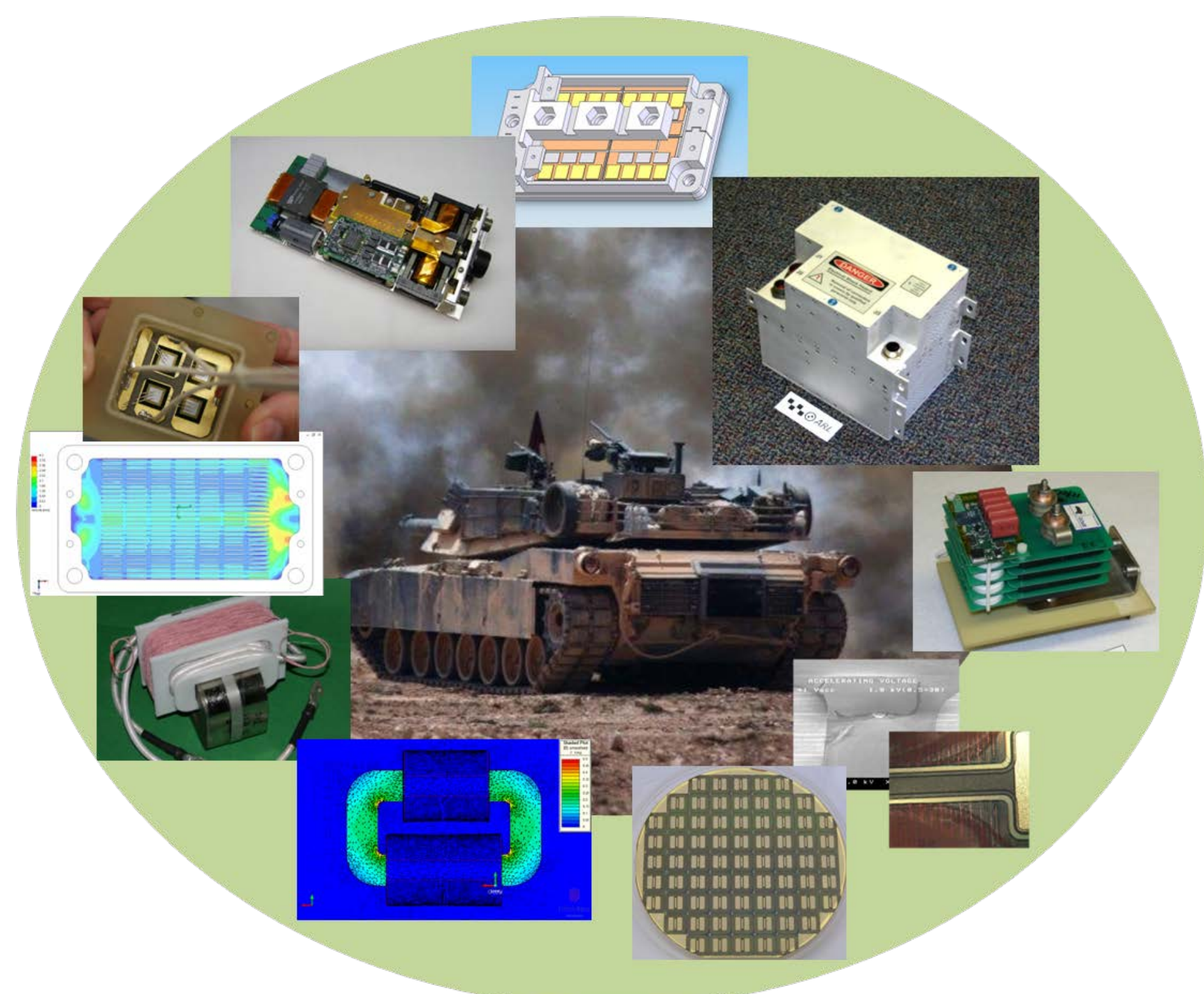


S&T Campaign: Materials Research
Electronics
Energy Efficient

Wes Tipton
(301) 394-5209
charles.w.tipton6.civ@mail.mil

Research Objective

Provide enabling technologies and materials that enhance the performance of future Army systems through the efficient utilization and distribution of electrical power across the spectrum of Army vehicles and tactical energy networks



ARL-developed power electronics components supporting next-generation systems

Challenges

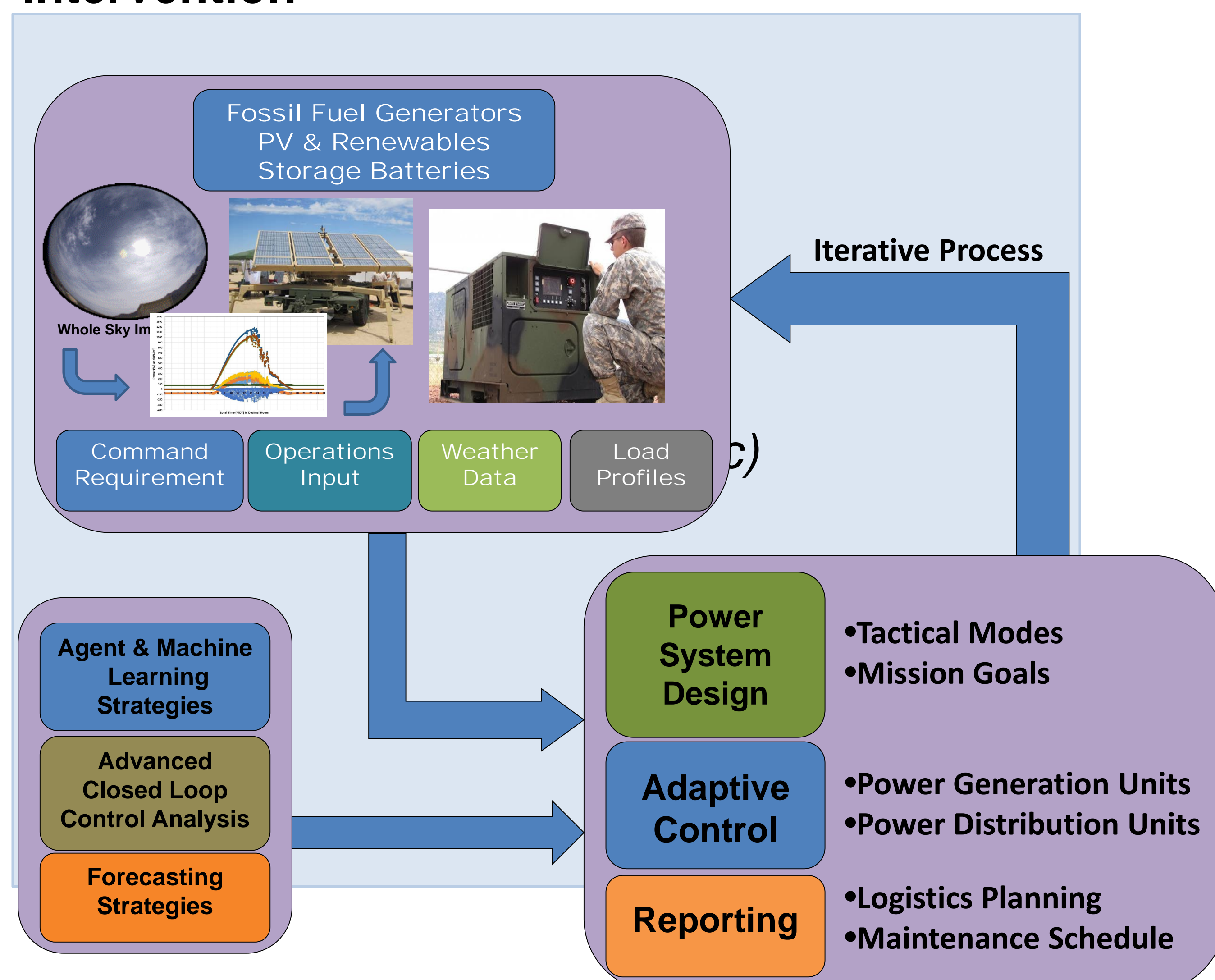
- Utilization of high-voltage energy storage
- Autonomous prognostics, diagnostics, and condition-based maintenance in adverse conditions on potentially unknown systems
- Maximize all aspects of power use to minimize the logistics tail of Army systems with minimal manual intervention

ARL Facilities and Capabilities Available to Support Collaborative Research

- TerraSAS photovoltaic simulator
- Variable AC/DC power sources up to 1 MW
- Programmable loads and Labview control suite
- 250 kW traction drive emulator
- OPAL real-time digital simulator powered by Matlab-Simulink
- 150 kVDC high-pot test system and Syntronics Corona Camera
- Expertise in high voltage AC/DC system design, test, and analysis
- Infolytica electromagnetic simulation suite
- COMSOL multiphysics simulation suite
- Silvaco Atlas semiconductor device simulation software
- Solidworks and ANSYS thermomechanical FEA software
- Expertise in packaging wide-band gap devices for use under extreme loading conditions
- Atmospheric measurement and prediction capabilities

Complementary Expertise / Facilities / Capabilities Sought in Collaboration

- Expertise in power system controls and algorithm development
- Mid-to-large AC grid test platforms with multiple generators/sources
- Renewable energy sources for dynamic environments
- High-voltage (>10 kV), hybrid energy storage technologies for compact systems
- Wide band-gap device development for high voltage applications (e.g., SiC, GaN, AlN)



Multi-tiered Energy Management