the standard Blue Forces Lasers	M		Awaiting LCG 1 guidance
	T5.2	Continue to widen the frequency range of the current commercial protection systems	L	Interaction with industry	Awaiting LCG 1 guidance
Noise	T6.1	Develop a testing regime that addresses both hearing and situation awareness	M	UK	UK to create the 'Noise Battlefield Day' template which other nations can insert their specific noise profiles

		demands			
	T6.2	Assess and improve the acceptability of current systems in the field – Military survey by UK	S		UK to conduct a military survey of the acceptance of current operational noise reduction systems
	T6.3	Integrate hearing protection into head sub-systems	M		???
Non-Ballistic Threats	T7.1	Explore the benefits of new (including fragmentation vest) materials and coatings to deliver blunt force trauma protection and cut protection in a single system –Stage 1 Market research and industry direction	S – Stage 1 M _ Future work		Potential method: Stage 1 - Establish a small working group of military\industry\academia to scope possible ways forward Stage 2 – Produce concept demonstrators
	T7.2	Understand the injury mechanisms involved with head injuries being experienced in current operations	M\L		Establish what formal links have been made to share medical injury data and the resulting analysis Link helmet suspension and shell work (P7.4 & P1.2)
	T7.3	Develop standards and tests for NATO helmets - Review and develop STANAG 2902	M	Linked to T1.3	Formal division of work required between USMC (Non-ballistic) and Canada (Ballistic)
	T7.4	Assess the current helmet suspension	S	Linked to T7.2	How?? Potential way forward: Stage 1 – Survey and gathering examples of current systems

		systems ability to deliver protection against bump, fragmentation and blast			Stage 2 – Testing at several different labs to several standards Stage 3 – Publish assessment of current systems, shortfalls and way forward
Concealment	T8.1	Understanding of Hyper-spectral sensor methods and their effects on personal camouflage – Technology over watch and CCIEP information briefing	S		• US Army to deliver a unclassified brief at the next CCIEP • Discussion and agreement on the way forward • Info at: • http://www.globalsecurity.org/intell/library/imint/hyper.htm
	T8.2	Integration of active camouflage systems into any smart materials developmental work	L	Linked to T8.4	Establish, through LCG1, the formal recognition that the Smart textiles group must take into account the effects of their work on signature management while assessing any output for camouflage benefits.
	T8.3	Development of personal TIR concealment systems – Industry interaction and the production of a technology roadmap	M	Sheets and Shelters Uniforms	Stage 1 – Industry survey of current operational and industrial sheets and shelters – Including a CCIEP industry brief Stage 2 – Conduct or sponsor comparative testing against a draft NATO generic URD Stage 3 – Assess lessons learnt against the needs of the infantry uniform
	T8.4	Provide concealment systems that operate across all frequencies of the spectrum – Establish clear lines of	M	LCG 6 should be approached by LCG1	• Highlight the fragmented nature of camouflage work • Establish clear links of command, control and reporting • Assess CCIEPs potential to contribute through work packages or as a coordinating function.

		command and control that delivers a holistic approach to camouflage across all NATO groups			
Fratricide	T9.1	Establish clear requirements and boundaries for clothing and equipment based individual ID systems that integrates with the wider NATO intent	S		• Establish national and international efforts in the area of combat ID • Draft a document that outlines the CCIEPs scope of interest and responsibility • Set out work packages to achieve definitive CCIEP aims
	T9.2	Draft a consultation paper to outline proposals for a NATO standard clothing and equipment based individual ID system	M		• When P9.1 is completed establish a team to draft the requirements of a NATO standard clothing and equipment based personal ID system • With industry produce concept demonstrators
Environmental	T10.1	Create a database of integrated protective pads and their performance.	S		•
	T10.2	Create a database of cooling systems / active thermal management systems, their performance and use.	S		An increasing number of nations have worked with industry to develop and test personal cooling systems. A database of cooling system trial reports will be create that enables NATO members to understand what has already been done and co-ordinate future work.. This will enable a medium term project to be divided into complementary parts and focus industry on solutions that show promise.
	T10.3	Assess the performance	M		To lighten the load and increase capability the soldier will need to be

		and uses of multi-functional materials / products and list them on a readily accessible web site.			equipped with materials that deliver multiple capabilities.. This task should: • Create and maintain a database that lists fabrics that deliver two or more functions (e.g. waterproof and CBRN proof) or alternatively products that deliver two or more functions (e.g. load carrying vest with integrated ballistic vest) • Identify capability gaps and highlight them to industry
	T10.4	Create a database of long lasting or permanent anti bug treatments	M		
	T10.5	Integrated environmental system: Identify and encourage potentially promising industrial and academia solutions.	L	Linked to T10.2 & T10.3	• Establish a monitoring system that records the creation and progress of systems that have the capability for further integration (e.g. integration of environmental and ballistic systems while obtaining wear comfort). • Liaise with industry to continually increase the number of capabilities and systems in a single system
CBRN	T11.1	Development of incorporated combat and CBR clothing	M	Delivered through CBRN Group	Establish clear lines of communication between LG7 to establish the remit and scope of each group. Ensure that the needs of each group are understood by all