Medium Tactical Vehicle Replacement (MTVR)

In service since 2001, the six-wheel, 7-ton, all-terrain Medium Tactical Vehicle Replacement (MTVR) truck is a popular Marine Corps workhorse. The multi-purpose vehicle has replaced the service's aging 5-ton trucks.

The MTVR hauls fuel, water, food, and supplies, as well as Marines, and also tows the M777 Lightweight 155 mm howitzer. Built by Oshkosh Corporation, the remarkable MTVR can traverse terrain previously regarded as impassable by military trucks.

There are four MTVR models, each carrying a crew of three Marines in its cab: a cargo variant, a dump truck, a wrecker, and a tractor. In addition, the High Mobility Artillery Rocket system (HIMARS) also includes an MTVR ammunition Resupply Vehicle (RSV) and trailer. There is a high level of commonality across the family of vehicles.

The predominant standard cargo variant is 26 feet long, 8 feet wide and 12 feet high. It can haul up to 15 tons of payload on paved primary or secondary roads to a maximum speed of 65 miles per hour, or can carry 7.1 tons cross country. The MTVR can traverse a 60 percent gradient and a 30 percent side slope with its maximum cross-country load, and can ford 5 feet of water. It has an on-road cruising range of 300 miles.

The vehicle features Oshkosh's high-performance TAK-4 independent suspension, which provides superior mobility and off-road maneuverability. It allows each wheel to move up and down separately in response to uneven surfaces, reducing the stress on the axle and keeping the vehicle more level on rough terrain. The MTVR also features a 425-horsepower Caterpillar engine, an Allison 7-speed automatic transmission, anti-lock brakes with automatic traction control, a central tire inflation system, an aluminum cab, and special corrosion protection. The MTVR wrecker variant is equipped with mechanical rear-steer technology, which aids in tight turns for vehicle recovery missions.

More than 8,900 MTVRs are in service with the Marine Corps. The Marine Corps' Ground Combat Tactical Vehicle (GCTV) Strategy reduced the MTVR AAO to 8,750 vehicles. The Navy SeaBees also possess over 1,800 MTVRs that are used in riverine and combat engineering missions. More than 800 USMC MTVRs have been in service in Afghanistan. The MTVR wrecker variant has been in high demand in Iraq and Afghanistan to recover heavy Mine-Resistant Ambush-Protected (MRAP) vehicles.

To improve the vehicle's level of protection against mines and improvised explosive devices (IEDs), the MTVR Armor System (MAS) was designed as a permanent modification to the vehicle. It provides complete 360-degree protection as well as overhead and underbody protection for the cab occupants.

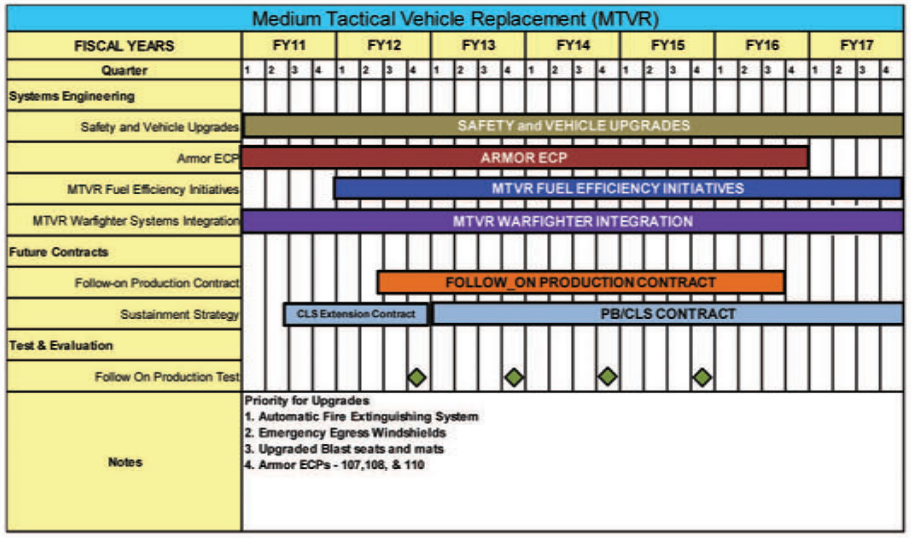
The armor kit was developed by the MTVR OEM, Oshkosh Corporation, and Israel's Plasan Sasa. Installation of MAS on MTVR cargo variants deployed overseas began in late 2004-early 2005. The kit's effectiveness had been proven in combat by late 2005. The dump truck and tractor MAS variants began fielding in December 2006.

MAS includes integrated, permanently mounted cab armor, as well as an upgraded front suspension, and air conditioning system. On selected armored vehicles, the Marine Corps Transparent Armor Gun Shield (MCTAGS), which provides a protective "turret" for the vehicle gunner, and a removable armored personnel carrier for the vehicle's cargo bay, nicknamed "the Armadillo", are added. The latter is a capsule with armored sides, ballistic glass windows, bench seats, and a tarp-covered open top.

The Marine Corps has continued to improve the MAS in response to Urgent Universal Need Statements from the field, including adding increased underbody blast protection and fuel tank fire-protection kits. The newest configuration of MAS is a "reducible height" version that includes a removable cab roof to facilitate storing the MTVR trucks on Maritime Prepositioning Ships. The Marine Corps completed installations of MAS in all of its MTVR variants in Afghanistan and Iraq, including the dump truck and tractor models, in December 2008. MAS installations for vehicles in the continental United States, as well as those on Maritime Prepositioning Ships and at III MEF locations in Japan and Hawaii, have been ongoing since 2008, and will continue through 2012. The Marine Corps' Deputy Commandant for Combat Development & Integration (CD&I) is still determining how many of the MTVRs in the stateside Marine Expeditionary Forces need to be armored.

The Corps plans to install MAS on about half of its MTVR fleet, but could scale back that number because the MAS adds a lot of weight and reduces fuel economy. Even though the armor was added to the MTVR after it was designed, the vehicle has the capability to carry the added weight without severely affecting its performance. The suspension has been modified, not just because of the added weight of the armor, but also because of all the government-furnished equipment that is added to the vehicle, such as an IED jammer and the Blue Force Tracking digital map system. The Marine Corps' MTVR and its new Logistics Vehicle System Replacement (LVSR), also built by Oshkosh, form a formidable logistical tandem. They also share many common parts and similar maintenance, which streamlines service and support while reducing downtime.

Medium Tactical Vehicle Replacement (MTVR)



Program Description

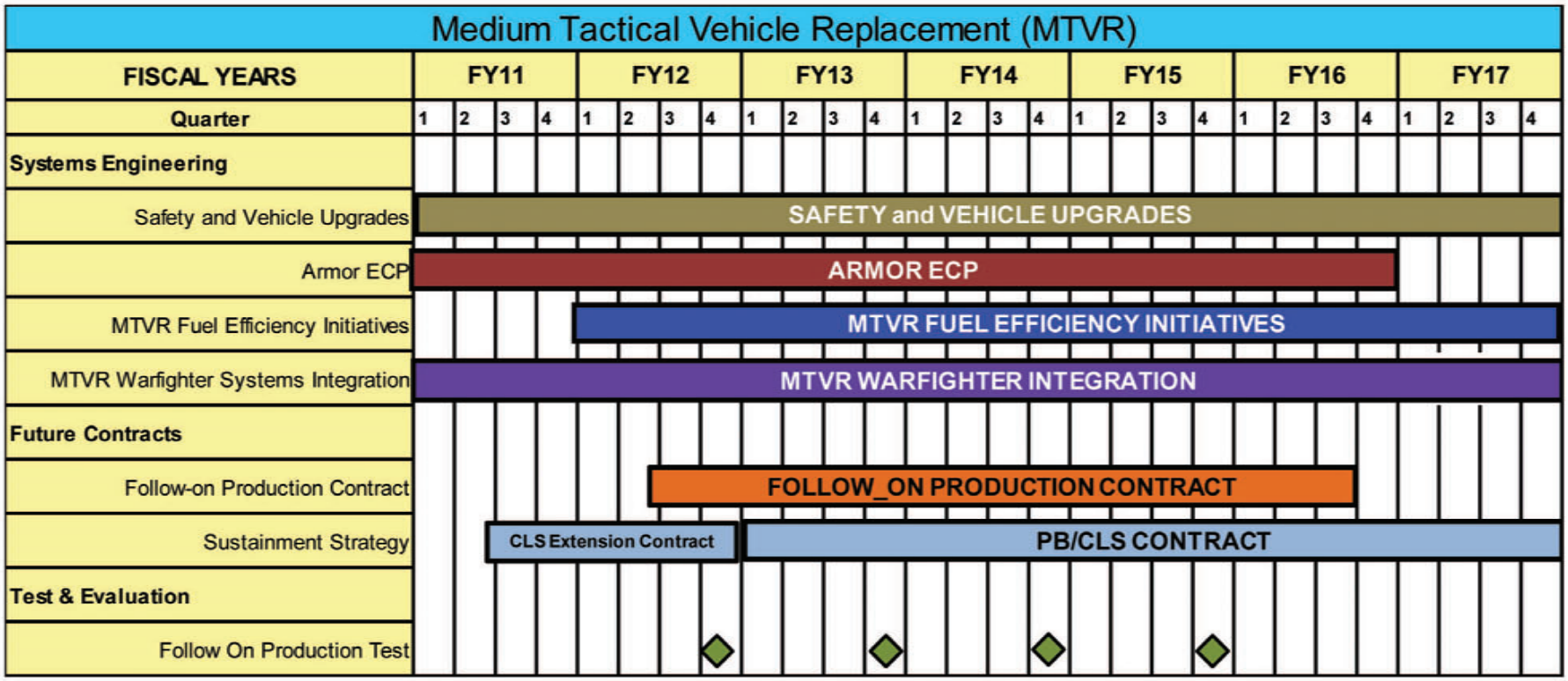
- The MTVR replaced the aging M809/M939 series 5-ton trucks with state-of-the-art commercial automotive technology beginning in 2001. The MTVR Cargo truck has a 7.1-ton off road and 15-ton on road payload and a 22-year service life. MTVR variants include the Cargo, Dump, Wrecker, Tractor (5th Wheel) and High Mobility Artillery Rocket System (HIMARS) Re-Supply Vehicle. There is a high level of commonality across the family of vehicles.
- The MTVR Armor System (MAS) provides complete 360-degree protection as well as overhead and underbody protection for the crew compartment. The MAS is a permanent modification to the vehicle and includes an upgraded front suspension and cab rebuild. The kit includes a removable personnel carrier (with ballistic glass), air conditioning system, and machine gun mount. All vehicles in theater include MAS armor.

Program Status

Significant events:

- Follow-on production contract award planned 2nd Qtr FY12
- PB/CLS sustainment contract (award 4th Qtr FY12)
- OEF urgent requirement Upgrade Capability planned 2nd Qtr FY12.
- MTVR Upgrades
  1. Automatic Fire Extinguishing System (AFES)
  2. Emergency Egress Windshields
  3. Upgraded Blast seats and mats
  4. Armor ECPs

Medium Tactical Vehicle Replacement (MTVR)



Medium Tactical Vehicle Replacement (MTVR)

MTVR's TOP THREE PROGRAM ISSUES:

1. <u>Fuel Economy</u> - At 3.8 miles per gallon, coupled with the Fully Burden Cost of Fuel (FBCF), moderate increases in fuel efficiency of the MTVR has the potential of saving millions of dollars. Current fuel efficiency efforts include the Fuel Efficient MTVR, and multiple ONR and TARDEC projects that are exploring engine mounted fuel efficiency technologies, regenerative braking, accessory electrification, hybrid and electric drive.

2. <u>Current & Future C4I Integration Demands</u> - The addition of multiple communications and electronics equipment to the MTVR, interoperability, heat rejection, and space claim issues present human systems integration challenges to the crew. Although there are no active S&T initiatives specifically addressing these demands, there are PMO, ONR and TARDEC programs addressing these issues.

3. <u>Increased Survivability</u> - Although the addition of armor has directly increased survivability of the MTVR, continuing effort is required to maintain or increase survivability of the vehicle and occupants from emerging threats. This includes increasing armor protection while maintaining or reducing current weight, improvements in blast resistant seats, crew egress systems, and advanced fire suppression systems.

1. <u>Fuel Economy:</u>

1a. Active S&T Initiatives for MTVR

Future Naval Capability (FNC)
- Fuel Efficient MTVR

Small Business Innovation Research (SBIR)
- Engine Efficiency Enhancements (MTVR Phase II SBIR)

1b. Potential S&T Initiatives for MTVR

Discovery & Invention (D&I)
- Future Fuel Alternatives
- Extended Traction Tire (ETT)

Exploration & Development (E&D)
- Integrated Power and Propulsion
- Fuel Efficient Enabling Technologies w/ TARDEC

TARDEC
- Alternative Fuels & Petroleum, Oil & Lubricants
- Efficient Powertrain Technology Integration

2. Current & Future Power Demands:

2a. Active S&T Initiatives for MTVR

Exploration & Development (E&D)
- Modular Vehicle Platform (MVP)

Other
- NUCLEUS Effort

2b. Potential S&T Initiatives for MTVR

Exploration & Development (E&D)
- Integrated Power & Propulsion

TARDEC
- Electrical Power Systems
- Vehicle Electronics Integration Technologies
- Distributed Soldier Load Through SMART Vehicle Control
- Vehicle Electronics Architecture and Standards

3. Increased Survivability:

3a. Active S&T Initiatives for MTVR

Exploration & Development (E&D)
- CSTV Shock Mitigating Seats
- Silencing USMC Vehicles

Small Business Innovation Research (SBIR)
- Mitigation of Blast Injuries through M&S (MTVR SBIR Phase II)

Small Business Technology Transfer and Research (STTR)
- Mitigation of Fuel Tank Explosions and Fires (MTVR STTR Phase I)

Other
- Fuel Tank Protection System Swampworks
- MTVR Blast Seat Evals

3b. Potential S&T Initiatives for MTVR

Discovery & Invention (D&I)

- Lightweight Armor Materials
- CSTV Shock Mitigating Seats
- Energy Absorbing Structures for Blast Mitigation

Exploration & Development (E&D)

- CSTV Shock Mitigating Seats

TARDEC

- RPG Active Protection (RAP)
- Enhanced RPG Active Protection (ERAP)
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Other

- AMAS JCTD

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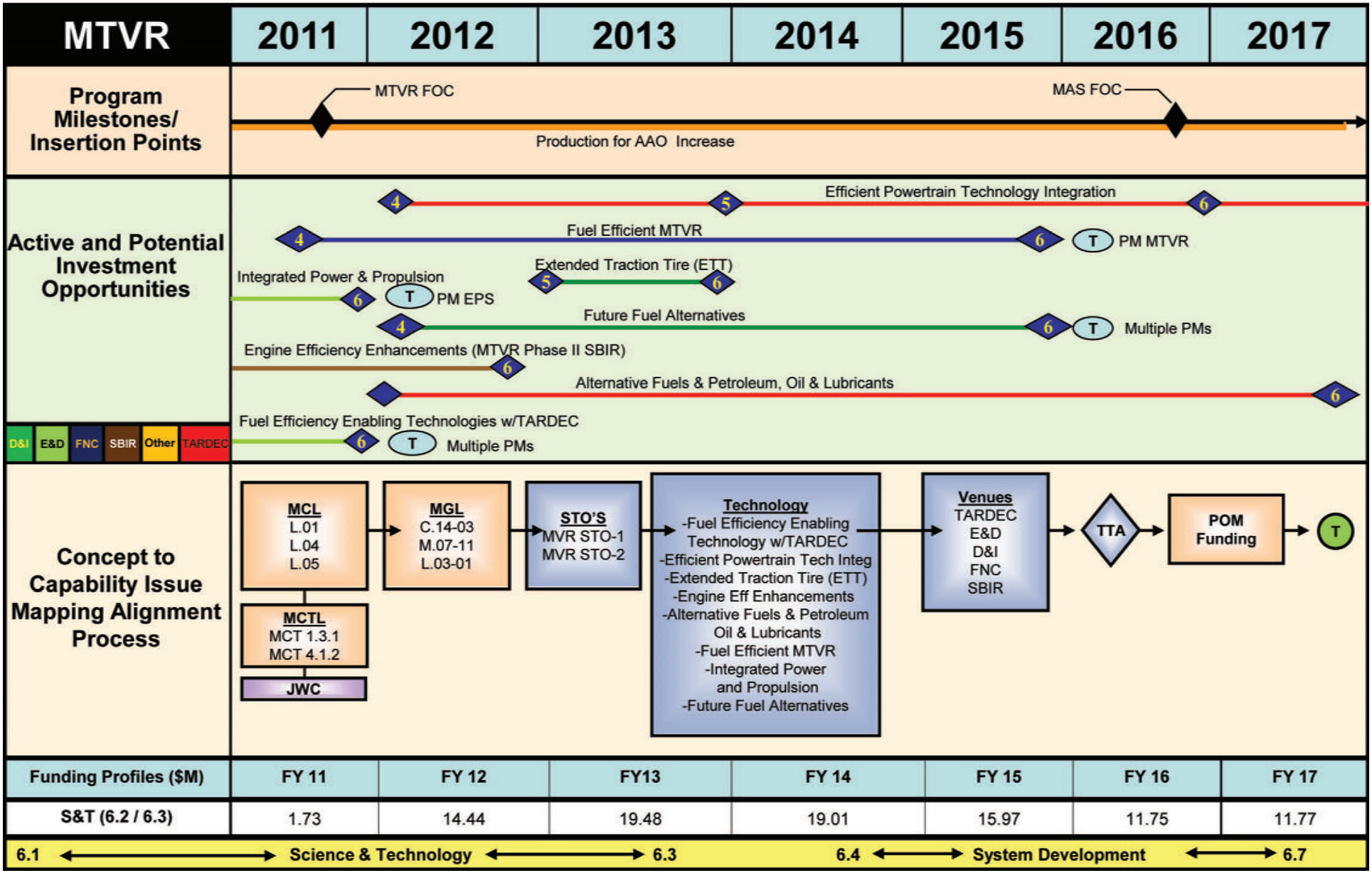
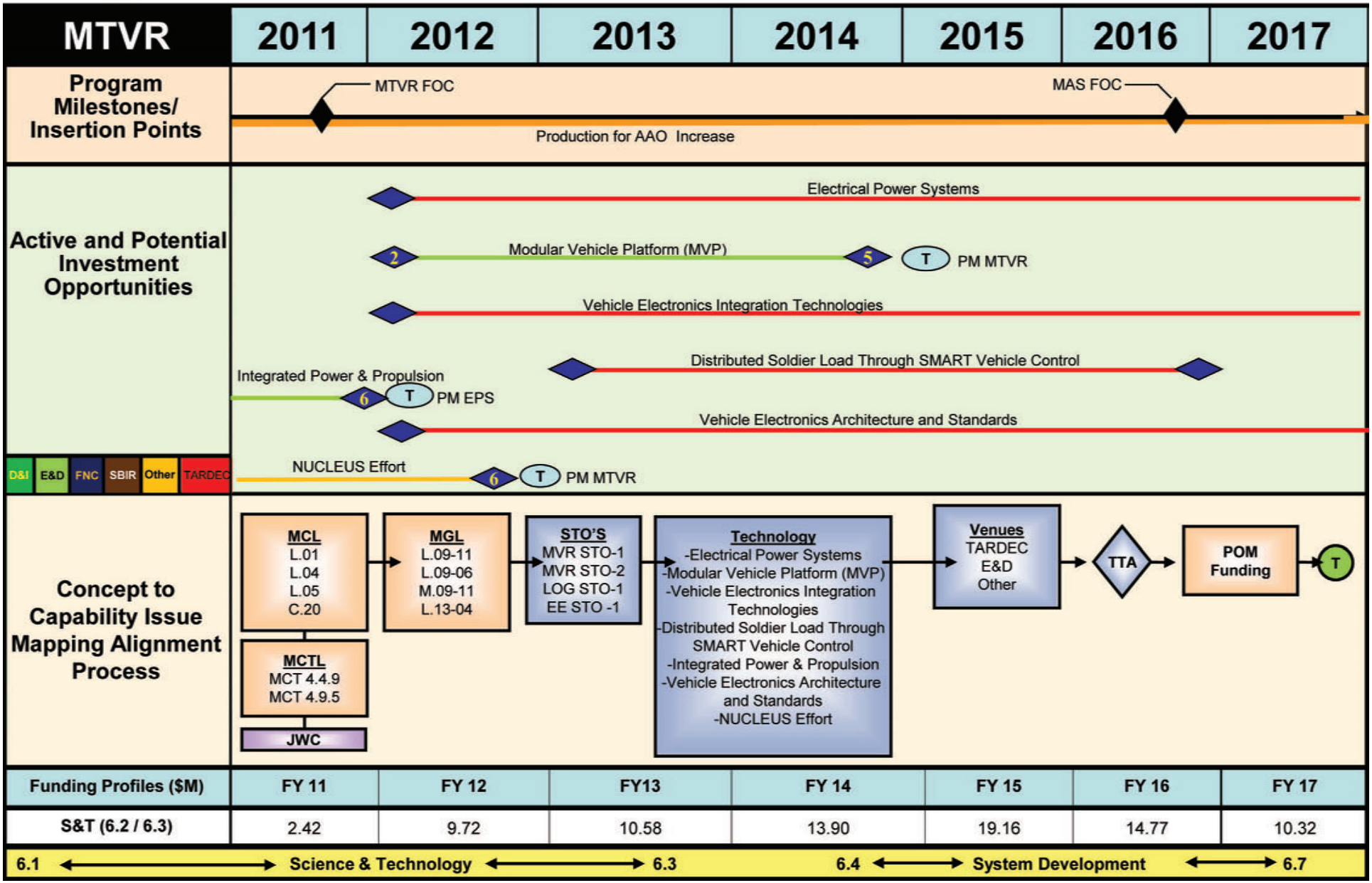
MTVR Technical Issue #1 Fuel Economy



MTVR Technical Issue #1 Fuel Economy

MCL	L.01 Provide supply support L.04 Provide logistics services L.05 Provide deployment and distribution support.	
MCTL	MCT 1.3.1 Conduct Maneuver MCT 4.1.2 Conduct Ground Supply Operations	
MGL	C.14-03 Limited Transport Capability M.07-11 Mobility in all terrain & climates L.03-01 Sustainment Distribution	
STO'S	MVR STO-1 Fuel efficient power generating systems MVR STO-2 Ground vehicle mobility	
Technology	Active: -Fuel Efficient MTVR -Engine Efficiency Enhancements (MTVR Phase II SBIR)	Potential: -Efficient Powertrain Technology Integration -Extended Traction Tire (ETT) -Integrated Power & Propulsion -Future Fuel Alternatives -Alternative Fuels & Petroleum, Oil & Lubricants -Fuel efficiency Enabling Technology with TARDEC
Venues	TARDEC, E&D, D&I, FNC, SBIR,	
TTA	w/ MTVR	T Transition target for: PM MTVR, EPS, Multiple PMs
POM Funding	MCCDC integration division	
T	Transition to a program of record	Comments/Issues:

MTVR Technical Issue #2 Current & Future C4I Integration Demands



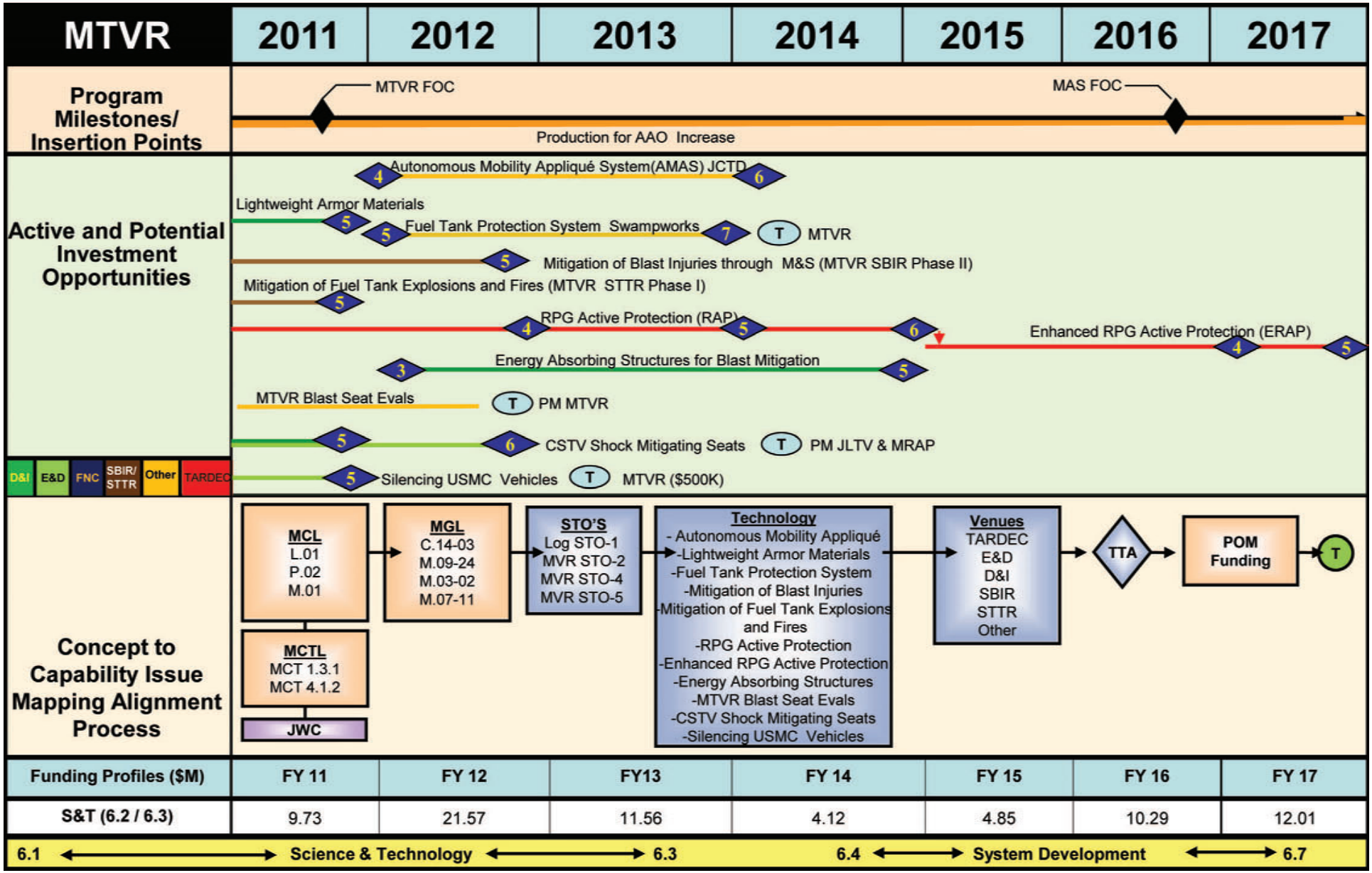
Funding Profiles ($M)	FY 11	FY 12	FY13	FY 14	FY 15	FY 16	FY 17
S&T (6.2 / 6.3)	2.42	9.72	10.58	13.90	19.16	14.77	10.32

6.1 ⟷ Science & Technology ⟷ 6.3 6.4 ⟷ System Development ⟷ 6.7

MTVR Technical Issue #2 Current & Future C4I Integration Demands

MCL	L.01 Provide supply support L.04 Provide logistics services L.05 Provide deployment and distribution support C.20 Optimize Networks	
MCTL	MCT 4.4.9 Conduct Tactical Electrical Supply MCT 4.9.5 Supply Electrical Power	
MGL	L.09-11 Alternate Power Sources L.09-06 On Move Power Generation M.09-11 Exportable Power For On-Board Systems L.13-04 Power Generation/ Distribution	
STO'S	MVR STO-1 Fuel efficient & power generating vehicle systems MVR STO-2 Ground vehicle mobility LOG STO-1 Asset versatility EE STO-1 Expeditionary energy harvesting	
Technology	Active: -NUCLEUS Effort -Modular Vehicle Platform (MVP)	Potential: -Electrical Power Systems -Vehicle Electronics Integration Technologies -Distributed Soldier Load Through SMART Vehicle Control -Integrated Power & Propulsion -Vehicle Electronics Architecture and Standards
Venues	TARDEC, E&D, Other	
TTA	No TTAs is needed	T Transition target for: PM MTVR, EPS
POM Funding	MCCDC integration division	
T	Transition to a program of record	Comments/Issues:

MTVR Technical Issue #3 Increased Survivability



MTVR Technical Issue #3 Increased Survivability

MCL	L.01 Provide supply support P.02 Protect Personnel physical assets & LOCs M.01 Maneuver to secure	
MCTL	MCT 1.3.1 Conduct Maneuver MCT 4.1.2 Conduct Ground Supply Operations	
MGL	C.14-03 Limited Transport Capability M.09-24 Force Protection M.03-02 Protected Mobility M.07-11 Mobility in all terrain & climates	
STO'S	Log STO-1 Asset versatility MVR STO-2 Ground vehicle mobility MVR STO-4 Advanced materials and survivability technology to enhance the performance and survivability of combat vehicles &surface craft MVR STO-5 Vehicle and surface craft design for Marine usability, habitability, and survivability	
Technology	Active: -Fuel Tank Protection System Swampworks -Mitigation of Blast Injuries through M&S (MTVR SBIR Phase II) -Mitigation of Fuel Tank Explosions and Fires (MTVR STTR Phase I) -MTVR Blast Seat Evals -Silencing USMC Vehicles	Potential: -Autonomous Mobility Appliqué System(AMAS) JCTD -Lightweight Armor Materials -RPG Active Protection (RAP) -Enhanced RPG Active Protection (ERAP) -Energy Absorbing Structures for Blast Mitigation -CSTV Shock Mitigating Seats
Venues	TARDEC, D&I, E&D, SBIR, STTR, Other	
TTA		T Transition target for: PM MTVR, MRAP, JLTV
POM Funding	MCCDC integration division	
T	Transition to a program of record	Comments/Issues: