TACOM

Mobility and Firepower for America's Army

TACOM's Role in Meeting the Light Force Challenge
1998
Combat Vehicles Conference

MG Roy E. Beauchamp
Commander, US Army TACOM

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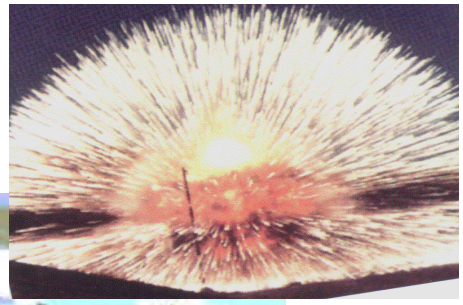
Agenda

- TACOM Overview
- Quick Look Back
- Changing Environment
- Support to Future Armored Systems
- TACOM Technology
- Summary

TACOM is ...

Mobility

Firepower



Survivability

Lethality

What Is TACOM?
…A Public Corporation…

* Buys material used by Army, other DoD and FMS… 92,270 contractual actions in 97
  - Stocks material … $4.276B*
  - Supports Weapon System Readiness for 3,341 Systems (NSNs)
* Receives & Fills Customer Orders …$1198.3M
  Army $850.9M NGB $117.1M Marines $57.7M
  Foreign Customers/SSA $142.6M Other $30.0M
* Manages Stock Numbers in the DoD System
  - 34,138 NSNs… consumable/reparable items
* Performs Technical Support to (TDPs):
  (In support of FY98 procurement actions)
  - IMMC/ACALA 6000
    DLA Centers 1210
  - Maintain Tech Data…7.5M drawings
  - Coordinates with services on engineering issues
  - Insures technical conformance / quality assurance
* Research and Development
  - 80 Tech Base Programs
  - 93 Engineering Development Programs
* 15 Project/Product Managers - Over 300 systems
  - Combat Vehicles - Commercial items
  - Tactical Systems

KNOWS THE MARKET

KNOWS THE INDUSTRY

KNOWS THE CUSTOMER

KNOWS THE PRODUCT

ATDs 5
STOs 29
ICTs 21
CRADAs 79

12.4 M Sq. Ft. Facilities ($2.4B)

33% of TOTAL AMC SALES

964,000 NSNs SUPPORTED BY ENGR

ADVANCE USE OF DUAL USE TECHNOLOGIES

MANAGES 33% OF THE ARMY INVENTORY

MARKETPLACE LEVERAGE

QUALITY

PRODUCT CONFORMANCE

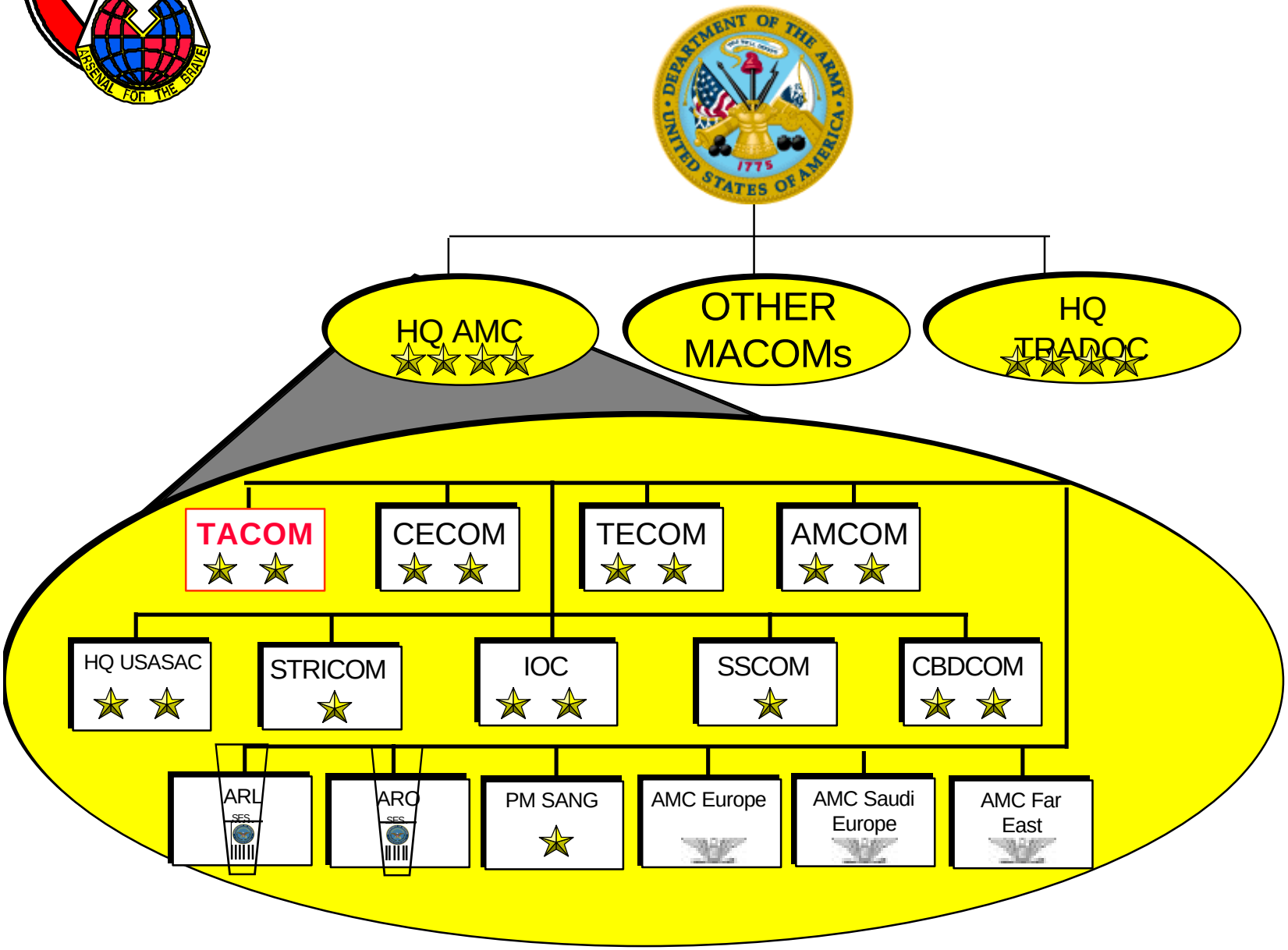
PRODUCT INTEGRITY

LEGAL ASSISTANCE

GO TO WAR PARTNERSHIP

As of Feb 98
*As of Sep 97

Department Of The Army



Committed to Excellence

History Of TACOM

…We Were There…

In the beginning…

…when we were needed…

…in the future…

ARDEC

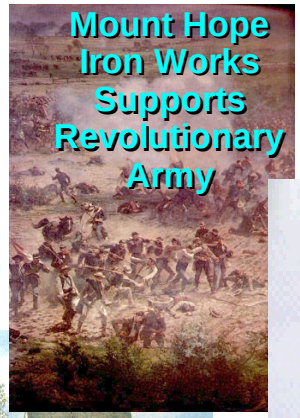
WARREN

ACALA

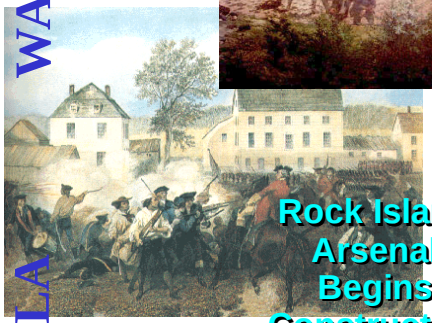
1749 — Middle Forge Established

1775 — "Picatinny Powder Depot" Established

1880-03 — Mount Hope Iron Works Supports Revolutionary Army



1862 — Rock Island Arsenal Begins Construction



1919-1973 — The US Gov't Builds A Tank Arsenal In Warren, Michigan; Arsenal Develops And Repairs Tanks

1926 — Electrical Storm Explosions Nearly Destroying Arsenal

1940 — Ordnance Tank Automotive Center Activated In Detroit

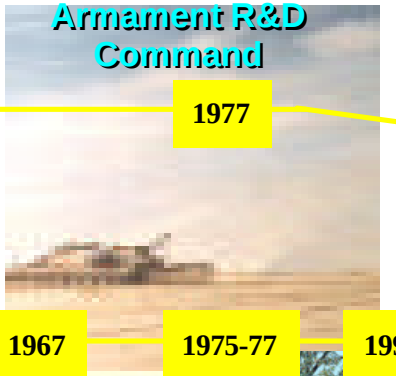
1950 — TACOM Organized

1962 — Becomes Weapons Command (WECOM)

1967 — TROSCOM Transfer

1973 — Becomes Armament Command (ARCOM)

1977 — Picatinny Becomes HQ For The Armament R&D Command



1975-77 — Belvoir Research & Development Center Transfer

1991 — Armaments Research & Development Center (ARDEC) and Armament Chemical & Logistics Activity (ACALA) Transfers

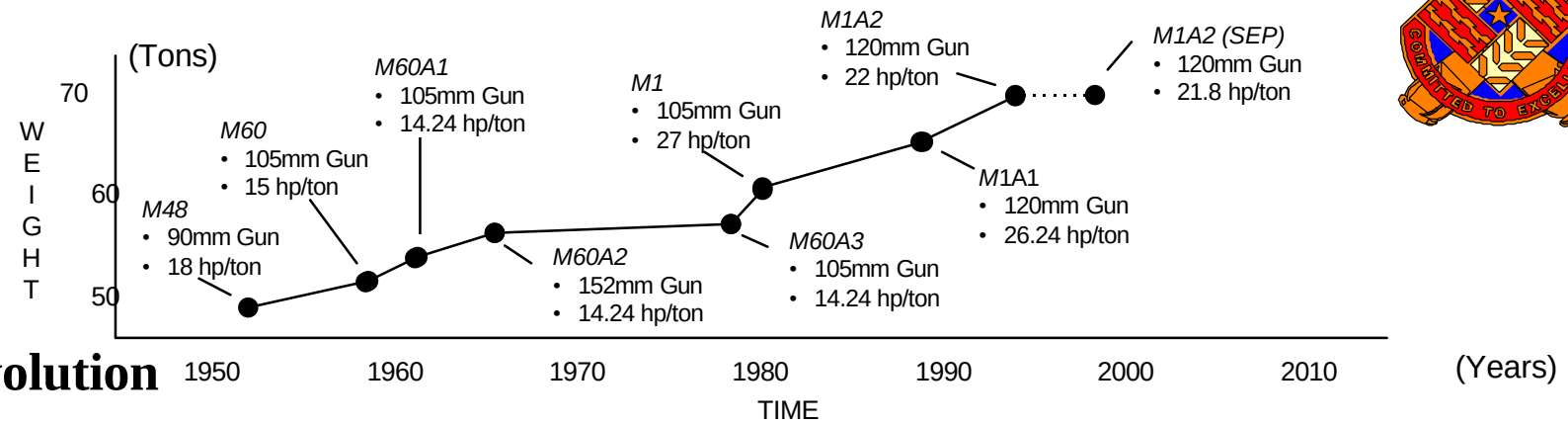
1994

1997 — Aviation & Troop Command Transfer.

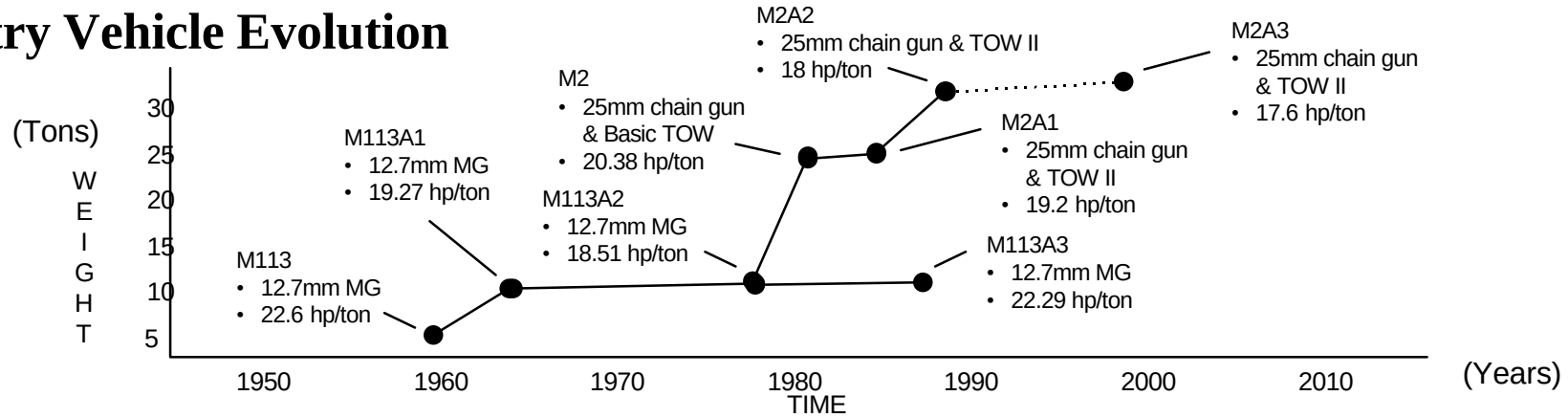
Committed to Excellence

Vehicle Evolution

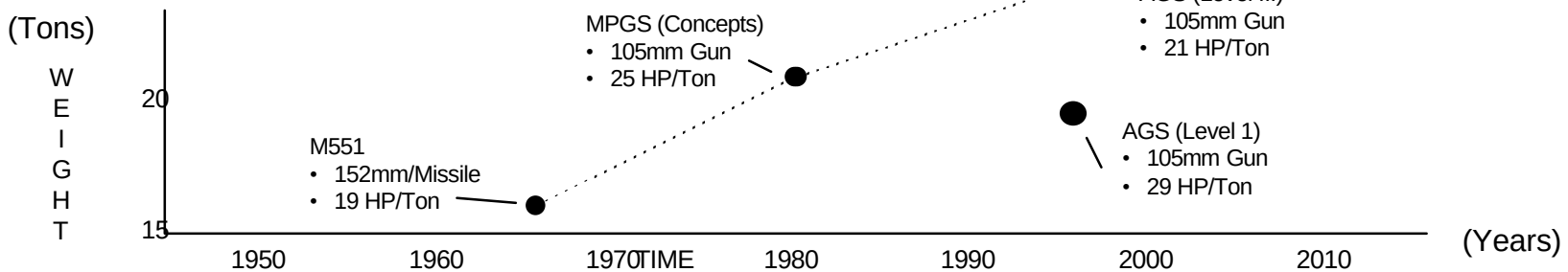
Tank Evolution



Infantry Vehicle Evolution



Light Armor Evolution



The Strategic Environment Has Changed

Yesterday

Threat Based

Forward Deployed w/Fixed Pre-Po

Deter, Defend, Contain

Monolithic Soviet Threat

Indications & Warning

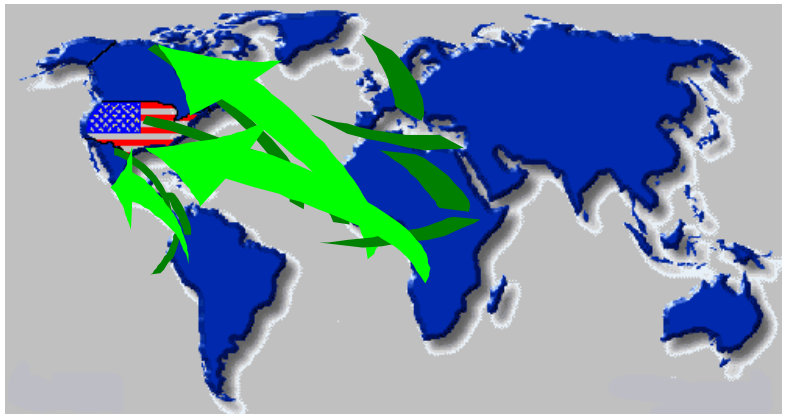
Global Nuclear War Focus

Threat Defined

Today & Tomorrow

Capabilities Based

- Conus Based Power Projection w/ Pre-Po Afloat
- Prepare, Shape, Respond
- Asymmetric Full Spectrum Threats
- "Come as You Are" Contingencies
- Focus on Regional Threats, Major Regional Competitors



Threat Undefined

Changing To Meet The Nation's Needs
Today & Tomorrow

Fielding Force XXI while focusing on the Army After Next

CAPABILITY

Army XXI
Maintain Overmatch
Establish Info Dominance

- Training
- Doctrine
- Force Design
- Information Age Technology

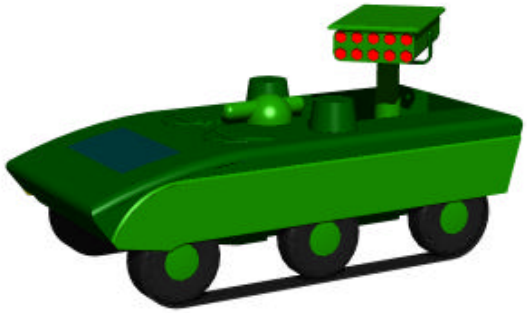
Regional Competitors

1997 2010

Army After Next
Knowledge & Speed
Full-Spectrum Dominance

Revolutionary Change...

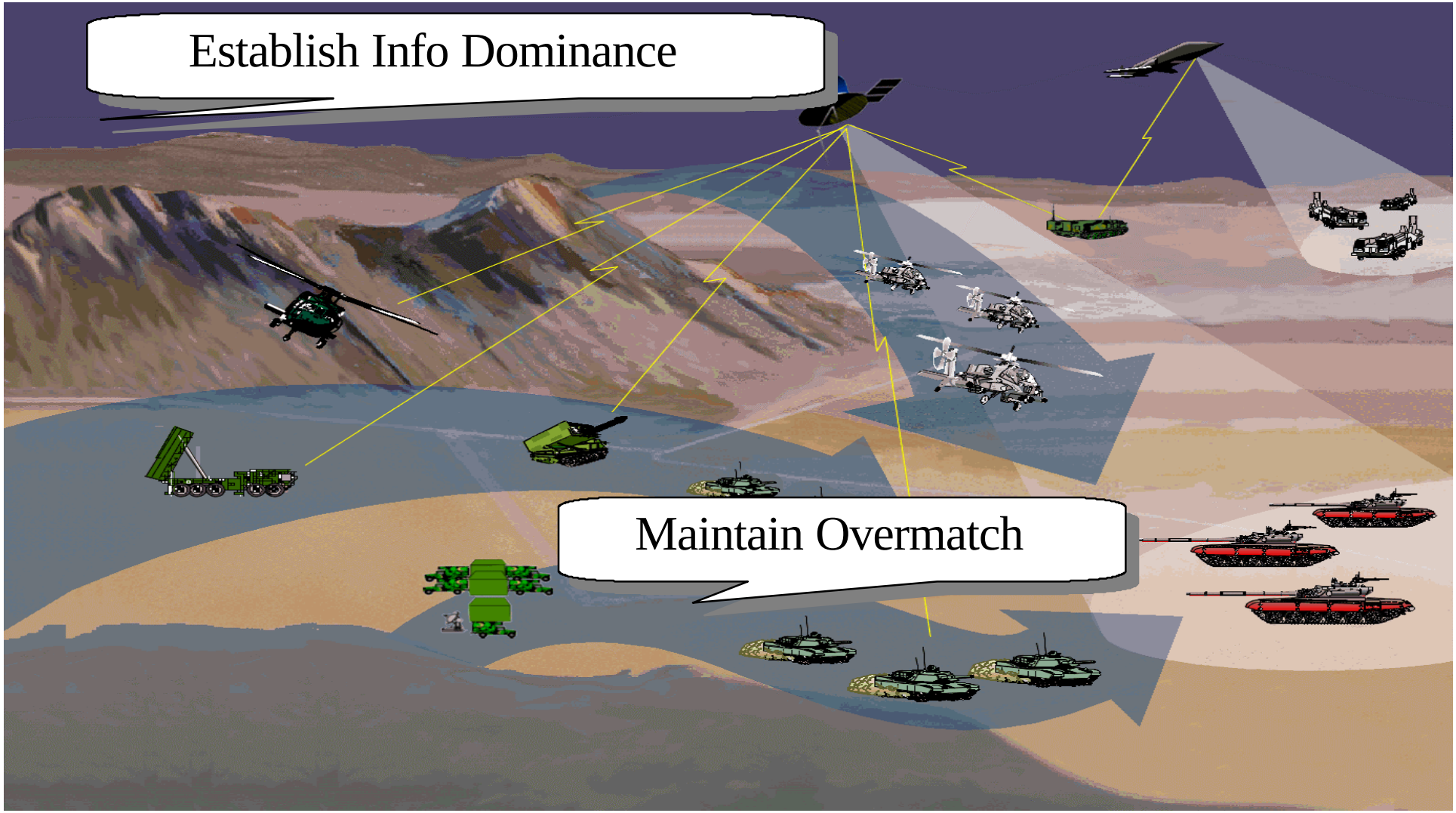
- Greater Lethality
- Greater Strategic / Operational Mobility
- Logistically Unencumbered
- Greater Versatility



To achieve continuous full-spectrum dominance

Committed to Excellence

Army XXI



Future Scout And Cavalry System (FSCS)

Bridge to the

Army After Next

Tactical Reconnaissance Armoured Combat Equipment Requirement (TRACER) Programme

Mounted Scouts & Cavalry In Force XXI and Beyond

Gain Information Dominance

Project the Force

Protect the Force

Cavalry and Scout Forces Provide the Commander the Capability to:

- **Create Time and Space**
- **Obtain/Verify Current Information**
- **Preserve Combat Power**
- **Facilitate Movement**

Shape the Battlespace

Sustain and Transition

Decisive attack

Critical Technologies

Bridge to AAN

Potential Horizontal Applications

SENSORS

- Mast Mounted FLIR with Extended Range Optics
- Multi-Function Laser
- Acoustic Sensors
- Active Emitter

SURVIVABILITY

- Signature Management
- HTI Hit Avoidance
- Armor

MOBILITY

- Electric or Conventional Drive
- Semi-active Hydropneumatic Suspension
- Band Track

C4I/ELECTRONICS

- Advanced Crew Station
- Open Electronic Architecture
- Multi-band, Multi-mode Radio
- Fully Integrated into Digital Battlefield

ARMAMENT

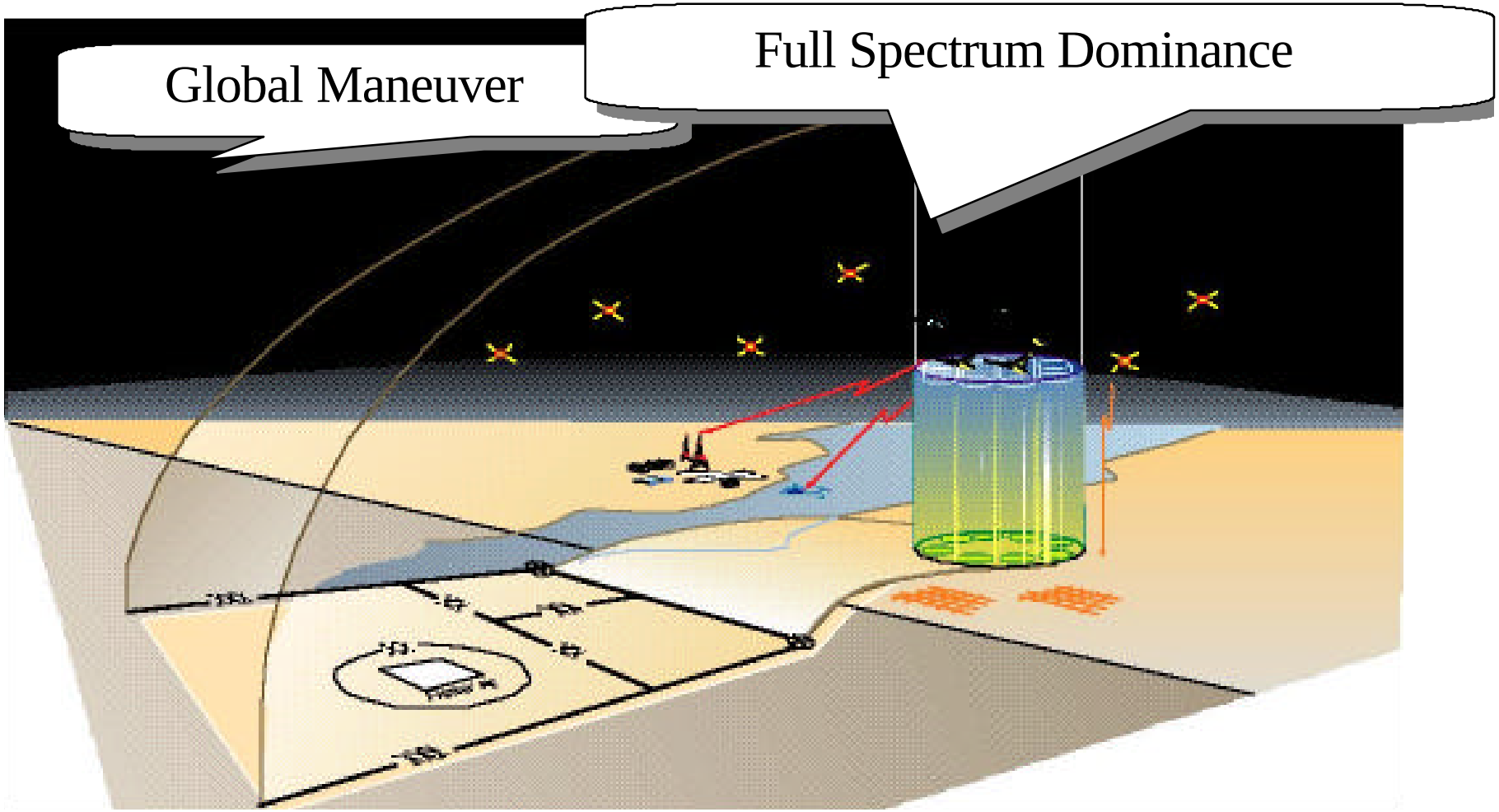
- Medium Caliber Weapon
- Advanced Fire Control

SYSTEM/DEPLOYABILITY

- Advanced Structure
- Hybrid Power System

FSCS - A Key Technology Carrier

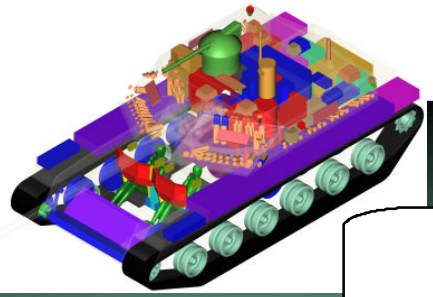
Army After Next



FCS Pre-AAN (2015)

One of the first deployment driven systems

Circa 1996



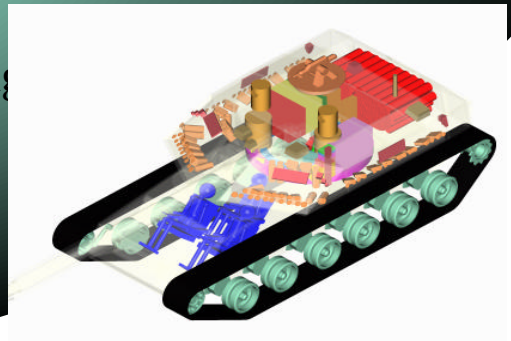
EM

Sustainability a premium

User Goals

Deploy 2 Combat Loaded on C17
Lethal vs all Threats @ 3-5 Km LOS & 10 Km NLOS
Survivable vs all Threats
75-100 kph cross country speed for 500 meters (50 kph sustained)
50% reduction in Class III,V,IX
Situational Awareness/Reduced Crew Fi

Missile



ETC

Mid 90's Conceptual Vision
40 Ton Combat System

40T Concept Vehicle

- Remote Turret
- High Pressure 120mm Gun
- Advanced Integrated Sight
- 2 Man Crew

- 2 Vehicles on C17 (38.7T)
- 50% Reduction in Fuel Consumption

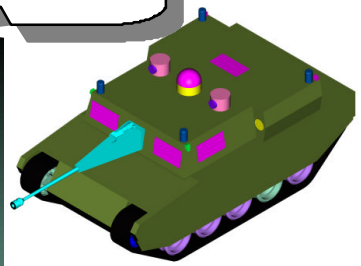
- Hit Avoidance
- Signature Management
- Active Protection
- Advanced Hybrid Armor

- Electric Drive
- Advanced Diesel or Turbine Engine
- Variable Height Semi-Active Suspension

FCS AAN (2020+)

Deployability a premium

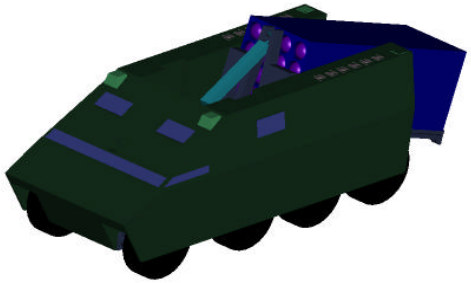
20 Ton Variant



User Goals

- Deploy 1 on C130 , 1 on AAN Advanced Air Transport
- Lethal vs all Threats @ 3-5 Km LOS/10+ Km NLOS
- Survivable vs direct fire CE, KE, and top attack without heavy armor (Only medium caliber ballistic protection)
- 100 kph cross country burst speed (70 kph sustained)
- 50%-75% reduction in [illegible] ion
- Situational Awareness/R[illegible]

Lethality and Survivability a technical challenge



Sustainability a premium

Future Infantry Vehicle Concepts

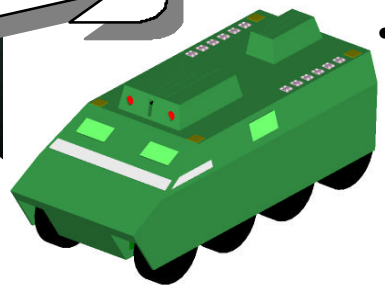
Primary Goal Troop Carrier with Advanced Technology

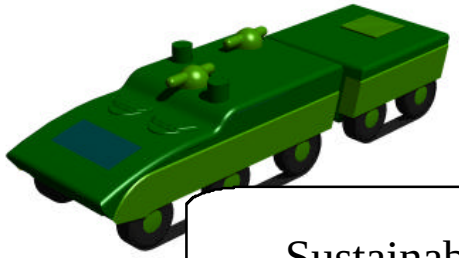
Deployability

Infantry Center Goals

- Deploy 3 combat loaded on C17
- Carry complete Land Warrior Squad
- Survivable vs. Threat
- 75-100 kph cross country speed for 500 meters (50 kph sustained)
- 50% reduction in Class III, V, IX
- Situational Awareness

Agility





Sustainability

U.S. Army
Ground
Vehicle
Technology

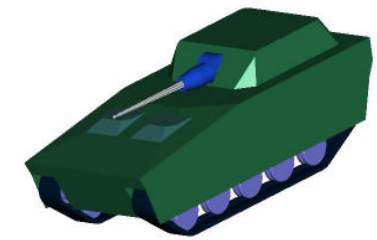
Technology Investment Strategy

Key Issue: Integration

Lethality

- Electromagnetic (EM)
- Electrothermalchemical (ETC)
- Missile

Mid Term



Mobility

- Combat Hybrid Power System Demonstrator
- Semi-Active and Active Suspension
- Electric Drive
- Band Track

Mid Term

Structures

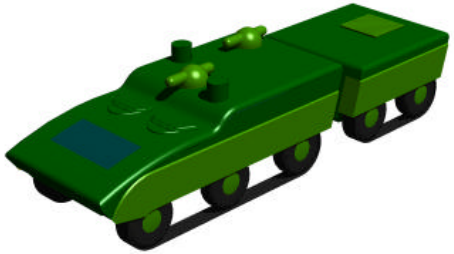
- Composites
- Lightweight Chassis & Turret
- Modular Removable Armor
- [illegible] Crew

Mid Term

Electronics

- Advanced Crew Station
- Weapon System Technical Architecture
- Ground Vehicle Robotics

Mid-Far Term



Survivability

- Future Light Vehicle Ballistic Prote
- Smart Armor
- Low Observables
- Full Spectrum Active Protection
- Laser Protection for Ground Vehicle Vision Systems
-

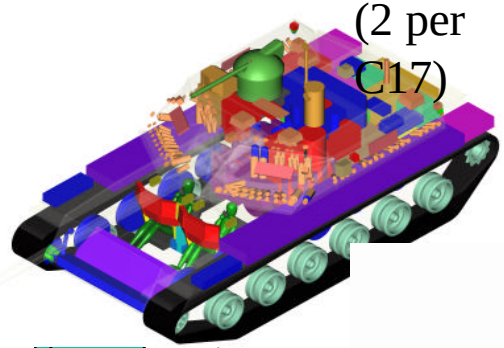
Mid Term

Legend
Current: 0-5 yrs
Near Term: 5-10 yrs
Mid Term: 10-15 yrs
Far Term: 15-20 yrs

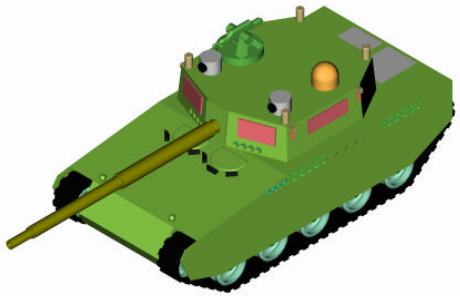
Lethality Challenge

ODS
70 Tons

1996
40 Tons
(2 per C17)

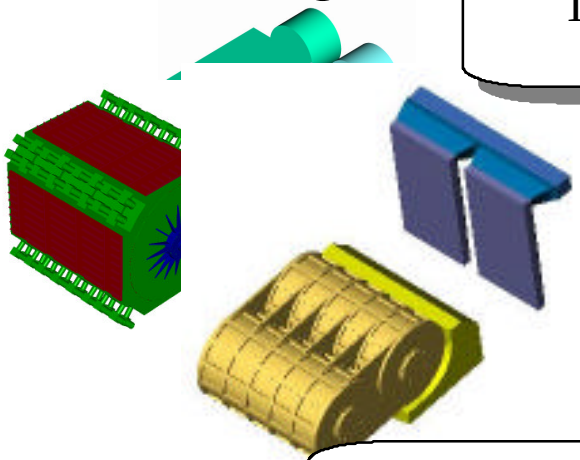


1998
20 Tons
(1 per C130)



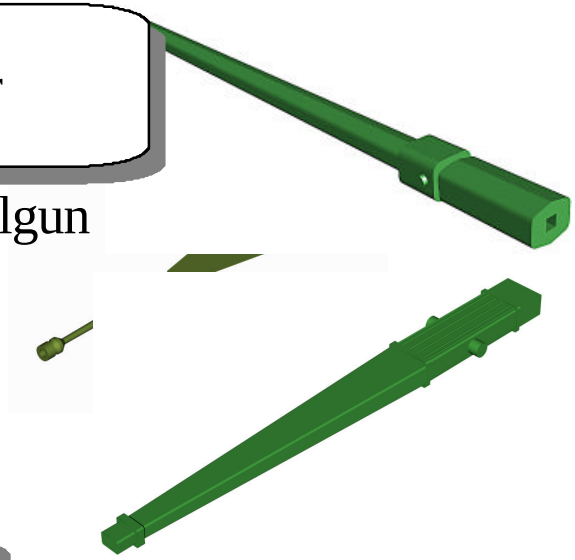
EM Armament

Pulsed Power & Cooling



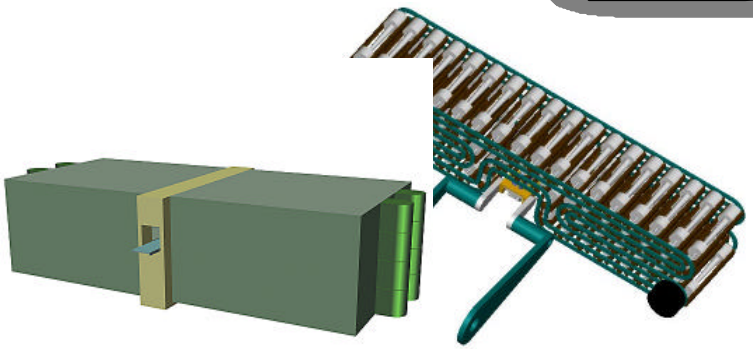
Today: 1 Semitrailer

Railgun



Mid-Term: 1 Conex

Autoloader & Ammo



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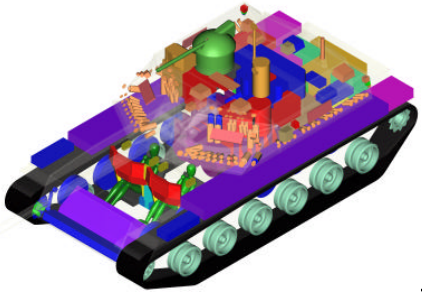


2015 - 2025
Far Term: 1/2 Conex

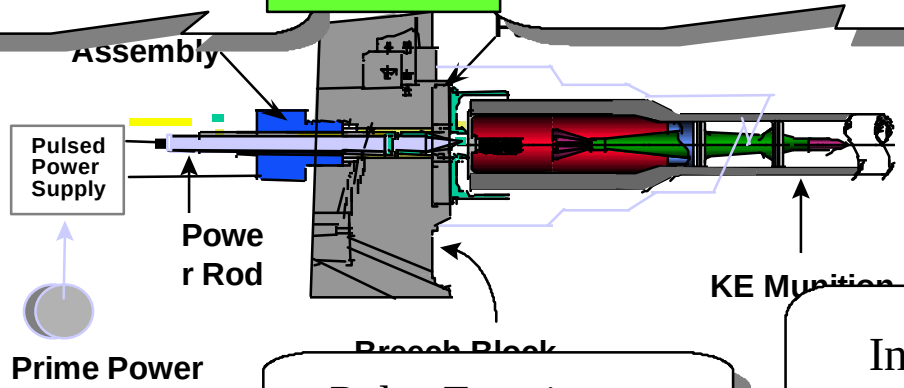
ETC & Missiles (20 Ton)

ETC

Low Electric Power Requirement

High Density Low-Vulnerability Propellants

Near-Term

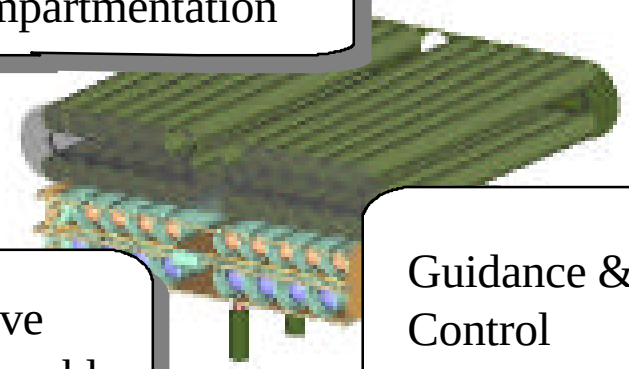


Pulse Forming Network Storage

Insensitive Non-detonable Propulsion

Missile Launcher

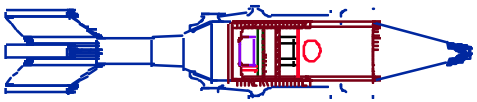
Compartmentation

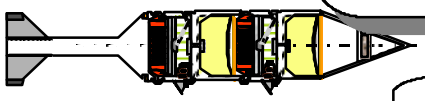


Guidance & Control Miniaturization

Missile

XM908 ("Hammer")



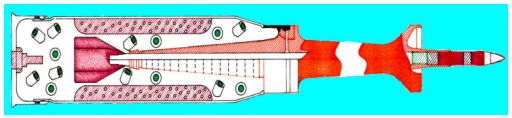


CKEM

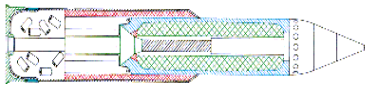
CE P3I

Re-Arm Materiel Handling

Competent KE



Compact TERM-KE ("Rhin



Mid-Term

VETRONICS

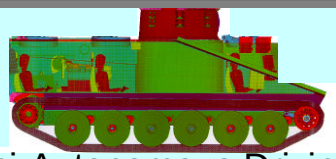
WEAPON SYSTEM TECHNICAL ARCHITECTURE (WSTA)

- Operational Architecture
- Systems Architecture
- Technical Architecture

Army Enterprise Architecture

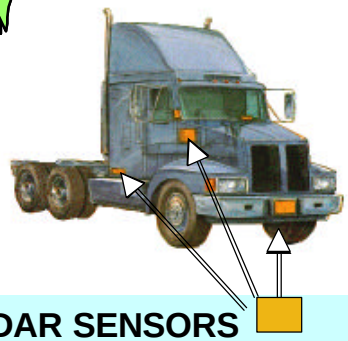
- •Where am I?
- •Where are my Friends?
- •Where is the Enemy?

GROUND VEHICLE ROBOTICS APPLICATIONS



Semi-Autonomous Driving

Autonomous Recon



RADAR SENSORS

Collision Avoidance

Mid-Term

Technology Challenges

- •Cybernetics
- •Voice Control
- •3D Audio
- •Decision Aids
- •Panoramic Displays
- •Technical Architecture

AVAILABLE FOR NEAR TERM TECH DEMOs

CREW STATION TECHNOLOGY APPLICATION

ASSIMILATE "DATA"

USE "INFORMATION"

Universal Applications

- •Soldier-Machine-Interface
- •C^2 Tactical Display
- •Technical Architecture

Increased Crew Effectiveness

- •Potential Reduced Crew Size
- •Reduced Vehicle Size/Weight

Structures

1996

Composite Armored Vehicle Advanced Technology Demonstrator

Achieve Reduced Signatures

Monocoque

Demonstrated weight reduction of 33% of structure and armor when compared equivalent aluminum vehicle
Sandwich construction using layers o fiberglass, ceramic armor tile, and signature management materials
Encapsulated Crew

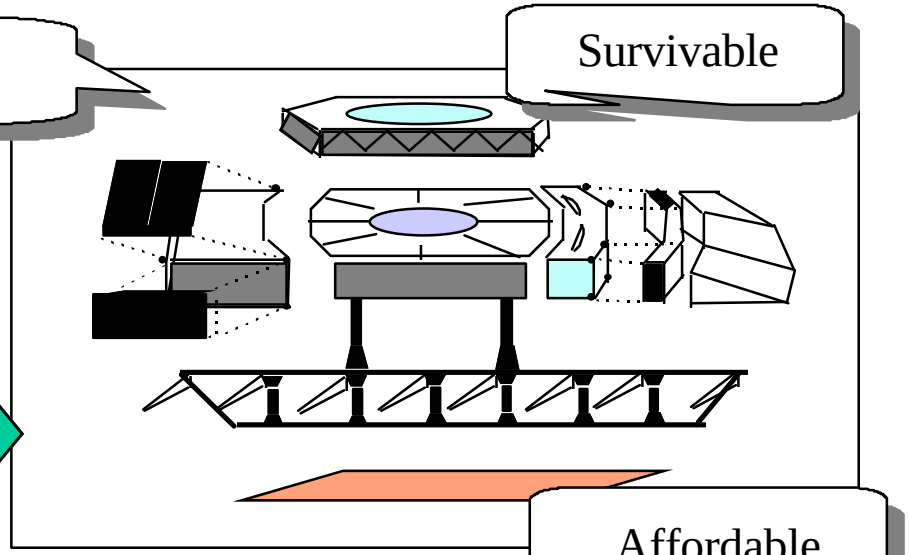
Mobile

Current

2010+

Light Weight Chassis & Turret

Survivable



Affordable

Space Frame

- **Demonstrate a 30% weight reduction improvement in the structure**
- **Modular Removable Armor**
- **Truss / Space Frame Structure**
- **Minimum Gage-Stiffened Skin Basic Vehicle Cover**
- **Encapsulated Crew**
- **Replaceable High Energy Belly Plate**

Far-Term

Enhanced Mobility Technologies

Energy Storage

Band Track

Noise Signature Reduction 30% - 50%

Active Track Tensioner

4000 mile maintenance free

Near-Term

Durability

Maintainability

Electric Drive

Increase Operating Range 50%

Increase Power Density (HP/ft³) 50%

Increase Power Electronics Capability 100%

40% Reduction in fuel consumption

Far-Term

High Temperature Silicon Carbide Switches

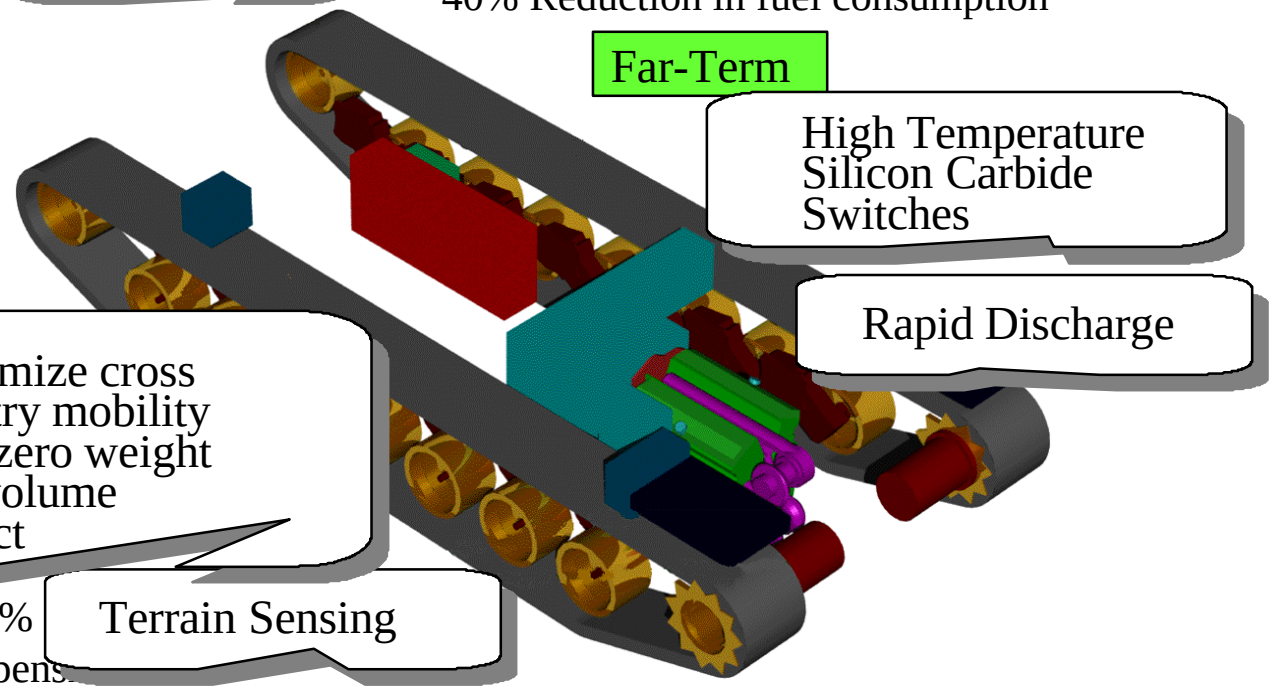
Rapid Discharge

Semi-Active Suspension

40% cross country speed increase in near ter

Near Term

Maximize cross country mobility with zero weight and volume impact



Active Suspension

Improve X-Country Speed 100%

Intelligent Preview Active Suspens

Terrain Sensing

Electro-mechanical suspension to provide 100% increase in cross country speed by 2015

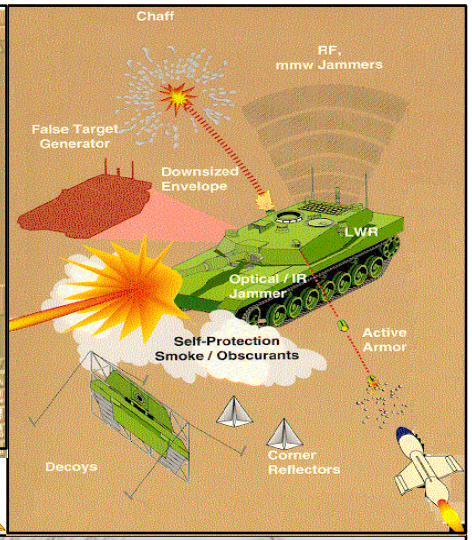
Mid-Term

Survivability

Survivability Technology

Don't Be Seen

- Low Observable Technology

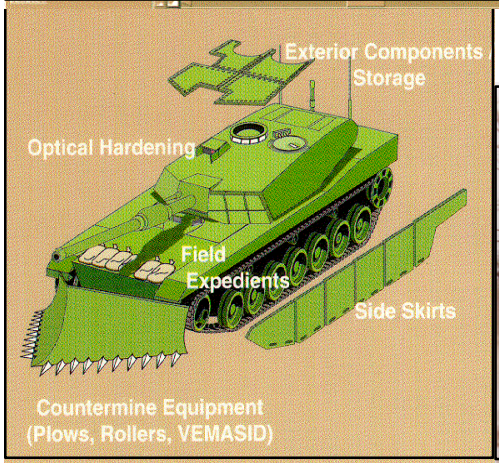


Don't Be Hit

- Active Protection Systems

Don't Be Penetrated

- Advanced Light-Weight Armor



Don't Be Killed

- Automated Fire Suppression

Signature Management

- **Develop and demonstrate <u>optimized</u> vehicle components which will provide reduced signatures**

- **50-75% Less Detectable = more survivable**
- **Signature/EW/Armor Integrated/Optimized Solution**
- **Optimization means less weight = more**
- **Risk reduction for Future Systems**

Threat Info
User Requirements

CAD/ Virtual Prototyping

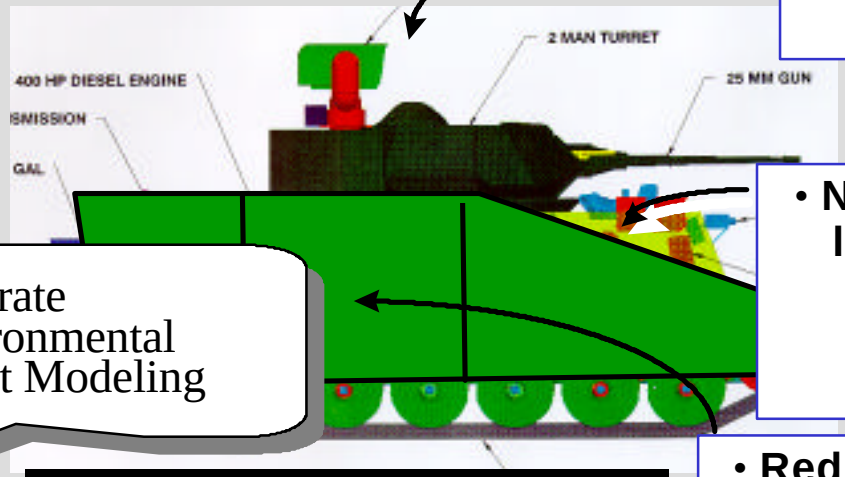
Modelin and Simulati

Fab and Demo/Test

Typical Components

Signature Management Treatment Durability

- **Signature Reducing <u>FLIR Micromesh window</u>**



- **New lightweight low <u>signature grille</u> with improved ballistics**

Accurate Environmental Effect Modeling

<u>Conceptual Future Scout Vehicle</u>

- **Reduced Signature ballistic <u>side panels</u> with reduced weight**

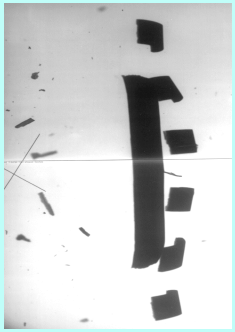
Affordability

Committed to Excellence

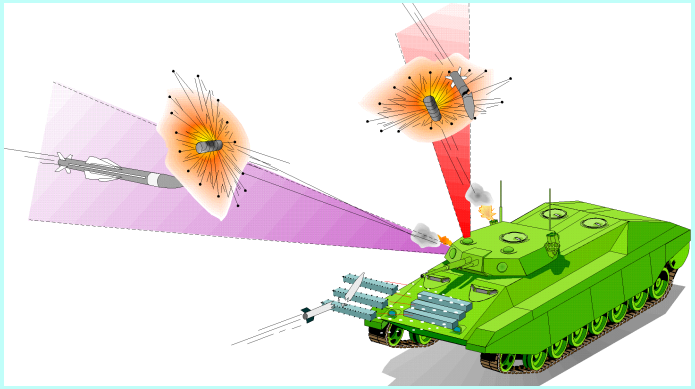
Full Spectrum Active Protection

Defeat CE

Near-Term



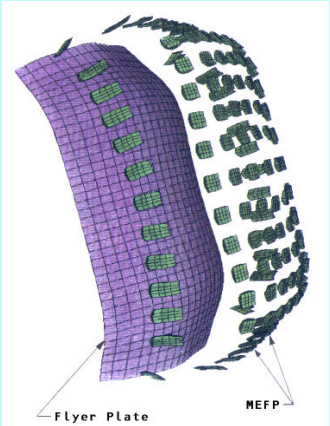
BAR COUNTERMEASURE DEPLOYING



FULL SPECTRUM AP SYSTEM

Defeat Hemispherical CE + Tube Launched KE

Far-Term



MEFP

Defeat Tube Launched CE

Mid-Term

- Blast/Fragmentation
- High Velocity Bars and Plates
- Mini Explosively Formed Penetrators (MEFP)

- Can be integrated onto current ground vehicle fleet
- Improve Vehicle & Crew Survivability
- Low Cost & Weight

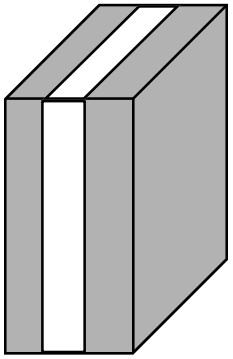
Key Enabler for Lightweight Combat Vehicles

Future Light Vehicle
Ballistic Protection Technology

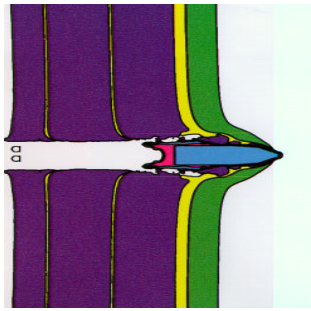
OBJECTIVE

- Demonstrate new armor systems designed to provide vehicles in the 18-40 ton range protection against the future medium caliber cannon threat, light and medium shaped charge threats, top attack weapons, and mines
- Systems will be compatible with advanced structural technology likely to be used in future light vehicles
- Utilize advanced defeat mechanisms
- Designed to avoid adverse impacts on mission equipment and other survivability measures

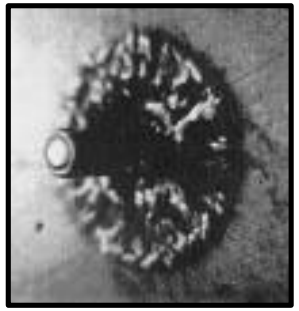
At < 30 Tons Defeat Medium Caliber Threats



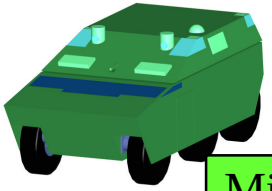
Material Development



Modeling and Analysis



Experimental Validation

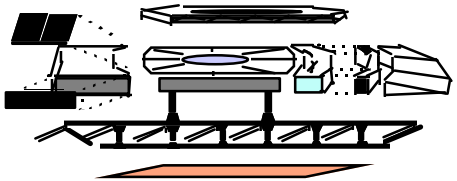


Mid-Term

Develop max protection possible for fixed areal density

Armor/structure integration & optimization

Develop minimum weight armor/structure for given protection requirement



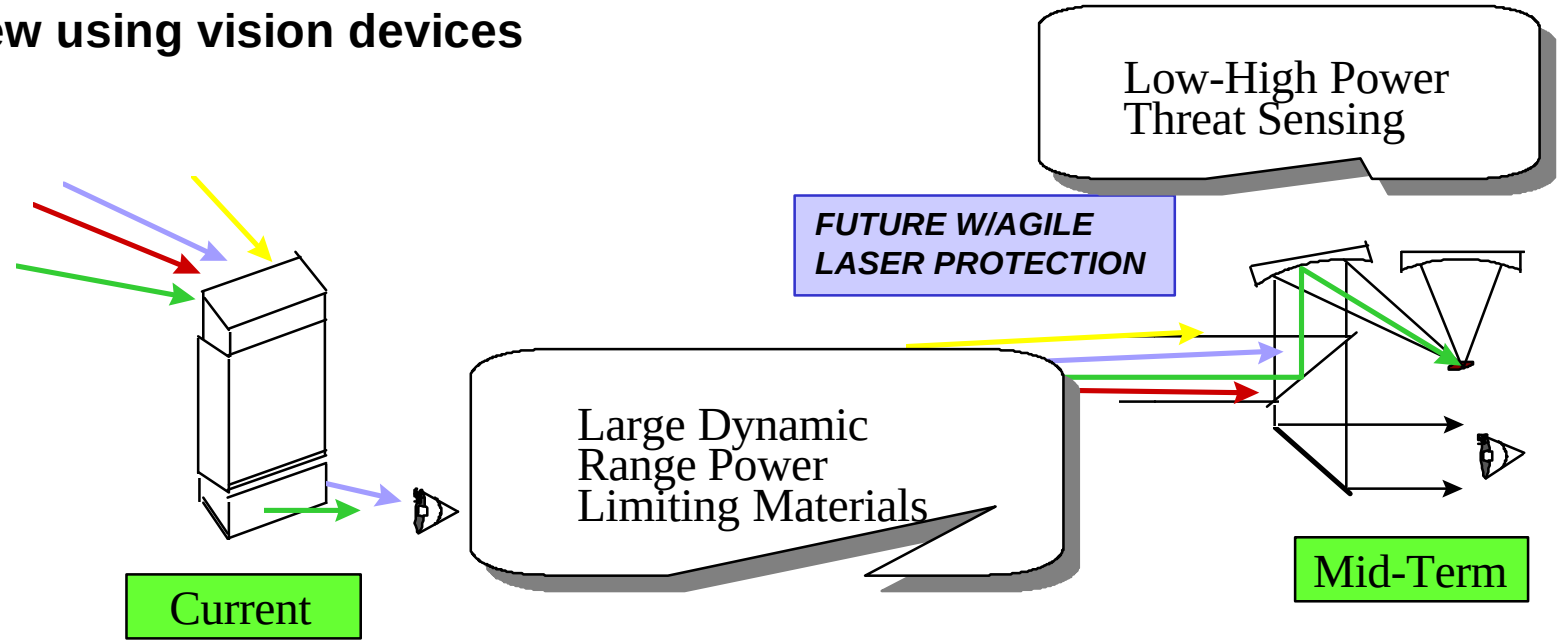
Weight/Space Efficient, Affordable Ballistic Protection

Advanced Structures

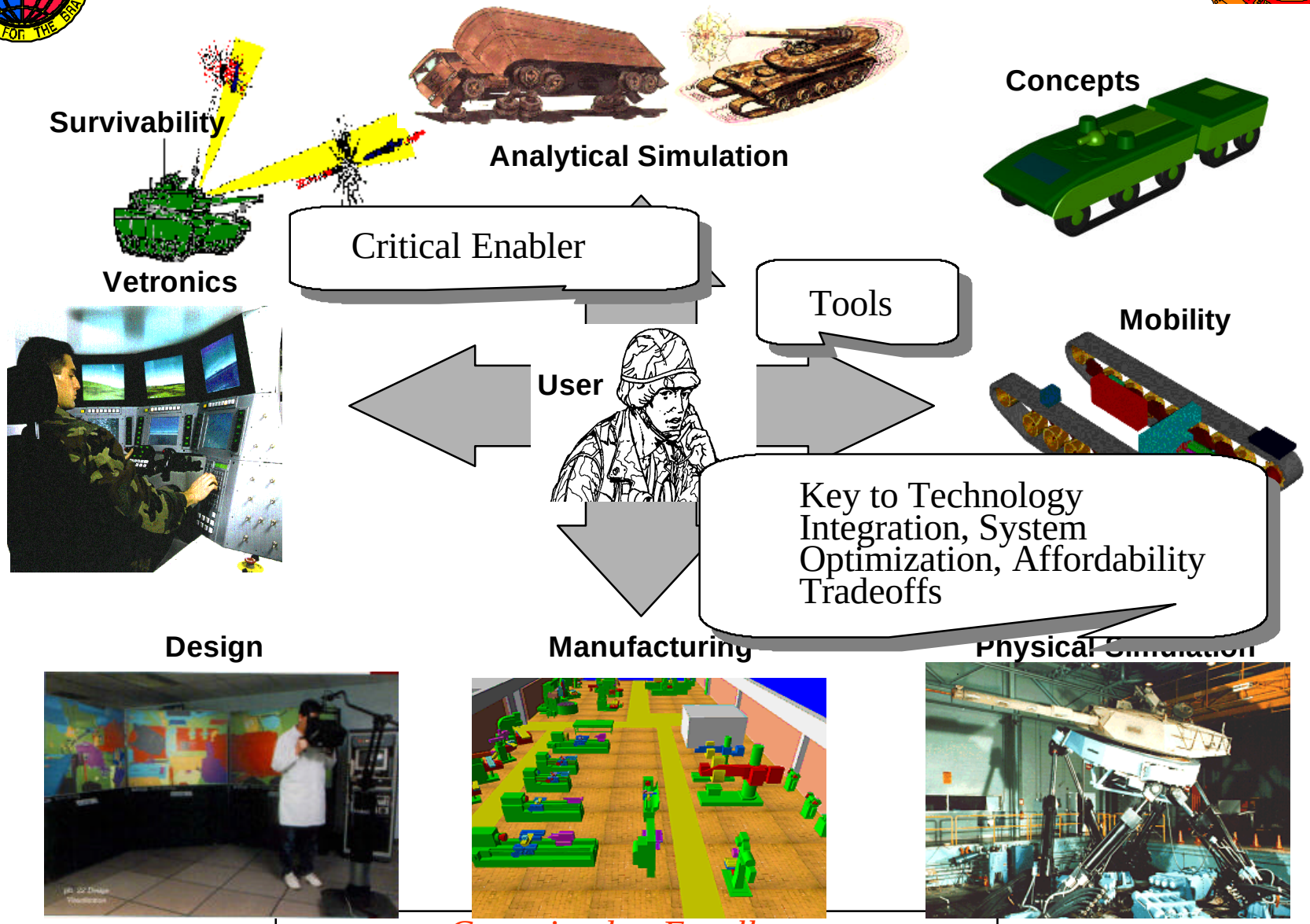
Laser Protection
For Ground Vehicle Vision Systems

Asymmetric Threat

PAYOFF: Provide positive protection against laser attack to vehicle crew using vision devices



Modeling & Simulation

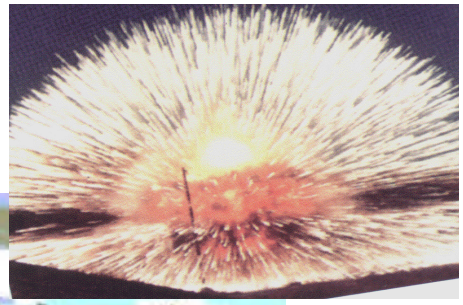


Committed to Excellence

TACOM is ...

Mobility

Firepower



Systems Integration

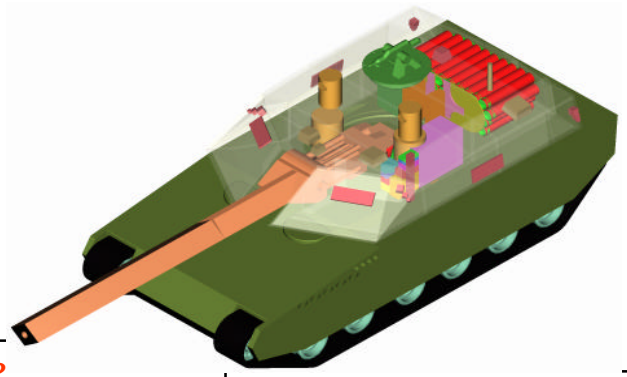
Survivability

Lethality

SUMMARY

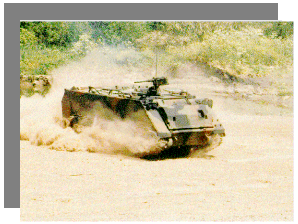
- **TACOM - A KEY PLAYER IN SUPPORT OF LEGACY SYSTEMS**
- **TACOM PROVIDES R&D TECH BASE VISION AND UNIQUE INTEGRATION EXPERTISE IN SUPPORT OF THE USER**

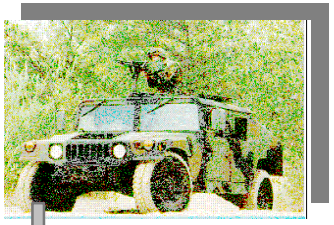
TACOM WILL BE AN ACTIVE PARTNER NOW AND INTO THE FUTURE

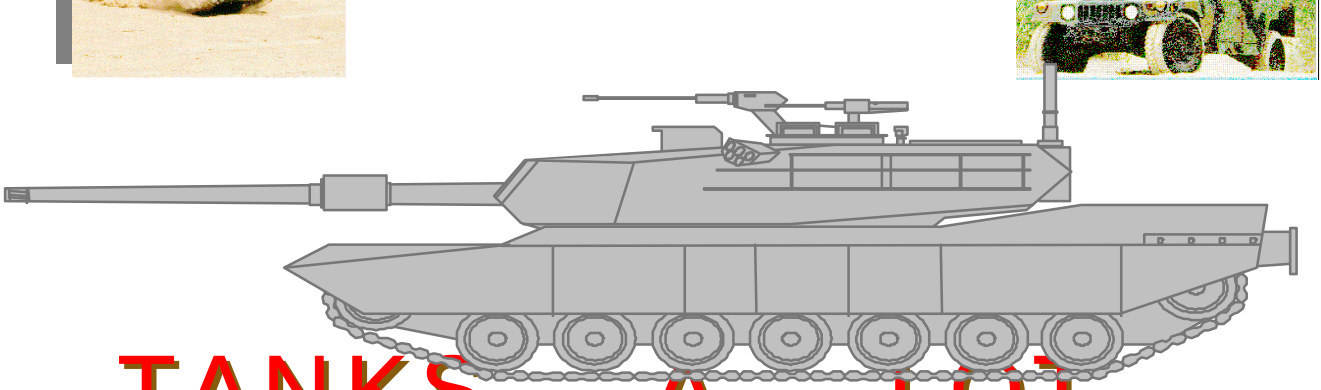


TACOM

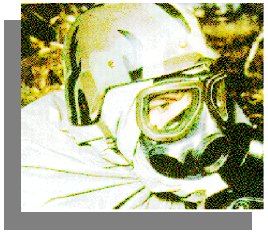
Mobility and Firepower for America's Army







TANKS A LOT



Mobility and Fire Power for America’s Army