Hard to See Lessons Clearly

• The war isn’t over.
  – Conventional phase seemed fast & decisive
  – Unconventional phase looks slow & difficult
  – ISR needs vary greatly between phases

• Many of the most significant lessons are secret.
  – ISR capabilities tend to be classified
  – U.S. not interested in advertising shortfalls to terrorists
  – Bush Adm. less open than predecessors

• Review process distorted by transformation bias.
  – Exaggerates role of jointness & special ops
  – Neglects traditional virtues like air superiority
  – Some recent setbacks traceable to subjective analysis

• Lessons will look a lot different if America loses.
In August, Joint Forces Command completed a “quick look” at lessons of the Iraq campaign.

<table>
<thead>
<tr>
<th>FIRST-TIER ISSUES</th>
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<td>“Capabilities that reached new levels of performance”</td>
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<td>“Capabilities that demonstrated effectiveness but need enhancement”</td>
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<td>“Capabilities that fell short of expectations or needs”</td>
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1. **Joint integration/adaptive planning**
2. **Joint force synergy**
3. **Special ops/conventional integration**

1. **Urban operations**
2. **Psychological operations**
3. **Intelligence, surveillance & reconnaissance**

1. **Fratricide prevention**
2. **Deployment planning & execution**
3. **Reserve mobilization**

Second-tier issues: joint fires, time-sensitive targeting, training, overmatching strike, theater logistics, media integration, inter-agency involvement.

Five classified findings not disclosed.
The Conventional Enemy

• Recent U.S. adversaries have been weak & incompetent.
  – Noriega (1990)
  – Saddam (1991)
  – Milosevic (1999)
  – Taliban (2001)

• Iraqi conventional forces were no exception in 2003.
  – Failed to preempt allied buildup in Kuwait
  – Failed to torch oilfields
  – Failed to blow up dams & bridges
  – Failed to get any aircraft into the sky
  – Failed to disrupt extended supply lines
  – Failed to employ weapons of mass destruction
  – Failed to exploit absence of northern front
  – Failed to leverage entrenched urban defenses

• Combination of an inept enemy with favorable terrain, nearby allies and 12 years of intensive U.S. reconnaissance makes any “lessons” suspect.
The Unconventional Enemy

• Since conventional combat ended, U.S. forces have faced growing guerrilla resistance.
  – Attacks up 500% in five months (6 per day to 30)
  – Increasingly diverse & deadly
  – 5,000 insurgents operating mostly in Sunni triangle

• Enemy consists mainly of Baathist sympathizers.
  – Former Republican Guard & security services
  – Some foreign elements, especially in suicide attacks outside triangle (Hamas, Hezbollah, Qaeda)

• Loosely coordinated campaign aims to prevent consolidation of U.S. control.
  – Kill or coerce collaborators
  – Discourage broader foreign presence
  – Influence U.S. election cycle

• To date, lessons from fighting insurgents mostly negative.
Integration of Space Capabilities

• Iraq campaign has seen unprecedented integration of space systems with other ISR assets.
  – “Space tasking order” appended to daily ATO
  – Heavy use of national assets to support tactical ops

• All five types of orbital constellation played important roles in supporting or exploiting ISR efforts.
  – Intelligence collection
  – Communications
  – Early warning
  – Navigation
  – Meteorological

• Barriers to sharing information eroding rapidly.
  – Strategic/tactical distinction gone
  – National/joint/organic distinctions fading

• Impressive progress in fusing information from space sensors with other sources to provide timely knowledge.
Space-Based Communications

- Viability of emerging ISR architecture depends on high-capacity, secure communications via orbital relays.
- Four DSCS satellites dedicated to support of Iraq campaign.
  - 80% of military space traffic generated by Iraq ops
  - 45% of in-theater wideband communications
- But the real star in supporting/exploiting ISR was Milstar II -- high data rate, antijam, encrypted & 100% available.
  - Transmission of NRO/CIA processed intel to theater
  - Remote tasking of Global Hawk
  - Critical comms support of special operations
  - Rapid retargeting of Tomahawk missiles
- Milstar II space crosslinks facilitate secure comms & increased data rate allows transmission of ATO in six seconds (versus one hour on Milstar I).
- Advanced EHF satellite will provide 500% more capacity, 600% greater terminal coverage & similar security features.
Space-Based SIGINT

• GEO & other orbital platforms played key role in collecting electronic intelligence before & during Iraq campaign.

• NRO & NSA have been struggling since 1990s to maintain an adequate space-based SIGINT architecture.
  – Changing collection requirements
  – Launch delays & failures
  – Spacecraft design deficiencies

• Space-based SIGINT collectors are losing ground as adversary assets evolve & diversify.
  – Terrestrial fiber
  – Packet switching
  – Encryption software

• Orbital collectors still capture open emitters (radar, radio, satellite phones, etc.).

• But faster migration to terrestrial & unmanned aerial collectors needed to slow erosion in SIGINT performance.
Space-Based Imagery

- NRO & NIMA used six imagery satellites before & during the Iraqi campaign.
  - Three “Advanced KH-11” spacecraft with daytime optical & night-time infrared cameras
  - Three “Lacrosse” (or “Onyx”) spacecraft with all-weather radar imaging capabilities
- Current constellations have major deficiencies in meeting emerging imagery needs.
  - Out of range >90% of the time
  - Very infrequent revisit rates
  - Poor resolution at night & in inclement weather
  - Some spacecraft have exceeded design life
- Commercial imagery satellites lack timeliness & resolution to provide useful tactical imagery (unless tasked in advance).
- Future Imagery Architecture will address some issues (like revisit rates) but schedule & performance of space segment slipping.
Space-Based Early Warning

• Defense Support Program geosynchronous satellites & other spacecraft provided continuous warning of launches & explosions during campaign.
  – 26 missile launches detected
  – 186 high-explosive events
  – 1,493 “static IR events”

• Early application of technology developed for SBIRS-High replacement of DSP supported better battlespace characterization.
  – Faster warnings due to improved system integration
  – Greater precision due to fusion with data from other collectors
  – Previously undetectable ordnance added to database

• First step in effort to fully integrate missile warning mission with other ISR functions.

• SBIRS-High program delays depriving operators of critical information concerning enemy moves.
Emerging Space Lessons

• Space integration with other joint-force capabilities is progressing rapidly.
  – Warfighters have unprecedented access to orbital ISR
  – Growing dependence on space could be critical vulnerability in network-centric warfare

• SATCOM’s provide unmatched leverage for fast & reliable transmission of ISR information.
  – Ground forces may have over-invested in terrestrial communication networks
  – Proliferation of mobile terminals such as Milstar SMART-T essential to Army, Marines & special forces

• Space may be optimum vantage point for early warning, but it has severe limitations in collecting SIGINT & imagery.
  – More emphasis on air-breathing & surface collectors seems inevitable
  – Cost of space systems hard to justify given diminishing results
### Electronic Aircraft in Iraq (3/19-4/18)

- **39** U.S. unmanned aerial vehicles (16 Predator, 16 Pioneer, 6 Hunter, 1 Global Hawk).
- **About 3,200** coalition electronic sorties (not counting jamming).
  - **1,656** ISR / **1,601** command & control
  - **42,000** battlefield images generated
  - **2,400** hours of SIGINT coverage
  - **1,700** hours of moving-target coverage
ISR Integrated Operational Picture

• Integration of all ISR to generate a “common operating picture” for joint force a key goal of network-centric warfare.
  – All orbital/air-breathing terrestrial collectors
  – Fused & available to all joint-component commanders

• Iraqi campaign suggests integrated picture nearly here.

• Theater Battle Management Core Systems provides Joint Force Air & Space Component Commander (JFACC) with powerful ISR integration tool for air campaigns.
  – Automated & web-enabled
  – 40 applications & 500 functional segments (6M lines of code)
  – All phases of command & control: monitoring/assessment/planning/execution

• Already operational at 20 Air Operations Centers worldwide & 300 other sites (including Navy carriers).

• Continuously evolving via spiral development.
Air Dominance: Missing Lesson

• Much of the critical ISR during spring campaign in Iraq was generated by air-breathing systems.
  – JSTARS & AWACS
  – Global Hawk & U-2

• The most neglected lesson of the campaign is how critical air dominance was to every facet of military success.
  – Destruction of enemy fighters & missiles
  – Suppression of enemy sensors
  – Dis-integration of enemy communications

• Without early air dominance, many ISR systems could not have been used to optimal effect.
  – Vulnerable manned aircraft like JSTARS & EP-3 operated deep in Iraqi airspace
  – Aerial refueling tankers penetrated to support ISR
  – Unmanned vehicles nearly defenseless if attacked
Role of Unmanned Vehicles Growing

• Unmanned aerial vehicles (UAV’s) are claiming a bigger role in ISR collection & exploitation.
  – First time 4 Predators flew simultaneously in combat

• Heavy use of Global Hawk underscores trend toward larger, more capable UAV’s.
  – Single prototype flew 357 hours & produced 4,800 images
  – 55% of all time-sensitive-target imagery
  – Significantly shortened kill-chain

• Large payload includes synthetic aperture radar, electro-optical camera & 3rd-generation infrared sensor.
  – 3 times the persistence of manned aircraft
  – Reachback enables remote piloting from U.S.

• Minimal analysis prior to posting & extensive use of secure chatrooms seemed to validate Task-Post-Process-Use (TPPU).
Unmanned Vehicles Have Limitations

- Growing role of UAV’s has created widespread misconception that manned aircraft are obsolete in ISR.
- UAV’s offer more endurance & less risk than manned aircraft, but in most respects they are inferior.
  - Vulnerable vehicles require weak enemy
  - Small payload constrains productivity
  - Limited flexibility/versatility
  - Unclear cost advantage given high attrition rate
- Heavy use of U-2 reconnaissance planes in Iraq reflects continuing advantages of manned aircraft in ISR.
  - 15 of 34 U-2’s deployed to theater
  - First time six U-2’s flew in same ATO
  - 169 sorties totaling 1,400 hrs. (average duration 8 hrs.)
- U-2 has much bigger payload than any UAV -- multiple imagery systems plus SIGINT collection.
Manned SIGINT Aircraft Vital

- U.S. forces deployed over 40 aircraft capable of collecting signals intelligence during the spring campaign.
  - 18 Army RC-12 Guardrail
  - 15 USAF U-2
  - 9 USAF RC-135 Rivet Joint
  - 3 Navy EP-3
- Additional SIGINT provided by NSA orbital & surface sensors and dozens of tactical collectors.
  - Monitoring of military communications
  - Targeting of air defenses & missile launchers
  - Localization of leadership elements
- Unprecedented integration of national assets & personnel with tactical operations (NSA cell in air operations center).
- Improved datalinks & conops enabled cross-cueing, fusion of orbital/airborne/ground sensors -- leading to greater precision & timeliness of intelligence.
Joint STARS a Core ISR Asset

• Spring campaign was biggest-ever deployment of Joint Surveillance & Target Attack Radar System (JSTARS).
  – Nine of 15 aircraft in USAF inventory
  – 191 flights with >3,000 hours on-station
  – 30,000 synthetic aperture radar images generated

• Extremely valuable in generating ground-moving-target intelligence day or night, in any weather.

• JSTARS rapidly evolving from Cold War C2 role.
  – Users beginning to grasp full potential
  – Datalinks like Link-16 enhance timeliness
  – Task/Post/Process/Use enhances relevance
  – Fusion with other sources & sensor types advancing

• But optimization of JSTARS requires system upgrades.
  – Blue-force tracking to distinguish friends from enemies
  – Direct datalink with Global Hawk for cross-cueing
Orion A Surprise Star in ISR

- During Iraq campaign, P-3 maritime surveillance plane was surprisingly useful in supporting ground forces.
  - Imagery collection & on-board analysis for special forces
  - Blue-force tracking
  - Route reconnaissance & assessment of nearby enemy
- 1st Marines lessons-learned said P-3 AIP variant “was of immense utility for the collection of intelligence in the immediate fight for the maneuver elements.”
  - 28 P-3’s deployed to theater
  - 3 additional EP-3 for SIGINT
- However, Navy leadership removing P-3 from overland missions in hostile airspace due to survivability concerns.
  - Overland surveillance moves to Global Hawk
  - P-3 reverts to antisubmarine warfare
  - EP-3 SIGINT role absorbed in Army Aerial Common Sensor
Emerging Air-Breathing Lessons

• Airborne collection & processing of ISR becoming more valuable as digital datalinks & improved conops facilitates multisource fusion.

• However, ISR fleet is full of high-demand/low-density assets.
  – Airframes are aging rapidly
  – Regional commanders (outside CENTCOM) complaining about coverage gaps

• UAV’s are increasingly important, but their payloads & versatility are generally inferior to manned aircraft.

• Penetration of manned & unmanned collectors alike depends on U.S. air dominance.

• Need for battlespace flexibility raises doubts about wisdom of concentrating multiple ISR missions on one airframe.
Third Infantry Division lessons-learned found that newly-deployed ISR systems often performed well.

- Quick Reaction System for exploiting national-level imagery a “critical resource”
- Automated Deep Operations Coordination System (ADOCS) “an invaluable tool for situational awareness and quick analysis”

However, 3rd ID saw numerous shortfalls in its organic ISR and access to joint/national assets.

- Comms can’t support fast & fluid ops over long distances
- Divisions need organic collection & processing capacity rather than relying on echelons above division
- Divisions need tactical SIGINT systems that can collect & jam across the spectrum
- “Divisions must have UAV’s at division and brigade level to provide near-real time imagery & targeting”
- Human intelligence for coping with unconventional enemies deficient
Ground Truth: Marines

• First Marine Division lessons-learned acknowledges big gains in ISR timeliness, precision & access.
  – Intelligence units “could not have achieved their mission” without Trojan Spirit -- “a godsend”
  – JSTARS common ground station had “tremendous positive effect for integrating information into a comprehensive intelligence picture”

• But Marines highly critical of ISR shortfalls.
  – “After crossing the line of departure, the division received very little actionable intelligence from external intelligence organizations”
  – “Intelligence sections at all levels were inundated with information … that had little bearing on their missions”
  – “The existing hierarchical collections architecture, particularly for imagery, is wildly impractical”
  – Solution: procure family of tactical intelligence collections platforms (ground & air) and decentralize collection
The Bottom Line

• No doubt about it -- ISR is in the midst of a revolution.
  – Unprecedented richness (sensors)
  – Unprecedented reach (connectivity)
  – Unprecedented relevance (not just information, knowledge)

• But the fog of war is lifting slowly & unevenly.
  – Iraq operation looks more transitional than transformational
  – System not yet truly integrated or user-friendly

• Iraq experience validates Cebrowski view that networked warfare isn’t just about technology.
  – New technology is an enabler
  – Conops & organization make the revolution real

• Emerging ISR system well-suited to defeating conventional adversaries -- what about unconventional ones?