



**GROUND**

**SYSTEM**

**SURVIVABILITY**

**TARDEC**

## Report Documentation Page

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- Security
- Facilities
- Breaks & Lunch
- Breakout Room
  - West Room
    - OCS
    - CVAD
  - East Room
    - Fire
    - Vision



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# Agenda



0730-0830	Sign in	All
0830-0845	Intro & Admin	Steve Knott
0845-0930	GSS Overview & Program Formulation	Steve Knott
0930-1000	Requirements Planning	Debbie DiCesare
1000-1015	Break	All
1015-1130	Occupant Protection Roadmap	Mark Germundson
1130-1300	Lunch	All
1300-1415	Hit & Kill Avoidance Roadmap	Jeff Jaster
1415-1430	Break	All
1430- 1530	Ballistic Protection Roadmap	Jeff Koshko
1530- 1545	Wrap up	Steve Knott

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# Ground System Survivability FY12 Advance Planning Briefing to Industry



*TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.*

**Steve Knott**  
Associate Director,  
Ground System Survivability



14 JUN 11

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- GSS is engaged continuously by Industry on technology & capability....two situations occur:
  - *Technology and/or capability doesn't always match our investments or timelines are not synchronized.*
  - *When GSS doesn't act on the engagement its perceived by Industry that we suffer from "not invented here" syndrome.*
- We want to be transparent to Industry and get the best products for the Warfighter.
  - *We are threat driven*
  - *We are focused on SWaP-C*
  - *We make decisions based on data*

**Communication will help Industry & TARDEC achieve greater mission success**

# What You Should Walk Away With

- Who we are.
- What our mission is.
- How we plan.
- What we are investing in.
- When we plan to work these efforts.
- Ideas on how you can help us help the Warfighter.



*This is the first of an annual event.....It may not be perfect, so we want the feed back to help us help you.*

**[susan.l.rose-vincent.ctr@mail.mil](mailto:susan.l.rose-vincent.ctr@mail.mil)**

# TARDEC Mission



- 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 **3,300** Army systems and many of the Army's and DOD's Top Joint Warfighter Development Programs

# Ground Systems Enterprise



unclassified



Department of the Army (DA)

Army Materiel Command (AMC)

(ASA(ALT))



Research, Development and Engineering Command (RDECOM)



Armament Research, Development and Engineering Center (ARDEC)



Army Research Laboratory (ARL)



Edgewood Chemical and Biological Center (ECBC)

Aviation and Missile Research, Development and Engineering Center (AMRDEC)



Natick Soldier Research, Development and Engineering Center (NSRDEC)

Simulation and Training Technology Center (STTC)

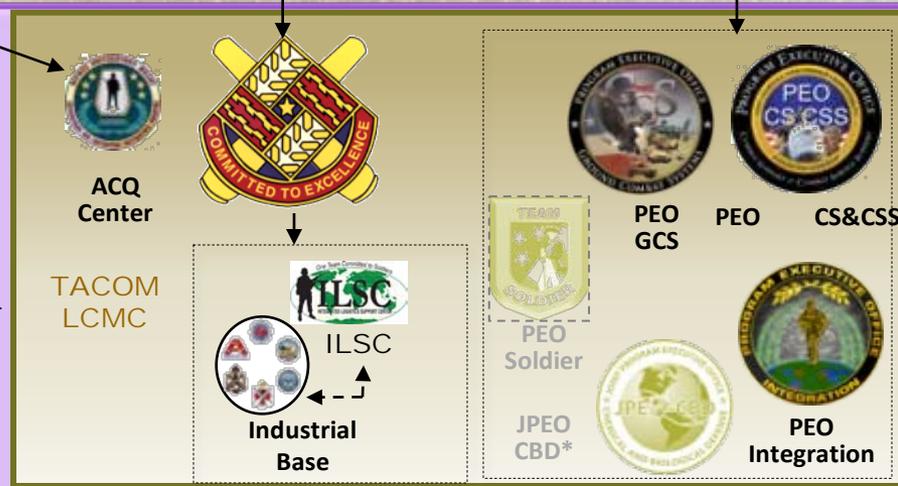


Communications-Electronic Research, Development and Engineering Center (CERDEC)



Department of the NAVY  
 Research, Development & Acquisition

unclassified



Joint Center for Ground Vehicles



Office of Naval Research



MARCORSYSCOM



PEO Land Systems

# TARDEC Chain of Command



**TARDEC Director**



**Executive Director of Research & Technology Integration**  
Ms. Jennifer Hitchcock



**Executive Director of Product Development**  
Mr. Thom Mathes



**Executive Director of Engineering**  
Mr. Magid Athnasios



**Chief Scientist**  
Dr. David Gorsich



**Military Deputy**  
COL Paul Lepine



**Senior Research Scientist - Robotics**  
Dr. Jim Overholt



**Center for Ground Vehicle Development & Integration**

**Force Projection Technology**

**National Automotive Center (NAC)**

**Systems Engineering**

**Life-Cycle Data Management**

**Foreign Vehicle Specs & Materials Eng**

**RAM, Test & Quality Assurance**

**Standardization & Transportability**

**Software Engineering Center**

**Industrial Base Engineering Support**

**Eng - Systems in Acquisition**



**Chief of Staff**  
Ms. Marta Tomkiw

**Director's Staff**

**Executive Officer**  
Keith Appling

**Organizational Development Director**  
Ron Meadows

**Executive Secretary**  
Anne Roth

**Teresa Gonda**  
Joint Center for Ground Vehicles Development Lead

# 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

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## Vision

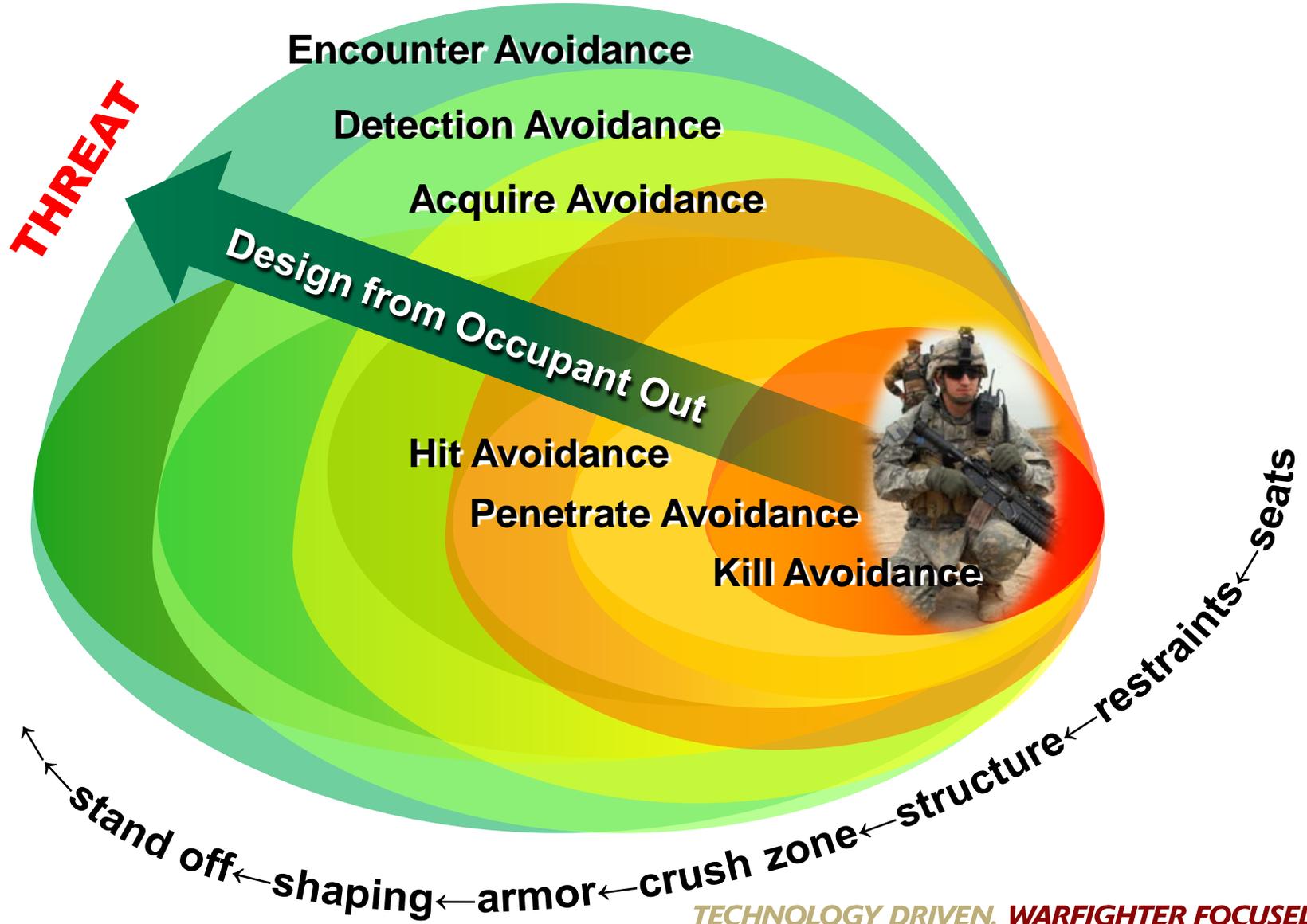
Demonstrate and be recognized as the Army ground vehicle survivability integration leaders.

## Mission

Design for *Occupant Centric Survivability* via maturation & integration of technology

# Occupant Centric Survivability

*Designing from the Inside Out*



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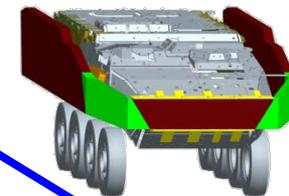
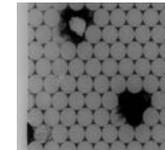
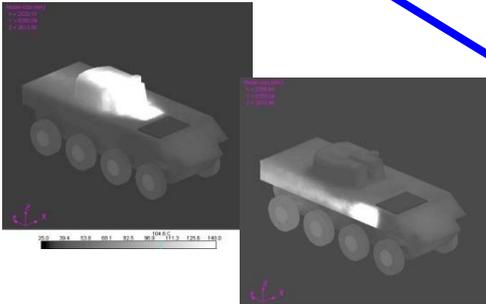
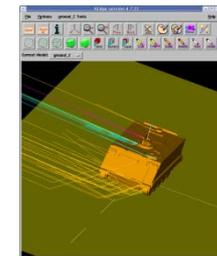
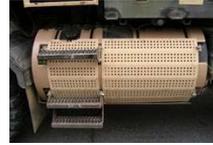
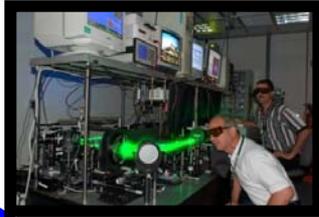
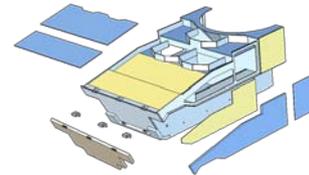
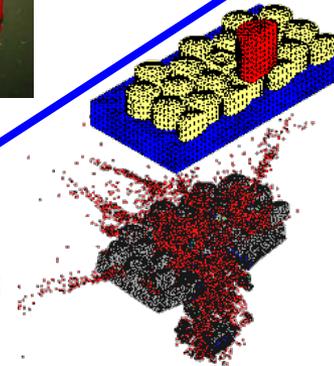
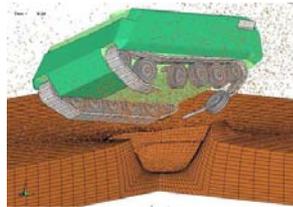
# GSS Core Competencies

System Optimization

Kill Avoidance

Penetration Avoidance

Detection Avoidance



Hit Avoidance

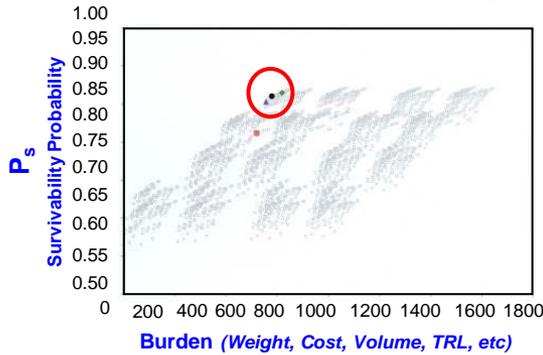
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Requirements

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



Optimization Modeling



Vehicle Integration & Design Studies (SWAP-C)



M&S

- Armor
- Weight
- Mobility (Veh Dynamics)
- Powertrain
- Thermal (HVAC)
- Safety (Crashworthiness)
- Cost
- Op. Effectiveness
- Mine Blast
- Sig Man
- Vulnerability
- Criticality

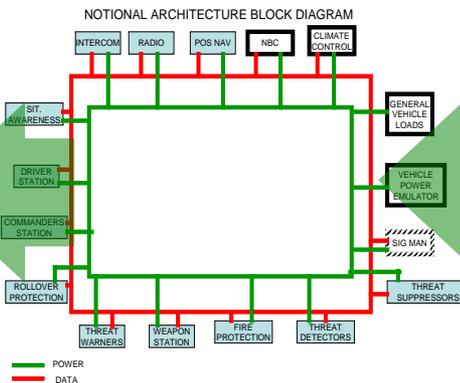
1st Order OE



The "so what" test



Prototype Integration



System Integration Lab (SIL) & Maturation

# Our Lane

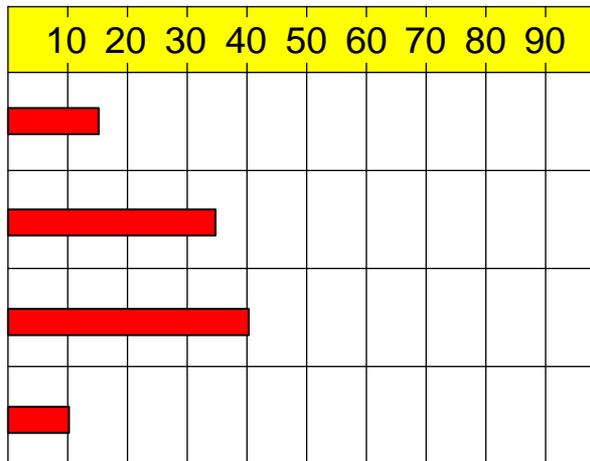


Requirements

Partners



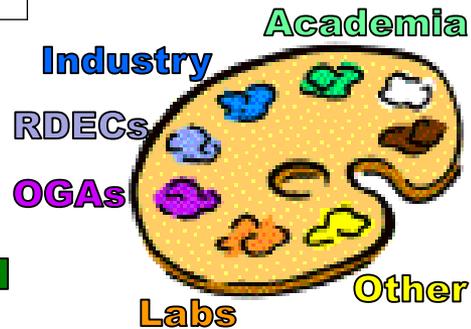
% of GSS Work



TRL 6 Transition



- TRL 4 – Tech Research
- TRL 5 – Tech Development
- TRL 6 – Tech Demo
- TRL 7 – Operational Demo



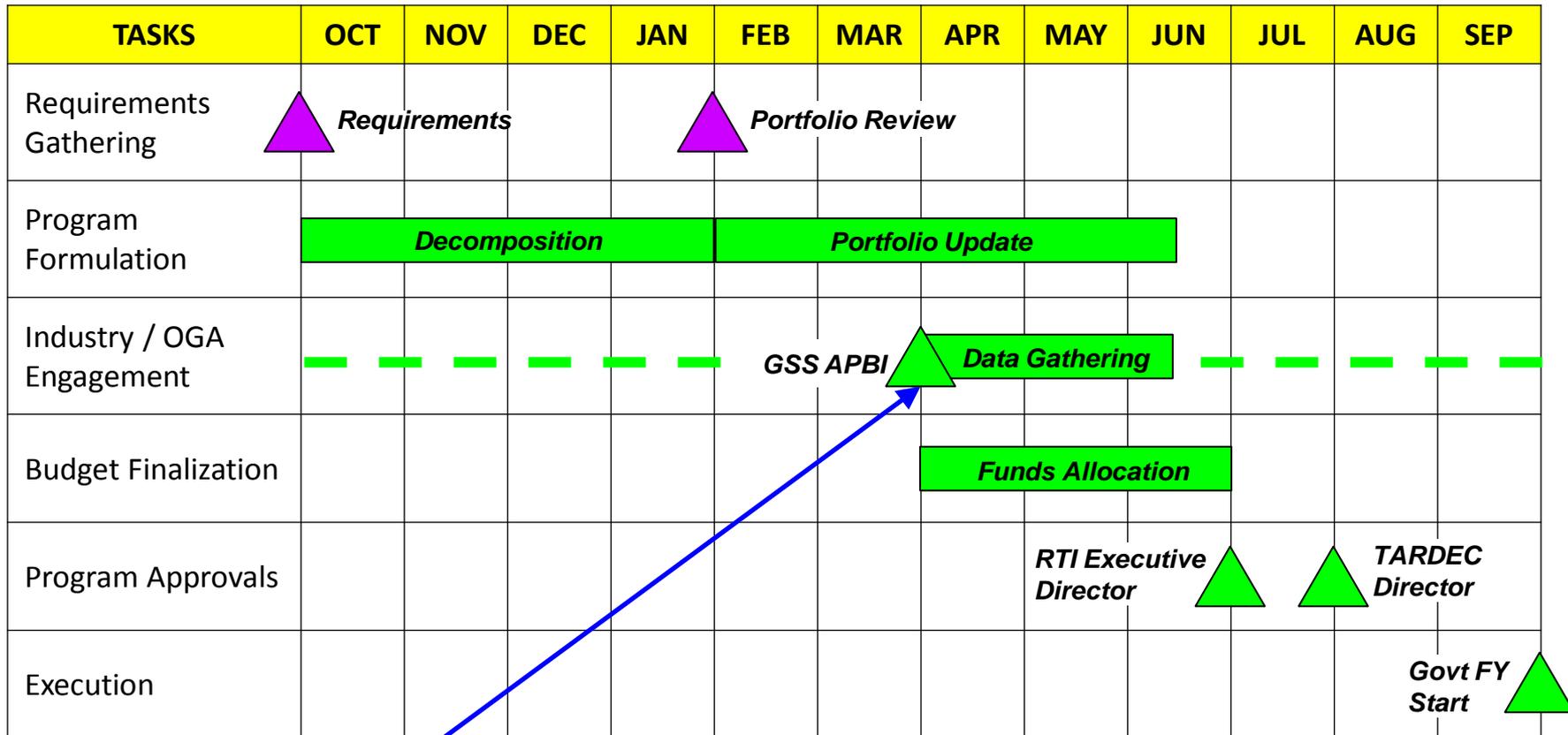
TRL 4 Technologies

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# TRL Definitions

DA Technology Readiness Level	Description	GSS's Basic Definition
<p><b>4.</b> Component and/or breadboard validation in laboratory environment.</p>	<p>Basic technological <b>components</b> are integrated to establish that they will <b>work together</b>. This is relatively "low fidelity" compared to the eventual system. Examples include integration of "ad hoc" <b>hardware in the laboratory</b>.</p>	<p><b><u>Demonstrate it Works!</u></b></p> <p>Armor Example – coupon 22 out of 22 shots with no perforations.</p>
<p><b>5.</b> Component and/or breadboard validation in relevant environment.</p>	<p>Fidelity of breadboard technology increases significantly. The basic technological <b>components are integrated with reasonably realistic supporting elements</b> so it can be <b>tested in a simulated environment</b>. Examples include "high fidelity" laboratory integration of components.</p>	<p><b><u>Demonstrate it's environmentally sound under MIL-STD-810 !</u></b></p> <p>Armor Example – coupon 22 out of 22 shots with no perforations in hot, cold, UV, weathering, shock &amp; vibration, drop, etc.</p>
<p><b>6.</b> System/subsystem model or prototype demonstration in a relevant environment.</p>	<p>Representative model or <b>prototype system</b>, which is well beyond that of TRL 5, is <b>tested in a relevant environment</b>. Represents a major step up in a technology's demonstrated readiness. Examples include testing a prototype in a high-fidelity laboratory environment or in simulated operational environment.</p>	<p><b><u>Integrate on the vehicle system and run it at the Army proving grounds!</u></b></p> <p>Run approx 3K miles and verify performance.</p>
<p><b>7.</b> System prototype demonstration in an operational environment.</p>	<p>Prototype near, or at, planned operational system. Represents a major step up from TRL 6, requiring <b>demonstration of an actual system prototype in an operational environment</b> such as an aircraft, vehicle, or space. Examples include testing the prototype in a test bed aircraft.</p>	<p><b><u>Soldier T&amp;E !</u></b></p> <p>Limited User Test (LUT) or like</p>

# GSS Budgeting Process



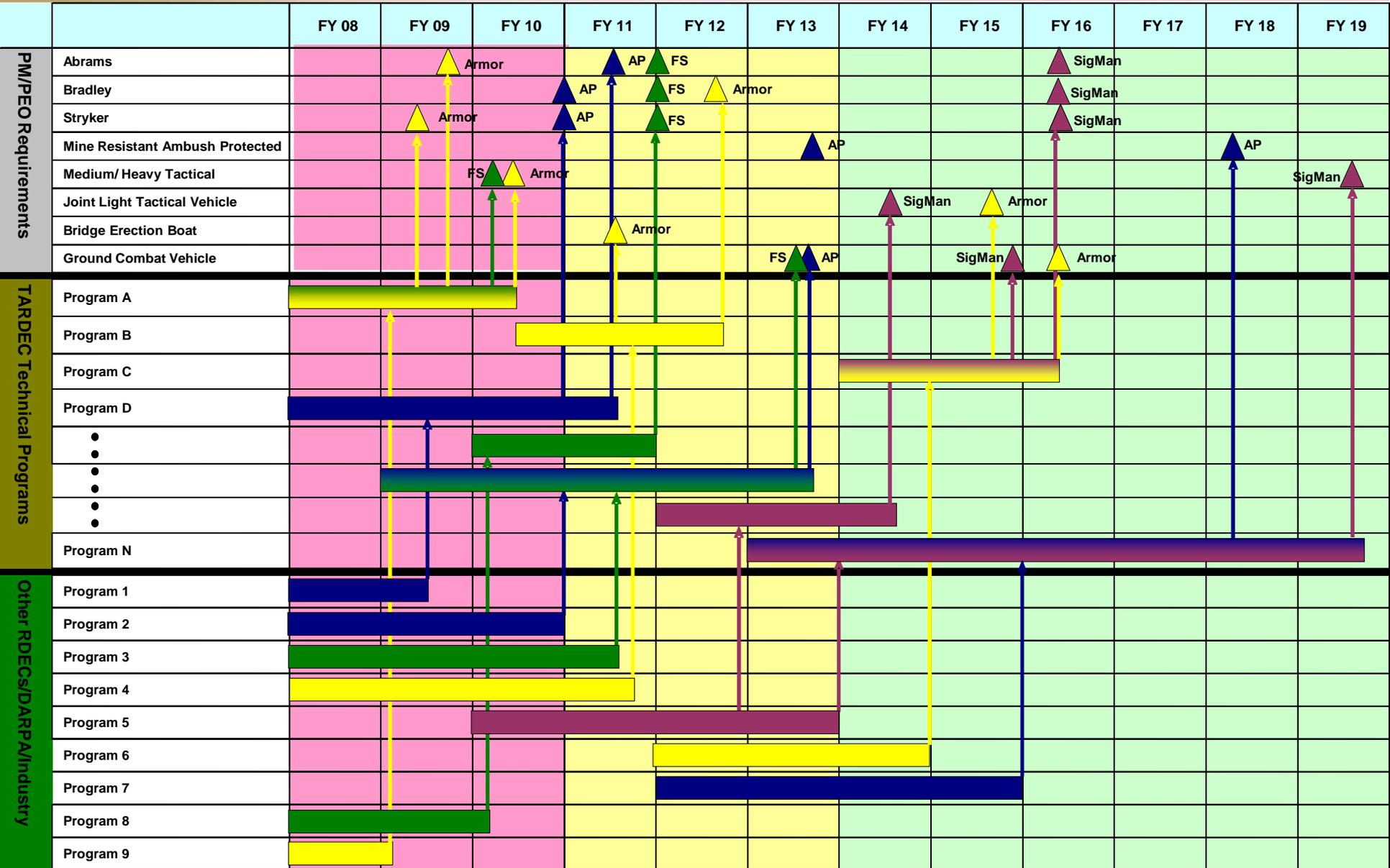
## Critical Step

- *We don't know it all*
- *Need the best solution for the requirement*
- *Need to be efficient by leveraging partners*
- *Must let everyone know where we are going*
- *Drive competition – better price*

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# Notional Process Output



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U.S. Army Research, Development and Engineering Command

## Ground Domain Planning & Integration (GDP&I)

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Deborah DiCesare

Associate Director, Ground Domain Planning and  
Integration

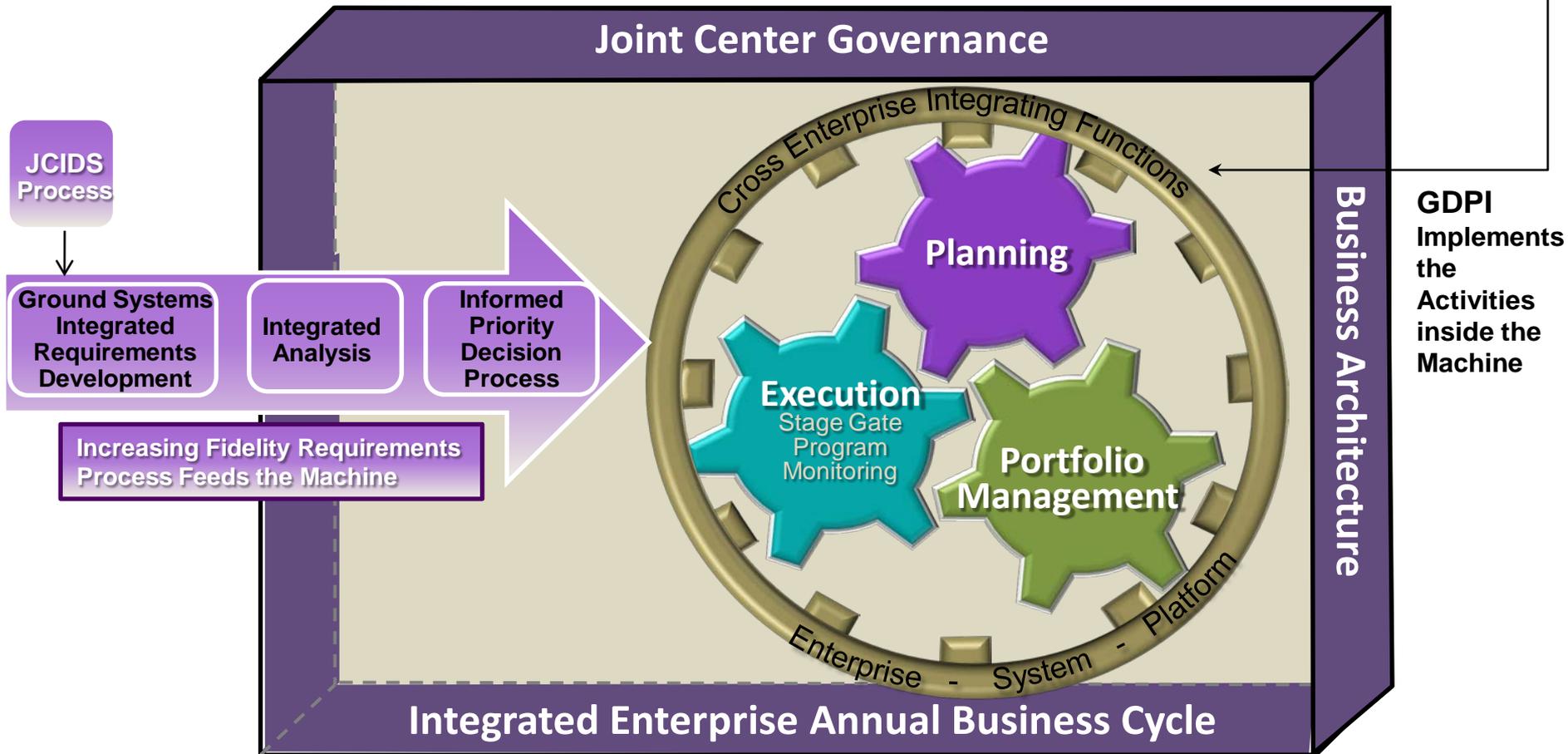
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# Developing an Integrated Enterprise Requires Integrated Planning Mechanisms

**Joint Center for Ground Vehicles:** Creates a formalized mechanism with repeatable processes that provides the data needed for the partners to collaboratively plan across ground systems and develop robust shared systems integration capabilities, infrastructure, and projects that benefit all.

**Ground Domain Planning and Integration:** The implementer of integrated planning. The information integration hub for collaboration excellence across DoD Ground Vehicles.



# Ground Domain Planning Process



**Project Execution Management**

- TARDEC Gated Evaluation Track (TARGET)
- Project Management Best Practice Standardization
- Project Governance
- Project Health Dashboard

**Manage and Execute Project Plan**

**Integrated Needs Analysis**

- Gather, Analyze, Integrate Needs
- Identify and Prioritize Ground Domain Gaps aligned to Strategic Vectors and time-phased needs.

**Identify and Prioritize Gaps**

**Balance Portfolio to align with Ground Domain Priorities**

**Integrated Portfolio Management**

- Assess Balance and Alignment to Strategy
- Refine Recommended Strategy

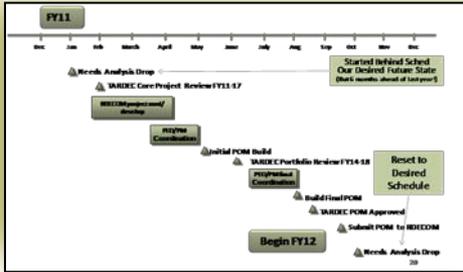
**Integrated Strategic Project Planning**

- Coordinate Tech Gaps
- Align Acquisition/ST&T Plans and Schedules
- Develop Ground Strategic Technology Plans & Roadmaps
- Annual POM Planning
- Annual Guidance

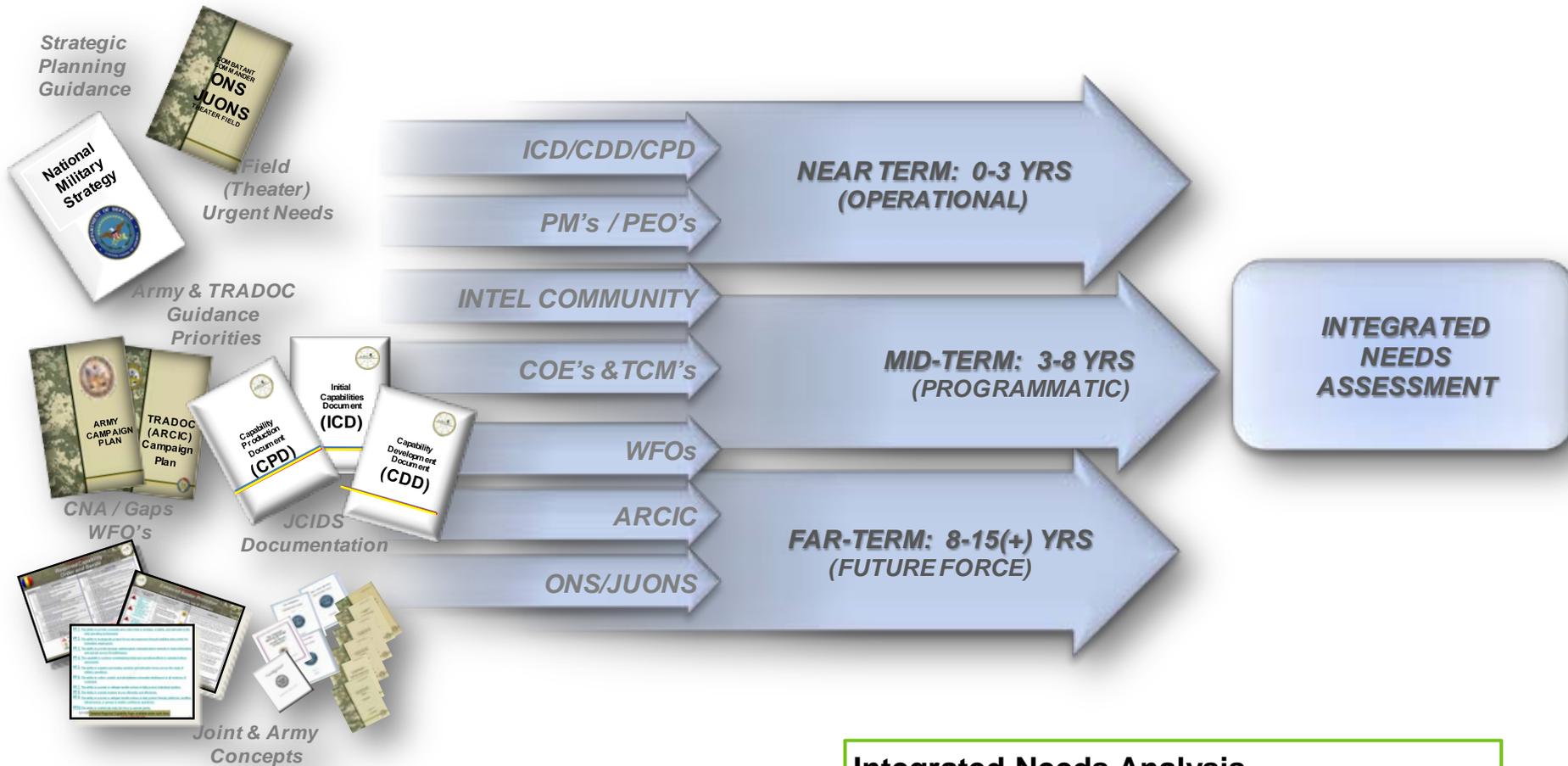
**Align Investments to Meet Ground Domain Priorities**

**Integrated Portfolio Assessment**

- Analyze portfolio balance and alignment for leadership and tech developers.
- Monitor portfolio health and assess impacts from changes.



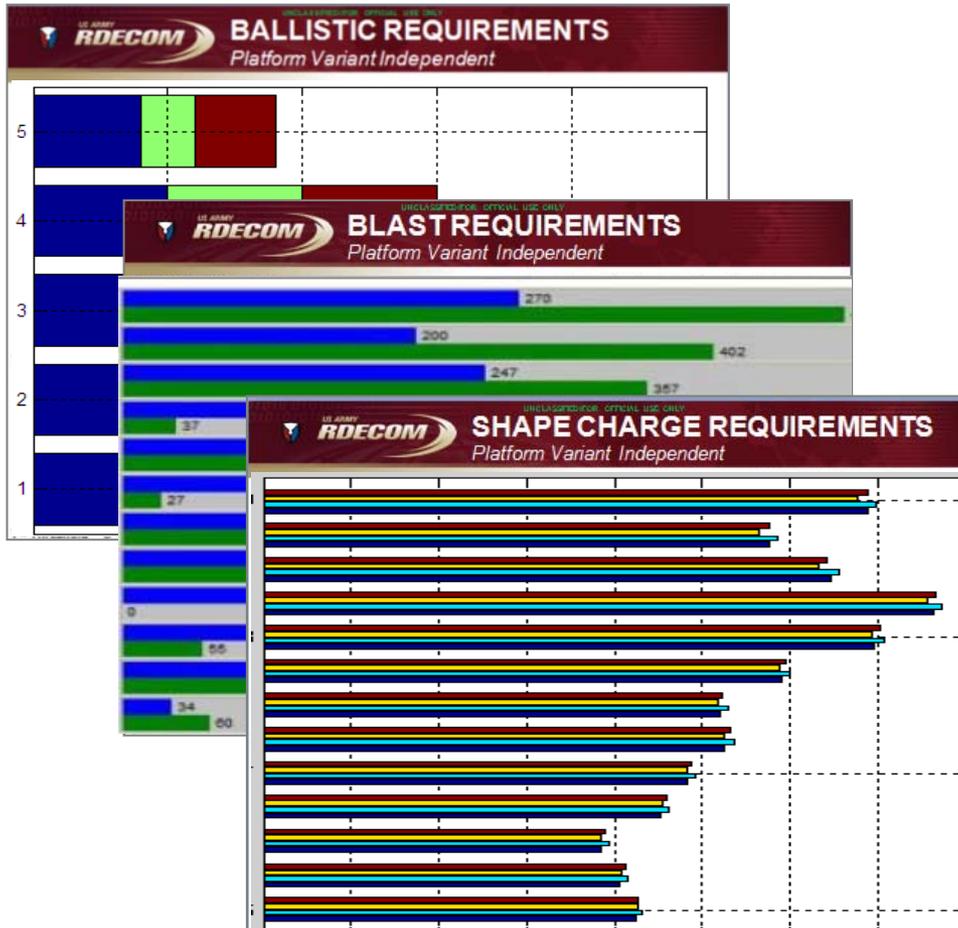
**Annual Integrated Planning Cycle**



**Integrated Needs Analysis**

- Gather, Analyze, Integrate Needs
- Identify and Prioritize Ground Domain Gaps aligned to Strategic Vectors and time-phased needs.

# Needs Analysis



- Monitor developing ground vehicle requirements (CDDs) as they mature.
- Provide material solution cost impacts of required capability to inform developing CDDs.
- Analyze developing threats and evaluate their impact on system survivability design.
- Look across platforms for opportunities to leverage common solutions.

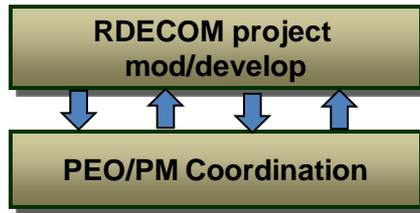
**TARDEC is actively engaged with Requirements Developers as they define future ground vehicle survivability & force protection capability.**

# Annual Planning Cycle



▲ Needs analysis drop

▲ TARDEC Core Project Review Current FY +2



▲ TARDEC Portfolio Review Current FY+3-5

▲ Needs analysis drop

*The output of this process is what's next*



# GSS FY12-18 Roadmap



Project Name		FY12	FY13	FY14	FY15	FY16	FY17	FY18	
Occupant Survivability	Occupant Centric Survivability Program (OCS)	Active							
	Blast Technology Development	Active							
	WIAMan	Active							
Armor	Advanced Combat Vehicle Armor Development (ACVAD)	Active							
	Armor Development	Active							
	Transparent Armor	Active						Active	
Hit Avoidance	RPG Active Protection (RAP)	Active							
	ERAP		Active						
	KE APS	Active							
	VALOR			Active					
Kill Avoidance	Common AFES Demonstrator	Active							
	Advanced Fire Protection				Active				
	Ground Combat Vehicle Vision Protection	Active							
	Advanced Directed Energy Protection - Camera & Eyes		Active						
	Short Pulse Energy Research					Active			
	Threat Oriented Survivability Optimization (TOSOM)	Active							

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- IRAD
- Cooperative Research and Development Agreement (CRADA):
- The Small Business Innovation Research (SBIR)
- Competitive Contract
- Sole Source Contract