Survivable Vehicles for the Warfighters



# Systems Engineering and Logistics: Gunners Restraint

**Systems Engineering Conference**
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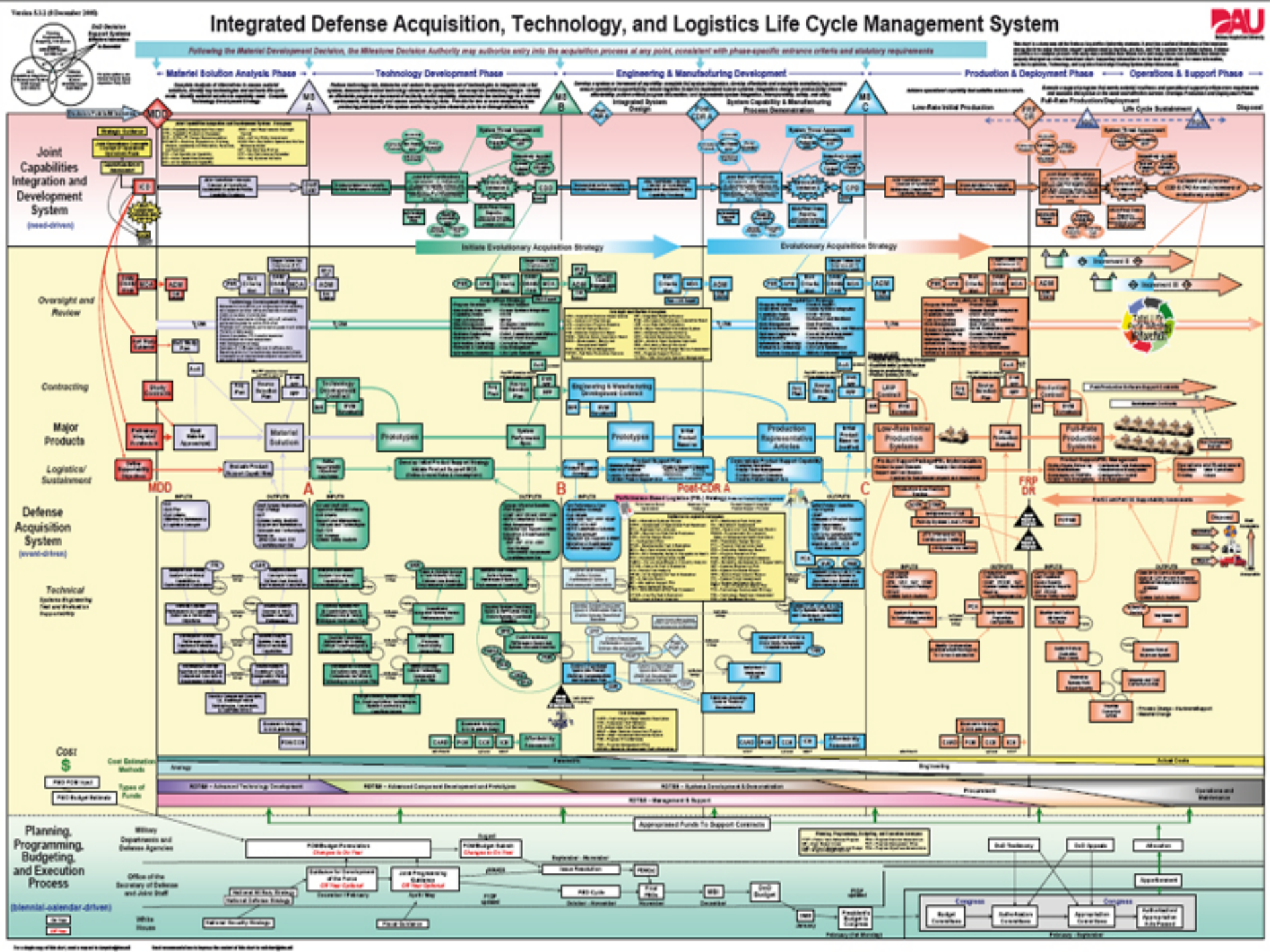
# Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System



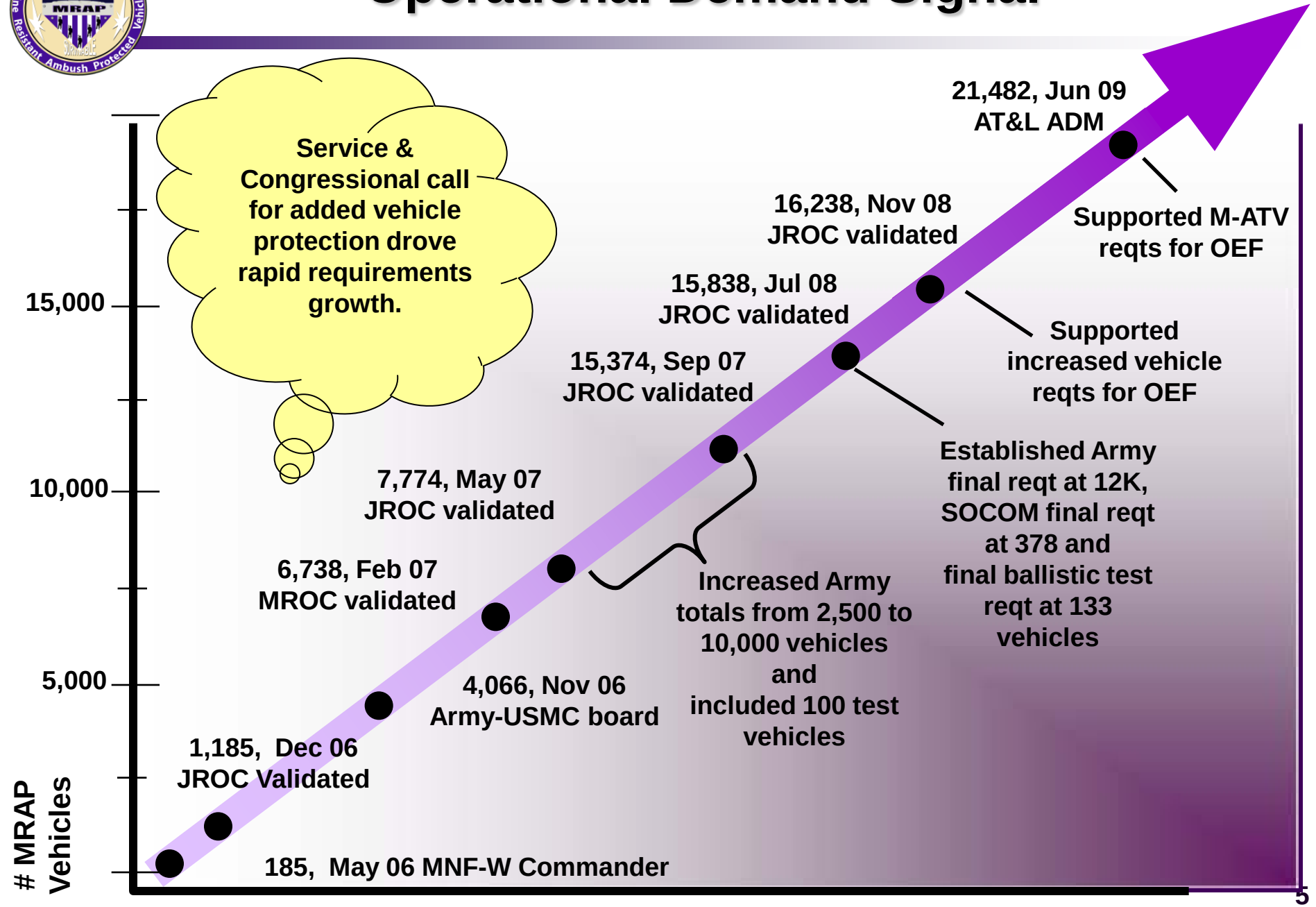
# Agenda

- MRAP Overview
- Systems Engineering and Logistics
- Implementation of Systems Engineering to save lives: Gunners Restraint System (GRS)

# Tactical Response

- **Change in enemy tactics generated an urgent Warfighter need for:**
  - Mine Resistant Ambush Protected Vehicle
  - Large quantities
- **MRAP Program is the response to this urgent need**
  - Unprecedented effort
  - Unprecedented speed
  - Unprecedented Gov / Industry Teamwork

# Operational Demand Signal



# MRAP Vehicle Variants

- To meet the requirement as quickly as possible 5 IDIQ contracts were awarded.

- Requirements were written to the capability industry had at this time

GDLS RG-31 CAT I/EM

BAE SOCOM (RG-33) CAT I /Plus

Navistar MaxxPro CAT I /Plus/Dash

FPI Cougar CAT I/Plus

BAE-TVS Caiman CAT I/ Plus

BAE RG-33L CAT II/Plus

BAE HAGA CAT II/Plus

FPI Cougar CAT II/Plus

# Systems Engineering and Logistics

- As we support the operations in OIF/OEF it is critical that we continue to integrate logistics into our SE process closely

- Specific processes are in place bringing logistics in at the front end of engineering decisions

  - Requirements Decomposition
  - Design
  - Feedback from the Warfighter

**Systems Engineering and Logistics Cannot Be Separated**

# MRAP Integrated SE and Logistics

- Only PdM with a Chief Systems Engineer for Logistics

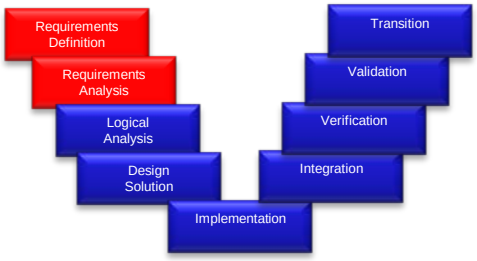
- PdM Logistics has implemented a planning cell that uses SE processes to accomplish each levied requirement
  - Integrated Master Schedule/Critical Path analysis
  - Risk analysis and Mitigation Strategies
  - Roles and Responsibilities
  - End to end Life Cycle Analysis (example: follow-on roll over trainers)

- Logistics is a heavily weighted factor in the requirements management process to include commonality, install level and theater of operation

# GRS SE/LOG that Saves Lives

## ❖ Requirement/Requirements Analysis:

- MRAP vehicles are more prone to rollover due to their weight and higher center of gravity
  - Gunners were being thrown from the vehicle due to rollover
- Sept. 20, 2008 during a visit to Bagram Air Field in Afghanistan Secretary of the Army Pete Geren was informed that the MRAP didn't have a gunners restraint like other tactical vehicles.
  - All MRAPs received a GRS
  - All GRSs were fielded by February 1 2009

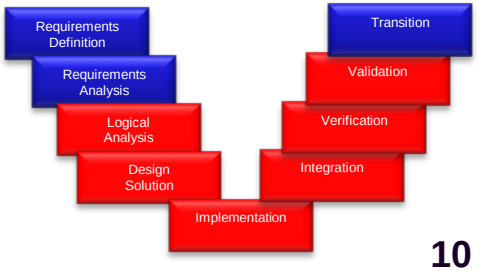


# Design/Integration/Verification/Validation

- 24 September 2008 RDECOM was tasked to design a GRS for MRAP in 72 hours.
  - Integration of the existing gunners restraint of the BAE M1114
  - Systematic approach to designing the minimum amount of A-Kits for 9 different variants.
  - No CAD of any of the MRAP vehicles.

- Design Completed and User Jury conducted at TARDEC before sending to test at ATC

- ILSC tech writer sitting side by side with designers to produce install instructions and parts and special tools list.

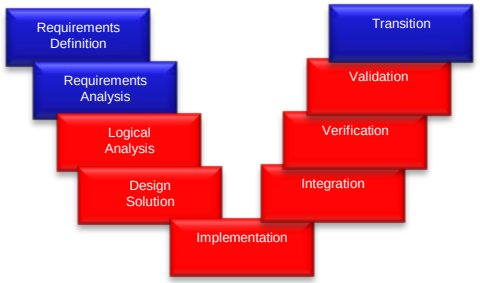


# Design/Integration/Verification/Validation, cont.

- Upon arrival at ATC, redesign was required due to a human factors issue

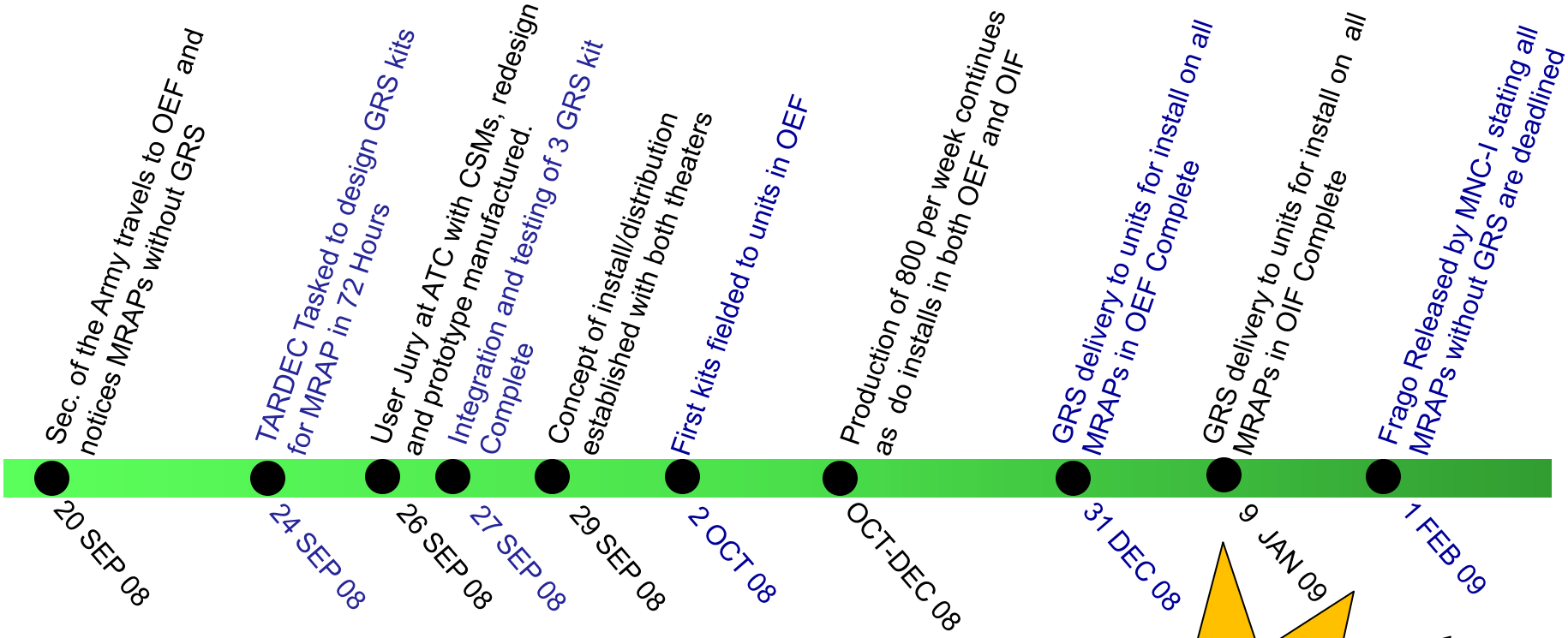
- All parties pulled together to analyze the issue, redesign/update the drawings and prototype the part for test over night.

- Testing completed on 3 variants by Sept 27 allowing production to begin at Rock Island Arsenal and Blue Grass Army depot. The remaining variants following closely behind.




**Design/Integration/Verification Completed in less than 72 hours**

# GRS Timeline




Over 9,500 GRS Systems Delivered in 110 Days

# Summary

- MRAP's use of systems engineering principles in logistics lead to fielding MRAP as quickly as possible.
- Integrating Logistics into the SE process early is critical to support the Warfighter

# MRAP "the Ultimate Team Sport"

# Questions?