



Negative Impacts of Ignoring Stakeholder Quality Attributes

Joint Fire Support (FS) Command and Control (C2) Case Study

May 2007

Presented to SATURN

By

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Overview of Joint Automated Deep Operations Coordination Problem Space



- Collaborative coordination of fire support mission execution
 - Interagency
 - Multinational
 - Cross service components
 - Cross intra-service staffs
- Targeting engagements
 - Surface-to-surface
 - Air-to-surface
 - Maritime-to-surface

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Historical Background of Current System Evolution for Joint Automated Deep Operations Coordination



- Operational capability fielded from Advanced Concept Technology Demonstration (ACTD) and used by all DoD service components and coalition
 - CENTCOM
 - EUCOM
 - PACOM
 - USFK
- Used in all service components and in Army at all echelons Brigade and above for mission coordination
- Lightweight and agile development and support structure with no rules; ad-hoc (level 1) but *effective* process areas
- Support includes field support, 24/7 Help Desk, training, and surge support for exercises and special events
- 2600+ Systems Supported by 14 dedicated Field Support Engineers

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Historical Background of Attempted Replacement Solution for Joint Automated Deep Operations Coordination

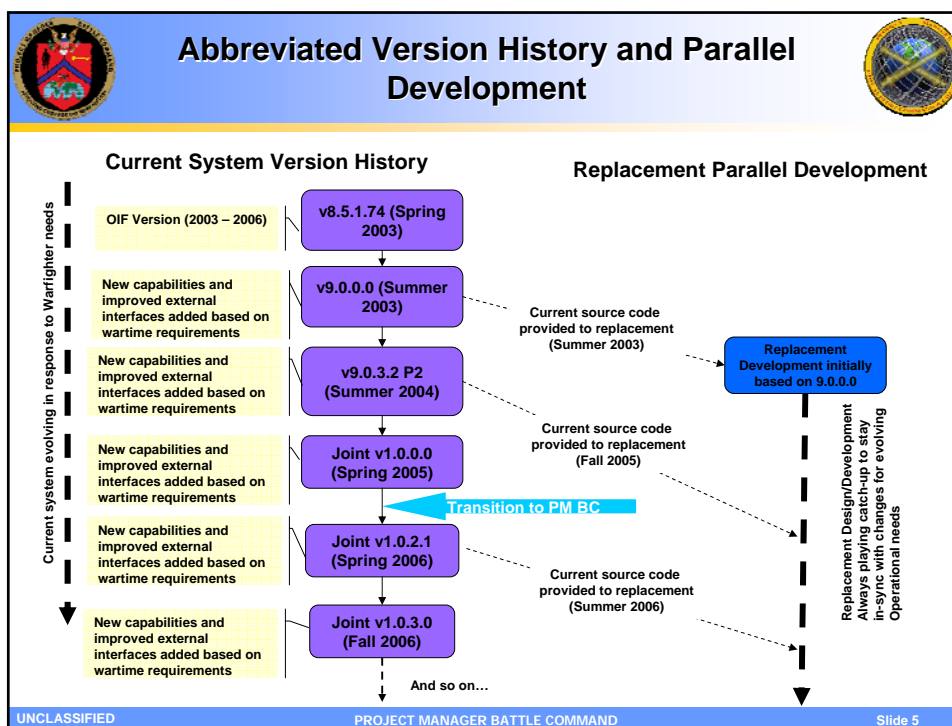


- Tasked to replace current capability with same UI but web-enabled tightly coupled with existing C2 programs; why?
- Not all stakeholders value proposition addressed; focused on functionality for one military service paying the bills
- Not all deployment environments considered; unsupportable hardware and software license dependencies
- Different data models employed with no plan for backward compatibility

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Replacement System	Fielded System
Server-based caching	Shared-caching
• Reduces duplication of data	• Clients can operate without server
One target-centric data model	Every manager has a data model
• Not everything is a target (e.g., CSAR)	• Easier to add new mission types
Embedded in POR/SOR	Standalone
• Capitalizes on existing functionality (e.g., maps)	• Choose appropriate servers
• No need for new licenses	• Certainty about performance
	• Predictable deployment schedule
Single instance of data	Multiple copies of data
• Consistent data across managers	• Data specialized for managers
Architecture can be improved	Unacceptable architecture
• Needs to include quality attributes	• Migration plan in place

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SEI Recommendations



- ITA Task to provide specific actionable recommendations to:
 - achieve transition from current system and net-centric
 - recommend final state based on DoD emerging Command and Control net-centric architecture
- ITA Assessment (account for joint service needs)
 - Transition and deploy newly developed web services software on modernized current system architecture
 - Use quality attributes as a driver for architecture migration (QAW on contract with SEI planned for June 07)
 - Document architecture, architecture drivers, decisions, and design (Architecture improvement workshops on contract with SEI for FY07)

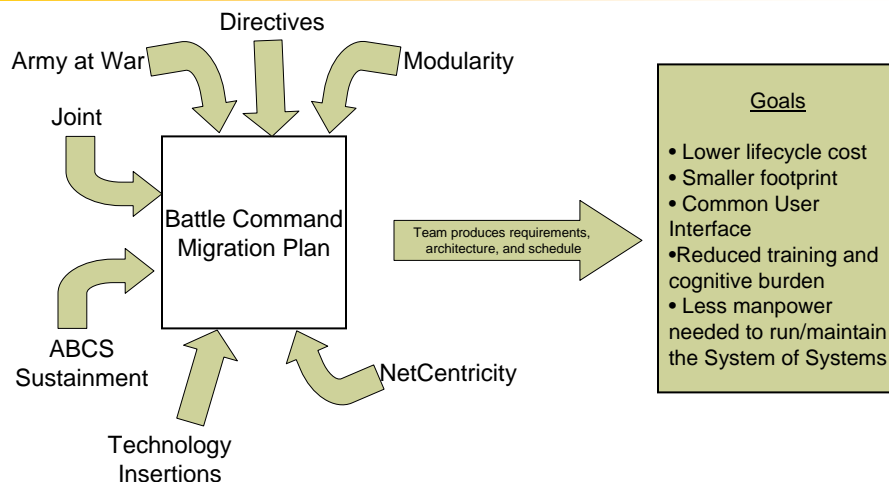
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Army Migration Plan Key Drivers and Goals



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Army Battle Command Systems (ABCS) Quality Attributes Workshop (QAW)



Initial quality attribute to architectural strategy mapping based on ABCS QAW results:

- | | |
|----------------------------|-------------------|
| – Usability | – Testability |
| – Data Management | – Maintainability |
| – Performance | – Trainability |
| – Reliability/Availability | – Security |
| – Interoperability | – Scalability |
| – Configurability | – Reusability |

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FY06 Architecture Objectives



- Supporting the War-Fighters, through Capability Enhancements and Additions
 - Continue to inter-operate with external systems, via legacy communication services
 - Maintain current system functionality to support end-users daily work
- Introduce Modernized Architectural components
 - Open-source JBoss Web Application Server
 - RDBMS for data repository behind open-source Hibernate
- Upgrade interfaces with existing systems to new web service APIs

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FY07 Architecture Objectives



- Integrate BCCS Common Viewer components
 - Common map engine (ESRI CJMTK)
 - Common overlay and symbology services (MOLE)
- Support 3rd party developed user interface components
 - Implement OSGi Plug-in framework
 - Implement OGC standards (i.e. Web Feature Services and Web Mapping Services)
- Migrate Server Capabilities
 - Expand the Domain Information Model Entities
 - Continue to inter-operate with legacy systems
 - Enable deployment in a Virtual Machine
 - Enable remote server administration
 - Utilize Army Data Dissemination Services (DDS) for DDMS compliant interoperability
 - Exchange data with other ABCS and joint systems
 - Initial Inter-nodal replication for low volume/critical missions

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FY08 Architecture Objectives



- Expose and integrate common services
 - Integrating software from replacement system into modernized current system architecture
 - Migrate select high-use functionality to web services
- Use open-source Eclipse RCP for Common Viewer integration
 - Introduce thin-client managers deployed as thin and thick-client
 - Modify to interact with new server components for migrated capabilities and data
- Integrate common User Authentication and Role Based Access Control using Enterprise Security and Policy Services
 - Define users, roles, permissions associated responsibilities
 - Control user access, via centralized unit controlled user permissions (Active Directory within Army units)
 - Permissions to data are granted at field level

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Long-Term Architecture Objectives for NECC



- All system components are fully modernized with no loss of functionality to the Warfighter
- Finely grained services are integrated into BC SoS and NECC physical and software architectures
- Data architecture aligned with NECC
- Supports majority of users through web browser interface with OSGi compliant smart clients for heavy lifting roles
- All business logic encapsulated in Web Services
- System configuration and administration fully integrated with NECC Technical Operations architecture

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Lessons learned for future ABCS migration to Net-Enabled Command Capability (NECC)



- Other areas of systems architecture must be addressed by analyzing quality attributes, **not just software**
 - Physical
 - Data
 - IA/Security
 - Technical Operations/Support
- Economic realities must ground the technical solution; projected Total Cost of Ownership
- Backward compatibility during transition period must be well-planned
 - Universal fielding?
 - Run in parallel?

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Conclusions



- All stakeholders concerns with different business drivers and value propositions must be addressed
- Perfect technical solution may not be affordable, deployable, nor supportable
- Web services and SOA do not magically solve all problems, actually can cause more from quality attribute areas