



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Tank Automotive Research, Development & Engineering Center (TARDEC) S&T Investments

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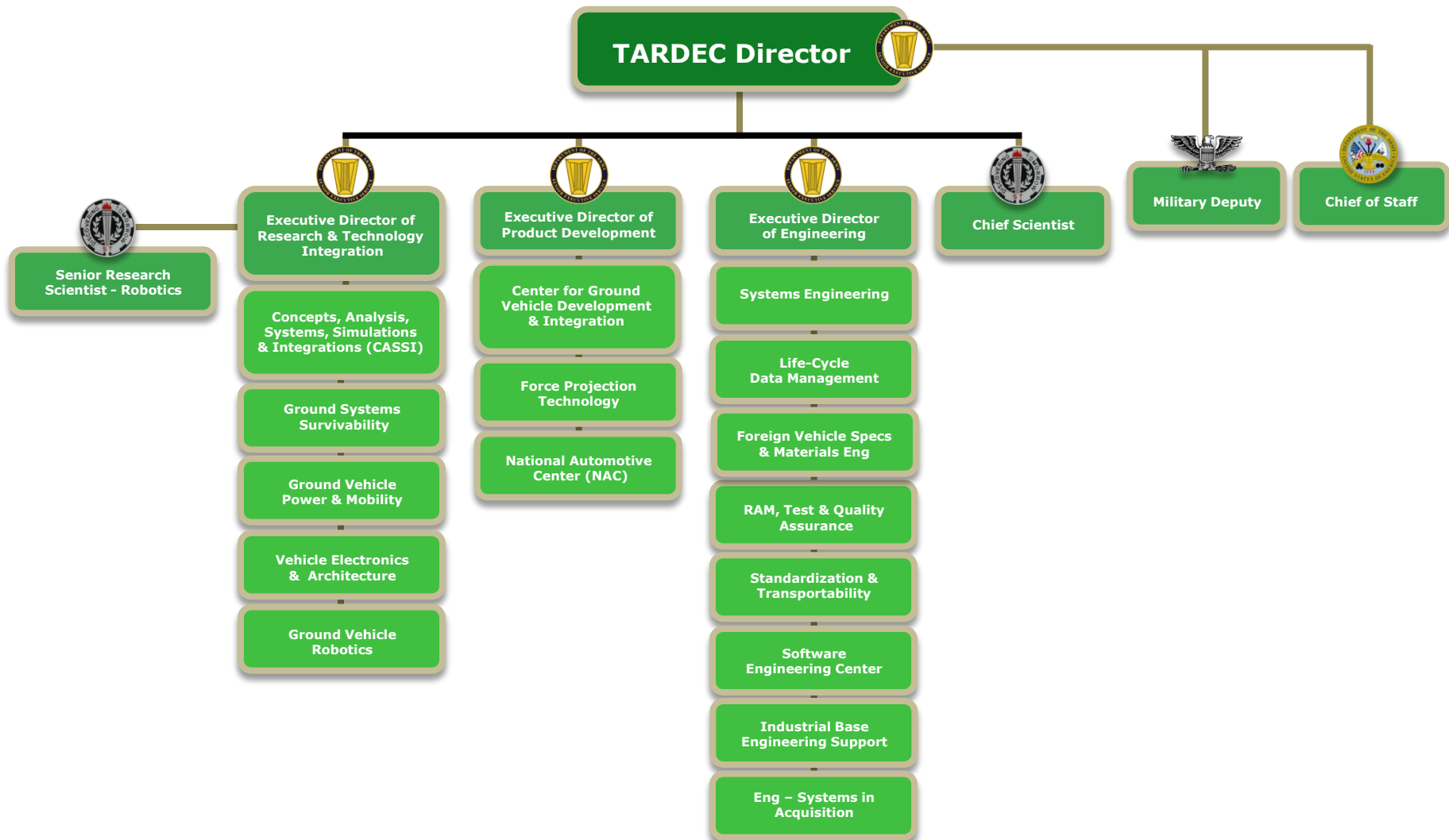
- Provides full life-cycle engineering support and is provider-of-first-choice for all DOD ground combat and combat support vehicle systems.
- Develops and integrates the right technology solutions to improve Current Force effectiveness and provide superior capabilities for the Future Force.



Responsible for Research, Development and Engineering Support to **2,800** Army systems and many of the Army's and DOD's Top Joint Warfighter Development Programs

unclassified

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.





Robust Technology Development & Integration



**Ground Systems
Survivability Integration**

**Vehicle Electronics &
Architecture Integration**

**Ground Systems
Power & Mobility Integration**

**Maturation of Ground Robotics
& Vehicle Situational Awareness**

**Development of Force
Projection Technology**

Systems Engineering & Integration Excellence Across the Life Cycle

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Advanced Concepting



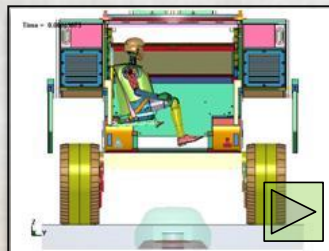
JLTV



FED

MRAP

Analytics



Blast



Structures/Durability

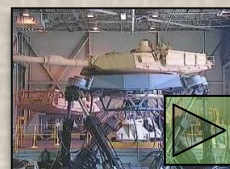


Crew Safety

Hardware & Man-In-The-Loop Simulation



MRAP



Turret Test



Characterization

Prototype & Demonstrators



TWVS

APD

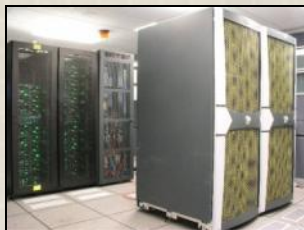


FED

HPC & Data Management



High Performance Computing (HPC)



Computer Aided Virtual Environment (CAVE)



Advanced Collaborative Environment (ACE)



Providing Rapid Assessment and Integration Services throughout the Life Cycle of both Technology and System/Platform Development Programs.

System & Simulation Integration Laboratories



Physical Simulation Laboratories



Fuels & Lubricants Laboratories



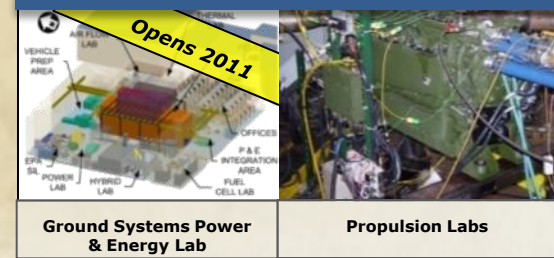
Survivability Laboratories



Prototype Integration



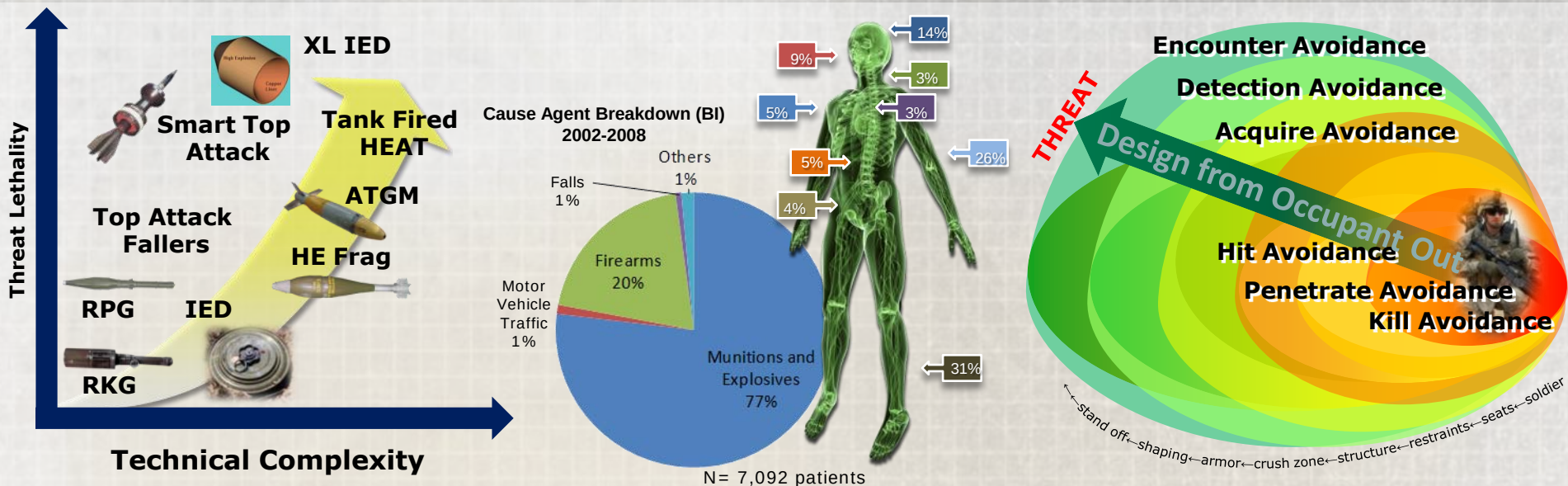
Power & Energy Laboratories



TARDEC's Warren, MI operations has a resource value of over \$950M and occupies 12 facilities on the Detroit Garrison totaling over 840,000 square feet of laboratory space



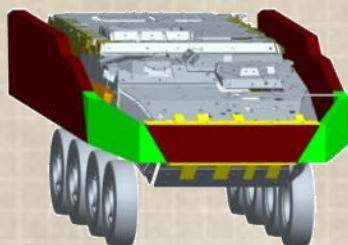
Excellence in Ground Systems Survivability Occupant Centric Vehicle Protection



**Increasing Demands and Operational Flexibility
Require Strategic Investments in Key Areas**



Kill Avoidance



Penetration Avoidance



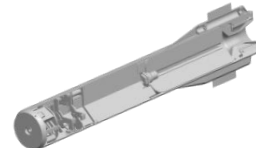
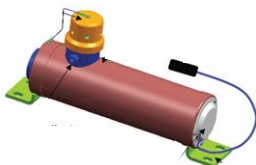
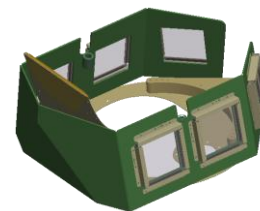
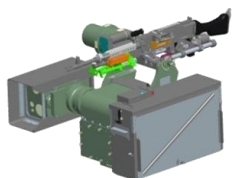
Hit Avoidance



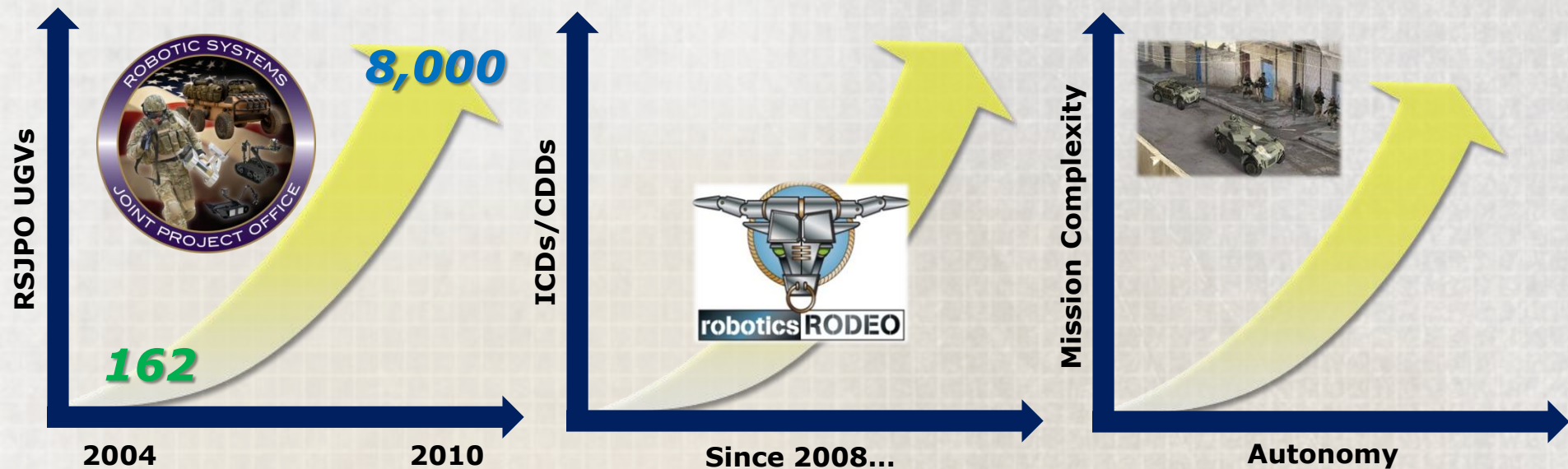
Detection Avoidance



Integration for Survivability



It's about balancing integration, mission, threat & technology



**Increasing Demands and Operational Flexibility
Require Strategic Investments in Key Areas**



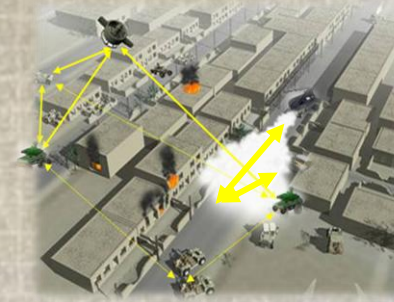
Reliable operations



Intelligent Control



Lighten the Load



**Collaborative
Interoperability**

Far Future

Collaborative Autonomy

- Mixed Assets (UGV, UAV, UUV)
- Auto. Mission Plan & Delegation
- *Global Urban Ops/Border Security*



Near/Far Future

Autonomous

- "Hands-Off" Mission Execution
- Human Intent Recognition
- Urban Ops/Robotic Wingman



Current/Near

Supervised-Autonomy

- Plan, Observe and Go;
- Road Rules Recognition & Follow
- Convoy Ops & Route Clearance



Current/Near Future

Tele-Op with Intelligence

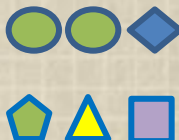
- Persistent Stare
- Range Clearance
- Retro-Traversal
- Navigational Blackboard
- Warehousing/Logistics



Current

Tele-Op w/o Intelligence

- IED / EOD Missions
- Engineering Functions



Current

Remote Control

- Vehicle /Security Checkpoint



- = Fielded JUONS/ONS/UUNS/UNS
- = JUONS/ONS/UUNS/UNS
- = Draft/Future Requirement
- = Current Requirement/POR

Increasing Autonomy



Robotics Technology Way Ahead Current to Future



- Affordable common robotic kit for manned/unmanned operations of current force vehicles
 - Incremental insertion of safety and automation capabilities
- Manned-unmanned and UAV-UGV collaboration for enhanced company operations
- Open systems architecture and joint interoperability
- Multi-mission capable family of robotic platforms
- Safe semi-autonomous operations in complex/dynamic environments
- Scalable autonomy based on terrain and mission understanding
- Robotic security for maneuver elements



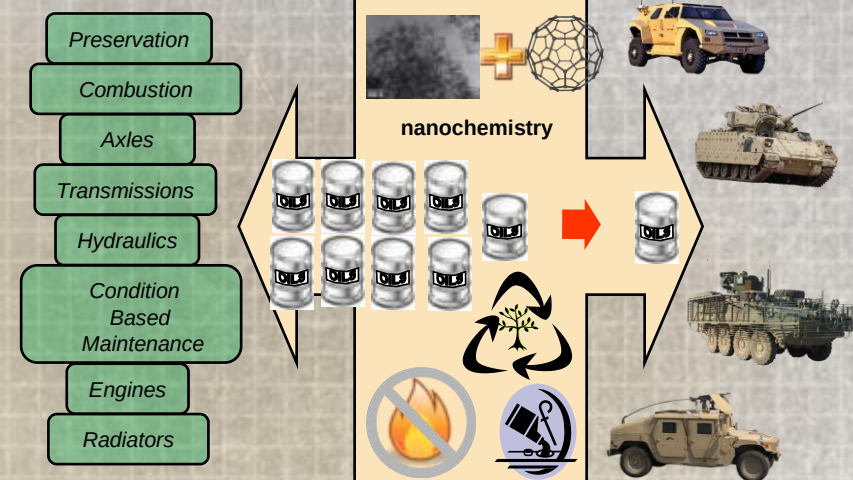


Next Generation Technologies

- Alternative Fuels
- Fuel Additive Technologies
- Fuel Efficient Powertrain Lubricant
- Nanotechnology for Fuels and Lubes
- Water from Air
- Water Reuse
- In-line Water Monitoring
- Fuel and Water Remote Quality and Quantity Surveillance
- Mechanical Countermine Increased Stand-off
- Structural Health Monitoring of Bridging
- Rapid Military Load Class Determination
- High Performance Materials for Lightweight Bridging & POL Storage Applications
- Priority Hydraulic System Combat Engineer (CE) & Hydraulic Hybrid Material Handling Equipment (MHE)
- Semi-Autonomous: CE, MHE, Bridging, Mechanical Countermine

POL Technology

Potential Applications



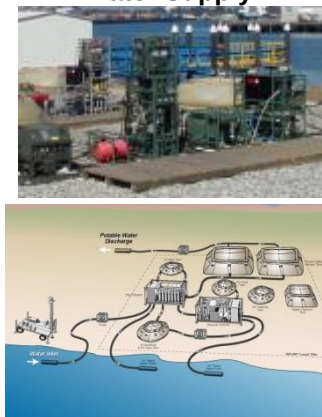
Mechanical Countermine



Petroleum Supply



Water Supply

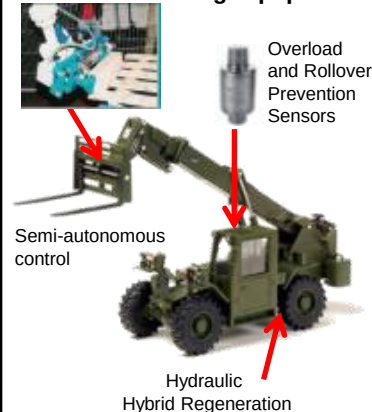


Bridging

Basic Building Blocks (Optimum Design)

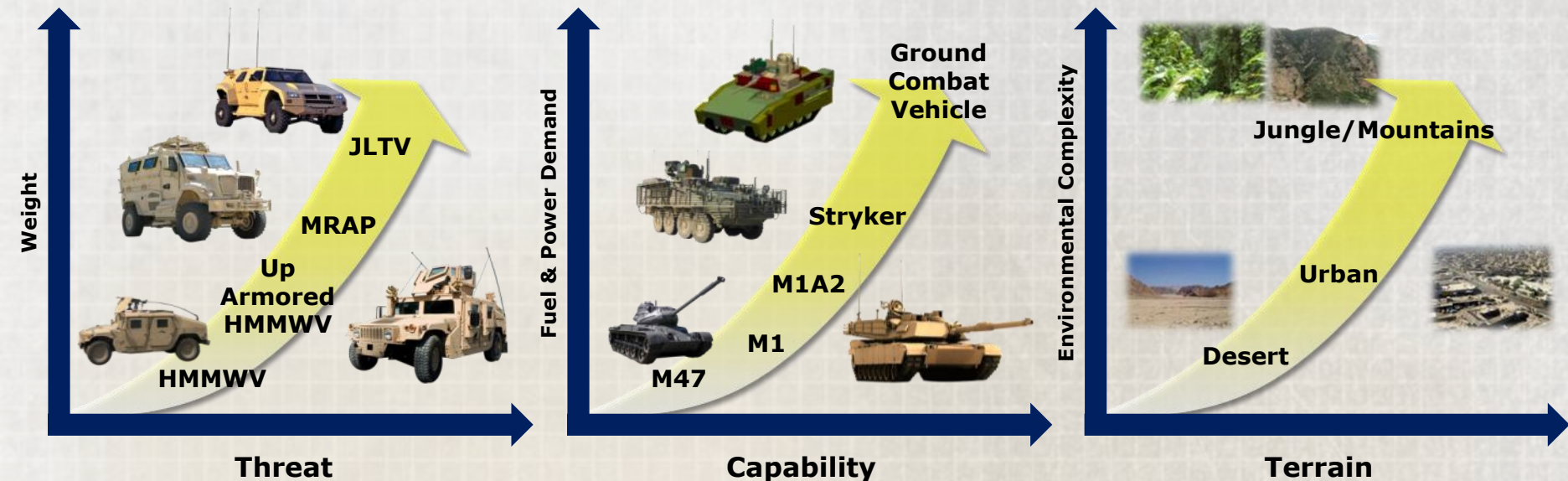


Combat Engineering and Material Handling Equipment





Excellence in Vehicle Mobility & Energy Efficiency



**Increasing Demands and Operational Flexibility
Require Strategic Investments in Key Areas**



Energy Storage



Power Generation
& Control



Thermal Management



Track & Suspension

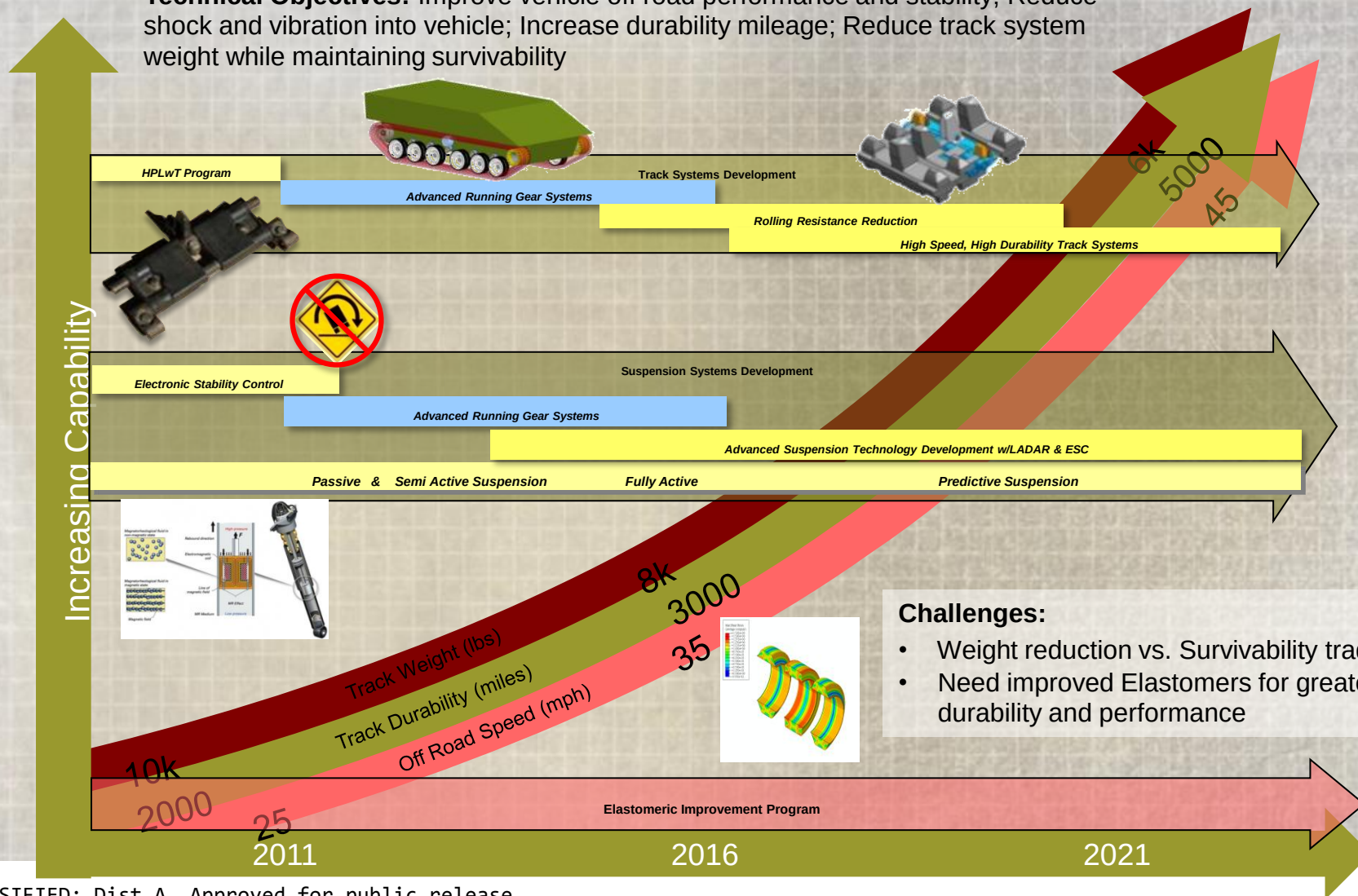


Current Efforts to Increase Vehicle Agility



Operational Objective: Combat and Tactical vehicles able to maneuver quickly and safely in any terrain

Technical Objectives: Improve vehicle off road performance and stability; Reduce shock and vibration into vehicle; Increase durability mileage; Reduce track system weight while maintaining survivability



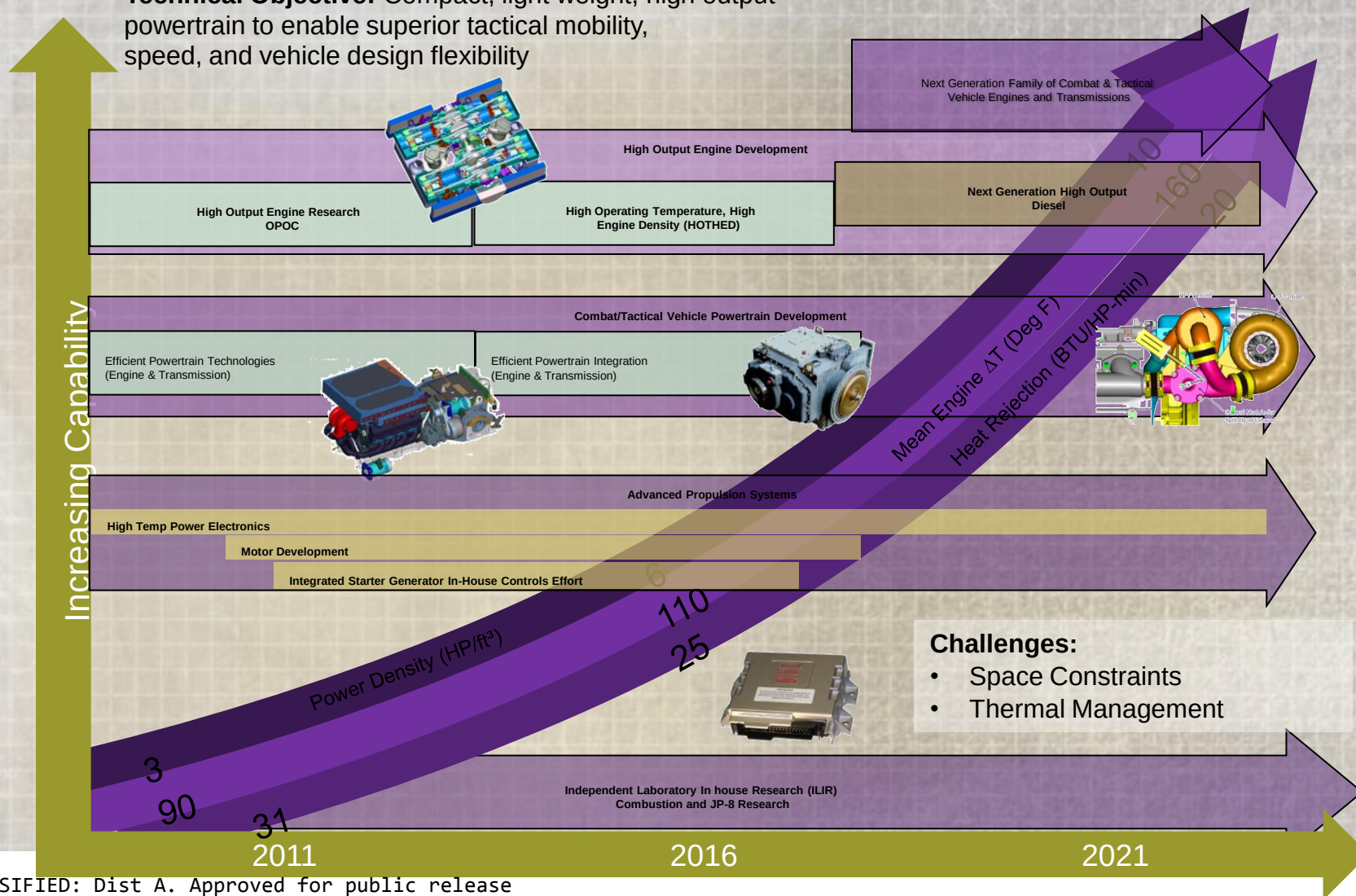


Current Efforts to Increase Prime Power



Operational Objective: Provide the required platform power to deliver the mission payload to the target

Technical Objective: Compact, light weight, high output powertrain to enable superior tactical mobility, speed, and vehicle design flexibility





Current Efforts to Reduce Fuel Consumption

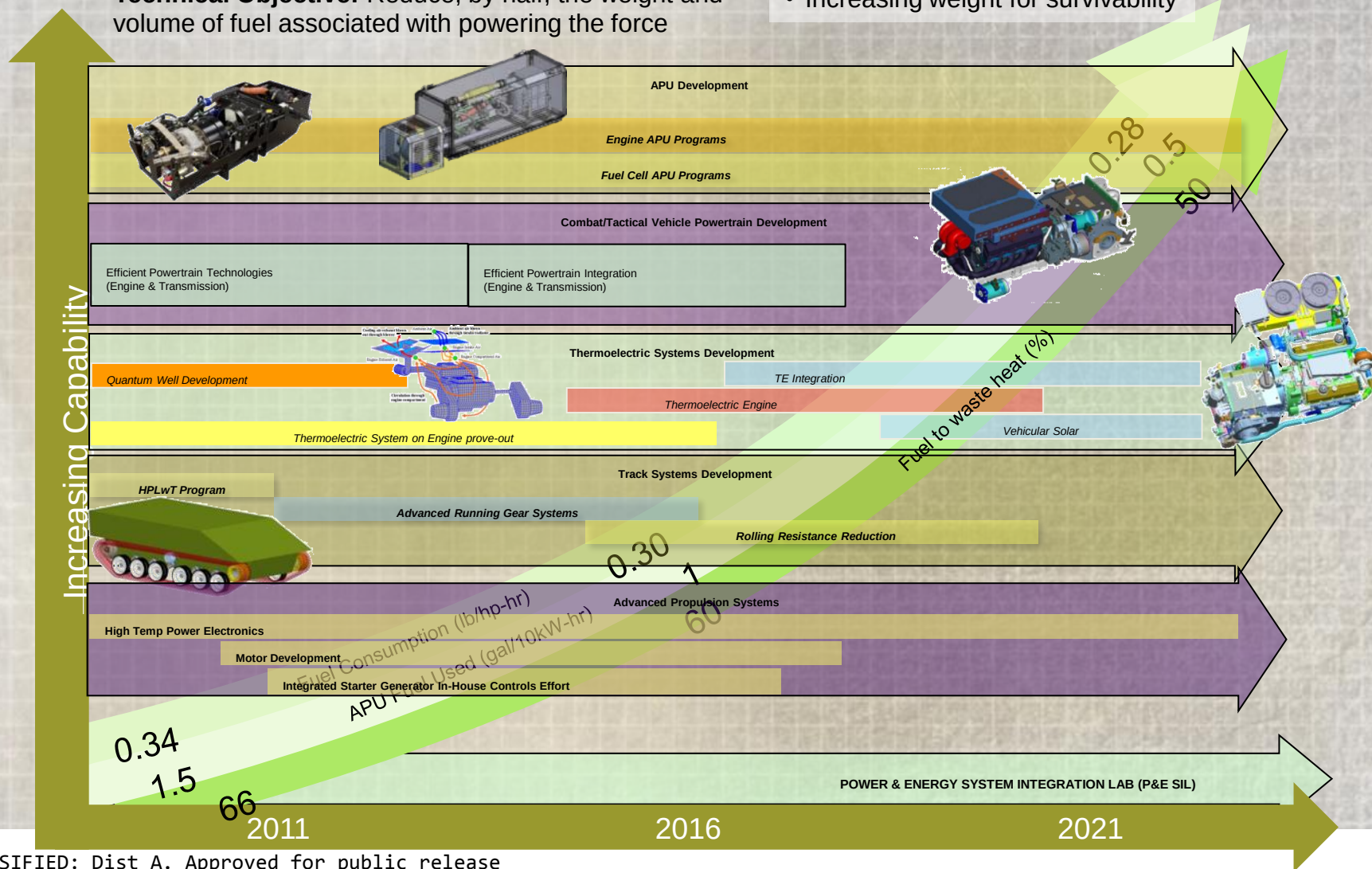


Operational Objective: Two battlefield days of operations without refueling

Technical Objective: Reduce, by half, the weight and volume of fuel associated with powering the force

Challenges:

- Increasing demand for power
- Increasing weight for survivability



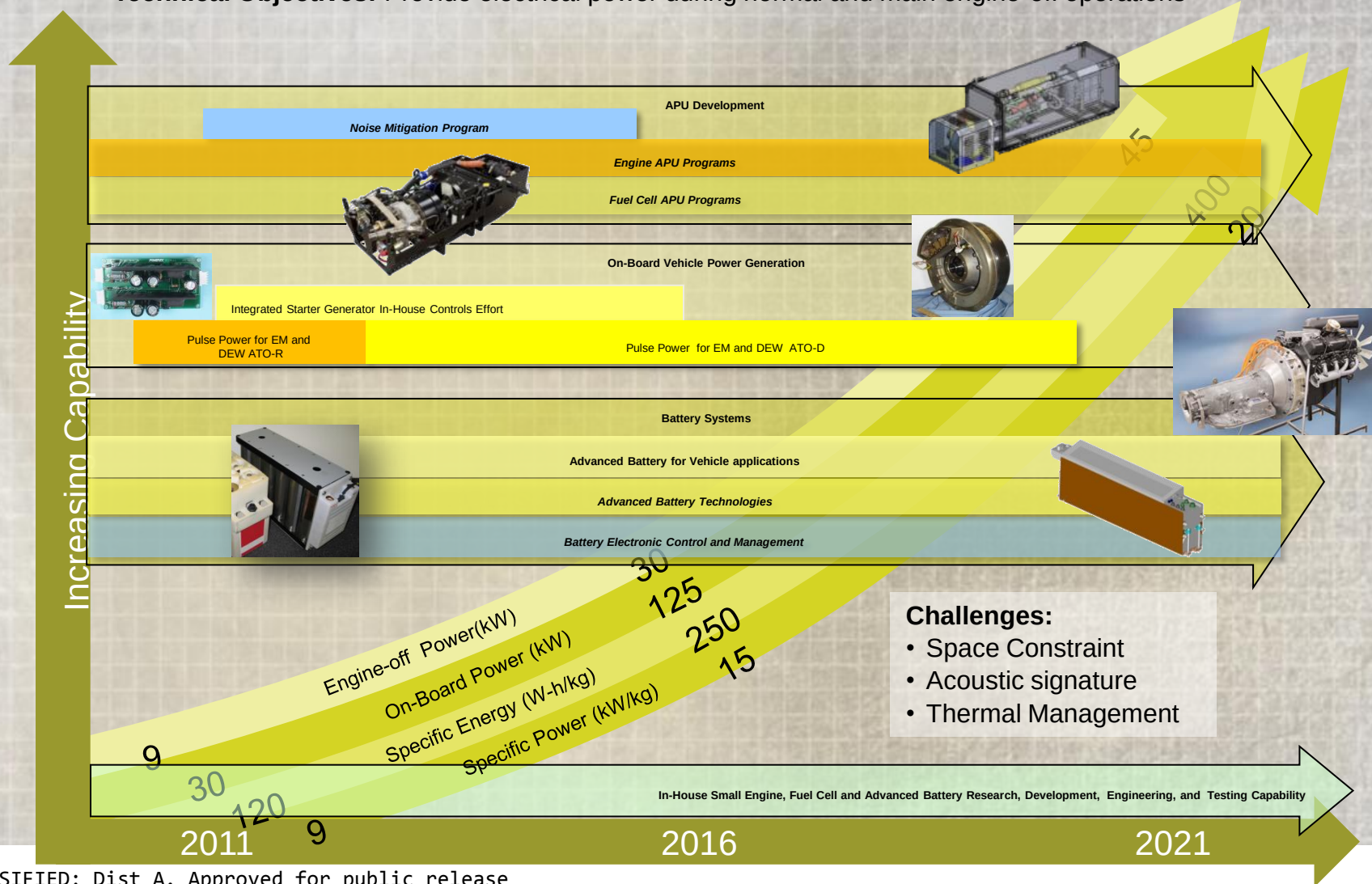


Current Efforts to Increase Electrical Power



Operational Objectives: Eight hours of silent watch; Sufficient on/off board electrical power for superior lethality, C4ISR, survivability and force protection

Technical Objectives: Provide electrical power during normal and main engine-off operations



	Primary Interest	
1) Advanced combustion engines and transmissions	High density, energy efficient powertrain	Extreme gains in engine efficiency
2) Lightweight structures and materials	Reduce weight to improve performance	Cost reduction for consumer market
3) Energy recovery and thermal management	Improved efficiency, manage heat generation	Efficiency gains through waste heat recovery
4) Alternative fuels and lubricants	Standardization & security	Efficiency gains for the legacy fleet
5) Hybrid power systems	Efficiency improvements	Efficiency improvements
6) Analytical Tools	Assessment/Design Trades	Assessment/Design Trades

It's All About the Warfighter

