

PACERS: Platoon Aid for Collective Employment of Robotic Systems (Remote Sensors?)



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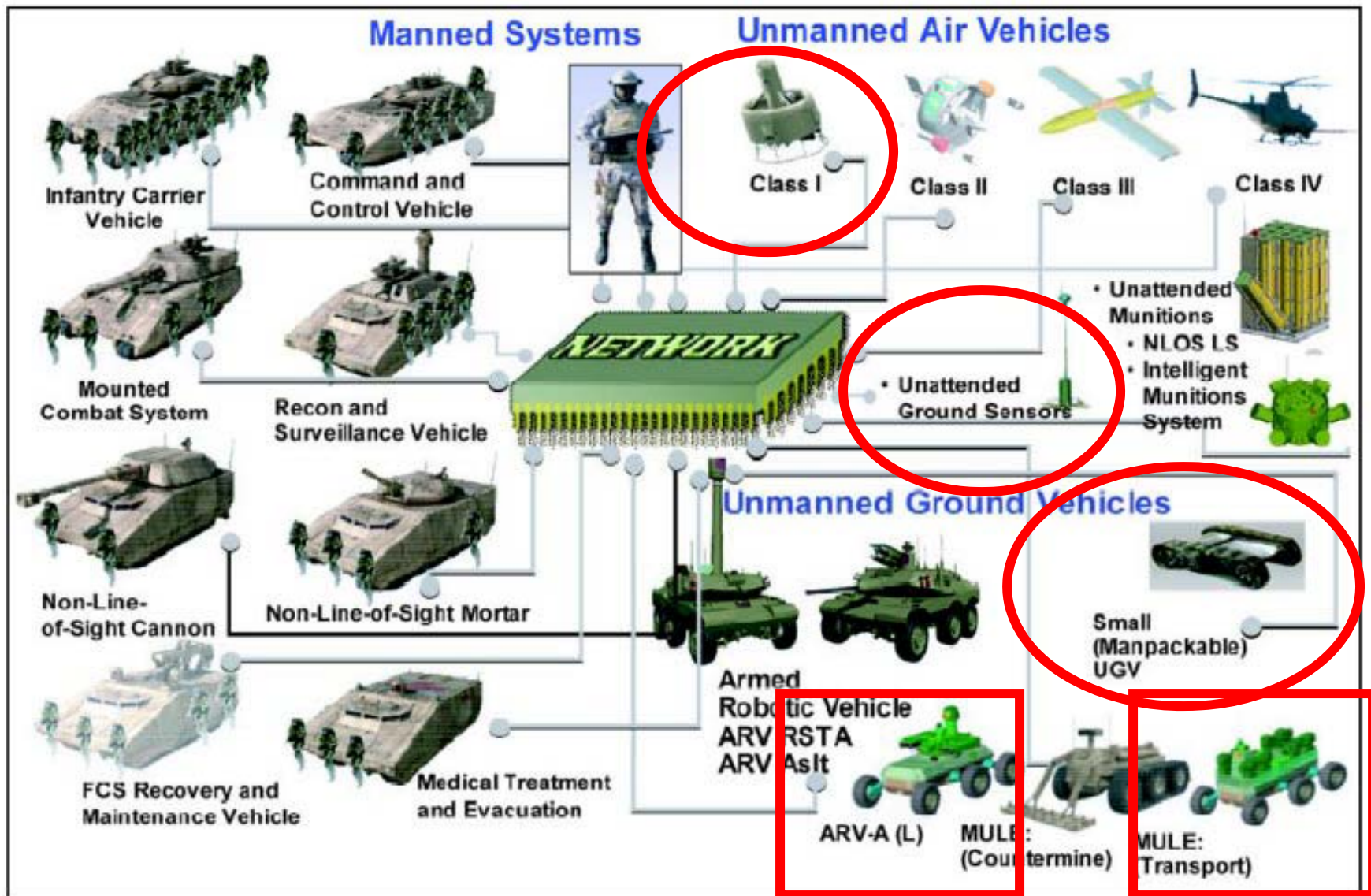
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Vision of the future Army



Potential Platoon-Level Unmanned Assets



Current Situation (new technology)

- Company Field Service Representative trains individual operators to operate individual system, without any mission context



Current Situation

- Where's the training to exploit the system and coordinate employment with the needs of the unit and the mission?



Current Situation

- Where's the training to exploit the system and coordinate employment with the needs of the unit and the mission?
- **TYPICALLY THERE ISN'T ANY**
- **Doctrinal training can't keep up with changes in the technology and the desire to push new technology out to the troops.**
- Even in “discovery experiments” with new systems, typically only the operators get training. As a result, the full potential of a system is often never truly assessed.
- **LEADERS who don't understand the potential advantages/disadvantages of a system will use them inappropriately or not at all.**
 - Need to know not only system capabilities (range/weather constraints/LOS requirements)
 - **Coordination & communication requirements need to be understood**
 - **Manpower requirements need to be understood**
 - **Capabilities / requirements of the operator to make tactical decisions need be understood**

Particular Challenges at the Platoon Level

- No dedicated “staff” to assist Platoon Leader (PL)
- Adding unmanned systems increases workload, and takes people away from their regular duties
- Extra delegation and coordination requirements
- Extra communications support may be required to properly utilize information provided by remote sensors



PACERS assumptions

- Every system will have its own peculiarities
- Trainers will be unable to keep pace with myriad of new systems and updates to technology*
- **BUT, several commonalities exist across systems**
- PACERS provides training guidance in unit employment of any unmanned system, based on commonalities
- * Already know this with digital C2 systems

HOW would PACERS work?

- PACERS is simply a list of observations and questions to guide coaching and feedback on unmanned system employment.
- It aids the trainer in suggesting what to look for and what to ask, in order to assess and guide improvement of unit proficiency in unmanned system employment.
- It would be used in addition to standard mission training (not instead of).
- It is structured around 6 activities essential to the employment of any unmanned system.
- It does NOT replace operator training, or training on the details of a specific system.

HOW would PACERS work?

- PACERS is concerned with the TECHNIQUES & PROCEDURES part of Tactics, Techniques, and procedures.
- Development of tactics requires proficiency on techniques and procedures.
- Would be used at a stage between operator training and tactics development.
- Can't develop tactics if something more fundamental about employment keeps getting screwed up.

6 Common Activities in Robotic System (RS) Employment

(many responsibilities fall on the PL, not the operator)

- Decide whether/how to employ the RS
- Select RS **team*** and plan RS missions within the overall mission context
- Define roles of unit personnel in tracking the RS mission, interpretation of RS sensor imagery, and reporting on critical intelligence
- Pre-deployment checks
- Develop / refine unit SOPs and tactics, techniques and procedures
- Record keeping

Structure of PACERS

- PACERS suggests a list of
 - 6 ACTIVITIES
- AND
 - GOALS
 - OBSERVATIONS
 - QUESTIONS
 - associated with each of the 6 common activities.
- Example...

TOOP LEADING PROCEDURES / PRE-LAUNCH CHECKS

<p>ACTIVITY</p> <p>Pre-launch checks:</p> <p>GOALS:</p> <ul style="list-style-type: none">▪ Necessary RS-related equipment and supplies are present and in fully working order▪ Download and upload frequencies have been cleared for use▪ Coordination with higher on A2C2 (air vehicles)▪ On time deployment	<p>OBSERVE</p> <ul style="list-style-type: none">▪ Is a checklist being used to make sure no items/steps are overlooked?▪ Have uplink/downlink frequencies been coordinated internally and with adjacent units?▪ Were any crucial items missing or steps skipped before attempt to launch?	<p><u>ASK Platoon Leader and RS Operators</u></p> <ul style="list-style-type: none">▪ Who is responsible for selecting OCU/RS communication channels?▪ Who is responsible for deconflicting channels/frequencies within the unit if multiple platforms will be used? What about deconflicting with adjacent units? <p><u>ASK RS Operators</u></p> <ul style="list-style-type: none">▪ Is it clear when all your pre-launch checks should be performed?▪ Were there any technical problems encountered during pre-launch checks?
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Seems like common sense?

- It is; but still not being done.
- In particular, delegation of who is responsible for what, when there is no dedicated team to operate the unmanned system seems especially important.
- Can't assume leaders are aware that this delegation is both necessary AND their responsibility.


Examples

- From DARPA MAV 2006 Soldier Experiment
- Stryker Reconnaissance Platoon
- My role: Observer only [PACERS was not employed for training].

- All NCOs and PL had operator training, 1 month prior to the experiment.



- 4 enlisted Soldiers had operator training, the week prior to the experiment & acted as the operators during the experiment.

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- Experiment consisted of 3 missions
 - Urban assault (day and night missions)
 - Area reconnaissance (day)
 - Route reconnaissance (day)

Steps prior to launch

- Assemble



Steps prior to launch

- Fuel



Steps prior to launch

- Tune



Steps prior to launch

- Establish communications links
- Semi-automated self-check process
 - GPS obtained
 - Visual vanes checks & other vehicle checks
 - Engine start
 - ...



Steps prior to launch

- Remove starter stand



Launch



Problems during pre-launch checks

- Assemble
 - Person assembling vehicle not told which payload pod to use (EO or IR); subsequently discovered the wrong one mounted. Followed incorrect procedure to switch pods causing technical issues. **Launch aborted.**
 - Payload pods not attached securely (check list was not being used for pre-launch checks). **Loss of sensor image during flight.**

Problems during pre-launch checks

- Fuel
 - Person fueling (not the operator) failed to attach fuel line. Operator unable to determine source of engine failure in timely fashion.
Delayed launch.
 - Night time fueling is a 2-person task.
Insufficient personnel at launch site.

Problems during pre-launch checks

- Tune
 - Tuning rod missing at launch site. Not checked prior to departure from assembly area. **Delayed Launch**

Problems during pre-launch

- Establish communications links between ground control station and vehicle.
 - Links not checked prior to launch attempt (led to **delays**).
 - Links not assigned when there were multiple vehicles schedule to fly (led to **delays**).
- Occurred repeatedly; never learned from prior mistakes. Never discussed during AAR.

Problems

- These were just the issues associated with pre-deployment checks.
- Each of the 6 PACERS activities had associated issues observed during the experiment.
- **Several problems arising from**
 - multiple personnel involved in process
 - **Lack of delegation of specific responsibilities**
 - **No one assigned responsibility for overseeing the entire process**
 - Reluctance to use checklists or technical manuals
 - Reluctance to write down SOPs
- These problems could have been addressed early on if they were explicitly raised in AAR or coaching discussions.
- Instead, they plagued the experiment, throughout, leading to several delayed missions.
- Being fair to Soldiers – **there were also genuine technology problems, which made trouble shooting difficult.** Is it a human error or a technology issue?

Other Issues

- Some issues arise in unit employment of a system, which never get considered properly during system development.
- Communications
 - How is information gained from the RS communicated to the rest of the unit?
 - Is special or extra equipment required for this?
- What knowledge must the operator have to properly employ the system?
 - Imagery interpretation
 - Terrain understanding
 - Tactical decision making
 - Communication competency
 - Understanding the needs of the information consumer
- Is it the responsibility of the unit leader to deal with these issues?

Mixed Reactions to PACERS

- “We already know how to train, not interested.”
- + “This is exactly what we need!”
- ≈ “Documenting a generic procedure is not...needed, but the documentation of lessons learned for the small unit in the employment of the MAV ...[and applying to the Class I] has definite potential.”
- + “You have identified the problem quite well and it is real.”
- “We don’t have time to use it.”
- + “You are right on track.”

Questions?

- To receive a full version of the PACERS table, or discuss its use, contact
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- An ARI Report on PACERS is forthcoming.

