Adapting for Unmanned Systems

LTG Michael A. Vane

Deputy Commanding General, Futures, and Director, Army Capabilities Integration Center
US Army Training and Doctrine Command

23 Mar 11
Isaac Asimov's "Three Laws of Robotics"

A robot may not injure a human being or, through inaction, allow a human being to come to harm.

A robot must obey orders given it by human beings except where such orders would conflict with the First Law.

A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.
“we must emphasize the integration of technology into capable formations commanded by innovative leaders who are comfortable operating under conditions of ambiguity and uncertainty.

To maximize the potential of technological developments, we must conscientiously evolve and adapt capabilities based on changes in threat capabilities and the operational environment”

GEN Martin Dempsey, CG TRADOC

“...robotics offer the potential to deploy appropriate combinations of manned and unmanned systems to perform an increasing range of tasks” pg 14 Promising Technologies

“Fighting for information will require ...the employment of appropriate combinations of manned and unmanned air and ground systems” pg 18 Supporting Ideas
Guiding Principles ...

• Robotics *enable and replace the human*
• Humans should *not have to accommodate*
• Early user and technology developer collaboration
• Use “system of system” to measure effectiveness
• *Get more from force structure ; Cost / Benefit*
**Potential Tasks and Feasibility...**

- **Logistics**
  - Yard lift and short movement
  - Cargo Packaging, warehouse opns
  - Surface cargo transport and delivery
  - Soldier sustainability: improved Solder strength and endurance

- **Security**
  - Perimeter security
  - Remotely scan personnel/vehicles
  - Casualty evacuation

- **Medical**
  - Conduct pharmacy operations
  - Perform tele-medicine / surgery
  - Recover battlefield casualties
  - Dispose of medical waste
  - Perform battlefield first aid

- **Maintenance**
  - Perform diagnostic and PMCS
  - Perform vehicle recovery
  - Perform advanced manufacturing
  - Perform tele-maintenance

- **Engineering**
  - Overcome obstacles, IEDs
  - Mark, record, report obstacles
  - Remove & clean contaminated areas

- **Socio-moral implications**

- Leader training required to ensure effective integration of manned-unmanned systems
- Requires sufficient availability of systems to enable training at home station, power projection platforms, and CTCs

---

**Green – feasible**  **Amber – potentially feasible**  **Red – Near-term infeasible**

---

as of 22 1100 Mar 11  J. Wiseman x3491

NDIA Ground Robotics Conf 23 Mar 11
The ethical and moral...
Thoughts on Autonomous Robots...

• **Seamless integration** of robots into military & civilian society
  – Trust and confidence: transparency of action, cues to activity, tolerance to failure
  – Operating within society: adaptability to varying social cues and context

• **Autonomy is “conditional”** ...
  – Reliability
  – Task complexity
  – Variety of the operational environment

*Soldiers must be able to control autonomous systems to suit conditions as they change over time*
**Some Challenges:**

**Cultural**
- An unwillingness to reduce force structure.
- Trust and confidence issues related to autonomous behaviors.
- Appreciation of the potential return on a robotic investment.

**Moral**
- Responsibilities associated with the Unmanned application of force.

**Social**
- The incurious nature (lack of curiosity in a machine).
- Lack of comfort for people to operate in close proximity to machines.

Robotics are *enablers* and catching on but, mainly as *force multipliers* – Not yet replacing *force structure*.

- *Move beyond ONS/JUONS capability gaps*
- *Develop a Small Robotic Environment (Test Bed)*
- *Leverage modeling and simulation for comprehensive DOTMLPF impact*
- *Conduct Independent Robotics Efficiencies Study to:*
  1) Determine return on investment for tasks robotics could perform
  2) Confirm that at various places along Bloom's taxonomy or some combination of dull, dirty, or dangerous tasks, we can replace humans.
  3) Determine personnel life-cycle cost savings
  4) Determine potential benefits associated with establishment of a test bed