Successful System Procurement; Avoiding the Pitfalls

IPSTA Conference
November 7, 2017

Federal Engineering, Inc.
"Unleashing the Power of Technology"

Your Expectations

- What are your expectations from this session?

- Why are you here?

- What would you like to take away?

Session Overview

- Present key issues and considerations throughout the communications system lifecycle
  - From Planning → Operations and Maintenance
- A high level action plan with recommended steps to follow
- Applies to all systems
  - From wireless communications systems (LMR, LTE, mW)
  - To NG9-1-1 and PSAP systems (Call-Taking, CAD, RMS, etc.)
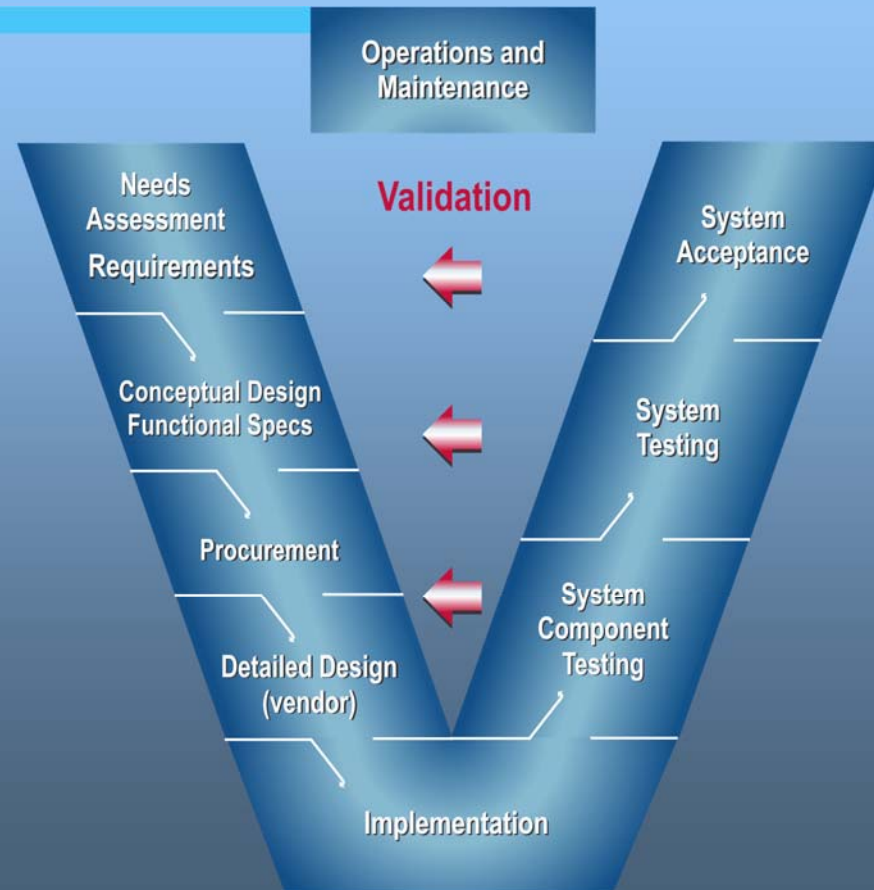- Our goal is a highly interactive session
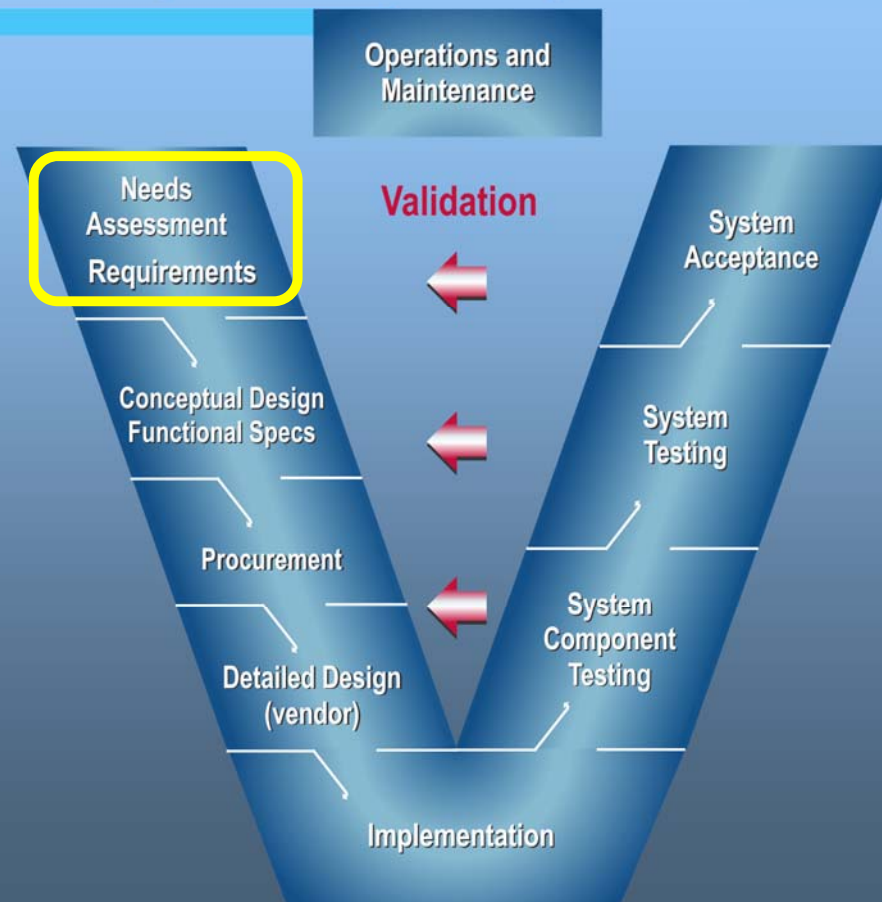
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System Lifecycle

System Lifecycle Support

- Project Management
- Quality Assurance/Quality Control
- Cost Management
- Time/Schedule Management
- Resource Management
- Configuration Management
- Scope Management
- Implementation Oversight
- Testing Supervision and Review
- Change Control

Operations and Maintenance

Needs Assessment Requirements

Validation

System Acceptance

Conceptual Design Functional Specs

System Testing

Procurement

System Component Testing

Detailed Design (vendor)

Implementation

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PLANNING, NEEDS ASSESSMENT, AND REQUIREMENTS

Planning, Needs Assessment, and Requirements in the System Lifecycle

Operations and Maintenance

Needs Assessment Requirements

Validation

System Acceptance

Conceptual Design Functional Specs

System Testing

Procurement

System Component Testing

Detailed Design (vendor)

Implementation

Planning, Needs Assessment, and Requirements Overview

- Identify project team
- Define objectives
- Evaluate funding
- Analyze existing system and resources
- Conduct needs assessment
- Develop and validate/approve requirements
- Perform gap analysis

Planning Aspects to Remember

- **Develop preliminary system operations plan**
  - Will have to be refined as system design evolves
- **Communicate goals, needs and objectives continuously**
  - Develop a communications plan early and use it often
    - List sever, web site, conferences, group meetings, emails, newsletters, social media, press releases
- **Set realistic expectations**
  - Coverage, project timelines, scope

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Identify Project Team

- Should be cross-functional
  - Users, administrators, dispatchers,
  - support staff, procurement,
  - government officials, consultants
  - Stakeholders - affected
  - agency/dept. heads, and govt. officials
- Project leader or champion aids in promoting consensus and communication of a unified message
- Develop communication plan based on project scope

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Define Objectives

- **What needs are primary, secondary and optional (project drivers)?**
  - Aging, soon to be obsolete infrastructure
  - Regulatory concerns (T-Band, Consolodation, etc.)
  - Expanded coverage area (service area)
  - Increased coverage (in building portable/user safety)
  - Enhanced features (unit location, higher speed data, security/authentication)
  - Improved interoperability (internal and external)
  - Meet FirstNet requirements/LTE design
  - NG91-1 readiness, implementation

Evaluate Funding

- Evaluate funding sources
  - Bonds
  - Tax levies or special tax districts
  - Grants
    - Favor multi-jurisdictional systems
  - Partnerships (public and private)
  - Lease purchase
  - User fees
- What steps, who do you need to talk to, get approvals?
  - Don't overlook O&M funding, internal costs, support funding for equipment replacement and upgrades, etc.

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Existing System Analysis

- **Baseline existing system(s)**
- **Review existing documentation**
  - Previous studies, system and network diagrams, SOPs, policies and practices, licenses, interfaces (CAD, RMS, WMS, etc.), programming maps, equipment inventories (users & infrastructure)
- **System(s) Assessment**
  - Site surveys
  - Dispatch centers
  - Radio, mobile data, fixed data, SCADA, etc.
  - Coverage

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Needs Assessment

- Select participants
- Develop Assessment Survey (formal) or discussion points (informal)
- Conduct survey
  - Web based, phone, in person by groups/functions
- Conduct interviews with key users/managers
- Review preliminary findings with key stakeholders
- Document in a report

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Categorizing Needs

- **Unmet current needs**
  - What you need now that you do not have?
  - What you have now that does not work well?

- **Unmet future needs**
  - What you can use now that you do not have?
  - What do you see coming in the short and long term?

- **Meet current needs**
  - What do you have now that could be improved?
  - What do you have now that works well and should or must be retained?

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Develop Requirements

- **User needs**
  - Drill down into specific needs
- **Current features and limitations**
  - Understand how systems are used today
- **Operational, functional, and technical requirements**
  - Baseline
  - Validate

Requirement ID	Requirement Classification	Requirement Description	Architecture/ Design Document	System Component(s)	Test Case(s)	Verification	Additional Comments
ER 1.0	Equipment Requirement	Base station installation	Design V2.6	Site #5	1.3, 1.8, 2.6	Passed	Issues resolved at site location

- **Alternatives analysis**
- **Communicate, communicate…**

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Gap Analysis

- What features are needed to support short and long term requirements?

- Which existing facilities can be reused?
  - Need to renovate, rebuild or secure new facilities?

- What regulatory issues must be addressed?
  - FAA, FCC, NTIA, FirstNet, etc.
  - NERC, FERC, NRC
  - Local and or state regulations, ordinance, zoning

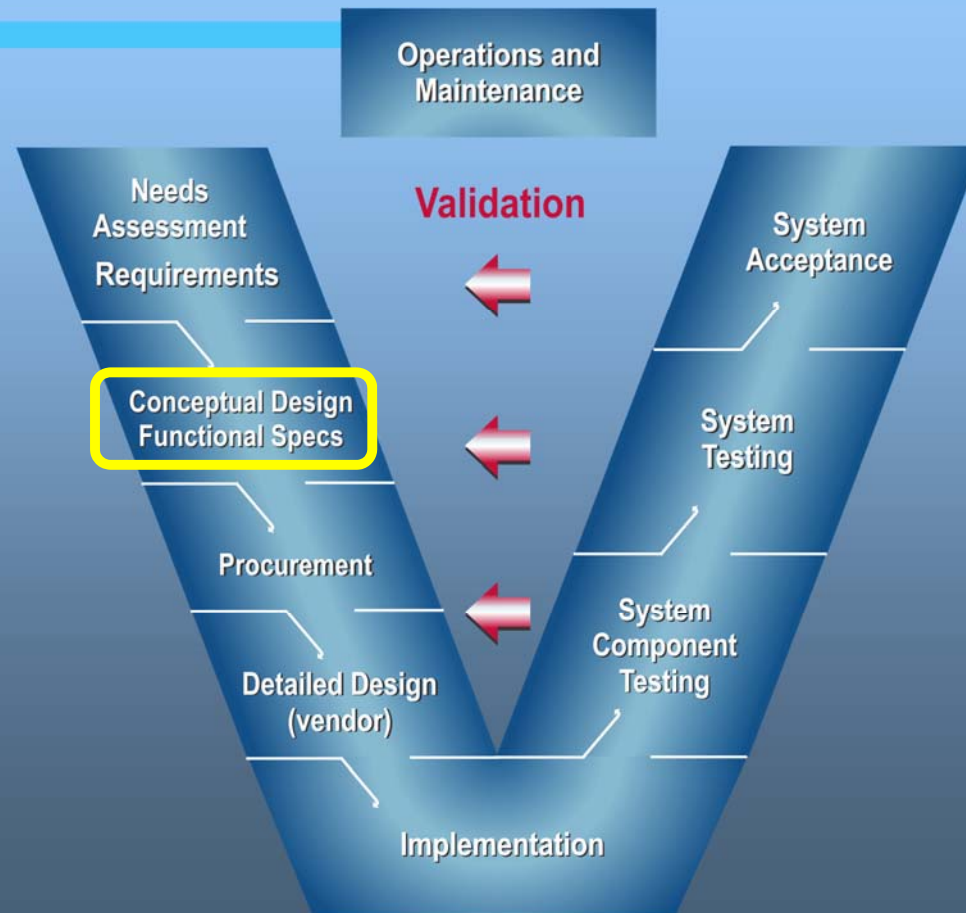- Will additional staff, training, equipment, etc. be needed to support new systems?

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Q&A - DISCUSSION

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Conceptual Design

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Conceptual Design in the System Lifecycle

Developing the Conceptual Design

- What is a Conceptual Design?
- Why develop a Conceptual Design?
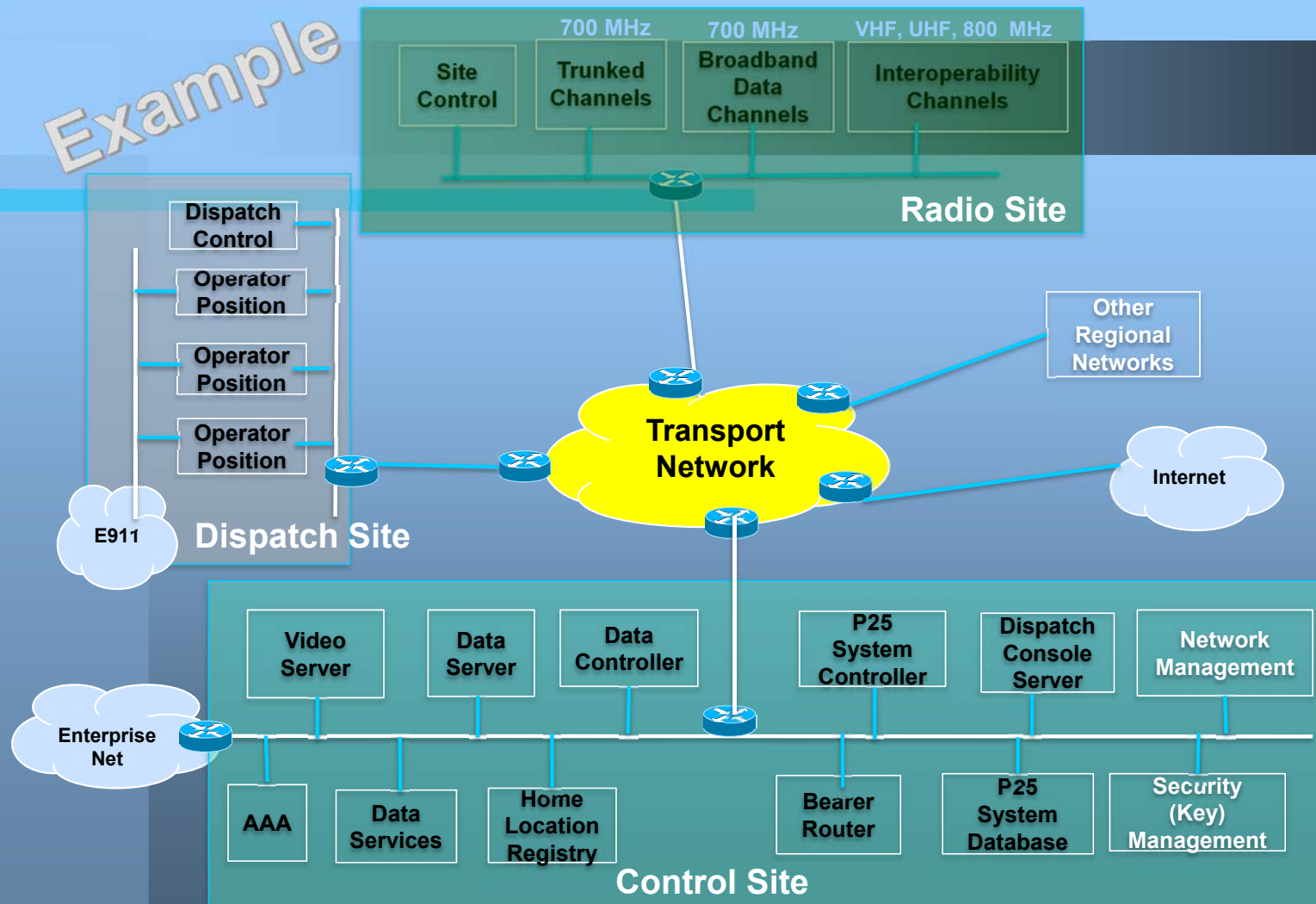- Categorizing needs and capturing in the design
- Conceptual Design validation

What is a Conceptual Design

- High level system design fulfilling requirements
- Evaluate system architectures
  - Explore alternatives
  - Validate against requirements
  - Analyze costs and benefits
  - Evaluate tradeoffs
  - Evaluate for risks
    - Technical risks
    - Schedule risks
    - Procurement risks

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Example

Radio Site
- 700 MHz — Site Control
- 700 MHz — Trunked Channels
- 700 MHz — Broadband Data Channels
- VHF, UHF, 800 MHz — Interoperability Channels

Dispatch Site
- Dispatch Control
- Operator Position
- Operator Position
- Operator Position
- E911

Transport Network

Other Regional Networks

Internet

Control Site
- Video Server
- Data Server
- Data Controller
- P25 System Controller
- Dispatch Console Server
- Network Management
- AAA
- Data Services
- Home Location Registry
- Bearer Router
- P25 System Database
- Security (Key) Management

Enterprise Net

From Needs and Requirements To a Conceptual Design

- Design based on the captured requirements
- Iterative process
  - Drill down into specific needs
  - Often uncovers unexpressed needs
- Current features and limitations
  - Understand how systems are used today
- Operational, functional, and technical requirements
  - Baseline
  - Validate

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- Alternatives analysis

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Conceptual Design Validation

- Validate against requirements
- Validate against budget
- Validate against governance
- Validate against risks
- Validate against test plans

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Conceptual Design Technical Elements

- Architecture decisions
- Features and functions
- Capacity
- Reliability
- Coverage

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System Architecture Decisions

- ## System Type
  - Voice, Data, Mixed (V&D), Broadband, Fixed, Backhaul (microwave or fiber)
  - Call taking, CAD, RMS, Etc.
- ## Technology (LMR/Broadband)
  - P25 (Phase 1 or Phase 2), TETRA, LTE, etc.
  - Server based, Cloud based, Shared, etc.

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System Architecture Decisions

- **Technology (Network)**
  - MPLS, Carrier Ethernet, SONET
- **System Architecture**
  - Conventional, Trunked, Single site, Multi-site, Simulcast, Networked
- **Interoperability**
  - Technically, Operationally, Administratively

Features and Functions

- Feature set
  - Alignment with requirements
  - Emerging requirements
- Capacity
  - Current needs
  - Margin
  - Expansion

- Coverage
  - Absolute needs
  - Desired needs
  - Emerging needs
- Interoperability
  - Local, state, federal
  - Inter and Intra jurisdiction

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Reliability/Availability

- System
  - System
  - Backhaul
  - Power
  - Support infrastructure
  - Management systems

- Coverage and other performance
  - Coverage reliability
  - Capacity
  - What percent / What area?
  - Specific locations
  - In-building average vs. in specific buildings
  - Interference

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Organizational Aspects

- The design team
- Alignment with organizational requirements
- Establish a balance
- Outreach and stakeholder buy-in

The Design Team

- Team leadership
- Core and extended team
- Stakeholder participation
- Technical support
- Managerial / budgetary interface

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Alignment with Organizational Requirements

- Alignment of team members and organizational goals
- Appropriate level of responsibility and authority
- Stakeholder interface beyond the core team

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Outreach and Stakeholder Buy-in

- Communicate, Communicate, Communicate

- Communicate up
  - Administrative, executive, and political levels

- Communicate down
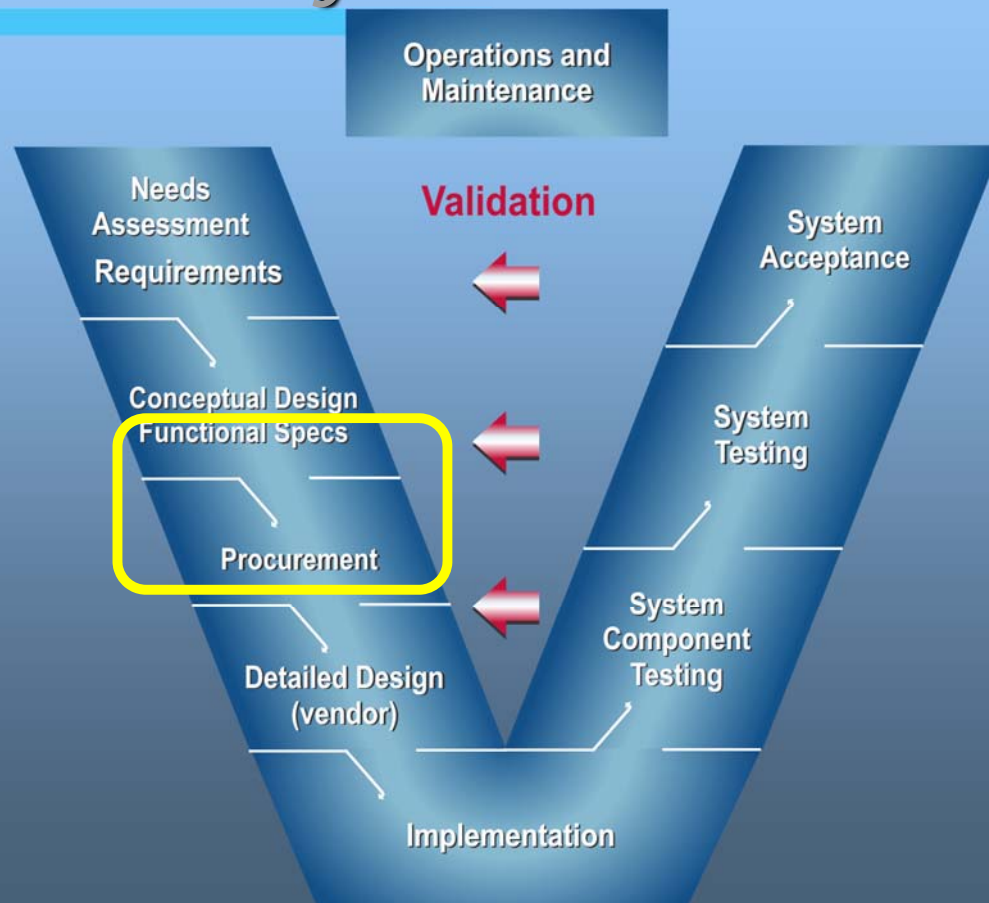 - Stakeholders, user groups, interoperability partners, and even other agencies not directly involved

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Q&A - DISCUSSION

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FUNCTIONAL SPECIFICATIONS AND PROCUREMENT

Functional Specs and Procurement in the System Lifecycle

Procurement and Functional Specification Development Overview

- Procurement Process Decision
  – Competitive Procurement
  – Sole Source Procurement
  – RFP? RFQ? RFI? IFB?
- Functional (Technical) Specifications – regardless of procurement process
- Competitive Procurement Activities
  – Evaluation Criteria
  – Prebid/Q&A/Site Walks
  – Solicitation Response Review
- Vendor Selection
- Contract Negotiation

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Competitive Procurement

- Opportunity for all or a few vendors to participate
- Often end up with lower costs since competitive
- Choice whether or not to disclose budget – vendor will scope to budget
- Role of RFP, RFQ and RFI

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Sole Source Procurement

- Situational
  - Expansion
  - Upgrade
  - Migration with significant resource reuse
- Still has many considerations
  - Am I getting a fair price?
  - Do I understand what I am getting?
  - What are lessons learned from others who have done the same thing?

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Technical Specifications

- Functionality
  - System functional, protocol, and operational requirements
  - Local, regional, state, and federal interoperability
  - Performance; coverage, capacity, reliability, redundancy
  - Connectivity
  - Network and physical security
  - Network management
  - Standards adherence

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Technical Specifications

- Equipment
  - Infrastructure
  - Dispatch
  - Subscribers
  - Backhaul
  - Network management
  - Redundant infrastructure and spares

- Spectrum
  - Band
  - FCC Regulatory and standards compliance

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Technical Specifications

- **Implementation**
  - Migration and cutover/transition requirements
  - Continuity of operations
  - System delivery
  - System installation
  - As-built documentation
  - User and technical training

- **Testing /Acceptance Guidelines and Criteria**
  - Factory
  - Interoperability
  - Coverage
  - Site
  - 30/60/90-day Operational Acceptance

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Technical Specifications

- Maintenance
  - Maintenance requirements
  - Warranty
  - Local and remote support

- Other Considerations
  - Expandability to accommodate future growth
  - Leverage existing resources

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Competitive RFP

- **RFP Sections**
  - Project overview
  - Instructions to proposers
    - Alternate proposals allowed?
  - Technical specifications
  - Project management
  - Overall project schedule
  - Pricing sheets
  - Mandatory submittals
  - Client terms and conditions/forms

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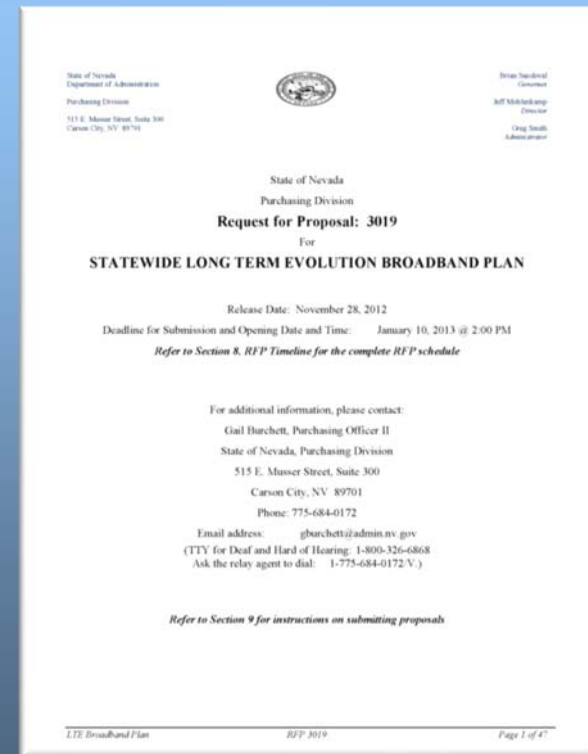
Competitive Procurement Activities

- Prebid conference
- Questions and answers
- Addenda
- Site visits
- Establish evaluation criteria
- Review responses
- Select vendor
- Negotiate contract

Evaluation Criteria

- **Should be developed by all agencies involved**
- **Pass/Fail items**
  - Financial disclosures, complete proposal, agreement to terms and conditions
- **Specific Criteria**
  - Feasible design
  - Adherence to the technical specification and other requirements
  - Adequate coverage and capacity
  - Required support and maintenance capabilities

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Evaluation Criteria

- Specific criteria (continued)
  - Complete equipment list
  - Adequate factory, coverage, functional, performance, and acceptance test plans
  - Required interoperability
  - Financing solution(s)
  - Partnering solution(s)
  - Other client-specific criteria

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RFP Response Evaluation

- Evaluate vendor responses
  - Use predefined rules and criteria
  - Educated evaluation team
  - Compliant with local, state and federal rules, requirements and processes
- Benefits of an independent, unbiased review
  - Mitigates possibility of protest
  - Allows review by experts familiar with each vendor's system
  - Relieves client of full responsibility
  - Client has technical and operational support

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CONTRACT NEGOTIATIONS:
GETTING EXACTLY WHAT YOU WANT

Setting the Stage: Knowing What You Want

- Develop Your Team
- Establish a "Chain of Command"
- Create a Roadmap
- Define Expectations

If It Is Not In Writing, It Does Not Exist

- Precedence of Documentation
- Clear Responsibilities
- Named Staff / Key Personnel
  - Rights to change
- Use Plain Language
  - Even for common terms
- Require Detailed Equipment Lists
- Title and Title Transfer
- Confidentiality

The Statement of Work; Your roadmap to completion

- **Three Critical Components**
  - The Implementation Plan
  - The Schedule
  - The Responsibility Matrix
- **Each should be clear and concise**
  - Proposal "Sales-ey" language should be avoided

Test Plans; If it can not be measured, It can not be assured

- Test to the proposed design as well as the standard features
- It is your right to have every feature tested
- Define criteria for success
  - And the requirements if failed!
- Define requirements and allowances for retesting
- Define which tests are separable
  - And which are not!
- Tightly define coverage, voice quality, message success, and other relevant performance tests

Taking Ownership:
System Acceptance, Beneficial Use, and Warrantee

- **Define System Acceptance**
  - Avoid unintended acceptance
- **Define Beneficial Use**
  - or "use for intended purpose"
- **Define warranty start, and maintenance responsibilities during;**
  - Implementation, Testing, Test Use,
  - And Inadvertent Use
- **Define warranty/maintenance requirements and allowances**

Negotiation: It's Not a Contest

- A Successful Implementation can not start if one side "loses" during negotiations
  - For success both sides must come to agreement
- Negotiation failures are rarely a success for anyone
- Know your parameters and limits
  - Know when to call it quits

Contract Negotiations

- Specific items that could impact final contract
  - Parts list errors
  - Factory, site, and acceptance testing that are not representative of true system performance or do not provide adequate test "coverage"
  - Factory acceptance testing performed out of the country or in a location that would be cost-prohibitive to attend
  - Clear coverage, subsystem infrastructure, and subscriber acceptance terms
  - Adherence to good workmanship standards

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Contract Negotiations

- Specific items that could impact final contract
  - Payment schedules that favor the vendor
    - Payment on shipment rather than on receipt/acceptance
  - Anything that causes acceptance before testing is complete
    - "Beneficial Use" statements not appropriate to the system
  - Extra fees for personnel that are not wanted or needed
  - Items that can be split out of the contract and completed by the agency at a substantially lower cost

Contract Negotiations

- Many seemingly small items can impact the final contract

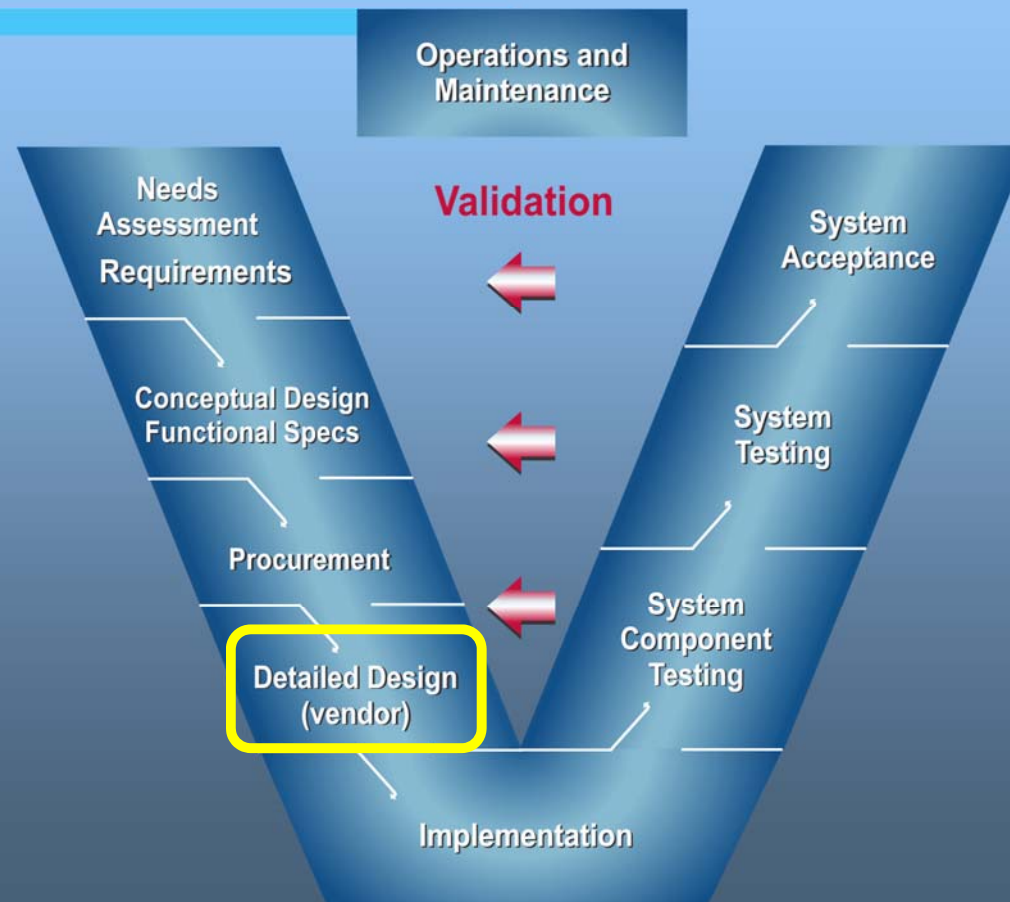$ Contract negotiations with the right support and knowledge can ultimately save millions

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Q&A - DISCUSSION

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DETAILED DESIGN

Detailed Design in the System Lifecycle

Detailed Design Activities

- Responsibility of the vendor (primarily)
- Proposal has preliminary design
- Design revisions based on contract negotiations/any resulting change in scope
- Schedule design reviews – on-site with the client and client representatives
- Maintain communication with all stakeholders; consider each agency's input
- Sign off before moving to implementation
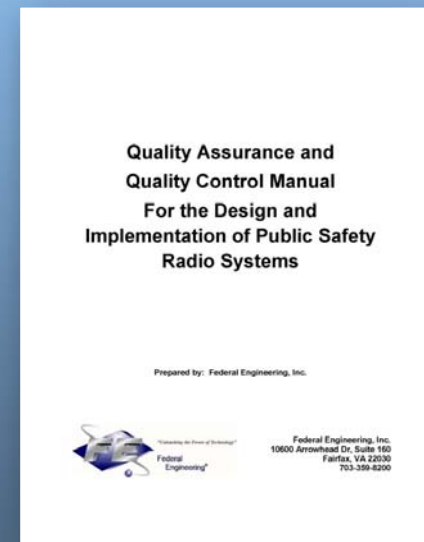
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IMPLEMENTATION

Implementation in the System Lifecycle
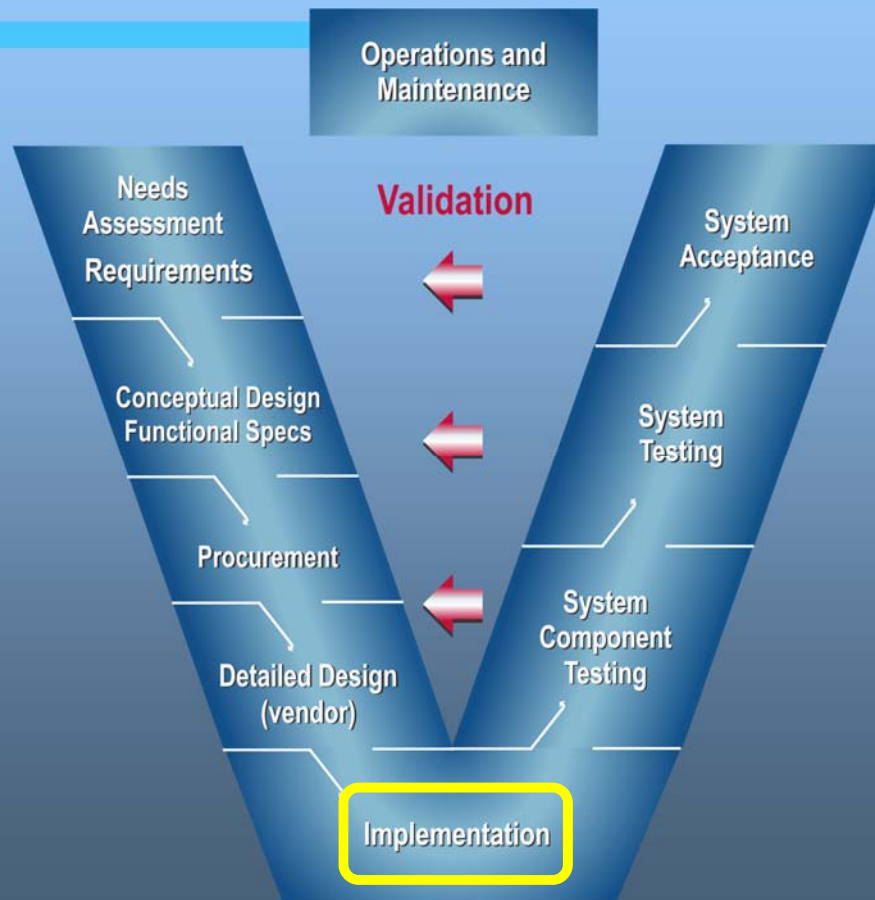
Quality Assurance / Quality Control

- Quality assurance and quality control throughout detailed design and implementation
- Maintain "Punch-list"
- Client always in the loop
- Client signs off at each step
- How smooth it runs depends on previous phases

Quality Assurance and
Quality Control Manual
For the Design and
Implementation of Public Safety
Radio Systems

Prepared by: Federal Engineering, Inc.

Federal Engineering, Inc.
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Fairfax, VA 22030
703-359-8200

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Vendor Responsibilities

- Drawings
- Equipment lists
- Equipment deployment
- Installation

- Test plans
- Testing
- Correct problems
- Acceptance

Preparing for Implementation

- Staging/Factory Acceptance Testing
  - Confirm that equipment matches contract
  - Execute tests to demonstrate performance
- Receive equipment at client site(s)
  - Equipment storage, inventory, tracking, deployment
  - System documentation complete
- Site development - the "long pole in the tent"
  - Site inspections
  - Regulatory compliance
  - Site sharing agreements
  - Weather and site access

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Implementation - Deployment

- **Equipment installation and deployment**
  - Manage internal and external resources
- **Prepare sites**
- **Users are ready and trained!!**
  - How will user and dispatcher training be conducted?
  - Ensure that regular training is available as needed
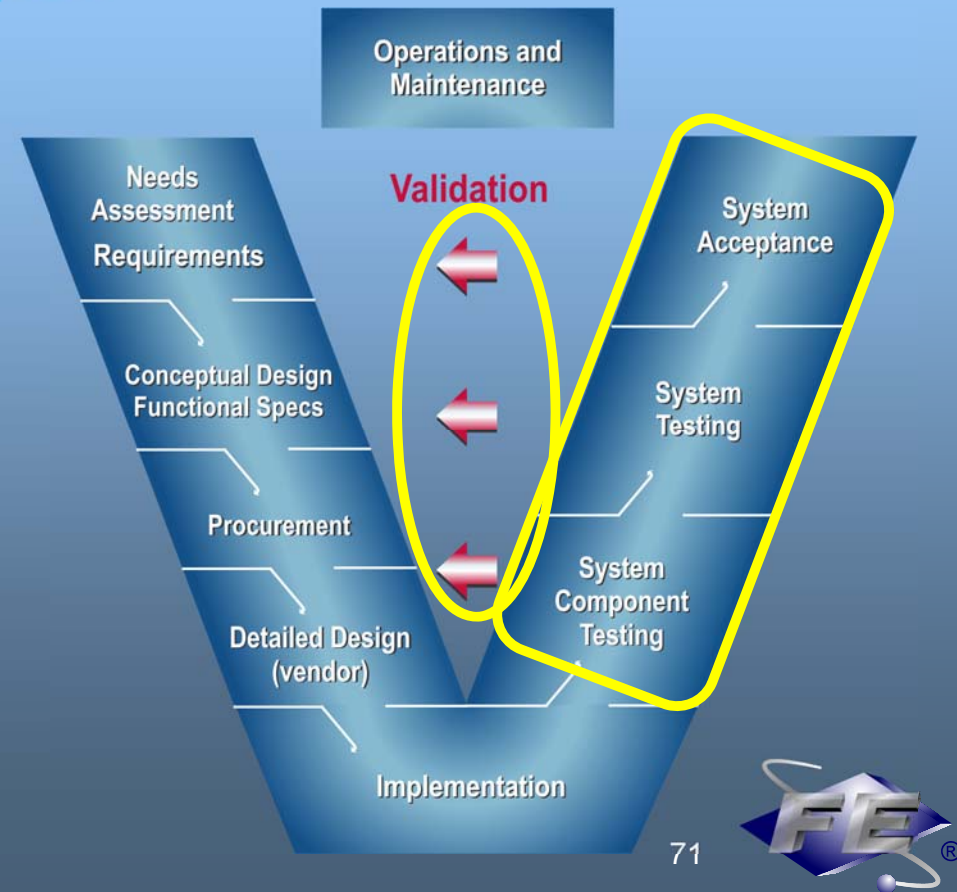
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TESTING AND SYSTEM ACCEPTANCE

Testing and System Acceptance in the System Lifecycle

Testing Validates…

1. Component level testing validates detailed design

2. System level testing validates conceptual design and functional specifications

3. Acceptance validates requirements

Testing Stages

- Keep the Vendor accountable!
  - Maintain a thorough punch-list throughout!
- Component testing (staging and field)
  - Individual sites, Individual subsystems, control, dispatch, etc.
- System testing (staging and field)
  - Selected sites
  - Coverage and other performance testing
- System acceptance
  - Final set of tests
  - Sign off

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Migration/Cutover

- **Migrate to new system(s)**
  - Determine method of migration
    - Gradual transition by groups,
    - Parallel operations needed
    - Monitor and track progress, issues that may arise
- **Remove old system(s)**
  - Are some existing systems needed for interoperability?
  - Decommission old systems
    - Update existing plans, user agreements, support contracts, file construction notices, etc.
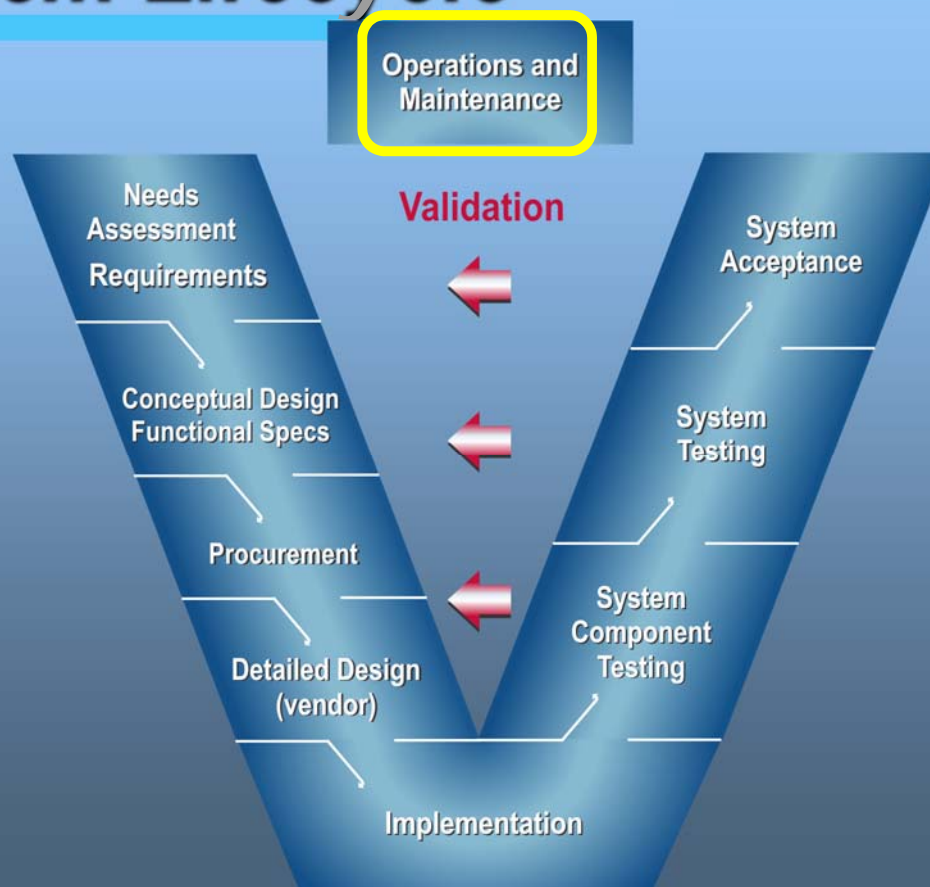   - Dispose of equipment properly!

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OPERATIONS AND MAINTENANCE

Operations and Maintenance in the System Lifecycle

O&M Planning and Monitoring

- Operations and maintenance plans
  - Update operations plans as needed
  - Budget for ongoing maintenance and upgrades
- Develop and maintain system inventories
  - Critical for future system updates
  - Track hardware, software and firmware versions
- Monitor regulatory environment and compliance
  - Track and maintain site permits, authorizations, and FCC licenses

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O&M Monitoring and Training

- Network Management Systems
- Monitor system operation and performance
  - Determine what is monitored, and how (NOC)
  - FCAPS (Fault, Configuration, Accounting, Performance, Security)
  - Fault - Develop processes and procedures for;
    - Faults – critical, major, minor
    - Field technician dispatch
    - Response and repair times
    - Escalation (internal, vendor TAC, external)
    - Trouble ticketing

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O&M Monitoring and Training

- **Monitor system operation and performance**
  - Configuration – Monitor changes to the system
    - Add sites, channels, subscribers
    - Add or revise talk-groups
    - Partition system
  - Accounting – Monitor usage of the system
    - Track usage by user, talkgroup, agency
    - Used for billing if multiple agencies on the network

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O&M Monitoring and Training

- **Monitor system operation and performance**
  - Performance - Analyze system usage
    - May require modifications to operations plans, system and user radio programming, console configurations, etc.
    - Watch for degrading performance – set triggers
    - Trends can forecast future needs
  - Security - Ongoing cyber security measures and administration
    - Evaluate and update as needed
    - Logical security management (IDs and passwords)

O&M Monitoring and Training

- Initial and Ongoing training
  - User training - "train the trainer"
  - Technical training – system and database administration – hands on, classroom
  - Ongoing and system upgrades - combine recurring user meetings with ongoing training, utilize web based training
- Communicate, communicate…

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Ongoing Maintenance

- **Corrective maintenance**
  - critical for maintaining proper system operation
- **Establish processes and procedures**
  - Monitoring – 24 x 7
  - On-call technicians
    - Know who they are and how to contact them
    - If vendor provided – defined Service Level Agreements
  - Access to vendor technical assistance (TAC)
  - Spare parts inventory – accurate tracking
    - Parts repair/return process, emergency parts process

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Ongoing Maintenance

- Proactive preventive maintenance
  - Processes and procedures
  - Schedule all preventive maintenance
    - Establish time "window" for preventive maintenance
  - Not just for radio system equipment
    - HVAC
    - Power systems
      - UPS, back up batteries, generators, transfer switches
    - Fault monitoring devices
    - Site civils – signage, tower, shelter, grounding, fuel tank, fencing, gates & locks, access road, weed control

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Ongoing Maintenance

- Test all systems periodically
  - Exercise the generator and transfer switch
  - Better to cause minor planned disruptions than experience major unplanned outages!

- Don't overlook user devices too!
  - Improperly maintained devices can cause system wide issues

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O&M; The Last Step

- Planning for . . . The next step

  . . . The System Lifecycle
- System Support
- System Upgrades
- System Replacement

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Q&A - DISCUSSION

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YOUR EXPECTATIONS REVISITED

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Thank You!!

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