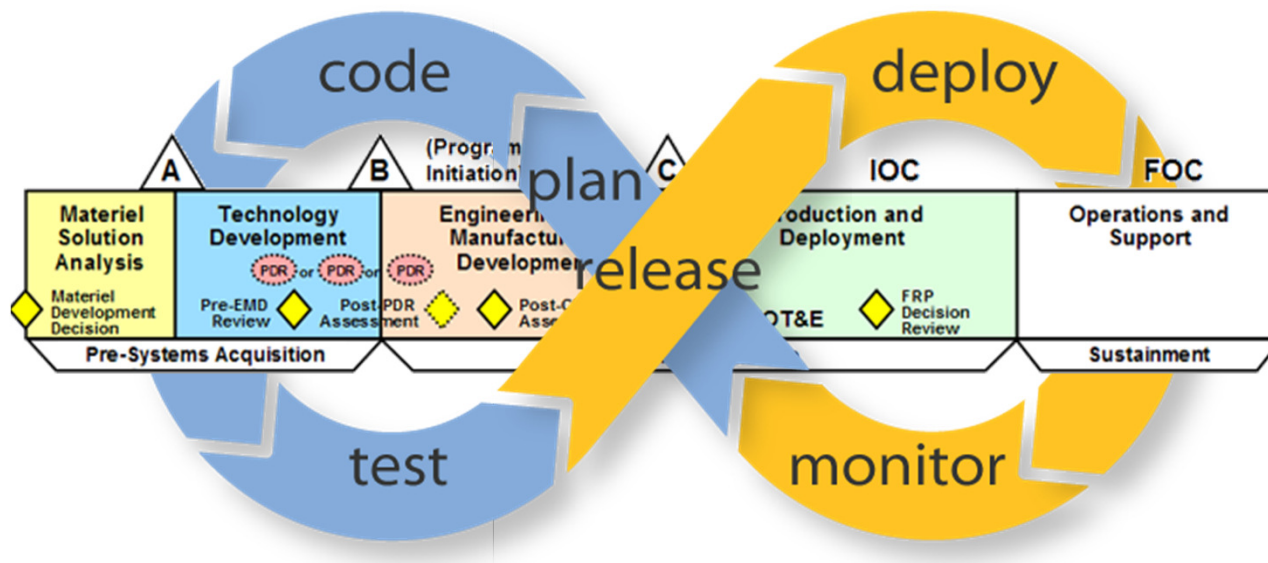


IEEE STC 2015

DevOps for Federal Acquisition

Rick Cagle, Tim Rice, Mike Kristan





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

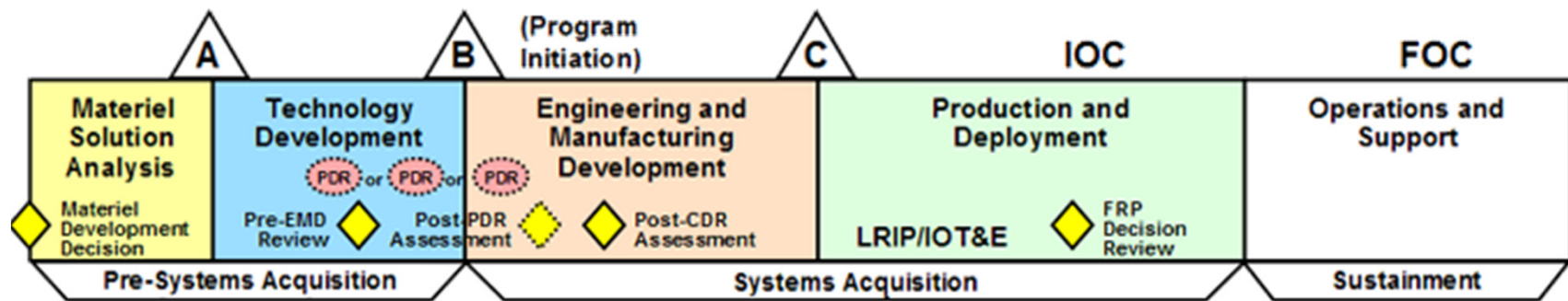
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■ What’s next?...

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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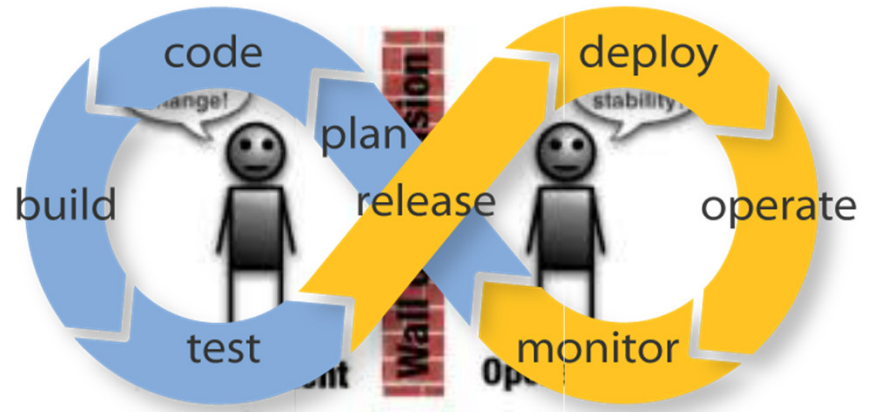
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DevOps

- **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

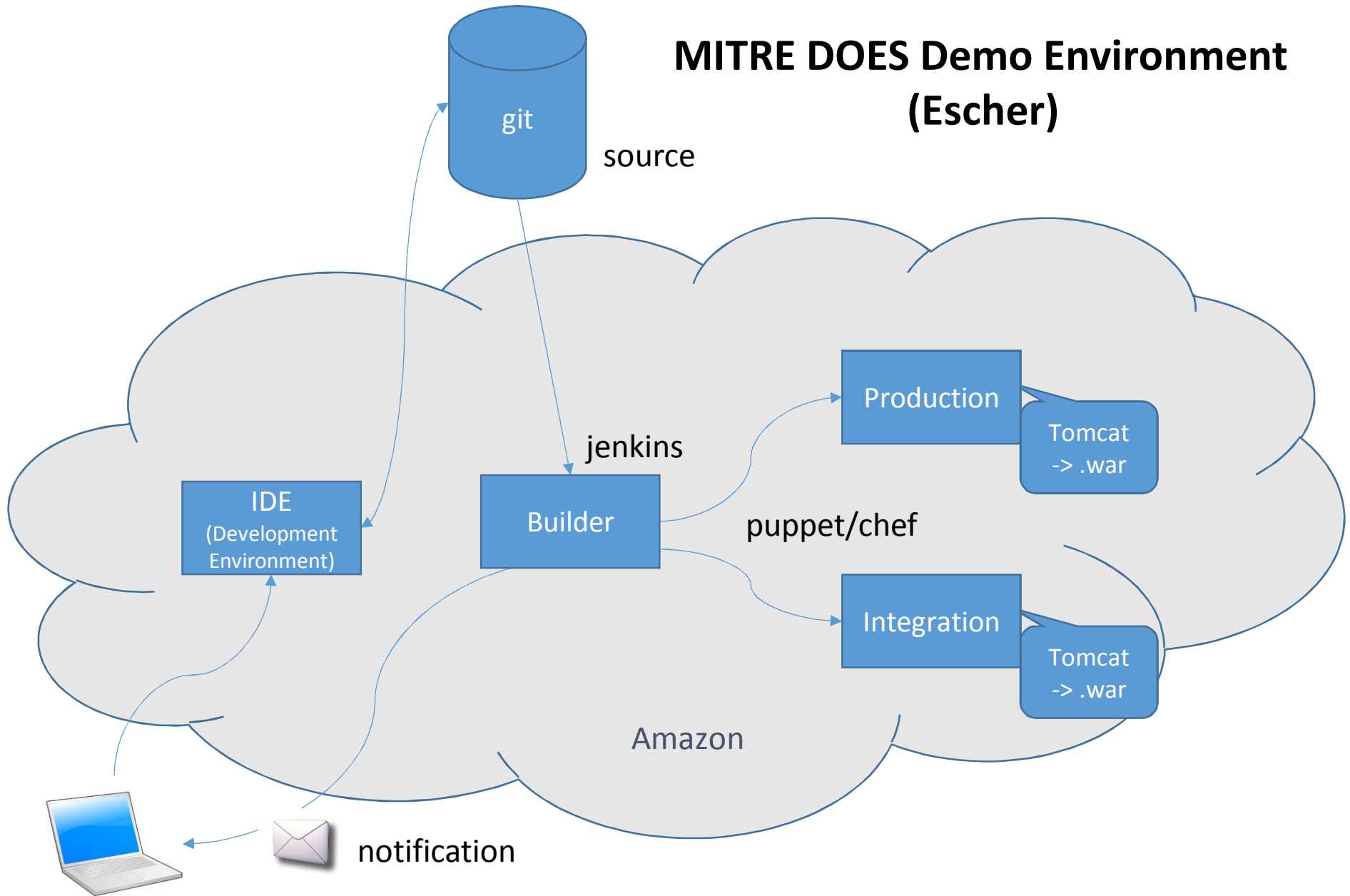
- Release Planning
- Continuous Integration
- Continuous Delivery
- Continuous Testing
- Continuous Monitoring
- Continuous Feedback
- Continuous Learning
- Continuous Improvement
- Continuous Security

Technologies

- Infrastructure-as-Code
- Delivery Pipeline/Workflow
- Development Environments
- Package Environments
- Test Environments
- Cloud Environments



MITRE DOES Demo Environment (Escher)





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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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■ **What’s next?...**



What's next?...

- **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?**