

Future Combat Systems

An Army (\$509 m)-DARPA (\$406 m) Program '01 thru '05

- System of systems
- Not “platform-centric” but “collaborative”
- Two thrust-lines: (1) industry; (2) DARPA
- Early M&S, then field experiments
- 5 DARPA system-components:
AFSS, A-160, DRaFT, IUGS and CPOF

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SENIOR ADVISORY GROUP (JUN- SEP 99)

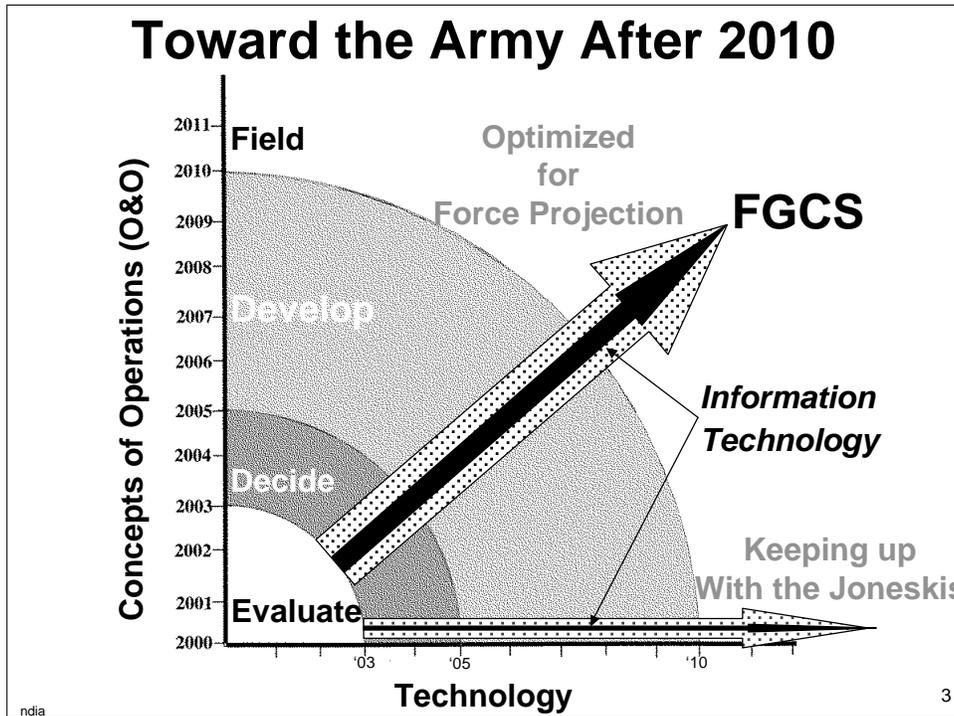
TOR:

- Explore innovative technology solutions
- Enable Army to achieve vision of lightweight, lethal, survivable, multi-mission ground combat forces
- Help DARPA and Army determine course of action leading to development of truly innovative future combat systems

SAG: 2 former Dir DARPA; 3 ASB/DSB; 5 Gen(R)

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CONOPS (O&O) Enablers

- **Distributed, integrated force** of teams with a mix of manned and unmanned systems, light (flattened structure, extensive reach-back, automation, low-weight vehicles, high fuel efficiency), lethal (precision munitions and effective suppressive ordnance), and survivable (teamwork and interactive protective systems).

- **Organic RSTA at every echelon** linked directly to weapons, particularly those enabling engagement beyond line of sight. This must include provision for highly mobile C2, and for elimination of forward TOCs and FDCs.

- **Highly-automated, self-actualizing C3 system** that assures situational understanding and prompt execution of tactical decisions.

- **Configured for airmobility:** moving overseas using commercial transmodal equipment and civil air freighters, and able to be deployed and sustained within the theater by C-130 (or comparable airlifters).

- **Punch and endurance** beyond that of today's heavy-force, capable of forcing entry and of gaining and maintaining operational and tactical initiative.

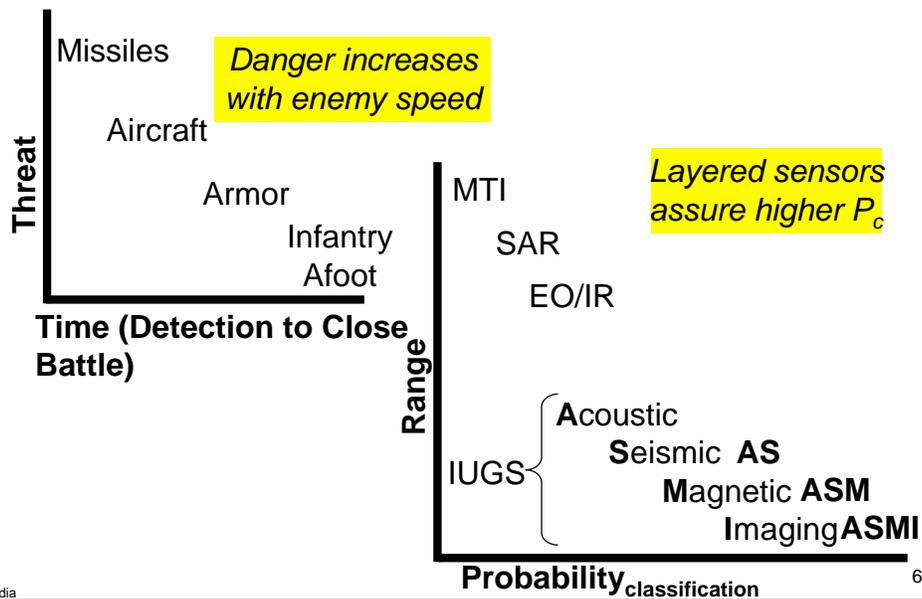
Toward New Team CONOPS (O&O)

	2000	post 2010
Force Structure	“heavy” or “light”	combined arms
Organization	hierarchical	networked
Construct	duel; overmatch	win at extended range
OPTEMPO	diurnal spikes	relentless
Venue	mono-plane	3-dimensional
Close Battle RSTA	“higher”+ eyes	RSTA layered
Indirect Fires	latency	linked sensor-shooter
Manpower	intensive	robot-assisted
AFV	crew + platform	network with robots
C3	TOC	distributed, automated
Mobility: strategic	DoD lift; RSOI	all lift; fight on arrival;
Mobility: tactical	control zone secure LOC	control enemy CGs; mass effects; sustain from the air

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Sensor-Derived Info



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Capabilities Year 2000 IDA Assessment of Current Sensors

Contribution to Force Effectiveness

Sensor System	Detect Locate			ID, Track, Cue, Fuse/Alert			Enable Fires &/or Maneuver		
	Div+	Bde	Bn	Div+	Bde	Bn	Div+	Bde	Bn
JSTARS	5-2*	5-2*	0	3	3	0	2	2	0
DISCOVER II	5-2*	5-2*	0	3	0	0	2	0	0
PREDATOR	5-2*	5-2*	0	2	2	0	1	1	0
GLOBAL HAWK	4	0	0	2	0	0	1	0	0
Tactical UAV	1	5-2*	2	3	3	1	2	0	1
UGS	0	0	2	1	2	2	0	0	2

0= No Contribution; 5=Significant Contribution
* Situationally dependent

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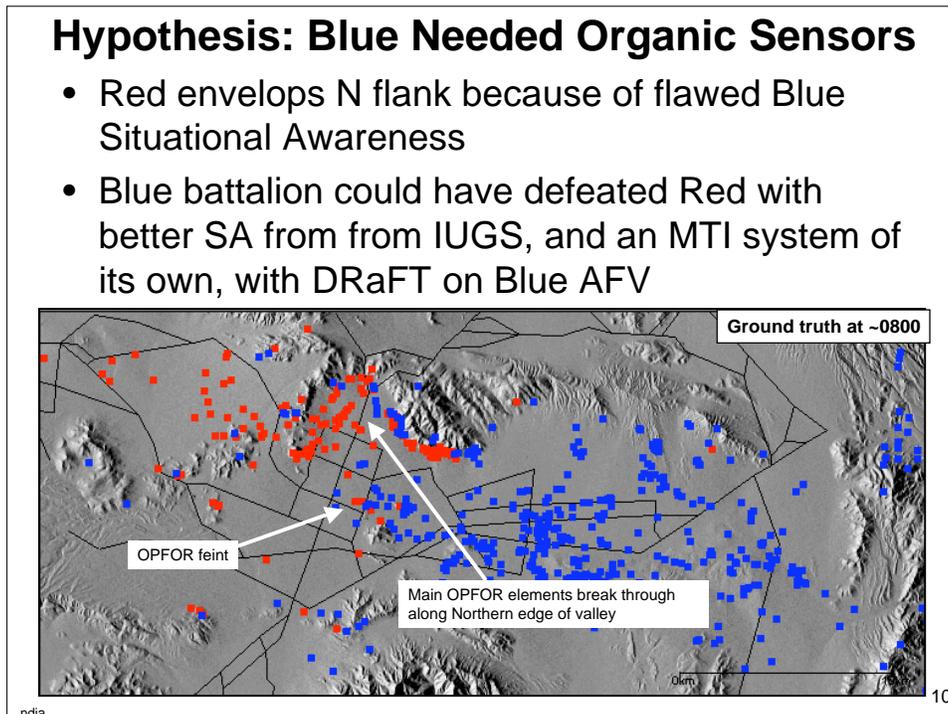
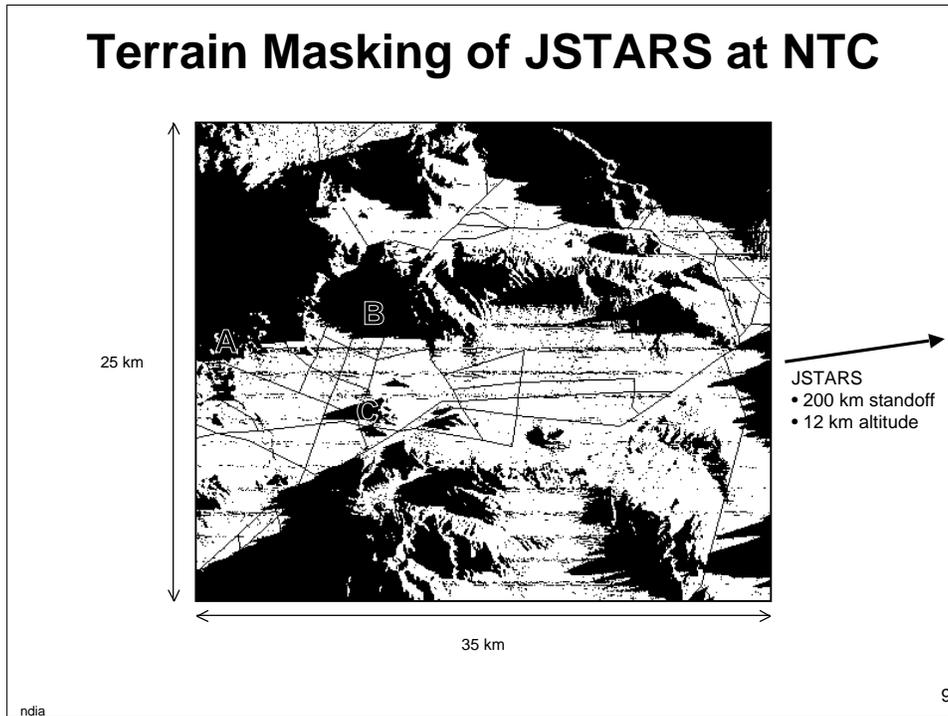
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Close Battle is the Payoff

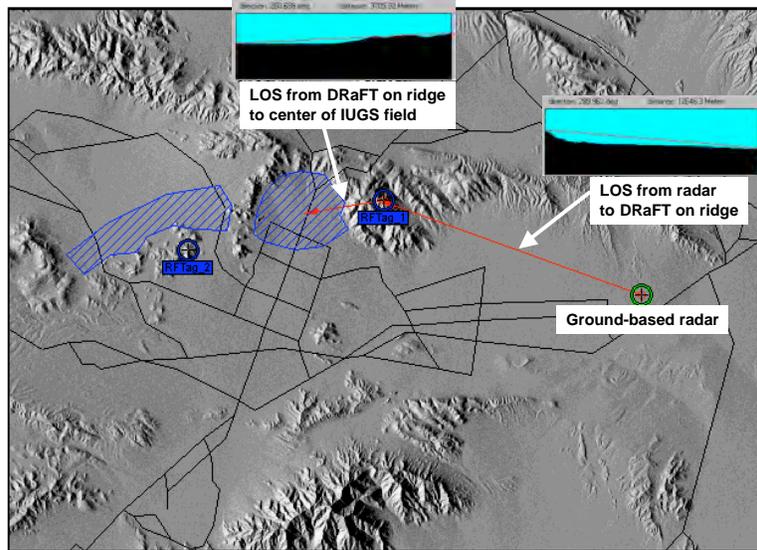
- Target acquisition (TA) for those in close battle is now largely based on (1) eyeballs and oral reports, (2) intel from the rear
- DARPA TTO recently analyzed problem. Method was to examine ground-truth data from Task Force XXI AWE (March 1997) [data from TRAC WSMR]:
 - Successful Red envelopment of Blue due to poor SA
 - Predicated on instrumented histories re behaviors of vehicle types
 - Replay script of AWE maneuvers in Toyon's SLAMEM model
 - Against standoff GMTI radar (JSTARS)
 - Against IUGS fields projected into in key corridors and blind zones
 - Assume IUGS fields communicate directly through battalion's **organic** ground-based air and surface GMTI radars
 - Employ statistics of target detections for analyses

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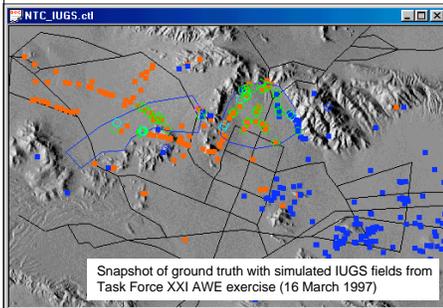
IUGS, DRaFT Simulated w/ 97 AWE Data



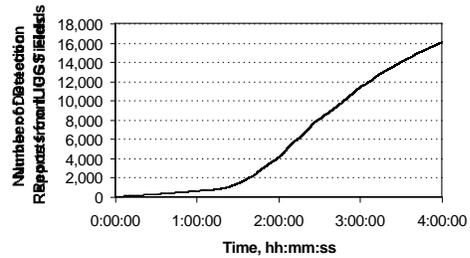
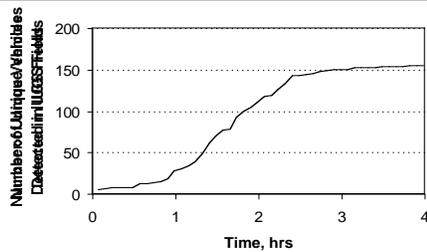
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Radar-read IUGS Can Plot Red AFV



IUGS linked by DRaFT to battalion radar(s) provide Red awareness not available from theater-level sensors



Assumes 30 second updates for detected targets in IUGS fields

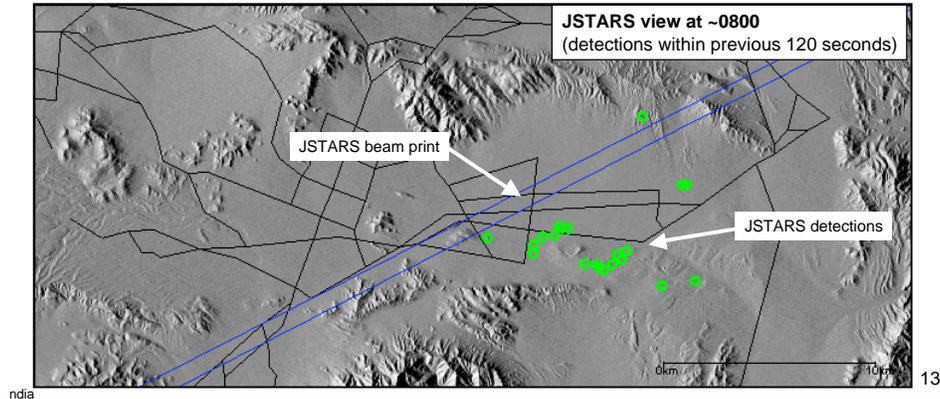
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Theater-level MTI Limited to Macro-detail

Negligible contribution to Blue situational awareness

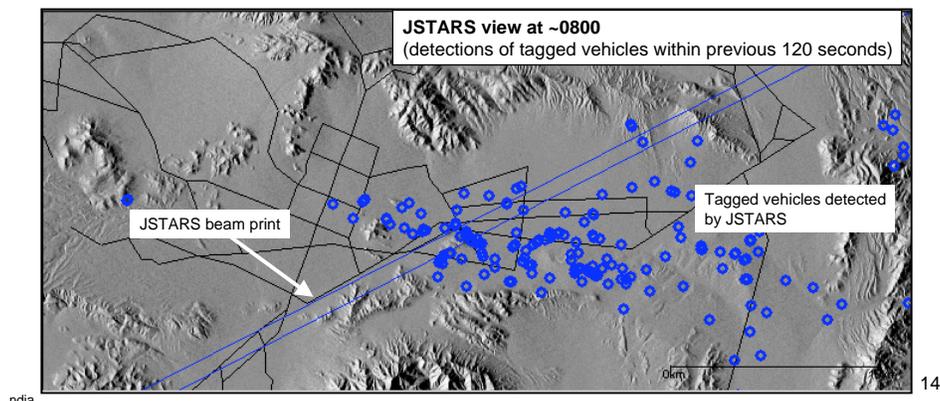
- Can only detect movers in MTI mode
- Majority of movers are masked by terrain
- Cannot distinguish Blue from Red
- Information has significant latencies



JSTARS+DRaFT Improves Blue Data

Blue-side awareness at the Theater level is significantly better

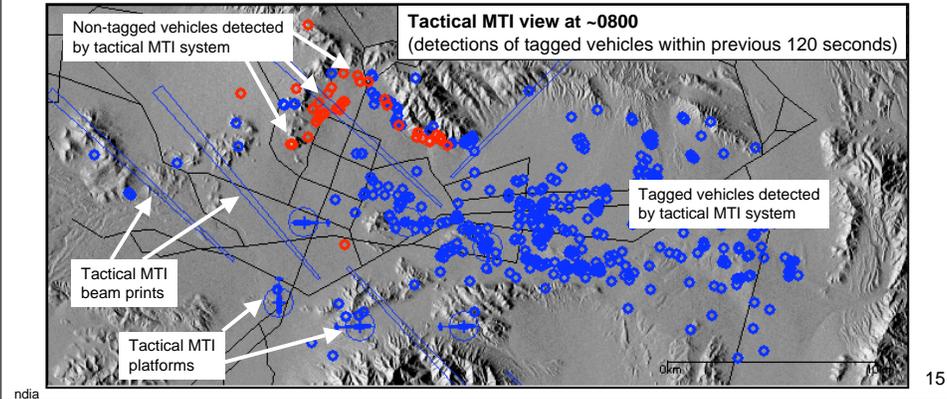
- **Movers and tagged stationary vehicles are located; DRaFT discriminates Blue from Red**
- **Many targets (including the main Red force) are masked by terrain**
- **Latencies may limit the value of the information forward of brigade**



Tactical GMTI+DRaFT = Reliable SA

Airborne GMTI for Blue, and DRaFT for all Blue vehicles provides timely, unambiguous Blue and Red SA:

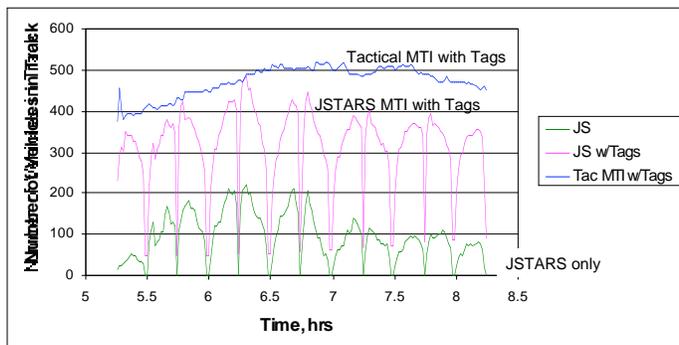
- GMTI assumptions: six platforms at 5 km altitude; 15 km MTI range; interacts with DRaFT
- Blue vehicles stationary or moving can be detected and identified



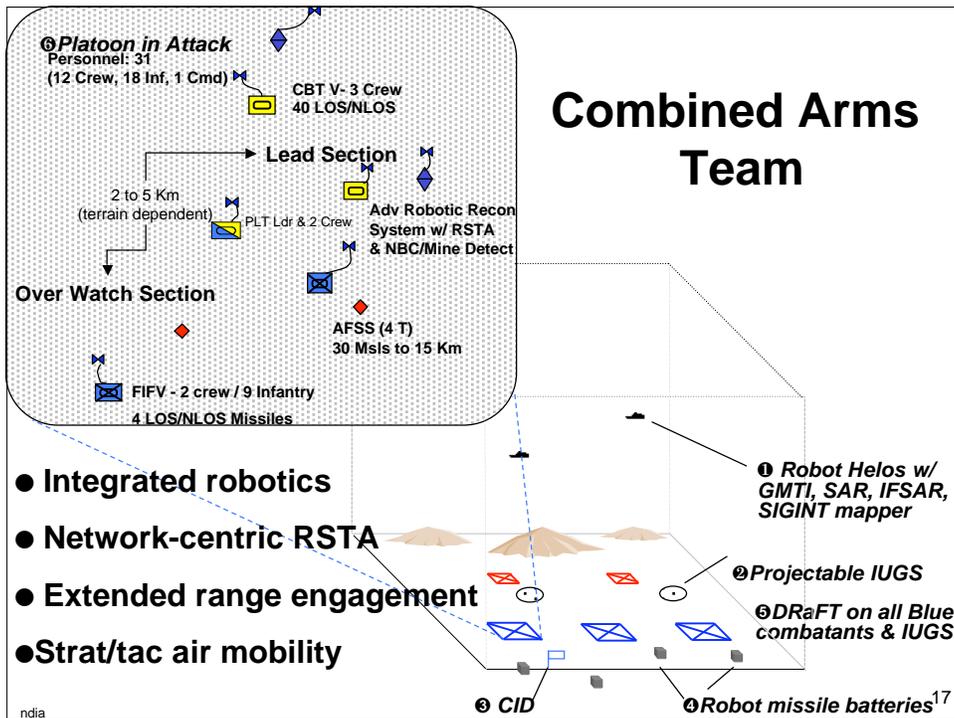
Blue-Force SA -- Options Compared

Tactical GMTI with RF Tags provides best awareness

- Sees most of the Blue AFV (not terrain masked; sees stationary tagged vehicles)
- Sees advancing Red AFV inaccessible to standoff GMTI
- Has high refresh rate and no outages due to turns



- Notes*
- Vehicle counted as in track if it was detected in the previous 120 seconds
 - Plot does not distinguish between Blue and Red vehicles
 - 20 km range for tactical MTI
 - 30 seconds to sweep 360 degree field-of-regard



Candidates for Layered RSTA ⇔ DRaFT

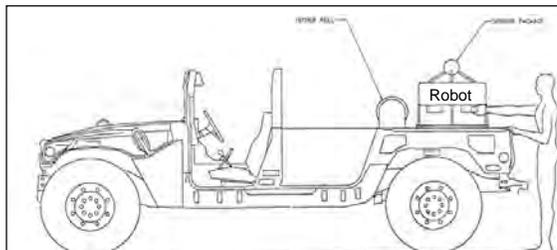


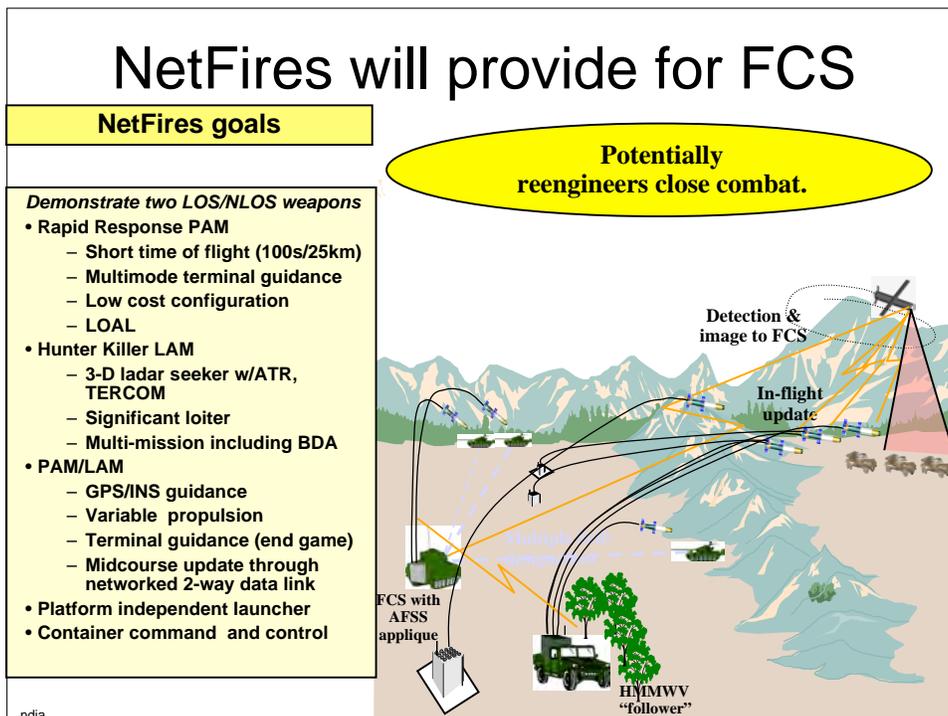
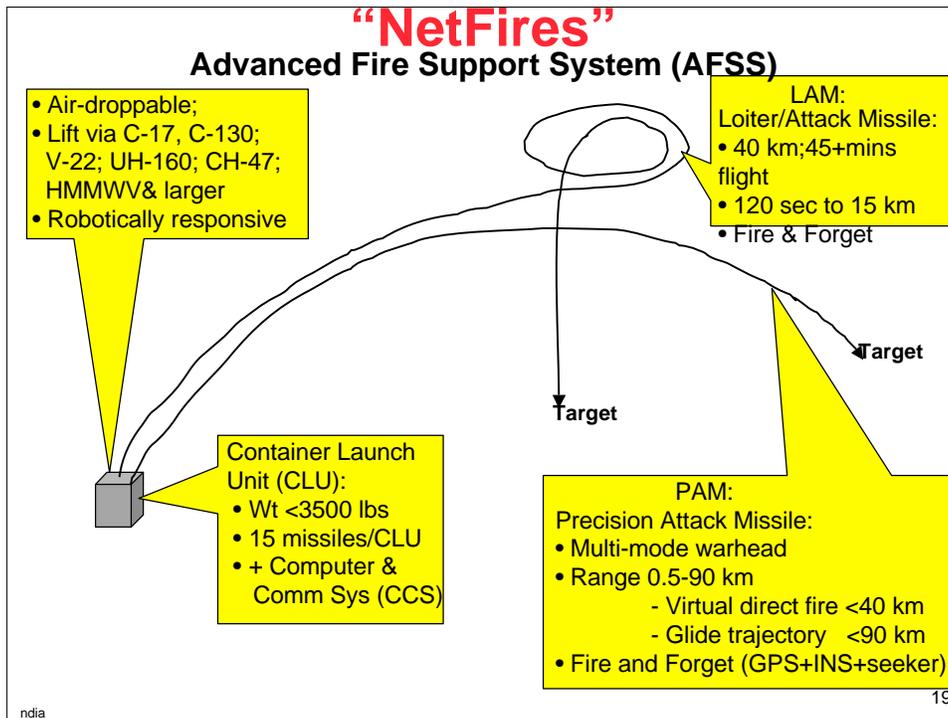
A-160 unmanned VTOL

- 40+ hrs endurance
- max speed 140 kts
- ceiling 30k ft
- payload 300#
- low signature

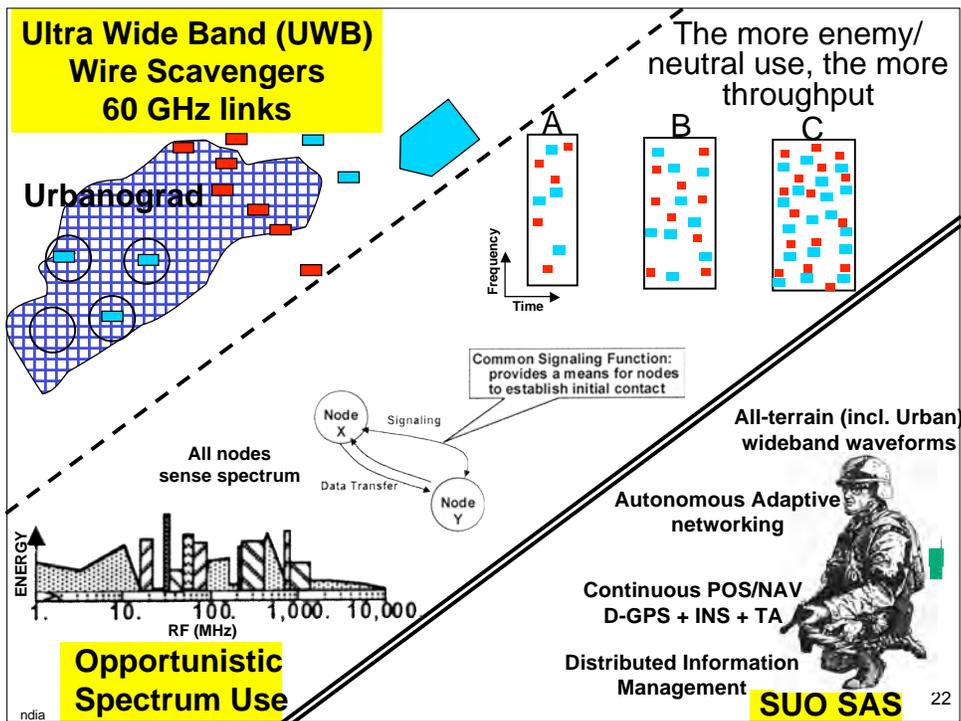
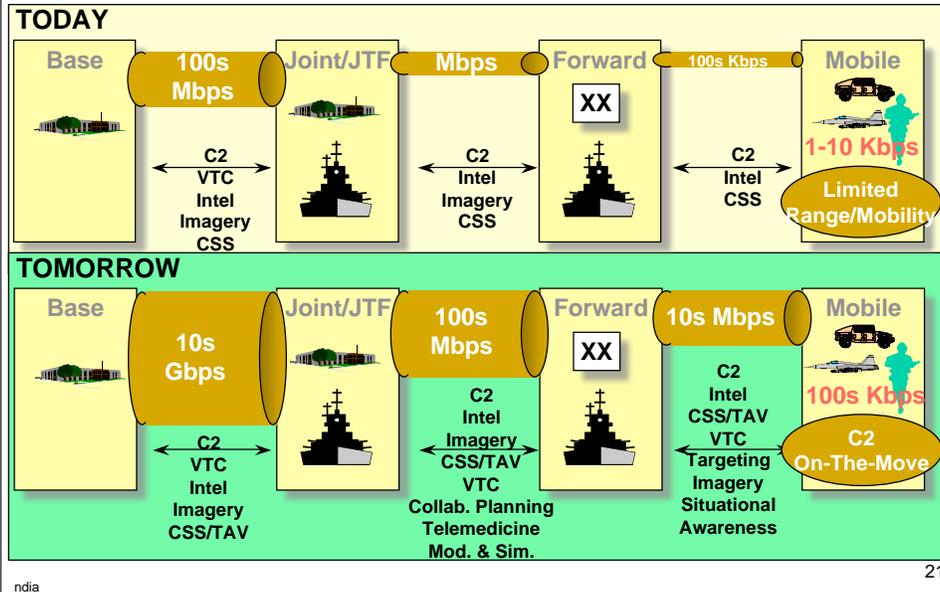
Tethered electric robot

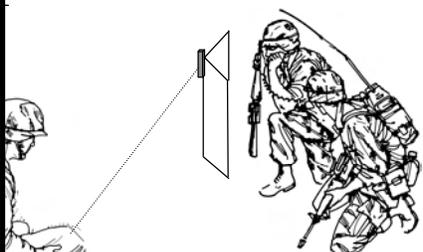
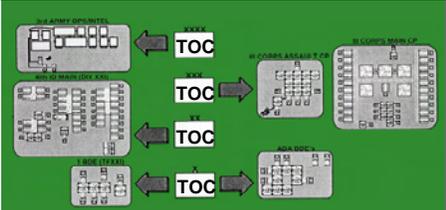
- 30" X 45"
- 30 lbs. gross
- 15lbs 45 MHz GMTI
- max alt 300 ft





Broadband Communications for Close Battle



<h3>Not This</h3> <p><i>Stovepiped C2</i></p> 	<h3>But This</h3> <p><i>Platform Independent Command-on-the-move</i></p> 
 <p>Target Of Choice</p>	<p>Distributed C2</p> <p>Intel⊗ CSS⊗ FS⊗ Ops⊗ ⊗Avn,AD</p> <p>• Bn Cdr • Bn Cdr <u>50 km</u> SU Cdr•SU • Bn Cdr Cdr•SU SU Cdr• Cdr•</p>

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FCS: Future Covering Force

- **Strategic Precursor for arrival of “heavier” forces**
 - Superior strategic mobility
 - Seize and defend strategic access facilities
 - Forestall enemy positional advantage
 - Set conditions for operational initiatives
- **Enabler of surprise reversal of regional force balance**
 - Deter
 - Be demonstrably lethal and survivable
 - Deny enemy Kosovo-like “hide” options
 - Act as force multiplier for follow-on forces
 - ... Protect RSOI and rapid advance
 - ... Exploit superior operational, tactical maneuver
 - ... Extend range of conventional DS fires
 - ... Shape decisive engagements

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