TARDEC Technical Director (Acting)
Dr. Marilyn Freeman
presentation on
Force Protection
to the
Science & Engineering Technology Conference
Perspectives:
- Science & Technology
- Survivability

Survivability:
- Recent Past
- Present
- Future
Responding to Army Needs

“...become a more strategically responsive, deployable, agile, versatile, lethal, survivable, and sustainable force, effective in all situations ...”

“...provide relevant and ready land power capability to the Combatant Commander as part of the Joint Team”

“...provide dominant land power to the Joint Force now and into the future.”

“...change in time of war must deal simultaneously with both current and future needs”
Army S&T Vision: Pursuing Transformational Capabilities for a Joint and Expeditionary Army

Current Force
- ~100 lb. load
- 70+ tons
- < 10 mph

Enabling the Future Force
Science and Technology—develop and mature technology to enable transformational capabilities for the Future Modular Force while seeking opportunities to accelerate technology directly into the Current Modular Force

Enhancing the Current Force
- < 40 lb. load
- < 30 tons
- > 40 mph
What is Survivability?

Survivability = \int f(Armor)dx/dt + f(APS)dx/dt + f(Electronic Warfare)dx/dt + \cdots

\cdots + f(Signature Mgt)dx/dt + f(Countermine)dx/dt + \cdots

\cdots + f(Damage Mitigation)dx/dt + f(Lethality)dx/dt + \cdots

\cdots + f(Unmanned Platforms)dx/dt + f(TTPs)dx + \cdots

\cdots + f(Platform Design)dx + f(Mobility)dx/dt + \cdots
• The Warfighter continues to face a significant threat from multiple threats including ballistic and blast

• Personnel armor plays an important role in the survival of our Warfighters

• Soldier Protection Technologies are responding to capability requirements and address the need for:
  
  – Lightweight protective materials technology that improve the survivability of the individual warfighter against a full spectrum of ballistic and blast threats
  
  – Tools that provide "leap-ahead" capability to assess individual survivability and munitions lethality
Key Focus Areas for Research and Development

- Behind Armor Effects Methodology
- Advanced Technology Development
- Casualty Reduction Analysis Model

- New high performance polymers/fibers/composites
- Nanotechnology
- Advanced ceramics & metals
- Enhanced predictive modeling
- Material systems integration

Conduct experimental (tissue & test fixture), analytical and numerical assessments of non-penetrating impact on body armor/body

Develop/update models for armor system performance from threat definition to incapacitation effect
Survivability Technologies: Recent Past & Present

Army Science Board, 2001: Active Protection Systems (APS) will not be able to achieve their objectives

**Significant Strides:**

IAAPS: Defeat On-the-move

CIAPS: Dual defeat On-the-move

FCLAS: Threat defeat demonstrated

EM Armor: Multiple defeats on single panel

Ballistic Armor: 225 psf down to 64 psf

“Come a long way in a short time”
Influences that Drive Our Path Forward

- As a result of today’s world situation: There is not only technology push, now there is current demand - particularly for survivability

- Current Threats apply not only for Light, Medium & Heavy Combat Vehicles but for Light, Medium & Heavy Tactical Vehicles and unmanned systems

- Emerging Requirements

- Application of Survivability Technologies
  - Address IED protection
  - Address Safe & Arm issues
  - Address Fratricide issues
  - Integration onto Platforms
  - Right mix on Platform
  - Tactics, Techniques & Procedures

Must Enable Continuous Improvement...
i.e. modularity, mission tailorability, commonality...
How Not to Make a Lightweight Vehicle Survivable

... Adding every survivability technology available without trade-off analysis and integration considerations
CAUTION: All along the yellow brick road we should expect signs like: STEEP GRADE; SCHOOL ZONE; LIMITED SPEED ZONE; ROAD NARROWS; STOP; WINDING ROAD; GO; DETOUR; TRAFFIC LIGHTS AHEAD; NO EXIT; NO PASSING; WRONG WAY.

There is a huge challenge before us... our work has only begun... we must find the right path to deliver and implement suites enhancing current and future platform survivability.