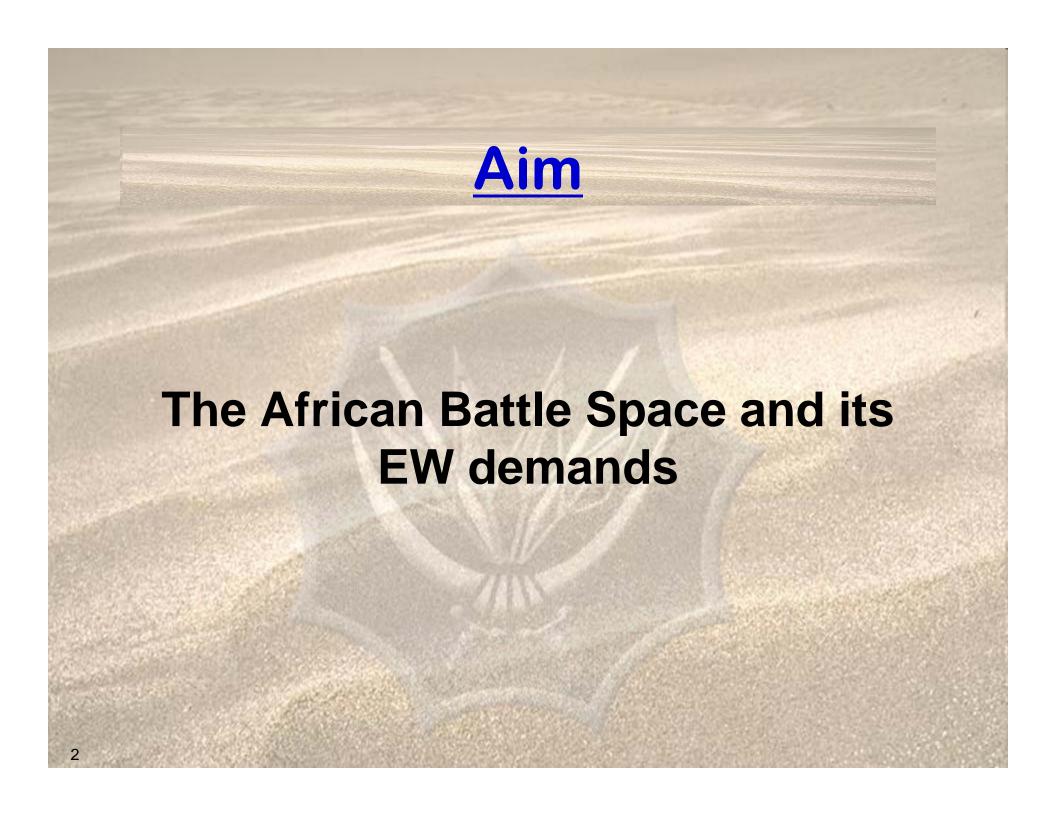
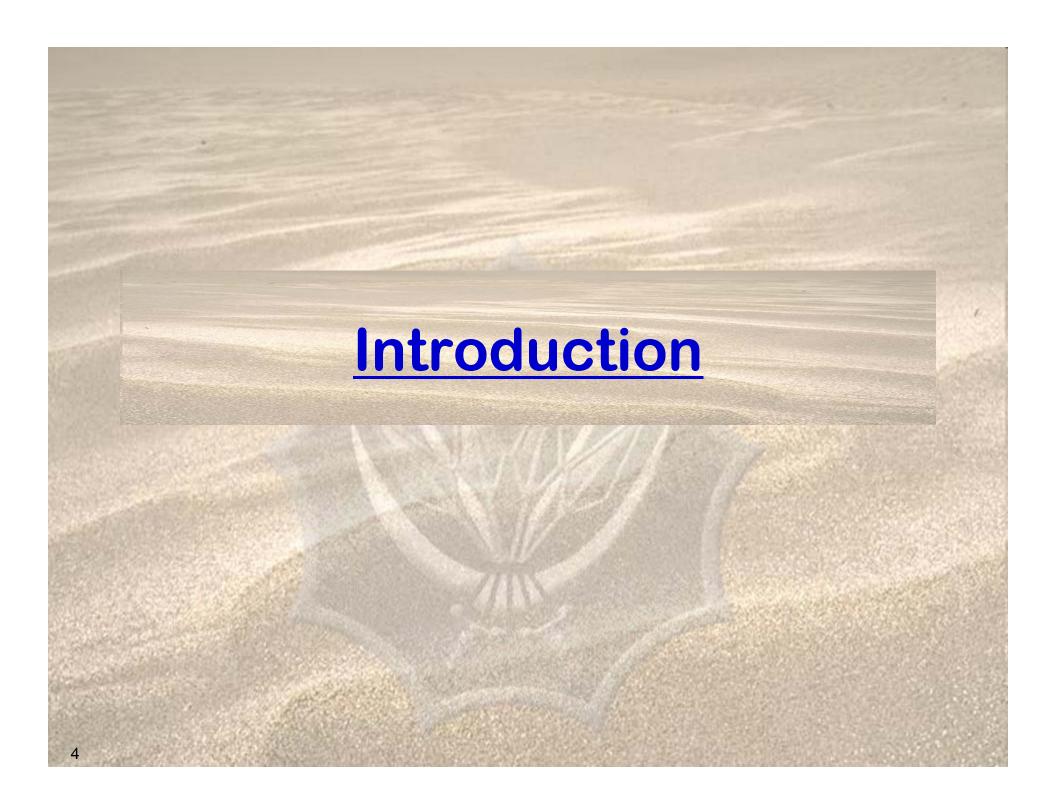
Aardvark Roost AOC Conference

25 August 2009

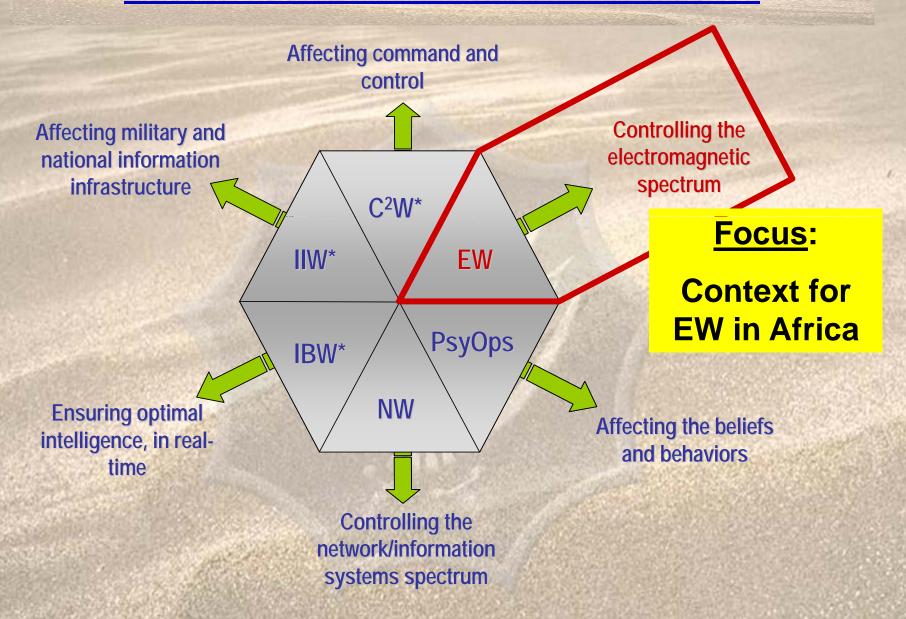


Scope

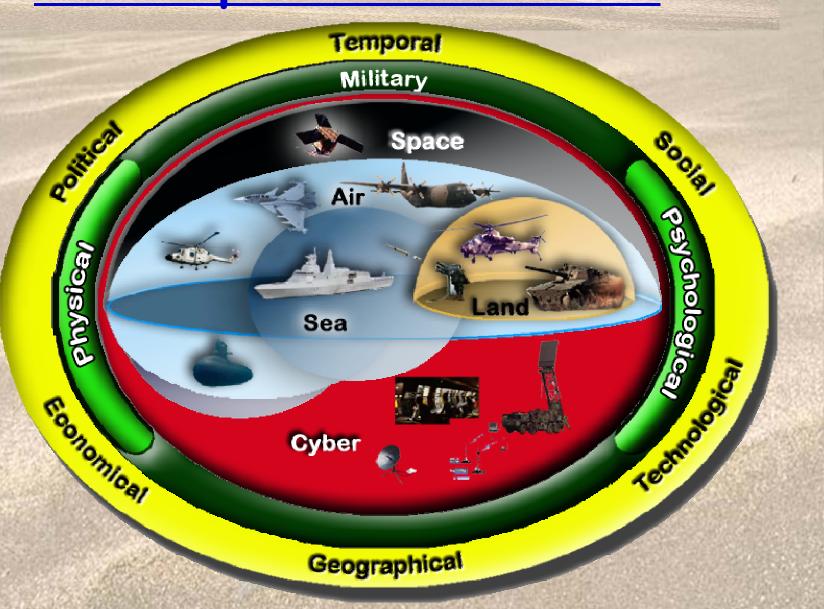
- Introduction
- African Battle Space
- Concept and Approach
- Requirements
- Conclusion



EW and Related Fields



Battlespace Dimensions





Threats To Security: An International View

Threats and risks

Terrorism

Nuclear weapons and other weapons of mass destruction

Trans-national organised crime

Global instability and conflict, and failed and fragile states

Civil emergencies

State-led threats to the mainly Western World Countries

Drivers of insecurity

Challenges to the rules-based international system

Climate change

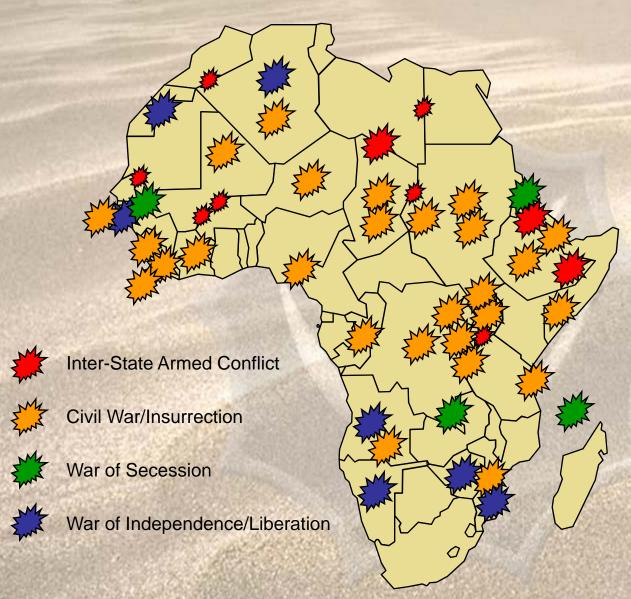
Competition for energy

Poverty, inequality, and poor governance

Source: The National Security Strategy of the United Kingdom - Security in an interdependent world, March 2008

Almost 100% match with SANDF views!

Conflict in Africa: Distribution of Wars of the 1960's to Present

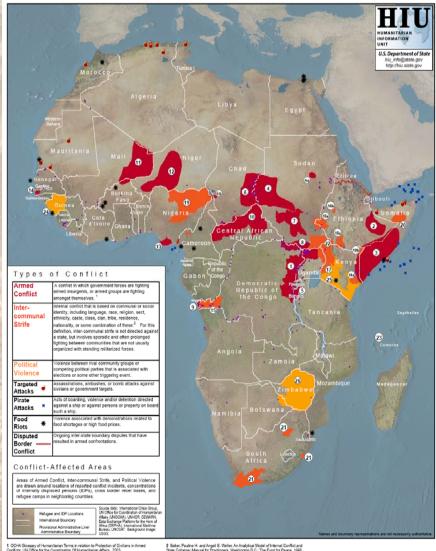


- Predominantly intra-state – civil wars, insurrections
- Inter-African and external interventions and support to belligerents common – virtual proxy wars in some cases
- Direct inter-state
 conflict the exception
- Major inter-state wars rare:
 - Ogaden
 Libya-Chad
 Ethiopia Eritrea

Conflict in Africa: An Update

Africa: Conflicts Without Borders

Sub-national and Transnational Conflict-Affected Areas January 2007 - October 2008



Conflicts in Africa

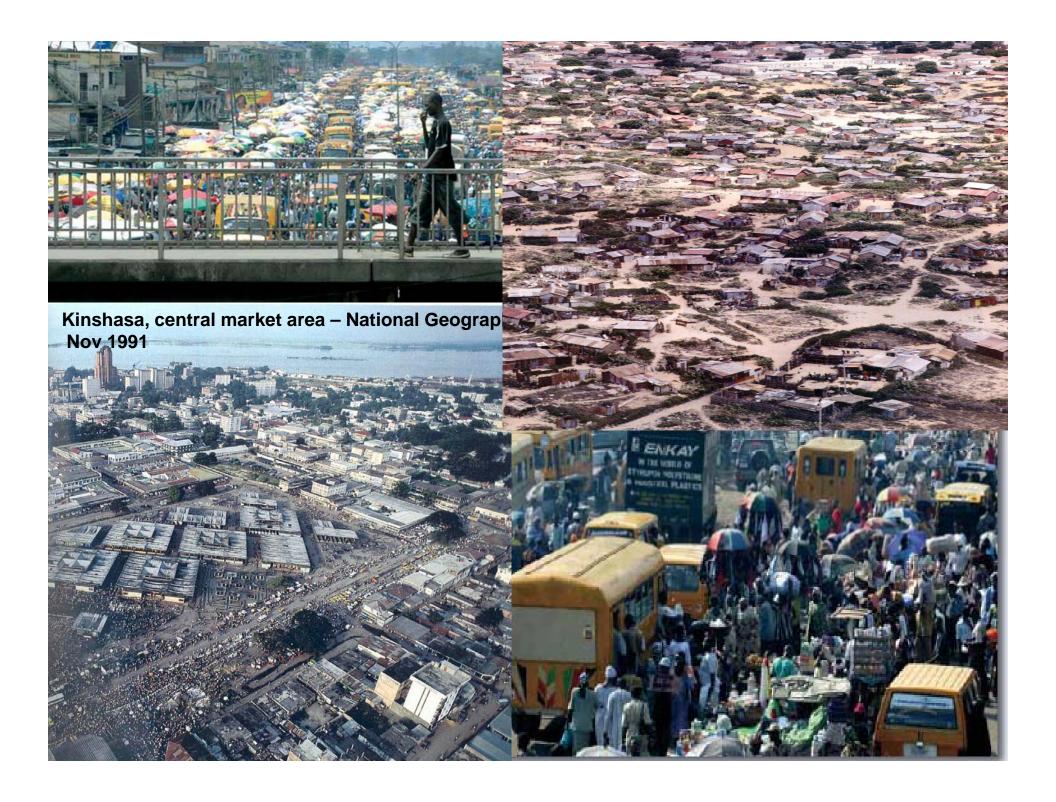
Г	MANAGE	TYPE		OCATION	BACKGEOUND						
Ì	1			Democratic Republic of the Congo (east) - Kivus and turi	Fighting and attacks against civitiums involving government and several rebel militias from DRC and Rwanda. UN MCNUC deployed in 1999. Conflict dates back to 1998. Goma ceatefire signed Jan. 2009 had little effect, as conflict continued, littling civilians, causing mass deplacements and suspension of some relief sperations.						
ı	2		į,	Ethiopia (east) – Ogaden/Sonali Region	Fighting and attacks against civilians involving government forces and Ogaden National Liberation From (ONLF). Conflict infensified in 2007.						
	3		MAJO	Somalia (south, central)	Fighting and attacks against civilians involving Islamic insurgents, Transitional Federal government forces, and Ethiopian military. African Union (AU) peacekeeping forces deployed in 2007.						
Ì	4	med Conflict"		Sudan (west), Chad (east) - Darker	representation in continued to the continued of the conti						
	5			Burundi (west)	Fighting between government armed forces and the Hutto-led Forces for National Liberation (FNL) continues, despits ceaseline agreements in 2004.						
	6		DWTE	Chad (east)	Fighting between government armed forces and two rebel groups, Union des Forces pour la Democratie et Exveloppement (UPDD) and Rassemblement des Forces pour le Changement (RFC), intensified in 2001. Rabels attacked ViDjamena on Feb 2-4, 2008. Idea.						
	7		INTERMEDIAL	Sudan (south) - Abyei	Renewed fighting in 2018 between the former South Sudan rebel force and northers milita, government forces, and Misseaps Iribal militia around the oil-rich Abyer region, destroyed Village, tilled evillans, and displaced over 25 000. Southern Sudan civil war lasted from 1963 urbii 2005, UNMIS deployed in 2005.						
	8	Arme		Jganda (north), Sudan south), DRC (north), CAR southeast)	Fighting between Government of Uganda and Lord's Resistance Army (LRA). LRA has attacked, atducted, and displaced civilian populace since 1997. LRA has retreated and established bases in scuttern Suzan, ORC and CAR.						
	9	•		Angota (west) Cabinda	Low-intensity flighting in oil-rich province/enclave continues betwees government forces and separatist Front for the Liberation of the Enclave of Cabinda (FLEC) - Armed Forces of Cabinda (FAC) despite July 2004 ceaseline. Secessionist novement cates backs to 1560-70s war of independence with Fortugal.						
	10			Central African Republic inorth)	Fighting between government forces and Rebel Union of Democratic Forces for Unity AUFOR) and Rebel Fooular Amry for the Restoration of the Republic AFRD) stanted in 2001. MRNUKAT deployed in 2007.						
	11		MINOR	Vlali (northeast)	Low-intensity conflict between Government and Turaveg rebel group since 2005 to present. In May 2008, refugees moved into Burkina Faso to escape fighting. Libyan protected conserter announced in. usp 2004.						
	12			Niger (northwest)	Low-intensity fighting between Government and Rigerien Movement for Justice (MRJ) since 2007 to present. Libyan brokened ceasefire announced in August 2008.						
	13			Nigeria (soeth) Rivers Stata Delta	Sporadio fighting between Government and the anned Movement for the Emancipation of the Nigera Delta (MEND) over oil-rich turnitory since 2006, combined with long-term communal and pany warfare.						
	14			Senegai (south) Casamance, Ziguirohor	Low-intensity fighting between Government ferces and separatint Movement of Democratic Forces of the Cassamance (MFDC) since 1990.						
	15	ommunal Strif		ORC (west) - Bas Congo, Sinohasa	Sporadio clashes in Bas Congo province between police and adherents of Buncu da Kongo, a political-religious interesent comprised of followers from the Bongo comunity, Clashes intensified in early 2007 and early 2008.						
	16			Ethiopia (wrst) Sambella/Sudan (east)	Sporadio low-intensity stantes over tirestock and land/exter rights amongst Ansak. Nov. and Sudasea Marie tribos is Gambolis Recion (16s): between Oromo and Gumu communities in East Wallega of Oromya Region (16b): and between Guji and Borara ethnic groups in southern Oromiya Region (16o).						
	17			Senya (west) - Mount Eigen	Sporadic clashes between two main cans of the Sabet community – the Mosop (also known as Ndorebe) and the Sey, started over disputed land redistribution.						
	18			Kenya least) - Bura, Mandera	Tribal clashes between the Wardel and the Orma in Bura Division intensified in early 2007 (15a). In Cottoner 2008, Baylong broke out in Maadera District between Game and Marele class over land following Spooding (18b).						
	19				Low intensity sporadio violence between Muslim and Christian communities and between farmers and nomodic pastoralists.						
	20	å		SomalifiendPurBland	Sporadic highling between class minitias over dispeted Sool and Sanzag territory.						
	21	-		South Mrica	Sporadic mob attacks is 2108 against migrant workers and families from neighboring countries.						
	22		_	Jganda (northeast/ Kenya northwrst/Sulan Comorcs - Anjcuan	Historic inter-tribal and cross-borcer livestock raids and attacks in Faramoja claster regions encompassing parts of Uganda, Kenya, Ethiopia and Sudan. Conflict in Anjouan Island intensified in 2007-2004 between Comorae Ocversment-1						
	23	9		Suisea	forces and separatist leader Mohamed Flanar Flanar was forced into exile in March 2008. Labor strikes and political profests against occurrement of President Conte resulted in						
	24	anc.			violence and imposition of martial law in 2007-2018.						
	25	al Violence		Senya (south)	The disputed Dec. 27, 2007 election sparked ethnic clastes between Rijukiu supporters of President Marai Kibasi and Luos and Kilanjin who supported approxion randidate Raila Ocings. Over 1,001 posels Hilled in mod stacks, over 200,000 displaced, and mass looting lated until late Feb. 2001 power-sharing agreement was announced.						
	26	Politica		Zimoabwe (pentral, east)	Following dispeted electrons in March 2008, security forces and party millso of Provided Mugglady "XAUIPP signing integrated supporter of the appearsion Wassemad for Democratic Change (MDC) in a months-forg campaign of violence, killing dezen and hospedating the foundance. It is estimated that beforese 10 2 million Cambalweans have field to neighboring caussine, but meet are arregistered, not recognized as relarges, and fire wheats of expension and violence.						
	ě	Targeted Attacks		Algeria, Mauritonia Worpoos, Yunisia, Somalia	Targeted kindagoings, simbusbes, and bomb attacks against civilizes, ficeign nationals, and government targets attributed to sI-Gzeds in the stanic Magneb and Istemic insurgeets in Semalis in 2007-2008.						
		Disputed Pirate Borde: Assets		Somalia, Cameroon, Nigeria	During 2007 – 2008 reported increases in pitals attacks on followy wassess, curps ables, a latent prists bearing and bearing and the cases of stillands, Cameroon and Rigings. Overflow to be the field good and pastingers and trave to true bear followed by the contract of the contract						
	Name of Control			Eritea-Ethispia, Eritea- Ojibouli, Camerous-Nigeria							
	*	Food		Burtina Faso, Cameroon, Cote d'Ivoire, Egypt, Guinea, Cenya, Mauritania, Worsoon, Mozambique, Benegai	Rots and proteins resulting in violence break out over food shortages or increased food prices is 2007-2008.						

Definitions of Armed Conflictrankings*
Major: More than 1,000 conflict-related deaths in a year. Conflict-related deaths include deaths attributed to vicience, but also due to maintain on and disease reacestained by the conflict.
Intermediate: At least 25 conflict-related deaths or year and an accumulated total of at least 1,000 deaths, but fewer than

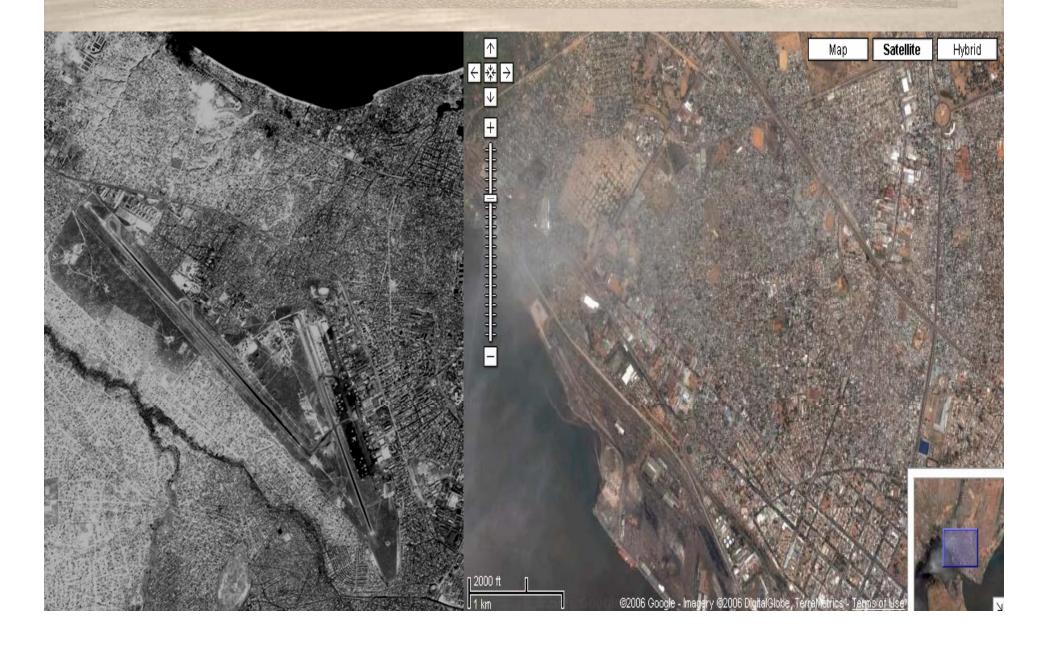
1.000 in the past year.
Minor: At least 25 conflict-related deaths per year but fewer than 1,000 accumulated deaths during the course of the conflict

Alex Schmid and A.J. Jengman. PIDOM (PIDOM is a Dutch arronym for Intendisciplinary Research Program on Root Gauses of Human Rights Violations); Leiden, the Netherlands, 1897 based on Department of Peace and Conflict Research Usersala Universit. Sweden.





Access to Ports of Entry



Social Anomalies: Child Soldiers



IFF, Rules of Engagement regarding Child Soldiers?

Broadening Concept of Security

- Concept of security has broadened.
- •Includes everything that poses a threat to individual, natural or human induced.





<u>Implications</u>: Defence Forces are increasingly tasked to conduct "collateral" operations.

This imply that it is not security first and on its own

Asymmetric Conflict

"That is, when two combatants are so different in their characters and in their areas of comparative strategic advantage, that a confrontation between them comes to turn on one side's ability to force the other to fight on their own terms."

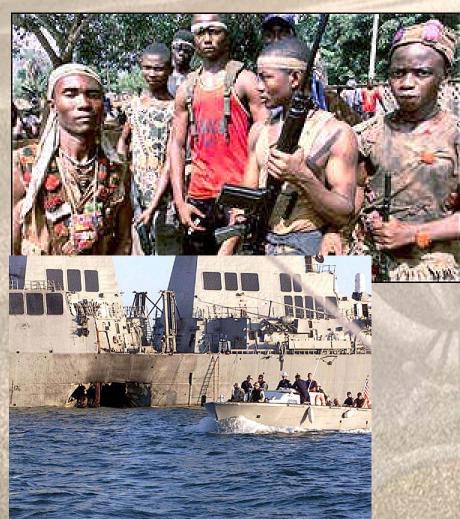




Photo: SAAB

Hackers and Cyber Warriors/Terrorists

Incompetent Amateurs

Hackers

Disgruntled Employees

Criminals

Organised Crime

Political Dissidents

Terrorists

Espionage Services

Orchestrated Info war



Threats to Security in Africa

Sub-state conflict

Humanitarian threats

Disease: HIV/Aids, malaria, cholera, etc.

Food/water Insecurity

Displacement and migration

Demographic stresses: e.g. Urbanisation, youth bulge, etc

Poverty and underdevelopment

Vulnerable political structures

Environmental degradation, exacerbated by climate change

(International) Organised crime

International terrorism (Targets and Bases)

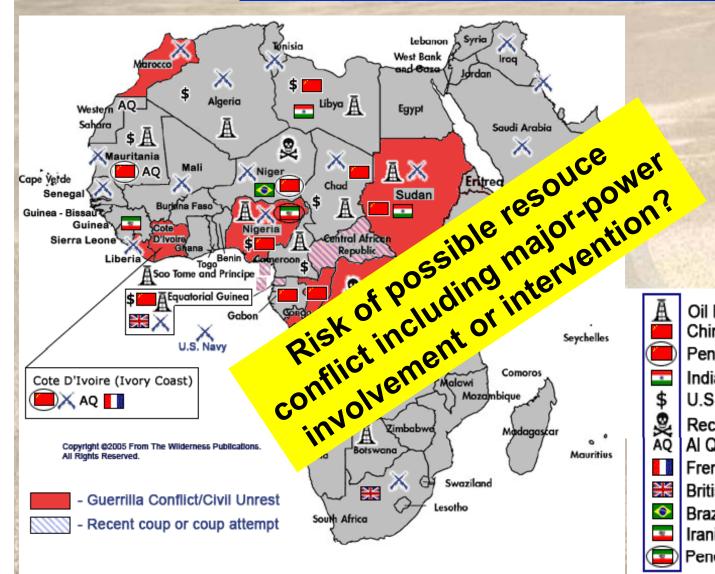
Exceptionally, Inter-State armed conflict

Implication: Persistent, mainly sub-state conflict, often with external support and/or intervention

New Threats



Foreign Involvement In Africa



-Trade between China and Africa up 50% in 2004 (IAGS - Energy Security Nov. 15, 2004)
-Sir Mark Thatcher pled guilty to involvement in coup attempt in Equatorial Guinea on Jan 11th

-"OIL IS THE ONLY U.S. INTEREST IN AFRICA" - The Economist

Indian Investment in Oil/Gas

U.S. Investment in Oil/Gas

Recent disease outbreaks

AQ Al Qaeda links

French Military Activity

British Military/Intelligence Activity

Brazilian Investment

Iranian Investment in Oil/Gas

Pending Iranian Investment in Oil/Gas

Chinese Investment in Oil/Gas

Pending Chinese Inv. in Oil/Gas

Oil Development

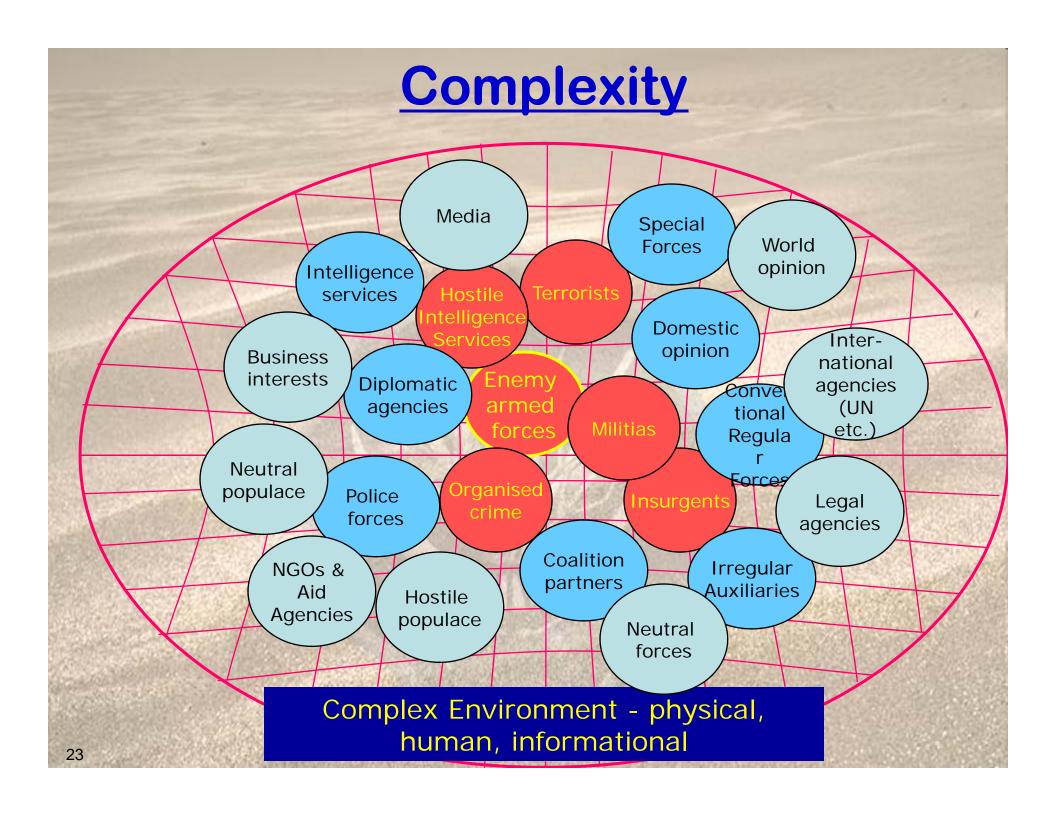
X U.S. Military/NATO/CIA Activity

Source: fromthewilderness.com

Cell phone Coverage in Africa: GSM



Ku-band Satellite Coverage 2005 **VSAT Licensing Status** Situation des autorisations d'utilisation de VSAT Monopoly Monopole Duopoly **Exclusively for satellite** Duopole Partially liberalised Partiallement libéralisé communications -Fully liberalised Totalement libéralisé broadcasting and 2-way No data Aucune donnée **Internet connections** Beam strength (dBW), VSAT antenna size (m) and cost Puissance du faisceau, taille de l'antenne VSAT et coût Risk of interception or disruption? 50 48 46 44 www.gvf.org Size/Taille 1,2m 1.8m Cost/Coût \$\$\$ \$\$\$\$ Source: Satellite Operators, ESRI World Map, Africa Connectivity Model 22 Source: Opératuers satellite, Carte Mondiale ESRI, Africa Connectivity Model



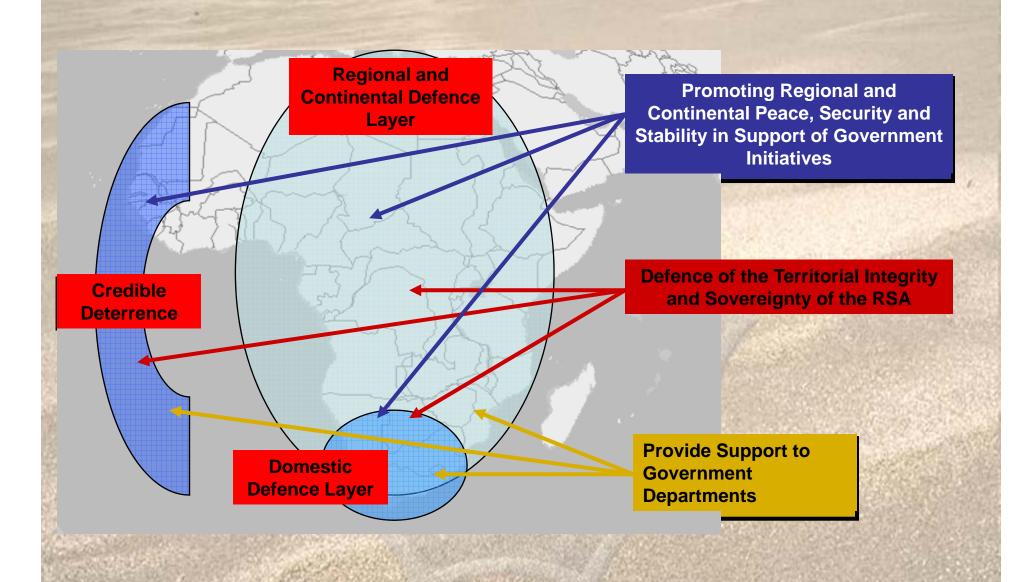
Remember

The attacker needs only one vulnerability.

The Defender needs to protect every avenue.



JFE Objectives: Within a Layered Approach





Range of Military Operations

		litary rations	General Type of Operation Goals (Examples)		Opposition		
C		War	Defeat Enemy	Major Combat Operations	Military		
M B A T	NONC	Military Operations	Deter War & Resolve Conflict	Peace Enforcement Counterinsurgency Show of Force/Raid/Strike Peacekeeping Counterterrorism	Military/ Para-Military		
	OMBAT	Other Than War	Promote Peace & Support Civil Authorities	Freedom of Navigation Counterdrug Protection of Shipping Humanitarian Assistance Civil Support	Criminal		

(Adapted from US JP3-07 Joint Doctrine for Military Operations Other Than War, 16 June 1995)

EW capabilities must enable and support operations across the spectrum from combating crime to major combat

Looking Back: 1997 Potential Threat of Info Attack on US National Security

Source	Validated Existence	Existence Likely	Likely by 2005	Beyond 2005
Incompetent (Amateur)	W			
Hacker	W			
Disgruntled employee	W			
Criminal	W			
Organised crime	L /		W	
Political dissident	34//	W		
Terrorist group	1/	/L	W	
Foreign espionage	L ///	1	W	
Tactical countermeasures	7///	W		
Orchestrated tactical IW			L L	W
Major strategic disruption				L

W = Widespread, L=Limited

Source: From a Defence Science Board (US Department of Defence) Task Force report on 'Information Warfare – Defence', quoted in "Waging the infowar" by J.R. Wilson, Jane's IDR Extra, Volume 2 No.4, April 1997

A Later US View C. 2005

- Continued asymmetric opposition to US interests
 - Non-state actors
 - Nation states
 - Military actions
-certain trends are obvious:
 - Nuclear, chemical, bio weapons continue to proliferate
 - Terrorism continues
 - Increasing violence and political influence by non-state actors
 - Proliferation of primitive (but effective) as well as modern weapons/systems
- Threats Impacting Navy-Marine Corps Missions
 - Proliferation of capabilities for sophisticated information warfare
 - "Network centricity" creates vulnerabilities for US forces
 - Interruption/jamming
 - Effective emission control impossible
 - Information overload
 - Over-dependence on reachback

Extracts from *Science and Technology for Naval warfare, 2015 – 2020*, Naval Research Advisory Committee, 304 October 2005

EW Activities

Electronic Attack Activities

Activities related to electronic attack are either offensive or defensive and include —

Countermeasures.

Electromagnetic deception.

Electromagnetic intrusion.

Electromagnetic jamming.

Electromagnetic pulse.

Electronic probing.

Electronic Warfare Support Activities

Activities related to electronic warfare support include —

Electronic reconnaissance.

Electronic intelligence.

Electronics security.

Source: FM 3-36: Electronic Warfare In Operations, February 2009

EW Activities (Contd)

Electronic Protection Activities

Activities related to electronic protection include —

Electromagnetic hardening.

Electromagnetic interference.

Electronic masking.

Electronic warfare reprogramming.

Emission control.

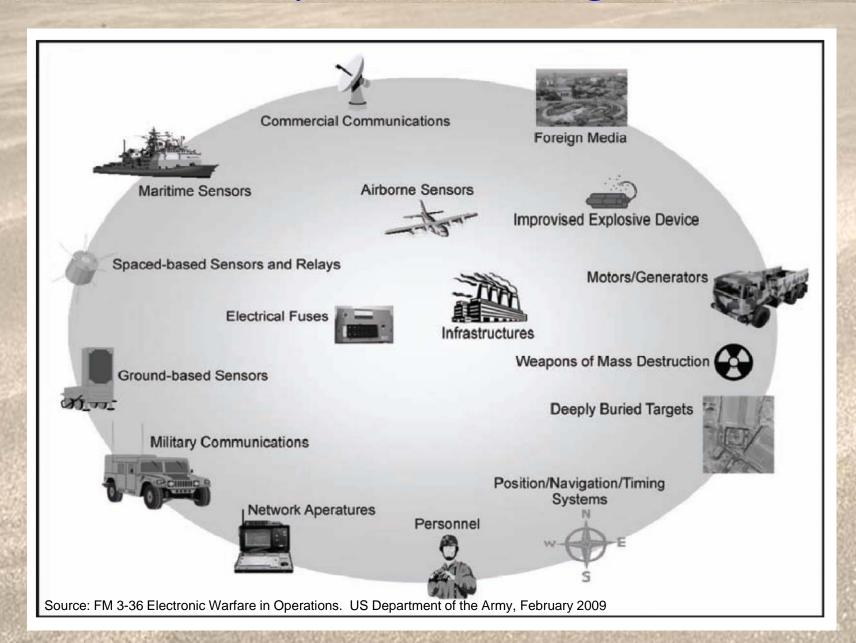
Spectrum management.

Wartime reserve modes.

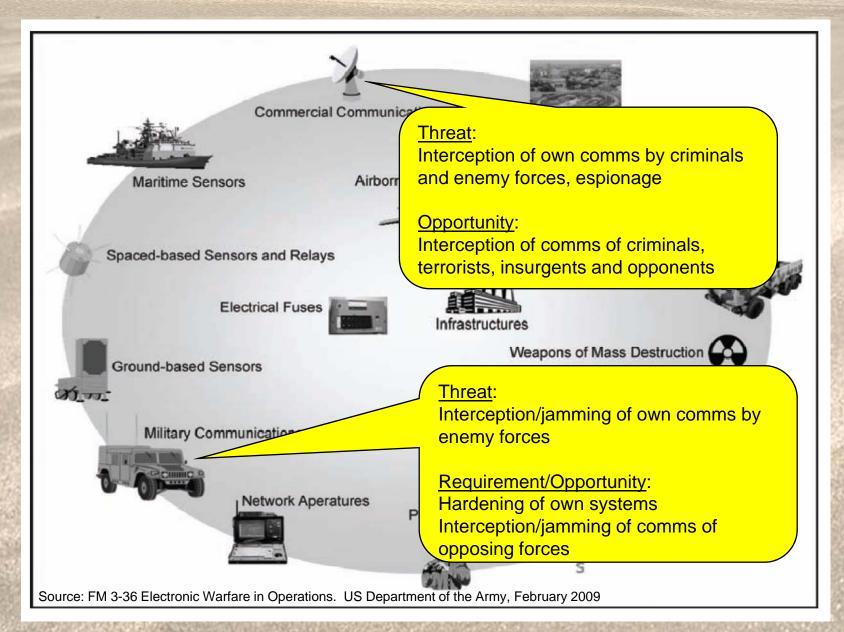
Electromagnetic compatibility.

Source: FM 3-36: Electronic Warfare In Operations, February 2009

EM Spectrum Targets



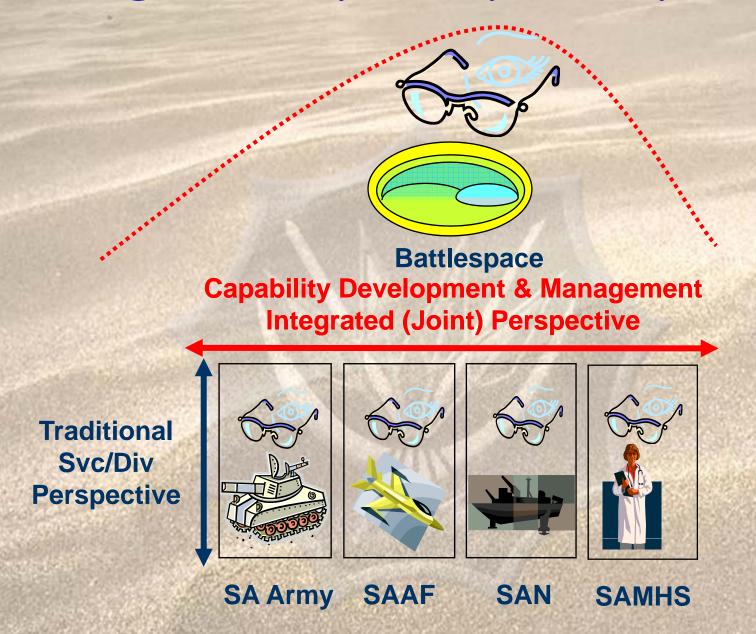
Opportunities and Threats for the SANDF

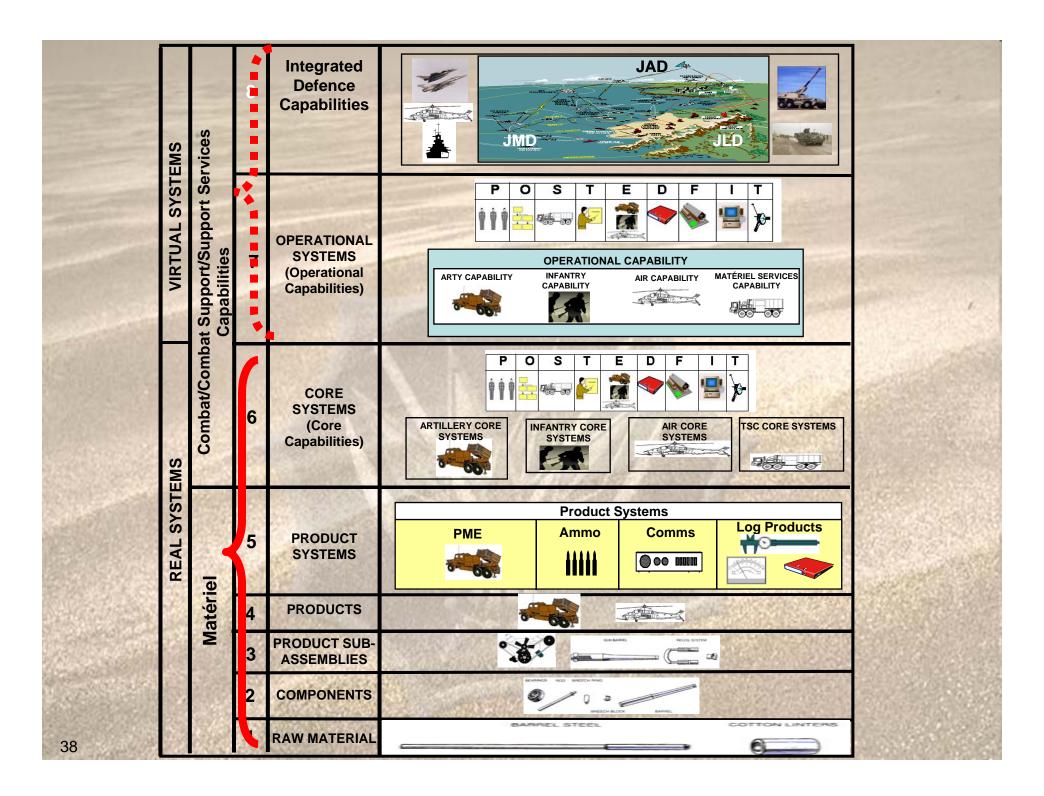


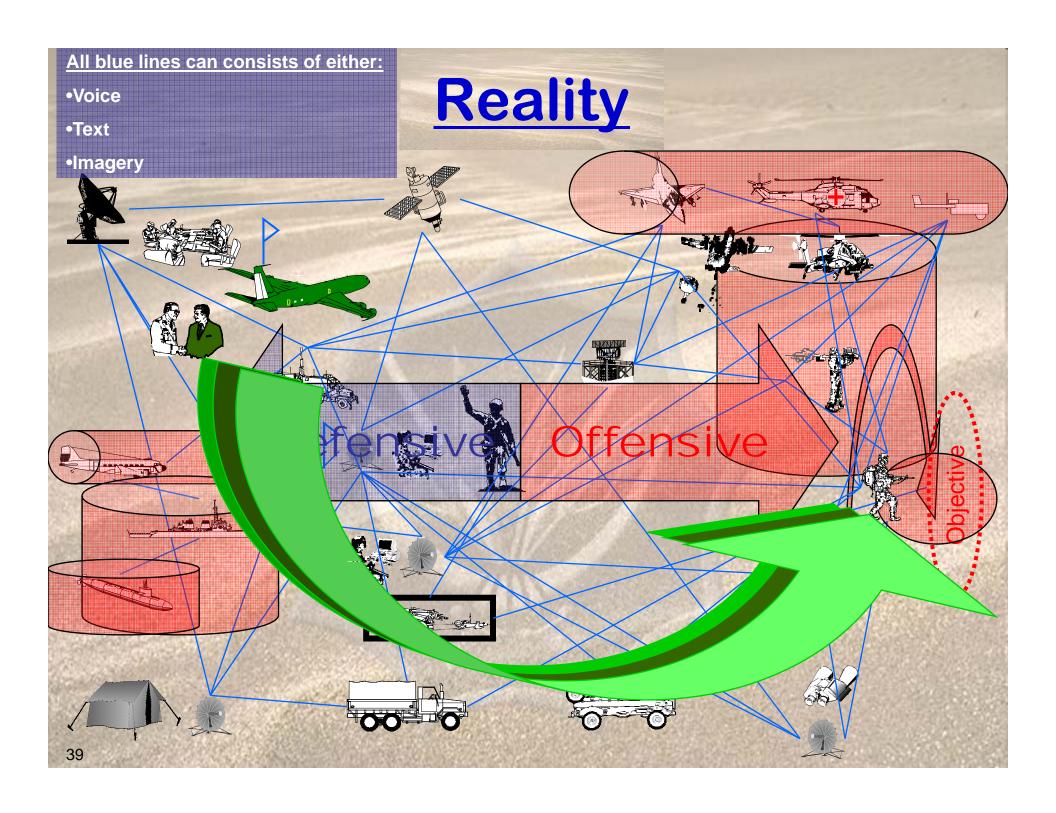
Utilising trade-off studies to better decision making C²I³RS Application Protection Force C² Information Support Generation Knowledge Sustainment A COLOR **Mobility Force Deployment** 35



Integrated (Joint) Perspective







Example of Capability Requirements

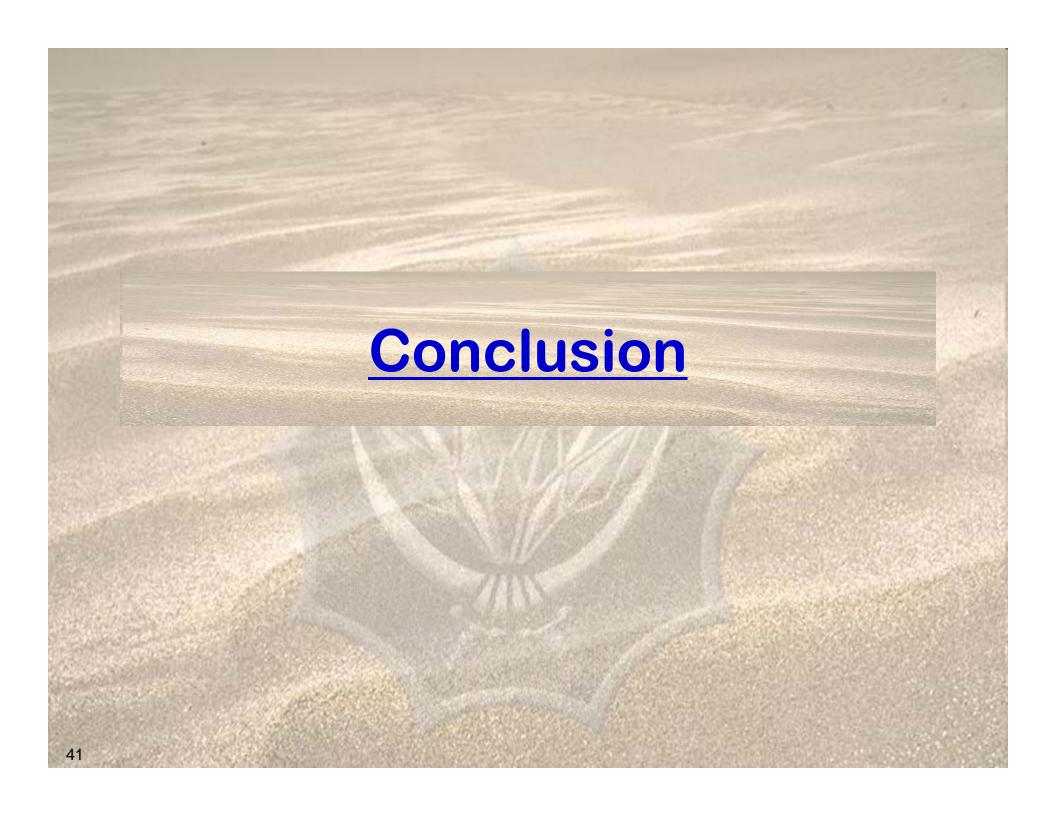
Table XI-1. Functional Capabilities Needed-Electronic Warfare

	Operational Capability Elements									
Mapping		Electronic Attack						Electronic Warfare Support		
Functional Capabilities	Attack Warning	Aircraft Protection	Ship Protection	Land Combat Vehicle Protection	C² Attack	Lethal SEAD	Electronic Protec- tion	Signal Collection	Emitter ID/Location	Battlespace Awareness
Real-Time Threat Detection, ID, and Geolocation	•	•	•	•	•	•		•	•	•
Missile Approach Warning	•	•	•	•		•	Not addressed in this Joint Warfighting S&T Plan			•
3. Modular, Programmable EW Receiver/Processor	•	0	0	0	•	•		•	•	•
Sensor/Data Fusion, Electronic Intelligence	•	•	•	•	•	0		•	•	•
5. Decoy Terminal Threat Weapons		•	•	•		•	t addressed in this Jo Narfighting S&T Plan			
UAV EW Employment	0	•	•	•	•	•	sed i	•	•	•
7. Robust, Multispectral EA of Simultaneous Threats		•	•	•		•	dress			
8. Broadband, Coherent, Surgical RF Countermeasures		•	•	•	•	0	t adc Warf			
Second-Generation Directed IRCM		•	•	•			N			
10. Laser-Based IRCM		•	•	•						
11. Counter IADS Surveillance, Acquisition, and C2		•	•	•	•	0	<u> </u>	0	0	0

Strong Support

Source: US Joint Warfighting Science and Technology Plan, Chapter XI, Electronic Warfare

O Moderate Support



The EW Challenges

- Exponential technology growth high levels of unpredictability and uncertainty
- Today, military only; tomorrow, off-the-shelf
- Finding focus with limited resources
- Leveraging limited capabilities
- Need for a System of systems approach
- Increased protection requirement

Key Requirements for SANDF

- Secure communications
- Secure C2 and computer networks
- Encryption/decryption
- Electronic surveillance
- Disruption/jamming
- Advanced signal processing
- Deconfliction of EW spectrum
- Realisation of interoperability requirements



How can I guarantee the basics?

 The most basic communication requirements for dismounted soldiers are to know (1) their own location, (2) the location of friends, and (3) the location of enemies.

 Can we guarantee even that for the next decades?

