

Embedded Training Solution for the Bradley Fighting Vehicle (BFV) A3

30 May 2001

R. John Bernard
Angela M. Alban

United Defense, L.P.
Orlando, Florida

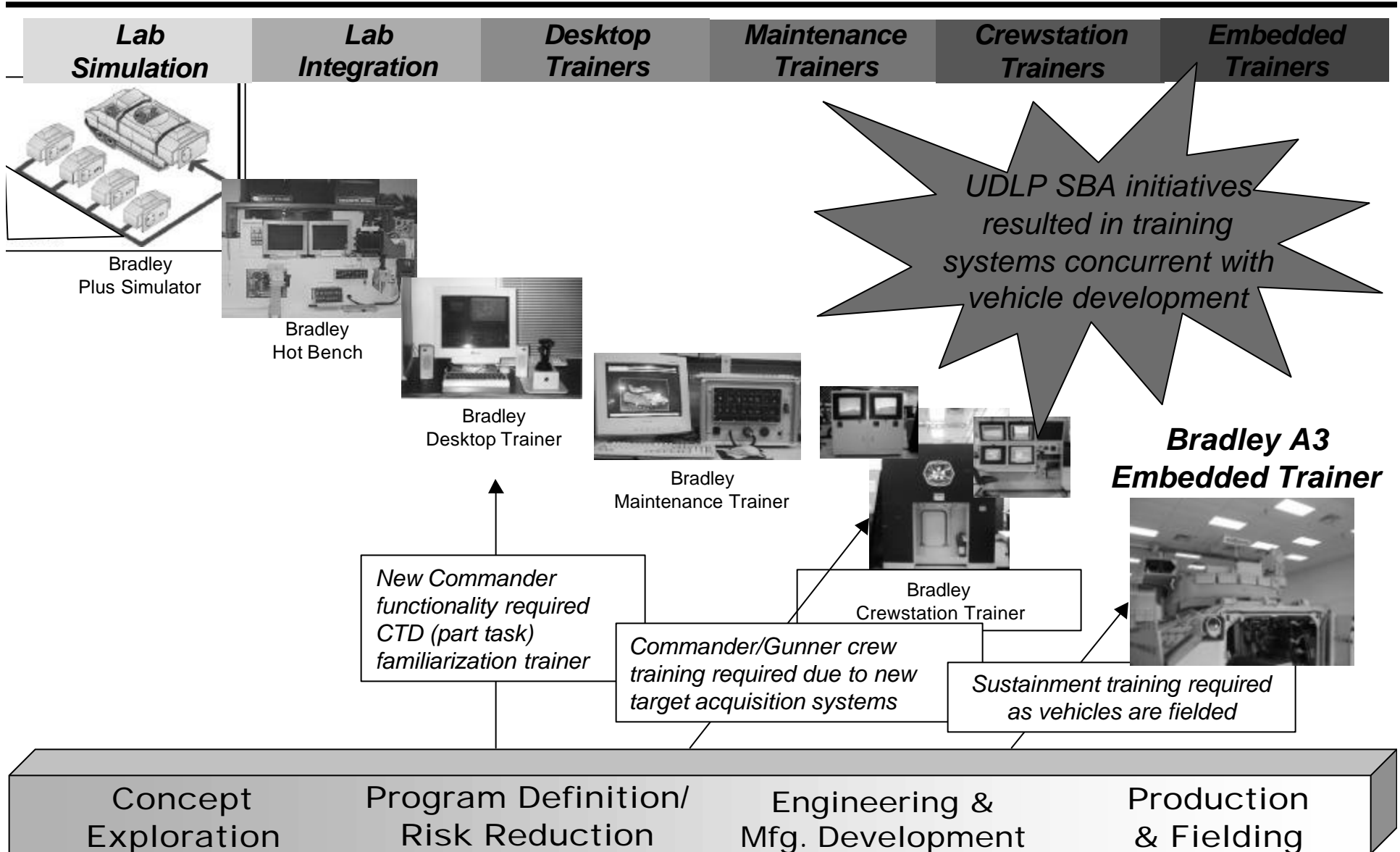
Report Documentation Page

Report Date 29May2001	Report Type N/A	Dates Covered (from... to) -
Title and Subtitle Embedded Training Solution for the Bradley Fighting Vehicle (BFV) A3	Contract Number	
	Grant Number	
	Program Element Number	
Author(s) Bernard, John R.; Alban, Angela M.	Project Number	
	Task Number	
	Work Unit Number	
Performing Organization Name(s) and Address(es) United Defense, L.P. Orlando, Florida	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 11		

Overview

- Bradley Fighting Vehicle (BFV) A3 Training System Development
- United Defense's Approach to SMART and SBA initiatives
- Bradley A3 Embedded Trainer (BATS-E)
- BATS-E integration into platform
- SMART Applications to Bradley A3

Bradley Training System Development

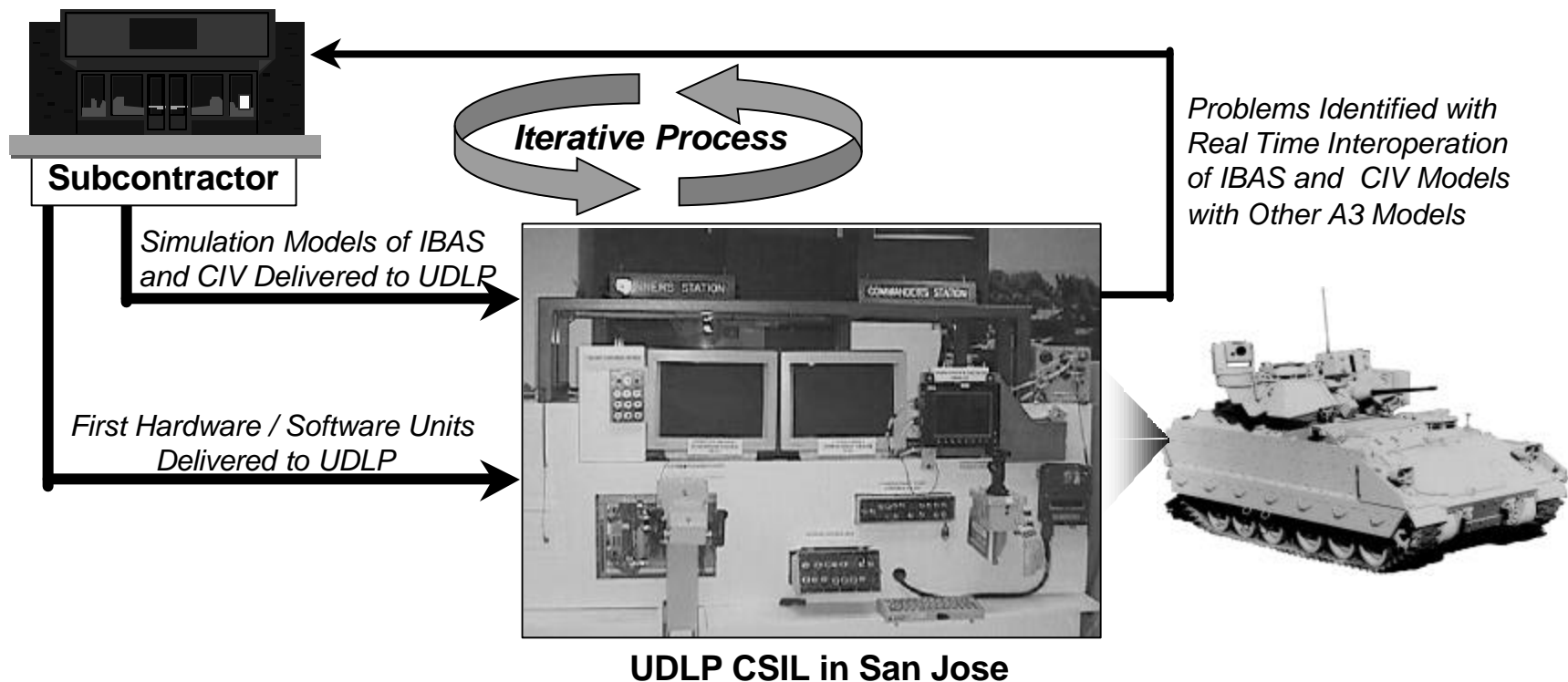


UDLP SBA initiatives resulted in training systems concurrent with vehicle development

SBA Enhances UDLP Development

United Defense

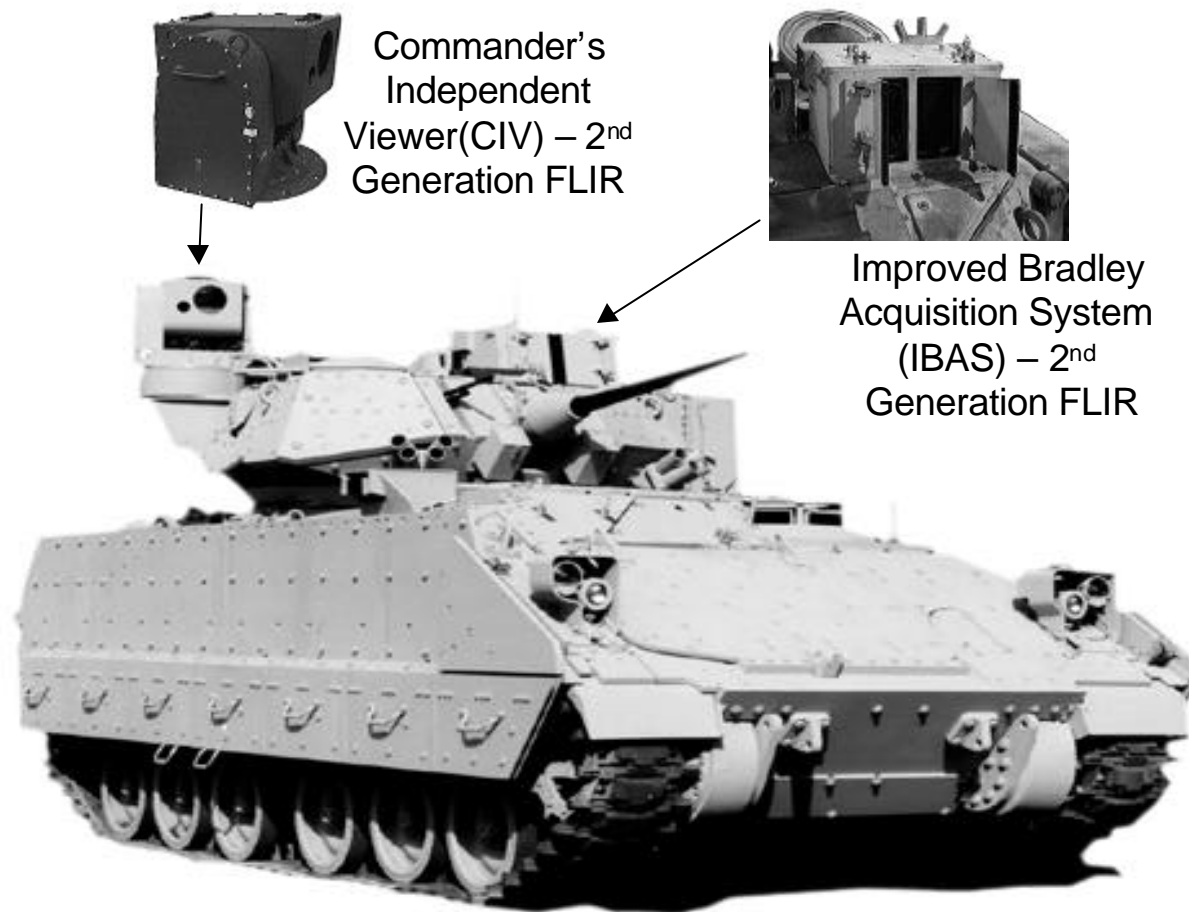
- Significantly reduces integration time, cost, and program risk
- Design flaws/problems are identified early - before commitment to design
- Simulated models accurately represent actual hardware
 - Allows for use of actual vehicle software in training devices
 - Training Device software is easier to integrate into real vehicle



Bradley Fighting Vehicle (BFV) A3

United Defense

- Integrated Force XXI Battle Command Brigade and Below (FBCB2) on-board vehicle
- 1553 Digital Databus
- On-board diagnostics system
- Training Device Interface Port
- Training Mode on Vehicle Software



BFV A3 is a modernized legacy system that facilitates embedded training by design....

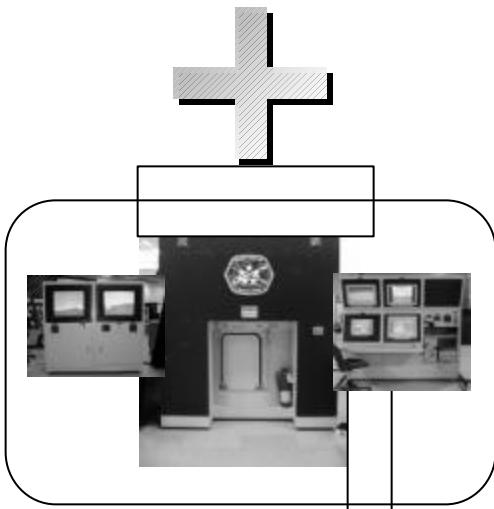
BATS-E Concept



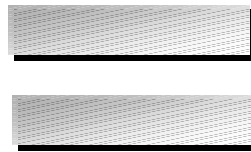
Bradley A3

Bradley A3 immersed in the synthetic battlefield using proven simulation technology

Bradley A3 Embedded Gunnery Training Device



Bradley Advanced Training System



BRADLEY A3 IMMERSSED IN THE SYNTHETIC BATTLEFIELD

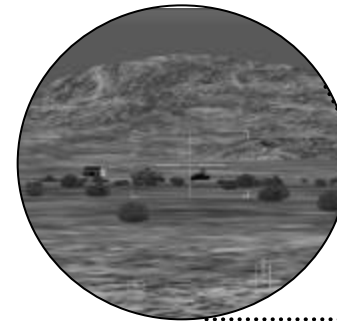
Bradley A3 Embedded Trainer Functionality

United Defense

- Target Generator
 - ModSaf Version 3.0 used to place targets on Database (allows for interoperability with other simulation devices)
- Actual Vehicle Tactical Code and Fire Control Solution
 - Realistic interaction between user and vehicle
- CCTT Interoperability
 - CCTT Primary Two (P2) Terrain Database
- Limited Gunnery Functionality
 - Degraded modes, back-up sight
- 2 main sights, camera, 2nd Gen FLIR
 - Simulates Day TV and FLIR, only in sights w camera view
- Image Generation
 - PC Based, one PC per video channel
- Exercise Management



*Bradley A3
Gunner*



*Bradley A3
Commander*



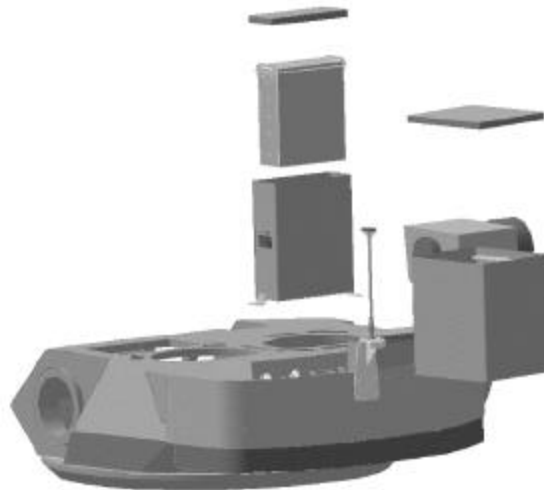
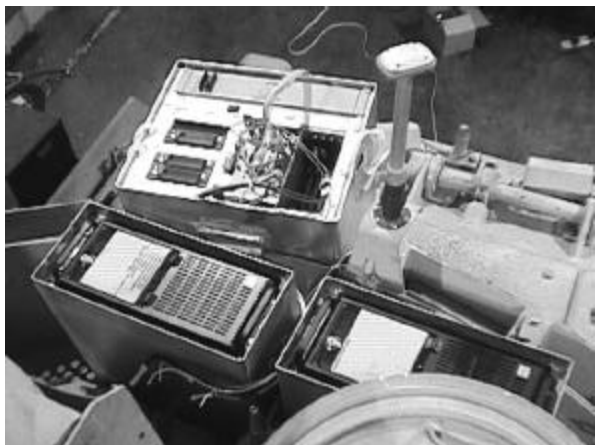
Vehicle Design Facilitates ET Development

United Defense

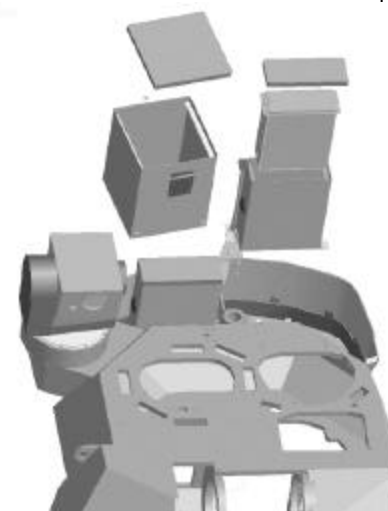
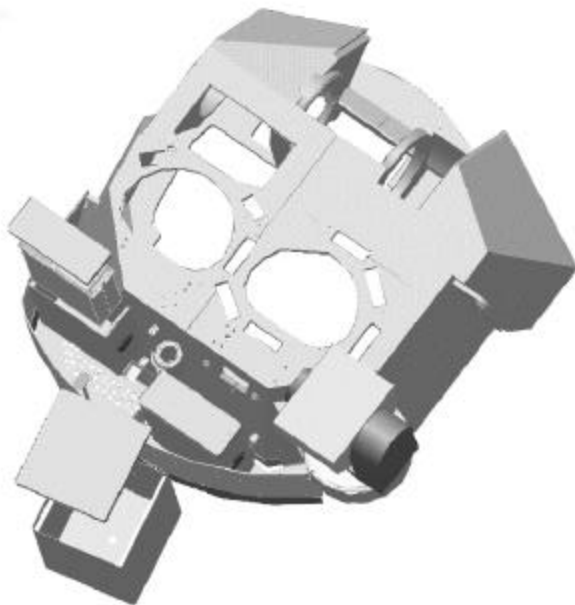
- **1553 Digital Data Bus Architecture**
 - Allows for monitoring of all communications between hardware and software on the vehicle.
 - BATS simulation uses simulated and actual 1553 data bus architecture
- **Video In/Video Out**
 - Connection in place for video input and output to and from two main sights
 - Crew interaction (generates 1553 digital data) drives synthetic visuals through primary sights
- **Power Out**
 - Vehicle power provides power for BATS-E appended simulation prototype
- **Ethernet Export Display**
 - Export of exercise control software on Commander's Tactical Display (CTD) allows commander to control all aspects of simulation from his normal user's interface
- **Training Mode Software**
 - Leveraged Precision Gunnery System (PGS) training mode embedded in the BFV A3 tactical (fire control) software
 - Software allows for control of various indicator LEDs, ammo tracking, and sounds

BATS-E Appended Equipment

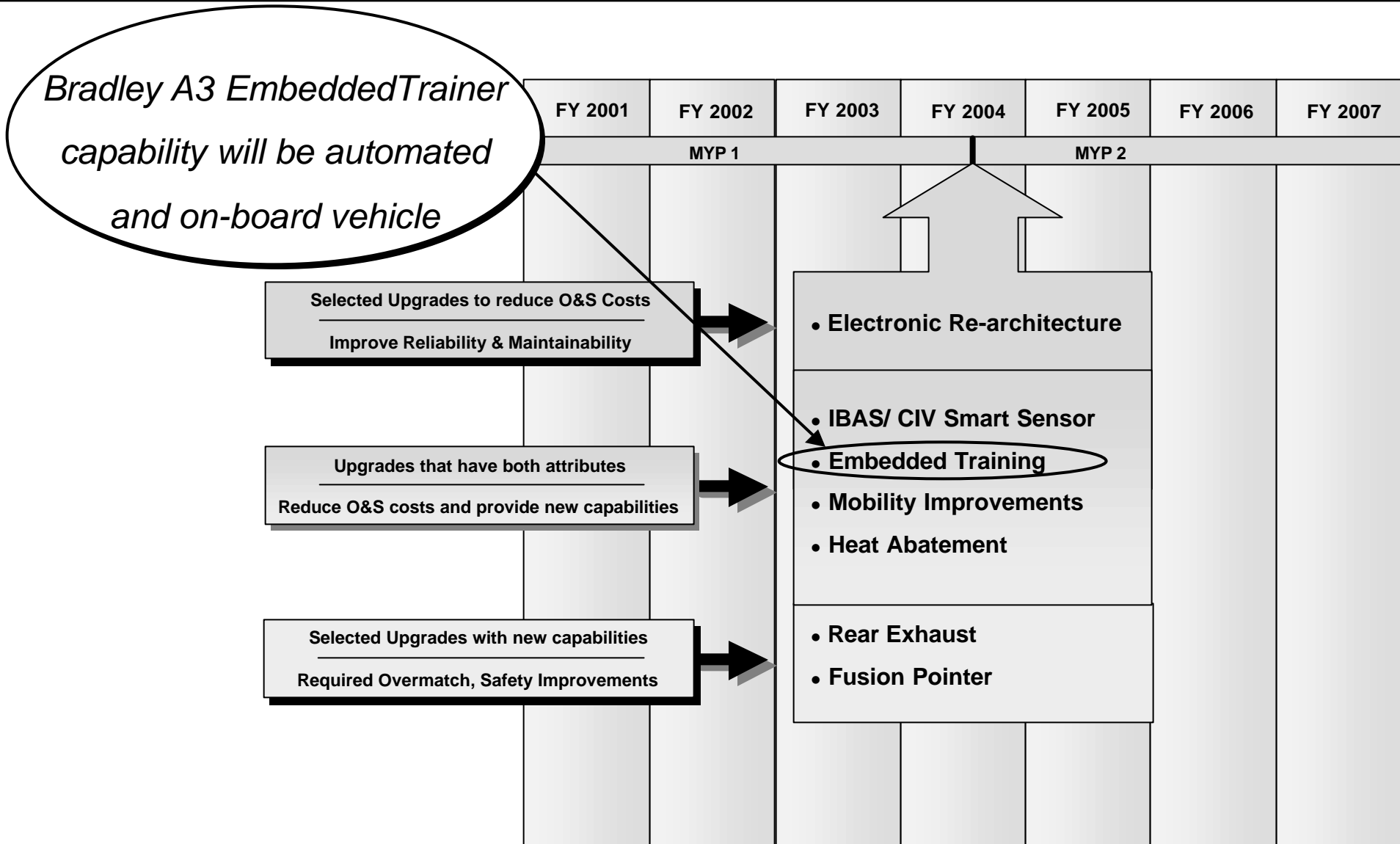
Commercial PC hardware running BATS simulation software...



.....and interfacing with vehicle video and 1553 data bus through Training Device Interface Port (TDIP)



Bradley A3 Technology Insertion Plan



SMART Application to Bradley A3

United Defense

- Applying SMART methodologies provides:
 - Training systems concurrent with vehicle software and hardware
 - Rapid prototyping of new training systems (i.e. Crewstation Trainer)
 - Prototyping allows for requirements evaluation and development
- Other added SMART benefits
 - Test earlier in the acquisition / development cycle
 - Conduct more extensive and comprehensive testing/planning
 - Reduced testing costs and training system costs
 - Training capabilities are concurrent with platform capabilities

SMART methodologies transition concurrent development of embedded training systems onto weapon system platforms