



O&M and System Training Requirements— It's Not Working

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Providing Services In

HVAC

Electrical

Plumbing

Fire Protection

Telecommunications

"Green" Design

Energy Conservation

Life Safety Code Consulting

Program Management

Commissioning

Facilities Support

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Best Practice

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Learning Objectives

Upon completion of this program you will be able to:

1. Establish a process to receive better Operations Manuals from the contractors on your projects
2. Establish a process to receive better Maintenance Manuals
3. Establish a process to retain a Third Party Trainer to receive better training on your projects



Introduction



- O&M Standard Specification
- A 21st Century Solution
- Training Standard Specification
- Another 21st Century Solution

O&M Standard Specification

- Has anyone asked the end-users what they need???
- The Designer's "delegation" role:
 - Standardize specification
 - No ownership requirement
 - Designers specify in a vacuum



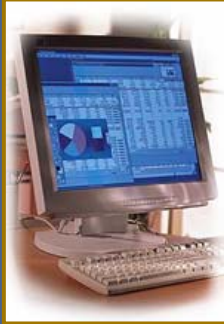
A New – But Still 20th Century O&M Specification



- 4 manuals vs. 1 manual
- Has anyone considered the cost to produce these manuals??
- Has anyone considered the time to produce these manuals?
- Has anyone considered the time required to educate with these manuals?
- Will the End-User embrace these manuals?



A 21st Century Electronic “O” Manual



- Owner project requirement
- In sync with system training
- A submittal requirement
- A web site requirement
- A financial commitment by owner— a **project allowance/ budget** should be established



A 21st Century Electronic “M” Manual



- Owner project requirement
- Needs to integrate with Owner’s CMMS system
- A submittal requirement
- A financial commitment by owner— a **project allowance/ budget** should be established



Training Standard Specification

- Has anyone asked the End-Users what they need??
- The Designer's "Delegation" Role
 - Standardize specification but no budget
 - No ownership requirement



The Contractor's Training Responsibility



- Has anyone considered the cost to fulfill the training?
- Has anyone considered the time required to implement training?
- Will the End-User embrace the training process?



A 21st Century Training Solution



- Owner project requirement
- A building program – allowance/ budget in the Conceptual Phase
- Training Plan starting in the Design Phase
- Training Plan continuing in the Construction Phase



A 3rd Party Trainer

- The Designer?
- The Commissioning Firm?
- A Technical Educator?



Summary: Operations Manual

- Owner project requirement
- In sync with system training
- Allowance to “level the bidding field”
- A time commitment in the Construction Phase



Summary: Maintenance Manual

- Owner project requirement
- In sync with CMMS System
- PM Work Orders on Day-1 Occupancy
- Allowance to “level the bidding field”
- A time commitment



Summary: System Training

- Owner project requirement
- A 3rd party educator
- Allowance to “level the bidding field”
- A time commitment starting in the Design Phase



This concludes the American Institute of Architects
Continuing Education Systems Program

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Implementing a Better, Electronic Operation Manual & Maintenance Manual

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Page 1 of 2

DESIGN PHASE – OWNER'S PROJECT REQUIREMENTS

O&M Staff?

- In-House Staff
- Outsource Staff
- Mix of Both Staff
- Service Contracts

Facility Mgt. Tools?

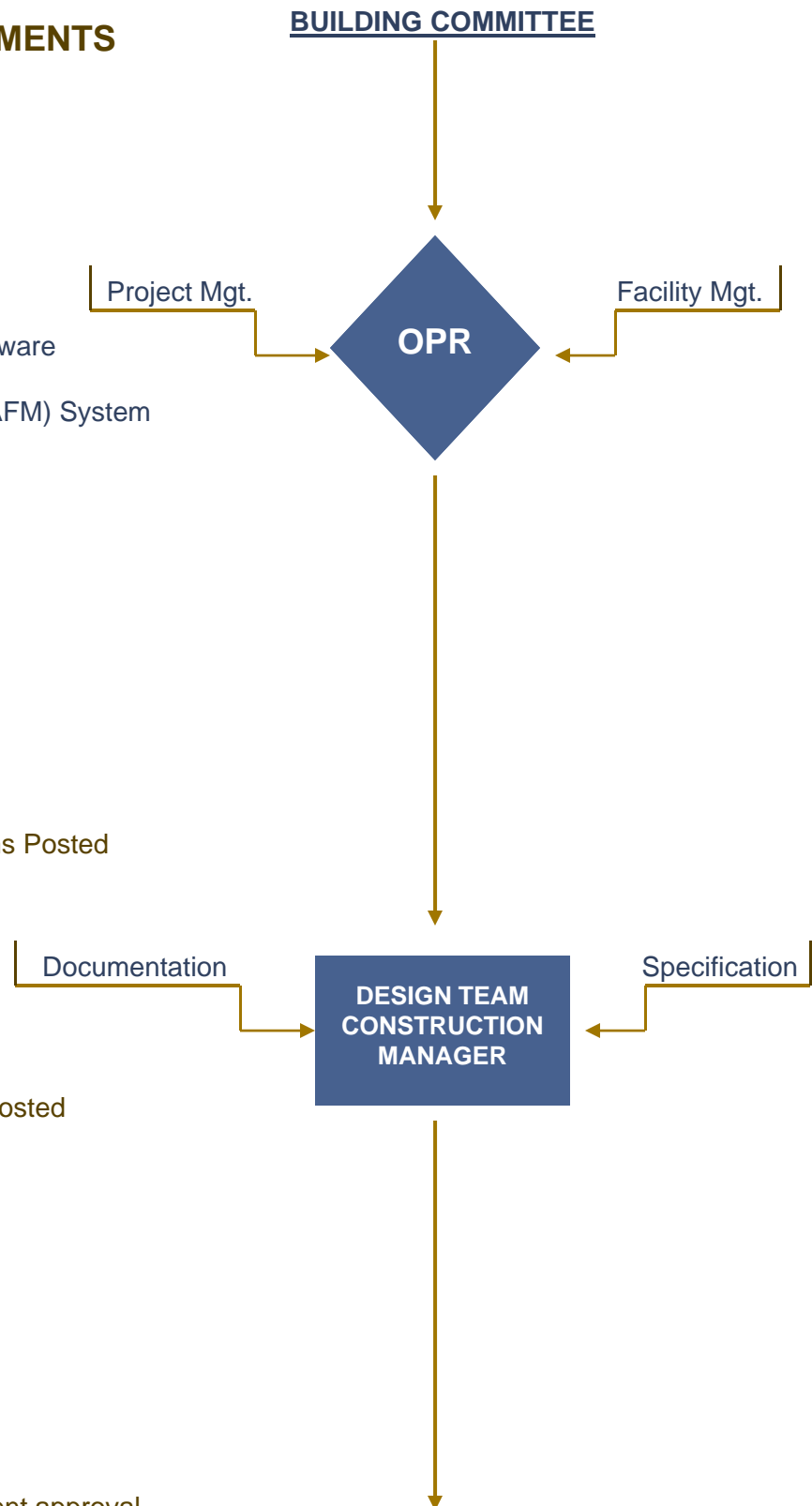
- Proactive Use (full-time operator) or Reactive Use (no operator) for:
 - ❖ Computer Maintenance Mgt. Software (CMMS) System
 - ❖ Computer-Aided Facility Mgt. (CAFM) System
- Metering
 - ❖ Energy Simulation Software?
- Record Documents
 - ❖ Electronic
 - ❖ CAD License
 - ❖ Ease of use in the building
- Asset Database
 - ❖ Bar-coded
 - ❖ Labor hours
- PM Work Order Library

Documentation?

- One-line Electrical Diagrams Posted
- One-line Piping System Flow Diagrams Posted
 - ❖ Steam & Condensate
 - ❖ City Water
 - ❖ Domestic Hot Water
 - ❖ Hot Water Heating
 - ❖ Chilled Water
 - ❖ Condenser Water
 - ❖ Fire Protection
- One-line Air System Flow Diagrams Posted
 - ❖ ATC/FPT
 - ❖ Air Balancing
- Operating Instructions?
 - ❖ Safety
 - ❖ Startup
 - ❖ Shutdown
 - ❖ Trouble-shooting
- Training Plan
 - ❖ Lesson Plan

Contract Specifications

- Incorporate the OPR from above
- Submit immediately following equipment approval
- Internet & Electronic
- Include Asset database



(Continued on Page 2)

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Page 2 of 2

(Continued from Page 1)

CONSTRUCTION – OPR COLLECTION

Submittal Phase

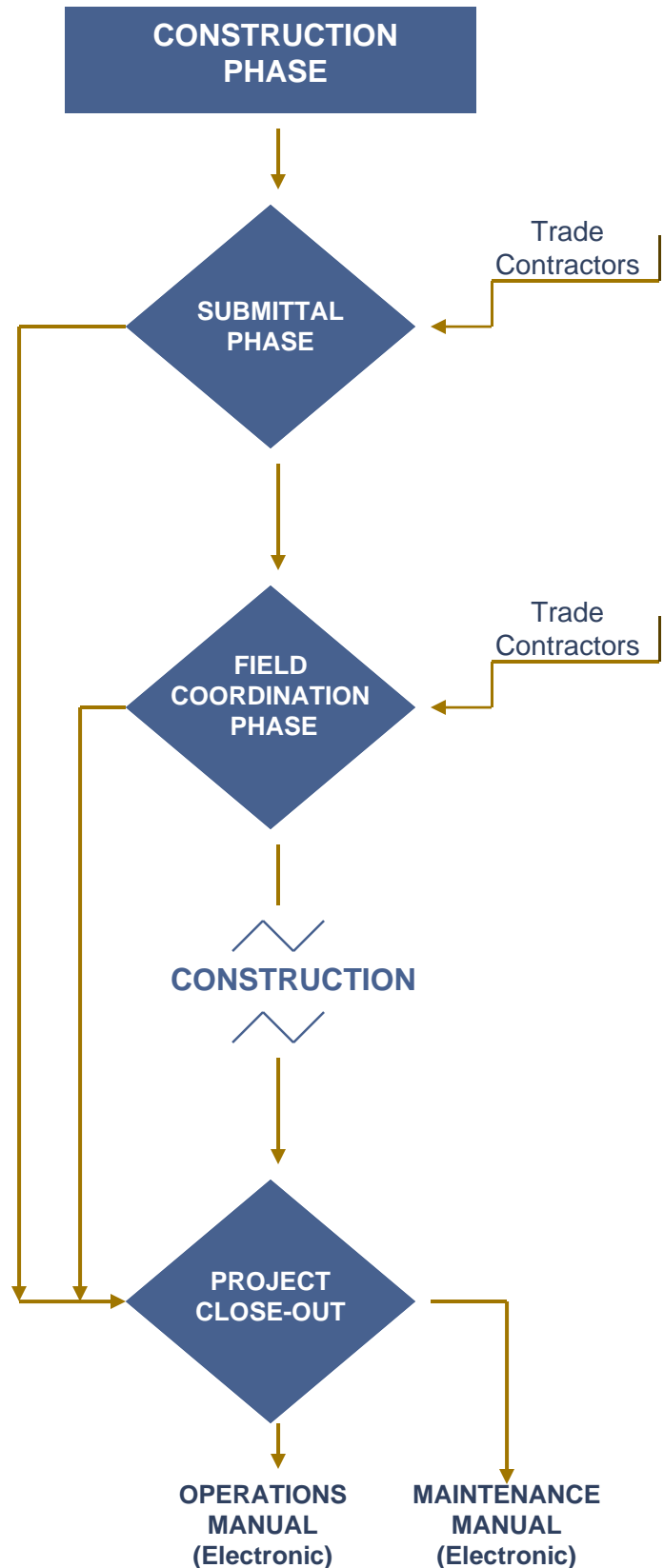
- Approved, electronic copy of equipment
- Approved automatic control submittal
- Population of the Asset Database
- Populate each “Maintenance Manual” data collection folder with:
 - ❖ Web site addresses
 - ❖ Equipment submittal
 - ❖ PM Work Order requirement
 - ❖ Safety requirement
 - ❖ Trouble-shooting requirement
 - ❖ Startup & shutdown requirement
 - ❖ Parts list
 - ❖ Material & lubricant lists
 - ❖ Service contract (if applicable)
 - ❖ Warranty

Field Coordination Phase

- Populate each “Operations Manual” data collection folder with:
 - ❖ One-line electrical diagram
 - ❖ One-line Piping System Flow Diagrams Updated by Trade Contractors
 - Steam & Condensate
 - City Water
 - Domestic Hot Water
 - Hot Water Heating
 - Chilled Water
 - Condenser Water
 - Fire Protection
 - ❖ One-line Air System Flow Diagrams Updated
 - ATC/FPT by 3rd party Commissioning firm
 - Air balancing by 3rd party TAB firm
 - Automatic Control Submittal
 - ❖ Training Plan (Refer to System Training Process Flow Diagram)

Project Close-Out:

- Update Electronic Maintenance Manual
- Update Electronic Operations Manual



Implementing a Better System Training Process

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Page 1 of 2

DESIGN PHASE – OWNER’S PROJECT REQUIREMENTS

O&M Staff?

- In-House Staff
- Outsource Staff
- Mix of Both Staff
- Service Contracts

The Educator & the Budget

- Design Engineer??
- Commissioning Engineer?
- 3rd Party Professional Educator
- Training Cost Allowance

Training Plan Starting in the Design Phase

Schematic Phase

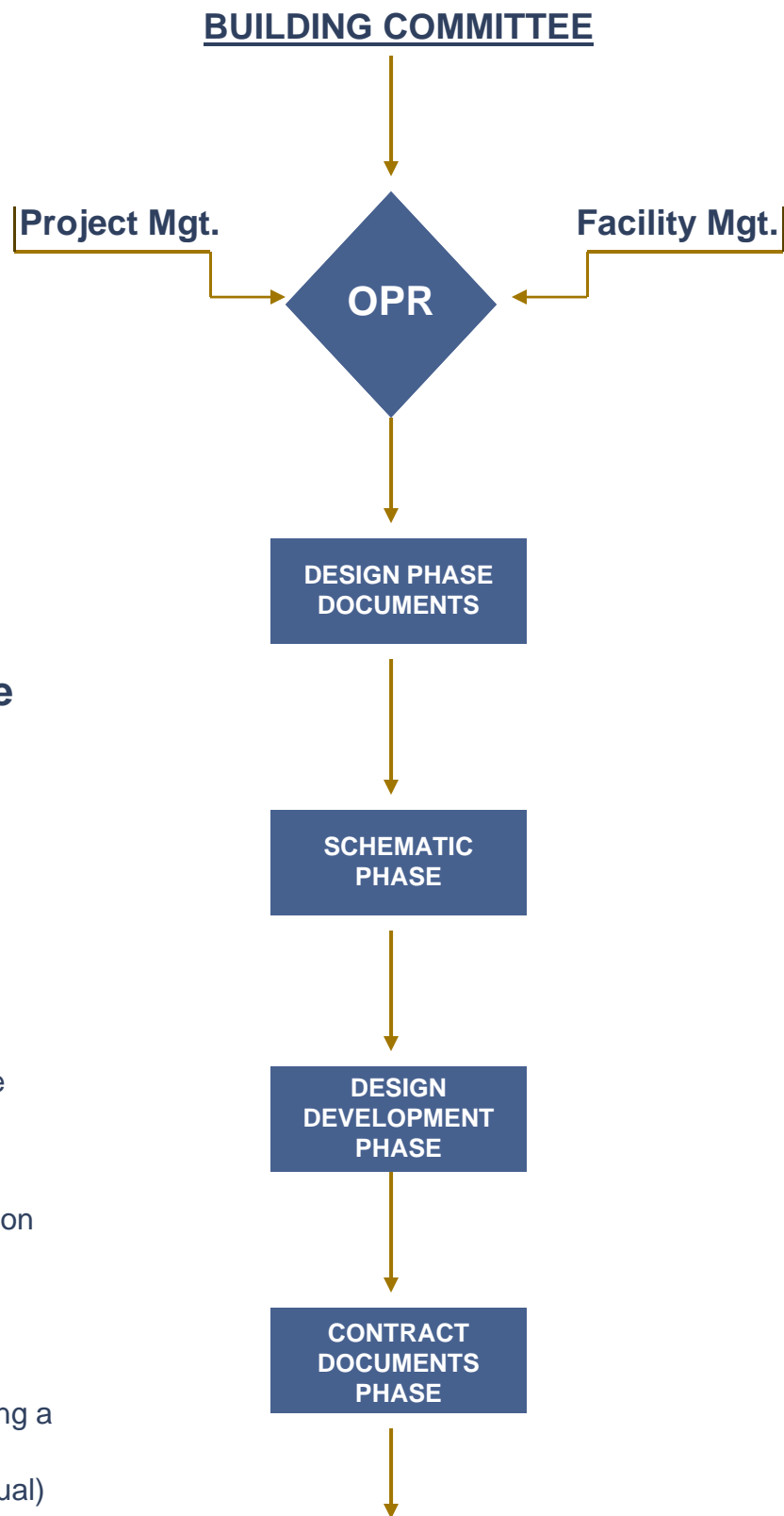
- Introduction to System Flow Diagrams
- Sequence of Operation

Design Development

- System Flow Diagram Update
- Sequence of Operation Update
- Commissioning Functional Performance Narratives
- Equipment Type, Size & Location

Contract Documents

- Distribution Overview
- TAB Plan
- O&M Process (Refer to “Building a Better, Electronic Operation Manual and Maintenance Manual)



(Continued on Page 2)

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Page 2 of 2

Continuing into the Construction Phase

- **Participate in the Commissioning Process**
 - Mechanical Systems
 - Electrical Systems
- **Participate in the Air & Water Balancing Process**
- **Equipment Startup & Shutdown Instruction**
- **Trouble-shooting Instructions**
- **Safety Instructions**
- **Facility Tours**
- **Final System Training**

Project Close-Out

(Continued from Page 1)

CONSTRUCTION
PHASE

PROJECT
CLOSE-OUT