

VETRONICS OVERVIEW

By

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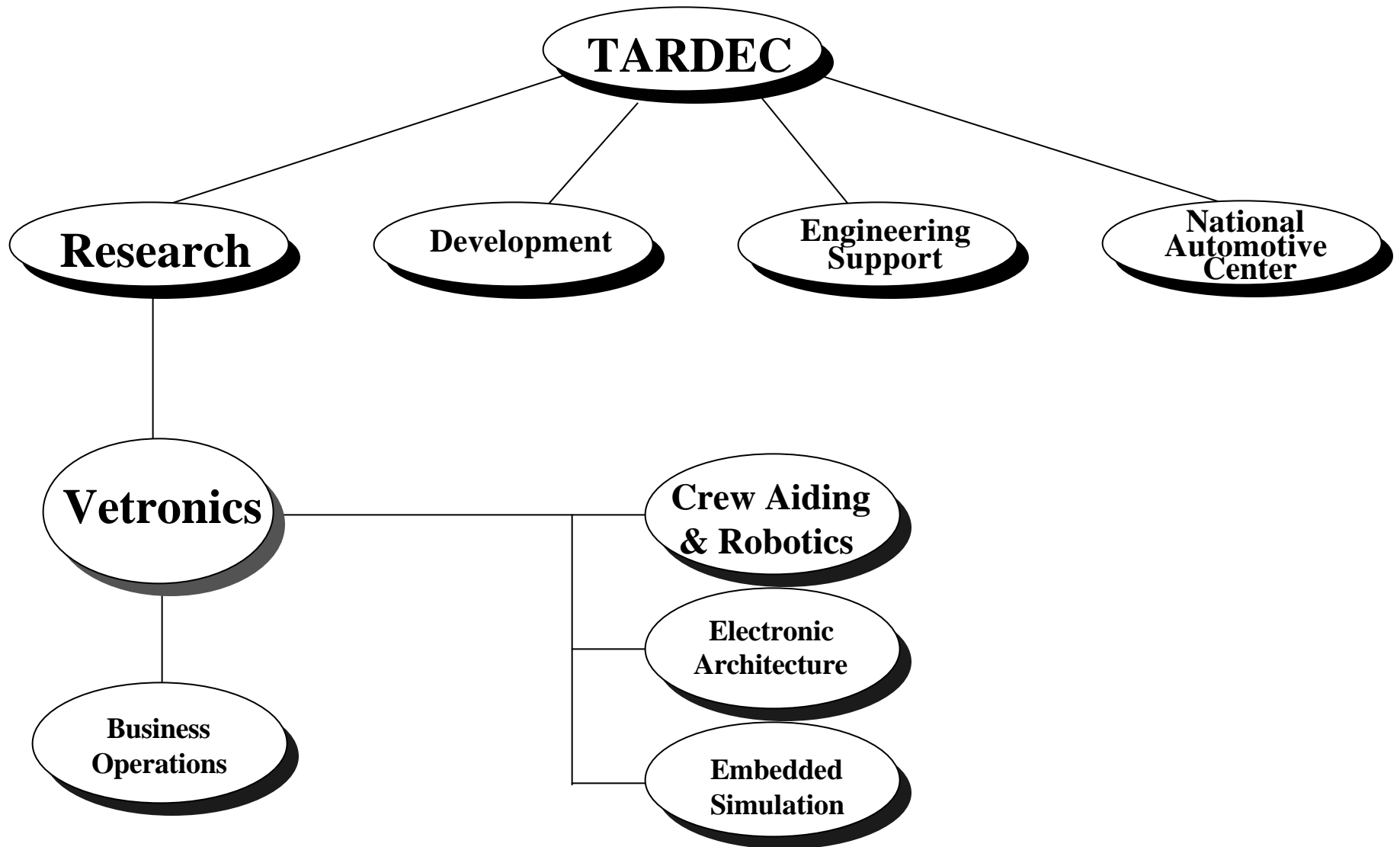
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May 30, 2001

Report Documentation Page

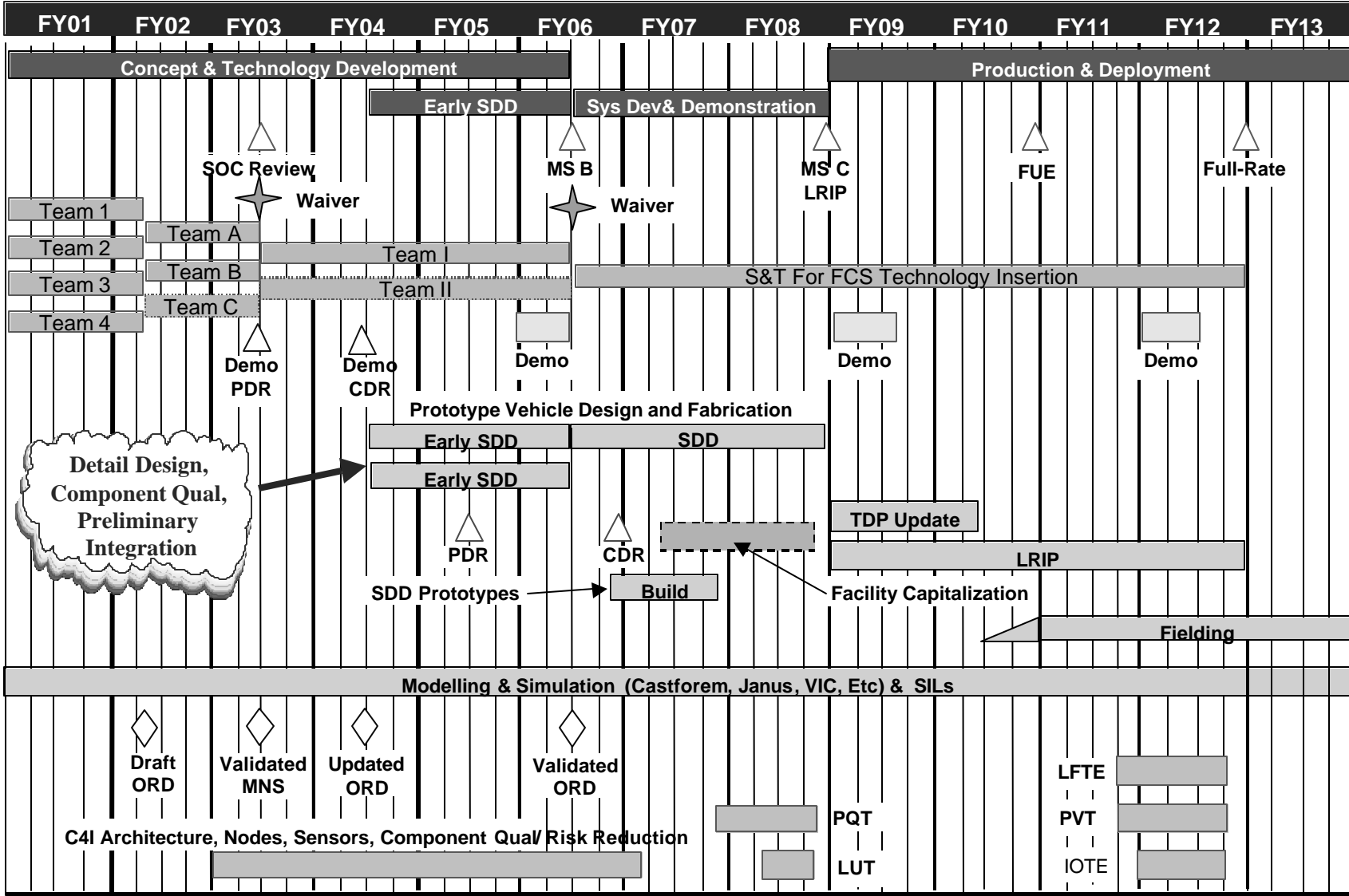
Report Date 30May2001	Report Type N/A	Dates Covered (from... to) -
Title and Subtitle Vetronics Overview	Contract Number	
	Grant Number	
	Program Element Number	
Author(s) Adams, Curt	Project Number	
	Task Number	
	Work Unit Number	
Performing Organization Name(s) and Address(es) U.S. Army Tank-Automotive RD&E Center (TARDEC) Vetronics Technology Area (AMSTA-TR-R, Mailstop 264) Warren, MI 48397-5000	Performing Organization Report Number	
Sponsoring/Monitoring Agency Name(s) and Address(es) NDIA (National Defense Industrial Association) 211 Wilson BLvd., Ste. 400 Arlington, VA 22201-3061	Sponsor/Monitor's Acronym(s)	
	Sponsor/Monitor's Report Number(s)	
Distribution/Availability Statement Approved for public release, distribution unlimited		
Supplementary Notes Proceedings from 2001 Vehicle Technologies Symposium - Intelligent Systems for the Objective Force 29-31 May 2001 Sponsored by NDIA, The original document contains color images.		
Abstract		
Subject Terms		
Report Classification unclassified	Classification of this page unclassified	
Classification of Abstract unclassified	Limitation of Abstract UU	
Number of Pages 8		

Vetronics Organization



Vetronics Mission

- Support the 6.2 and 6.3 applied technology research and development for the Vetronics *constituent* technologies
- Enable the transition of Vetronics technology to ground vehicle systems
- Current program focus: **FCS**



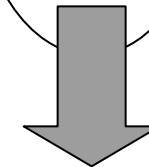
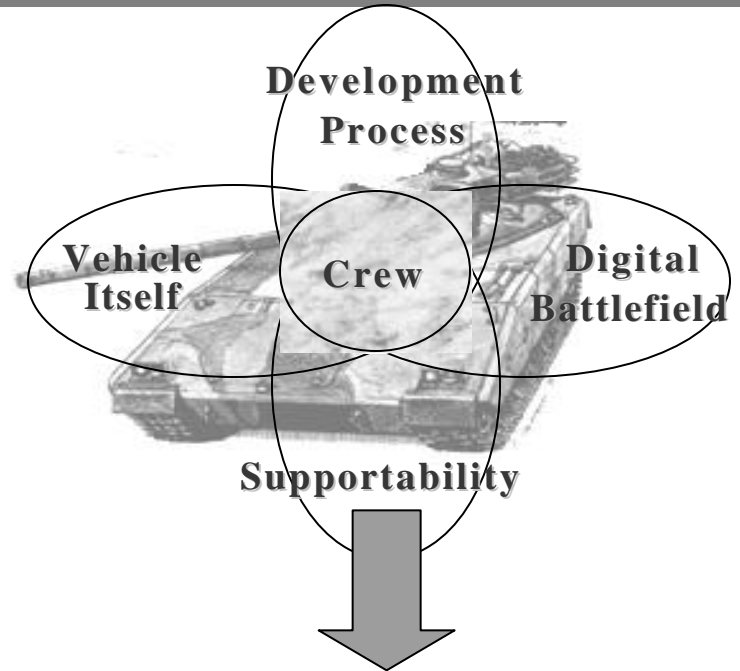
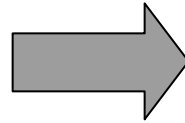
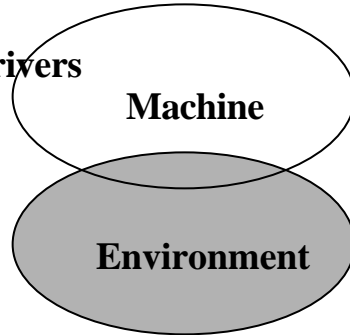


Why Vetronics?

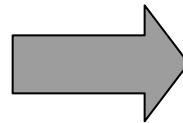
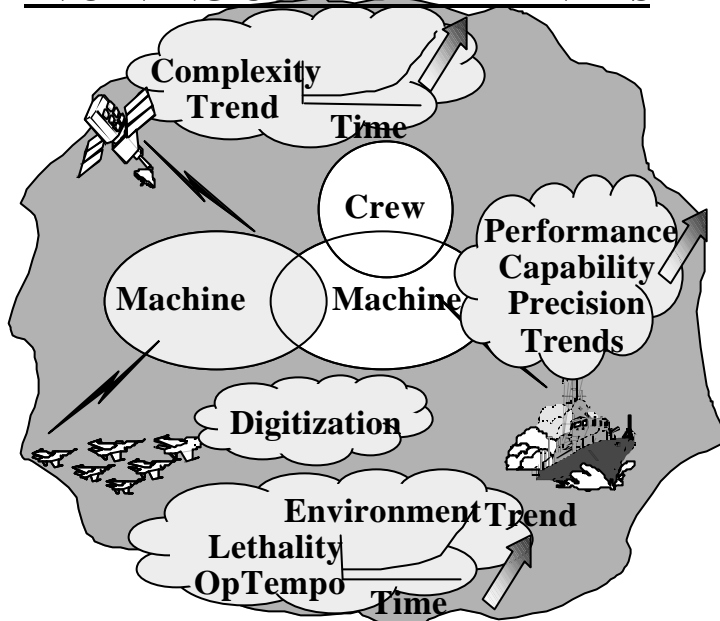
TRADITIONAL S&T DEVELOPMENTS

Environmental Drivers

Space
Weight
Thermal
Shock
Vibration
etc



EVOLVING COMPLEXITY DRIVERS

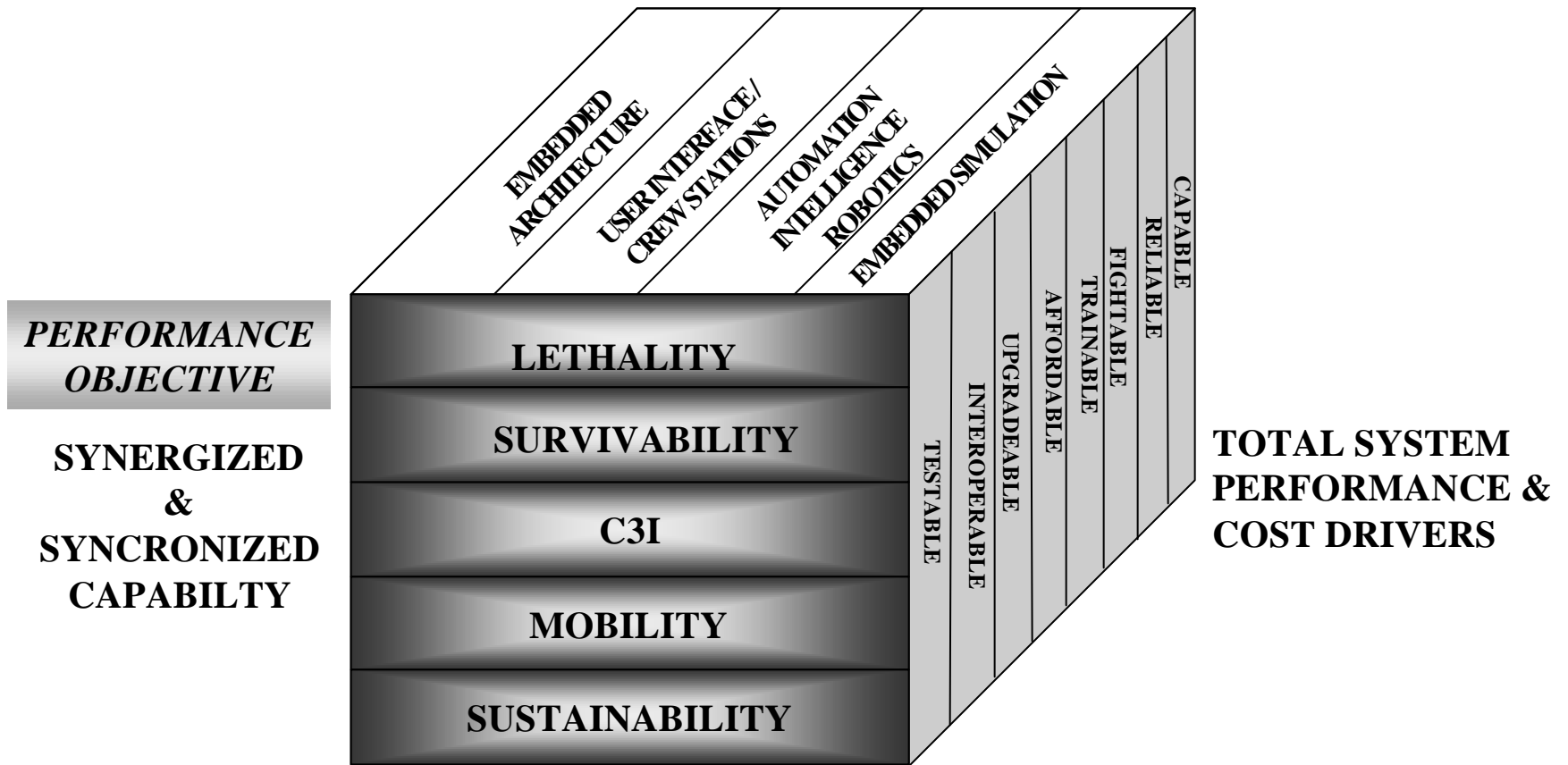


REAL TIME EMBEDDED COMPLEX SYSTEM TECHNOLOGY FOCUS

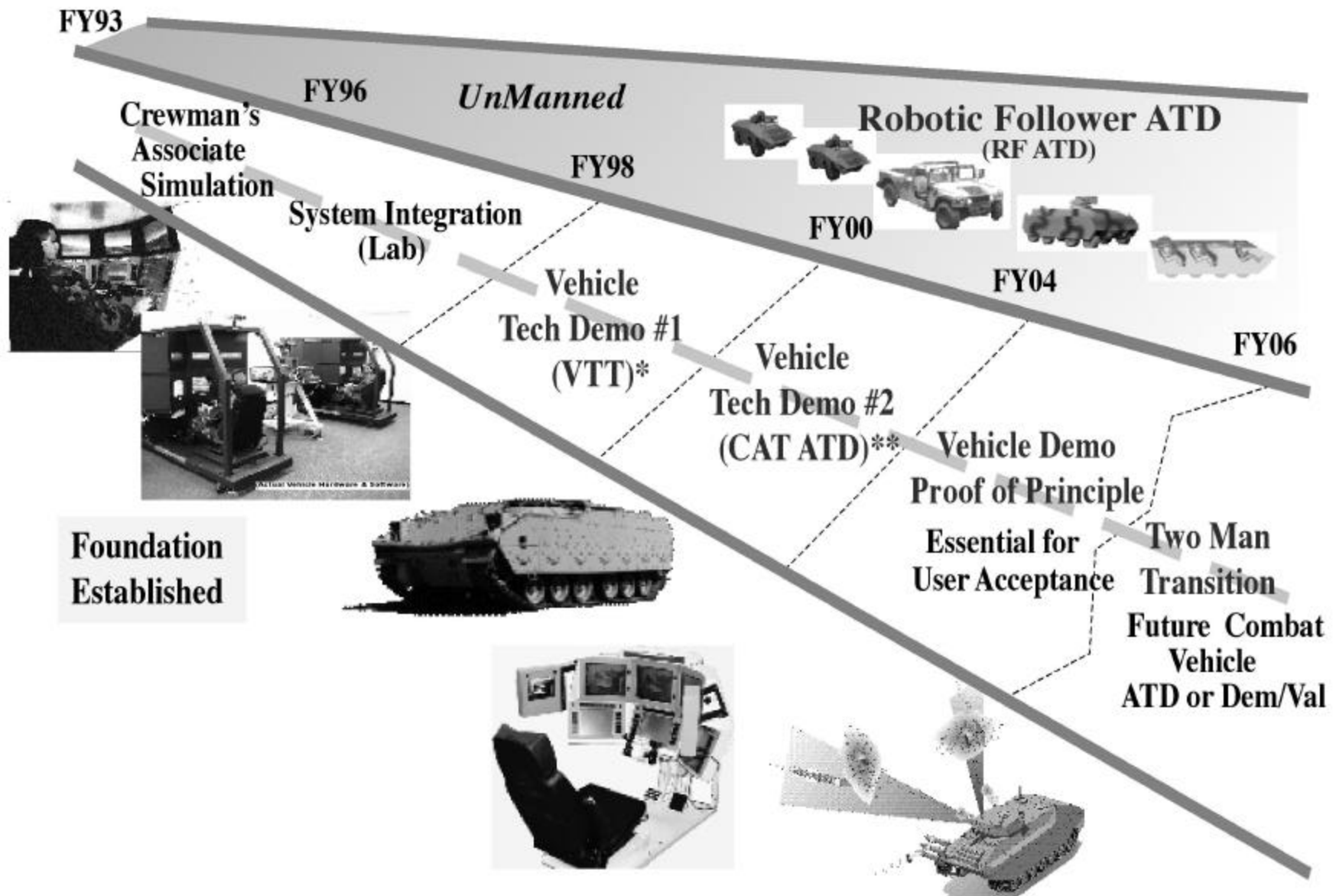
- User Interface/Crew Station
- Automation/Robotics
- Embedded Architecture
- Embedded Simulation

TOTAL SYSTEM INTEGRATION

VEHICLE ENABLING TECHNOLOGIES



Crew Reduction Progression



*VTT = Vetronics Technology Testbed

**CAT ATD = Crew integration and Automation Testbed Adv. Tech. Demonstration



VETRONICS EVOLUTION

FOCUS

A/TEPS

- Wire Reduction
- Wire Harness Field Replacement
- Busmed Power Distribution & Control
- Multiplexed Data Distribution

VETRONICS

- Total System Integration
- Vehicle Based Architecture
- Vehicle into the Battlefield Force
- Supportable
- Additive into the Total System

M1A2 Abrams

- 1st Central Vehicle Application
- Core Architecture
- Multiplexed Data
- Busmed Power Distribution
- Integrated Controls Displays

SAVA

- Commonality / Modularity
- Distributed Processing
- Common Modules
- Software Modularity

Block III Tank Concept

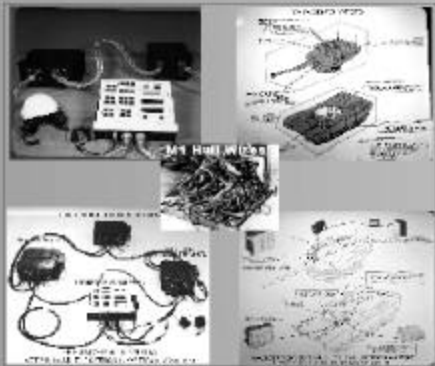
- SAVA Architecture
- Common Veh (C) (GV2)
- Adv Integrated Propulsion Sys (AIPS)
- Veh Integrated Defense Sys

Reduced Crew Simulation

- General Dynamics (GA) Simulation Based
- VETRONICS Open System Architecture (VOSA)
- VETRONICS System Integration Lab (VSL)
- Application Programmer's Interface (API)

Reduced Crew Vehicle Test Bed

- VETRONICS Technology Test Bed (VTT)
- 2 Man Crew
- In-line Configuration
- Side by Side Configuration
- Embedded Simulation
- Demo 1 Aided Driving (1 Man - Command/Driver)
- Demo 11 Crew Automation & Integration Test Bed (AT) (2 Man Command/Driver & Gunner)

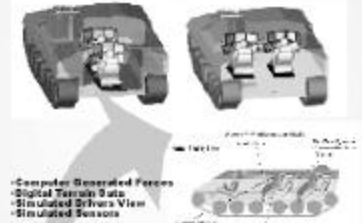


VETRONICS Crew Display Demonstrator (VCDD)

- First Ground Vehicle Crew Station Simulator
- Early Soldier Module Interface Definition
- Tailored to the Top Mission
- Standard battlefield environment
- Interactive Headset
- Ready race of replaceable displays, controls, and interactive display features



M1A2 LRU Architecture



- Computer Generated Forces
- Digital Terrain Data
- Simulated Drivers View
- Simulated Sensors

Embedded Simulation



1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
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1977-1982
ACQUISITION TECHNOLOGIES
FOR ELECTRIC POWER
MANAGEMENT & CONTROL
SYSTEMS (ATEPS)

• Hall Effect
• 1000W Data Bus
• Power Signal Bus
• Self Test

• Maintenance Concept
• Redundancy & BIT
• Digital Signal Processing
• Performance & MIL-STD-1553
• System

Technologies Developed /
Demonstrated
• Multiplexed Data
• Distribution
• Bus Power Distribution
• Half System Cable Reduction
• Multi-Module Control Display
• Distribution of an Analog
System (Sub System)
• Fiber Optic "Trunk"

• High Power High Operation
with Fiber Optic Transceiver
Bus Data
• Fiber Optic Display
• Solid State Power Reducer
• Power MOSFET Technology
• BIT/OTC Capability
• 5.00 VDC, 111.40 Amp
Waveform
• Digital Voice
Communications
• MIL-STD-1553 Compatible

1983
STUDIES
16 Purchase Order
Study Contracts

Contracted Avionic Type
Architecture in
applicable to Dispersed
Vehicles - Avionics
Transfer to VETRONICS
was \$100,000.00 and
CMR Vets. Expenses /
License License,
Technology very little
hardware per se.

Contracts:
• DRL
• Texas Instruments
• Harris Modems
• InLine-Vision
• Honeywell University
• SPICOR
• Hughes
• Raytheon
• TRC
• Delta
• GEAC
• Convex
• Honeywell
• LITTON

1983-1986
VETRONICS SYSTEM ARCHITECTURE
DEMONSTRATOR (VSD)

Four competitive contracts to
demonstrate VETRONICS vision with
VETRONICS System Architecture
Demonstrator (VSD),
Contracts:
• DRL
• TRC
• GEAC
• TI
• Decentralized Broadband Global and
Inter-Node Bus
• Generalized digital map data symbology
• Decentralized allocation of power
generation and control including STOVDC
• Decentralized remote control data
controlling no data, shared access security,
& digital radio communication interface
• Hardware & Software Modularity
• Redundancy & Fault Tolerance
• BIT/OTC
• Bus Reliability
• Multifunction Controls & Displays
• Distributed Processing

1980-1987
VETRONICS CREW DISPLAY
DEMONSTRATOR (VCDD)

• Two crew stations & a controller
station
• Replaceable crew station
(optical & functional characteristics)
• Embedded battlefield environment
• Interactive Headset
• Tailored to the Top Mission
• Tailored to the Top Mission and the
Development community together early
in the development cycle to define
Soldier Interface Definition (SID)
functional requirements and
performance specs for new
developments.

1983-1993
M1A2 ABRAMS TANK
General Dynamic
Land System (GMLS)

• Utility Bus
• 1000W Data Bus
• Distributed
Processing
• Integrated
Multi-Function
Controls Displays
• Power Distribution
• Inter Vehicle
Interface System (IVIS)

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1980-1993
STANDARD ARMY VETRONICS
ARCHITECTURE (SAVA)

Standard Army Network
Architecture (SANA)
Decentralized
• Modular reconfigurable
design
• Distributed multiprocessor
• Standardized interface
• Common hardware and
software modules
• Use of Commercial
Standard Backplane, board
level
• Ability to add functionality
without user restructuring
Technology Transfer

1989-1993
COMMON CORE
TECHNOLOGY TEST
DEVCARTS

• Over 80 SAVA
Common Vehicle
Integration
• Subsystems
• Addressed Integrated
Propulsion Systems (AIPS)
• Vehicle Integrated
Defense System (VIDS)
• Advanced Tank
System (ATKS) with
Autoleader
• Multi-Access Target
Acquisition System (MTAS)
• Central Vehicle
Command & Control
System (CVCS)
• Automatic Fire
Control System

• Decentralized Broadband Global and
Inter-Node Bus
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1992-1996
GENERAL DYNAMICS
ASSOCIATE (GA) ATD

• User approve crew
station design
• 2015 - 2 Man Crew
Station
• 1998 - 2 Man Crew
Station
• Completed M1A2
Baseline experiments at
FL Range May/June 1995
• Completed 2888 Crew
Station Expts, May
1995
• Completed 2888 Crew
Station Expts,
Sept/Nov 1995
• Human Computer
Interface Input to ATA
Version 4.0
• FMU Control
• Mobility System
• FMU / FCC
• 1424 Crew
Station Simulation

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Station Simulation

1997-1998
APPLICATION
PROGRAMMERS
INTERFACE (API)
DEVELOPMENT

• Embedded Map
Server 1997
• Map Editing
Station 1997
• Operating
Software SEP 1998,
• Multi-Function
API 1998.
Support to Program
Managers

• Decentralized Broadband Global and
Inter-Node Bus
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1998-2000
VETRONICS
TECHNOLOGY
TEST BED (VTT)

• Commander/Driver
Crew Station
• Gunner Crew
Station
• Side by Side and
In-Line Configured
Configurations
• Drive-By-Wire
• Includes Demo II
Technology
• Self-Administered
Driving
• Command/Driver
Aids
• Indirect Viewing
• 3D Audio
• Training
• Mission Rehearsal
• Object Oriented
Software Architecture
• Embedded Simulation
• Embedded Training
• Mission Rehearsal
• Distributed Simulation
• Command/Driver
Requirements

• Decentralized Broadband Global and
Inter-Node Bus
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• Decentralized allocation of power
generation and control including STOVDC
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• 3D Audio
• Training
• Mission Rehearsal
• Object Oriented
Software Architecture
• Embedded Simulation
• Embedded Training
• Mission Rehearsal
• Distributed Simulation
• Command/Driver
Requirements

2000-2004
CREW INTERACTION
AND AUTOMATION
TEST BED (CAIT) ATD

• Two-Splitter Operation
• Mission Demo II
• Self-Administered
Driving
• Indirect Driving
• Self-Administered
• Speech Recognition
• 3D Audio
• Indirect Vision
• Head Tracking
• Head Mounted
Displays
• Commander's Associate
Interface
• Advanced Electronic
Architecture
• Advanced Network
Technology
• Object Oriented
Software Architecture
• Embedded Simulation
• Embedded Training
• Mission Rehearsal
• Distributed Simulation
• Command/Driver
Requirements

• Decentralized Broadband Global and
Inter-Node Bus
• Generalized digital map data symbology
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2000-2004
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AND AUTOMATION
TEST BED (CAIT) ATD

• Two-Splitter Operation
• Mission Demo II
• Self-Administered
Driving
• Indirect Driving
• Self-Administered
• Speech Recognition
• 3D Audio
• Indirect Vision
• Head Tracking
• Head Mounted
Displays
• Commander's Associate
Interface
• Advanced Electronic
Architecture
• Advanced Network
Technology
• Object Oriented
Software Architecture
• Embedded Simulation
• Embedded Training
• Mission Rehearsal
• Distributed Simulation
• Command/Driver
Requirements