International Efforts Related to Dismounted Soldier Systems

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NATO International Efforts have three major thrusts related to dismounted soldier power:

- Connectivity (both power and data) between coalition forces
- Studies to recommend the best possible power source (focus on batteries and fuel cells)

New

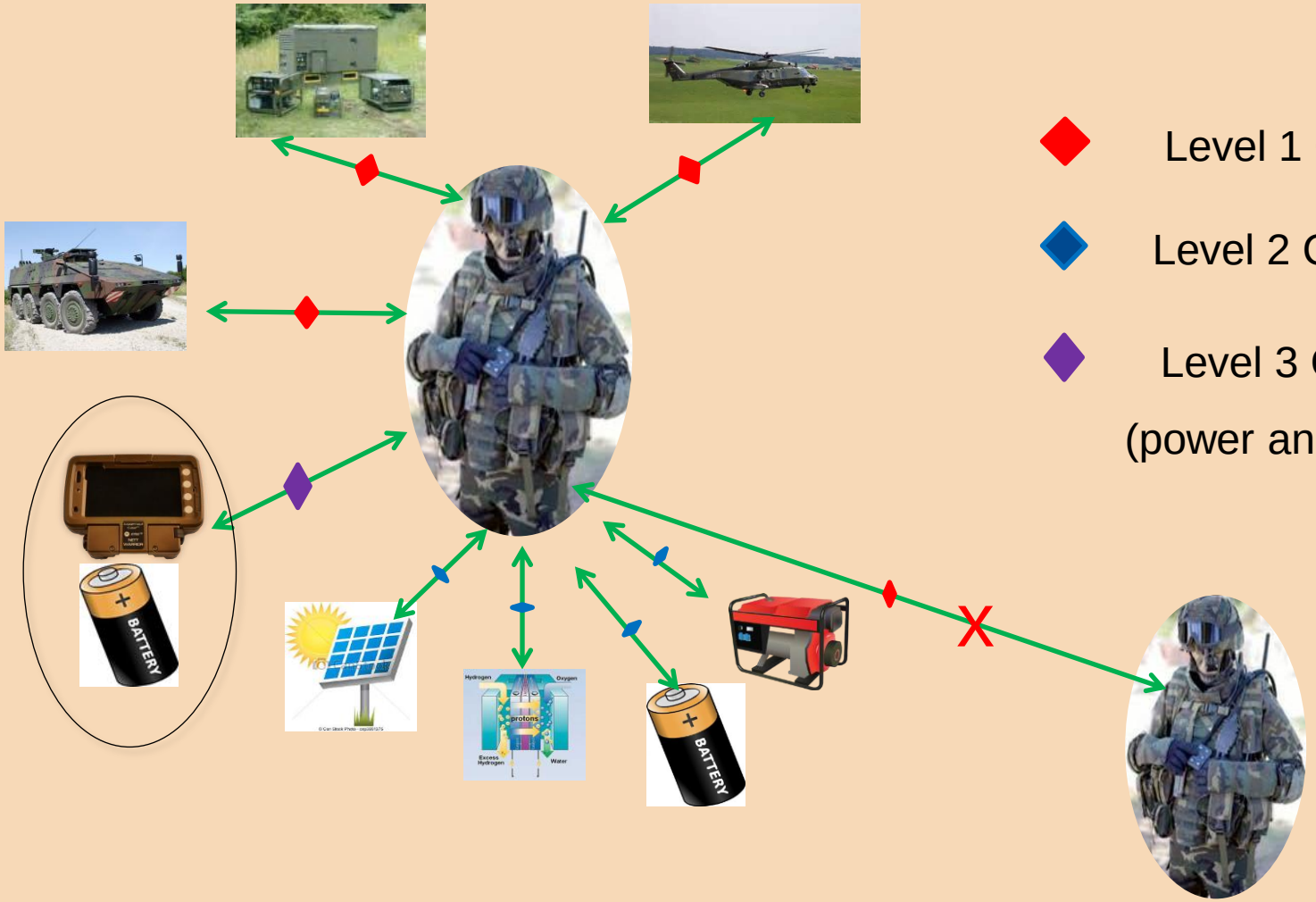
- Establishment of microgrid standards

Soldier Power encompasses expeditionary power solutions intended for the most austere operating environments. These solutions include Soldier **power generation** systems, power **scavenging**, **renewable energy**, **power distribution**, **power management**, and **power storage** solutions that are light weight, portable, and/or wearable.

Levels of Connectivity

- ***Level 1*: System to system interoperability**. That is one nation's Dismounted Soldier System to a NATO transportation system, NATO garrison system or another nation's Dismounted Soldier System or Dismounted Soldier Battle Management System (i.e. system to system connection)
- ***Level 2*: Module to system interoperability**. That is one nation's Dismounted Soldier System Module to another nation's Dismounted Soldier System or Dismounted Soldier Battle Management System. (i.e. scavenge power)
- ***Level 3*: Component to Module interoperability**. That is one nation's component to another nation's Dismounted Soldier System Module. Level 3 interoperability gives the possibility of one nation to use another nation's components as parts of a soldier system module (i.e. common power source)

3 Levels of Connectivity

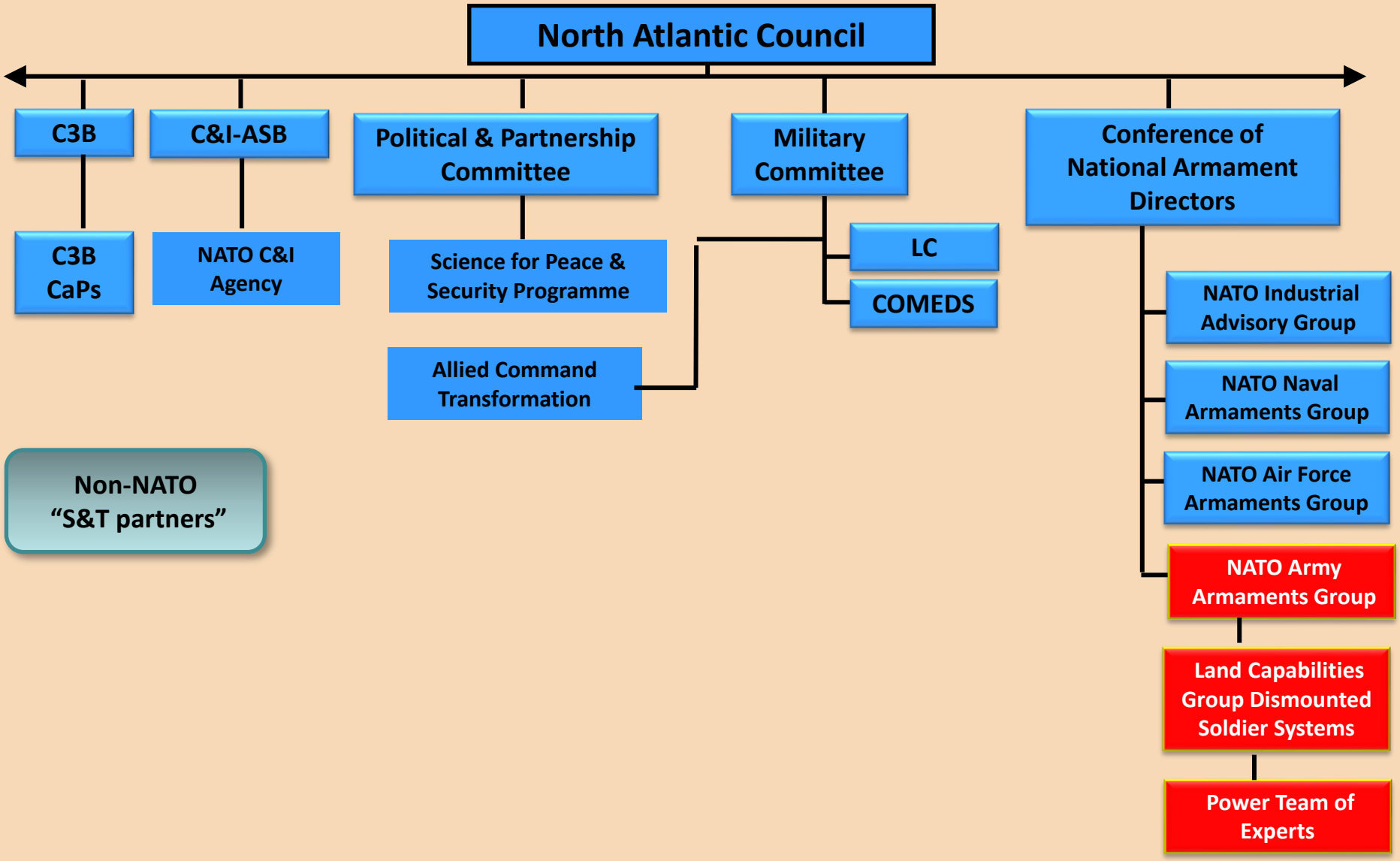


Level 1 Connector

Level 2 Connector

Level 3 Connector (power and data)

Partner with member nations to identify challenges and solutions associated with Soldier Power integration and interoperability.



Avoid This!!!

AN/PVS 14 (Night Vision)
- AAs (2)

Mark VII
-3.9 V Lithium (1)

MBITR
-BB 521 (8)

Sure Fire Light
-CR-123A (6)

Mag Lite
-AAs (2)

DAGR
-AAs(24) & ½ AA (1)

Army Standard Batt.
- BA-5557 (12)
- BA-5699 (3)
- BA-5590 (125)

Head Set
-AAs (2)

PEQ-2A
-AAs (2)

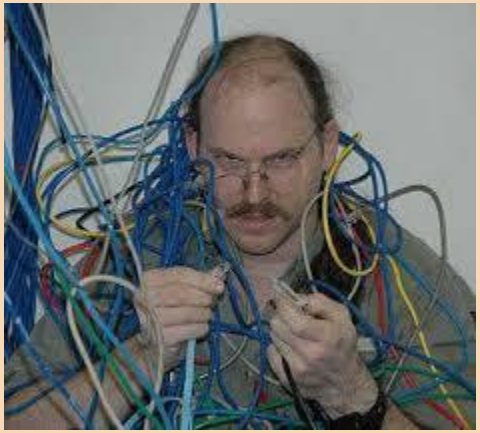
HTWS (Night)
- AAs Lithium (12)

M68 CCO (Day)
- DL 1/3N (1)

LMR
- 3600 mAh NIMH (8)

P-Beacon
- 9V (1)

72 Hour Mission (CO)
4773 Total Batteries
1413 lbs Total Weight



Participating Countries

- Power ToE
- United Kingdom (chair)*
- Canada*
- Czech-Republic
- United States*
- Netherlands*
- Sweden
- Denmark*
- Austria
- Germany
- Portugal
- Poland

* - representative in attendance at the JSPE

ToE Authored STANAGS

- *STANAG 4619 "Electrical Connectivity Standards Between NATO Power Sources And Dismounted Soldier SYSTEMS (DSS) - Level 1 Connector to External NATO Power Sources*
  - AEP 86 is the associated engineering document
  - In the process of being ratified
  - Technologically Obsolete for soldier systems
- *STANAG 4695 "Electrical Interface Specifications For Dismounted Soldier Systems (DSS) Level 2 Power Interoperability"*
  - AEP 95 is the associated engineering document
  - In the process of being ratified
  - For sharing of energy only
  - AEP requires final connector drawings/dimensions
- *Level 3 connector*
  - Will allow for exchange of energy and C4I data (data is TBD based on DSS decisions)
  - May be a "family" of connectors

Industry Input

- Provide responses to request for information
- Contact your ToE national representative to
  - Provide any input
  - Ask questions as to what is being worked to increase your awareness
- Provide demonstrations/briefings during the scheduled meetings (meeting usually take place in the Spring (Brussels) and Fall (at a different location every year)
- Keep the group informed of any industry standardization efforts

Sensors and Electronics Technology Technical Team 206 (SET 206)

"Energy Generation for Manwearable/Manportable Applications and Remote Sensors"

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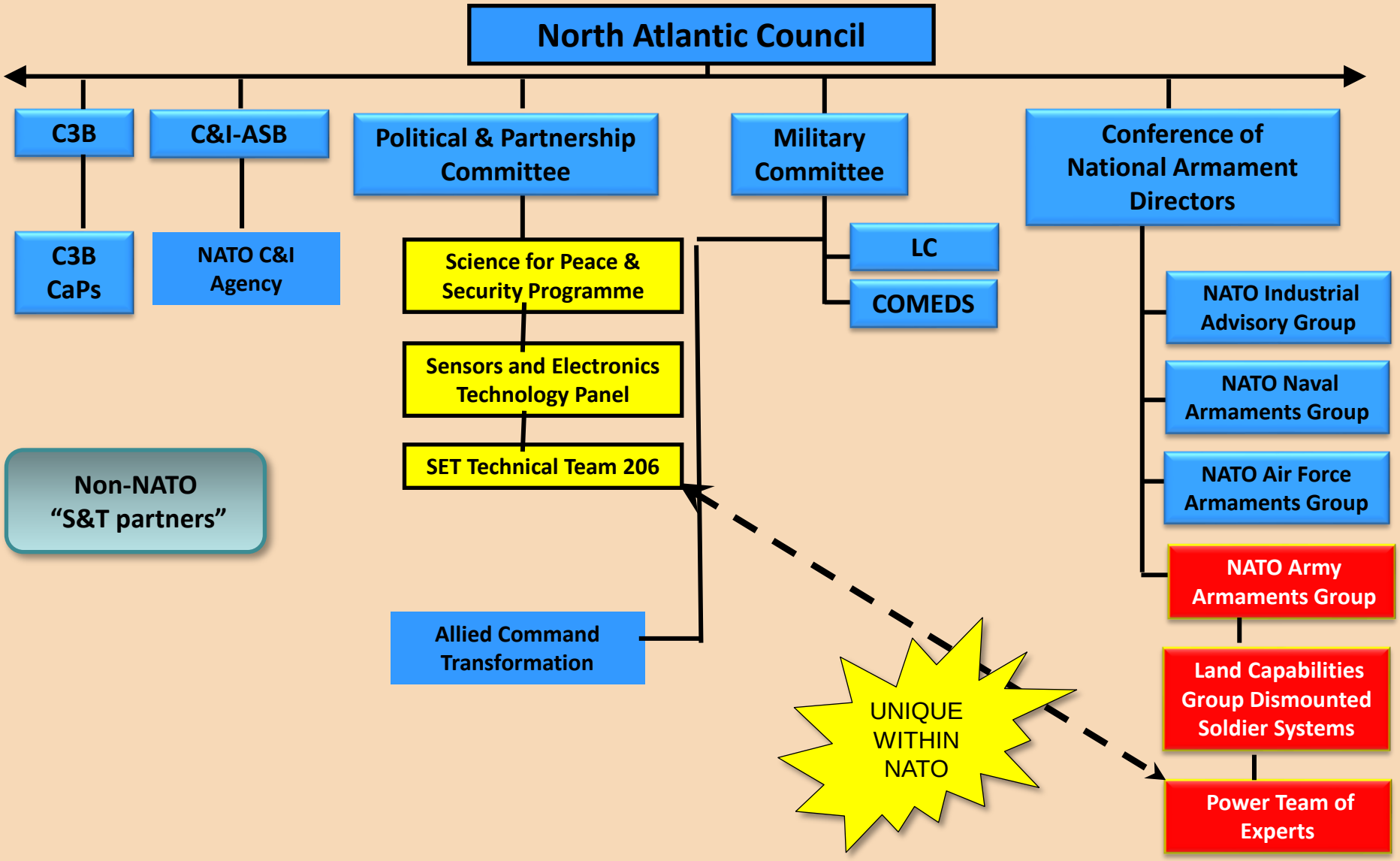


SET 206 Objectives

- Assess and forecast advances in manportable energy generating technologies
- Conduct an assessment for emerging technologies and recommend leveraging of resources as appropriate
- Identify the issues and make recommendations related to use of emerging technologies by dismounted soldiers
- Determine which technologies can be developed as part of a hybrid system to improve overall effectiveness
- Recommend standardization and specification protocols
- Serve as subject matter experts and act as a liaison to other NATO technical teams

Participating Countries

SET 206

1. United States (chair)
2. Canada
3. Czech-Republic
4. Turkey
5. Netherlands
6. Denmark
7. Germany
8. Portugal
9. Poland
10. Slovenia
11. Israel
12. Singapore
13. United Kingdom

Goal - To gather product details and lessons learned on (integrated) energy systems for dismounted soldier systems so that the similarities and differences between energy systems can be studied and the ideal energy system for dismounted soldier systems defined.

Activities:

- Gather information from nations and industry with a questionnaire for current systems and future developments
- Compare systems by their applied power sources, architectures, capabilities and other features that vary between solutions
- Compile into a report detailing both individual systems and the outcome of the comparison to identify the ideal energy system

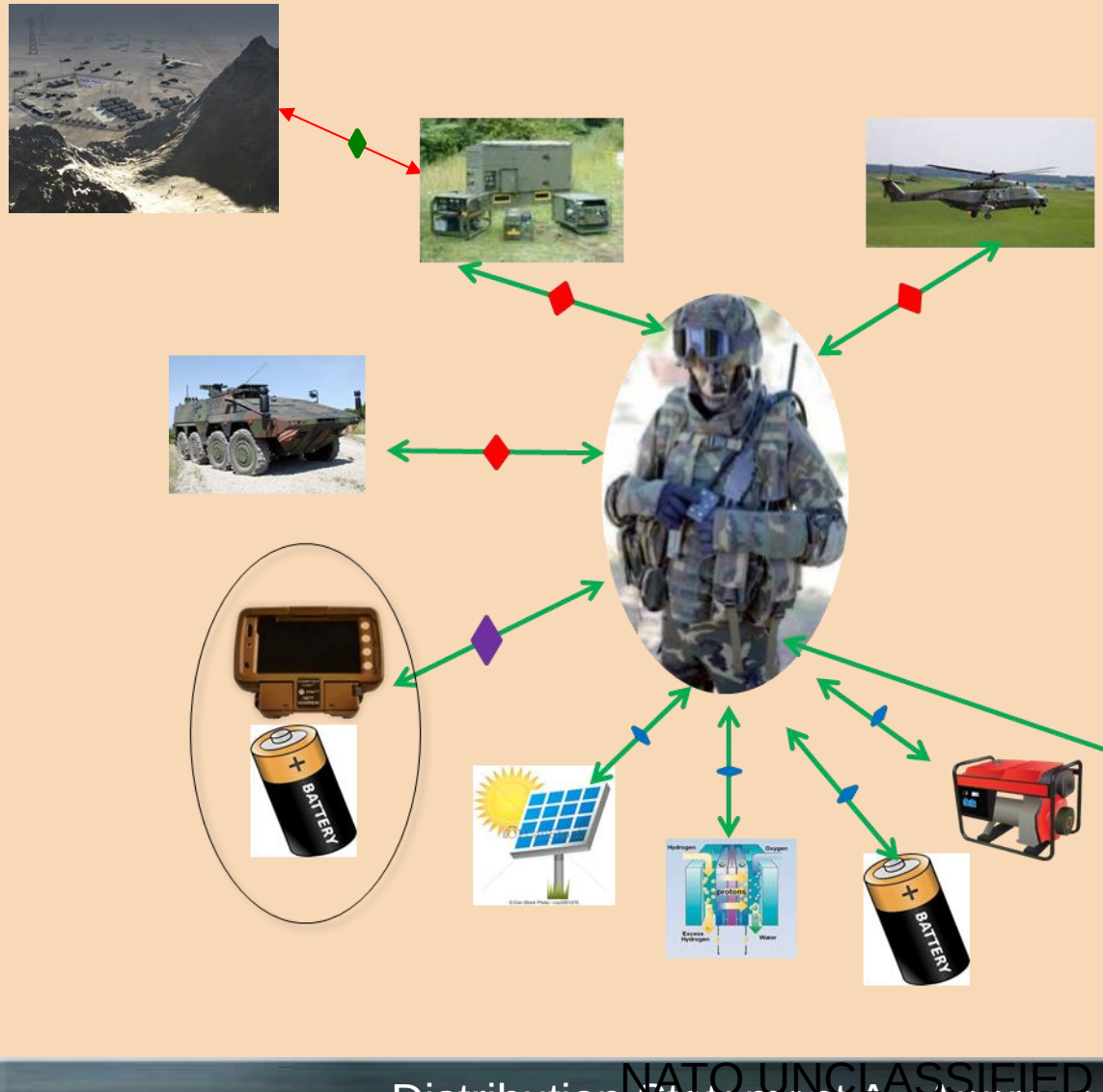
GOAL – Based on a nominal dismounted soldier load profile characterize current and projected manwearable power sources to determine the optimum power source for a given type of application

Activities –

- Assess relevant information to determine a normalized DSS load profile (complete)
- Create database of potential energy sources
- Test/analyze sources compared to load profile
- Establish a view of future power sources
- Study wireless charging

Tactical Microgrid Standards

Another Level of Connectivity



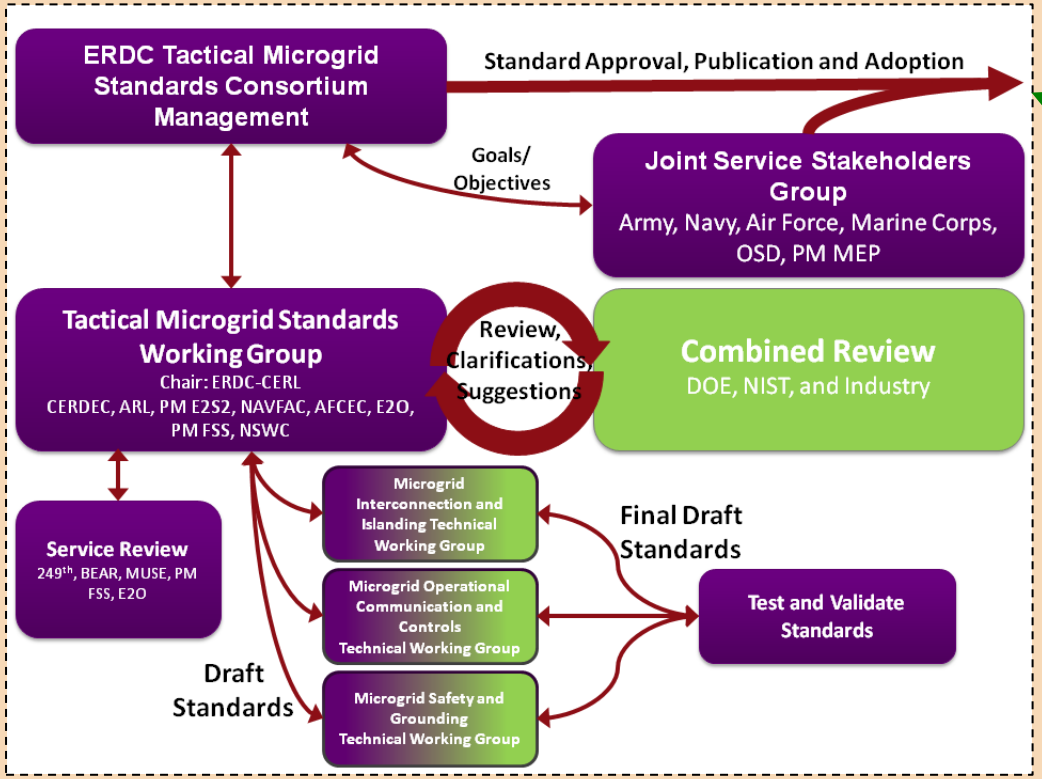
- "Grid" Connectivity
- Level 1 Connector
- Level 2 Connector
- Level 3 Connector (power and data)

PURPOSE: To develop standards for Tactical Microgrids including:

- Safety, Protection, & Human Factors
- Mechanical and Electrical Interconnection
- Communications, Controls, & Cyber Security

PROCESS: A consortium approach will be used to incorporate relevant organizations – such as, Department of Defense (DoD), Department of Energy (DOE), National Institute of Standards and Technology (NIST), and industry – and related on-going work to develop a joint standard(s).

VISION: Combining real time management of generators, renewables and storage with intelligent management that minimizes the size and variability of the loads, minimize the total mission weight (more than 40%) of fuel and power generating equipment.



TMSC Process

TMSC Requesting Help to:

- **NATO participation in the TMSC, either directly or through a common panel/committee**
  - Establishment of join a NATO microgrid group(s)?
- **Development of STANAGs**
- **Looking for NATO partners interested in demonstrating interoperability through formal agreements (PAs, MOUs, etc.) in the FY16 timeframe**
- **Participate in CL19**

Standard Microgrids can AVOID

Soldier Power Team of Experts

Sensor and Electronics Panel 206