Command & Control for Teams of Autonomous Systems and People (TASP C2)

Naval Postgraduate School

Integrated Manned-Unmanned Missions

Background & Motivation

- Issues with C2 for Teams of Autonomous Systems & People (TASP)
  - Tall org hierarchies, long decision chains, slow mission responses
  - Manned v unmanned org, skill, culture, cost & performance differences
  - Current C2 unable to handle future manned-unmanned missions
- Next generation missions require next generation C2
  - Much more than C2 *technology*
  - Requires agile C2 *organization & approach*
  - Organization, acculturation, education, training & sharing important too
- How to prepare for this future 5 – 10 years ahead?

Approach & Method

- State-of-the-art computational experimentation
  - CTG mission task environment
  - 6 degrees of UAS autonomy x 4 levels of un/manned mission integration
  - Measure mission efficacy, delay, cost, risk, coordination load, others
- Model current CTG organization, C2 approach, mission assets & personnel
  - Assess performance with increasing UAS autonomy & integration
  - ID debilitating points & causes of failure
  - Work backward to plan cost-effective, low-risk solutions
- Analytic results provide roadmap for Fleet implementation

Issues & Benefits

- Operationally important issues:
  - Numerous UAS will need to co-occupy same airspace-time (swarm)
  - Manned & unmanned aircraft will need to work together (TASP)
  - Aircraft from different ships, shores & nations will need to be integrated
  - Current C2 org & approach likely to fail within 5 years
- Devising best solution is analytically intractable
  - Myriad alternate approaches, costs, benefits, risks & timeframes
  - Trial & error (OJT) with operational assets is expensive & error-prone
  - Computational experimentation is systematic, cost-effective, risk-free

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