ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

May 2009

BUDGET ACTIVITY	PE NUMBER AND TITLE
5 - System Development and Demonstration	**0604665A - FCS Sustainment & Training R&D**

COST (In Thousands)		FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	Cost to Complete	Total Cost
FC6	FCS Network Hardware & Software	724397	556301	749182	Continuing	Continuing

A. Mission Description and Budget Item Justification: Provides the tools and capabilities necessary for a collection of systems composed of computers, sensors, and platforms linked together to achieve a single capability. This is accomplished through distributed functionality that consists of the following applications and interfaces: a distributed information management backbone, Communications; Intelligence, Surveillance and Reconnaissance (ISR); Command and Control (C2); and training and supportability. These elements are integrated and managed as the Battle Command System (BCS) software.

The information management backbone necessary for the distributed network is composed of the Integrated Computer System (ICS) and System of Systems Common Operating Environment (SoSCOE). The ICS consists of multiple computer processors, as well as network, graphics and memory cards, and is integrated with software functionality provided by a modified operating system (OS) and SoSCOE. SoSCOE serves as a middleware solution by separating software applications from the ICS hardware and OS. This isolates changes in the ICS from impacting software applications directly, reducing traditional integration and maintenance costs. It also provides services that network the collection of nodes (hardware and software applications) into a single, integrated system. SoSCOE addresses the needs of different system types, supporting real-time environments and platforms with processing and memory constraints. It also provides a suite of other services that are commonly required by BCS software applications that are loaded onto the ICS.

Application Software: 1. Communication applications include the Network Management System (NMS) which provides the management of voice, data, and video communications between multiple, mobile system platforms. The NMS manages these platforms as nodes that are changing due to availability and bandwidth limitations. 2. Integration of air and ground sensors data (images, video) into the common operational picture (COP) 3. Command and Control software provides battle command and mission execution, planning and preparation, and situational understanding, accessed through the Warfighter Machine Interface (WMI). 4. IBCT training will include training support packages, IETMs, representation of IBCT elements in current collective trainers, and embedded tactical training for appropriate platforms. Embedded training applications for MGV platforms will no longer be developed based on DAE direction and Congressional approval in FY10. 5. Supportability applications are composed of the Platform Soldier Mission Readiness System (PS-MRS), Logistics Decision Support System (LDSS), and Logistics Data Management Services (LDMS) subsystems and are integrated into the BCS, providing distributed logistical capabilities.

Software development is executed incrementally in five two-year build cycles (Build 0-4), aligning with program requirements. Each software build is initiated by a Build Definition Checkpoint (BDC), phasing software functionality. Development teams begin the software build with either a Life Cycle Objective (LCO) review or Software Specification Review (SSR) to assess build objectives and requirements. Following the LCO, either a Life Cycle Assessment (LCA) or Preliminary Design Review (PDR) is held. This review ensures that the product build to the architecture will be able to meet all of its functional and performance requirements. Additional checkpoints are executed throughout the FCS software build to ensure both horizontal and vertical consistency. A Test Readiness Review (TRR) is held prior to Functional Qualification Test (FQT) to ensure that all lower level testing has been completed and the qualification test procedures adequately test the requirements implemented during the build. Further integration and testing between software subsystems and hardware occurs within respective Software/System Integration Labs (SIL), until all software is integrated at the SoS Integration Lab (SoSIL). A Build Assessment Checkpoint (BAC) is completed to ensure that all software was tested, delivered, and integrated.

Common Network Hardware - Includes design, development and prototype procurement of common hardware (sensors, computer and common controller) required for implementation of the data network.

The ICS hardware is being commonly developed for each of the FCS platforms with the necessary computing resources, Information Assurance hardware, and Crew workstation processing to support the capabilities required of the FCS BCT. The ICS is being developed using commercial processing equipment but militarized to meet the Information Assurance requirements as well as meet the reliability needs for the harsh environments of a tactical mobile platform. With the termination of the MGV portion of the program ICS configurations will be reduced from 7 to potentially 4, to support the IBCT platforms.

In addition to the computing and communications equipment, the FCS C4ISR system includes a set of advanced common sensors that are deployed to the ground and air vehicle platforms. These sensors include the EO/IR sensor devices, the Laser Rangefinders/designators, Radars, and Acoustics sensors in common packages sized to support the needs of the remaining FCS platform. There will be approximately 10 prototype ground sensor packages developed and delivered for platform qualification and Limited User Testing. There will be approximately 20 air sensor packages including EO/IR, laser rangefinder/designators, and STARLite SAR/GMTI products delivered and integrated into the Class I and Class IV UAVs.

The network (hardware and software) has been changed due to the restructuring of the MGV portion of the FCS program and the refocusing of the FCS program to spin out FCS technologies faster to the IBCT. The accomplishments, funding, and schedule reflected in this budget justification are based on preliminary analysis of the new direction and reduced program budget. Upon further resolution and detailed planning, adjustments may occur which could potentially change planned accomplishments, funding requirements, and program schedule. The budget justification program schedule reflects the current FCS program. The funding and accomplishments are a top-level attempt to incorporate the new direction to refocus the FCS program.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

May 2009

BUDGET ACTIVITY	PE NUMBER AND TITLE
5 - System Development and Demonstration	**0604665A - FCS Sustainment & Training R&D**

B. Program Change Summary	FY 2008	FY 2009	FY 2010
Previous President's Budget (FY 2009)	647649	539145	334085
Current BES/President's Budget (FY 2010)	724397	556301	749182
Total Adjustments	76748	17156	415097
Congressional Program Reductions		-1844	
Congressional Recissions			
Congressional Increases		19000	
Reprogrammings	94641		
SBIR/STTR Transfer	-18121		
Adjustments to Budget Years	228		415097

Change Summary Explanation: Funding - FY10 - Additional Funding is realigned to meet NSA Information Assurance Requirements.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

May 2009

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
5 - System Development and Demonstration	**0604665A - FCS Sustainment & Training R&D**	**FC6**

COST (In Thousands)		FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	Cost to Complete	Total Cost
FC6	FCS Network Hardware & Software	724397	556301	749182	Continuing	Continuing

A. Mission Description and Budget Item Justification: Please see Exhibit R-2.

Accomplishments/Planned Program:	FY 2008	FY 2009	FY 2010
SOSCOE Development FY08: Completed development and pre-Formal Qualification Test (FQT) of SoSCOE Build 2.0 in support of Spin-Out. Completed FQT of SoSCOE Build 2.0 in 2Q FY08. Integrated with ICS Build 2.0 and integrated into IMT-1 and BCS B2E for SO1. SoSCOE Build 2.0 functionality includes updates to previously included services, as well as initial functionality provided for Information Assurance, Input/Output, OS Abstraction, and Software Support Services. SoSCOE Build 2.0 also includes full functionality for System Services. Approximately 60% cumulative functionality delivered based on original program software sizing estimates. Completed SoSCOE Build 2.5 Life Cycle Objectives (LCO) and Life Cycle Assessment (LCA) Reviews. Detailed Design, Code, and Unit Test completed. SoSCOE Build 2.5 will include full functionality for Information Assurance Services. Purchased and maintained COTS License Agreements for all software supplied.	95845		
SOSCOE Development FY09: FQT and release SOSCOE Build 2.5 to support FCS SW Build 2 Final. Approximately 60-70% cumulative functionality will be delivered based on original program software sizing estimates. SoSCOE Build 2.5 will include full functionality for Information Assurance Services. Begin requirements Analysis, Design, Code, and Unit Test for SoSCOE Build 3.0, leading to an engineering release delivered in 4Q FY09. The completion of SoSCOE Build 3.0 will include full functionality for Administrative, Communication, Configuration and Control, TIN, and Web Services. Purchase and maintain COTS License Agreements for all software supplied.		50200	
SOSCOE Development FY10: FQT and release SOSCOE Build 10.3 and 10.4 (new numbering system) to support T-IBCTs. Approximately 75-80% of the cumulative functionality, based on original program software sizing estimates, will be delivered in this release and will include full functionality for Administrative, Communication, Configuration and Control, and Web Services. Begin requirements Analysis, Design, Code, and Unit Test for SoSCOE Build 10.4 leading to an engineering release delivered in 4Q FY10. Purchase and maintain COTS License Agreements for all software supplied. For E-IBCT, continue the resolution of software integration issues and incorporation of cross domain guard, GSE and JTRS NSA certified radio and associated waveforms. Begin developmental planning for the T-IBCT and the new combat vehicle platform network integration.			79606
Communication Systems Software FY08 - Build 2 Early Detailed Design, Code and Unit Test completed. B2E includes initial functionality for Network Data Management (NDM)/Adaptor Management System (AMS), Security Management, and Embedded Training.	19083		
Communication Systems Software FY09: Complete Build 2 Early FQT of Network Management software 3Q FY09. Approximately 50-55% cumulative functionality delivered based on original program software sizing estimates. This included initial functionality for Network Data Management (NDM)/Adaptor Management System (AMS), Security Management, and Embedded Training. Complete Life Cycle Architecture (LCA) checkpoints for Build 2 Final 2Q FY09. Complete ER2 for Build 2 Final. NMS Build 2 Final will include		17811	

functionality for Fault Management. Complete Network Management System Build 3 Early Life Cycle Objective (LCO) review 4Q FY09.			
Communication Systems Software FY10: Complete Life Cycle Architecture (LCA) checkpoints for Build 3 Early 1Q FY10. Develop and FQT software for Build 2 Final 2Q FY10. Complete Network Management System Build 3 Early and Final Life Cycle Architecture (LCA) review and Build 3 Final Life Cycle Objective (LCO) review. For E-IBCT, continue the resolution of software integration issues and incorporation of cross domain guard, GSE and JTRS NSA certified radio and associated waveforms. Begin developmental planning for the T-IBCT and the new combat vehicle platform network integration.			27000
Battle Command Software FY08: Completed Initial Build 2 Early for Warfighter Machine Interface (WMI), Mission Planning and Preparation, Situational Understanding, and Battle Management & Mission Execution to support SO1 WMI Engineering Releases for early integration and FQT delivery (3Q08) made available to Battle Command Partners.	109574		
Battle Command Software FY09 - Complete Build 2 Early FQT for Warfighter Machine Interface (WMI), Mission Planning and Preparation, Situational Understanding, and Battle Management & Mission Execution. Approximately 45-50% cumulative functionality delivered based on original program software sizing estimates. Initial start of Build 2 Final development.		63964	
Battle Command Software FY10: Complete Build 2 Final FQT for Warfighter Machine Interface (WMI), Mission Planning and Preparation, Situational Understanding, and Battle Management & Mission Execution. Approximately 60-70% cumulative functionality delivered based on original program software sizing estimates. Initial Start of Build 3 Early development. For E-IBCT, continue the resolution of software integration issues and incorporation of cross domain guard, GSE and JTRS NSA certified radio and associated waveforms. Begin developmental planning for the T-IBCT and the new combat vehicle platform network integration.			71569
Networks Management FY08 - Provided requirements management, contract management, technical guidance, horizontal integration and architectural oversight of the NMS contract. FY08 - The NMS developed and released two configurations of NMS software for the B2E, B2E CVT (classified verifications test) and B2E FF (future force). The major milestones are B2E TRR, B2E, FQT, B2F, LCO, B2F, LCA. The functionality of B2E two configurations (B2E CVT, B2E FF) included: Dual Enclave Support, SO1 CVT IA Upgrades, Interface To SOSCOE RBAC, File Access Control, Digital Signatures, PKI User Authentication, Audit Logging, Password Management, Software Upgrades/Patches, (CR 300) LynxSE-based Qos Request Agent, Re-Host NMS QoS Agent On Lynx SE, (CR 278) SRW1.0c And CI Mgmt Upgrades To Planning And Management, SRW 1.0c Configuration and Monitoring Changes For GMR EDM (B- Kit) and HMS (U-UGS/T-UGS) Support, Controlled Interface Management, Start/Stop Message Flow, Status.	16403		
Network Management FY09 - Provide requirements management, contract management, technical guidance, horizontal integration and architectural oversight of the NMS contract. The NMS will complete development of B2E NMS software and start on Build 2 Final NMS software. The major milestones for FY09 are B2E TRR, B2F LCO and LCA and B3E LCO. The functionality of B2E should include: FCS Network Planning Capacity Updates, Network Planning Integrated with BC Mission Planning (PPS), Quality of Service (QoS), Bandwidth Budgets, FCS Network Mgmt Interface To BC Logistics(PS-MRS), Performance Monitoring Updates, IA access control and audit Logs, Plan and configure dual security enclaves, and password management.		18248	
Networks Management FY10: Provide requirements management, contract management, technical guidance, horizontal integration and architectural oversight of the NMS contract. During this fiscal year, NMS will develop B3E NMS software and finalize delivery and FQT B2F software. Major milestones during this period are B2F FQT, B3E LCA, B3F LCO, and B3F LCA. The B2F functionality consists of: Net Planning - Planning for the Build 2 Final network architecture, Network Topology Planning, Spectrum Planning, QoS planning, admission control, traffic class, bandwidth, Network Tier planning WNW, Fault management for B2F elements, Dynamic Role			27387

Management of NMS, Spectrum planning for WNW and SRW, Interface to JTRS NMSs (JWNM 4.0 and SRW NM1.0+). For E-IBCT, continue the resolution of software integration issues and incorporation of cross domain guard, GSE and JTRS NSA certified radio and associated waveforms. Begin developmental planning for the T-IBCT and the new combat vehicle platform network integration.			
Fusion Software FY08 - Sensor Data Management (SDM) and Level One Fusion (L1F) completed FCS SW Build 2 Early SO to support SO with approximately 45-50% cumulative functionality delivered. FCS SW Build 2 Final Life Cycle Objectives (LCO) and Life Cycle Assessment (LCA) Reviews held for SDM and L1F. Detailed design and coding initiated.	21650		
Fusion Software FY09 - Completed Build 2 Early FQT for Sensor Data Management (SDM) and Level One Fusion (L1F) and currently integrating this into the E-IBCT. Initial start of FCS SW Build 2 Final including Life Cycle Assessment (LCA) Reviews held for SDM and L1F. Detailed design and coding initiated. Initial Exploitation Tools and Embedded Training functionality to be provided by L1F.		10792	
Fusion Software FY10: Complete Build 2 Final FQT for Sensor Data Management (SDM) and Level One Fusion (L1F) capturing approximately 65%-75% cumulative functionality based on original program software sizing estimates. Build 2 Final includes the completion of Kernel functionality for SDM. Begin effort for FCS SW Build 3 Early.			9923
Embedded Training Software FY08 - Performed integration with SoSCOE versions 1.5, 1.8, and 2.0. Initiated integration with WMIS. Completed FQT of Training Common Components (TCC) for FCS SW Build 2 Early. Complete Life Cycle Objective (LCO) checkpoint for TCC to support FCS SW Build 2 Final.	12736		
Embedded Training Software FY09 - Complete integration with SoSCOE 2.5. Continue integration with WMIS. Complete Life Cycle Architecture checkpoint of TCCs to support FCS SW Build 2 Final. Provide Build 2 Final (B2F) Engineering Releases in 2Q and 4Q FY09 to support early integration with FCS Manned Ground Vehicle (MGV). Due to Termination of FCS MGVs the embedded training requirement for FY10 and out was also curtailed		21152	
Contractor Logistics Products Application Integration FY08 - Completed design, code, and unit test for LDSS and PS-MRS. Completed pre-FQT to support early integration activities within the Software Integration and Test (SWIT) lab for Battle Command System (BCS) Build 2 Early. Completed FQT scheduled in 3Q FY08 to support FCS SW Build 2 Early. Approximately 20-25% logistical functionality available at the completion of Build 2 Early. Completed FCS SW Build 2 Final LCO and LCA reviews for LDSS, LDMS, and PS-MRS.	36970		
Contractor Logistics Products Application Integration FY09 - Complete design, code, and unit test for Build 2 Final LDSS, LDMS, and PS-MRS with pre-FQT in 3Q FY09. Build 2 Final FQT scheduled for 4Q FY09. Approximately 40-45% of the original program logistical functionality will be delivered by Build 2 Final, including initial Interactive Electronic Technical Manual (IETM) viewer capabilities. Complete FCS SW Build 3 Early LCO and LCA reviews for LDSS, LDMS, and PS-MRS.		1953	
Contractor Logistics Products Application Integration FY10: Complete Build 3 Early FQT in 3Q FY10 for PS-MRS and LDSS, as well as a beta-release of LDMS. Will conduct trade study to determine most cost effective means of managing PBL data (LDMS versus LIW). The completion of Build 3 Early represents approximately 55-60% logistical functionality based on the original program's software sizing estimates. For LDSS, this will include enhanced Sustainment Plan Generator, Plan Execution and Monitor, Readiness Assessor, Service Request Handler, Support Services, and interface development with Warfighter Machine Interface System (WMIS), Situational Understanding (SU) and Battle Command and Mission Execution (BCME). For PS-MRS, Build 3 Early software will include enhanced Diagnostics and Prognostics. For E-IBCT, continue the resolution of software integration issues. Begin developmental planning for the T-IBCT and the new combat vehicle platform network integration.			2629
Ground Sensors Integrator Hardware FY08 - Conducted PDR for the Ground Sensor Suite, SREO and SUGV EO/IR Sensors. Conducted CDR for SUGV EO/IR Sensor, MREO and the CEEU. 720 drawings were completed.	187831		

Ground Sensors Integrator Hardware FY09: Conduct Prototype Readiness Reviews (PRR) for the following sensors: Multi function RF (MFRF), Combat ID, and SUGV EO/IR. Commence deliver the following 5 Sensor prototype hardware; CID and SUGV EO/IR. Complete 8 MFRF deliveries. Conduct CDR for the GSS. Conduct PDR for EMS and acoustic sensor. There will be approximately 1,002 drawings reviewed.		173750	
Ground Sensors Integrator Hardware FY10: Complete delivery of 5 SUGV EO/IR. Design/development efforts to support incorporation of 3rd Gen FLIR within MREO sensor package. Completion of design work on MREO light and acoustic sensors. Commence procurement of 5 MREO ("Light" with 3rd Gen FLIR) with delivery of 1 in FY10 and 4 in FY11. Commence procurement of 4 acoustic sensors. There will be approximately 400 drawings released.			223253
Air Sensor Hardware FY08 - Updated Technical Performance Measures (TPMs) based on sensor PDRs, CDRs and verification testing (CL I & IV). C4ISR SIL Integration effort started in 3Q FY08. CL IV UAV - Continued Prototype development of ASTAMIDS and EO/IR sensor into a single sensor. Continued Prototype development of Synthetic Aperture Radar (SAR) / Ground Moving Target Indicator (GMTI). Delivered 1 SAR Emulator to support initial SIL integration: Continued Hardware and Software development of the Aided Target Recognition (AiTR). Continued Software qualification tests for the Class IV AITR software that ASI's Air Sensor Developer was developing. The testing was performed at an ASD to ASI level with LSI and government witnessing. Delivered 3 Emulators with AiTR Algorithms Embedded. C4ISR SIL Integration effort started in 1Q FY08.	16784		
Air Sensor Hardware - FY09 - CL IV UAV - Delivered 1 ASTAMIDS emulator to SIL, conducted Contractor Field Test. Deliver 1 Emulator to support initial SIL integration: Continue Software development of the Aided Target Recognition (AiTR). Continue Software qualification tests. Deliver 2 Emulators with AiTR Algorithms Embedded for SIL integration.		11376	
Air Sensor Hardware FY10: Deliver approximately 5 ASTAMIDS CL IV Sensors. Deliver 4 SAR/GMTI Sensors. Deliver 2 AiTR software packages. Deliver 3 Electro Optical Infrared (EOIR/LD) Class 1 Sensors. Evaluate alternatives for UAV threat detection.			26506
Communication Hardware (Air and Ground) - FY08: Delivered 2 Air Platform Comm Systems (APCS) Payloads to C4 SIL, and 9 to UAV IV. The APCS provided target designation, mine detection, communications extension, long endurance persistent staring, wide area surveillance, and chemical detection for the FCS BCT at the brigade level and supports manned/unmanned teaming operations with manned aviation. Delivered 1 Ground Platform Comm Systems Payloads to BAE SIL. Conducted Air Platform Comm Systems Class IV CDR. Conducted Network Systems PDR 4Q FY08. Ground Platform Comm Systems Payloads MGV; CDR in FY08. Delivered 4 Ground Control Stations (GCS) to UAV. Delivered GMR and HMS EDMs Radios to UAV and SUGV SILs. Delivered 2 Ground Platform Comm Systems Payloads to C4IT, and 4 to MGV.	46409		
Communication Hardware (Air and Ground) - FY09: Deliver HMS SFF-D to UAV and UGV (SUGV1). Deliver Integrated Communication Suites to C4ISR, MGV, and UGV System Integration Laboratories (SILs). FY09 Networks Hardware efforts: Upgrade Radios (HMS and GMR) with SRW 1.0c. Change Surrogate Radios (MSRT and ZigBee in T-UGS and MSRTs in U-UGS) with HMS SFF-A in preparation for E-IBCT. Continue C4ISR HW Deliveries to Systems/Platforms. Complete preliminary design of Integrated Platform Communications System (IPCS) for T-IBCT. Preparation, presentation and acceptance of IPCS Critical Design Review (CDR). Begin detailed design of FCS components of T-IBCT IPCS. Begin detail design of common controller which will support UAV Class I, SUGV, ARV-L.		28800	
Communication Hardware (Air and Ground) - FY10: Complete detailed design of T-IBCT Integrated Platform Communications Systems (IPCS). Preparation, presentation and acceptance of T-IBCT IPCS Critical Design Review (CDR). Prepare test stations and conduct final integration and test acceptance T-IBCT Payloads. Deliver System Integration Lab Payloads to T-IBCT platform integrators.			28225

Deliver remainder of System Development and Demonstration (SDD) payloads for T-IBCT platforms to government field testing. Prepare and deliver Payload Training Support Packages. Anticipated deliveries include: GMR (IBCT SO-34), GPCS: (HMMWV-14 and SUGV -6), HMS:(SFF-D-40), APCS: (UAV-4). Refurbishment of B-Kits and upgrade of radios to support OA testing. Initial delivery of 4 common controller prototypes to begin qualification testing.			
ICS - Computer Processing, Hardware and Software FY08 - ICS Hardware: Delivered 1 ICS Type VI Brass boards (a full ICS ship set in terms of form fit & function). Delivered 2 ICS Prototypes (a Prototype is a brass board ship set that has successfully passed formal qualification testing). Retrofit 21 ICS type VI Prototypes. A Retrofit activity in place to correct some hardware deficiencies in the type VI computers delivered in support of SO1. Another retrofit in FY08 to upgrade 10 of those computers to the dual domain computer needed for the CVT in FY09. Delivered 9 ICS Type 8 Emulators.ICS Software: Completed development of the ICS Objective Operating System (OOS) Build 2.5 with SQT on Software Development Unit (SDU) to support FCS SW Build.	97768		
ICS - Computer Processing, Hardware and Software FY09: Plan to deliver 74 Software Development Units (SDU). The SDUs represent a cost-effective emulation of the ICS. They are as close in function as COTS and cost allow. The SDUs are typically used by application developers. The SDUs contain a subset of CPU cores found in the final ICS configuration. Plan to deliver 20 ICS Emulators. Emulators are defined as 19" rack mountable 1U 'pizza box' computers that approximates a complete ICS ship set, i.e. it will have roughly the same number of CPU cores found in the final deliverables. It will not have Info Assurance or Built-in-Test. The emulator is essentially a Software Development Unit that's sized equivalent to full ICS ship set. Emulators are non-form/fit, affordable commercial approximations of an ICS ship set primarily for use as a preliminary software integration test bed. ICS Type I Emulators, qty. 3; ICS Type II Emulators, qty. 7; ICS Type IV Emulators, qty. 5; ICS Type VII Emulators, qty. 5. In addition to Emulator deliveries, the ICS program will deliver 1 ea Brass Board Type VIII computers in support of the SUGV program, and 26 ea Dual Domain Prototype Type VI computers in support of the IBCT conducted at Ft. Bliss. ICS Software: Conduct Life Cycle Objective (LCO) Review for ICS Build 3.0 L5OS and RTOS. Engineering Release of ICS Build 2.5 L4OS and Build 3.0 RTOS. Functional Qualification Test (FQT) of ICS CDG to support Current Force CVT and IBCT. Delivery Build 2.5 L4OS in support of SDU and Emulator deliveries. Conduct Life Cycle Architecture (LCA) review for ICS Build 3.0 L5OS and RTOS for FCS SW Build 3 Early. ICS Build 3.0 includes full functionality for Video Graphics and Maintenance Support. Provide fully integrated ICS software architecture of Build 2.5 L4OS, Build 3.0 RTOS and Build 2.5 Future Force CDG Engineering Release to support platform IQT's. Start activities for ICS Build 3.0 to support delivery in FY10.		86986	
ICS - Computer Processing, Hardware and Software FY10: Deliver approximately 15 Emulators - ICS Type IV qty 8, ICS Type VII qty 7. Deliver approximately 15 ICS Brass-boards- ICS Type IV qty 8, ICS Type VII qty 3, and ICS Type VIII qty 4. Deliver 7 additional ICS Type VIII Prototypes. Deliveries of these items are scheduled to be made to various LSI SILs, platform developers, platform integrators, and test facilities. ICS Software: Conduct Life Cycle Objective (LCO) Review for ICS Build 3.5 L5OS and RTOS. Functional Qualification Test (FQT) of ICS 3.0 L5OS and RTOS to support platform Integrated Qualification Tests (IQT). Conduct Life Cycle Architecture (LCA) review for ICS Build 3.5 L5OS and RTOS FCS SW Build 3.5 Early. Release ICS Build 3.5 L5OS and RTOS Engineering Release for integration with FCS SW Build 3.0 Final. Deliver Early Engineering Release of ICS Software Separation Kernel to provide multi-security enclave video on a single display. ICS Build 3.5 includes full Fault Management, Audit Logging, Device Driver and Bootstrap functionality. Refurbishment of B-Kits to support OA testing.			125045
Contractor C4ISR System IAT&C - FY08 - Integration of Battle Command software applications in the Software Integration Team (SWIT) to support delivery of Battle Command System (BCS) for SO1 CVT and Build 2 Engineering Iteration (EI). This included integration of WMI, SoSCOE Build 2.0 and ICS Objective Operating System (OOS) Build 2.0 with other Battle Command Applications prior to completion of the BCS Build 2 Early DSQT. C4ISR level Integration, Test Planning, Test Execution, and Test results analysis	35340		

for equipment that is integrated and tested at the C4ISR level for later incorporation as a unit to another product, such as a vehicle. Integrated and tested the suite before delivering it for integration into the vehicle. Included management and integration of sensor, communication and computer hardware and software in the SIL and integration of network management, Battle Command and ISR Fusion software packages from partners into SOSCOE conducted in the SIL.			
Contractor C4ISR System IAT&C - FY09 - BCS Build 2 Early NSQT scheduled for 3Q FY09 within the SWIT. BCS Build 2 Early software delivered to C4ISR SIL for Hardware/Software integration. Cumulative integrated BCS functionality at approximately 40-45% based on original program software sizing estimates. Capabilities provided during Build 2 Early include initial Situation Refinement, Weather Services, and Embedded Training support within Situational Understanding (SU); and initial capabilities for Incoming Order Processing, Airspace Control, Unmanned Payloads Control, Unmanned Vehicle Control, and Embedded Training support within BCME. NSQT for BCS Build 2 Final scheduled for 4Q FY09. The Build 2 Final delivery will capture approximately 60-65% cumulative Battle Command functionality based on original program software sizing estimates. This includes full functionality of the Embedded Training Common Components (TCC), as well as integration of SoSCOE Build 2.5 and ICS OOS Build 2.5. T/U UGS will be integrated with the B-kit during the Formal NSIV testing. This will include T-UGS Gateways, ISR and EOIR nodes and U-UGS gateways and intrusion/EO nodes.		26266	
Contractor C4ISR System IAT&C FY10: Complete NSQT for Build 2 Final BCS software in 1Q FY10. Cumulative integrated BCS functionality at approximately 60-65% based on original program software sizing estimates. Conduct early integration of Build 3 Early BCS software subsystems, with NSQT scheduled for 1Q FY11. For E-IBCT, resolve any remaining final A and B kit integration issues along with fixing hardware/software integration issues and software problem reports.			59892
FY08 GFX: GFX supported the LSI contractor efforts. Networks GFX included: The Network Analysis Integration Laboratory (NAIL) which provided C4ISR End-to-End (E2E) Network performance analysis to include analytical capability, scalable architecture, in a live, virtual and constructive (LVC) environment. The NAIL supported the LSI with analysis and enables the FCS Program to assess FCS network capability and requirements in specification and design; identify potential network and services performance gaps and emerging technical solutions to mitigate E2E network performance related risk; and provided design recommendation in support of Network Design Reviews (PDR), System of System PDRs and BC Requirements. It also mitigated risk associated with Joint, Multi-National, and Current Force interoperability and information assurance. JEFX08: Combined live air, space, naval, and ground forces, simulation, and technology insertion into a near-seamless warfighting environment. Focused on joint air operations in a Live Fly environment demonstrating Net-centric Interoperability, Joint Networked Fires, and Networked Sensors. JEFX08 examined improved network integration and joint interoperability: Demonstrated Joint/Multinational interoperability, demonstrated Current Force to Future Force interoperability, achieved assured Global Information Grid (GIG) connectivity, established capability for evolving enterprise services, and achieved shared situational awareness and understanding. Provided hardware to support Experiments 2 and 3, C4ISR End-to-End Network, Night Vision Labs, Joint Interoperability, and Multinational Interoperability. The C4ISR LVC environment was used to conduct analysis to conduct the detailed experimental design (e.g. entity lay down, entity movements, entity behaviors, etc.) specifically regarding phase 1 of Experiment 2 (e.g. JEFX 08).	28004		
FY09-FY10 GFX: NAIL will provide an analytical capability, scalable architecture, and live, virtual and constructive (LVC) environment enabling the FCS Program to assess FCS network capability; identify network and performance gaps and technical solutions to mitigate E2E network performance related risk; and provide recommendation in support of Network Design Review (PDR) and System of System PDR. Mitigate risk associated with Joint, Multi-National, and Current Force interoperability and information assurance. Perform E2E integrated network performance and risk analysis of the FCS Network supporting IBCT, to include: end-to-end network performance, voice and video architecture; ISR effectiveness; and analysis of service level deployment architecture for BC/SOSCOE applications at the		29424	63147

upper and lower echelons targeting IBCTs. Perform LVC Integration and Experimentation: Horizontal C4ISR E2E integration and LVC field analysis of Voice, Video, TeleOps, Information Assurance, etc. with emerging versions of BC and SOSCOE deployments. Perform network performance baseline analysis with full brigade representation on LVC environment. Perform Multinational Experimentation to support bilateral interoperability of service to service interface, collaborative services, joint fires, interoperability via the Secret/Releasable DISA domain, and domain guard interoperability. Perform Joint Interoperability Experimentation and Analysis. Integration of selected FCS communications, C4ISR, unmanned air and ground systems, and Soldiers, Airmen, and Marines combined with Army and Joint lethality enablers at the battalion, company, and platoon echelons with the Joint Services at tactical level. Analysis of Service Oriented Architectures within the Army, Navy, Air Force and DISA and the effects upon the FCS (BCT) mobile ad-hoc networks.			
FY10 SO A-Kit Dev: FY08-09 - The efforts were funded under 0604666A Project FC7. The FY10 efforts will continue the design effort for rewiring the power distribution to support in cab control of the B-kit; continue IQT testing of the production configuration of the B-kit; start development of the modular A-Kit for different HMMWV variants; start integration of the United Battle Command (UBC) into the HMMWV; start integration of a centralized controller into the HMMWV; update B-kit start up procedures for HMMWV due to software improvements.			5000
Small Business Innovative Research/Small Business Technology Transfer Programs		15579	
Total	724397	556301	749182

B. Other Program Funding Summary	FY 2008	FY 2009	FY 2010	To Compl	Total Cost
0604660A FCS Manned Grd Vehicles & Common Grd Vehicle Components	635846	782664	368557	Continuing	Continuing
0604661A FCS System of Systems Engr & Program Management	1292514	1414756	1067191	Continuing	Continuing
0604662A FCS Reconnaissance (UAV) Platforms	42772	57190	68701	Continuing	Continuing
0604663A FCS Unmanned Ground Vehicles	78826	102976	125616	Continuing	Continuing
0604664A FCS Unattended Ground Sensors	22007	17011	26919	Continuing	Continuing
0604646A Non Line of Sight - Launch System	246071	208009	88660	Continuing	Continuing
0604647A Non Line of Sight - Cannon	133139	89545	58216	Continuing	Continuing
0604666A FCS Spin Outs	84111	111032		Continuing	Continuing
0603639A FCS MRM	43068	40731		Continuing	Continuing
WTCV G86100 FCS Core Program	78932	154127		Continuing	Continuing
WTCV G86200 FCS Spin Out Program	1370	67268	327921	Continuing	Continuing
060525A - Manned Ground Vehicles			100000	Continuing	Continuing

Comment: Comp Programs: ASTAMIDS, WIN-T, JTRS-HMS, JTRS-GMR, STARLite SAR/GMTI, GSTAMIDS, JAVELIN, JCADS, JSLSCAD, DCGS-A, STRS-AMF,

FBCB2, OneTESS, OneSAF

C. Acquisition Strategy The original FCS Contract was awarded to the Boeing Company 30 May 2003 and definitized 10 Dec 2003. Boeing is responsible to PM FCS to provide SoSCOE development and, through various One Team Partners, the following: Communications Systems Software, Battle Command Software, Network Management, Embedded Training Software, Live Training Tactical Engagement Simulation System (LT-TESS), Contractor Logistics Products Application Integration, Ground Sensors Integrator Hardware, and will deliver the following prototype hardware to C4ISR SIL, UGV SILs, and MGV SILs, Air Sensor Hardware, Communication Hardware (Air and Ground), Integrated Computer System (ICS) processing, hardware and software. For FY 2010, the associated sensors and MGV software are being terminated. As the program transitions to an incremental development approach, the above will continue to be provided by Boeing to the E-IBCT and T-IBCT. Future Network activities to support the new combat vehicle program (to be initiated in FY10) will be acquired outside of the current Boeing contractual arrangement.

ARMY RDT&E COST ANALYSIS (R3)

May 2009

BUDGET ACTIVITY
5 - System Development and Demonstration

PE NUMBER AND TITLE
0604665A - FCS Sustainment & Training R&D

PROJECT
FC6

I. Product Development	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award Date	FY 2009 Cost	FY 2009 Award Date	FY 2010 Cost	FY 2010 Award Date	Cost To Complete	Total Cost	Target Value of Contract
SoSCOE / INFO MGT SYSTEM SOFTWARE	FAR	THE BOEING COMPANY, ST LOUIS, MO,		95845	1-3Q	50200	1-3Q	79606	1-3Q	Cont.	Cont.	
COMMUNICATIONS SYSTEMS SOFTWARE & NETWORK MGT SOFTWARE	FAR	THE BOEING COMPANY, ST LOUIS, MO, see remark 2		19083	1-3Q	17811	1-3Q	27000	1-3Q	Cont.	Cont.	
BATTLE COMMAND SOFTWARE	FAR	THE BOEING COMPANY, ST LOUIS, MO, see remarks 3,5,6,7		109574	1-3Q	63964	1-3Q	71569	1-3Q	Cont.	Cont.	
FUSION SOFTWARE	FAR	THE BOEING COMPANY, ST LOUIS, MO, see remarks 1, 7		21650	1-3Q	10792	1-3Q	9923	1-3Q	Cont.	Cont.	
EMBEDDED TRAINING SOFTWARE FY08	FAR	THE BOEING COMPANY, ST LOUIS, MO, all tier one subcontractors		12736	1-3Q	21152	1-3Q			Cont.	Cont.	
CONTRACTOR LOG PRODUCTS SOFTWARE	FAR	THE BOEING COMPANY, ST LOUIS, MO, see remarks 4,12,13		36970	1-3Q	1953	1-3Q	2629	1-3Q	Cont.	Cont.	
GROUND SENSOR INTEGRATOR HARDWARE	FAR	THE BOEING COMPANY, ST LOUIS, MO, see remark 8		187831	1-3Q	173750	1-3Q	223253	1-3Q	Cont.	Cont.	
AIR SENSOR INTEGRATOR SOFTWARE	FAR	THE BOEING COMPANY, ST LOUIS, MO, see remarks 9		16784	1-3Q	11376	1-3Q	26506	1-3Q	Cont.	Cont.	
COMMUNICATION	FAR	THE BOEING		46409	1-3Q	28800	1-3Q	28225	1-3Q	Cont.	Cont.	

HARDWARE - AIR & GROUND		COMPANY, ST LOUIS, MO, see remark 10										
ICS COMPUTER PROCESSING HARDWARE AND SOFTWARE	FAR	THE BOEING COMPANY, ST LOUIS, MO, see remark 11		97768	1-3Q	86986	1-3Q	125045	1-3Q	Cont.	Cont.	
Contractor SEPM	FAR	THE BOEING COMPANY, ST LOUIS, MO,		16403	1-3Q	18248	1-3Q	27387	1-3Q	Cont.	Cont.	
CONTRACTOR C4ISR SYSTEM IAT&C & MANAGEMENT	FAR	THE BOEING COMPANY, ST LOUIS, MO,		35340	1-3Q	26266	1-3Q	59892	1-3Q	Cont.	Cont.	
SO A-Kit Dev	CPFF	AM GENERAL, LIVONIA, MI						5000	1-3Q	Cont.	Cont.	
Government GFX	MIPR	PM FCS (BCT) St. Louis, MO		27776	1Q	29424	1Q	63147	1Q	Cont.	Cont.	
Subtotal:				724169		540722		749182		Cont.	Cont.	

Remarks: 1: Subcontractor: Lockheed Martin Integrated Systems and Solutions, San Diego, CA; (ISR Level 1 Fusion)
2: Subcontractor: Northrop Grumman Network Management Systems, Carson, CA; (Network Mgt Sys)
3: Subcontractor: Boeing Mesa, Mesa, AZ; (Warfighter Machine Interface)
4: Subcontractor: Northrop Grumman Mission Systems, Carson, CA; (Logistics Decision Support Software)
5: Subcontractor: Raytheon Network Centric, Fort Wayne, IN; (Battle Command & Mission Execution)
6: Subcontractor: Network Centric Systems/Austin Info Systems, Austin, TX; (Situational Understanding)
7: Subcontractor: General Dynamics C4 Systems, Scottsdale, AZ; (Sensor Data Mgt)(Planning & Preparation Services)
8. Subcontractor: Raytheon Network Centric Systems, Plano, TX; (Ground Sensor Integrator)
9. Subcontractor: Northrop Grumman Electronic Sys CMS, Belcamp, MD; (Air Sensor Integrator)
10. Subcontractor: BAE Systems, Wayne, NJ; (Air & Ground Communication Integration)
11. Subcontractor: General Dynamics Adv Info Sys, Bloomington, MN; (Integrated Computer Systems)
12. Subcontractor: Honeywell Defense & Electronics System, Albuquerque, NM; (Platform Soldier Mission Readiness System)
13. Subcontractor: IBM, Bethesda, MD; (Logistics Data Management Systems)

II. Support Costs	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award Date	FY 2009 Cost	FY 2009 Award Date	FY 2010 Cost	FY 2010 Award Date	Cost To Complete	Total Cost	Target Value of Contract
SBIR/STTR	Direct	OSD				15579	1-2Q			Cont.	Cont.	

ARMY RDT&E COST ANALYSIS (R3)

May 2009

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
5 - System Development and Demonstration	**0604665A - FCS Sustainment & Training R&D**	**FC6**

Adjustment to Budget Line	Direct	ABO		228	1-2Q						Cont.	Cont.	
Subtotal:				228		15579					Cont.	Cont.	

III. Test And Evaluation	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award Date	FY 2009 Cost	FY 2009 Award Date	FY 2010 Cost	FY 2010 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal:												

Remarks: All Test and Evaluation costs for this project are included in 0604661 FC2 SoS Engineering and Program Management project.

IV. Management Services	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award Date	FY 2009 Cost	FY 2009 Award Date	FY 2010 Cost	FY 2010 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal:												

Remarks: All Management Services costs for this project are included in 0604661 FC2 SoS Engineering and Program Management project.

Project Total Cost:		**724397**		**556301**		**749182**		**Cont.**	**Cont.**	

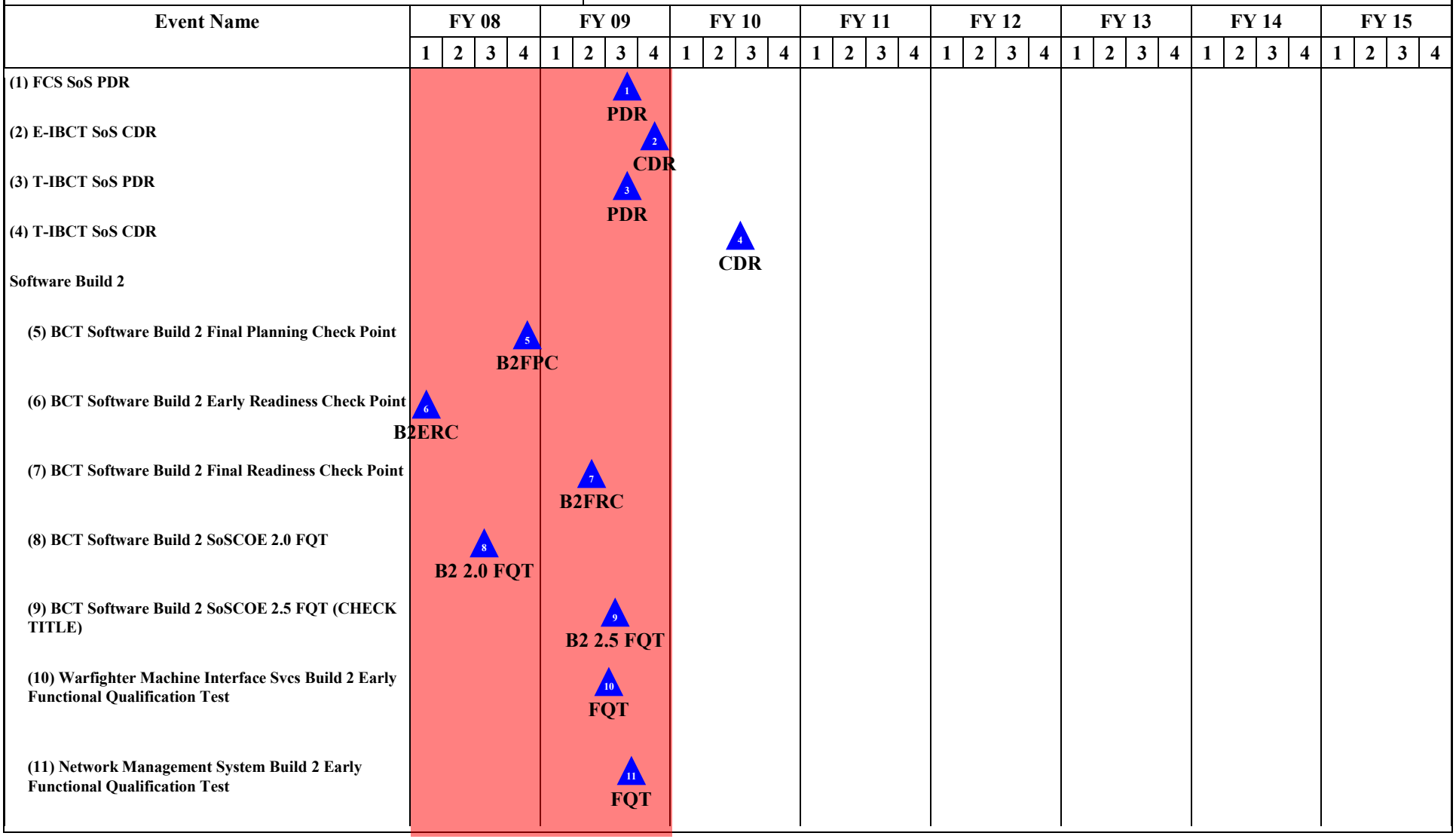
Schedule Profile (R4 Exhibit)

May 2009

BUDGET ACTIVITY
5 - System Development and Demonstration

PE NUMBER AND TITLE
0604665A - FCS Sustainment & Training R&D

PROJECT
FC6



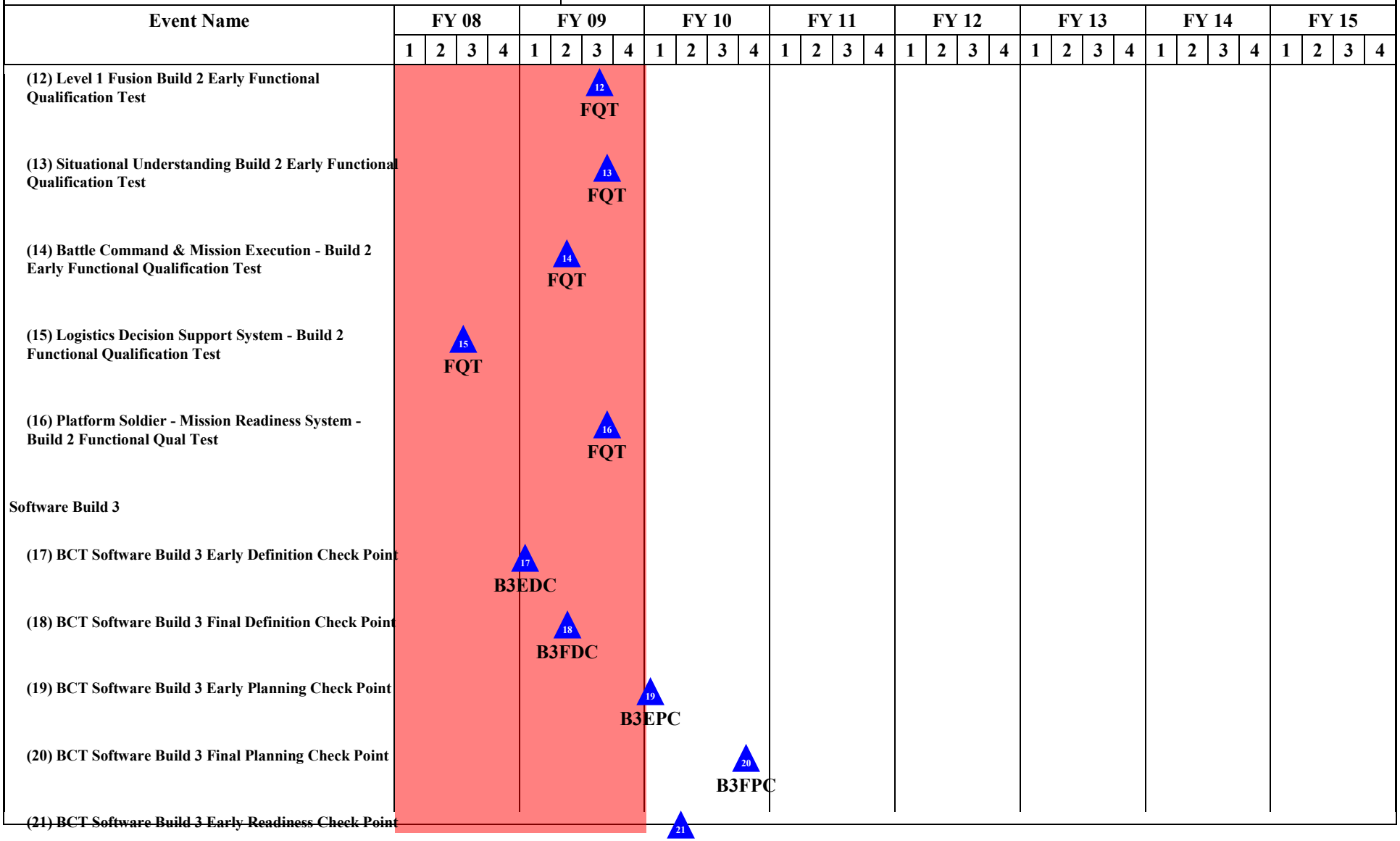
Schedule Profile (R4 Exhibit)

May 2009

BUDGET ACTIVITY
5 - System Development and Demonstration

PE NUMBER AND TITLE
0604665A - FCS Sustainment & Training R&D

PROJECT
FC6



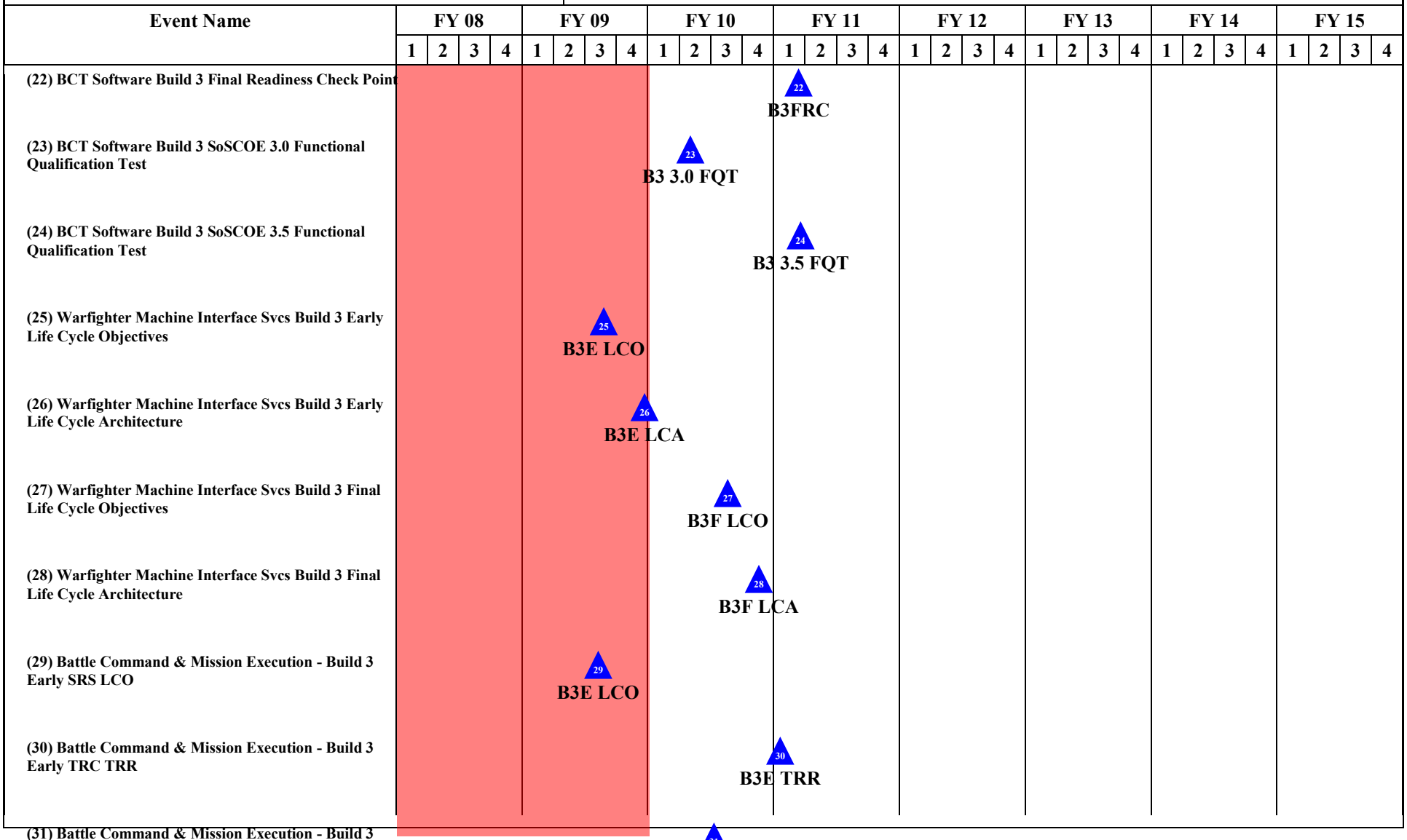
Schedule Profile (R4 Exhibit)

May 2009

BUDGET ACTIVITY
5 - System Development and Demonstration

PE NUMBER AND TITLE
0604665A - FCS Sustainment & Training R&D

PROJECT
FC6



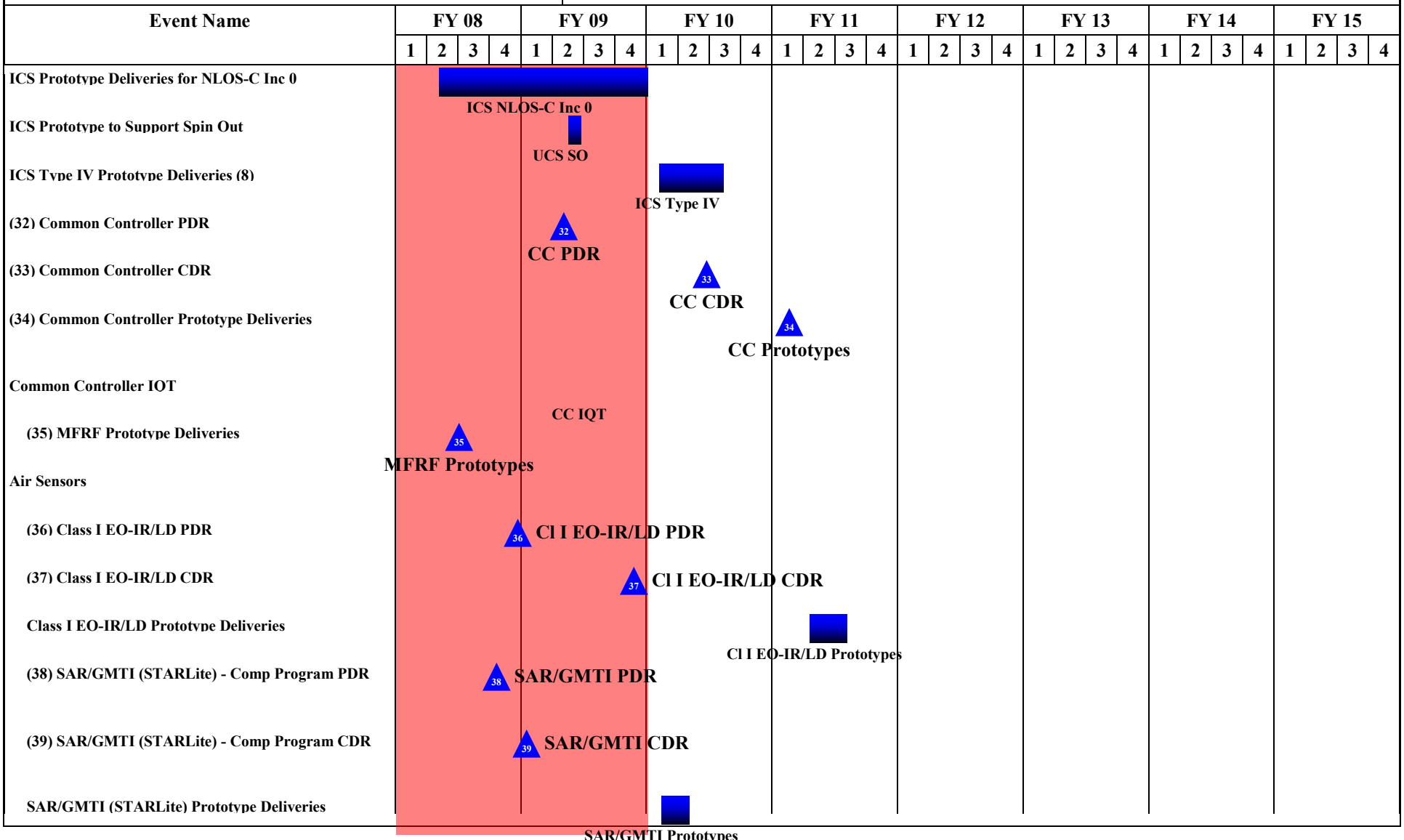
Schedule Profile (R4 Exhibit)

May 2009

BUDGET ACTIVITY
5 - System Development and Demonstration

PE NUMBER AND TITLE
0604665A - FCS Sustainment & Training R&D

PROJECT
FC6



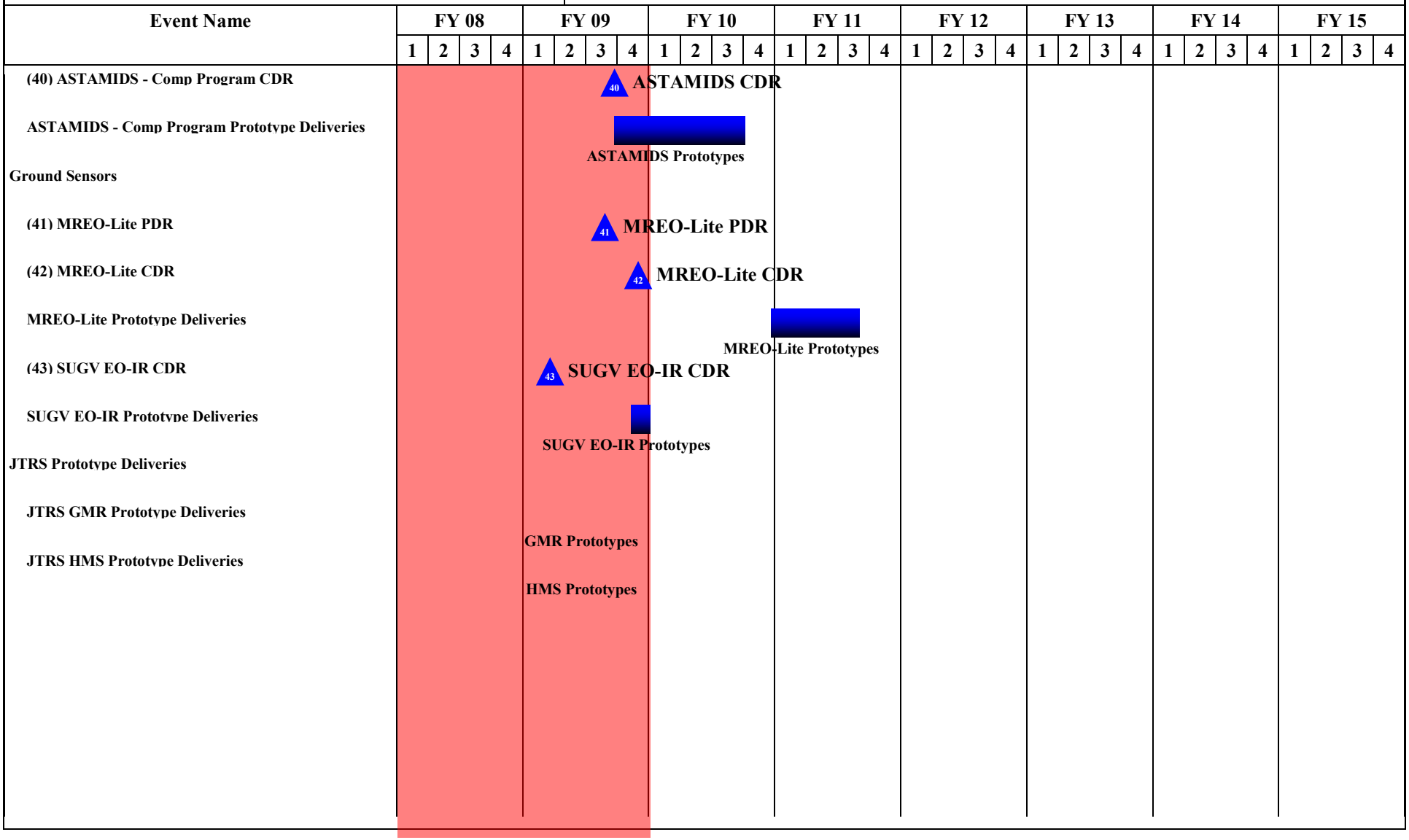
Schedule Profile (R4 Exhibit)

May 2009

BUDGET ACTIVITY
5 - System Development and Demonstration

PE NUMBER AND TITLE
0604665A - FCS Sustainment & Training R&D

PROJECT
FC6



Schedule Detail (R4a Exhibit)

May 2009

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
5 - System Development and Demonstration	**0604665A - FCS Sustainment & Training R&D**	**FC6**

Schedule Detail	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
FCS SoS PDR		3Q						
E-IBCT SoS CDR		4Q						
T-IBCT SoS PDR		3Q						
T-IBCT SoS CDR			3Q					
Software Build 2								
BCT Software Build 2 Final Planning Check Point	4Q							
BCT Software Build 2 Early Readiness Check Point	1Q							
BCT Software Build 2 Final Readiness Check Point		2Q						
BCT Software Build 2 SoSCOE 2.0 FQT	3Q							
BCT Software Build 2 SoSCOE 2.5 FQT (CHECK TITLE)		3Q						
Warfighter Machine Interface Svcs Build 2 Early Functional Qualification Test		3Q						
Network Management System Build 2 Early Functional Qualification Test		3Q						
Level 1 Fusion Build 2 Early Functional Qualification Test		3Q						
Situational Understanding Build 2 Early Functional Qualification Test		3Q						
Battle Command & Mission Execution - Build 2 Early Functional Qualification Test		2Q						
Logistics Decision Support System - Build 2 Functional Qualification Test	3Q							
Platform Soldier - Mission Readiness System - Build 2 Functional Qual Test		3Q						

Software Build 3								
BCT Software Build 3 Early Definition Check Point		1Q						
BCT Software Build 3 Final Definition Check Point		2Q						
BCT Software Build 3 Early Planning Check Point			1Q					
BCT Software Build 3 Final Planning Check Point			4Q					
BCT Software Build 3 Early Readiness Check Point			2Q					
BCT Software Build 3 Final Readiness Check Point				1Q				
BCT Software Build 3 SoSCOE 3.0 Functional Qualification Test			2Q					
BCT Software Build 3 SoSCOE 3.5 Functional Qualification Test				1Q				
Warfighter Machine Interface Svcs Build 3 Early Life Cycle Objectives		3Q						
Warfighter Machine Interface Svcs Build 3 Early Life Cycle Architecture		4Q						
Warfighter Machine Interface Svcs Build 3 Final Life Cycle Objectives			3Q					
Warfighter Machine Interface Svcs Build 3 Final Life Cycle Architecture			4Q					
Battle Command & Mission Execution - Build 3 Early SRS LCO		3Q						
Battle Command & Mission Execution - Build 3 Early TRC TRR				1Q				
Battle Command & Mission Execution - Build 3 Final SRS LCO			3Q					
ICS Prototype Deliveries for NLOS-C Inc 0	2Q - 4Q	1Q - 4Q						
ICS Prototype to Support Spin Out		2Q						
ICS Type IV Prototype Deliveries (8)			1Q - 3Q					

Common Controller PDR		2Q						
Common Controller CDR			2Q					
Common Controller Prototype Deliveries				1Q - 3Q				
Common Controller IQT		3Q						
MFRF Prototype Deliveries	2Q							
Air Sensors								
Class I EO-IR/LD PDR	4Q							
Class I EO-IR/LD CDR		4Q						
Class I EO-IR/LD Prototype Deliveries				2Q - 3Q				
SAR/GMTI (STARLite) - Comp Program PDR	4Q							
SAR/GMTI (STARLite) - Comp Program CDR		1Q						
SAR/GMTI (STARLite) Prototype Deliveries			1Q - 2Q					
ASTAMIDS - Comp Program CDR		3Q						
ASTAMIDS - Comp Program Prototype Deliveries		3Q - 4Q	1Q - 3Q					
Ground Sensors								
MREO-Lite PDR		3Q						
MREO-Lite CDR		4Q						
MREO-Lite Prototype Deliveries			4Q	1Q - 3Q				
SUGV EO-IR CDR		1Q						
SUGV EO-IR Prototype Deliveries		4Q						
JTRS Prototype Deliveries								
JTRS GMR Prototype Deliveries		3Q						
JTRS HMS Prototype Deliveries		3Q						

The schedule reflected in this R-Form is based on preliminary analysis of the available budget. Upon further resolution and detailed planning, adjustments may occur which could potentially change the program schedule.

B1 RC - Software Build 1 Readiness Check Point
B2 DC - Software Build 2 Definition Check Point
B2 EPC - Software Build 2 Early Planning Check Point
B2 FPC - Software Build 2 Final Planning Check Point
B2 ERC - Software Build 2 Early Readiness Check Point

B2 FRC - Software Build 2 Final Readiness Check Point
B2E - Software Build 2 Early
FQT - Functional Qualification Test
LCA - Life Cycle Architecture
LCO - Life Cycle Objectives
LDSS - Logistics Decision Support System
PSMRS - Platform Soldier - Mission Readiness System
SIL - Systems Integration Lab
TRR - Technical Readiness Review