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DevOps for Federal Acquisition

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Overview

■ Some Important Acquisition Terminology
  – What is Federal Acquisition?
  – What’s an RFP? What’s a CDRL? What’s a DID?
  – RFP Sections for Influence
    ■ “Instructions for Proposal Preparation” (Section L)
    ■ “Evaluation Criteria” (Section M)

■ DevOps – Shift Happens
  – Tradition vs Emerging
  – Driving Event: GSA 18F: Blanket Purchasing Agreement
  – Common Characteristics of DevOps Environments
  – Our Model Environment

■ Blending DevOps into Federal Acquisitions
  – A Look at Select DIDs for Tailoring
  – Tailoring Sections L and M of the RFP
  – Considerations for Updating the GSA BPA

■ What’s next?…
Acquisition Lifecycle

- Federal Acquisition Regulation (FAR)
  - Pre-Systems Acquisition
  - Systems Acquisition
  - Sustainment

- Easier to influence the outcome as far “up-stream” as possible
  - Drive to impact criteria and language at the proposal stage – influence selection of a winning bidder
Acquisition: What’s an RFP?

A Request for Proposal (RFP) is a solicitation, often made through a bidding process, by an agency or company interested in procurement of a commodity, service or valuable asset, to potential suppliers to submit business proposals.

- Specifies what is proposed to be purchased.
- Often constrains the exact structure and format of a potential supplier's response.
- Provides for structured evaluation and selection.
- Enables impartiality in the procurement.
- MITRE is often invited to assist with construction of RFPs.
Acquisition: What’s a CDRL?

The Contract Data Requirements List (CDRL) is the standard format for identifying potential data requirements in a solicitation, and deliverable data requirements in a contract.

– Identifies products to be formally delivered by the supplier.

– Provides a standardized method of clearly and unambiguously delineating the minimum essential data needs.

– Data requirements, format, delivery, and content can be further specified…
Acquisition: What’s a DID?

The **Data Item Description (DID)** further breaks down details for most items produced or used as part of production of the work described in the SOW.

- Defines the data required of a contractor.

- Easily linked back to the Statement of Work.

- Defines the data content, format, and intended use.

- Standard DIDs for all topics can be found in the [ASSIST Database](#), etc.
Acquisition: RFP Sections

- An RFP is divided into sections A–M
  - Sections A–J are primarily contract documents, except for section C, which is the SOO or SOW
  - Section K contains attachments like the TRD/SRD
  - Section L is the “Instructions For Proposal Preparation”
  - Section M is the “Evaluation Criteria” (Technical criteria need to be included and need to address areas of technical risk and complexity.)

- MITRE is often asked to participate in the construction of sections L and M
Acquisition: Section L
“Instructions for Proposal Preparation”

- Solicitation provisions and other information and instructions to guide respondents in preparing proposals or responses to requests for information.

- Prospective respondents may be instructed to submit proposals or information to facilitate evaluation. The instructions may specify parts, such as:
  - Administrative
  - Management
  - Technical
  - Past performance
Acquisition: Section M
“Evaluation Criteria”

■ The standard against which the proposal will be evaluated.
  
  – Forms the basis for selection, identifying all significant factors to be considered in awarding the contract and their relative importance.
  
  – Often mapped to supporting DIDs in the CDRL.

■ Discriminating factors may include: program risks, key performance indicators, costs, etc.

■ Establishes ratings for factors:
  
  – “Unacceptable”, “Marginal”, “Acceptable”, and “Exceptional”
  
  – “Low”, “Moderate”, “High”, and “Unacceptable”
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DevOps

- DevOps – Shift happens
  - Tradition vs Emerging
  - Automation overtakes Craft
  - Momentum vs Change

- Culture Evolves
  - Increasing experience and comfort
  - Increasing repeatable processes and trust
  - Processes are shared and adopted
  - Goals merge, evolve, and become shared

- “The advance of ... engineering makes it quite conceivable that we will begin to design our own evolutionary progress.” - Asimov
Driving Event: GSA 18F BPA Released September 2015

- Sixteen vendors green-lit by the General Services Administration’s 18F under the Agile Development Services Blanket Purchase Agreement
- Alpha Phase: Limits use to 18F projects only
- Beta Phase: Will roll out after some months later – opening to broader Federal Agency participation

- TechFAR Handbook for Procuring Digital Services Using Agile Processes
  - No explicit mention of DevOps, but many references to qualities
- U.S. Digital Services Playbook
  - Only “Play 7 – Bring in Experienced Teams” explicitly mentions DevOps only once (again, other qualities are referenced)
Common Characteristics of DevOps Environments

Several characteristics common to DevOps approaches were considered as we developed a model to explore effects of DevOps on an acquisition:

**Practices**
- Release Planning
- Continuous Integration
- Continuous Delivery
- Continuous Testing
- Continuous Monitoring
- Continuous Feedback
- Continuous Learning
- Continuous Improvement
- Continuous Security

**Technologies**
- Infrastructure-as-Code
- Delivery Pipeline/Workflow
- Development Environments
- Package Environments
- Test Environments
- Cloud Environments
MITRE DOES Demo Environment (Escher)

IDE (Development Environment) → git → jenkins

Builder

puppet/chef

Production

Integration

Amazon

Tomcat -> .war

notification
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Candidate DIDs

Plans

- **Software Development Plan (SDP)** - A plan for performing the software development
- **Software Installation Plan (SIP)** - A plan for installing the software at user sites
- **Software Transition Plan (STrP)** - A plan for transitioning to the support agency

Critical inclusions for DevOps would include

- The overall inclusion of DevOps across development, installation, and transition
- How Continuous Delivery and Continuous Deployment integrate development and installation
- How transitions occur iteratively, and how responsibilities are to be shared among the blended DevOps Team
Candidate DIDs

Concept/requirements

- **Operational Concept Description (OCD)** - The operational concept for the system
- **System/Subsystem Specification (SSS)** - The requirements to be met by the system
- **Software Requirements Specification (SRS)** - The requirements to be met by a Computer Software Configuration Item (CSCI)
- **Interface Requirements Specification (IRS)** - The requirements for one or more interfaces

Among these early scoping documents, capture
- Types of users and roles, including developers and end-users
- The depiction of the development environment and the delivery pipeline
- How “Minimum Viable Product” frames evolution of requirements
Candidate DIDs

Design

- **System/Subsystem Design Description (SSDD)** - The design of the system
- **Software Design Description (SDD)** - The design of a CSCI
- **Database Design Description (DBDD)** - The design of a database
- **Interface Design Description (IDD)** - The design of one or more interfaces

Address reliability and resilience across these artifacts for
- Evolution of the system through iterative releases
- Graceful degradation of system functionality
- Feedback injection and continuous improvement
Candidate DIDs

Qualification/test products

- **Software Test Plan (STP)** - A plan for conducting qualification testing
- **Software Test Description (STD)** - Test cases/procedures for qualification testing
- **Software Test Report (STR)** - Test results of qualification testing

These artifacts should depict

- Maximizing automation for unit and integration testing
- How and when testing occurs manually
- Feedback on deficiencies into development to support regular, smooth flow of deliverable work product
Candidate DIDs

User/operator manuals

- **Software User Manual (SUM)** - Instructions for hands-on users of the software
- **Software Input/Output Manual (SIOM)** - Instructions for users of a batch or interactive software system that is installed in a computer center
- **Software Center Operator Manual (SCOM)** - Instructions for operators of a batch or interactive software system that is installed in a computer center
- **Computer Operation Manual (COM)** - Instructions for operating a computer

These artifacts could contain

- How to monitor applications
- How to configure, tune, analyze, and report feedback
Candidate DIDs

Support manuals

- **Computer Programming Manual (CPM)** - Instructions for programming a computer
- **Firmware Support Manual (FSM)** - Instructions for programming firmware devices

Add instructions on

- How to configure and scale properly
- How to properly instrument
- How to incorporate unit testing for automation
Candidate DIDs

Software

- **Software Product Specification (SPS)** - The executable software, the source files, and information to be used for support

- **Software Version Description (SVD)** - A list of delivered files and related information

**Add material to address**

- Infrastructure-as-Code
- Proper versioning for IaC alongside applications source
- How to generate source, IaC, configuration and scaling needed
Sections L and M for DevOps

■ Section L
  – Detail in the PWS the project management changes required
  – SDP includes DevOps tools and processes details, Continuous Integration and other practices
  – SPS includes *Infrastructure-as-Code (IaC)*, creating and deploying instances, and provisions for autonomic scaling
  – SVD also includes *IaC*, executable scripts, and how Development and Operations can share the same repository
  – SIP and Product Development Roadmap should align delivery schedules with DevOps approach

■ Section M
  – Key elements to assess: feedback loops, automation, *IaC*
  – Numbers of VMs and management of deployments
  – Extent of automation across all environments
  – Instrumentation and Monitoring across all environments
Considerations for GSA BPA

Some recommended enhancements to the current GSA BPA text:

- **Scope Language:** Specific references to DevOps characteristics
- **Technical Factors:** To include automated testing, instrumentation and monitoring, scaling, etc.
- **Functional Areas for SOO:** To include DevOps expertise in practices and tooling, evidence for sustaining a DevOps delivery tempo, and processes for refining and optimizing across workflows
- **Key Personnel:** Experienced in DevOps environments
- **Performance Metrics:** May include measures of automation, release success rates, defect resolution, time-to-market, user-satisfaction rates, robustness of feedback mechanisms, and so on
- **Language for Enterprise Engineering Support:** Ensure that work is structured for DevOps environment (deployed iteratively, reviewed regularly, automated where possible, and delivery planned and released on time)
- **Language for Maintenance of Software:** Scaling on-demand and robust feedback mechanisms
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■ Tailor DIDs and develop templates for DevOps Acquisition
  – Modify existing templates
  – Merge where necessary
  – Add DevOps specific items where expedient

■ Address specific RFP language for Sections L & M in the form of one or more papers we are in the progress of writing

■ How can projects amplify feedback loops during an acquisition?

■ What are the costs versus benefits for injecting DevOps into an acquisition?

■ What are the relationships with Agile, virtualization, cloud, etc?

■ Is Federal Acquisition in its current form compatible with DevOps, or do we need a new approach entirely?