

# Turnover Work Group Practices

By Doug Litwiller

**M**ost organizations struggle with the turnover process that occurs when a newly constructed building is turned over to the operations team. Colleges and universities are no exception. The turnover activities needed to transition newly constructed or renovated space from “construction” to “operations” are often overshadowed by the flurry of construction work required to reach project completion and occupancy based on strict project schedules.

Frequently, the turnover process may not *officially* start until the project gets closer to the substantial completion date. If the turnover process is poorly planned and executed, the members of the operations team receive a building for which they are not ready. The goal of every project team should be to start planning the turnover well in advance of the date of substantial completion using a process that I am calling the **TurnOver Workgroup** process or TOW. At its core, TOW is more of a mindset than an actual process. TOW helps change the focus of new building from a construction project that has a finite, relatively short-term, beginning and end; to a focus on the operational aspects of the building, which will last for 50+ years.

The TOW process is aligned with *ANSI/APPA 1000-1 Total Cost of Ownership for Facilities Asset Management (TCO) – Part 1: Key Principles*<sup>1</sup>. The TCO standards were developed to help building owners and managers to “produce the greatest possible ROI for a given building, facility, general site or infrastructure need throughout its lifespan (initial design and planning stage to the end of an asset’s life)” [1, p. vii]. Furthermore, the standards state that the “optimum time for the application of TCO occurs during the planning and design phase of procuring or building an asset,” [1, p. ix] which is one of the key tenets of the TOW process.

Turnover activities are part of every project. Some are planned, some happen organically, and many are reactionary. The purpose of the TOW process is to provide

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additional structure to these organically occurring activities. TOW creates an environment in which the members of the operations team look forward to the date of substantial completion with high expectations. TOW provides an efficient and effective method for identifying operational needs and resolving the inevitable conflicts that exist between the worlds of Planning, Design, and Construction, (PD&C) and Facilities Management (FM) operations. It seeks to give an early voice to the long-term building operations stakeholders while fostering buy-in and ownership from the building's eventual occupants. Most importantly, TOW seeks to shift the view that turnover activities are the responsibility of a single unit within Facilities Management (FM). New building turnover should become a function and responsibility of the entire FM team.

Patrick Duke, writing for Health Facilities Management, notes *"Failure to prepare operationally, prior to moving into a space designed for a set workflow, can upset the financial parameters on which the project was approved. It can also create a negative perception of the project delivery team's performance even if all the building systems are functioning properly."*<sup>2</sup>

TOW supports the following functions in the transition from PD&C to FM operations:

- Manages the communications, accountabilities and expectations across the wide array of stakeholders, with emphasis on the units within FM.
- For facilities that are shared by multiple business units, such as general fund and housing / auxiliary entities; it divides the lines of financial and operational responsibilities from planning, into construction, and during operation.
- Provides for the organized transfer of ownership and operation of the building systems.
- Ensures that the FM has the staff and budget in place for annual operations when the building opens. This means additional resources when the space is expanded or new. This includes custodial, grounds, and maintenance services.
- Provides a structure for confirming that all of the building operational assets have been completely and effectively loaded into the computerized maintenance management software (CMMS), maintenance programming is designed in context with other buildings on campus, and work order management can begin at turnover.
- Reviews energy efficiency measures and ensures that the new systems do not have their energy savings eclipsed by higher maintenance expenses.

- Defines custodial equipment purchasing and storage strategy.
- Defines internal trash collection frequencies and processes. Integrates the facility into campus waste management practices to include frequency of pickup, container sizing, and location.
- Sets the stage for a fluid transition into post-substantial completion activities such as punch list completion, warranty management, first cleaning, furnishing, and occupying the new space.

It should be made clear that nearly all of the TOW activities that will be described in this document happen on nearly all projects. The success of turnover activities on a typical project are largely dependent on the effectiveness and experience of the PD&C Project Manager (PM) and Construction Manager (CM) and impacted individuals within the project's maintenance, services, and operations stakeholders. Many of the tasks and activities occur informally and organically. An informal model for project turnover will lead to ambiguity and overlapping efforts and erode the culture of the project. The TOW framework should be viewed as the gradual, organized transfer of control and responsibility from members of the PD&C team to the building operations personnel and future building occupants. It seeks to replace the "hand over the keys and walk away" model which is never effective.

## Anticipated Resistance

Since the TOW concept is introduced to the project team when the new space project is in the early design phase, key project stakeholders will offer some significant pushback because it doesn't follow the typical project construction model.

### It's in the spec!

The argument will be made that language has been included in the project specifications that puts the responsibilities, outlined in this document for the TOW, on the members of the project team. The premise is that the design team, construction manager, contractors, and commissioning agent will *ensure* the project turnover will be successful and all of the operational stakeholders and the new occupants will live happily ever after. This is rarely the case! The responsibility of the project team, regardless of how many words are placed in the specification, is to build a building and not to operate it.

Sacrifices will be made during the project to achieve the construction of the project which may negatively affect the operation of the building. The members of the project team want to build the building, get paid, and move on to the next project.

### **We have project meetings!**

Yes, the project does include project meetings, and yes, members of the operations team can participate. However, the members of the project team use the project meeting to get the building built. The topics of major interest to the operations team (discussed later) will typically be given short shrift. There will be specific operations-related topics that must be discussed at a level of detail that will bore the members of the project team to death.

### **We don't have the internal resources to dedicate to a turnover process!**

Maybe not, but then an organization will have to take the time and resources to deal with ugly issues related to a poorly conducted building turnover. These issues are always reactionary, the new occupants get upset, the members of the operations team are frustrated, some level of rework may be necessary (which costs money), and the reactive resolution is going to come at a time and investment double that of the proactive TOW strategy.

## **TOW Process Participants**

The participants in the TOW process may be different depending on the type and size of the project. The makeup of the team will change from time to time during the course of the project. The process should be led by an individual representing the interests of the members of the FM operations team. We will call this person the “TOW Coordinator” or TC. The role of the TC should not be a full-time position. An existing team member with meeting facilitation skills and one who sees the “big picture” would be a good candidate for this part-time role. The time investment would be limited to preparing for the meetings, facilitating the meetings, and distributing the meeting notes. The TC should delegate responsibilities and respect that the TOW members are also participating part-time. The following roles should be considered as members of the TOW team:

### **Core Members:**

- Assigned Building Maintenance Technician
- Area Maintenance Supervisor or Manager
- PD&C Construction Manager
- TOW Coordinator
- Representatives from business units that will also manage space in the new project

### **As-Needed Representatives from the following FM Units:**

- Fire Protection and Fire Alarm
- Custodial Services
- Key and Access Control Services
- Landscape Services
- Work Control Center
- Environmental Compliance
- Building Controls
- Utilities
- Energy Management
- Records Document Center

### **As-Needed Representatives from the following non-FM Units:**

- Shared IT Services
- Environmental Health and Safety
- Future Occupants
- Assigned Building Coordinator

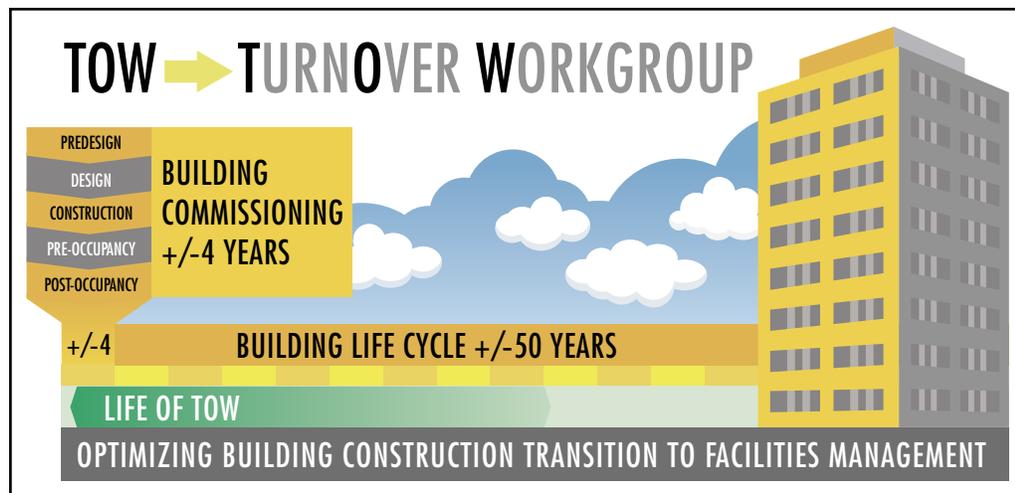
A charter should be developed which establishes and guides the TOW. This charter should specify the team members, their positions, duties for each position, meeting frequencies and locations, meeting agenda template, ongoing communication channels and policies, mission statement, and strategic purpose. The strategic purpose should include the functions TOW will and will not provide. There should be a charter template developed for heavy and light projects. TOW “Light” would combine positions efficiently and, perhaps, call for fewer meetings. Following are project characteristics for a standard TOW charter:

- Constructing a new building or a significant addition;
- A large portion of a building is being reprogrammed or major pieces of new equipment, building systems, or technologies are being added;
- A mission-critical or high-risk system is being added or an existing system altered.

*“Successful project delivery teams start with the capital project delivery process with the end in mind. They not only focus on integrating operations into the design process, but also ensure that the facility is prepared for its intended use.”<sup>2</sup>*

With the above quote in mind, it is important for all of the project stakeholders to keep in mind that the reason the building is being constructed in the first place. It’s not just an exercise in building a physical structure. The purpose is to build a building that many people will spend a lot of time in and will be full of assets that will be used for many years following the date it is turned over. Figure 15.1 demonstrates that the relative short period of time that is defined by the design and construction phase. Neglecting to focus with the “end in mind” during the design and construction phase will result in a building that may not perform optimally over the life of the building.

**Figure 15.1: Turnover Workgroup**



The turnover process should be initiated during the design phase. These design phase topics should be addressed on all projects, regardless of size, and should be resolved prior to the distribution of final construction documents. A list of recommended design phase and construction phase turnover topics is included later in this document. Depending on the complexity and size of the project, the TOW process may continue well into the post-construction/occupancy phase.

## Key characteristics of an effective TOW process

- The TOW effort should be led by a member representing the long-term operational interests of the FM team. The PD&C CM will be a key team member but will not lead the team. The CM will be the primary two-way communication conduit between the project team and the TOW team.
- When the TOW process is initiated and as new members are invited to participate in the TOW process, the TOW Coordinator (TC) should provide an overview of the TOW process including informing the members regarding the goals and purpose of the TOW process. The charter should be updated accordingly. It also must be emphasized at this time that the TOW meetings are not duplicative of the project management meeting led by the PD&C CM. The smooth transition from construction activities to operations has historically been a point of friction within most FM organizations. The TOW framework helps to avoid and prevent much of that friction by engaging the affected parties and providing clear lines of communication.
- The TOW meetings ARE NOT duplicative of project meetings. The purpose of these two meetings is different. The TC should make every effort to make sure the TOW meetings do not turn into project meetings. Keep project issues separate from turnover issues. This is difficult, but necessary. The TOW group should focus on the operational transition of the project, without being bogged down in the minutiae of the construction activities.
- TOW is not a PD&C, Building Operations/Maintenance, Landscape Services, Utilities or Energy Management function. **It is a Facilities Management function.** It is imperative that the turnover activities not be viewed exclusively from the perspective of any single business unit. The TOW process supports the creation of a culture of interaction, collaboration, and communication identified as beneficial in TCO [1, p. 15].
- It is critical that a clear path is maintained for elevating and resolving the inevitable conflicts relating to the interests of the FM operations team. State clearly and often that all members of the TOW team have the right and responsibility to elevate to management any issue they do not feel is being resolved at the project level. There are competing interests for almost every issue on a construction project. For some, the focus is on budget and schedule. For others, the focus is on a specific nuance of operations or maintenance. TOW attempts to resolve conflicts at the lowest

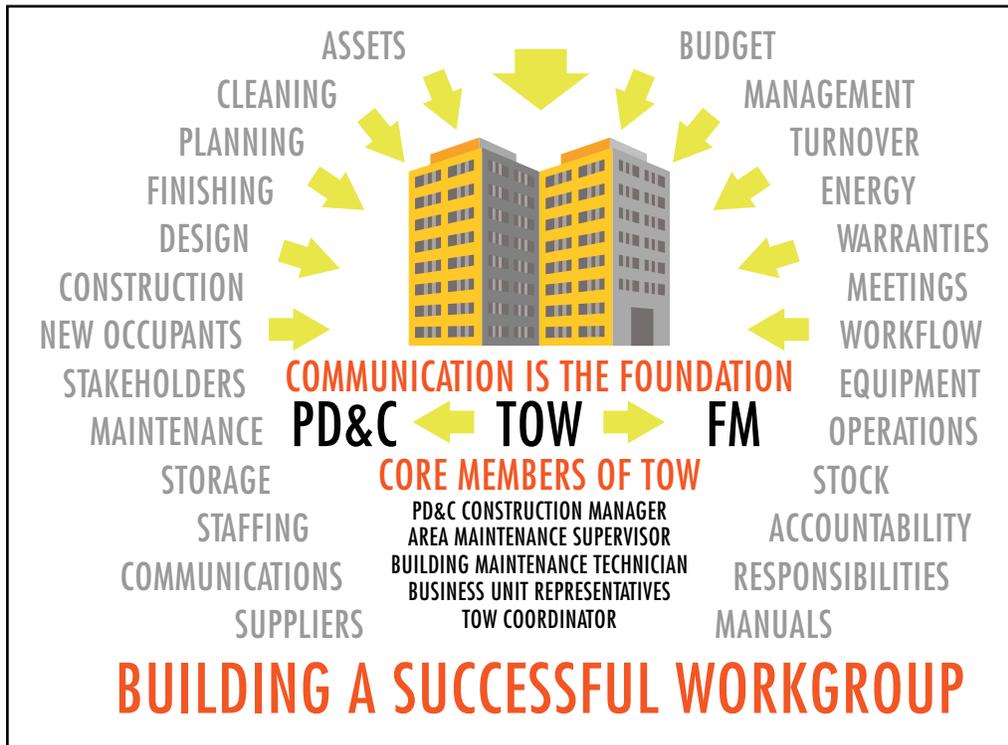
possible level. If, however, someone is not satisfied with the final decision, that person has the responsibility to elevate it to management.

- Make sure the members of the TOW team are fully engaged. This is critical for front-line contributors, especially those representing custodial and area maintenance. The front-line contributors have the most intimate and personal relationship with the operations and occupants in the spaces. All too often, they have not been intimately involved in project turnover.
- Make sure people understand the time and personal commitment required to make the TOW process successful. There may be initial resistance to investing the time and effort required for following through with the TOW process. It **MUST** be emphasized that these activities will be completed with or without TOW. The advantage of incorporating the TOW process is that the activities will be addressed, planned, and completed in an organized fashion with the key operational stakeholders. Small problems will be addressed proactively instead of ignoring them and allowing them to grow into larger obstacles.
- Informative and clearly communicated meeting agendas should be developed and distributed. Comprehensive and detailed meeting notes should be taken and distributed to the stakeholders promptly. When assignments are made during the meeting, make sure the **WHO**, **WHAT**, and **WHEN** are documented.

### **Key TOW characteristics during the design phase and construction phase**

The TOW process should start during the design phase and will continue through the construction phase and into the post-construction phase. The following section highlights some of the key TOW activities and discussion items that occur during these project phases. Please keep in mind these activities and topics are subject to change depending on the type and size of the project. As illustrated in Figure 15.2, lot of topics, all related to the future operations of the building will be covered during the life of TOW. Depending on the nature and function of the buildings, additional topics may need to be addressed and some may not need to be addressed.

Figure 15.2: Building a Successful Workgroup.



**TOW Membership and Logistics:**

Confirm who the TOW Coordinator (TC) will be with the responsibility of leading the TOW effort during the course of the project. Identify, select and recruit the members of the TOW team who will represent the operations team throughout the project. Consider scheduling an initial meeting, early in the design phase, including ALL of the potential stakeholders who may be invited to the TOW team during the course of the project and introduce the purpose and key characteristics of TOW. The PD&C project manager (PM) or construction manager (CM) should be an active participant depending on the current stage of the project but may not need to attend each meeting. Confirm the frequency of the meetings. Establish communication channels for project issues. This includes the process for elevating issues to the appropriate management level if there are conflicts at the project level. It is critical that comprehensive and detailed meeting minutes are taken and distributed with two or three business days following the meetings.

### **Project Overview:**

It is critical for the members of the operations team to receive a comprehensive overview of the project, early in the design stage, so they get a good feel of the characteristics of the building they will eventually operate and maintain. The “Owner’s Project Requirements” (or OPR) and the “Basis of Design” (or BOD) should be shared with the TOW team members at this time and be available for review by future TOW team participants. If these documents do not exist, the same type of information, normally contained in these documents, should be shared with the TOW team.

### **Hiring of Additional Personnel:**

This is the appropriate time to start the discussion related to the need to hire and fund additional operations personnel who will be assigned to this new building. The staffing level should be based on a detailed analysis of the individual spaces and new assets to be installed rather than building-level models. Otherwise, the team will run the risk of losing credibility by understating or overstating the need.

The hiring process, as we all know, can be a very long, drawn-out process. Starting this process now and establishing responsibilities and timelines can significantly reduce the amount of stress later on. Keep this topic “front and center” during the course of the project and solicit updates from those responsible to hire and train the new team members and have them available at building turnover. If the new employees will not be available when the building is turned over, start developing a plan on how current employees will be reassigned on a temporary basis to serve the new building.

### **Attic Stock and Spare Parts/Consumables:**

Early in the design phase, establish accurate attic stock, spare parts, and consumable requirements including quantities with input by the FM operations team. The PM should provide the TOW team with a list of suggested attic stock, spare parts and consumables, and suggested quantities which will be reviewed by the TOW team. It is also critical to confirm the locations where this material will be stored both during and after the construction phase.

As the project moves through construction, the following issues should be discussed:

- Confirm when the material will be delivered. Make sure the prior notice is adequate.

- Confirm whether members of the operations team will need to assist with offloading and transportation of the material.
- Confirm **WHO** will be responsible for receiving and signing for the material and how the receipt will be documented and filed with the CM.
- Confirm where the items will be stored, especially if they need to be stored in a temporary location during the construction period.
- Confirm if the storage locations will need to be secured.
- The key members of the operations team should establish a process on how the attic stock, spare parts and consumables will be managed, inventoried and tracked post-construction.

### **Custodial Team Concerns:**

It is very important, at this stage, that the PM review any special building finishes installed in the building that will require unique cleaning chemicals, processes, or equipment be identified now. This list should include, but not be limited to:

- Flooring
- Wall coverings
- Windows
- Ceilings
- Casework

The custodial team stakeholders should be involved in the identification and selection of any new pieces of custodial equipment that will need to be purchased and available at building turnover. It should also be determined early in the design phase which budget (project or operating) will fund the purchase of this equipment. This would be a good time to review, with the members of the custodial team, the types of furniture that will be purchased to confirm the floor finishes will not be damaged by the furniture. For example, it may be necessary to purchase leg protectors to prevent this damage.

As the project moves through the construction phase, the following issues should be discussed as well as **WHO** is going to be responsible for these tasks:

- Confirm what equipment will need to be purchased and when it needs to be purchased to make sure it is onsite and available when needed.

- Solicit proposals from vendors as necessary.
- Confirm which budget will fund the purchase of the equipment.
- Confirm where the equipment be stored and if the area needs to be secured.

### **Maintenance Tools and Equipment:**

As early as possible, confirm what additional tools and equipment will need to be purchased and available at building turnover. Pay particular attention to unique equipment and systems that will be incorporated into the project that may require specialized tools. Review with members of the design team the placement of any maintainable assets that will require special tools or access equipment to perform routine maintenance. It should also be determined early in the design phase which budget (project or operating) will fund the purchase of this equipment. This new equipment may also include computer equipment and peripherals (e.g. PCs dedicated to the building automation system).

As the project progresses, the following issues should be discussed as well as **WHO** is going to responsible for these tasks:

- Confirm which pieces of new equipment will need to be ordered and when it needs to be ordered to make sure it is onsite and available when needed.
- Confirm which budget will fund the purchase of the equipment.
- Confirm where the equipment will be stored. Determine if there will be enough room in the mechanical room for this equipment or if it will need to be stored elsewhere.
- If the equipment will be stored in the new building prior to substantial completion, determine if the room needs to be available and securable when the equipment arrives.
- Confirm where the equipment will be stored temporarily if the equipment cannot be stored in the new building.

### **Asset Management Program Development:**

Early in the design phase, TOW follows the TCO standard to “Begin with the end in mind” [1, p. 17]. It lays the groundwork for a strategic asset management plan that will be in place following building turnover. This asset management program pertains to roof, exterior envelope, interior structure, conveying, plumbing, fire protection, HVAC,

electrical, fire alarm, and equipment system components. It is critical that someone representing the interests of the maintenance organization is assigned the responsibility of leading the effort to develop and implement the asset management program. Every effort should be made to make sure that the asset management program is designed and be fully implemented prior to the date of building turnover such that:

- Preventive maintenance (PM) work orders can be initiated the day the building is turned over.
- Work orders can be generated and tracked the day the building is turned over.
- Begin with the end in mind by developing 10-, 20-, and 50-year capital renewal projections. Install this information in your CMMS or another capital planning repository in use by FM operations.

Other topics and tasks related to the development and implementation of the asset management program that should be discussed during the course of the project include:

- Establish the equipment naming conventions for use in the project documents. The intent is to provide equipment names consistent with naming conventions already in use for other buildings in the computerized maintenance management software (CMMS).
- Confirm, by name, **WHO** will be responsible for the preparation of an official, physical, comprehensive, accurate and complete inventory of all building assets that will need to be maintained and tracked within the CMMS.
- The TCO standard states that “the facilities professional shall identify and maintain an asset inventory in a comprehensive database centrally location for all stakeholders to use.” [1, p. 19] Establish what asset nameplate and operational data is required for CMMS system input. It must be emphasized that equipment lists and schedules provided by the installing contractor should be used **ONLY** as a starting point and should not be treated as “gospel.” A physical inventory of all assets MUST be conducted, by a qualified individual/team, BEFORE the building is turned over. This inventory should be applied in a consistent manner across trade disciplines and in context with other similar assets in the building portfolio. This is consistent with the TCO standard which emphasizes the importance of the need for collecting accurate and reliable asset data. According to the standard, success of the asset management plan is dependent “on having accurate and reliable

data to make better decisions rather than basing decisions on conjecture.” [1, p. 15]

- Take photographs of each asset during the physical inventory. These photographs will be uploaded to the CMMS or a document repository in use and will be associated with the particular asset.
- All selected assets must be tagged with a high-quality asset tag that will include a serialized asset number, QR code and/or barcode which enables mobile interaction with the CMMS.
- Develop effective preventive maintenance (PM) procedures for each asset which consider other like assets in the building portfolio but are also useful to the technicians. The procedures should include estimates of wrench time, special tools required, data that will be collected during the PM, and identification of consumables.
- Early in the design phase, discuss the wireless connectivity that needs to be available in all mechanical spaces for interaction with the CMMS and available document management systems.
- Ensure that systems are installed such that maintenance staff can safely access all components without unusual requirements for disassembly.
- Establish the process by which asset operations and maintenance (O&M) manuals can be captured and tracked **DURING** the construction phase to make it easier for the asset management team to find them and upload them into the CMMS. Consider giving the asset manager access to the project submittal exchange site to access key pieces of asset information including equipment lists, building drawings, equipment submittals, and installation, operation, and maintenance (IOM) manuals.
- Upload all of the information into the CMMS and conduct quality control checks prior to substantial completion.
- If internal resources will be used to perform these tasks, make sure they are properly trained. If a 3rd party vendor will be used to support the implementation, develop the scope of work, contact the vendor, solicit the proposal, and get them onboard at the appropriate time; well in advance of building turnover.
- Establish a budget for this work and confirm which budget (project or operations) will cover the cost of this work.

## Project Walkthroughs and Inspections:

It is critical that key members of the operations team be intimately involved with project walkthroughs and inspections during the construction phase. Prior to the start of the walkthroughs, establish the purpose of them and the responsibilities of the participating individuals. This will make this process as effective and constructive as possible. Include the CM in these discussions.

- Early in the design phase, identify the individuals who will eventually be responsible for maintaining and operating the building. Commit to having them involved early.
- Confirm who, by name, should be involved in project walkthroughs, when they will start, and how often they will be conducted. It is very important that the members of the operations team make every effort to participate in each walkthrough when scheduled.
- Confirm how items/issues found during the walkthroughs are to be documented and communicated to the CM for resolution. DO NOT overlook the importance of how the resolutions will be communicated back to the initiator of the concern so the loop is completed. It will be essential that all items of concern are documented, funneled to the CM, and filed to become part of the project record. It is also critical that timely feedback is given to the initiator when updates on the resolution are available.

## Operations Personnel Training:

During the design phase, establish the training requirements for specific pieces of equipment and systems. It is critical to keep in mind that the training is provided for the benefit of the operations team. The training requirements specified in the contract documents must be designed to ensure and guarantee that the quality of the training is high and that it is effective and meets the needs of the operations team who will be responsible for maintaining and operating the equipment. Consider including the following items in the contract documents:

- The contractor will develop proposed detailed agendas for each training session. These agendas will be reviewed and approved prior to finalizing the agendas.
- The selection of the person who is assigned by the contractor to perform the training is very important. Far too often, this individual has been selected because they are “available” and not because they have any expertise or experience with the

equipment. Ask for a brief curriculum vitae of the proposed trainer. The members of the operations team will review and approve prior to the final selection of the trainer.

- The members of the operations team will be responsible for establishing the training schedule windows for the contractors. The schedules must be established for the convenience of the operations team and not for the contractor. The contract documents should include information regarding the acceptable days of the week the training can occur, the acceptable time windows, and the minimum prior notice.
- The contractor providing training should agree to having the session recorded. The video should then be made available to technical personnel in the field via the CMMS, document management system, or encrypted account on a video sharing site. Confirm the session recording tasks for which the contractor will be responsible.

As the project moves through the construction phase, begin preparing for the training events. Topics and tasks that should be established during the construction phase include:

- Review and confirm all of the individual training events that will be held.
- Review the proposed training schedule well in advance of the start of the training. Identify any major scheduling conflicts and provide feedback to the CM. Remember that the training events must be scheduled to fit the operations team member schedules and not for the convenience of the contractor.
- Review the proposed agendas provided by the contractors. Provide constructive feedback to the CM if the agendas are not acceptable.
- Review the credentials of the proposed trainers. Provide constructive feedback to the CM if the credentials are not acceptable.
- As the training events get closer, decide which employees, by name, will be assigned to attend each training event. Provide this information to the employees as soon as possible to accommodate vacation schedules.
- Select the appropriate location of each training event.
- If any of the training events will be recorded, start planning for these sessions well in advance. The plan should consider who will be recording, location, recording devices, microphones, key operations, background noise, etc.

## Operations and Maintenance (O&M) Manuals:

Establish requirements for an effective IOM manual document collection and review process. Key members of the FM operations team must provide feedback at this stage to make sure the manuals provided by the contractors are valuable and useful. Discussion items at this stage should include the confirmation of manual review schedule window and a review of the list of manuals that will be included.

Early in the construction phase, begin planning for the O&M review process. The following topics and tasks should be established:

- Confirm what an effective IOM manual review entails.
- Confirm which IOM manuals will be reviewed.
- Confirm when the review process starts and when it needs to be finished.
- Confirm **WHO** is going to be responsible for reviewing the manuals.
- Confirm where the approved IOM manuals will be filed and confirm format (hardcopy, PDF, or both).
- Confirm how the comments will be provided; handwritten notes on hard copies or electronic notes on electronic versions.

## Training & Orientation of the New Building Occupants:

The goal of this effort is to orient the new occupants to their new surroundings and get them comfortable with their new “home” as they move in. It is advisable that this training and orientation is provided by key members of the operations team and the CM (or their designated authority). The new occupant will need to be shown how to report problems and issues identified by the new occupants to the work control center. It may be desirable to conduct this training with selected new occupants prior to occupancy.

Identify the potential training events that would be appropriate for the future occupants of the new building. This training should include:

- Review the location of area thermostats, identify which thermostats serve which areas, and show the occupants how to use them.
- Review the operation of all automatic lighting control systems throughout the building. Remind the new occupants that the traditional occupancy sensors may need to be adjusted early during the occupancy phase.

- Review the operation of controls that will automatically operate window shades based on ambient light levels.
- Review the location of fire extinguishers.
- Review the location of and proper use of eyewash stations, emergency showers, fume hoods, kitchen hoods, dust collectors, fire alarm pull stations, and other life safety systems.
- Provide an orientation of the operating procedures and characteristics of the new audio-visual equipment located in conference rooms.
- Review the location of automatic defibrillators and first aid kits.
- Review the proper waste handling and disposal procedures.
- Review the locations and proper operation of unique building characteristics (e.g. lab gas isolation valves).
- Review emergency egress routes.

### **Warranty Management:**

The foundation of an equipment, system and asset warranty management program should be established early in the design phase. It will become critical, post-turnover, that the key members of the operations team, including the work control center, know and understand the warranty periods and other details for the equipment they will be responsible for maintaining. The TCO standard also recommends that “a full inventory of all of mechanical/electrical equipment and other maintainable/capital assets should be conducted to include specific location, age, condition, nameplate information, initial and replacement costs as well as applicable warranties.” [1, p. 20].

Well in advance of the official building turnover and in concert with the CM, develop processes and procedures that will specify how to manage and address issues and problems, identified post-occupancy, related to project warranties. Include key members from the work control center in these discussions. Develop and distribute processes and procedures to prevent the dreaded “**Warranty Non-Action Syndrome**” (or “**WNAS**”). One of the symptoms of the WNAS is when the maintenance technicians are heard saying, “I’m not going to touch that piece of equipment because it will void the warranty.” Schedule a warranty orientation with all of the key stakeholders before turnover. The following items should be addressed:

- Confirm the prescribed communications channels when a potential warranty item is discovered.
- Confirm who is going to be responsible for the correction of problems.
- Develop a method of tracking the internal labor and materials used in conjunction with the discovery and correction of a warranty item. Confirm how these costs will be charged back to the project. Create CMMS work orders, associated with the particular asset or system, to document and track warranty issues.
- Define the responsibility of members of the operations team if a problem is found.
- Review with the members of the operations team any unique warranty programs associated with any particular asset or system including any extended warranties that may be in place.
- Develop a communication and feedback loop to confirm that members of the operations team and new occupants are aware that the issue has been resolved.
- Consider scheduling a “10-month warranty walkthrough.” Confirm the goal of the program, who will manage it, etc.

### **Maintenance Agreements:**

During the design phase, identify which pieces of equipment and/or systems will require, or may require, the purchase of a maintenance agreement. Issues related to maintenance agreements that need to be established at this stage include:

- Equipment or systems which should be covered by a maintenance agreement.
- The scope of the maintenance agreement.
- The cost of the agreement.
- The budget that will pay for the initial term; project or operations.

During the construction phase, review what maintenance agreements will be in place post-construction. The information established during the design phase should be transferred and refined as a part of the construction phase. The CM should provide a copy of the maintenance agreement to key members of the TOW team. The following topics should be discussed:

- Confirm which equipment and systems are covered under a maintenance agreement.
- Review what the maintenance agreement covers.

- Confirm the expiration date of the agreement.
- Review the responsibilities of the operations team when an issue is identified to be associated with a piece of equipment/system that is covered by a maintenance agreement.
- Confirm who will be responsible for managing the maintenance agreement.
- Provide the operations team with copies of the maintenance agreements.
- Well before substantial completion, the operations team should confirm if any additional maintenance agreements should be purchased and funded using their budget.

### **Accreditation, OSHA, and Regulatory Compliance:**

Early in the design phase, confirm and identify all components of the project which may require confirmation of compliance with accreditation agencies and other authorities having jurisdiction (AHJ). Identify which campus departments will need to be involved in establishing the requirements and will be responsible for reviewing and submitting documents related to compliance. Inform any campus departments that may be involved with any testing or inspections related to compliance and confirm the project budget will fund this work. For example, notify members of the building controls team during the design phase if they will be involved with testing a BL3 lab containment area.

Confirm, during the design phase, the tasks that will need to be completed to confirm compliance with OSHA requirements and which budgets will fund these tasks. These tasks may include:

- Perform arc flash analyses and affix labels to the equipment.
- Develop equipment lockout / tagout procedures.
- Identify confined spaces and confirm the safety equipment that will need to be incorporated in the project for safe entry and egress of confined spaces.
- Install roof tie-off anchors for maintenance personnel.

Review the following topics and tasks if the facility has accredited healthcare space:

- Confirm the accrediting body (e.g. The Joint Commission (TJC), Det Norske veritas (DNV), Association for Assessment and Accreditation of Laboratory Animal Care

International (AAALAC), or the Healthcare Facilities Accreditation Program (HFAP)).

- Work with the accrediting body on their initial and ongoing requirements for accreditation.
- Integrate their requirements into the construction process.
- Ensure that all data is collected and transferred as such to maintain continuous compliance.

During the construction phase and well before substantial completion, make sure all issues and tasks related to compliance have been addressed and plans to ensure compliance are developed and implemented. Identify and contact key campus departments that should be involved in these discussions. Specific items that should be addressed include:

- Confirm **WHO** will be responsible for testing, documenting and maintaining safety showers, eyewash stations, bio-safety cabinets, fume hoods, and other life safety systems. Ensure that testing has been completed and documented.
- Confirm **WHO** will be responsible for monitoring and documenting chemical and fuel storage systems and ensure that all portable tanks are properly secured.
- Confirm **WHAT** final testing documents will need to be submitted to and reviewed by **WHICH** entity for final approval and acceptance. Confirm **WHO** will be responsible for performing any required tests (e.g. fume hood test results submitted to Environmental Health and Safety).
- Confirm **WHAT** reporting will be required to confirm compliance with AHJs (e.g. U.S. EPA). Confirm **WHO** will be responsible for collecting and distributing this information to the appropriate entities and **WHEN** these tasks need to be completed.
- Confirm compliance with OSHA requirements including:
  - Arc flash testing and labeling
  - Lockout / tagout procedures
  - Roof tie-off anchors
  - Areas defined as “confined spaces” have been identified with labels affixed and access and maintenance procedures have been prepared.
  - Materials Safety Data Sheets for chemicals have been collected and are available for employees to review.

## Waste Stream Management:

Members of the design team, in concert with key members of the future occupant team, must identify potential waste streams for which the members of the custodial team must prepare. The waste streams may impact the types and size of the waste receptacle containers used, the location of the containers, the routes members of the custodial team will use to empty the waste containers, etc. Make sure there is space reserved outside the buildings for dumpsters. Waste streams to consider include:

- Recycling
- Landfill
- Composting
- Hazardous materials
- Biohazard
- Batteries
- Electronics
- Other specialized materials

Additional waste stream topics and issues that should be addressed during the design phase include:

- Where will all of the waste containers be located?
- Do the waste receptacles meet the requirements of the custodial team?
- Will the standard custodial team waste receptacles fit in the casework?
- Which budget will fund the purchase of the waste receptacles and who will be responsible for ordering them?

It is critical that the custodial team play an integral role in preparing for building turnover. Custodial team tasks and activities that should be addressed early during the construction phase include:

- Identify all of the waste containers that will need to be specified and purchased and where they will be located. Confirm **WHO** is going to be responsible for ordering them, **WHEN** they need to be ordered, **WHICH** budget will fund them, and **WHO** will be responsible for distributing them.
- If certain waste receptacles will be specified and ordered by the project team, confirm these receptacles meet the requirements of the custodial team.

- Confirm all of the waste receptacles will fit the casework. Perform this task early in the construction phase so problems can be corrected before turnover.
- Review waste collection processes and procedures with the new occupants.

### **Commissioning and Equipment Startup:**

Members of the building maintenance and controls team may be heavily involved in the building commissioning and equipment startup phase. Review with the CM when these events will start and how the operations team will be involved. The operations team should also inform the CM which activities they want to observe and be involved in. These activities may include:

- Assist the contractors with functional testing of equipment and systems.
- Inform the CM which equipment and system startup they want to witness.
- Develop a schedule for when these events will occur and confirm the length of prior notice required.
- Confirm **WHO** will be involved in these activities.

### **Owner's Project Responsibilities:**

Identify all of the tasks that will need to be completed by members of the OPERATIONS team. Confirm **WHO** is going to participate and **WHEN** the work will be scheduled. Confirm with the CM which budget (project or operations) will fund these activities. These tasks may include:

- Access control commissioning including door hardware keying.
- Equipment startups.
- Fire alarm testing commissioning.
- Building automation system work.
- IT/communications department activities.
- Custodial floor prep in selected areas.
- Final floor/finishes cleanup.
- Grand opening festivities.
- Final landscaping activities.
- Occupant & furniture move-in.

## Final Thoughts

Throughout the life of a major project, the stakeholders from the design team, the construction team, the operations team, and the new occupants should always be planning for and looking forward to a smooth, effective, stress-free turnover from construction to operations as depicted in Figure 15.3 below!

Figure 15.3: Stakeholders Before and After TOW



This process takes a significant amount of planning and internal labor resources. Consider these labor resources as an investment that will pay big dividends post-construction.

## References

- <sup>1</sup> APPA - Leadership in Educational Facilities, "APPA 1000-1 Total Cost of Ownership for Facilities Asset Management (TCO) - Part 1: Key Principles," APPA - Leadership in Educational Facilities, Alexandria, VA, 2017.
- <sup>2</sup> P. Duke, "Hospital construction success factors," Health Facilities Management, 5 August 2015. [Online]. Available: <https://www.hfmmagazine.com/articles/1662-hospital-construction-success-factors>.