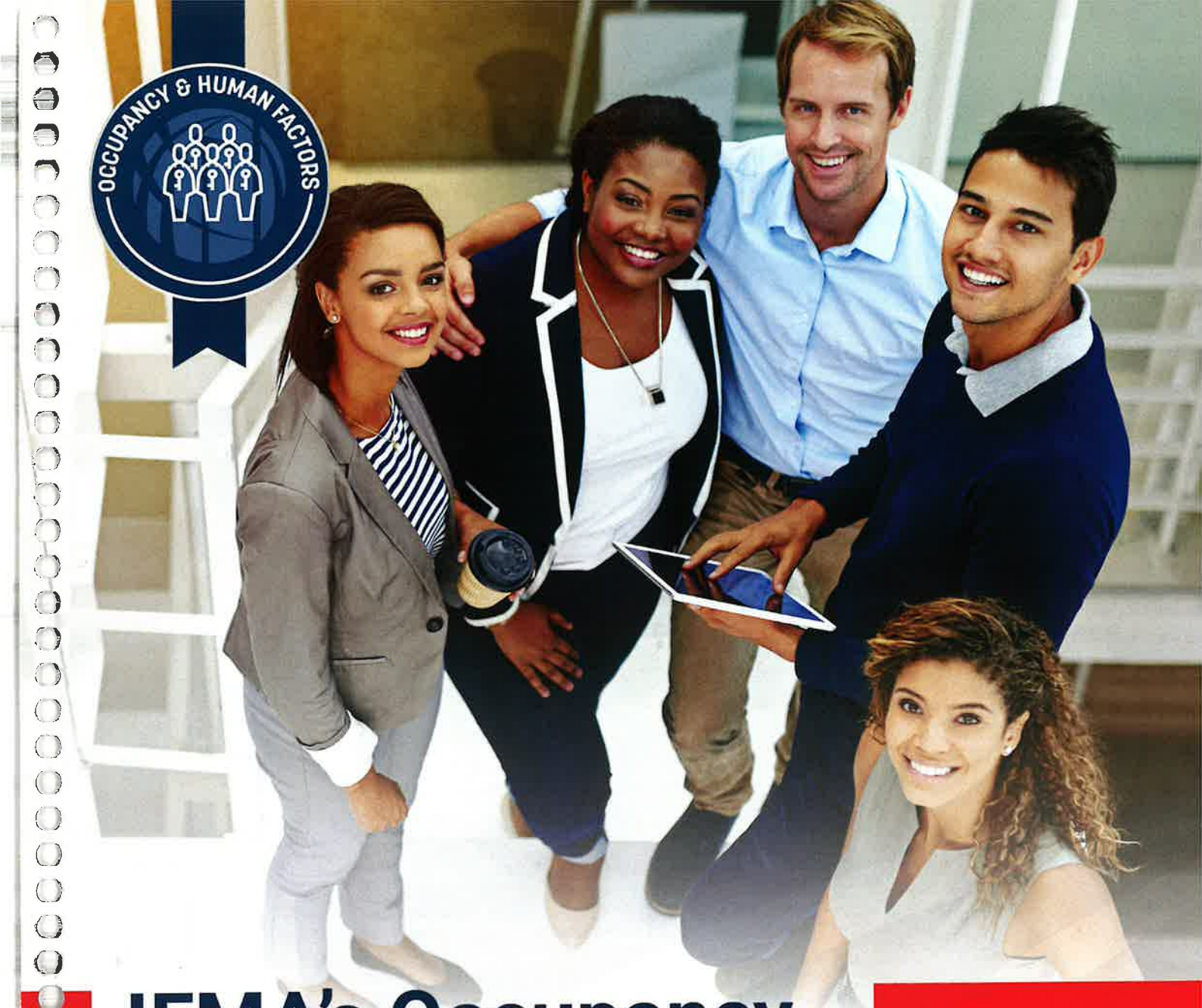

IFMA's Occupancy and Human Factors Course

Student Guide

IFMA™

Acknowledgments

IFMA's professional development courses – including our world-class credential programs, the FMP®, SFP® and CFM® – are the cornerstone of our industry-leading offerings for career advancement. The contribution of IFMA volunteer members is critical to the relevance and value of our educational programs. The result of their global input is learning for facility managers, by facility managers. We would like to acknowledge the cumulative hours and expertise our members have contributed to educational content development and review, from design through delivery, with special acknowledgement to Teena Shouse as a lead contributor, ensuring that IFMA's Occupancy and Human Factors Course accurately reflects the body of knowledge and skills required of FMs in today's global business environment.

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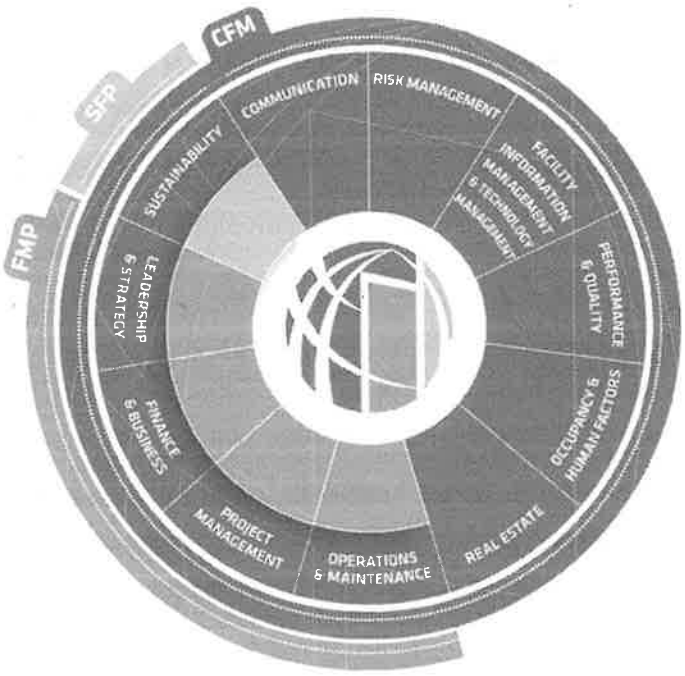
IFMA Credentials

About IFMA Credentials

After analyzing the work performed by facility managers, we have defined 11 competency areas. Our three world class FM credentials, — Facility Management Professional™ (FMP®), Sustainability Facility Professional® (SFP®), and Certified Facility Manager® (CFM®) — are based on these competencies.



1. The FMP® is the foundational credential for FM professionals and industry suppliers looking to increase their depth-of-knowledge on the core FM topics deemed critical by employers.
2. The SFP® is the leading credential for all FM and like-minded professionals with an interest in the development of sustainable FM strategies.
3. The CFM® is the premier certification for experienced FM professionals. A comprehensive exam assesses knowledge, skills, and proficiency across all FM competency areas.

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IFMA's Core Competency Courses

IFMA's 11 core competency courses, developed from IFMA's Global Job Analysis (GJTA), comprise the body of knowledge for facility managers. IFMA continuously refreshes the courses to align with global industry standards for FM knowledge, skills, and tasks. The courses provide practical knowledge and examples to help you improve your performance.

IFMA's Core Competency Courses include the following:

Communication: develop the skills you need to be an effective liaison between external and internal stakeholders.

Participants will be able to:

- Create and deliver the right message for the intended result.
- Develop an FM communication plan.
- Identify and share relevant information to the appropriate audience.

Risk Management: address the role of the facility manager in supporting or leading risk management planning; emergency preparedness, response and recovery; facility resilience and business continuity.

Participants will understand how to:

- Respond appropriately to emergencies affecting the facility.
- Meet the organization's business continuity goals.

Facility Information Management and Technology Management: understand how to leverage modern tools and techniques for today's workplaces and occupants.

Participants will be able to:

- Understand secure, efficient data collection supports decision-making processes to meet core business objectives.
- Conduct technology needs assessments and anticipate the impact of new technologies.
- Understand decisions are made to keep, update, augment, or replace technology.

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Occupancy and Human Factors: grow your ability to support organizational and individual occupant performance, while leading the FM team to develop and implement practices necessary to achieve success.

Participants will be able to:

- Create an environment where motivation, productivity, and retention are the norm.
- Blend safety and security with innovation.
- Negotiate service level agreements.

Real Estate: understand real estate principles and practices and how they contribute to achieving the core business strategy.

Participants will be able to:

- Develop and implement a real estate strategy to support the core business including assessing, acquiring, and disposing of real estate, and space management.
- Understand project management principles for managing new construction and other major projects.

Performance and Quality: define and make relevant what it means to capture fitness for the intended purpose, embrace a continuous improvement mindset, and satisfy stakeholders' needs.

Participants will be able to:

- Determine the needs and expectations of stakeholders for the facility and related service requirements.
- Understand and describe what comprises a comprehensive quality management system for FM.
- Measure the FM organization's performance to make continual improvements.

Sustainability: define the basics of five areas of sustainability and make relevant what it means to embrace sustainability.

Participants will be able to:

- Understand the management basics of:
  - Energy
  - Water
  - Materials and Consumables
  - Waste
  - Workplace and Site

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Welcome

Introduction

Welcome to IFMA's Occupancy and Human Factors Course!

Participant Introductions

- → Your name
- → Company name and/or job responsibilities
- → Reason(s) for taking this course – expected outcome(s)
- → Your experience in FM – years and work responsibilities over your career

Expectations

Learner responsibilities:

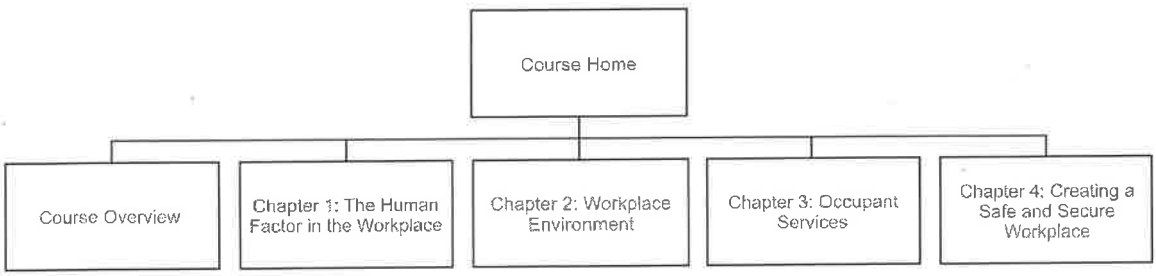
- → Be prepared – complete class pre-work
- → Take part in class discussions and activities
- → Follow the rules of common courtesy
- → Provide feedback to the instructor and IFMA

Audience

Welcome to IFMA's Occupancy and Human Factors Course! This course is designed for persons interested in developing knowledge and skills in IFMA's FM Core Competencies and who wish to gain practical knowledge to enhance FM industry professional development.

Chapters

There are four chapters in the Occupancy and Human Factors course.



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Course Goals

The goals for this course are as follows:

- Articulate what Occupancy and Human Factors mean to a facility manager
- Identify best practice as it relates to Occupancy and Human Factors
- Demonstrate awareness of the occupational health and safety.
- Evaluate and provide occupant services, manage the services, and meet the safety and security needs of a facility's occupant in accordance with the Occupancy and Human Factor competency

Overview

According to the World Health Organization, human factors "refer to environmental, organizational, and job factors. They are the human and individual characteristics which influence behavior at work in a way which can affect health and safety". Human factors play a vital role in influencing facility management (FM) in any organization. Facility managers impact three elements that correspond to the competencies within Occupancy and Human Factors those related to:

- The workplace environment
- Occupant services
- Occupant health, safety, and security

The occupancy and human factors competency highlight the fact that occupant comfort, productivity and satisfaction are as critical to an organization as energy and water resources, materials, and processes. Given the need to manage the workplace environment, a competent facility manager manages the workplace environment so that:

- Environmental factors that threaten productivity, including health and safety of employees, tenants and visitors are identified, mitigated and or eliminated.
- The site meets all environmental, health and safety codes and regulations. Human factors can and should be included within a good safety management system and should be examined in a similar way to any other risk control system.
- The FM can prevent major accidents, occupational accidents and conditions which could cause ill health and cost businesses money and reputation. An example would be to ensure that safe and adequate indoor air quality is maintained.

Occupants also require services associated with their use of a facility, so a competent facility manager identifies and provides occupant services such that:

- Occupant service requirements are documented and agreed upon with the appropriate stakeholders.

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- The impact of those services on existing building systems, structures, and elements of interiors, exteriors and grounds can be determined.
- The need for additional systems, structures, and elements of interiors, exteriors and grounds can be determined.
- Funding required to alter existing or acquire new systems, structures, and elements of interiors, exteriors and grounds is appropriate.
- A business case can be made to either outsource or in-source the service.
- Services provided are based on a comparison of the cost effectiveness and quality of service delivery of outsourcing versus in-sourcing services.
- The benefits and risks of outsourcing compared to in-sourcing are determined and considered.
- The feasibility of service providers having the correct knowledge, skills and abilities (KSAs) is considered.
- Capable service providers can be recruited or selected.
- Service level agreements with providers can be developed and negotiated.

A competent facility manager also prepares to meet the safety and security needs of a facility's occupants, such that:

- Adequate barriers and signs are in place to minimize risk and provide instructions during emergencies.
- The need to follow safe practices is continually reinforced and encouraged.
- Best practices to improve safety and health are identified and implemented, as appropriate.
- Employees and tenants are trained in how to respond to hazards and emergencies.
- Employees have access to secure locations for their personal belongings.

These three roles, in proper balance, help the facility manager to not only lead the facility management organization, but also to support the entire organization and its occupants.

Facility Managers Impacting Human Factors in the Workplace

Facility managers are in a unique position to positively impact the human factors in the workplace, including occupant productivity, while achieving the strategic objectives of the demand organization. Occupancy and human factors address the people element in the FM model.

FM is no longer defined as a cost center focused on facility operations and service delivery. Facility managers now contribute to the organization's strategic objectives and are embedded in the core business as senior business partners and advisors. Facility managers are recognized as business-oriented specialists possessing critical new skills in areas, such as:

- Analyzing, building and developing networking capabilities which expands the talents and expertise of the workforce
- Using the workplace as a tool to strengthen company culture, improve employee engagement and productivity
- Approaching problems as experience architects – people who create experiences based on their physical surroundings
- Leading the acceptance of behavioral economics and evidence-based decision making
- Supporting and implementing workplace experiences that communicate and reinforce the organization's value proposition and brand and enhance the occupant experience
- Developing and maintaining diversity awareness, as a key element in supporting a cohesive and productive workforce

The facility manager is becoming the champion of the holistic employee experience. New roles are being created in organizations such as Chief Workplace Officer or Chief Employee Experience Officer, which reflect the facility manager's new mandate.

This course focuses on employee engagement, creation of a productive culture and crafting safe and secure workplace experiences that reinforce the demand organization's value proposition.

Role of Facility Managers as related to the Human Factors Competency

In an organization, human factors play a vital role in influencing FM operations. The roles that facility managers perform, are:

- To support the organizational and individual occupant performances by providing a quality workplace which includes occupant services, health, safety and security related services.
- To lead the facility management organization in developing and implementing practices that support the entire demand organization's performance.
- To master specific areas of knowledge and skills, as indicated in Figure 1

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Figure 1 Role of Facility Managers

The occupancy and human factors competency highlights that occupant comfort, productivity and satisfaction are as critical to an organization as energy and water resources, materials, and processes.

Figure 2 highlights that the largest component in the life cycle of a building is the salaries and benefits of the employee. The exhibit depicts the breakdown of life cycle costs of a commercial building. Proportions vary depending on an organization and its activities.

Given that almost 90% of an organization's costs are salaries, imagine the impact of occupant productivity across the organization's life cycle. Even small improvements the FM can make in occupant productivity can have a big impact on the life cycle costs for an organization.

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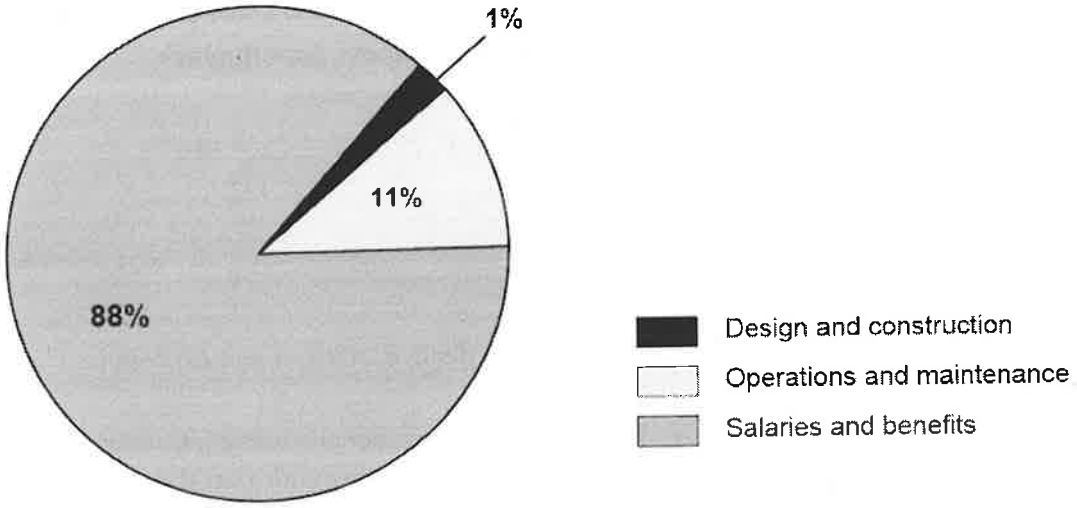

Figure 2 Costs of a Commercial Building over a 30 -Year Life Cycle
Source: National Institute of Building Sciences, as cited in "Defining High Performance Buildings for Operations and Maintenance" by Angela Lewis, David Riley and Abbas Elmualim, International Journal of Facility Management, Vol. 1, No. 2, 2010.

In some industries and business strategies, high employee turnover may be desirable, but for organizations that rely on well-developed skills and expertise, employee retention and development are necessities. The activities and operations provided by the FM department can have a significant impact on those necessities. One resource for the FM to better understand these necessities is the Global Reporting Initiative (GRI).

The GRI, is an international group that aims at providing guidelines to help organizations measure and report their sustainable actions which may influence employee retention and development.

A link to the Web site for the Global Reporting Initiative is provided in the online Resource Center.

The GRI guidelines focus on reporting on an organization's responsibility to:

- Ensure a healthful, safe and secure workplace that reduces workplace injuries and supports productivity.
- Create a workplace in which occupants are engaged in their work.
- Exercise fairness in employment relations – achieving diversity, awarding livable wages and standard benefits, complying with international and local labor laws and labor contracts.
- Invest in improving human capital through performance management and training.

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This module on occupancy and human factors focuses on the skills and knowledge facility managers will be required to have in order make the most of those opportunities.

Overview of the Occupancy and Human Factors Competency

Chapter	Content
1. The Human Factor in the Workplace	• Defining an effective, efficient and expressive workplace • Facility and organizational issues that affect occupant and employee comfort in the workplace and in the work relationship • Understanding and managing occupants' reactions to change

2. Workplace Environment	• Indoor environmental quality:
	  • Indoor air quality, lighting, thermal comfort, noise
	  • Sick building syndrome
	• Supporting employee and occupant wellness:
	  • Ergonomics
	  • Stress management
	• Supporting productivity:
	  • Supporting different types of work
	  • Aesthetic qualities

3. Occupant Services	• Creating an efficient and safe environment • The need to manage additional soft services • Documented requirements such as Service Level Agreements (SLAs) or written contracts
4. Creating a Safe and Secure Workplace	• Creating a culture of safety and security • Introduction to ISO standards • Strategies to improve workplace safety • Strategies to improve organizational, facility and occupant security • Signage

Table 1 : Overview of the Occupancy and Human Factors Competency

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Chapter 1: The Human Factor in the Workplace

Lessons

- Objectives
- Lesson 1: Effective Workplace
- Lesson 2: The Need for Comfort
- Lesson 3: Humans and Change

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Objectives

Chapter 1: Objectives

On completion of this chapter, you will be able to:

- Determine the impact of the workplace on its occupants.
- Identify organizational factors a facility manager should be familiar with before implementing processes that affect occupants.
- Provide examples of how FM processes can affect each of the five basic human needs as defined by Maslow.
- Identify effective strategies for managing change.
- Define an effective workplace.
- Align FM practices to the organization's strategy, culture and values.

Introduction

In the course overview, it was mentioned that a facility manager is in the position to positively impact the human factors in the workplace while achieving the strategic objectives of the demand organization. This chapter will cover how creating an efficient and effective workplace that expresses the values and goals of the organization, meets the physical and psychological needs of its occupants.

Lesson 1: Effective Workplace

Lesson 1: Objectives

On completion of this lesson, you will be able to:

- Determine the impact of the workplace on its occupants.
- Identify organizational factors which a facility manager should be familiar with before implementing processes that affect occupants.
- Define an effective workplace.

Defining an Effective Workplace

What is an effective workplace?

An effective workplace goes beyond the traditional goals of efficient space utilization, operations and maintenance practices. It places more emphasis on employee comfort and productivity.

The Commission for Architecture and the Built Environment (CABE) and the British Council of Offices, proposed two frameworks for assessing the quality of a workplace. These frameworks apply to all types of workplaces, including educational, retail and manufacturing facilities, but at the time, the commission was focusing specifically on offices.

One framework was the Balanced Scorecard, an assessment tool that combines different perspectives – Learning and Growth, Customers, Internal Processes and Financial, which provides a more holistic analysis. (T*he balanced scorecard is discussed in more detail in the* **Leadership and Strategy** *competency.*) The concept is that the services and the environment provided by the FM team, must provide services in a manner that balances the needs of the occupants with proper fiscal responsibility. It means that the processes and procedures will support the physical needs of the facilities and will be in alignment with the objectives of the organization including attention to the customers, growth of the employees and responsibility to society.

A workplace is only effective to the level that it fulfills the needs and expectations of the occupants, visitors and customers. It is important to point out that effective work processes must be supported in a cost-effective manner in order to meet the organization's performance goals in a cost-effective manner.

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The second analytic framework is derived from the work of Francis Duffy, a leading figure in workplace strategy and design. Duffy proposes that a workplace is truly functional when it balances the "three Es" namely efficiency, effectiveness and expression.

- Efficiency is the optimal use of the workspace from a cost perspective
- Effectiveness is the degree to which the workplace supports productivity by enabling employees' performance.
- Expression is the way in which the workplace articulates the values and goals of the organization and its members.

These similar assessment approaches indicate the complexity of human needs that the facility manager must address. For an organization to achieve its strategic goals, the demand organization and the FM organization must recognize that occupants require physical comfort, such as a comfortable temperature and humidity, adequate lighting, proper air quality and work satisfaction. Work satisfaction includes control over work life and workspace, engagement in work, the opportunity to be creative and a sense of pride in the workplace and organization.

While the demand organization exerts a larger influence on the cultural values, policies and practices that affect workplace satisfaction, FM plays an important role in creating effective workplaces, and supports the demand organization's strategies to promote employee engagement and creativity.

To support effective workplaces and the need for comfort, the facility manager needs to be aware of the employee's journey in the workplace. Journey maps can be used to highlight areas that need attention and areas that produce a positive user experience.

Journey Maps

The journey map is a synthetic representation that describes step-by-step how a user interacts with a service. The process is mapped from the user perspective, describing what happens at each stage of the interaction, what touchpoints are involved, what obstacles and barriers that may be encountered. The journey map is often integrated with additional layers representing the level of positive/negative emotions experienced throughout the interactions.

By studying the journey maps of occupants, workplace environments can change in response to:

- Organizational needs
- Generational/individual work styles
- Business realities

- Emphasis on sustainability related activities

Planning or reviewing effective workplaces requires that facility managers have a perception of efficient space utilization and operations and maintenance (O&M) practices. Recognizing the employee's journey in the workplace provides a more insightful appreciation of the need for comfort.

End users affected by the FM decisions are structured around location and the degree of their mobility. A work style can be dictated by location, consider the work styles of:

- A worker who is desk-bound, who works at the office primarily at a single desk for most of the day.
- An individual who is internally mobile, who works at the office, but floats between desks and/or conference rooms, from meeting to meeting.
- Someone who is externally mobile/remote, or who works most of the time away from the office – for example, from home, an airport, a hotel or meeting clients.

These parameters are determined by roles, job responsibilities and the organization's culture.

Figure 3 represents where the work integration happens.

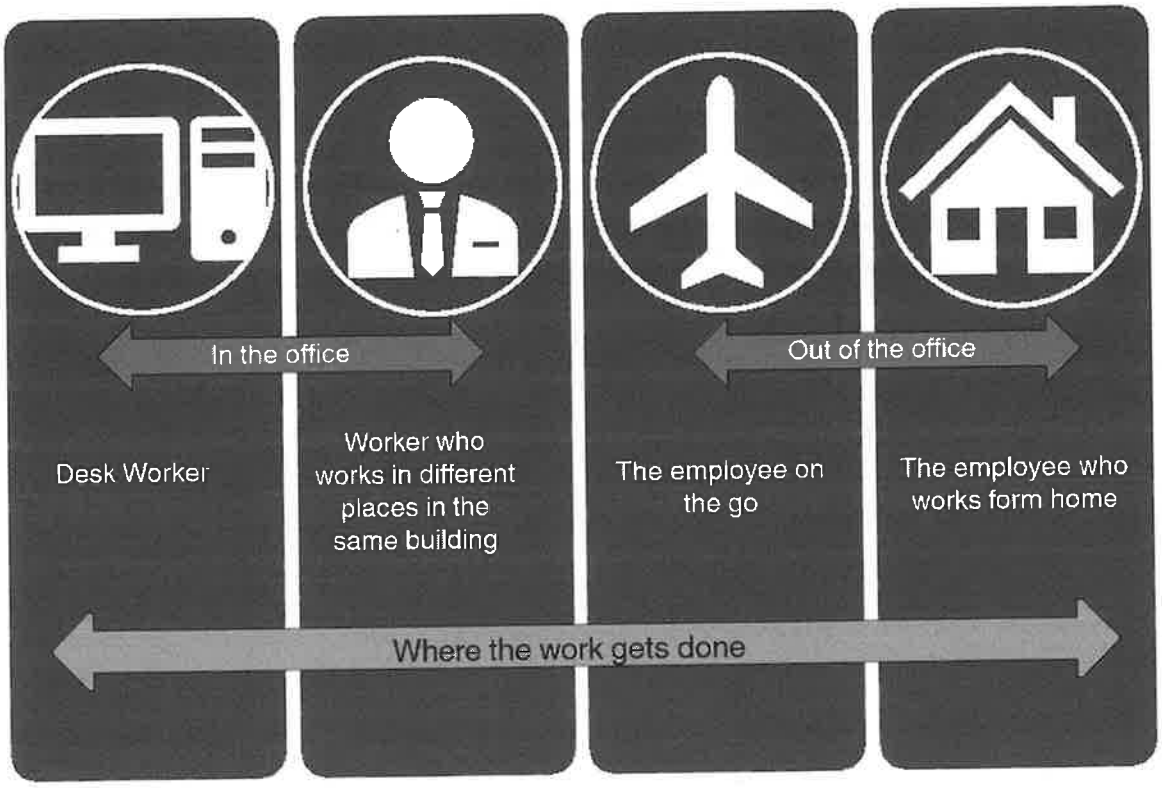

Figure 3 Integration of work

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An employee holds expectations whether they are office-centric or on-the-go. This is why it is important for a facility manager to understand their "job journey path touch points" to assess their physical needs related to their work environment.

Touchpoints are the places where an individual moves to throughout the day, such as arriving at work or going to the break room. These need to be considered and identified by looking at the employee's journey.

Figure 4, the journey map diagram represents an employee's workday.

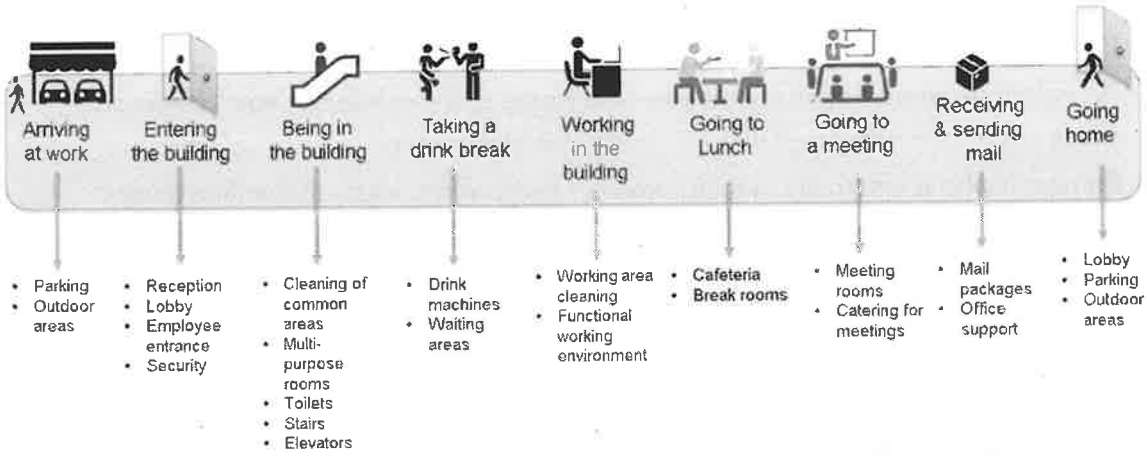

Figure 4 Example of a journey map with touch points.

Effective journey mapping plots out end-to-end experiences for both employees and customers and ensures a positive experience with the organization from the onset. This can be vital in the recruitment and retention of the best candidates for the organization.

Areas for improvement can be identified and awareness of both the positive and negative aspects of the workplace experience can be determined.

Journey mapping is typically a task delegated to human resources. This can be a valuable joint exercise conducted by HR and FM, to ascertain areas that can be improved upon and those most valued by the occupants and customers.

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Aligning FM Practices with the Organization's Strategy, Culture and Values

Before developing processes that affect human factors, or are affected by human factors, facility managers should recognize:

- **The organization's strategic plans** – Experts frequently cite the appeal of the facility as a factor in recruitment. Investing in the type of facility that would appeal to targeted recruits could be a priority for an organization that relies heavily on workers with specific skills.
- **Cultural factors that may shape processes** – An organization that values equality and inclusiveness will be more interested in processes that engage occupants. A hierarchical organization that has a history of controlling information and limiting employee input, will likely resist more flexible space planning. Cultural factors encompass occupant/worker demographic characteristics, including generational differences, ethnicity and socioeconomic positions.
- **Historical factors that affect occupant attitudes** – Occupants who have been through reorganizations, layoffs or poorly planned renovations, will be skeptical and resist any facility change, even changes that may improve productivity.
- **Specific stakeholder needs** – An organization that has a history of environmental and/or safety issues with regulatory agencies will need to focus less on cost savings and more on increasing facility safety and safe environmental practices.
- **Organizational resources** – In some organizations, the FM department may operate with a small training budget. This will cause them to be more creative, in identifying ways to achieve their goals. This could include relying on local training opportunities, mentoring and support from professional organizations such as IFMA.

Facility managers should begin by developing an in-depth awareness of how the organization relates to its employees, occupants and visitors, where it has been in the past and what it foresees for the future. This understanding will drive the processes and procedures within the facility related to Occupancy and Human Factors.

Compliance

Providing a proper environment addressing the comfort and support issues of the occupants is only part of the solution. Facility managers must be conscious of compliance obligations related to, building codes, signage, fire detection, suppression systems and indoor air quality.

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*(For more information about this issue, read about assessing the facility's needs in the **Operations and Maintenance** competency.)*

Compliance is a challenge. The demand organization must comply with all national and local laws and regulations, many of which directly relate to FM.

A Facility manager will be required to comply with laws and regulations that affect the facilities' layout and operation. For example, some laws or regulations may specify the maximum distance between workstations and exterior windows, air exchange standards, weight limits, and egress requirements. It could be a policy requirement such as requiring employers to provide nursing areas for working mothers.

Countries, and regional and municipal governments, may have numerous regulations that dictate the health and safety of working conditions, these include:

- Outside air requirements
- Maintaining fall protection programs
- Hazardous materials management
- Testing of fire suppression systems
- Managing work related injuries
- Emergency preparedness

Organizational liability for harm suffered by occupants while in the facility – with substantial civil and criminal penalties – can fall under the facility manager's area of responsibility.

The FM processes, procedures and training programs should demonstrate compliance with all the appropriate regulations and laws.

Lesson 2: The Need for Comfort

Lesson 2: Objective

On completion of this lesson, you will be able to:

- Provide examples of how facility management processes can affect each of the five basic human needs as defined by Maslow.

This lesson includes the following topics:

- Physiological comfort
- Safety
- Social belonging
- Esteem
- Self-actualization

A facility manager's goal is to commit to supporting both the occupants and employees in the workplace. Knowing that the concept of comfort, which applies to physical and emotional needs, is fundamental to FM for developing strategies to achieve this goal, this should shape their operational plans.

Figure 5 displays the type of occupant/employee needs that correspond to each of Maslow's five levels and how a facility manager can help occupants move through Maslow's hierarchy.

Facility design consultant Derek Clements-Croome uses Maslow's hierarchy of needs to describe the range of occupant comfort requirements.

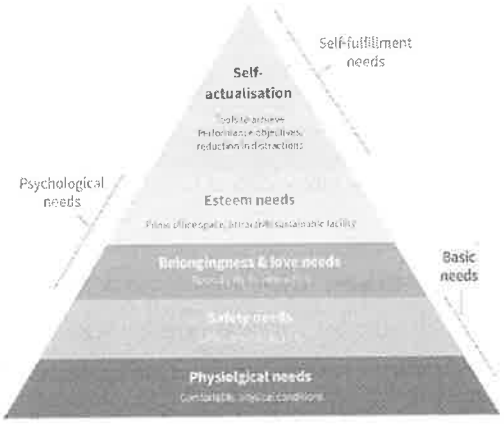

Figure 5 Maslow's Hierarchy of Needs for Facility Occupants

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1. **Physiological needs:** The base level of needs includes basic comforts, for example, clean air, acceptable temperature, lighting, comfortable seating, clean water, a clean environment and noise control.
2. **Safety needs:** Next among the lower-level needs is safety. Safety needs include protection from violence and theft, emotional stability and well-being, health security, and financial security.
3. **Love and belonging needs:** The social needs on the third level of Maslow's hierarchy relate to human interaction and are the last of the so-called lower needs. Among these needs are friendships and family bonds – both with biological family such as parents, siblings, children and chosen family such as spouses and partners. Physical and emotional intimacy ranging from sexual relationships to intimate emotional bonds are important to achieving a feeling of elevated kinship. Additionally, membership in social groups contributes to meeting this need, from belonging to a team of coworkers to forging an identity in a union, club, or group of hobbyists.
4. **Esteem needs:** The higher needs, beginning with esteem, are ego-driven needs. The primary elements of esteem are self-respect - the belief that you are valuable and deserving of dignity and self-esteem – the confidence in your potential for personal growth and accomplishments. Maslow specifically notes that self-esteem can be broken into two types: esteem which is based on respect and acknowledgment from others, and esteem which is based on your own self-assessment. Self-confidence and independence stem from this latter type of self-esteem.
5. **Self-actualization needs:** Self-actualization describes the fulfillment of your full potential as a person. Sometimes called self-fulfillment needs, self-actualization needs occupy the highest spot-on Maslow's pyramid. Self-actualization needs include education, skill development – the refining of talents in areas such as music, athletics, design, cooking, and gardening – caring for others, and broader goals like learning a new language, traveling to new places, and winning awards.

Physiological Comfort

The work of psychologist Abraham Maslow provides a better understanding of the kinds of factors that contribute to comfort.

Physiological needs: The first of the id-driven lower needs on Maslow's hierarchy are physiological needs. These most basic human survival needs include food and water, sufficient rest, clothing and shelter, overall health, and reproduction. Maslow states that these basic physiological needs must be addressed before humans move on to the next level of fulfillment.

Humans seek comfort. Comfort is a sense of satisfaction with one's current state, things feel right and there is no need for corrections or changes.

Comfort is an essential ingredient for productivity. Studies have shown that occupants are not as productive when they are physically uncomfortable for example, their speed slows, error rates increase, and attention spans decrease.

Comfort is not just physical. It has emotional and cognitive dimensions. Productivity is affected by confusion about expectations, inadequate direction or support, and harassment from supervisors or peers.

Productive workplaces are effective at accommodating the wide range of occupant needs that result in comfort – from obvious physical requirements to subtle issues related to social and emotional comfort.

Did You Know?

Temperature tolerances or preferences vary by climate and culture. For example, recommended room temperature in China is 26°C (Celsius), or 79°F (Fahrenheit), while in the U.S. the norm might be 23°C (about 73°F). It is interesting to note that Chinese hotels serving foreign visitors bend the mandatory standard and keep the temperature closer to 23°C.

Safety

Both employees and visitors need to be assured that they are not risking their current and future health and well-being while at the facility. This level of comfort means that a facility must:

1 **Leadership Initiates Safety Culture**
If you want to develop a strong safety culture at your company, start with your leaders. Supervisors and managers must set an example for everyone else. They demonstrate the model for safe behavior that everyone else will follow.

   a. **Responsibility Maintains Safety Culture**
   Companies with strong safety cultures share the value of responsibility. Responsibility, is the shared belief that each individual is morally and ethically bound to act responsibly for the good of the fellow employees, the company, and society as a whole. Until every person in the organization believes this, you will struggle with creating a better safety culture.

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b. **Accountability Creates Safety Culture**
Managers must be held accountable to lead by example every day. Managers and supervisors need to understand that their behavior influences everyone around them. Upper management needs to hold these individuals accountable for safety, and not look the other way as long as production goals are being met.

c. **Clear Expectations Builds Safety Culture**
Safety expectations need to be set and communicated to everyone in the organization. The commitment to achieving these goals needs to be demonstrated from the top down. Only when the rank-and-file employees see this commitment will they start to change.

d. **Ethics and Safety Culture**
Ethically driven management systems are important in developing a strong safety culture. The goal is for employees to make decisions that not only satisfy the procedures in the safety manual but that are also ethical and moral. The individuals hired for your company should have the ability to make ethical and rational decisions in everyday situations and share your company's core values. Hiring the right people with the right attitudes goes a long way towards creating a strong safety culture.

2 **Ensure a healthful physical environment** – This aspect of comfort is important to facility managers when considering how much time individuals spend in buildings, either working or visiting. Both European and U.S. health agencies estimate that residents spend on average 90 percent of their day indoors. (A healthful workplace is discussed in the next chapter.)

3 **Ensure a safe and secure environment** – The FM must ensure that occupants are not vulnerable to accidents caused by negligence, violence or theft.

4 **Create a safety culture** — This is more than having procedures and measuring results, it is the attitudes, beliefs, and values that the entire company shares in relation to safety. To create a culture that values safety and taking care of each other on the job so everyone goes home safe, you must focus on the five elements of an effective safety culture.

Social Belonging

The need to belong, also known as belongingness, refers to a human emotional need to affiliate with and be accepted by members of a group. This may include the need to belong to a peer group at school, to be accepted by co-workers, to be part of an athletic team, or to be part of a religious group.

A sense of belonging involves more than simply being acquainted with other people. It is centered on gaining acceptance, attention, and support from members of the group as well

as providing the same attention to other members. The need to belong to a group also can lead to changes in behaviors, beliefs, and attitudes as people strive to conform to the standards and norms of the group.

This aspect of comfort recognizes the facts that humans are social beings and spend most of their lives at work. This increases the importance of creating a comfortable facility that facilitates formal and informal interaction, such as scheduled meetings or unscheduled meetings and social encounters that are not related to work.

Interaction and productivity can be inhibited by physically separating team members. For example, one workplace found that the location of team members in the building, with a complexity of routes, resulted in employees interacting more with team members 40 miles away rather than with those in the same building.

By decreasing the size of each cubicle, another organization found that they were able to accommodate an increasing workforce. This did not allow for enough space in the cubicle to support informal chats that were key to team cohesion and project work. The facility needed to redesign the use of space to incorporate this important dimension of the workplace activity.

A sense of belonging can be derived from being able to brand an individual's workspace, by posting personal touches such as pictures or drawings. This can pose a conflict between occupant expression and workplace image. In an organization that relies on alternative work strategies, occupants may not have a designated space that they can customize, this can cause them to lose some of their sense of individuality. FM may become involved in negotiating solutions to these conflicts as well as being the enforcer of the standards set by the organization.

Esteem

Esteem is a feeling of self-worth, with internal and external dimensions, that are derived from a sense of accomplishment and the perceptions of others. These perceptions are influenced by accomplishments but also by associations with highly regarded people, places or things. Esteem can be self-confidence based on a record of having completed difficult projects successfully. This performance is hopefully recognized by the organization.

From an organizational perspective, occupants' esteem can be supported in two ways that are directly affected by the facility managers:

- Through the "branding" of the facility itself
- By providing a work environment in which the employee can have pride

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Facility branding depicts the organization's values and priorities within the spaces it creates. Branding communicates the identity to those inside and outside the organization and invites occupants to share in an organizational identity. Occupants describe the pride they take in going to their workplaces, which may be distinctively clean and well-appointed bank offices or surprising and imaginatively challenging software development or advertising firms. The age and condition of work surroundings can motivate or demoralize occupants.

FM should involve occupants in facility branding projects.

Jean Neumann, an organizational consultant, relates a situation with a government legal department that was moved into a new facility – a striking high-rise building. Senior managers thought the attractive building was enough to nurture their lawyers' self-esteem. They were wrong. When the lawyers moved into their new office, they found they had lost their private offices, furniture was bolted to the floor and could not be rearranged. The carpeting color was chosen to distinguish one floor from another in the high-rise; theirs was red. The department experienced a 30 percent turnover rate in the period leading up to and following the move.

The case study below describes how British Petroleum (BP) branded its facilities according to the organization's brand values.

BP Case Study

BP committed to creating workplaces that reflected the organization's commitment to performance, innovation, progressiveness and sustainability. Ernie Pierz, Director of Projects for Integrated Supply and Training, explained, "The idea is that if I walk into an office in Johannesburg, Mexico City or Chicago, I will say, 'This feels like a BP office.'"
To achieve the objective of branding its workplaces, BP took a range of actions, including the following:

- Sustainability – facilities use recycled carpet and sustainable wood products. Energy use is monitored.
- Workplace characteristics – space is assigned by function, not hierarchy. All employees, including management, use public workstations. Collaborative spaces of various types and sizes are provided – from phone booths, small huddle rooms and cafes to "smart" conference rooms with LCD projectors, full voice/data connectivity and electronic whiteboards. Distributed work is supported through policy and processes. Touchdown spaces are allocated to those who opt to work remotely.
- Services and amenities – occupants use Voice over Internet Protocol (VoIP). Amenities include cafeterias, exercise centers, concierge service, shops and services such as dry cleaning.

In terms of the supervisory relationship, self-esteem often motivates employees to work more productively and with more attention to quality. Employees derive a sense of esteem in different ways. This is covered in more detail in the *Leadership and Strategy* course. Managers should strive to recognize what drives their employees. Not all employees are motivated by financial rewards. Recognition at meetings or positive feedback delivered privately is acceptable to some, others may value a plaque or award, or an individual may seek the opportunity to demonstrate their ability.

Self-actualization

Self-actualization is a vague-sounding term, but it refers to a real and profound human need. Self-actualization is the need to grow, to become as good in a chosen field as abilities will allow.

From the perspective of the facility manager, self-actualization means encouraging employee development. This can include:

- Helping employees identify their strengths and weaknesses
- Providing training and development opportunities to help them to achieve their work and personal goals
- Creating opportunities for staff members to gain experience and progress in their job responsibilities

Promoting self-actualization in workers requires investment, but this investment can result in employees who are self-starters, require little supervision and are motivated to perform and succeed.

In summary, Derek Clements-Croome demonstrates where and how FM needs to address occupants', comfort needs in a way that supports the organization's strategy and values.

- At the Physiological or basic needs level, individuals are impacted by temperature ranges, indoor air quality, lighting levels, cleanliness, and noise.
- At the Safety level, there is a need to know that there is no risk to the individual's current or future health and well-being while at the facility.
- At the Belonging level, the environment must foster formal and informal interaction through the design of spaces and create a sense of belonging, for instance, by allowing some personalization of spaces.
- At the Esteem level, the individual relates to the atmosphere of, and their position in the surroundings. The communication of a positive identity and pride in the organization; includes recognition and rewards for contributions.

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- At the Self-actualization level, individuals strive to be their best self, doing as well or better than can be expected. Self-realizing individuals are concerned with self-improvement and fulfilling their potential and are less concerned with the opinions of others.

Now that we have a brief review of Maslow's hierarchy and understand what factors a facility manager can impact and have seen it through the eyes of a facility design consultant, we move onto why humans resist change.

Lesson 3: Humans and Change

Lesson 3: Objectives

On completion of this lesson, you will be able to:

- Align FM practices to the organization's strategy, culture and values.
- Identify effective strategies for managing change.

Some view change as negative, an unavoidable force pushing unwanted efforts or outcomes, while others embrace it as an opportunity to find ways to grow and continually improve. The challenge of the facility manager is to navigate this process and manage the change effort in a way that motivates individuals to ultimately accept the change. This is especially if they are the "change agent". Many times, the facility manager is the messenger when physical changes must be made to the facility such as changing space standards to bring about better space utilization. This can be a "tough sell" for the FM.

The Problem of Change

Change is inherent to FM and facility managers are used to responding to changing conditions. However, not everyone is open to change. Ironically, while facility managers implement changes aimed at improving the human factor of comfort, if changes are not implemented in a thoughtful manner, the process may be stressful and uncomfortable for the occupants.

Consider the following contrasting examples of response to a natural disaster:

- The U.S. town of Xenia in the state of Ohio was heavily damaged by a tornado in 1974. The community was so attached to the way things were that they rebuilt the town exactly as it was – ignoring ample opportunity to improve land use and planning. They wanted their town back as they remembered it.
- In contrast, another city in the U.S., Greensburg, in the state of Kansas was heavily damaged by a tornado in 2007. Ninety-five percent of the city was destroyed and the remaining five percent heavily damaged. The city council passed a resolution that all new municipal buildings would be designed to meet LEED platinum standards, the highest sustainability criteria used in the U.S. Green Building Council's certification system. The city web site boasts that it has the highest number of LEED-certified buildings per capita in the world.

The levels of destruction were not the same, the financial climate differed, and the difference in technologies available 33 years later than the first example certainly would

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have impacted on opportunity. It is important to note that leadership, in the second example, had a significant impact on support for and acceptance of the change.

Change can be a big challenge for facility managers. Facility managers face challenges daily, some of these are entirely out of their control and if the change is not managed correctly, they can waste valuable time and resources. FM needs to be versatile, anticipate and plan for change, evaluate the impacts and address concerns while showing the positive aspects of the change. The focus of this lesson is on why occupants and staff resist change and how FM can develop strategies to introduce and implement changes positively.

Why Occupants Resist Change

Psychologists Leila Scannell and Robert Gifford propose that attachment to familiar surroundings is driven by a basic need for a sense of security and survival. In a familiar facility setting, occupants know what resources are available and where they are. This knowledge imparts a sense of confidence that a job can be accomplished. The sense of confidence feeds a willingness to explore and try new processes that may benefit the organization as well as the individual.

Change can be uncomfortable. To lose familiar surroundings or having to learn new patterns and try new processes, can affect confidence, security and competence, can create a sense of risk.

Similar impacts are observed on regular visitors to a facility. There may be an initial negative reaction to the change because they do not fit the stored image of what is expected, but over time the improvements will be appreciated. People are driven by emotional attachments to a place, such as pleasure in shared history in a particular facility or pride of association with what the facility represents.

Cognitive issues can affect perceptions of change, because people rely on known markers and familiar processes to recognize the world around them efficiently. For example, consider a cluttered desk that a co-worker refuses to tidy up because he or she knows exactly how to find a particular paper amidst the chaotic mess. This is possible because this person has created a mental map, using different piles of papers and books, coffee cups or framed photos as markers. Change threatens the mental map that an individual has created regarding the workplace. Eliminate or move any of these markers, and the map disappears. The person will have to waste time examining everything to find the necessary document.

Process improvement that is designed to save time, or a new technology that boosts efficiency may be resisted and may very likely cause delays and slowdowns immediately following implementation. Workers are required to learn the new process and will need to

overcome increased stress about their performance, competence, lost productivity and ever-increasing backloads of work.

Change takes time, planning and patience. The FM must plan for emotional and performance effects when introducing change in the facility and its processes. This applies to the FM Team as well as the facility occupants.

Environmental psychologist Jacqueline Vischer compares occupants' experiences with change to Elisabeth Kübler-Ross's stages of grief. Vischer transposes the stages of grief onto the process of adapting to change. The steps are shown in Figure 6. Note that these stages may not always unfold in this order. Many steps may happen almost at the same time.

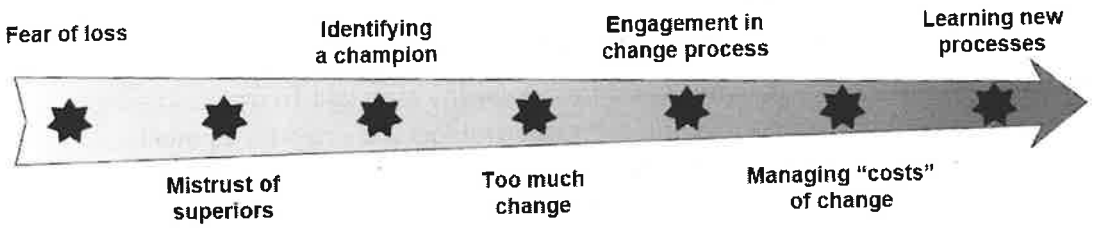

Figure 6 Stages of Occupant Reaction to Change in Facility Space and Services

How Facility Managers Can Support Change

Case Study - Visher's adaptation of the stages of grief into the change process.

A facility manager can use this model to develop a change management strategy, anticipating and accommodating common occupant responses. A major component of change management is focusing on allowing people to move through the change reaction process and ultimately accept the change. An important factor in processing change is recognizing why the change is happening. As a facility manager implements changes, sharing the reasons why the change is happening will enable final acceptance of the change. It is important for others to see all sides of the reasoning and the benefits (perhaps short and long term) of making the changes.

Consider how the stages of occupant reactions can affect the implementation of a FM project.

A facility manager must consolidate printer/copy centers to provide more space for team meetings. Currently there is a center on each floor. The change is to provide one center for

every three floors. The facility manager should reinforce the reason for the change throughout the process, emphasizing that the change will enable more team collaboration and spaces to meet.

The facility manager can help implement this change by supporting occupants through the process by recognizing the following reactions to the change:

- **Fear of loss** – Occupants on two out of every three floors will have to travel between floors to make copies. Occupants worry that the new centers will be crowded. Users will have to wait for available copiers. Occupants in neighboring workstations are concerned that they will experience more distractions.

  To manage this change, the facility manager researches and plans how to accommodate customary volume. Sites are assessed with the awareness of the potential for distraction to neighbors. Then the facility manager meets with departments to gauge their use of the centers.

- **Mistrust of superiors** – It is important for the facility manager to meet with the affected occupants to announce the proposed change and provides as much information as possible about the change and the need it addresses, how the change can benefit the occupants, and how the occupants' needs have been considered.

  The facility manager asks for input and shows willingness to negotiate any reasonable solutions.

- **Identifying a champion** – During meetings the facility manager notes that certain occupants are well-regarded by their co-workers and often express the groups' reactions.

  The facility manager gains an ally and speaks with these individuals who he hopes will be the champion. He ensures that they understand the change and have the correct information to share with their co-workers, requesting that they provide feedback on how departments view the change.

- **Too much change –** Occupants begin to see how much of their work lives this change will affect. They anticipate more and more problems.

  The facility manager checks in often with additional information and promises that the occupants will be involved in the change process. The facility manager reminds the occupants of the benefits the change will bring and the reason the change is occurring.

- **Engagement in change process** – Once the change is implemented, occupants begin to identify specific effects of the change on their work lives.

  The facility manager focuses on gathering feedback so that occupant needs can be quickly identified and addressed.

- **Managing the "costs" of change** – Once the change is implemented, occupants begin to identify specific effects of the change on their work lives.

  The facility manager focuses on gathering feedback so that occupant needs can be quickly identified and addressed.

- **Learning new processes** – Occupants have accepted the change and adopted new habits, routes or processes to respond to the change in the facility.

  The facility manager meets internally and with department heads to debrief the change and find ways to improve the process of introducing facility change in the future.

Bridges Transition Model

Change consultant William Bridges created the Transition Model (2004) which is an additional model that can be used to manage and support change. The strength of this model is that it focuses on transition. The difference between these is subtle but important. Change is something that happens to people, even if they do not agree with it. Transition, on the other hand, is internal; it is what happens in people's minds as they go through change. Change can happen very quickly, while transition usually occurs more slowly. This model focuses on how an individual transitions to the acceptance of change.

The model highlights three stages of transition that people go through when they experience change. These are:

1. Ending, Losing, and Letting Go
2. The Neutral Zone
3. The New Beginning

Bridges states that individuals will go through each stage at their own pace. Those who are comfortable with the change, will move ahead to stage three quickly, others will be more set in their ways and will linger at stages one or two.

This model is useful as a tool to understand the transition individuals go through as they adapt to the change.

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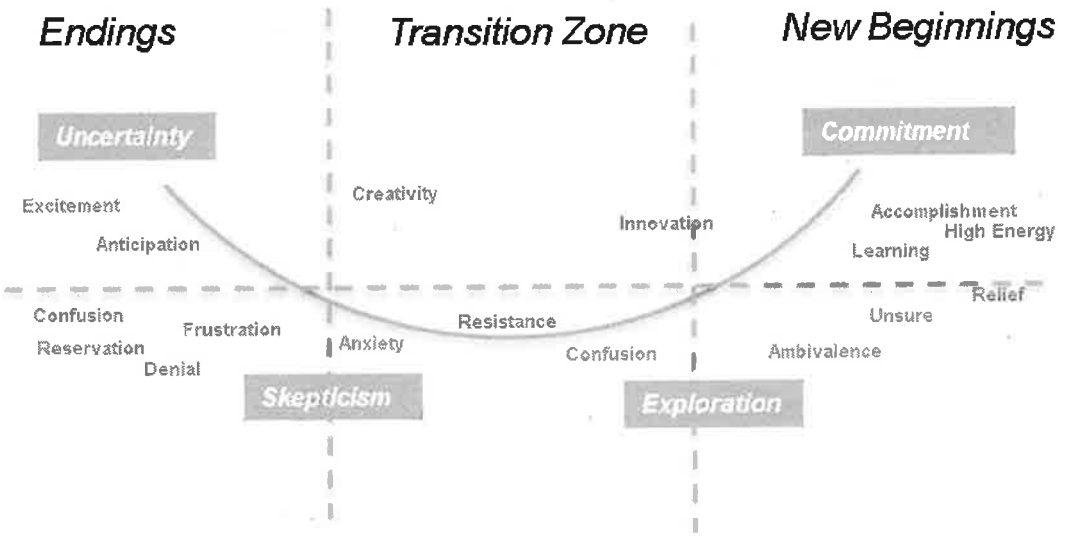

Bridges, W. , Building Transitions. Permission Pending

Bridges, W., Building Transitions.

Stage One – Ending, Losing and Letting Go

During stage one, an emotional reaction is experienced when individuals learn that something that they understood and are comfortable with is about to change. This initial stage is marked with resistance and emotional upheaval.

Emotions experienced at this stage are:

- Fear
- Denial
- Anger
- Sadness
- Disorientation
- Frustration
- Uncertainty
- A sense of loss

In order to provide support through stage one, the facility manager should:

- Acknowledge the resistance and understand the emotions of the individuals.
- Allow time for there to be acceptance of the changes and 'letting go' of the old.

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- Encourage discussions about emotions, listen empathetically and communicate openly the change and what it entails.
- Emphasize how skills, experience and knowledge can be applied once the change has been implemented.
- Explain how all needs will be supplied to work effectively in the new environment.
- Recognize that fear originates from misunderstandings and miscommunication. Once the positive impact of change is realized, moving to the next stage is possible.

Stage Two – The Neutral Zone

In stage two, individuals affected by the change may be confused, uncertain and impatient. A greater workload may stem from the change initially as new systems and processes are learned.

Individuals may exhibit:

- Resentment towards the change initiative
- Low morale and low productivity
- Anxiety about their role, status or identity
- Skepticism about the change initiative

In order to provide support through stage two, the facility manager should:

- Recognize that stage two can be one of great creativity, innovation and renewal.
- Encourage teams to try new ways of thinking and working that can serve to motivate and inspire them.
- Be aware that guidance through this period is integral, as it can seem unproductive and that little or no progress is being made.

Stage Three – New Beginnings

The final transition is acceptance and energy. Individuals begin to embrace the change and build the skills they need to work successfully in the new initiative and start seeing the benefits from their efforts.

Individuals may exhibit:

- High energy
- An openness to learning
- Renewed commitment to the role or group

In order to provide support through stage three the facility manager should:

- Encourage and assist, where possible, in sustaining the acceptance of the change
- Take time to celebrate and reward the team for all the hard work

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- Remember that not everyone will reach this stage at the same time
- Note that individuals can slip back to previous stages if they think that the change isn't working

A more recent example of change that has had international ramifications, has been the COVID-19 pandemic:

- In 2019 the COVID-19 pandemic was first identified. The World Health Organization (WHO) declared the outbreak a Public Health Emergency of International concern in January 2020 and a pandemic in March 2020.

  This pandemic has resulted in FM being required to take measures that prevent infection and protect occupants in all facilities, it includes elevated cleaning procedures, indoor environmental quality (IEQ) and careful monitoring of HVAC systems to prevent the spread of the virus. The organization's emergency and business community plans need to be upgraded. FM is responsible for staying up to date on information released by the Centers for Disease Control (CDC) and the World Health Organization (WHO).

  The changes forced by the pandemic will continue to influence the organization's dynamics creating a need for significant adaptation and change. The facility manager must consider alternatives, such as social distancing which could include restricting access to employee congregation areas such as conference rooms, cafes, and coffee stations. In many organizations, there will be internal operational processes changes such as cleaning, HVAC maintenance, air exchange adjustments just to name a few.

The Role of Communication in Change

As was discussed in the prior section, a successful change management strategy leads to the individuals accepting the change. Understanding why the change is happening and the benefits to the individual needs to be communicated deliberately and often. The facility manager can use varying communication techniques to appeal to a wide range of audiences.

Inevitably, there will be individuals who are resistant to change, no matter how effective your communication strategy. A body of work by Hans and Annemarie Bleiker focuses on implementing change in the face of substantial resistance and includes a tool called the Bleiker Life Preserver. The tool builds communications based on 4 principles:

The Situation

1. There is a serious problem or opportunity that must be addressed.

The Communication

1. The initial focus must be on the problem before the solution is presented.

2. You are the right entity to be addressing the problem. Given your mission, it would be irresponsible for you not to address the problem.	2. Validation as to why you and your team are the ones addressing the problem and that you are qualified to do so.
3. The way you are going about it is reasonable, sensible, and responsible.	3. Here you share the approach you have used to solve the problem and the facts or options you have considered – not reactively or defensively, but proactively, to demonstrate the attention you have given the issues.
4. You are listening, and you care if what you are proposing is going to hurt someone.	4. In this step, you close the loop by demonstrating that you have heard the input and that this is the solution that must be implemented.

Table 2 Bleiker Life Preserver

While not all change requires full application of the model above, a thorough understanding of the principles contained in the model will position a facility manager for success in leading change. The following Table 3 offers advice on some actions to perform and those to avoid during the change.

Do	Avoid
1. Face possible conflict head on and engage with those affected.	1. Ignoring occupants' reactions to change, including their emotional responses.
2. Provide as much information up front as possible.	2. Lying, overpromising or engaging in unfounded optimism for example, how long the project will take and how much disruption it will produce.
3. Focus on the reasons for change and benefits to the organization.	3. Asking open-ended questions when seeking occupant input. This can invite occupants to compile lists of wishes, most of which cannot be fulfilled. When management fails to respond to these wishes, occupant reaction can further deteriorate.
4. Listen to occupants and provide support.	
5. Negotiate solutions if necessary.	
6. Engage occupants by gathering input through questionnaires and focus groups.	
7. Use post-occupancy evaluations to identify unanticipated effects and take steps to address them.	

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8. Debrief the experience to improve FM processes.

Table 3 Recommendations for Making Facility Change

Chapter 1: Progress Check

1. Occupants are impacted by their workplace. Select the options within a facility manager's control that play a vital role in ensuring a positive working environment.
   a. Temperature
   b. Lighting
   c. Recreation
   d. Air quality
   e. Co-workers

2. *Answer True or False.* It is unnecessary to take historical factors or attitudes into account if comfort and productivity will be the positive result of a change.
   a. True
   b. False

3. *Answer True or False.* An organization experiencing environmental difficulties should be less concerned with cost saving and focus on increasing facility environmental best practices.
   a. True
   b. False

4. *Select the correct answer.* Compliance can be a challenge. FM needs to comply with national and local laws which may include:
   a. Managing the storage of hazardous materials
   b. Ensuring that labor union agreements are kept separate from FM compliance
   c. Documenting minor less important discrepancies
   d. Negotiating with regional and municipal governments when regulation stipulations are contrary to current FM practice

5. Occupants may resist change for several reasons. *Select all the correct answers below:*
   a. Fear of what the changes will entail
   b. Attachment to current surroundings
   c. Threat to the mental map
   d. The change is contrary to the stored image
   e. An increase in work

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6. Select all the effective strategies that can be put into place to manage change.
   a. Do not single out a specific individual as a spokesperson.
   b. Meet with the occupants and provide all the information possible about the project.
   c. Engage in the process and get all the ideas and reactions of occupants.
   d. Establish occupants' priorities and test possible approaches.
   e. Once the change is complete discourage ongoing/additional commentary.

Chapter 2: Workplace Environment

Lessons

- Objectives
- Lesson 1: Indoor Environmental Quality (IEQ)
- Lesson 2: Defining and Creating a Healthy, Effective Workplace
- Lesson 3: Occupant Wellness

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Objectives

Chapter 2: Objectives

On completion of this chapter, you will be able to:

- Define Sick Building Syndrome.
- Recognize the importance of ergonomics and be able to properly set up an ergonomic workstation.
- Identify strategies and systems used to provide occupants with a healthful, comfortable and safe workplace.
- Define and create a healthy, effective workplace.
- Describe the drivers of change from a generational context.
- Identify how stress can affect the productivity of the building occupants.

Introduction

In chapter one the basic needs of workplace occupants has been discussed. While occupational health, safety, and security are important in meeting these needs, occupant wellness factors as well as factors that contribute to mental well-being should also be considered. In this chapter the focus is on these key components, to determine how these needs can be met.

Lesson 1: Indoor Environmental Quality (IEQ)

Lesson 1: Objectives

On completion of this lesson, you will be able to:

- Define Sick Building Syndrome.
- Identify strategies and systems used to provide occupants with a healthful, comfortable and safe workplace.

As Derek Clements-Croome, editor and founder of the Intelligent Buildings International Journal, has commented, "The physical environment can enhance one's work, but an unsatisfactory environment can hinder work output."

There have been numerous studies about the effect of the workplace on productivity, and there is ample evidence that the quality of the physical workplace has a direct effect on the quality and quantity of the work performed there.

Physical discomfort can result in additional costs or resource demand to the organization. It distracts one's attention, leading to decreased work output, slower rates of work, higher incidence of errors and, in general, less-effective cognitive processes that can affect problem solving and innovation. It can also lead to increased sickness rates and absenteeism.

Sick Building Syndrome

The term sick building syndrome or SBS is used to describe a situation in which building occupants experience acute health and comfort effects that appear to be linked to time spent in a building, but no specific illness or cause can be identified. The complaints may be localized or widespread. A building is said to have SBS when 20 percent of the building's occupants complain of a similar medical condition due to an unknown cause over a period of at least two weeks while in the building. (Abdul-Wahab, 2011)

Indicators of SBS include:

- Occupants exhibiting symptoms of acute discomfort for example:
  - Headaches
  - Eye, nose, or throat irritation

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  - Dry cough
  - Dry or itchy skin
  - Dizziness and nausea
  - Difficulty in concentrating
  - Fatigue
  - Sensitivity to odors
  - Musculoskeletal discomforts
- The cause of the symptoms is unknown
- Relief from the symptoms is evident upon leaving the building

Causes of SBS include:

- Inadequate ventilation
- Fluctuations in room temperature
- Low humidity
- Poor lighting
- Airborne particles such as dust, carpet fibers and fungal spores
- Poor cleaning standards

Heating, ventilating, and air conditioning (HVAC) systems not effectively distributing air throughout the building can be a contributing factor in causing SBS.

Note: Radon and Asbestos cause long-term diseases which occur years after exposure and are not considered to be among the causes of sick buildings. This is not to say that these are not serious health risks; both should be included in any comprehensive evaluation of a building's Indoor air quality (IAQ).

Building-Related Illness

The term *building-related illness* (BRI) was first used by the U.S. Environmental Protection Agency to describe illnesses caused by exposure to environmental agents in a building that cause identifiable symptoms of diagnosable illness.

BRI can be caused by exposure to:

- Excessive levels of carbon monoxide and carbon dioxide.
- Toxic substances such as asbestos and radon.
- Bacteria, viruses and fungi (and the mycotoxins fungi produce).

Legionnaires' disease, a type of bacterial pneumonia, is a notorious example of a BRI. The bacterial strain, Legionella pneumophila, is named after the event that led to its identification. An outbreak caused 29 deaths at an American Legion convention in Philadelphia, Pennsylvania, in 1976. The outbreak was eventually traced to bacteria in the hotel's cooling towers. Other facility sources of legionella include hot and cold-water systems, spa pools, humidifiers and potting soil. The World Health Organization considers facilities such as factories, shopping centers, hospitals, hotels and leisure or sports clubs as major reservoirs of the infection that contribute to its spread in the local community and globally as hotel guests travel. Proper water treatment techniques and testing mitigate the potential for legionella to be present.

Building Investigation Procedures

Building investigation identifies and solves indoor air quality complaints preventing them from recurring and avoiding the creation of additional problems.

The investigator(s) must:

- Discover whether a complaint is related to a building related issue
- Identify the cause of the complaint
- Determine the most appropriate corrective actions

An indoor air quality investigation procedure is best characterized as a cycle of information gathering, hypothesis formation, and hypothesis testing. It generally begins with a walkthrough inspection of the problem area to provide information about the four basic factors that influence indoor air quality:

- The occupants
- The HVAC system
- Possible pollutant pathways
- Possible contaminant sources.

Preparation for a walkthrough should include:

- Documenting easily obtainable information about the history of the building and of the past complaints
- Identifying known HVAC zones and complaint areas
- Notifying occupants of the upcoming investigation

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- Identifying key individuals needed for information and access

The walkthrough entails visual inspection of critical building areas and consultation with occupants and staff, allowing the investigator to develop some possible explanations for the complaint. At this point, the investigator may have sufficient information to formulate a hypothesis, test the hypothesis, and see if the problem is solved. If it is, steps should be taken to ensure that it does not recur.

If insufficient information is obtained from the walkthrough to construct a hypothesis, or if initial tests fail to reveal the problem. An investigation should be conducted to collect additional information to allow formulation of additional hypotheses.

Essentially, from an FM perspective, the goal is to determine if the complaint is related to a building related issue and if it is, how to resolve the issue and execute the solution.

Education and Communication

When building occupants, management, and maintenance personnel communicate and recognize the causes and consequences of Indoor Air Quality (IAQ) problems, they can work more effectively together to prevent problems from occurring, or to solve them if they do. These types of issues need a strong relationship and trust between individuals. Consistent and effective communication from the facility manager, building operators, and occupants is crucial.

One of the most important roles of a facility manager is to ensure that buildings are a healthful, comfortable and safe workplace for the occupants. The next lesson covers IEQ Components which provides the strategies and system required to provide this.

Indoor Environmental Components (IEQ)

IEQ, which is a consideration in sustainable building ratings systems, including LEED, focuses on the indoor environment's impact on the health, comfort, and productivity of occupants. Key components of IEQ include thermal comfort, indoor air quality, lighting, and noise. Improved IEQ correlates with lower rates of respiratory infections and headaches. It supports higher rates of productivity and concentration needed for complex tasks.

Workplace quality is influenced by culture, such as expectations of cleanliness local practices, work equipment such as computer server room requiring lower humidity levels, or process requirements, and, in some countries, bylaws and building codes will drive guidelines. National energy consumption guidelines may require certain setpoints in workplaces. Worker safety laws may require monitoring, documenting and reporting of workplace conditions.

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Building codes may require that ventilation systems be designed to meet specific oxygen and carbon dioxide levels. It is a facility manager's responsibility to ensure that these influences and requirements are reflected in the facility strategy for creating an effective IEQ program.

IEQ focuses on:

- Temperature and relative humidity
- Indoor air quality
- Lighting
- Noise
- Cleanliness

Temperature Comfort

IFMA surveys its members to identify the top workplace complaints among facility occupants. Occupant complaints tend to be about the difficulty of achieving a comfortable temperature. The fact that most facilities report receiving complaints that the facility is both too warm and too cold underscores how difficult it is to deliver thermal comfort to all occupants.

The sensation of temperature is affected by factors besides air temperature, such as air movement and relative humidity:

- Air movement can increase the body's loss of heat through evaporation. During warm weather, fans moving air across an occupied area transport heat from the occupants and support a sense of comfort. During cooler weather, or in air-conditioned spaces, occupants may perceive moving air as a draft that produces chilly discomfort.
- Relative humidity refers to the percentage of water vapor in the air at a given temperature compared to the maximum amount of water vapor that could be held at the temperature. The higher the humidity during the cooling season, the more difficult it is for the body to shed heat through evaporation. Conversely, maintaining a certain level of humidity during the heating season enhances a feeling of comfort. According to HVAC.com, a relative humidity level of 50 percent provides the greatest comfort levels. The EPA recommends maintaining indoor relative humidity between 30 and 50% to reduce mold growth. Humidity level can be a factor in indoor air quality, as seen in the next section. It impacts comfort which can interfere with productivity. In addition, high humidity levels can cause problems for electronic equipment such as computers and servers.

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Comfort can be affected by wide swings in temperature that distract occupants from their work and drive them to seek temporary comfort – by putting on a sweater or turning on a small fan. One of the goals in facility HVAC systems is to maintain a steady temperature, for example, a range of two degrees above or below the temperature setpoint and five percent above or below the desired relative humidity.

The ideal temperature setpoints for a facility can depend on many factors, including the type of facility, the activities occurring and the expectations of occupants. As discussed in Chapter One, definitions of acceptable workplace temperatures can vary by geography and culture. Individual facility structures and HVAC systems may present challenges. According to the ANSI/ASHRAE Standard 55-2013: Thermal Environmental Conditions for Human Occupancy temperatures recommended by ASHRAE range from 68.5°F to 75°F in the winter, and from 75°F to 80.5°F in the summer assuming 50% relative humidity. The best course of action for the facility manager is to ensure awareness of any workplace regulations regarding temperature and humidity and to check in with occupants and assess satisfaction with indoor climate.

Soliciting occupant input supports the idea of individual occupant control of temperature. As noted in Chapter One, the feeling of control over the environment in which people work is an important component of comfort. Individual control conflicts with the way most HVAC systems are designed and since individual thermal comfort needs can be different, delivering occupant control of temperature is a challenge for facility managers. The challenge can be met, at least partially, by implementing occupant surveys that assess satisfaction with temperature, ventilation and humidity, reporting survey results to occupants, acting on occupant complaints and needs, and communicating those actions to occupants.

Indoor Air Quality

Indoor air quality (IAQ) refers to both the quantity of outside air and the quality of air within the facility.

The quality of air is affected by the facility's ventilation system and the amount of outside air that is mixed with facility air to reach an appropriate level of carbon dioxide and to moderate the pollutants in the air. Minimum and maximum levels are defined by local codes or regulations, including ASHRAE Standard 62.1. The quantity of outside air in modern facilities has been directly affected by the costs of conditioning facility air, which increases as you increase the amount of outside air. This can be managed through sustainable operating strategies and equipment and the trend toward tighter building envelopes and fewer operable windows.

Note: The lack of operable windows decreases occupant control.

The quality of facility air refers to the levels of pollutants present in facility air such as:

- High levels of carbon dioxide
- Carbon monoxide
- Ozone and other gases
- Volatile organic compounds
- Bacteria, viruses and mold spores
- Odors
- Dust and toxic substances, including asbestos.

IAQ can be affected by several factors, including:

- **Facility equipment and processes.** For example, some natural gas-fueled facility equipment can emit carbon monoxide, which can be toxic at certain levels and affect mental acuity. Certain cleaning products and pesticides contain harmful chemicals, many of which are masked by fragrances that can aggravate occupant allergies and sensitivities. A green cleaning program can mitigate concerns with cleaning chemicals. Active water leaks caused by poorly maintained HVAC equipment and wet carpet cleaning processes can contribute to the growth of mold. Poor cleaning processes can lead to increased dust levels.
- **Codes, regulations or industry standards.** The balance of outside and recirculated air within a facility to control the levels of carbon dioxide, carbon monoxide and other pollutants, is typically regulated by building codes and health standards.
- **Facility furnishings.** Paints, glues and coatings can emit volatile organic compounds (VOCs), which can irritate mucous membranes, impair memory and cognitive processes and cause headaches and, in extreme cases, liver damage. New furniture are carpeting sources of VOC.
- **Occupants.** The individuals who occupy spaces can add to odors, natural or perfumed, and contribute to bacteria and viruses in the air. People also increase the area's relative humidity and carbon dioxide levels. Higher humidity promotes odors and mold.
- **External environment.** Indoor air quality can be impaired by poor outdoor air used in makeup air supplies. High levels of ozone caused by heavy automobile use and seasonal dust and pollen may have a negative impact on building occupants and facility HVAC equipment.

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- **External maintenance.** Facility maintenance such as roof maintenance or asphalt work can create toxic environments inside the facility or for site visitors.
- **Breakrooms and cafeterias.** Proximity to breakrooms and cafeterias can contribute to employee discomfort by emitting odors.

Lighting

Adequate lighting denotes that:

- Lighting levels are appropriate for tasks and the surroundings. For example, detailed work requires higher ambient lighting. For those working at computers, eyes tire more quickly if the pupils are constantly adjusting to differences in brightness between the screen and the workstation's surroundings. Luminance is measured in foot-candles or lux, the metric equivalent. Various bodies – such as the Illuminating Engineering Society (IES) or the International Code Council (ICC) publish official lighting standards. One example is ANSI/ASHRAE/IESNA Standard 90.1. In addition, each organization develops its own standards for specific workplace types. FM should be aware of these standards.
- Lighting fixtures are installed to avoid a glare or any excessively bright source of light within the visual field that creates discomfort or loss in visibility.
- Lighting design incorporates natural light, without a glare as much as possible. The wavelengths in natural light complement those in artificial light and more fully satisfy human needs.

A separate issue is visual clutter or interference. Not directly related to lighting, clutter can impair occupants' ability to concentrate and discriminate among images. A computer screen positioned against the background of a busy entrance or aisle will challenge workers' visual attention. Structural elements or seating arrangements that block necessary sight lines can diminish productivity.

Inadequate lighting creates a host of problems for facility managers:

- Excessively bright light creates psychological stress that can become physical illness.
- Glare on computer screens or directed into occupants' eyes from poorly placed lights or reflective surfaces or flicker in certain types of light can cause headaches and eye strain.
- Insufficient lighting can slow work and cause higher error rates and accidents.

Did You Know?

A study conducted by the Commission for Architecture and the Built Environment attributes a 15 percent reduction in absenteeism and a 3 to 20% increase in productivity to good lighting design. Studies in schools have shown the effect of natural lighting on students' test performance.

There are standards that exist for facility situations, generally in agreement with Table 4, which shows both foot-candles and lux. Tools to measure intensity of lighting are widely available to facility managers and are a valuable tool for a FM organization.

Space	Foot-Candles	Lux
Open office	30	323
Private office	50	538
Printed tasks	30	323
Conference room	30	323
Videoconference room	50	538
Stairways/corridors	5	54
Lobby	10	108
Restrooms	5	54
Warehouse	30	323
Storage	10–30	108–323
Maintenance	50	538

Table 4 Lighting Recommendations for Sample Spaces and Tasks
Source: Bill Conley. Lighting Solutions. Sustainability "How-To Guide" Series. Houston, Texas: IFMA Foundation, 2010.

In addition to lighting levels, facility managers should take into consideration the color of light. The growing popularity of LED lighting has resulted in more attention being given to the color temperature of light. A warm color temperature is under 3,000 Kelvin, a color temperature over 5,000 Kelvin is considered cool and is closer to the color of sunlight.

There are several benefits to setting lighting standards, such as:

- Interchangeability of lighting fixtures and lamps is an efficiency measure that simplifies the maintenance of lighting throughout a facility and from one facility to another.
- The difference in color temperature is quite visible, a single-color temperature and intensity across a space will produce the most consistent appearance. Changing the lighting intensity or color temperature is not just a matter of changing a light bulb. The desired effect must be taken into consideration.

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- LED fixtures have extended usage.
- User control can enhance occupant's satisfaction in a workplace. For lighting, this type of control may take the form of task lighting, control of, or access to, natural lighting or individual controls.

In a recent tenant improvement project, a project manager reported lower costs in replacing the existing indirect light fixtures with dimmable LED troffers than modifying the existing lighting.

On another project, the addition of tubular skylights with motorized dimmers enabled users to keep the lights in an open workspace turned off most of the time. This effort created energy savings and increased general satisfaction with the natural lighting.

Noise

Noise can be considered unwanted sound that can harm health and impair productivity. Sound is measured in decibels. Figure 7 provides relative comparisons of sound levels.

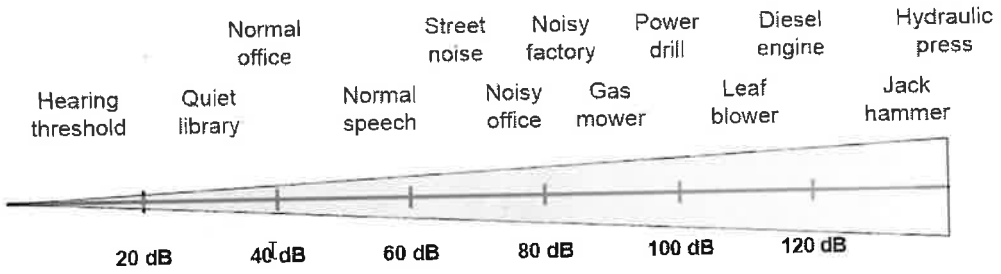

Figure 7 Typical Noise Levels

The negative effects of noise in the workplace include:

- **Loss of hearing.** Hearing loss can be temporary or permanent, sudden or gradual. It can result from exposure to a sudden loud noise or from prolonged exposure to an elevated level of noise. Loss of hearing affects workers' productivity and damages the quality of life. Hearing damage can take the form of tinnitus or ringing or buzzing in the ears.
- **Increased vulnerability to safety hazards.** A loud background noise level can obscure warning sounds, such as alarms or forklift beeping.
- **Increased levels of distraction.** Like visual clutter, noise – such as that generated by vacuums and floor polishers or lawn mowers – can diminish productivity by distracting occupants from their work.

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The effects of too much noise have been well studied, but with the increased use of open workplace designs and quieter ventilation systems and office equipment, facilities are becoming more aware of the effects of too little noise. Too little ambient noise can challenge speech privacy, as conversations can be overheard. A survey of over 65,000 office workers on four continents found that more than half were dissatisfied with the level of speech privacy that their workplaces provided. The lack of background noise can increase distractions. A study by the Institute of Occupational Health in Finland found that overheard conversations could cause a five to ten percent decline in the performance of cognitive tasks by unintended listeners.

Each generation in the workplace has experienced a trend toward hearing loss due to exposures specific to their time. Today's working generations are exposed to near-constant audio stimulation. A significant number of individuals observed will be wearing headphones or ear buds, listening to music, podcasts or other audio content.

OSHA recommends occupants should wear a hearing protector if the noise or sound level in the workplaces exceeds 85 decibels or 85 dBa. If hearing protection is required, then FM needs to implement a complete hearing conservation program.

Solutions are available for dealing with travel of sound in a space, ranging from acoustic finishes, clouds, or panels, to what is commonly referred to as white noise generators. It is important to consider these solutions to fully understand the proper products and placement.

Noise generators functions are sometimes misunderstood and so can be mis-installed. A noise generators intent is not to mask the sound within the source space, but to mask the sound from that space to an adjoining space as well as to diffuse sounds such as speech, to reduce disruption. The sound device or speaker should not be placed in the space the sound originates from but in the adjoining space. The device is not expected to prevent sounds from being heard but to filter, muffle or break up the sounds making the sound transfer less prominent. Different devices produce different colors of sound and should be chosen to fit the application.

Placement of acoustic finishes, clouds and panels can impact the effectiveness.

Expert advice is available through acoustic engineers. Where budgets prohibit seeking expert advice, information is available through online resources, such as the IFMA Knowledge Library, or in networking with professional associations and peers.

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Cleanliness

Facility managers need to be proactive in their approach to cleanliness as it relates to the prevention of the spread of illness. Providing resources throughout the facility, such as tissues, hand washing gels, wipes and sanitation sprays encourage proper hygiene and are used to supplement cleaning services.

The COVID-19 pandemic has had international repercussions on hygiene and cleaning in facilities. Facility managers need to partner with other business units, such as Human Resources to implement the required changes and to keep current on any medical issues, preventive measures and best practices to prevent infection. Some states in the United States, including Virginia, developed a regulatory workplace standard on worker protection requirements related to the COVID-19 pandemic. IFMA publications have many good references for facility managers for overall pandemic procedures.

For most outbreaks, facility managers need to review and elevate cleaning procedures, implement disinfection procedures, assess IEQ and check on HVAC systems. Updating and communicating the organization's emergency and business continuity plans and staying up to date on information released by the CDC and WHO, is integral.

The perception of cleanliness varies by culture, type of organization, and within an organization. Cleanliness refers to the presence of dirt and dust and the maintenance of interior elements and furnishings. In some workplaces – such as hospitals, food preparation areas or data centers – cleanliness may be regulated by government and/or the organization itself. In other workplaces, a sense of cleanliness is highly contextual. The lobby of a Swiss bank may be kept spotless to impress clients, but the same level of cleanliness may not be required in the garage of a motor transport firm or in an agricultural products facility. FM should establish cleanliness standards in keeping with the organization's values, strategy, and processes.

Cleanliness expectations are subjective and contextual. APPA (APPA – Leadership in Educational Facilities) an organization for educational facilities, has created standards by which an organization can measure its cleanliness in terms of a level of service. These service levels are shown in Figure 8. The guidelines are detailed, comparing certain facility elements at each level. The exhibit provides examples related to carpeting, but the full APPA levels of service have cleaning appearance guidelines for walls, lighting fixtures, restrooms and trash collection. These guidelines can be useful in helping FM develop its own standards for self-assessment. They are recognized by the U.S. Green Building Council and are used in the LEED building certification system.

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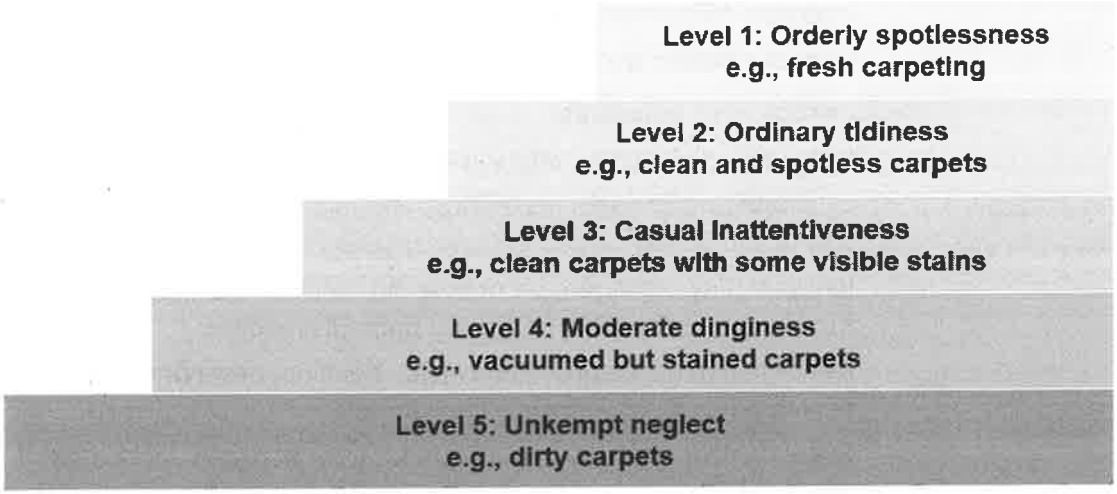

Figure 8 APPA Levels of Cleanliness

Strategies to Support IEQ

Table 5 lists some strategies facility managers may pursue to increase the physical comfort of occupants in the various categories of IEQ. The strategies should align with the organization's goals and values. Certain listed strategies may not be practical in all facilities (or cultures) and may or may not apply when a workplace is being renovated. Management should be aware of conflicts between goals, such as those between decreased energy use and occupant health.

IEQ Component	Strategy/Tactics
Temperature and humidity	• Ensure performance of facility HVAC system and building automation system to deliver air at preferred operating temperatures, humidity levels and air speeds. • Increase individual control: - In-floor air distribution systems with workstation controls. - Operable windows, if feasible and safety issues do not exist. • Post heating/cooling temperature setpoints so occupants know what to expect. • Urge management to implement season-appropriate clothing policies. • Implement occupant satisfaction surveys.
IAQ	• Ensure optimal supply of outside air:

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  - Integrate carbon dioxide sensors and alarms into building systems.
  - Inspect exhausts and maintain dampers.
- Reduce sources of pollutants:
  - Install and maintain air filters in ventilation systems.
  - Eliminate possible sources of mold and mildew through inspections and maintenance.
  - Revise facility management policies on purchasing supplies and furnishings to eliminate VOCs and harmful chemicals.
  - Revise maintenance procedures (e.g., cleaning, pest control) to decrease occupant exposure to chemicals.
  - Separate ozone-producing equipment from occupant work areas if possible.
  - Encourage implementation of a facility policy to avoid hazardous materials and supplies.
- Encourage facility policies to reduce odors and irritants:
  - Ban smoking inside the facility and outside entrances.
  - Implement policies on use of fragrances in certain areas.
  - Prohibit cooking that releases objectionable odors into work areas.
- Require plans to reduce air pollutants in all service/construction contracts.
- Survey occupant satisfaction and monitor illness statistics.
- Review scheduled temperature setbacks on a periodic basis to verify schedules are valid, revise as necessary and review when operations/organization schedules, processes or activities are altered.

Lighting

- Reduce glare:
  - Survey work areas to identify and correct sources of glare (e.g., highly reflective and poorly placed objects).
  - Add glare-reducing screens to monitors.
  - Use glare-reducing films or structures to reduce glare from outside light.
  - Add sensors to adjust indoor lighting to amount of outdoor light, reducing contrast.
- Reduce flicker:
  - Replace lamps before they begin to fail.
  - Replace older light fixtures with fixtures equipped with electronic ballasts.
- Provide appropriate lighting levels:

	- Establish recommended light level at desktop and measure levels. - Add task lighting at workstations to supplement ambient lighting. - Increase levels of natural light by redesigning space use or using reflective "light shelves" to direct light further into facility interior. - Survey occupant satisfaction with lighting and conduct periodic facility walking tours/inspections. - Ensure building interior/exterior lighting, bulbs and fixture inspections are scheduled as required – report outages, damage or burnt outs immediately.
Noise	• Reduce unnecessary noises originating from poor insulation by: - Implementing high Sound Transmission Class (STC) walls between high noise areas inside and outside the building. - Hire an acoustical engineer to achieve the ideal acoustic conditions • Reduce reverberation: - Strategically install acoustic materials that absorb or diffuse noise for example, installing a carpet or placing rugs in large open areas and soft padded furniture helps reduce reverberation.
Cleanliness	• Assess the risks and know and prioritize them • Implement a hygiene policy and communicate this throughout the facility • Schedule office cleaning by professionals • Encourage occupants to clean their workstations and the area around them. Provide the necessary cleaning materials. Discourage clutter • Ensure that trash is removed daily and trash bins cleaned • Focus on keeping floors clean • Ensure all food and beverage utensils are cleaned after being used

Table 5 Strategies to Support IEQ

Facility managers should consider that one of the best ways to increase an occupant's sense of control over his/her environment is to provide a regular means of communication through periodic surveys, a facility web site, social media page, or forum. Providing feedback on how their opinions and suggestions have affected facility management practices encourages a sense of belonging.

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Lesson 2: Defining and Creating a Healthy, Effective Workplace

Lesson 2: Objectives

On completion of this lesson, you will be able to:

- Recognize the importance of ergonomics and be able to properly set up an ergonomic workstation.
- Identify how stress can affect the productivity of the building occupants.
- Support healthy facility operations and practices.

In a study done on the ROI of employee wellness programs, Harvard researchers conclude that, on average, for every dollar spent on employee wellness, medical costs fall US$3.27 and absenteeism drops US$2.73. This is a 6-to-1 return on the investment. (March 21, 2019)

Internal factors can affect occupant well-being and productivity. Facility managers provide value to the organization by supporting occupant wellness.

These internal factors that impact productivity include:

- Stress, an individual psychological response to work conditions that can harm physical health and occupant productivity.
- Ergonomics, or the musculoskeletal stresses individuals may develop from their working conditions or habits.
- Health maintenance, or the way in which the workplace can support healthy or discourage unhealthy practices.

Supporting a healthy workforce benefits organizations by:

- Reducing stress
- Reducing illness and absenteeism
- Reducing medical costs
- Reducing incidence of workplace accidents
- Increasing resilience of employees to illness and stress
- Increasing employee engagement and productivity
- Improving employee morale and increased employee commitment/loyalty
- Improved recruitment and retention rates
- Improved organizational image

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- Complying with national and local laws and regulations

Stress

Stress is normal. Everyone will experience stress in one form or another at some time. Many events that happen put stress on your body.

The subgroups of stress according to endocrinologist Hans Sleye include:

Eustress – a positive cognitive response to stress that is healthy and which can depend on one's current feelings of control, desirability, location, and timing of the stressor. For example, a promotion, getting married, buying a home, and taking a vacation.

Eustress characteristics:

- Motivates, focuses energy
- Is short-term
- Is perceived as within our coping abilities
- Feels exciting
- Improves performance

Distress – a negative cognitive response to stressors and if continuous, can lead to loss of productivity, health problems and exhaustion. For example, job insecurity, excessive job demands, and inadequate authority required to carry out tasks.

Distress characteristics:

- Causes anxiety or concern
- Can be short or long-term
- Is perceived as outside of our coping abilities
- Feels unpleasant
- Decreases performance
- Can lead to mental and physical problems

The following information will focus predominantly on distress.

Stress can be triggered by a variety of workplace forces, which include, but are not limited to:

- **New processes,** which reduces productivity during the implementation phase. Work backloads accumulate, resulting in longer hours and management and customer dissatisfaction.

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- **Poor alignment of work expectations** with the time, skill and/or equipment required to perform the work. A common stressor is the management practice of increasing work quotas to meet business needs without considering what the tasks require of workers. Frequent and extended periods of required overtime are problematic. Recently promoted employees who have not been adequately prepared for the change, become less motivated and engaged and grow demoralized.
- **A work environment marked by low employee trust and empowerment.** Poor supervisory practices – such as constant negative feedback, inconsistency in expectations and treatment, or insufficient instruction, compound employee stress. A lack of opportunity to contribute ideas or report concerns, feeds a sense of powerlessness. Employees with little or no information about the organization's goals, challenges and reasons behind decisions feel vulnerable.
- **Economic changes,** such as challenging budget environments or events that lead to workforce reduction produce fear and worry.
- **Change.** Even positive change requires cognitive and physiological adaptation. Frequent physical moves and repeated changes in leadership or direction raise levels of stress and can result in employees becoming alienated from their organizations.

Stress can be imported into the workplace – for example, stressful commutes, family problems or health issues.

Continuous or severe stress, can produce:

- Higher rates of illness and absenteeism.
- A decline in the quality and quantity of work.
- Behavioral issues such as arguing, poor working relationships, disrespect for managers and co-workers, aggression and insubordination.
- Poor attitude and alienation from the workplace.

Physiological discomfort can play a substantial role in contributing to an occupant's stress. A facility manager can alleviate this by implementing ergonomic design and good practice that directly addresses the physiological needs of occupants. This is explained in the following lesson.

Ergonomics

Ergonomics is defined as the study of equipment design in order to reduce operator equipment fatigue and discomfort. An ergonomic workplace should be designed to meet the employees' needs. Poor ergonomic design and poor work habits can result in

musculoskeletal disorders (MSDs), these are injuries involving bones, muscles, joints and tendons.

MSDs can develop over time from different causes, such as repetitive motions, lower back, or leg strain from working/standing on concrete floors, or poorly designed workstations or equipment, for example, floor burnishers. Some MSDs occur suddenly as a result of slipping or tripping, incorrectly lifting heavy objects, lifting from an awkward or off-balance position.

Making the workplace meet the needs of multiple employees may require some adjustments, but the immediacy with which those adjustments are made should be individually evaluated for the organization, most often in cooperation between FM, HR and Risk Management.

Consider a standing-height workstation shared by multiple workers. Ergonomic recommendations suggest that workers position their elbows at a 90-degree angle when working. In one recent example, two co-workers stood side-by-side, each with elbows at 90-degree angles. One worker's elbow was 14" higher than the others because of height differences. That is a powerful case for considering an adjustable-height surface or some combination of other mechanisms, for instance, adjustable keyboard tray and adjustable monitor arms.

It is important to note that even when furniture and equipment is well designed for ergonomics, those features have little value if stakeholders are not trained in the appropriate use of the furniture and equipment. To receive the most benefit, the organization should provide professional ergonomic fittings for employees. The effort to develop resources and programs to inform stakeholders in the use of ergonomic equipment and furniture that is provided will be repaid many times if even one MSD is prevented.

High value information to provide in any ergonomic training program includes:

- Instructions (and copies of the manuals) for properly adjusting the specific type of workstation chairs monitor arms and keyboard trays provided, and encouragement to make that adjustment every time the worker changes workstations.
- Information about features of work areas. For instance, a footrest may be provided that allows the standing worker to raise and rest one foot at a time, causing the back to flex to a more neutral and comfortable standing position.
- Lists of approved standard ergonomic aids that can be ordered, such as gel keyboard and mouse pads, footrests or anti-fatigue mats for stand-up workstations.
- Resources for self-evaluating and adjusting a workstation, such as that found at the U.S. Occupational Safety and Health Administration website, www.osha.gov. This

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resource may help the worker to properly position monitors, phones, keyboard tray and other elements frequently handled to avoid unnecessary reach.

- Graphics showing ergonomic stretches, along with communication and encouragement to utilize positive work practices, such as stretching, moving frequently, taking micro-breaks and changing visual focus regularly.
- Tips on adjusting the workstation, see Figure 9.

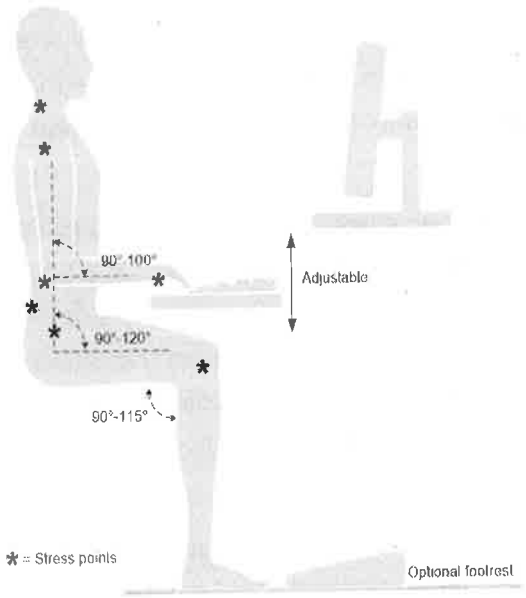

Figure 9 Ergonomic Computer Workstation

Tips for Ergonomics

- The monitor angled and positioned about 20 to 26 inches (50 to 66 cm) from the eyes and at an angle of about 15 degrees.
  - The seat at proper height to align the hands with keyboard without requiring an upward or downward flex at wrists.

Note: Many users find a negative tilt – with the front of the keyboard higher than the back, to be more comfortable since that position allows the fingers to flow naturally downward from the knuckles.

  - Allow roughly 90-degree angle at hips and knees.
  - Allow feet to be placed on the floor or on a footrest.

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- There must be sufficient lumbar support to maintain the upright position comfortably, this means the shoulders are stacked over the hips.
- Avoid any clutter at the feet to prevent tripping. If the seat height cannot be adjusted, a footrest should be provided to maintain the proper angle at the hips.

Poor ergonomic conditions affect not only productivity but also the organization's premiums for workers' compensation insurance, which are based in part on the organization's record of claims.

Health Maintenance

Work is increasingly sedentary in nature. This poses a challenge for maintaining a healthy workforce:

- Diabetes is associated with weight gain and a sedentary lifestyle with lack of exercise and can lead to heart disease and early death.
- Lack of exercise leads to poor muscle tone and flexibility which, in turn, leads to loss of balance and accidents. It is also a self-sustaining problem. Lack of exercise creates conditions that make exercising difficult.
- Eating habits have deteriorated, with more meals consumed away from home – often at the desk or in the car. These meals often include processed food with higher fat, sugar and salt content.

An additional challenge is the ease with which infections can be transmitted in workplaces with open designs, greater density, shared workstations and communal workspaces. A pandemic, such as COVID-19, can cause such a reduced staff that make it necessary for organizations to invoke their business continuity plans.

Some may challenge the role of the employer in influencing employees' life-style choices. Poor choices affect both the employee and the employer. Productivity declines when employees are struggling with health problems. Talent and organizational knowledge may be lost as employees have to stop working before usual retirement ages. For organizations providing health-care insurance, premiums increase to match the increased risk. In the end, it is the individual's choice, but the organization and facility can provide viable options and support good choices.

Wellness Component	**Strategy/Tactics**
Stress	• Identify and reduce sources of stress: - Conduct stress audits to establish stress levels and causes. - Ensure the training of managers and supervisors to

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identify signs of stress and implement stress reduction or management tactics.

- Support occupant stress management:
  - Provide training in stress management.
  - Provide sleep rooms for brief naps.
  - Implement policies that recognize stress and encourage employees to pursue treatment of stress-related conditions for example, counseling for chemical dependency, family problems.
  - Implement policies allowing alternative work schedules.

Ergonomics

- Reduce potential for injuries:
  - Modify processes to minimize repetitive motions.
  - Mitigate conditions for example, rubber mats at standing stations, wrist braces.
- Promote awareness of ergonomic issues and provide training:
  - Alert occupants to the contributing factors and warning signs.
  - Communicate and encourage positive work practices for example, periodic stretching, getting up from chairs and moving, "micro breaks".
- Evaluate workstations. Use ergonomic checklist to set up and reassess workstations. See a checklist example at the Web site for the U.S. Occupational Safety and Health Administration, www.osha.gov.
- Select equipment based on ergonomic characteristics. Ensure that equipment can be used comfortably by all employees – regardless of size or gender.

Health maintenance	• Encourage healthy lifestyles: - Include recreation/exercise rooms in facilities. - Include facility amenities to support exercise for example, walking/running/biking paths, and showers. - Include healthy eating options in facility food service areas. - Include exercise periods as part of compensated time. - Subsidize gym memberships. • Implement preventive measures: - Provide preventive health services for example flu vaccination clinics, blood pressure and cholesterol testing. - Implement more rigorous sanitizing practices in shared and communal workspaces. - Promote hand washing and provide hand sanitizers. - Encourage management to implement policies that allow employees to stay home when they have communicable infections. - Encourage use of employee assistance programs.

Table 6 lists strategies and tactics aimed at supporting occupant wellness.

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Lesson 3: Occupant Wellness

Lesson 3: Objectives

On completion of this lesson, you will be able to:

- Define and create a healthy, effective workplace.
- Describe the drivers of change from a generational context.

Factors Contributing to Wellness

The World Health Organization (WHO) defines a healthy workplace as, "A state of complete physical, mental and social wellbeing, and not merely the absence of disease."

The traditional role of the facility manager included:

- Occupational health
- Safety and security
- Dealing with physical, chemical, biological and ergonomic hazards

The current role adds to that list the following:

- Healthy workplace wellness programs
- Psychosocial factors such as work organization and workplace culture
- A link to the community

According to Burton, 2010 all of the above can have a profound effect on employee health. Not only are facility managers concerned with IEQ, but they need to consider occupant wellness factors as well as factors that contribute to mental well-being.

A 2020 Cort Furniture Company survey found that:

- Concerns about employee experience and well-being are on the rise in today's workplace.
- 50% of the FM professionals expressed interest in design trends related to occupant health and wellness.
- 43% of respondents are interested in trends related to health and wellness, such as sit-to-stand desks, adjustable lighting in their workstation areas and ergonomic seating.
- Focus on adding people over the next 12 months has risen from 34% in 2018 to 57%. This is a 60% increase in two years.

- 63% said the combination of open and closed workspaces is important. This indicates a trend of offering occupant spaces to work privately or collaboratively with coworkers.
- 36% said that cost is the greatest organizational challenge when it comes to providing furnishings.

FM can support occupant wellness by ensuring:

- Ample access to natural light.
- Implementation of an office design that encourages more movement, such as sit-stand desks or activity-based workspaces.
- The inclusion of natural elements such as plants, stone, wood and possibly water features in the workplace. Biophilic design, bringing the outdoors inside and providing access to the outdoors, improves occupant's health and wellness.
- A flexible work policy is developed while working with HR.
- Healthy snacks and meal options are offered in the staff cafeteria or breakroom.
- Employees have access to frictionless workplace technology that minimizes frustrations instead of adding to them. Frictionless workplace technology refers to cloud-based software platforms or artificial intelligence that automates repetitive tasks across multiple systems – such as sending updates about the status of a project.
- Employees are given access to workplace technology that makes it easy to navigate in the workplace – for example, book conference rooms or submit FM service requests to make the office comfortable.
- Workplace amenities are meaningful, promote collaboration and provide organizational value.
- Enforcement of social distancing, which has impacted the typical square foot per employees' standards and efficient use of space.

For those efforts that have a cost impact, it is the job of the FM organization to make the case to the demand organization that these efforts are worthy of support. Facility managers will work closely with Human Resources (HR) and risk representatives of the demand organization to ensure that new offerings, such as activity-based workspaces and ergonomic programs are well coordinated with legal issues such as accommodation, work safety and risk management.

Drivers of Change

The workforce is characterized by five generations of workers.

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Each generation is described using specific attributes and is characterized by its perspectives and values, based on world events, the known culture and experiences. It is worth noting that these generations are composed of individuals who may or may not hold the same values as the characterization given their generation. This discussion is intended only to identify the differences in work values and styles that a facility manager is working to meet the needs of at any given time. For instance:

- **Traditionalists**
  - Born 1925–1945
  - Dependable, straightforward, tactful, loyal
  - Shaped by: The Great Depression, World War II, radio, and movies
  - Motivated by: Respect, recognition, providing long-term value to the company
  - Communication style: Personal touch, handwritten notes instead of email
  - Worldview: Obedience over individualism; age equals seniority; advancing through the hierarchy
  - Employers should: Provide satisfying work and opportunities to contribute; emphasize stability
- **Baby Boomers**
  - Born 1946-1964
  - Optimistic, competitive, workaholic, team-oriented
  - Shaped by: The Vietnam War, civil rights movement, Watergate
  - Motivated by: Company loyalty, teamwork, duty
  - Communication style: Whatever is most efficient, including phone calls and face to face
  - Worldview: Achievement comes after paying one's dues; sacrifice for success
  - Employers should: Provide them with specific goals and deadlines; put them in mentor roles; offer coaching-style feedback
  - Stats:
    - (5) 65% of baby boomers plan to work past age 65
    - (6) 10,000 baby boomers reach retirement age every day
- **Generation X**
  - Born 1965–1980
  - Flexible, informal, skeptical, independent
  - Shaped by: The AIDs epidemic, the fall of the Berlin Wall, the dot-com boom

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- Motivated by: Diversity, work-life balance, their personal-professional interests rather than the company's interests
- Communication style: Whatever is most efficient, including phone calls and face to face
- Worldview: Favoring diversity; quick to move on if their employer fails to meet their needs; resistant to change at work if it affects their personal lives
- Employers should: Give them immediate feedback; provide flexible work arrangements and work-life balance; extend opportunities for personal development
- Stats:
  - (7) Gen Xers make up the highest percentage of startup founders at 55%
  - (8) Gen Xers will outnumber baby boomers by 2028

- **Millennials**
  - Born 1981–2000
  - Competitive, civic-minded, open-minded on diversity, achievement-oriented
  - Shaped by: Access to technology and the internet
  - Motivated by: Responsibility, the quality of their manager, unique work experiences
  - Communication style: IMs, texts, and email
  - Worldview: Seeking challenge, growth, and development; a fun work life and work-life balance; likely to leave an organization if they don't like change
  - Employers should: Get to know them personally; manage by results; be flexible on their schedule and work assignments; provide immediate feedback
  - Stats
    - (9) By 2025, millennials will comprise 75% of the global workforce
    - (10) About 15% of millennials age 25–35 live at home with their parents
- **Generation Z**
  - Born 2001–2020
  - Global, entrepreneurial, progressive, less focused
  - Shaped by: The information age
  - Motivated by: Diversity, personalization, individuality, creativity
  - Communication style: IMs, texts, social media

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- Worldview: Self-identifying as digital device addicts; valuing independence and individuality; preferring to work with millennial managers, innovative coworkers, and new technologies
- Employers should: Offer opportunities to work on multiple projects at the same time; provide work-life balance; allow them to be self-directed and independent

Catering to the generational differences is an important move toward organizational effectiveness. Providing a variety of types of workspaces allows occupants to maximize their productivity.

Productivity and Creativity

One of the major contributions that the facility manager can make to an organizations' success is ensuring that the amount and type of facility space is aligned to the organization's strategic goals and culture and meets specific department needs. FM needs to balance the facility's fundamental requirements with how to support individual self-expression and a sense of well-being while at work.

This topic examines:

- Trends that are shaping the way facilities look today.
- The process facility managers use to ensure alignment of space programming with organizational strategy.
- Strategies for creating more productive and creative work environments.

Workplace and Industry Trends

The business strategy an organization pursues affects the amount, quality and use of its physical space. Some businesses may emphasize price leadership, built on the ability to ensure the most efficient production. Others may focus on reliable quality and service, which require effective processes and attention to employees' knowledge levels. Some may rely on always having the most innovative products or services, which requires an imaginative and highly knowledgeable workforce. No matter what an organization's strategic focus is, no organization can neglect the need to use its resources prudently and to adapt to changing conditions in the environment.

Among the forces challenging today's organizations, three directly affect the way facility managers use space to support productivity and creativity:

- The trend toward smaller facilities.

- The increasing size of the knowledge-based economy.
- Changing demographics.

Reducing the Facility Footprint

A topic that the facility manager deals with constantly, is how to decrease square footage while still growing the number of employees and increasing output. This trend is driven not only by the cost of space but also by the economic and environmental costs of operating that space. The bigger the space, the higher the organization's energy bills and the larger the organization's energy footprint.

Some shrinkage in facility footprints results from changes fueled by the economy and new technology:

- Just-in-time manufacturing approaches have been spurred by the need to keep costs low in a more globally competitive market. They have been enabled by advances in communication among supply chain members that allow suppliers to track or be notified automatically of low inventory status and by improved transportation. This trend means less facility space may be needed for warehousing and storage.
- Manufacturing lines have grown smaller in response to lean manufacturing processes that seek to eliminate waste – some of which can come from unnecessary time moving supplies, products and equipment around. Facility footprints become compact and dense.
- Off-site data processing and storage through such means as cloud computing and more compact racking systems for servers have reduced the amount of facility space allocated for data purposes.
- New furnishings and office equipment, such as flat screens, can reduce the amount of office space needed.
- The increasing effectiveness of remote working, particularly as noticed during the COVID-19 pandemic, means less people working in the space at one time. This effectiveness was aided by the technology improvements which have greatly increased the effectiveness of working from home for example Zoom and Teams meetings among others.

How does an organization accomplish a reduction in footprint? A variety of approaches have been used:

- Allocating space by actual work needs rather than by status. (This means smaller senior management offices, with the regained footage often allocated to meeting areas.)
- Consolidation of amenities, such as multiple cafeterias in facility campuses.

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- Open floor plans that waste less space on walls and halls, using movable panels (cubicles) instead.
- Smaller-scaled furniture and equipment.
- Eliminating data equipment space by using cloud computing and storage.
- Eliminating vast paper file areas in favor of electronic archiving. (It is worth noting that converting existing paper files to electronic versions is time-consuming and expensive and still requires some storage. In addition, some documents, such as business continuity plans, require hard-copy backups.)
- Alternative work methods, such as telecommuting or part-time space sharing or hoteling (an analysis of data from the US Census and the Bureau of Labor Statistics, found that the number of people who telecommute increased by 159% between 2005 and 2017. In the last decade, remote work has grown by 91%, and 3.4% of all employees in the United States work remotely. In an IFMA survey, more than half of responding facilities offered unassigned, reservable space to accommodate alternative work modes.)

Reducing facility size has its benefits and challenges, as seen in Table 7.

Benefits	Issues
• Increased sustainability • Lowered real estate costs • Increased productivity and transfer of knowledge • Easier access to other occupants for work and socialization • Stronger morale because of more equal treatment • Increased retention of certain employees who value telecommuting	• Less privacy • Effects of increased density on comfort • Less meeting space • More noise and distractions • Less room for occupants' "stuff" • Compliance with government requirements for space per occupant • Resistance from labor or works councils/labor unions (See the Resource Center for more information about the nature of labor or works councils.) • Weakening of identity of telecommuters with organization

Table 7 Benefits and Challenges Associated with Reducing the Facility Footprint

On the positive side:

- Environmental stewardship increases, as the organization's carbon footprint and site impact decrease.
- Productivity will increase as a result of lower costs, but it may also increase because occupants can work more efficiently and effectively. Organizations usually report increased output in open space designs – perhaps because of better adjacencies.

Occupants have easier access to the people they need to work with. Transfer of organizational knowledge occurs more easily.

- Morale will improve when space is allocated according to need rather than status. Occupants will have the tools they need to accomplish their work. The organization puts its values into action.
- Employees who need flexibility in their lives will be attracted to the option of telecommuting.

There are issues, however:

- Occupants have less privacy in open floor plans.
- Increased density affects temperature and humidity, noise levels and air quality.
- Decreased office or workstation space means less opportunity for small meetings in these areas and creates greater need for meeting or conference space.
- If not implemented properly, an open space design can actually lower productivity by increasing the level of distraction.
- Space often comes at the cost of storage. Occupants may feel that they have no place to store personal items in their cubicles. Reducing storage space for FM supplies may require changing work processes, finding new sources for supplies and possibly revising automated ordering systems.
- External stakeholders must be considered in reducing space allocations. There may be government regulations on minimum space per worker. Relations with labor or work councils can suffer if these bodies are not involved in the process.
- Telecommuters can feel less connected with the organization. They can also feel less supported by the organization if telecommuting is not implemented properly. Some research has shown that hoteling does not have high acceptance rates among employees. This is probably due to poor implementation. The successful implementation of alternative work strategies is a complex challenge and should be accomplished by experts in the design and execution of workplace alternative strategies.

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Chapter 2: Progress Check

1. *True or false.* SBS is the term used to describe a situation in which building occupants experience acute health and comfort effects that appear to be linked to time spent in a building, but no specific illness or cause can be identified.

   a. True
   b. False

2. There are symptoms that help you identify if there is SBS in your facility. Select the symptom that is not associated with SBS:

   a. Headaches
   b. Dry cough
   c. Loss of taste or smell
   d. Fatigue
   e. Dizziness and nausea

3. *Select the correct answer.* When setting up an ergonomic workstation, the correct angle for the hips, knees and elbows is:

   a. 60 degrees
   b. 70 degrees
   c. 75 degrees
   d. 80 degrees
   e. 90 degrees

4. *True or false.* Eustress is considered to be a positive cognitive response to stress, that motivates and triggers energy.

   a. True
   b. False

5. *True or False.* FM should encourage healthy work practices for example, periodic stretching, getting up from chairs and moving around and provide sleep rooms for naps.

   a. True
   b. False

6. *Which of the following answers is incorrect*? Catering to the generational differences is important for organizational effectiveness this means that FM should:

   a. Provide a variety of workspaces allowing occupants to maximize their productivity
   b. Ensure that there is entertainment
   c. Provide more social and collaborative workspaces
   d. Provide access to quality hot desks and technology for the in-transit workforce

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Chapter 3: Occupant Services

Lessons

- Objectives
- Lesson 1: Occupant Services
- Lesson 2: The Need to Manage Additional Systems

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Objectives

Chapter 3: Objectives

On completion of this chapter, you will be able to:

- Identify occupant services in FM.
- Determine when the management of additional systems may be necessary.

Introduction

This far it has been established that the main goal for a facility manager is to provide a comfortable, safe, and productive work environment to support the mission of the organization. This chapter covers, how to achieve these goals through providing specific support services beyond the operational maintenance of hard assets of the building and its systems that facility occupants or visitors need. Additionally, what documentation may be required in providing these services is included.

Lesson 1: Occupant Services

Lesson 1: Objectives

On completion of this lesson, you will be able to:

- Identify occupant services in FM.

Occupant Services in FM

Occupant services in FM refers to the specific support services to be provided to the demand organization. Services will vary from organization to organization. Which services are offered is based on supporting the strategic objectives of the core business and maintaining the internal and external physical facility to support productivity and wellbeing.

These services create:

- An efficient and safe environment
- Encourage productivity
- Adhere to rules, regulations and governmental requirements
- Reflect the priorities and values of the demand organization.

Services are performed as per the requirements documented and agreed upon between the demand and FM organizations.

These include but are not limited to:

- Provision of thermal, comfort and environmental quality controls
- Custodial services
- Security services
- Maintenance of the interior and exterior of the facility
- Property, real estate or building management
- Services related to furniture or relocation management
- Food and beverage services, such as cafeterias and break areas

The term occupant services refer to anything that facility occupants or visitors need beyond the operational maintenance of hard assets of the building and its systems. These occupant or soft services are critical activities through which the facility manager directly affects the occupants. When competently performed, the activities are invisible to occupants, but the

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occupant services themselves are highly visible and present the organization's image to the rest of the world.

Occupant services should align with the organization's business strategy. These services are the primary interface with the organization's own customers and their quality and consistency reflect FM's effectiveness and value. Any failure in service to occupants is immediately apparent and detracts from the organization's mission and image.

There are many potential different types of occupant services a facility manager may have oversight of including:

Food Service – Within food service operations, a facility manager may be responsible for managing the food service contract with the vendor providing the services, and sustainability factors such as water use and waste in the kitchen operations. The facility manager may get encouragement from HR to provide a wellness program, if so the food service offering factors may also come into play including using organic, locally sourced, and healthy food options.

Mail and Shipping Services – Some facilities will have full-service mail rooms for ingoing and outgoing mail and packages. Oversight of the mail room and mail delivery logistics often fall under FM.

Copy and Printing Services – These occupant services tie directly to occupant needs on an almost daily basis.

Meeting Services – FM is often responsible for meeting spaces, from small to large meeting rooms and conference areas. In addition to meeting internal occupant needs, many organizations rent these spaces out to external customers. Meeting spaces need to meet the organization and external customer needs while balancing costs and sustainable practices. This may include providing audio/visual equipment within the meeting spaces.

Custodial Program – Whether performed with in-house staff or outsourced to contractors, the custodial program is integral to occupant satisfaction. There are many factors for the facility manager to manage. There are levels of service to consider, sustainability of products, and training of staff. Refer to the APPA Levels of service mentioned earlier for reference in standards for cleaning.

Grounds Management – Both hardscape and landscape management are included in grounds management. From an occupant perspective, effective grounds management that enhances their connection to the environment and allows for outdoor activities could lead to increased satisfaction. Even basic safety requirements such as lighting and security are included in grounds management.

More information on the sustainable practices of these occupant services can be found in IFMA's SFP program.

To support the organization, FM needs to maximize the efficiency and useful life of existing buildings and structures by:

- Providing features that protect the existing interior finishes while maintaining the safety and aesthetics.
- An effective custodial program that includes sustainable and effective services for cleaning finishes to maximize their useful life.
- Security features that enhance the safety of occupants and protect the assets of the demand organization.
- Grounds maintenance that provides a positive image for the demand organization, enhances occupant satisfaction with the environment and meets the organization's sustainability goals.

All these services are designed to maximize the value and usefulness of existing buildings and grounds until and unless the organization determines that those buildings and grounds require modification or replacement.

Existing buildings bring a new challenge for the facility manager, who is charged with operating within a structure that may have deficiencies or may present challenges due to the age of the facility or past poor maintenance practices.

For operations in an existing building or structure, facility managers will need to pay attention to elements, such as:

- Potentially limited thermal and/or electrical capacity of the existing systems
- Hidden environmental concerns, such as asbestos, lead or mold
- Availability of desired infrastructure, for example, high speed data transmission
- Site constraints (Accessibility Section 504)
- Age and condition of existing capital assets such as roof, fire protection, electrical distribution, HVAC, parking lot and structure of the facility
- Indoor Air Quality (IAQ)

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Lesson 2: The Need to Manage Additional Systems

Lesson 2: Objectives

On completion of this lesson, you will be able to:

- Determine when the management of additional systems may be necessary.

This lesson contains the following topics:

- Unique facility systems
- Documented Requirements
- Funding

Unique Facility Systems

Industries will have different needs for additional systems or programs to oversee, and unique facilities have unique stakeholders and will require management of various different systems. For a facility manager, the main goal is to provide a comfortable, safe, and productive work environment to support the mission of the organization. What if the mission of the organization is "Sparking compassion, curiosity and conservation for the aquatic animal world." as it is for the Shedd Aquarium in Chicago, Illinois? The FM stakeholders include aquarium employees, visitors and occupants – even if the occupant happens to be a penguin.

Some of the unique facility systems which a facility manager may be responsible for, include:

- **Life support systems** – In aquariums, zoos, museums, or other facilities with live animals there are systems that provide life support to the animals. These become critical systems that the FM department typically maintains.
- **Medical equipment** – Hospitals, research facilities, and other medical facilities have medical equipment that may include the FM department providing a proper maintenance program. This could include X-ray machines, MRI machines, laboratory equipment, and other systems.
- **Data centers** – Many facilities have data centers and some have very large data centers requiring a significant amount of operations and maintenance support.

Research and museum facilities also have unique operating requirements to support laboratories, artifacts, and collections. Temperature and humidity requirements vary in those unique spaces, often becoming critical systems that can't fail.

While the FM department oversee and manage these systems, a facility manager may choose to utilize contractors specializing in these unique types of systems to perform preventive and corrective maintenance.

Documented Requirements

Given the wide variety of possible occupant services, a clear understanding of the services expected by the organization and agreed to by the facility organization is necessary. This documentation can take the form of a contract, service level agreement or similar written acknowledgment of the details or may be an understanding based on the organizational structure.

The document must specify and itemize:

- What is to be provided by the facilities organization.
- What is specifically excluded from the occupant services.
- Financial arrangements regarding how those services are to be provided and accounted for.
- Procedures for adding or modifying services and for maintenance of capital assets.

Service level agreements also include detailed information on the quality of services to be performed. These agreements can be prescriptive or performance based. Prescriptive specifications dictate specific actions to be performed. In a grounds management contract, a prescriptive specification states the contractor shall cut the grass once a week. Performance based specifications outline outcomes FM would like to achieve. In a grounds management contract, a performance-based specification states that the contractor shall maintain the grass at a level of 4 inches. In this instance, the contractor determines how often they need to cut the grass to maintain it at that level. Both options have their advantages and disadvantages and it most often comes down to the level of knowledge and comfort that the FM group has in the subject matter. Staffing expertise and levels are also major factors in deciding which contract should be applied to the specific facility.

Funding

Funding for occupant services is divided into two categories, operating and capital funds.

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The operating budget will be set to provide for ongoing, repeat services as agreed upon. This budget would include sufficient funds:

- For FM staff and all occupant services to be provided, whether contracted out to a service provider or to be provided by the in-house staff.
- To perform regular inspections of and maintenance on assets, such as roofs, building envelopes, parking lots and equipment, to extend the life of those assets.
- To meet safety rules and regulations, such as annual inspections for backflow devices and life safety systems.
- For the occasional professional services for consulting needs beyond the expertise of the facilities staff.
- For ongoing training and professional development for FM staff.

The capital budget should be developed to provide for larger, one-time or unique needs. These may include:

- Replacements or upgrades to mechanical equipment.
- Significant maintenance requirements, such as roof replacements, parking lot or sidewalk replacements or major building envelope maintenance.
- Tenant finish projects and churn (move- adds-changes) projects.

Long range budget development should set aside funds for major capital maintenance needs. The facility register is an excellent source of information about the age and condition of assets to help in estimating requirements over an extended horizon for high-dollar items, such as asphalt, roofs, HVAC equipment such as boilers, chillers and air handlers, major industrial equipment, mailing or sorting equipment and even vehicle fleets.

Chapter 3: Progress Check

1. *True or False.* Occupant support includes those functions aimed at maintaining the internal and external physical facility and supporting the core business needs of the organization.

   a. True
   b. False

2. *Select all the correct answers.* Occupant services in FM refers to the specific support services to be provided to the demand organization. These services create:

   a. an efficient and safe environment
   b. encourage productivity
   c. adhere to rules, regulations and governmental requirements
   d. reflect the priorities and values of the demand organization

3. True or False. Services are performed as per the requirements documented by FM organizations exclusively.

   a. True
   b. False

4. *True or False.* A new facility does not require facility managers to put plans into place for new or replacement systems and structures for at least ten years.

   a. True
   b. False

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Chapter 4: Creating a Safe and Secure Workplace

Lessons

- Objectives
- Lesson 1: Create a Safe Culture
- Lesson 2: Introduction to Standards
- Lesson 3: Strategies to Increase Safety and Security
- Lesson 4: Create a Facility Safety Strategy
- Lesson 5: Create a Facility Security Strategy
- Additional Considerations for Safety and Security

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Objectives

Chapter 4: Objectives

On completion of this chapter, you will be able to:

- Identify the elements necessary to create a culture of safety and security.
- Identify how the implementation of standards helps to support the health and safety of workers.
- Define strategies to increase occupant safety and security.
- State why signage is important.
- Create a facility security strategy.

Introduction

An organization which maintains a high level of safety and security produces a strong, positive image of a well-managed operation and attracts prospective employees. Creating a safe culture is paramount in achieving this objective. In this chapter, the standards and strategies for creating this type of environment in order to achieve that objective is provided.

Facility and Building Safety

Facility and building regulations vary across industries and countries. All facility managers are responsible for prioritizing safety and security concerns for occupants and assets in buildings. The number of occupants in a building and the type of their activities can be important gauges of the risk an organization faces. There are several resources available to provide guidance to the facility manager, such as ISO, OSHA and others.

ISO 45001 Occupational health and safety management systems – Requirements with guidance for use is an international standard that provides a framework for managing the risks and opportunities. The objective of implementing these standards is to proactively improve the occupational health and safety (OH&S) performance and prevent injury and illness. Organizations must eliminate hazards and minimize risks by taking effective preventive and protective measures.

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A facility manager has an ethical obligation and often regulatory requirements to protect occupants from workplace accidents, violence, and theft. Ensuring workplace safety and security is a business imperative. The International Labor Organization (ILO) estimates that four percent of the world's gross domestic product, or $2.99 trillion is lost annually from workplace accidents and work-related diseases. An American insurance company survey concluded that most business leaders believe that an investment in injury prevention doubles its value through increased productivity.

Deliberate acts of violence and terrorism are primary facility safety concerns. The risk to human life, at the workplace, organizations and entire countries has increased, and deliberate acts of violence and terrorism are primary facility safety concerns.

An example of how terrorist attacks affect the economy are shown in the attacks in Mumbai in 2008. The estimated cost to India was approximately 40 billion rupees, more than US $715 million, in damage and lost productivity (*Weystaff, 2019*).

According to the Occupational Safety and Health Administration (OSHA), a division of the U.S. Department of Labor, nearly two million people in the U.S. are victims of workplace violence each year. Work-related assaults resulted in 18,400 injuries and 458 fatalities in 2017 (*Weystaff, 2019*). The number of cases is drastically under-reported, so the figure is likely to be substantially higher. A 2019 statistic from Cable News Network (CNN), reports 47 school shootings in 46 weeks (*Wolf & Walker, 2019*). The impact of fear and uncertainty weighs heavily on the human factors of safety and security.

Organizations must be proactive in their safety and security measures. The impact of failing to provide adequate safety and security measures and the loss of productivity associated with workers feeling unsafe is a serious threat to any business.

An organization which maintains a high level of safety and security produces a strong, positive image of a well-managed operation and is a sought-after workplace by prospective employees. Creating a safe culture is paramount in achieving this objective. Creating this type of environment is one of a facility manager's primary concerns and demands a great deal of their attention and resources to achieve.

Case Study

Consider the following case study where prioritizing safety and security and making accidents "the enemy" had a profound turnaround effect on the company's income and market value.

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How Paul O'Neill Fought for Safety at Alcoa

By most accounts, Paul O'Neill's first speech as the new CEO of Alcoa was a complete failure.

The speech was given in a hotel ballroom not far from Wall Street, and it was meant for the investors and analysts who did business just a few blocks away. The last few years the aluminum manufacturing giant had performed poorly. Investors were nervous, and many had arrived at the hotel expecting the usual grand turnaround vision of how this new leader was going reduce overhead, improve profits and, most importantly to them, raise the stock price. But that's not what happened.

"I want to talk to you about worker safety," O'Neill began. Almost immediately the attitudes in the room transformed. The energy disappeared. The room was silent. "Every year, numerous Alcoa workers are injured so badly that they miss a day of work," O'Neill continued. "I intend to make Alcoa the safest company in America. I intend to go for zero injuries."

When his initial remarks had finished, most of the audience was still stunned and confused. A few veteran investors and business journalists tried to get the meeting back toward a normal CEO-to-Wall Street address. They raised their hands and asked questions about capital ratios and inventory levels. O'Neill wasn't willing to entertain any of it. "I'm not certain you heard me. If you want to understand how Alcoa is doing, you need to look at our workplace safety figures." When the meeting was over, the confused attendees cleared out of the room quickly. Within minutes, investors were calling colleagues and clients with sell orders. Journalists were drafting their articles on how the new Alcoa CEO had lost his mind. But as it turned out, O'Neill's mind was still very much intact – and it was focused not only on the right metrics. But also, the right fight.

If you took a quick look at Alcoa by the numbers, its safety record was really one of the few things it was doing right. Alcoa had the best safety record in the aluminum industry. At the same time, its financial record was suffering. Alcoa was founded nearly 100 years before O'Neill took the reins, and it enjoyed a virtual monopoly on aluminum production in the United States for the first half of that. But anti-trust regulations, stiffer competition, and an over-supply in the marketplace led to a financial crunch for the giant. O'Neill's strategy was based on the belief that Alcoa and all its employees needed a deeper focus on process. They needed to make the production process more efficient (and likely at a lower cost). But O'Neill also realized that few people outside home office accountants would be able to grasp, let alone get motivated by, streamlining the production process. "Part of leadership," O'Neill once explained, "...is to create a crisis." O'Neill saw the safety record as something that would win their minds and their hearts. And it would require a deep look at the production process. You can't improve safety without understanding every step in the process – understanding each risk – and then eliminating it. But understanding the process doesn't motivate people. Safety could. So, O'Neill picked a fight.

He picked a fight with the idea that something inside the company was injuring and even

killing their employees. O'Neill picked a fight with the notion that industrial manufacturing came with an "acceptable" amount of risk. O'Neill wanted to fight the idea that any risk – any injury – was acceptable. He got to work recruiting others to join him in that fight. His speech at the shareholder meeting was the first of many declarations of war against whatever was harming Alcoa employees. And it was strategically chosen. It sent the message to employees that shareholder returns weren't his priority – employees were. O'Neill's commitment to leading the fight for safety would get tested early and often.

About six months into his tenure, O'Neill was awoken in the middle of the night by a telephone call from a plant manager in Arizona. Earlier, a machine had stopped working when a piece of aluminum scrap had jammed a hinge on one of the machine's large mechanical arms. A new employee offered to fix it. The man had only worked at the company for a few weeks – he joined because Alcoa offered free healthcare, and he and his wife recently found out they were pregnant. To try and fix the jam, he'd jumped over a safety wall and walked across the machine until he'd reached the jam and removed it. However, when he cleared the jam, the machine sprung back into action. The six-foot-long arm swung back across its arc quickly, striking the man in the head and crushing his skull. He died instantly from the impact. By the end of the day, O'Neill had assembled a meeting with the plant's executives. "We killed this man," he told them. He was unwavering. "It's my failure of leadership. I caused his death. And it's the failure of all of you in the chain of command." In that moment, it was clear to everyone in the room...and to everyone who would later hear about the tragedy and O'Neill's response. Unlike other industrial plants and unlike their own past. Accidents were unacceptable. Accidents were the enemy.

In that meeting, O'Neill and the executives went through every detail of the accident. They watched video footage again and again. They recreated the stages of the accident through diagrams. Eventually, they compiled a list of dozens of mistakes made by multiple parties. Two managers had seen the man jump the safety wall but didn't stop him. That was a failure of management. As was the man's lack of knowledge that he should find a manager before attempting a repair. That was a failure of training. The machine should have had an automatic shut-down procedure if it sensed a human was inside. That was a failure of engineering.

As a result of that incident, major changes were made and made quickly. All of the safety railings at every plant were repainted bright yellow. New policies and procedures were created. And perhaps most surprisingly, O'Neill sent a company-wide message to all workers asking them to call him directly, even at home, to suggest new safety practices. Especially if managers weren't listening or implementing their ideas.

The next big test would come midway through O'Neill's tenure. Alcoa was making progress on their fight, but accidents still happened. At a plant in Mexico, a carbon monoxide leak went undetected as it poisoned one hundred and fifty employees. Each one had to be treated at an emergency clinic though thankfully, no one was killed. The senior executive in charge of the plant had installed ventilators to remove the fumes and prevent future events. But he'd never

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reported the incident. In their individual fights to keep the accident rate at zero, a lone executive had decided to keep the accident a secret.

It wasn't until a shareholder meeting that O'Neill even heard of the incident. A Benedictine nun from the area near the plant raised the issue. The nun's order had heard about the tragedy in their community and purchased fifty shares of Alcoa for the express purpose of traveling to that meeting and forcing the issue. O'Neill sent a team down to Mexico to investigate. They gathered all the facts and concluded that the executive had most likely intentionally covered up the incident. Two days later, he was fired.

It wasn't an overnight transformation, but Paul O'Neill's internal fight against accidents – his fight for worker safety gradually changed the systems and the culture. Since prioritizing worker safety meant studying the production process, the improvements made also made the plants run more efficiently. Since monitoring and responding to accidents meant constantly communicating safety numbers and ideas for increasing safety, eventually executives began sharing other data and other ideas more rapidly as well. O'Neill's fight for safety didn't just turn around accident rates – it made the whole company better. When O'Neill left Alcoa in 2000, the company's income was five times higher than when he'd started. And its market value had increased from $3 billion to over $27 billion. It was a nearly impossible turnaround.

And it would have been impossible had O'Neill not chosen the right tactic to motivate senior executives, union representatives, and individual workers alike. "Increase efficiency" isn't a rallying cry that moves anyone. Safety – protecting each other from the threat of accidents – moved nearly everyone (disgraced Mexican plant executives notwithstanding). O'Neill picked the right fight. And that fight saved lives – and saved Alcoa.

Source: David Burkus - https://davidburkus.com/2020/04/how-paul-oneill-fought-for-safety-at-alcoa/

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Lesson 1: Create a Safe Culture

Lesson 1: Objective

On completion of this lesson, you will be able to:

- Identify the elements necessary to create a culture of safety and security.

A study by the Society for Human Resource Management (SHRM) reveals that one out of seven employees feel unsafe at work. Creating a safe and secure workplace is a priority (Wagstaff, 2019). The process must be integrated into the organization with the goal of changing behavior that may be deeply ingrained and motivated by complex factors. Providing communications about safety in the workplace is not enough.

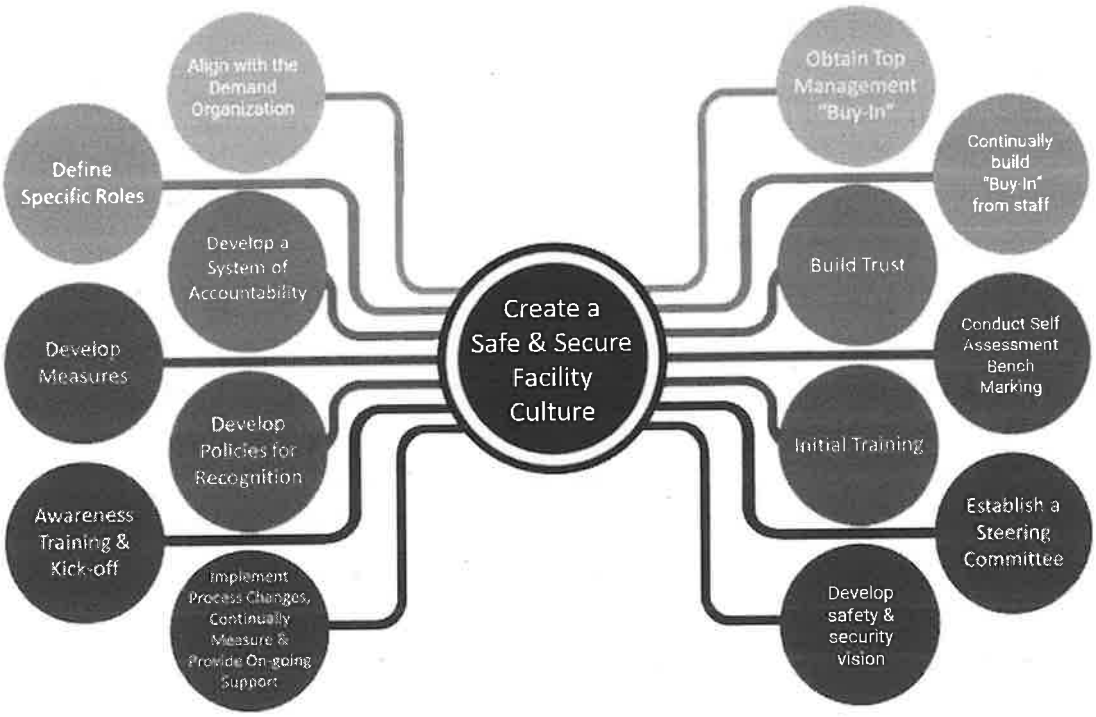

Figure 10 Shows processes that can be applied to creating a safe and secure facility culture

Cultures are based on shared values and norms that guide perception and choices. Safety and security must be a permanent and consistent focus for a facility manager. When considering a new process, project, or piece of equipment, the impact on safety and security must be included in the list of factors to be evaluated alongside budgets and schedules.

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The process of creating a culture of safety and security begins with enlisting support from the organization's leaders. Gaining greater awareness of the risks to occupant safety and security enables the facility manager to set goals and develop appropriate strategies. Management and occupants must be actively involved in the implementation of these goals and strategies. The facility manager must measure the effectiveness of the strategies, reinforcing or revising them as needed in accordance with international standards that provide the benchmark.

Occupational Health & Safety (OH&S) Policy

The facility manager must be knowledgeable about the elements of the policy and if there is no policy, one should be created. The elements below are taken from OSHA, but they are universal.

The elements of the OH&S policy should include the following:

1. A commitment statement which provides safe and healthy working conditions for the prevention of work-related injury and ill health. This must be appropriate to the purpose, size, and context of the organization and the nature of the OH&S risks and opportunities.
2. A framework or model for setting the OH&S objectives.
3. A statement to fulfill legal and other requirements and one that eliminates hazards and reduces OH&S risks.
4. A statement committing to the continual improvement of the OH&S management system.
5. A commitment to consultation and participation of the workers. If a union is involved with the organization, the workers' representative should be included.
6. The procedures for reviewing the effectiveness of actions taken, including corrective and preventive action.
7. A process that allows necessary changes to be made to the OH&S management system.

When corrective/preventive actions occur, the documentation of the action taken must be maintained as evidence of:

1. The incidents, non-conformities and actions taken.
2. The results of any action & corrective action, including the effectiveness.

All employees should be aware of the OH&S policy, this must be communicated in the documented information in the policy. In the case where there is an incident or a

corrective/preventive action taken, the facility manager should report and investigate the incidents without delay to enable hazards to be eliminated and to minimize OH&S risks.

Ensure Management Support

Management support is essential to any initiative aimed at shaping the organization's culture. Safety and security initiatives require resources to support any effort of changes needed to create the appropriate safe and secure environment. The importance of attention to safety and security is established in communications from leaders in annual meetings, letters, annual reports and actions. Management has an opportunity and obligation to model desired behaviors. Policies must be adopted. Responsibility for ensuring occupant safety and security must be included in job descriptions and considered during performance reviews. Actions that exemplify desired safe behavior should be rewarded in a public manner. Leaders, including facility managers, must demonstrate a serious and professional attitude toward safety and security issues, when requirements are treated as a nuisance by supervisors and managers, they will have little impact on occupant behavior.

One of the most critical aspects of leadership support is that occupants should never be forced to choose between safety and their jobs. Unrealistic deadlines can cause employees to drive home exhausted and fall asleep at the wheel. They can cause technicians to break rules or ignore safety procedures to save time. Supervisors might be penalized for having too many accidents, incidents or near misses in their units when they faithfully report accidents. As a result, there is perceived pressure to under report or not report problems which are not corrected as a result. This behavior is unacceptable and should be dealt with immediately upon it being revealed.

Note:

- An **incident** is an instance of something happening, an event or occurrence.
- An **accident** is an unfortunate incident that happens unexpectedly and unintentionally, and can result in damage or injury.
- A near-miss is a narrowly avoided accident.

An accident and near-miss are incidents, the difference being accidents result in physical damage where a near-miss does not.

An incident is any occurrence whether it results in an accident or not

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Situational Awareness

Facility managers work in complex and dynamic environments where they must make important decisions. This decision-making process, and its consequent performance, can be improved by enhancing the ambient awareness of the facility manager — in other words, knowing and being aware of what is going on around us. Enhancing the ambient awareness of individuals who work in complex and dynamic environments can be achieved through the concept of Situation Awareness (SA).

The model starts with scanning the environment. What is the perception of the attributes, the status and the environmental elements? For example, facility managers should perceive information, such as service contracts, collaborative groups' information needs and priorities in terms of facility needs and budget constraints among others. The second step is conducting an analysis of all the disjointed elements that came from Step 1. Here, patterns are formed with the elements to create a holistic picture of an environment. During the analysis, perceptions are looked at and interpreted. From the interpretation, projections are made which leads into Step 3, decision making. It is stated that SA can improve decision making. This may not be true for all situations. Other factors, such as training, personality, organizational and technical constraints also affect the decision-making process (Endsley & Garland, 2000). After good decisions are made, performance should improve.

Gheisari and Irizary (2011) claim that SA can be used to filter the large amount of information and to provide the facility manager with organized and required information. The organized information can shape the mental picture for the facility manager, but it can also have the potential to be used as a basis for developing human-computer interfaces and applications. The improved mental picture, together with human-computer interfaces, can enhance the decision-making process of facility managers and can lead to the achievement of their goals in FM. Goals, such as reducing errors and improving task performance, can lead to the improvement of FM practices for the working environment. Figure 11 shows the SA model as it relates to FM.

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Figure 11 The conceptual model of FM and SA integration
Source: J.Irizarry et al.

The SA model is not intended to be a one size fits all model for FM related issues. The purpose is to increase SA and assist facility managers by increasing awareness and access to relevant information that may lead to improved performance. Each facility manager is ultimately responsible for the final analysis of the available information and the corresponding course of action. This method may measure the measurable, but management personnel should be vigilant of other factors that can influence decision-making.

What Does Safety and Security Mean to FM?

Establishing a safe, secure and healthy workplace is paramount for FM in ensuring that occupants are not lost to injury or illness, which for even short periods of time, can cause significant disruption and cost. Having a proactive approach to finding and fixing workplace hazards before they occur rather than reacting to an incident 'after the fact', promotes workplace morale, productivity, turnover and reputation for the organization.

Involving workers in collaborating to identify and solve issues builds trust, enhances communication and can lead to additional business benefits.

To assist facility mangers in achieving these objectives, OHSA provides ten recommended practices to ensure success for a solid base to work from:

1. Set safety and security as a top priority
2. Lead by example
3. Implement a reporting system, preferably anonymous where hazards, near misses/close calls or health concerns can be reported for example:
    - Electrical hazards

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- Equipment operation practices
- Equipment maintenance
- Fire protection
- First Aid stations
- Workplace violence
- Lack of emergency procedures
- Biological/chemical hazards
- Slip and fall hazard

4. Provide training on a regular basis
5. Conduct inspections on a schedule
6. Collect hazard control ideas
7. Implement hazard controls
    - Providing signage for the above issues provides a form of communication to alleviate incidents/accidents. See Signage section in this chapter.
8. Address emergencies calmly
9. Seek input on workplace changes
10. Make appropriate improvements which are identified during the post-event meetings

There are guidelines that are provided by both OHSA and ISO to assist facility managers in achieving these goals.

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Lesson 2: Introduction to Standards

Lesson 2: Objective

On completion of this lesson, you will be able to:

- Identify how the implementation of standards helps support the health and safety of workers.

The nature of work is evolving; there has been a major transition from manufacturing to service-based industries and from a fixed to a mobile workforce:

- New technology, automated systems and robotics are being integrated into the workplace which introduce new and different hazards.
- The aging workforce and the rise of sedentary work means that some workers are at a higher risk for musculoskeletal disorders.
- There is greater recognition that workers in industries that in the past have been considered to be "safe" for example, health care, lodging, retail and transportation, face significant hazards.
- Remote working strategies present new hazards that organizations and facility managers are not able to control; alternative strategies need to be established.
- Increased temporary and contract employment means that traditional relationships between workers and employers are shifting.

These changes in the workplace indicate that facility managers need to keep on top of the hazards that are associated with the new normal in the workplace and managing the known hazards introduced with among others IAQ and IEQ.

OSHA offers six guidelines for an effective health and safety program:

1. Know what hazards exist by collecting information about workplace hazards. Collect, organize, and review information with occupants to determine what hazards are present and which occupants may be exposed or potentially exposed.
2. Conduct ongoing inspections in the workplace for safety hazards. Collaborate with the occupants to form an inspection team. Discuss and document the hazards reported.
3. Identify and keep a list of all health hazards including chemical, physical, biological and ergonomic risk factors.

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4. When an incident occurs, conduct an incident investigation. A clear plan and procedure should be developed so that the investigation can occur immediately after the incident occurs.
    - Collaborate with the occupants to conduct the investigations. Make sure the team is trained.
    - Investigate close calls and or near incidents if they have been brought to your attention.
    - Identify and analyze root causes to address the issues that allowed the incidents to occur.
    - Communicate the results of the investigation with occupants and other stakeholders to prevent recurrence.
5. Identify those hazards associated with emergency and non-routine situations.
    - Include any foreseeable emergency scenarios and non-routine tasks. Scenarios that may be foreseeable include fires and explosions, chemical releases, hazardous material spills, start-ups after planned or unplanned equipment shutdowns, and non-routine tasks, such as infrequently performed maintenance activities. For example, a machine catching on fire in the workplace or a natural disaster in the vicinity of the workplace, such as an earthquake or tornado.
6. Characterize the nature of identified hazards, identify interim control measures, and prioritize the hazards for control:
    - Consider the severity of potential outcomes. Rank the issues by the likelihood that an event or exposure will occur and the number of occupants who might be exposed.
    - Use interim control measures to protect occupants until more permanent solutions can be implemented.

PHYSICAL HAZARDS

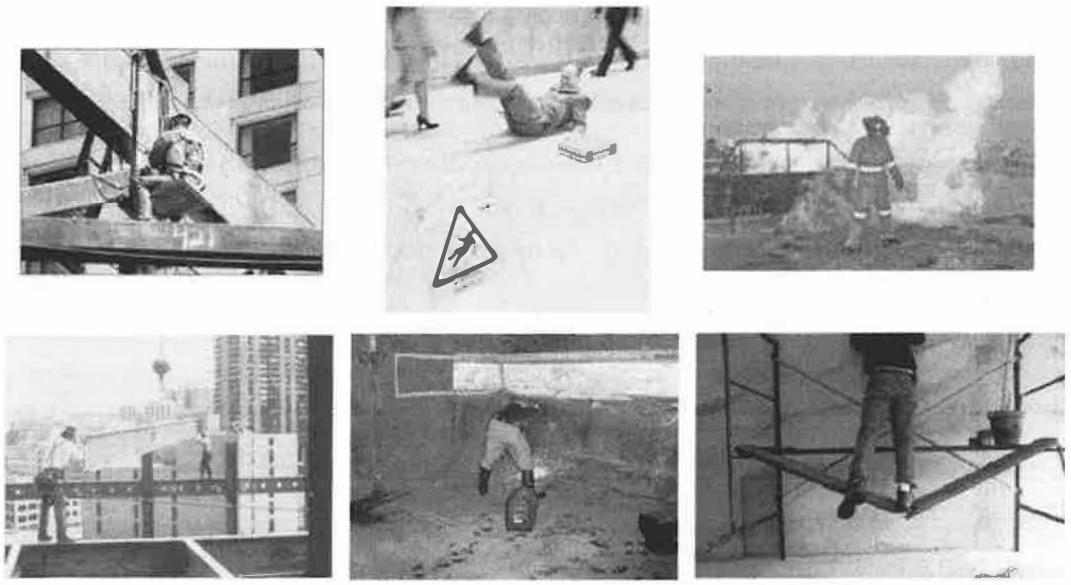

Figure 12 Example of Physical Hazards

ISO 45001

ISO 45001 Occupational health and safety management systems – Requirements with guidance for use has its foundation in OHSAS 18001 an international standard originating in Britain which was the first published recommended practices for health and safety in 1988 and issued the first update in October 2016. In that revision, OHSAS stated that much had changed over the preceding 28 years regarding the nature of work, the conditions in the workplace, employees themselves and how employers and employees interact and work together to be productive in a safe and healthy environment.

Developed to incorporate the Plan-Do-Check-Act (PDCA) model, ISO 45001 provides a framework for an organization to:

Plan – Implement standards in line with ISO standards to prevent possible workplace injuries and put processes in place.

Do – Be determined to enforce the processes.

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Check – Review the processes and efficiency thereof regularly.

Act – Correct problems and continually review and improve the organization's management system.

The benefits of this voluntary management system standard include the ability to apply ISO 45001 to all organizations. It is designed to be integrated into an organization's exiting management process regardless of size, industry or nature of the business.

ISO 45001 enables organizations to implement an occupational health and safety (OH&S) management system. This will help them manage their OH&S risks and improve their health and safety performance by developing and implementing effective policies and objectives.

Key potential benefits of using these standards include:

- Reduction of workplace incidents
- Reduced absenteeism and staff turnover, leading to increased productivity
- Reduced cost of insurance premiums
- Creation of a health and safety culture, whereby employees are encouraged to take an active role in their own OH&S
- Reinforced leadership commitment to proactively improve OH&S performance
- Ability to meet legal and regulatory requirements
- Enhanced reputation
- Improved staff morale

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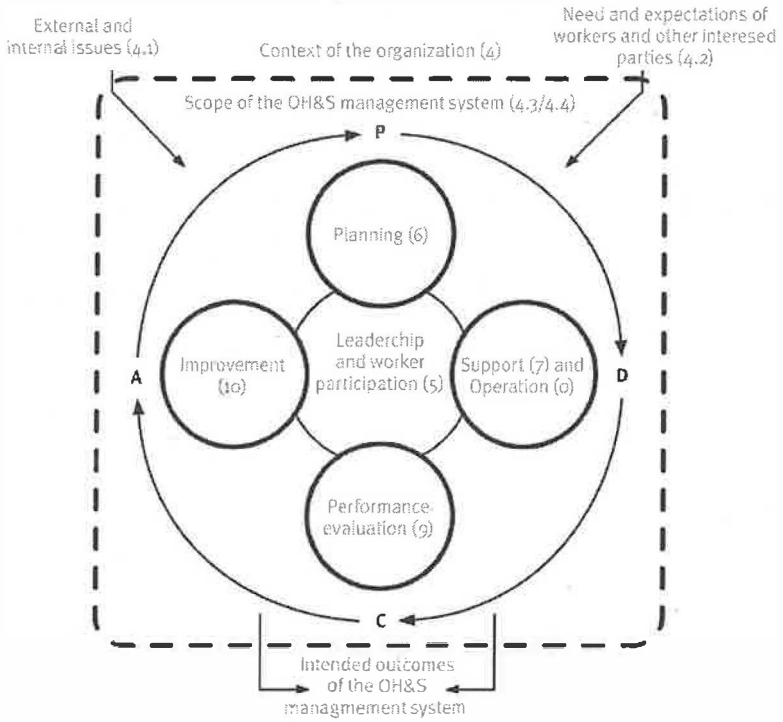

Figure 13 The PDCA cycle in ISO 45001

ISO 22301

Information Technology (IT) took the lead in contingency planning and disaster recovery in the 1990s and was instrumental in developing plans to deal with potential disruptions due to Y2K. Business Continuity Management (BCM) grew out of the recognition of there being different types or forms of disruption. Governments and regulators recognized the role of businesses in mitigating the effects of disruptive incidences on society and worked to gain assurance that business continuity plans were in place.

Companies recognized their dependence on each other and established agreements between key suppliers and partners to provide products and services in the event of a disruption. These efforts resulted in several national standards coming together to address the need for a recognized standard for BCM. The standards originated from Australia, Singapore, the UK, and the U.S. ISO 22301 Security and resilience – Business continuity management systems – Requirements, is the result of global interest and cooperation. This standard specifies the requirements for:

- Implementing, maintaining and improving a management system
- Reducing the likelihood of disruptions

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- Preparing for and responding to disruptions
- Recovering from disruptions when they arise

FM cannot control natural disasters or other business disruptions but plays a key role in responding to them, starting with building a BCM program. Business continuity planning is vital to the organization's response to an incident that disrupts business operations. Whether it is a short-term disruption or a long-term disruption, like we experienced with the global pandemic in 2020, maintaining business functions is crucial to organization survival. ISO 22301 offers guidance in:

- Operational resilience
- Emergency planning and preparedness
- Crisis management
- Disaster recovery
- Supply chain security
- Planning for the loss of critical resources

For more information on risk management and business continuity, please refer to IFMA's Risk Management course.

Emergency Response

The facility manager is responsible for emergency preparedness and response to an emergency. The voluntary ISO 45001 and ISO 22301 standards require an organization to establish, implement and maintain processes that are needed to prepare for and respond to potential emergency situations. Included in these processes are:

- Establishing a planned response to emergency situations that includes procedures for all relevant hazards.
- Providing training for the internal emergency response team and occupants on emergency response procedures.
- Periodic testing and exercising the planned responses, such as conducting an evacuation or shelter in place drills or tabletop exercises.
- Evaluate performance during drills and exercises as it relates to the planned response.
- Communicate and provide the relevant information needed to occupants and stakeholders, contractors or visitors in the building, government authorities, as appropriate, as well as the community, as appropriate.

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- Recognize the needs and capabilities of all members of the emergency response team and interested parties, ensuring their involvement as appropriate in the development of the planned response.

All these items should be documented as part of the processes.

An emergency response team is a group of trained individuals who respond to emergency incidents of various types. In some organizations, the term incident response team may be substituted. These teams require a high level of specialized skills training and commitment to meeting the objectives of the site emergency plan.

A crucial part of any emergency response plan is a ready workforce. Regular training and exercises will help build the long-term culture change you need to be successful. The goal for emergency response training and exercises is to create the muscle memory for people to know what to do and where to go during an emergency. Not only does training prepare us to better respond in an emergency, but it is required by law. OSHA requires all U.S. employers to create and train on their emergency action plans (OSHA 29 CFR 1910.38).

Planning

From a facility manager perspective, an emergency plan should:

1. Identify those mission-critical systems that must be kept running. Mission-critical systems include both national and regional codes and standards that address the minimal requirements for:
    - Emergency power & lights
    - Water
    - HVAC
    - Fire
    - Fuel storage
    - Communication systems
2. Have a list of regular occupants of the building, both visitors and contractors. Obtain their contact details and ensure that they are up to date. Create a process that allows for the easy identification of individuals.
3. Have a list of equipment and/or other property that needs to be moved out of harm's way.
4. Include checklists for every action the facilities team and or emergency response team needs to take during the emergency, for example, a checklist that ensures occupants are accounted for at the assembly point.

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The emergency plan should be communicated to all workers. This includes workers at a location not under direct control of the organization, such as mobile workers or workers who travel to perform work related activities at other sites. (*Beard, et al. (2017)*)

Training

The facility manager should identify the necessary training for the emergency response teams. The training should include, at a minimum, first aid and cardiopulmonary resuscitation (CPR). These training programs expire within a two-year time frame. A record must be kept in place and the team's training must be kept current. The team must be trained in all the documented procedures for emergency response, such as evacuation drills. Scenario-based drills should be included as part of the training. FEMA is a good reference for scenario-based training.

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Vehicle	Length	Training Use
Seminars • Use lecture, slide presentation, panel discussion. • Feature limited learner interaction, perhaps question/answer • Will accommodate larger groups	One to two hours	Create awareness of concepts and benefits of emergency preparedness and business continuity. Overview concepts, plans, policies and procedures. Ensure uniform message.
Workshops • Aim at increased participant interaction. • Focused on defined output, such as new process, specific problem solution and lists of risk scenarios • Can be larger groups with small group breakouts.	Two to four hours	Share perspectives and expertise to create consensus and/or develop solutions. Build teamwork. Test Ideas.
Tabletop exercises • Leaders can implement responses in a scenario according to plan. In advanced exercises, additional information and/or challenges are introduced throughout the exercise. • Smaller or breakout groups are used. • Do not occur in real time but are usually held around a conference table. • Discussion is encouraged. • No actual occupants or resources are involved.	Four to eight hours	Validate plans and specific procedures. Identify participants understanding of concepts Exercise decision-making skills. Motivate. Change attitudes.

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Vehicle	Length	Training Use
Games • Competitive structure is used. • Direction of play is driven by player decisions. • Players receive immediate feedback. • Stress can be stimulated by shortening decision times.	Two to five hours	Practice decision making, including group decision making. Improve understanding of complex processes and outcomes. Build teamwork.
Drills • Focus is on one operation. • Leaders and occupants perform actions in real time on site. • Feedback is provided.	Two to four hours	Validate single operation, such as facility evacuation or response to chemical spill. Assess reaction times. Familiarize participants with actual experience.
Functional exercises • Leaders respond to hypothetical incident (with complications) in real time. • Occupant involvement and use of resources is simulated.	Half day to several days	Validate capabilities and coordination of functions. Exercise leaders of emergency response functions.
Full-scale exercises • All leaders, functions, occupants participate in real time on site. • Simulated threat is presented, often with additional complications. • Participants respond as they would in actual situation. • Actual resources are used.	At least one day	Validate all elements of plans: • Interfunctional coordination. • Adequacy of resources, preparation, training.

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Performance Evaluation

The facility manager should have a process in place for monitoring, measuring, analyzing and evaluating the effectiveness of the emergency plan. The metrics included here are safety and security metrics. This is not the same as the annual performance review. These are measures that demonstrate the intended outcomes of the safety and security system have successfully been achieved.

Note: Performance evaluation is discussed in the Performance and Quality module.

The following elements need to be monitored and measured:

1. Any legal requirement and other regulatory requirements that are applicable; activities and operations that are related to the identified hazards, risks, and opportunities; progress towards achievement of the organization's occupational health and safety objectives; and the effectiveness of operational and other controls.
2. Any equipment, as applicable, to ensure valid results. An example of this may be a fire extinguisher or oxygen tank that may have expiration limits.
3. The competence of those addressing the emergency, such as those employees who are on the emergency response teams.
4. The effectiveness of emergency training particularly in "high risk" areas, including vendors.
5. Corporate policy and procedures as they relate to the safety and security measures in place for an emergency.
6. Safety and security key performance indicators as defined by the organization.

Evaluating Compliance

The organization should have a process for evaluating compliance. OH&S falls under the responsibility of the facility manager, the safety officer or risk management. The frequency and methods for evaluating compliance must be established and actioned as required. Knowledge and understanding of the compliance status with legal requirements and other

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requirements need to be current. Evaluation should be documented and kept in accordance with the retention policies of the regulatory body for example, OSHA and the demand organization.

Internal Audits

Internal audits and inspections help to provide assurance that facilities are following laws and regulations, organizational policies and OH&S standards. The organization will conduct internal audits on whether the OH&S system conforms to the organization's requirements for their OH&S management system, the OH&S policy and OH&S objectives.

The responsibility for planning and conducting internal audits and inspections for an organization's full range of operations is a significant responsibility. Sufficient resources and enough time need to be allocated to the process. See Figure 14 for a sample of the ISO 45001 – Internal Audit Checklist.

INSERT COMPANY NAME/LOGO HERE

ISO 45001:2018 – Occupational Health and Safety Management System – The Internal Audit Checklist

This checklist is based on the information provided in the ISO 45001 2018 international standard. The checklist is best used by trained and practicing auditors to evaluate or assess Occupational Health and Safety Management Systems (OHSMS) requirements based on the standard. You will see questions on the checklist that refer to the standard and for each clause provisions are made for additional questions.

The auditors are expected to keep in mind that the standard does not requires mandatory procedures for the various OHSMS processes; however, the auditors will expect documented information to be available because in the clauses of the standard, the phrase such as 'documented procedures' is used to specify that a process, a method, a system, a work instruction, or an arrangement be documented.

The auditors must use a great deal of discretion and therefore must be careful and thoughtful prior to establishing a deficiency against a requirement. Evidence for visible top management leadership, commitment and quality management action must be looked for.

The bold numbers and titles used in the first two columns of the checklist indicate the "Requirements" and may be referred to on nonconformity reports prepared by the auditor.

During assessment of each requirement, auditors record the status of the evaluation by indicating in the right-hand column a

Yes - for Acceptable Condition or No - for Deficient Condition

—	OCCUPATIONAL HEALTH and SAFETY MANAGEMENT SYSTEM	OBSERVATIONS / COMMENTS	STATUS
4	CONTEXT OF THE ORGANIZATION		
4.1	Understanding the organization and its context		
	As an organization, does your company determine external and internal issues that are relevant to your purpose?		
	Do you consider the relevant issues that affect your ability to achieve the intended outcomes of the OH&S Management System (OHSMS)?		

ISO / FDIS - Audit conducted by _____ Date _____ to _____ Copyright © ISO 45001Store Page 1 of 43

Figure 14 for the ISO 45001 – Internal Audit Checklist

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Audits are covered in detail in the Performance and Quality Course.

Continual Improvement

Continual improvement involves implementing a process that continues to review actions, it identifies and prioritizes areas of improvement and ensures that plans are in place to appropriately address non-conformities. Assessment is a tool that enables constant improvement of services to the organization.

The FM assessment model starts out with what is called a gap analysis. The gap analysis defines the current state, the desired state, the gap between those states, and solutions to close the gap. This analysis is conducted for each of the Critical Success Factors (CSF) and is improved with involvement from both the facility manager and from the demand organization.

The management approach to the continual improvement is described below:

- **Plan:** Determine and assess OH&S risks and opportunities to deliver results in accordance with the demand organizations OH&S policy.
- **Do:** Implement the processes as planned.
- **Check:** Monitor and measure activities and processes about the OH&S objectives and report the results.
- **Act:** Act to continually improve the OH&S performance to achieve the intended outcomes.

Note: More about the Plan-Do-Check-Act process can be found in the Performance and Quality Course.

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Lesson 3: Strategies to Increase Safety and Security

Lesson 3: Objective

On completion of this lesson, you will be able to:

- Define strategies to increase occupant safety and security.

Safety and Security Committees

The safety and security process is institutionalized through the creation of loss management committees. These committees are composed of representatives from management and workers. They may be created within departments or may be cross-functional.

In some countries, these committees may play a statutory role under state and municipal law. They are referred to as joint loss management committees, and they are required to review incidents and workers' compensation claims for the purpose of making workplace conditions safer.

Safety committees can support safety programs in several ways. They can:

- Assess workplace risks and conduct workplace inspections/tours.
- Review new equipment, processes, or projects for potential safety implications.
- Develop or review and endorse safety policies and work rules. This can include integrating new safety policies into construction and maintenance procedures.
- Implement training and review its effectiveness. They can organize annual safety training events to refresh the safety message to all occupants and work with Human Resources to ensure that new employees have received all the necessary training.
- Investigate safety-related complaints.
- Investigate workplace accidents and report on the adequacy of prevention and mitigation tactics.
- Coordinate with insurance inspectors and law enforcement to ensure that vital evidence is not destroyed or tampered with during the cleanup process.
- Provide a point of contact between management and occupants on the issue of safety and security.

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- Monitor facility conditions for safety and security and propose changes.

Identify Risks

Facility managers work with cross-functional teams to identify internal and external risks from nature, humans and technology. Some of the same techniques can be used to identify safety and security risks, such as interviewing managers and supervisors, conducting focus groups with work groups and conducting surveys.

In addition, FM should consider:

- Working with human resources to analyze accident reports and claims for workers' compensation to identify patterns of problems and key sources of risk.
- Collaborating with the organization's safety and security officers or departments to develop effective risk treatment strategies, or responses to risks.
- Arranging for an insurer to conduct a workplace needs assessment. Insurers may provide online tools to assess risk.
- Conducting safety/security walk-through tours of the facility.
- Observing occupants and facility technicians at work.
- Compiling a list of all hazardous materials used in the facility and the storage locations.

The Risk Management competency discusses the process of risk management planning, including identifying risks of various sorts that could cause injury to people, damage the facility or harm the organization's business.

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Lesson 4: Create a Facility Safety Strategy

Lesson 4: Objectives

On completion of this lesson, you will be able to:

- State why signage is important.

Plan a Facility Safety Strategy

When planning facility strategies to ensure and promote safety, facility managers should include representatives who will be directly affected by the proposed programs. They can help make programs reality based, assist in identifying requirements needed to implement these ideas and gain credibility for the programs with their intended audiences.

The facility's safety strategy should approach the topic from a variety of tactical directions:

- Policies and work rules are used to communicate expectations to occupants and staff. To be effective, they must be supported through consistent and continuous management action.
- Prevention aims at identifying hazards and then removing or avoiding causes of accidents through actions such as, identifying proper work process, training and education, safety inspections and audits.
- Mitigation can reduce the likelihood of an accident or reduce the severity of its impact through preparation. Examples of these tactics are listed in Table 8.

Policies and work rules	• Including safety priorities in descriptions of roles and responsibilities and using these expectations to assess performance. • Creation of safety committees and processes for investigating issues and recommending solutions. • Commitment to funding training and equipment and making them available to employees. • Disciplinary procedure for negligent or non-compliant behaviors. • Protection from management or co-worker retaliation for reporting unsafe conditions or practices. • Requirements for the use of personal protective equipment (PPE), such as breathing masks or protective eyewear. • Safe work method statements, descriptions of how to perform a specific process or operate a piece of equipment.

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	• Requiring managers and supervisors to report "near misses" so that potential problems can be identified and corrected. • Work dress rules prohibiting clothing or jewelry that could become entangled in equipment. • Cautions that must be taken when using certain equipment or hazardous materials. • Documentation of accidents, safety audits and completion of training for example, accident logs, site inspection checklists. • Reporting to outside agencies to comply with laws and regulations. • Compliance with inspections by outside agencies.
Prevention	• Assessment of risks and hazards for example, job hazard analysis or job safety analysis. • Training, for example, how to lift heavy objects, how to turn off electricity, steam or fuel before repair and maintenance jobs. "Toolbox talks" bring brief training events on specific topics to the workplace floor. Free meeting agendas and materials can be downloaded from different sites. • Regular inspection of safety devices on operating equipment. • Replacement of dangerous equipment. • Substitution of nontoxic materials for hazardous materials where possible. • Barricades and signage in multiple languages, if necessary, for example, to mark slippery floors or risk from falling objects or electrical lines. • Appropriate lighting levels.
Mitigation	• Organization and training of an incident management team, including team and occupant exercises for example, facility evacuations under different conditions. • Root cause analysis and corrective action following incidents. • First aid supplies and training. • Eye-washing stations and safety showers. • On-site information about materials used for example, Safety Data Sheets and binders. • Training about accident response. • Signage with quick, clear instructions.

Table 8 Examples of Safety-Oriented Tactics

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The safety strategy must include:

- Plans for auditing compliance with policies and work rules, including required intervals for audits and tools used to assess compliance.
- Appropriate measures identified that can be used to evaluate the strategy's effectiveness after a defined period of time.
- Measures that reflect the organization's unique risks and concerns and are quantifiable, such as a decrease in workers' compensation claims or a certain level of compliance scores on audits.

Implement a Facility Safety Strategy

Effective implementation of safety programs depends on the quality of communication and the degree to which occupants and staff are engaged in the organization's safety goals.

A new safety strategy merits a full communication campaign. The campaign can address issues, such as:

- The best timing and vehicle for introducing the program.

  Consider:

  - Can the safety initiative be combined with an annual or quarterly meeting?
  - Will a special edition of a tenant newsletter be read?
  - Would a series of short newsletter/Website articles or e-mails be more effective than a full launch?
- Management support.

  Consider:

  - Would video messages from senior management be effective with this audience?
  - Could senior managers attend group meetings to endorse the program?
- Receiving feedback from occupants and staff.

  Consider:

  - How can a feedback channel ensure anonymity to those reporting safety infractions?
- Avoiding message fatigue.

Consider:

- At what point will occupants and staff cease to hear the message?
- How can the message be modified? For example, regular safety messages in facility newsletters could be kept fresh by alternating safety stories with statistics, tips and new information.

Training and Promoting Behavior Changes

Training programs, whether developed in-house or purchased from external sources, must be assessed for effectiveness and appropriateness for the intended audiences. Programs should differentiate between needs for knowledge about environmental health and safety and needs to perform specific tasks. They should include some form of testing to document completion and understanding of the training and competency achieved, as applicable. The strategy must also address:

- How the training of new hires can be accomplished after the delivery of initial training to current occupants and staff.
- How to handle changes in conditions or equipment that affect safety procedures covered in training.
- When and how to refresh knowledge through retraining.

Incentives for adopting safe behaviors is a tricky issue. Organizations that have rewarded groups based on decreases in the number of reported accidents have found that reports of decreases can be bogus – occupants and supervisors simply don't report accidents and falsify the data in order to receive the incentives. It is essential to reward steps taken to promote or practice safety rather than accident report rates. For example, rewards might be given based on:

- Department scores on safety training tests.
- Evidence of new safety issues that have been identified and corrected.
- Observations of good compliance with safety policies and work rules.

Incident Investigations

One of the possible functions of safety committees is to investigate incidents to determine possible causes. Any incident involving a fatality, serious injury, or damage to property, equipment or the environment should be carefully investigated to ensure that their causes are correctly identified and fully understood. Then the appropriate corrective action can be

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taken. A thorough investigation should and resulting corrective action should also mitigate liability in future accidents.

Incident Investigation Process Diagram
Prepare Determine: • Who conducts and participates in investigation • What incidents to investigate • What information to collect • Prepare investigation kit • Create investigation and interview forms • Document investigation procedures • Select and train investigators
Incident Occurs
Enact • Arrange for first aid or medical treatment of injured person(s) • Secure the scene • Identify and gather witnesses • Retrieve investigation kit • Interview injured worker and witnesses • Document scene with photos or videos • Collect information
Analyze • Review documentation • Identify causal factors (root causes) using the "Why" method • Determine corrective actions • Prepare report • Communicate report
Correct • Implement corrective actions • Track completion of corrective actions • Share information with others • Critique process for continuous improvement

Table 9 Incident Investigation Process

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Safety and Third Parties

Ensuring safety in the facility when third parties, such as contractors and visitors, are involved is a challenge for facility managers, who must ensure that these parties know and comply with the facility's policies and rules. In addition to a responsibility to protect facility property and occupants' safety, the facility manager shares a responsibility to ensure the safety of the work crew.

To ensure the safety of occupants, facility property and the contractors, facility managers should consider:

- Ensuring that safety records and employee safety training are criteria in selecting contractors and that records are checked. Facility managers should note whether the practice of pre-qualifying contractors and subcontractors for their safety training and records is legally permitted in their areas.
- Including review and compliance with facility policies and procedures in the contractors' scope of work. These statements should describe the facility's expectations, work rules and conditions, including but not limited to permits required, existence of potential hazards, requirements for worker drug testing.
- Providing contractors with safe work method statements and perhaps testing their understanding. Some facilities require all visitors to view a brief safety training video or complete a quiz.
- Requiring work permits for hazardous work for example, confined entry, hot work. Permits would require inspections of work areas for compliance with facility safety guidelines.
- Reviewing a list of chemicals used by contractors and requesting substitutions, if possible, for problematic materials. Ensure that material safety data sheets and appropriate emergency response supplies are available at the work site.
- Ensuring that the contractor has plans in place to protect occupants from the effects of the work and to maintain indoor environmental quality.
- Including contractors in emergency drills. They should be aware of the location of alarm systems and the facility's emergency procedures.
- Auditing performance during projects to ensure compliance with the scope-of-work statement and the facility's safety policies. These audits should be included in records to guide future contracting decisions.

Since contractors may subcontract to other entities, facility managers must ensure that they are aware of these relationships and that subcontractors are held to the same expectations and requirements.

Providing necessary safety information to visitors is a challenge and requires understanding how visitors interact with the facility – where they go, whether they are escorted, how often

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they visit and how long typical visits last. Training and communication strategies can include having visitors complete a brief safety lesson and quiz on their first visit, repeating it annually perhaps. Floor wardens could be assigned to review evacuation routes and procedures with long-term visitors. Special training of these occupants may also be required in especially challenging environments, such as chemical plants.

Evaluate and Implement Corrective Action

After every event, the adequacy of the facility's safety measures and response should be assessed, gaps identified and plans drafted to address the shortcomings.

Safety measures should be verified periodically for their effectiveness and the tests and results documented.

Annually, perhaps in conjunction with the review of the facility's emergency management plans, the facility manager should review facility safety policies and processes, identify opportunities for improvement and respond accordingly. If a facility safety committee is in place, those members should be involved in reviewing data and discussing possible improvements.

The safety committee should review:

- Data such as the number of accident reports filed and workers' compensation, or on-the-job injury claims submitted.
- Inspection reports, both internal and external.
- Accident reports, including insurer reports.
- "Near miss" reports.
- Post-incident reports. The safety committee may conduct incident debriefings, or discussions. These meetings focus on whether response protocols were followed completely and correctly.
- Safety training records of completion for visitor, new hire and refresher training.
- Post-training testing data that would indicate the degree of effectiveness of safety training.
- Changes in facility conditions or operations that may affect safety.
- Changes in incident response team members for example, ensure communication of changes, training of new members.
- Changed or new regulatory requirements that must be transposed into the organization's policies, procedures and work rules – as well as responsibilities for tracking regulations to identify changes.

The Safety Committee should recommend corrective or preventive action.

- Corrective Action – avoid incident reoccurrence
- Preventive Action – identify potential incidents and put process in place to avoid them.

Signage

Signage is an element of wayfinding; or assisting a user to navigate through a physical space. Visual clues are placed to orient a user, to help them find the appropriate route, confirm the route and get them to their desired destination. Consider the building map signage required by fire code in many jurisdictions. The map helps the user quickly identify where he or she is and which direction to turn to exit, the next sign confirms the route until the user reaches the emergency exit.

Signage need not be complicated. It needs to be designed for quick communication. For example, in an emergency, every second counts when approaching a hospital facility with multiple entrances and parking lots. A large, lighted, bright red EMERGENCY sign provides immediate guidance to the destination.

Another example is cautionary signage utilized at machinery. A sign that says WARNING in large, bold letters carries a message that an occupant will understand.

Experienced facility managers recognize the value of planning and auditing signage from multiple perspectives, bringing occupant evaluation and feedback into their signage planning processes. All signage must follow signage codes, regulations and requirements.

Safety signs are used to communicate important messages to employees, on-site contractors and visitors.

The international colors for signage are:

Red:

- reserved for danger signs and labels
- signifies a hazard
- OSHA states red should be used to identify fire protection equipment and apparatus

Orange:

- alerts to the fact that there is dangerous parts of machinery or equipment
- usually placed directly on the machinery, but can be wall signs

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Yellow:

- Where caution needs to be taken, specifically physical hazards such as tripping, falling, hearing damage or any common type of hazard

Green:

- Safety related and means there is no danger present
- Used for first aid signage or exit signs

Blue:

- Informative signage about a specific area
- This signage does not have to be safety related such as property policies
- Blue is used for depicting mandatory actions by the employee and notice signs

Magenta and Yellow:

- Magenta text on a yellow background is used for radioactive materials or equipment the produces radiation

Black and White:

- For guiding traffic and providing direction
- Can be used for housekeeping information in the facility
- While not specifically safety related, can improve the facility safety

The following ten categories of signs ensure that the facility has the most relevant safety signs displayed in the proper locations, are meeting OSHA regulations, and are clearly communicating the intended messages.

Exit/Evacuation Signs:

In the U.S., OSHA requires visible emergency response exit and evacuation routes. Any doorway or passage along routes that could be confused for an exit must indicate its actual use.

Every authorized exit sign must be either constantly illuminated by a reliable light source or be sufficiently self-luminating by use of photo-luminescent materials and be of distinctive color. These signs should be placed in every location where the direction of travel may not be obvious. Each sign must have the word "Exit" in plainly legible letters not less than six inches high or less than three-fourths of an inch wide.

Fire Signs:

OSHA requires signs that indicate the location of fire extinguishers and fire hose cabinets, so that they are readily accessible in case of an emergency. Walkthroughs will ensure that all necessary signs are present and can be conspicuously identified.

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- Electrical Arc Flash Hazard Signs:

  OSHA requires signs that indicate high voltage areas to provide sufficient access and working space be maintained around energized electric equipment.

  For Example:

  - Danger-High Voltage: identifies high voltage areas.
  - Danger-Battery Charging Area: identifies areas in which batteries are charging. A newly revised NFPA standard, NFPA 70E-2012, mandates that arc flash labels be placed on all electrical equipment, including switchboards, panel boards, meter socket enclosures and motor control centers that would require maintenance while energized.

  These labels must contain:

  - Nominal System Voltage
  - Arc Flash Boundary

  One of the following:

    - Available incident energy and corresponding working distance
    - Minimum arc rating of clothing
    - Required level of PPE.

- First Aid Signs:

  OSHA requires that first aid supplies be identified and readily available in case of a medical emergency.

  For Example:

  - Eye Wash: identifies areas that offer first aid solutions for instances when eyes may be contaminated by foreign materials or substances.
  - Safety Showers: identifies areas that offer first aid solutions for instances when the body comes in contact with hazardous chemicals.
  - AED: identifies the location of Automated External Defibrillator in case of an emergency.
  - First Aid Stations: indicates stations that provide care or treatments before regular medical aid can be obtained.

- Flammable/Combustible Signs:

  OSHA requires conspicuous warning labels be placed on containers and areas that contain flammable or combustible liquids, vapors or materials.

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For Example:

- Danger – No Smoking, No Open Flames, No Sparks: identifies areas where precautions should be taken against ignition of flammable vapors and hydrogen gas.
- Flammable – Keep Fire Away identifies areas that could result in materials combusting due to flammable reaction.

- Personal Protection Signs:

  Personal Protective Equipment (PPE) must be provided and used when a hazard capable of causing injury or impairment through physical contact, absorption or inhalation. PPE signs, symbols and accident prevention tags serve as a reminder of the requirements.

  For Example:

  - PPE Signs: include reminders about appropriate and required eye protection, hearing protection, foot protection and head protections. These reminders include messages about wearing a hardhat, face shields, eye protection and respirators.

- Hazardous Areas Signs:

  OSHA requires "Caution" accident prevention signage to warn against potential hazards and unsafe practices. Hazardous signs instruct employees of area protocol.

  For Example:

  - Biohazard Signs: used to identify equipment, rooms and materials which contain, or are contaminated with, hazardous agents.
  - Caution or Danger – Hot: helps identify areas with areas of extreme heat and danger.
  - Hazardous Waste Storage Signs: identify areas that require caution due to the storage of hazardous waste.
  - Radiation Signs: Each radiation must be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words: "Caution Radiation Area." The pictogram to be displayed is the conventional three-bladed design.

- Confined Spaces Signs:

  Warns employees of areas that require authorized permits or specific instructions for entering into a potentially hazardous confined space.

  For Example:

  - Danger – Confined Space: helps identify confined workspace areas. These confined space signs include warnings for authorized or permit entry areas. Confined space signs can also indicate specific instructions to employees for space entry.

- Machines and Equipment Signs:

  Alerts of dangerous areas in operating areas and machine use in order to warn and protect employees from hazards that could cause personal injury or equipment failure.

  For Example:

  - Operation Warnings: includes warnings of automatic start-ups, emergency shutdowns and machine guard requirements.

- Slips, Trips and Falls Signs:

  Identifies areas where there is a general need for instructions and suggestions to maintain safety in aisles, passageways, stairways and balconies of a facility.

  For Example:

  - Caution – Slippery Floor: helps warn of areas where individuals could easily slip or fall due to slippery or wet surfaces.
  - Watch Your Step: indicates areas that may have uneven or irregular floors.

Training and Promoting Behavior Change

Training programs, whether developed in house or purchased from external sources, must be assessed for effectiveness and appropriateness for the intended audiences. Programs should differentiate between needs for knowledge about environmental health and safety and must perform specific tasks. Some form of testing must be included to document completion and understanding of the training. The strategy must address:

- How the training of new hires can be accomplished after the delivery of initial training to current occupants and staff.
- How to handle changes in conditions or equipment that affect safety procedures covered in training.
- When and how to refresh knowledge through retraining.

Incentives for adopting safe behaviors can be tricky. Organizations that have rewarded groups based on decreases in the number of reported accidents have sometimes found that reports of decreases are bogus, as occupants and supervisors don't report accidents and, in that way, falsify data in order to receive the incentives. It is essential to reward steps taken to promote or practice safety rather than accident report rates. For example, rewards might be given based on:

- Department scores on safety training tests.
- Evidence of new safety issues that have been identified and corrected.

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- Observations of good compliance with safety policies and work rules.

Lesson 5: Create a Facility Security Strategy

Lesson 5: Objectives

On completion of this lesson, you will be able to:

- Create a facility security strategy.

Process for Creating a Facility Security Strategy

To create a facility security strategy, it is necessary to work through the following steps:

1. Plan a facility security strategy.
2. Implement a facility security strategy.
3. Evaluate a facility security strategy.

Ensuring facility security involves protecting both employees and the organization's assets from unlawful actions. It is critical in many facilities to know exactly who has entered the facility. This can affect complete evacuations of facilities in case of emergencies and protect occupants and assets from individuals entering the facility without authorization.

Security threats can be:

- **Internal or external** – Employees can steal from the organization and from each other. Thieves can break in and steal equipment or data. Shipments to or from the facility can be stolen in transit.
- **Minor or severe in consequence** – Losses can range from a stolen purse to assault or murder.
- **Physical or nonphysical** – Damage can include bodily harm and lost equipment and supplies; it can also take the form of stolen proprietary information for example, marketing plans and reports, or stolen customer or occupant personal data for example, credit or health data.

Depending on the organization, facility managers may be responsible for facility security or may work closely with security officers to develop and implement security strategies.

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Identify Risks

Organizational risk to occupants and assets will vary greatly, depending on the organization's business processes, physical facilities and culture. For example:

- An organization engaged in a politically or socially controversial activity may be vulnerable to physical and cyber-attacks on its property and occupants.
- High levels of traffic, including visitor traffic, may make some parts of a facility more vulnerable to theft.
- An organization marked by poor supervisory skills and practices may have higher rates of workplace harassment and violence.
- Organizations that are known to handle large amounts of high-value data can be subject to hacking and theft of organizational, employee or client data.

As with all risk assessments, identifying the most likely vulnerabilities should be a cross-functional task. Facility managers should ensure the input of various departments or units for example, finance and accounting, IT, warehousing and shipping, research and development as well as those different groups such as supervisors, office workers, line or floor workers.

The risk identification process could include:

- Walking observation tours of facility security vulnerabilities and responses. This would be enhanced by the company of a security expert.
- Security audit by the facility's insurer or a security consultant.
- Review of workers' compensation, or on-the-job injury claims, over a fixed period of time, for example, five years, to identify security-related injuries.
- Critical incident analysis. The facility manager and the security manager could review evidence from previous events to isolate common causes or patterns.
- Focus groups with occupants.
- Surveys and questionnaires.
- Benchmarking comparisons or discussions with comparable facilities.
- Discussions with local police or government officials.

Plan a Facility Security Strategy

Table 10 lists some of the tactics facilities can use to address security risks, employing policies and work rules, prevention and mitigation. Organizational culture, resources and vulnerability assessment should be considered before choosing specific strategies. For

example, intensive entrance and exit visitor screening may be appropriate for a software development or high-tech operation, but this level of screening may not be acceptable or practical at a university.

Policies and work rules	• Visitor policy for example, surrender of passport ID at security. • Encryption policies for all data leaving the facility. • Prohibitions against lending of IDs. • Enforcing employee photo ID and badge policies (badges should specify whether the visitor can be unescorted or must always be escorted. • Clearly communicated policy prohibiting occupants from – and possibly disciplining for – allowing an unauthorized individual to trail or tag along when the occupant passes through a secured entrance, also known as "piggy-backing". • Rules regarding use or removal of facility assets. • Policies targeting potential for violent behavior for example, anti-harassment, guns on premises and in cars parked in facility areas. • Document shredding and electronic communication destruction procedures. • Identifying documents as confidential or privileged. Unless documents are clearly marked as proprietary, defending ownership in court is difficult. • Confidentiality agreements with all contractors working on site or with confidential information provided by the organization. • Facility's right to search occupants, work areas and lockers. • Data privacy procedures.
Prevention	• Pre-employment (or contracting) screening. • Occupant training on theft prevention. • Employee training on data protection tactics, especially when working/discussing in public areas, for example, working on a laptop in a coffee shop or talking on a cell phone at the airport. • Training on active assailant emergency measures. • Supervisor training on preventing harassment or detecting domestic violence or worker stress. • Stress management/detection programs. • Random drug testing, when appropriate to the industry/activity and legal. • After-hours security escorts to parking areas. • For carded entrances, a system that can detect "piggy-backing"

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	and issue alarms. • Automated intrusion alert systems. • Installation of distress alarms throughout the facility. • Closed circuit video surveillance systems. • Security checks at entrances. • Security lighting at access points. • Facility or area access control via electronic IDs or biometric technologies for example, fingerprint scans or iris scans. • Scanning of all mail, packages and deliveries. • Firewalls on Internet connections, system intrusion alerts. • Document shredders at all copy/print stations.
Mitigation	• Lockable personal storage for occupants, for example, drawers, lockers. • Periodic inventories of facility assets. • Periodic financial audits on departmental level. • Use of radio frequency identification smart tags on shipments and high-value facility assets. • Employing "standoff" distances and restrictive access at facility entry points, these measures are designed to prevent unscreened vehicles from approaching a facility. • Bomb barriers and shatterproof glass at entrances.

Table 10 Examples of Security-Oriented Tactics

The facility manager must work closely with security to develop policies and procedures in this area.

Planning for Facility Security

Planning is essential in creating an effective security system. Core factors that need to be considered are:

- The type of activity to be carried out
- The surrounding environment
- The capacity of local emergency services to react
- How the flow of people and goods can be controlled and to what extent this can be achieved

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A zonal or layered approach to security allows a site to remain prepared, firstly by working to counter a threat and secondly by minimizing the consequences if a threat occurs.

This approach is divided into four key areas:

- Deter
- Detect
- Delay
- Defend
- **Deter -** Deterrence is ideal and effective when dealing with inexperienced offenders who can be dissuaded by the obvious challenges of attacking a site, for example:
  - Physical barriers
    - Gates
    - Fences
    - Walls
    - Bollards
    - Access Control with speed gates
    - Security glass
    - Barred windows
  - Psychological barriers:
    - Video and electronic surveillance
    - Alarm sensors
    - Natural surveillance – visible spaces, where there is no place to conceal unauthorized activities
    - Security lighting that cannot be tampered with
- **Detect -** If the measures applied to deter are breached, security must be alerted immediately. Alarm systems provide detection at the point of entry and CCTV cameras monitored remotely, or beam interruption, based on ultraviolet or infrared light can detect an intruder/s.

  Where authorized personnel are present, intruders can be detected through the use of a radio frequency identification (RFID) tag or facial or gait recognition technologies.
- **Delay -** An attack must be made as difficult as possible, providing staff, visitors, vendors and assistant services more time to react, respond and evacuate if necessary.

  Entrance control provides a barrier to entry or a safe escape route for occupants. Delaying options include attack-resistant windows and doors and crash barriers. Security partitions and security doors provide obstacles for intruders to overcome.

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- **Defend -** There are critical measures required to protect valuable items on a site. Layers of protection circle inwards from the perimeter. At the center of these layers is the most extensive defense solutions – safes and vaults.

  Safes and vaults have different options such as fire, explosive and diamond drill resistance. Security audits will define the level of security required.

As with any element of facility safety, communication and education play a critical role in maintaining facility security and in creating a consciousness of the need for security among occupants. Occupants should be made aware of the potential consequences of lapses in security, such as taking unencrypted sensitive information out of the facility on a laptop that is then stolen. Violations of policy must be consistently disciplined, according to policy.

If secured access systems are implemented, facility managers must ensure that occupants are provided IDs in a timely manner and are supported when problems, such as lost, damaged or deactivated ID cards, occur. A manual security process should be developed in the event of a power loss.

Facilities must decide when outside-security consultants or firms are required. Security consultants can help facility managers determine the need for security, including where, when and how much security is needed and develop effective requests for proposals from security companies.

FM must implement its own data security policies and practices. The FM network and computers must be protected from unauthorized access using firewalls and identification systems. Staff should be trained in good data practices, such as safe use of the Internet and data backup procedures. FM may consider working with IT to restrict access to certain types of Internet sites from the facility network.

Evaluate Facility Security

On a periodic basis, facility managers could measure their strategy's effectiveness according to:

- Reports of organizational committees, such as joint loss management committees, on safety and security incidents.
- Changes in rates of loss of equipment and supplies, occupant and department reports of theft or reports of workplace violence.
- Vandalism reports by FM staff.
- Communication and training events.

- Strategies should also be assessed after major losses. For example, after an embezzlement of FM funds, the facility manager should consult with an auditor to identify missing or weak controls against theft.

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Additional Considerations for Safety and Security

Facility managers cannot fulfill the responsibility to provide a safe and secure facility alone. The entire organization must be fully engaged in the safety and security of self and others. Facility managers must make safety and security part of the organization's culture to achieve any measure of success in specific initiatives.

More information about facility safety and security from an operational perspective is available in the course for the Operations and Maintenance competency.

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Chapter 4: Progress Check

1. *Select all the correct answers.* The elements of the OH&S policy should include:

   a. A commitment statement which provides safe and healthy working conditions for the prevention of work-related injury and ill health.
   b. A framework or model for setting the objectives.
   c. The procedures for reviewing the effectiveness of actions taken, including corrective and preventive action.
   d. The results of any action & corrective action, including the effectiveness.
   e. A commitment to consultation and participation of the workers.

2. *Answer True or False.* Management support is not essential to an initiative aimed at shaping the organization's culture.

   a. True
   b. False

3. *Select the correct response.* ISO 45001 focuses on:

   a. The nature of work, the conditions in the workplace, employees and how employers and employees interact and work together to be productive in a safe and healthy environment.
   b. Implementing, maintaining and improving a management system
   c. Reducing the likelihood of disruptions
   d. Preparing for and responding to disruptions
   e. Planning for the loss of critical functions

4. *Select the correct response.* In order to create a facility safety strategy, the facility manager needs work through the following steps:

   a. Document, communicate and promote a safety strategy
   b. Plan, implement and evaluate a safety strategy
   c. Identify risks, investigate and coordinate a safety strategy
   d. Monitor facility conditions for safety and security and propose changes

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5. *Select all the correct answers.* Signage is:

   a. an element of wayfinding
   b. a way of assisting a user navigate through a physical space
   c. a visual clue placed to orient a user
   d. required by fire code
   e. designed for quick communication

6. *Select the correct response.* A zonal approach to security is divided into four key areas and needs to be followed in the order of:

   a. Detect, Delay, Deter, Defend
   b. Detect, Deter, Delay, Defend
   c. Detect, Defend, Deter, Delay
   d. Deter, Detect, Delay, Defend

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Progress Check Question Answer Key

Chapter 1: The Human Factor in the Workplace

Objectives

1. a, b, d
2. b
3. a
4. a
5. a, b, c, d, e
6. b, c, d

Chapter 2: Workplace Environment

Objectives

1. a
2. c
3. e
4. a
5. a
6. b

Chapter 3: Occupant Services

Objectives

1. a
2. a, b, c, d
3. a
4. a

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Chapter 4: Creating a Safe and Secure Workplace

Objectives

1. a, b, c, e
2. b
3. a
4. b
5. a, b, c, d, e
6. d

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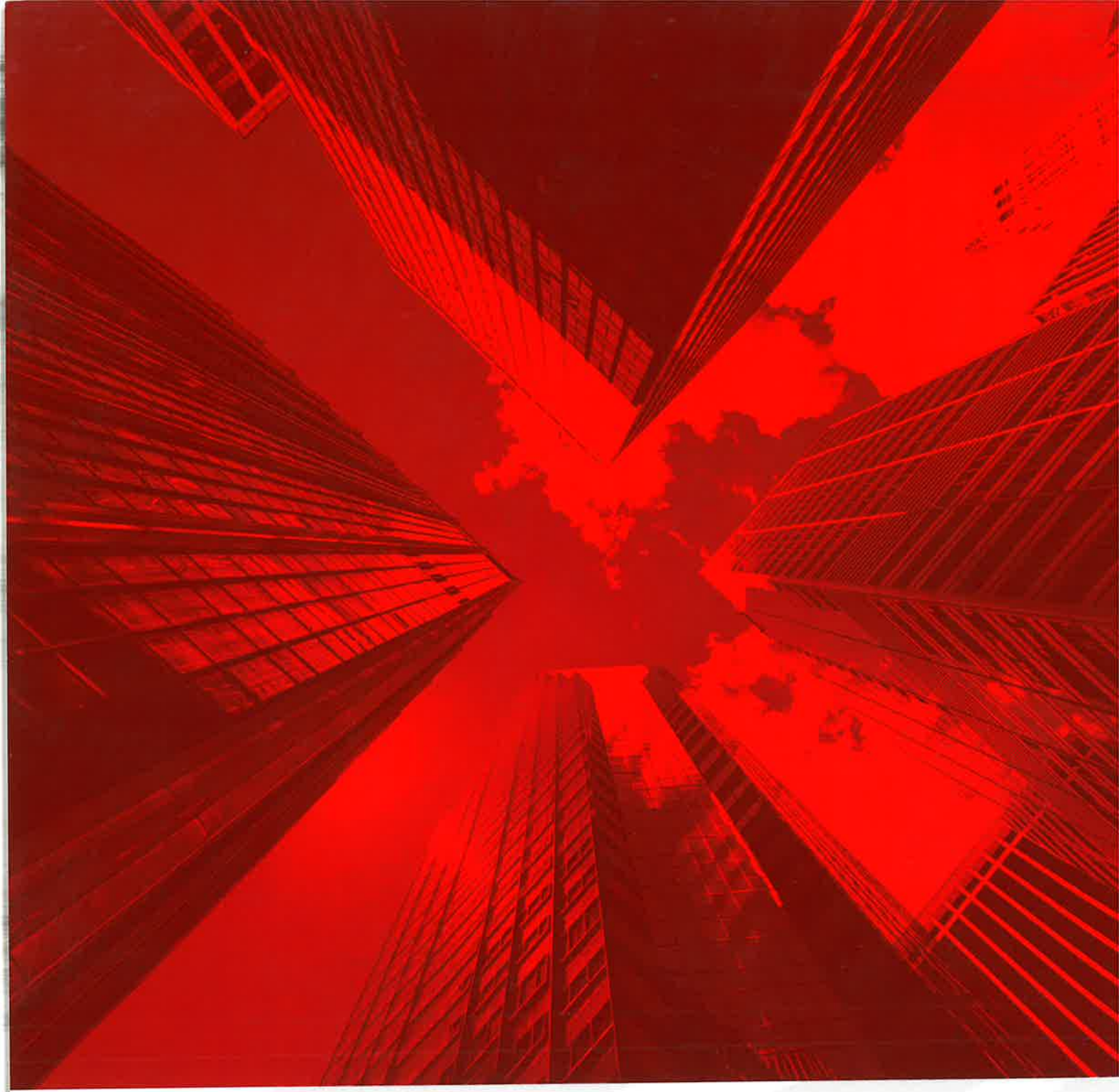

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