Amphibious Combat Vehicle (ACV)

Capability Gaps

Introduced in 1972, sustained with both a 1983 service life extension program and a 1999 rebuild program, the AAV will be 40 years old in FY12. The AAV platform provides a limited capability for surface operations as envisioned by the Naval Operations Concept (NOC) and Marine Corps Operating Concept (MOC) in the 2015 timeframe due to its limited survivability, force protection, lethality, environmental controls for long distance water mobility, land mobility, and communications. The AAV7A1 shortcomings were identified in Marine Corps Mission Area Analyses (MAAs) for MA-21 Direct Fire and Maneuver, MA-22 Ground Tactical Mobility/ Counter-Mobility, MA-23 Close Combat, and MA-11 C2, with these deficiencies becoming issues in the timeframe beyond 2005.

Operational Impact

Upon cancellation of the Expeditionary Fighting Vehicle Program, five distinct capability gaps were evident with the current AAV, in the areas of force protection and survivability, network/ C2, lethality, land mobility, and water mobility. The ACV is intended to fill those current capability gaps in the amphibious portfolio. The ACV will provide tactical surface armored land and water mobility for the landing force. The ACV will be launched from amphibious ships from a point over the horizon (OTH) and will deliver the surface assault elements of the landing force at speeds over moderate seas, transition seamlessly from sea to land, and maneuver to inland objectives. It will provide surface power projection and, if necessary, forcible entry against a defended littoral. Crossing the beach in a seamless (non-stop) maneuver, the ACV will continue to inland objectives and provide Marine infantry forces armor protected mobility and firepower in support of all facets of ground combat operations. Tactics for units employing the ACV will usually call for the embarked Marine infantry to dismount as close to the objective as possible, relying on the vehicle's weapons system to provide direct fire in support of ground maneuver. The ACV's firepower will destroy, neutralize, or suppress antitank weapons, light armored vehicles, emplacements/bunkers, and dismounted infantry. The ACV's communications and information systems will provide the requisite situational awareness (SA) and navigation capabilities for the ACV crew and embarked Marine infantry to operate in the expeditionary environment. As an amphibious vehicle, the ACV provides the ground combat element with the means to reenter the sea, deploy along the littoral, and strike where the enemy is vulnerable. Additionally, the vehicle will be ideally suited for shore-to-shore, riverine, and shore-to-ship operations such as emergency evacuation.

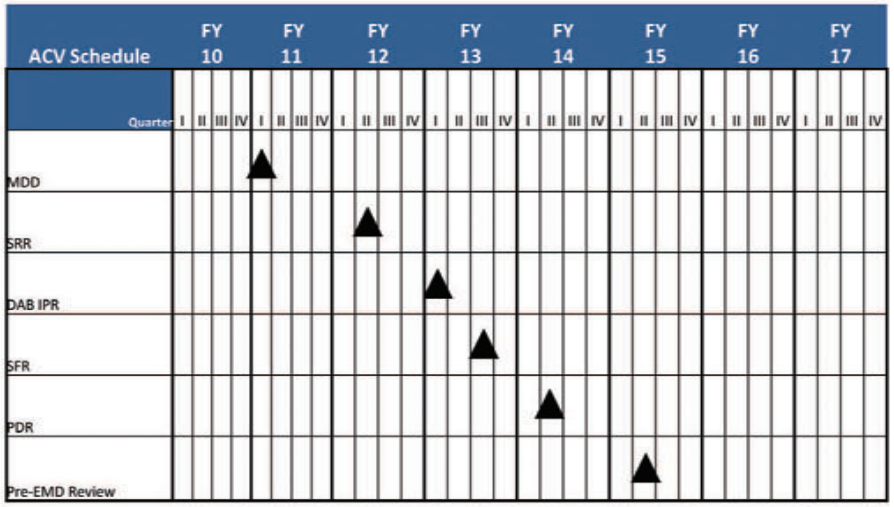
The ACV capabilities are key enablers for the Joint Force to conduct amphibious operations, specifically when forcible entry is required, and for the MAGTF to conduct operations across the range of military operations. The ACV will provide the MAGTF greater capacity with mobile armored protection to increase maneuverability throughout the sea to land domains and in an

extended land operational environment. The ACV will enable the MAGTF, as part of the Joint Force, the ability to concentrate combat power, support, and sustainment at decisive points. As a result, the ACV enabled force must deliver precise lethal and nonlethal effects and be interoperable with Joint, Interagency, Intergovernmental, and Multinational partners. The ACV will support network enabled mission command and have ready access to joint C4ISR.

Program Status

The associated Material Development Decision Defense Acquisition Board (MDD DAB) was conducted successfully in the first quarter of FY12. The ADM will provide analysis of alternatives study guidance in support of the AoA. Following the AoA, up to two prime contractors will be tasked to develop preliminary designs in support of the planned Milestone B in early FY15. An initial prototype build will lead to a fly off between the competing prime contractors and down select for final design efforts and eventual Milestone C at the end of FY19. Initial Operational Capability is planned for FY22 with Full Operational Capability in FY29.

Amphibious Combat Vehicle (ACV)



Program Description

Mission: General Support Lift / Amphibious Mobility / Firepower
Dimensions: Similar to EFV footprint for transportability

Weapon: Lethality Options under analysis
Fire control: Modern, Stabilized Day / Night Optics
Capacity: 17 Infantry Marines + 3 Marine Crewmen
Range: 200 mile
Speed: Mobility effective with MAGTF Maneuver Task Force

Program Status

Acquisition Status: Pre-AoA
Acquisition Objective: ~600
MS B/MS C: Q1 FY15/Q4 FY19
IOC/FOC: 2022/2028 (Projected)
Comments:

- AAO will provide lift for 8 Infantry Battalions

Amphibious Combat Vehicle (ACV)

ACV Schedule	FY 10				FY 11				FY 12				FY 13				FY 14				FY 15				FY 16				FY 17			
Quarter	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
MDD					▲																											
SRR										▲																						
DAB IPR													▲																			
SFR															▲																	
PDR																			▲													
Pre-EMD Review																						▲										

ACV'S Top Three Program Issues:

1. Increase Survivability - As it relates to protecting the occupants of the vehicle and the vehicle itself from emerging threats, a continuing effort to maintain or even increase survivability. This includes such things as increasing armor protection while maintaining current weight (or with minimal weight gain), or decreasing detrimental impacts to the occupants and vehicle due to battle damage, such as through fuel system containment and fire suppression improvements.

2. Increased Weight Margin - The ACV will need to balance vehicle survivability (among other weight driving requirements) with the overall mobility performance and sea-keeping capability, as they generally trend in opposite directions. Overall, the requirement for increased weight margin creates strain on the ability of the vehicle to incorporate solutions to address other requirements/technical issues.

3. Crew Visibility - While the ACV vehicles are in silent watch and maneuvering on land and water, especially in tight formation in limited visibility (night, smoke, fog, etc.), the crew must maintain direct sensory knowledge of their surroundings in order to safely and effectively employ the system. This includes, but is not limited to, fully blacked out land/water operations, station keeping, obstacle detection (including near-surface obstacles), operation in urban environments, etc.

1. Increased Survivability

1a. Active S&T Initiatives for ACV

Small Business Innovative Research (SBIR)
- Laser Eye Protection (ACV SBIR I)
- Semi-active Damped Seating (ACV SBIR III)
- Modular Lightweight Armor System (ACV SBIR II)

Small Business Technology Transfer and Research (STTR)
- Low Cost, Low Weight, Self-Sealing Fuel Tank Technology Development (ACV STTR II)

Discovery and Innovation (D&I)
- Energy Absorbing Structures for Blast Mitigation Light Tactical Vehicles

1b. Potential S&T Initiatives for ACV

Discovery and Innovation (D&I)
- CSTV Shock Mitigating Seats
- Lightweight Armor Materials

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

TARDEC
- GSS- Blast Technology Development

Other
- DARPA AVM Program

2. Weight Margin

2a. Active S&T Initiatives for ACV

Small Business Innovation Research (SBIR)
- Aluminum Casting Alloy (ACV SBIR II)
- Modular Lightweight Armor System (ACV SBIR II)
- Modular Lightweight External Fuel Tank System (ACV SBIR I)

Small Business Technology Transfer and Research (STTR)
- Low Cost, Low Weight, Self-Sealing Fuel Tank Technology Development (ACV STTR II)

2b. Potential S&T Initiatives for ACV

Discovery & Invention (D&I)
- Lightweight Armor Materials
- Expeditionary Light Armor Seeding Development

Exploration & Development (E&D)
- Energy Storage Module to Reduce Fuel Consumption

TARDEC
- Energy Storage Research & Development

3. Crew Visibility

3a. No Active S&T Initiatives for ACV

3b. Potential S&T Initiatives for ACV

Small Business Innovation Research (SBIR)

- Innovative Cost-Effective Lightweight Transparent Armor for Vehicles (TARDEC SBIR I)
- Low Cost Manufacturing of the Ballistic Resistant Transparent Spinel Windows (TARDEC SBIR I)

Exploration & Development (E&D)

- "Flawless" Glass Armor

TARDEC

- Ground Combat Vehicle Vision Protection Program
- Transparent Armor

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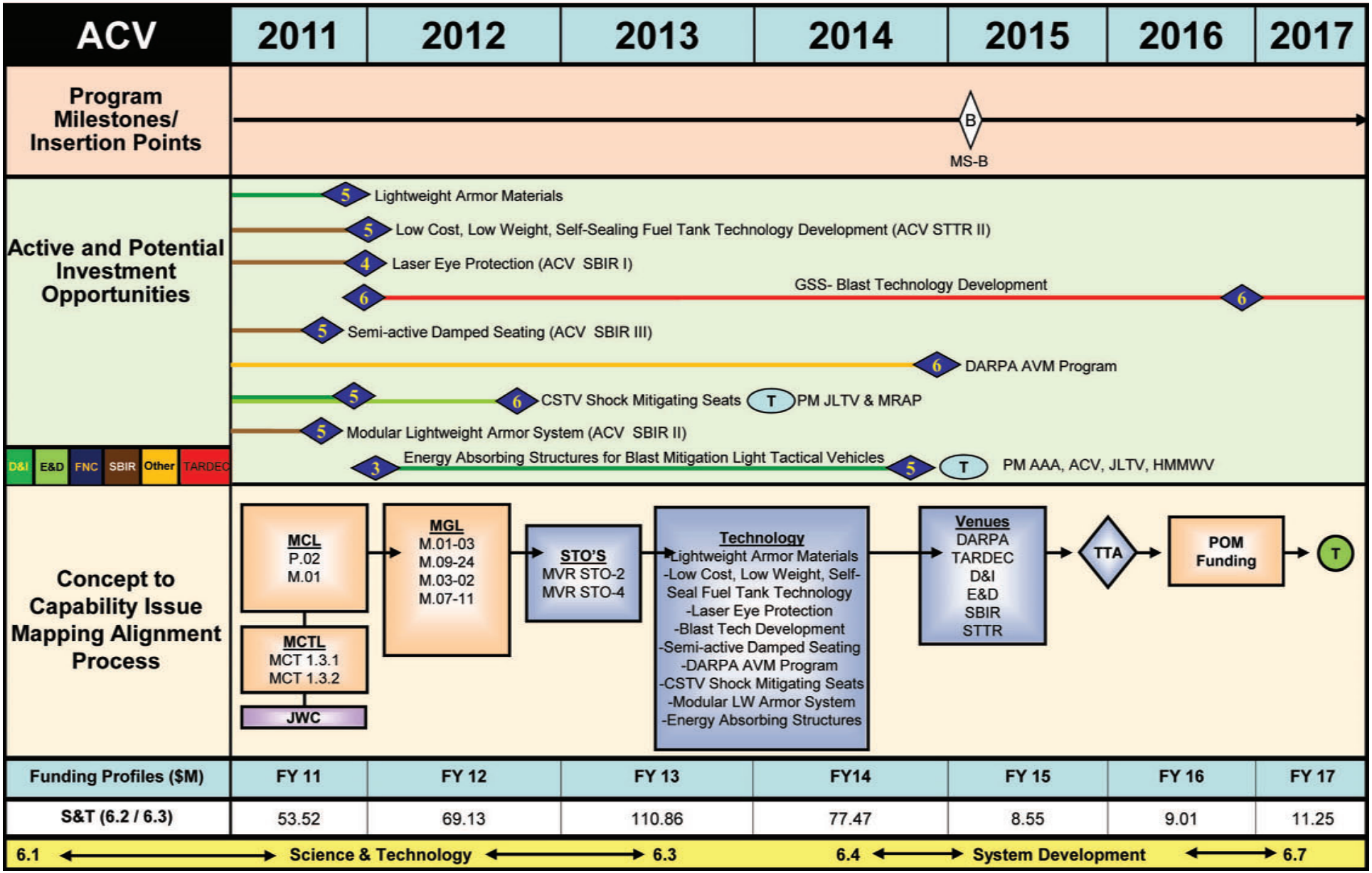
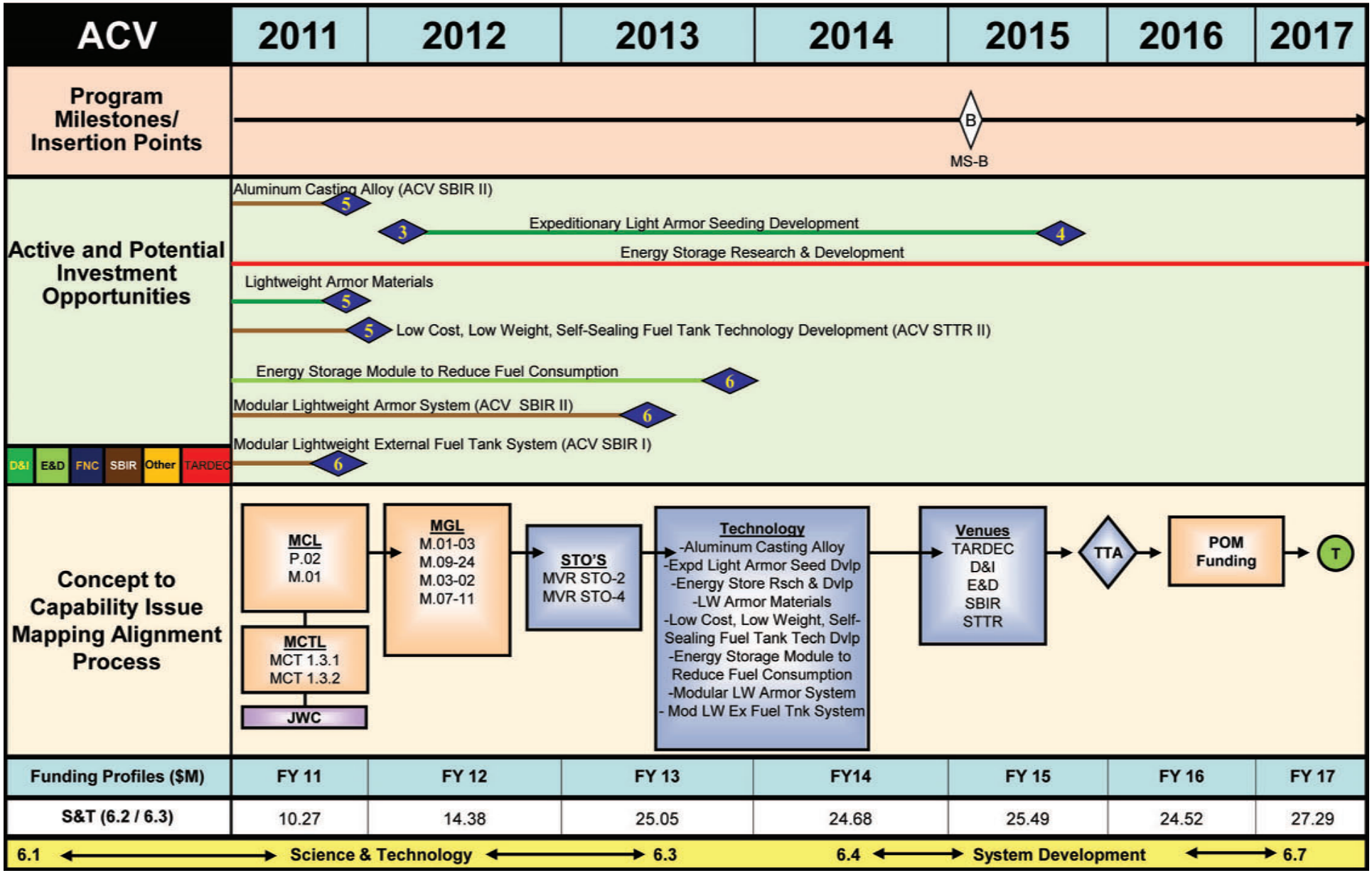
ACV Technical Issue #1 Increased Survivability



ACV Technical Issue #1 Increased Survivability

MCL	P.02 Protect Personnel/physical assets and LOCs M.01 Maneuver to secure	
MCTL	MCT 1.3.1 Conduct Maneuver MCT 1.3.2 Conduct Amphibious Operations	
MGL	M.01-03 AAV iso STOM M.09-24 Force Protection M.03-02 Protected mobility M.07-11 Mobility in all terrain & climates	
STO'S	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	
Technology	Active: -Low Cost, Low Weight, Self-Sealing Fuel Tank Technology Development (ACV STTR II) -Laser Eye Protection (ACV SBIR I) -Semi-active Damped Seating (ACV SBIR III)	Potential: -CSTV Shock Mitigating Seats -Lightweight Armor Materials -Blast Tech Development -DARPA AVM Program -Modular LW Armor System -Energy Absorbing Structures
Venues	DARPA, TARDEC, D&I, E&D, SBIR, STTR	
TTA	N/A	T Transition target for: PM ACV, JLTV, MRAP, AAA, HMMWV
POM Funding	MCCDC integration division	
T	Transition to a program of record	Comments/Issues:

ACV Technical Issue # 2 Increased Weight Margin



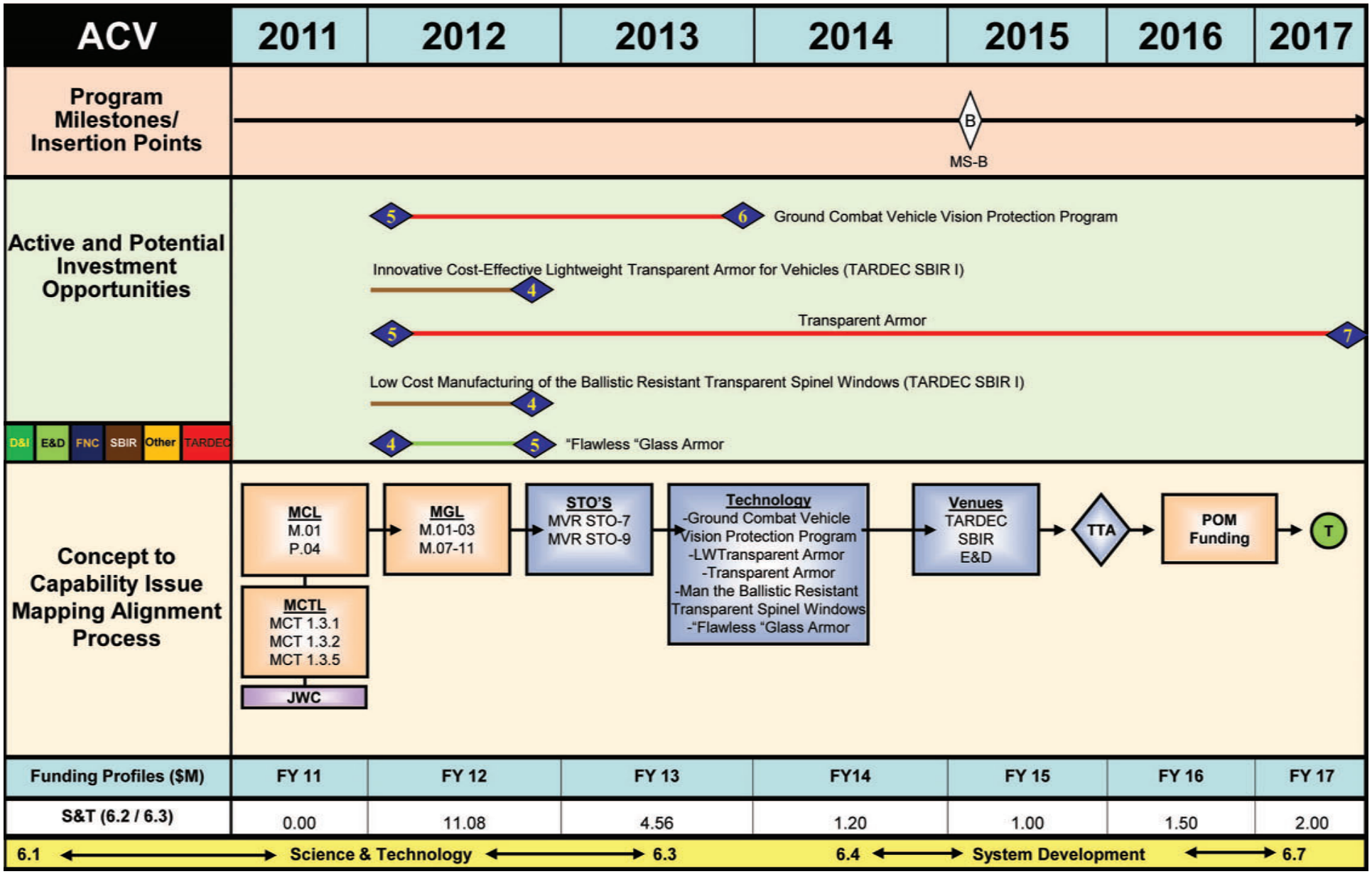
Funding Profiles ($M)	FY 11	FY 12	FY 13	FY14	FY 15	FY 16	FY 17
S&T (6.2 / 6.3)	10.27	14.38	25.05	24.68	25.49	24.52	27.29

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

ACV Technical Issue # 2 Increased Weight Margin

MCL	P.02 Protect Personnel/physical assets and LOCs M.01 Maneuver to secure	
MCTL	MCT 1.3.1 Conduct Maneuver MCT 1.3.2 Conduct Amphibious Operations	
MGL	M.01-03 AAV iso STOM M.09-24 Force Protection M.03-02 Protected mobility M.09-03 Mobility in all terrain & climates	
STO'S	MVR STO-2 Ground vehicle mobility MVR STO-2 Advanced materials and survivability technology to enhance the performance and survivability of combat vehicles &surface craft	
Technology	Active: -Aluminum Casting Alloy (ACV SBIR II) -Low Cost, Low Weight, Self-Sealing Fuel Tank Technology Development (ACV STTR II) -Modular Lightweight Armor System (ACV SBIR II) -Modular Lightweight External Fuel Tank System (ACV SBIR I)	Potential: -Expeditionary Light Armor Seeding Development -Energy Storage Research & Development -Lightweight Armor Materials -Energy Storage Module to Reduce Fuel Consumption
Venues	TARDEC, D&I, E&D, SBIR, STTR	
TTA	N/A	T Transition target for: PM ACV
POM Funding	MCCDC integration division	
T	Transition to a program of record	Comments/Issues:

ACV Technical Issue #3 Crew Visibility



ACV Technical Issue #3 Crew Visibility

MCL	M.01 Maneuver to secure P.04 Detect threats to protect/secure forces	
MCTL	MCT 1.3.1 Conduct Maneuver MCT 1.3.2 Conduct Amphibious Operations MCT 1.3.5 Navigate	
MGL	M.01-03 AAV in support of STOM M.07-11 Mobility in all terrain & climates	
STO'S	MVR STO-7 Explosive hazard detection from the surf zone to inland objectives MVR STO-9 Augmented cognition for combat vehicle crews & operators of maneuver systems	
Technology	Active: N/A	Potential: -Ground Combat Vehicle Vision Protection Program -Innovative Cost-Effective Lightweight Transparent Armor for Vehicles (TARDEC SBIR I) -Transparent Armor -Low Cost Manufacturing of the Ballistic Resistant Transparent Spinel Windows (TARDEC SBIR I) -"Flawless "Glass Armor
Venues	TARDEC, SBIR, E&D	
TTA		
POM Funding	MCCDC integration division	
T	Transition to a program of record	Comments/Issues: