

Technology and the Workplace of the Future

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1. Introduction

The IFMA Foundation recently published a book, edited by Diane Coles, entitled “Work on the Move: Driving Strategy and Change in Workplaces.” This paper, based on the book, focuses on the technology component of the book. It is divided into three sections: a general description of the book and how it treats technology; existing and emerging technologies available to the facility manager; and some examples of how these technologies impact the workplace.

2. The Book

This book focuses on helping the “boots on the ground” facility managers (FMs), from around the globe, in large, mid-sized and small organizations prepare for the future of work. The book examines the forces driving workplace change and its effects on FMs. It provides tools to show FMs how to take the driver’s seat, become more strategic, and lead change in the workplace. The book is scalable and relates to FMs managing office workspace whether they are single or multiple sites.

The authors are well-known workplace strategy experts from around the world. The book provides practical tools for FMs to develop workplace strategy from beyond an “idea” to analyzing the benefits to implementation and measurement and it includes innovative, forward thinking case studies from around the globe.

Topics that are addressed include:

- ◆ Forces driving workplace change
- ◆ Evolution of the office
- ◆ Workplace Strategy – What it is, why it’s important to take the lead
- ◆ Space planning in an uncertain environment
- ◆ Leadership development for the 21st century
- ◆ Change management as a core FM competency
- ◆ Projected impacts on the FM profession
- ◆ The role of technology in the workplace

Sustainability is a way-of-life for most companies. With the emphasis on the triple bottom line -- people, planet and profit -- becoming more popular, this topic is woven throughout the book and addressed in the case studies.

The Role of Technology in “Work on the Move”

Technology is changing where and how we work. Innovation is changing how we look at facility management, creating new means to enhance corporate agility and flexibility, enabling increased control over facility-related processes and reducing building costs. This book focuses on how technology is changing the way people work in the office and elsewhere and how facility managers can support new ways of working by utilizing new technologies. Technological innovation is not only facilitating change but is also resulting in changing work patterns. Included are discussions about:

- ◆ Business Intelligence tools used to develop workplace strategy

- Real Estate Portfolio management
- Space Management
- CAFM & IWMS
- Sensor Technology & RFID
- BIM
- ◆ Technology and the “Virtual Workplace”
 - Extending the enterprise
 - Connecting work at home and third places
 - Augmented reality and the future
- ◆ The tools that holds people together
 - Video-conferencing
 - Automated space planning
 - Mobility technology
 - Wayfinding

3. The Technologies

The technology landscape is changing. Traditional technologies such as CAFM are being augmented by a variety of newer aspects of IT technologies that support the virtual workplace including:

- **New Devices**
New generations of personal/mobile devices are becoming available. Simplicity, ease of use and high level user interaction are key aspects of these technologies. Devices are expected to be personalized further.
- **Network connectivity**
Networking technologies are diversifying to meet different connectivity needs¹. Network connectivity is not only moving towards a ubiquitous service, but the increase in bandwidth (the ability to transport large volumes of data) is enabling new types of applications.
- **New Applications and Data**
Applications are gradually allowing people to work location independent by being available on the Internet. New types of applications are emerging that shape the virtual workplace for its users. Social networking tools, tools to share and exchange information and collaborate, the emergence of services to store data on the Internet as well as specific applications for specific functions are now available². The way applications can be acquired and installed is simplified, further lowering thresholds to using them. The driver for much of this is the availability of Cloud Services³.

The following is a brief description of traditional and emerging technologies available to the facility manager.

CAFM / IWMS / CMMS Systems

These are the administration/information (both graphic and attribute) management systems, dedicated to supporting facility disciplines. These types of systems may have different labels, but they are commonly referred to as CAFM (Computer Aided Facility Management) or IWMS (Integrated Workplace Management Systems⁴). For maintenance, the term CMMS (Computer aided Maintenance Management) is used.

Building Automation Systems (BAS)

¹ Examples: G and 4G networks, Wifi, and mesh networking.

² E.g., Google Apps, Microsoft-online, salesforce.com, Wikipedia, Asana, BIM application stores for smart-phone apps etc.

³ Those services available through computer networks (e.g., the internet) rather than from a local computer.

⁴ By Gartner (www.gartner.com)

A key component in building infrastructures are Building Automation Systems (BAS). Building Automation Systems are primarily concerned with controlling the building's systems for climate control (heating, cooling, air composition: HVAC), lighting, and safety (fire alarms). BAS are primarily involved in energy management and control assets.

Building Information Modeling (BIM)

Building Information Modeling (BIM) Systems basically provide a powerful collaborative virtual modeling environment for the design, construction and engineering of buildings. They allow users to create three dimensional digital representations of physical and functional characteristics of a facility. A BIM integrated 3D model can access all pertinent graphic and non-graphic data about a facility as an integrated model. It not only contains information about depicting the 2D and 3D geometry of the building's elements but the types of topological relationships that exist between elements. Thus if a user makes a change in one view, it is automatically reflected in all views.

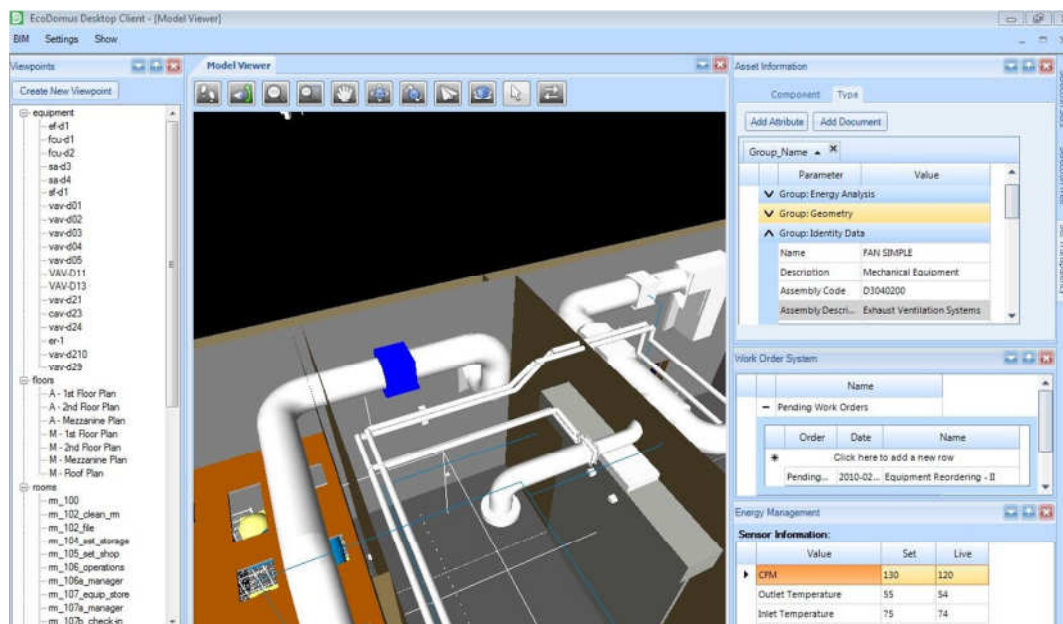


Figure 1: BIM model depicting assets data (courtesy of EcoDomus)

Geographic Information Systems (GIS)

A GIS is a system of hardware and software used for storage, retrieval, mapping, and analysis of geographic data.⁵ Spatial features are stored in a coordinate system (latitude/longitude, state plane, UTM, etc.), which references a unique location on the earth. Descriptive attributes in tabular form are associated with spatial features. Spatial data and associated attributes in the same coordinate system can then be layered together for mapping and spatial analysis. GIS differs from CAD and other graphical computer applications in that all spatial data is geographically referenced to a map projection in an earth coordinate system. For the most part, spatial data can be "re-projected" from one coordinate system into another, thus data from various sources can be brought together into a common database and integrated using GIS software.

⁵ See <http://www.nwgis.com>

RFID – Radio Frequency Identification

RFID technologies can be used for real-time location of people and assets. They can also be used in conjunction with sensors. Sensors using RFID technology might detect air flow for energy analysis. In the health care industry, for example such technology might be used to detect radiation or hazardous materials.

The technology employs two components:

- a radio tag containing a microchip for storing data about an object and an antenna for transmitting such data and;
- a reader which provides power for the tag and then reads and processes such data.

Wireless networking

In information technology, a 'network' is defined as a series of points or nodes interconnected by communication paths. Networks can interconnect with other networks and contain sub-networks. The communication paths in a network can be either hardwired (such as exists in many offices of today) or they can be implemented wirelessly by the use of transmitters sending data and receivers providing the data to equipment and applications.

Smart infrastructures

New and emerging applications related to intelligent infrastructures include wireless networks consisting of sensors, intelligent meters, and/or switches. Such networks enable space and real estate professionals to register events around the work place, analyze them, and act upon the information they provide.

Cloud Computing / Software as a Service (SAAS)

Cloud Computing and SAAS on-demand computing denotes all types of network-based IT services that are necessary to run applications. The unique property of such services is that they run on multiple servers on the network (or the Internet) in such a way that it seems as if it were just one powerful computer that serves all users connected to the services.

4. The Workplace

Technology is changing where and how we work. Innovation is changing how we look at facility management, creating new means to enhance corporate agility and flexibility, enable increased control over facility-related processes and reduce workplace costs.

What is the definition of 'workplace' really? For FM professionals, the built workplace is paramount to their activities and a prime aspect of their focus. Obviously, we see some fundamental change occurring in the built environment.



Specifically for knowledge workers, the definition of 'workplace' is implicitly changing and will continue to do so. A new type of 'workplace' is added: the virtual workplace. A realm of applications and information to use is emerging and is effectively being used in the context of daily work.

Drivers:

Now that flexible ('hot desk') facilities emerge and the employee-to-desk ratio will probably fall well below 1:1 ratio,

defining effective space utilization is further complicated because people also tend to work externally to their offices. Furthermore, the principle of 'part time' work is either existent or emerging in a number of countries. The consequence of this is that space management professionals are being confronted with fundamental changes (variability) in the demand for workplaces. This variability emerges from various causes:

- Changing daily work patterns
People tend to work at home in the morning, avoiding traffic, and thereby coming to work later in the day, leaving early to avoid traffic, and working in the evenings at home.
- Changing weekly work patterns
People with part-time jobs tend to take Wednesday's and/or Friday's off.
- Changing monthly patterns
People leave work on holidays, preferably during children's holidays from school. An impact of this is that, during vacation periods, significant percentages of the workforce are absent.
- Changing multi-year patterns
Organizations tend to reorganize and may relocate operational units across various properties.
- Changing hiring patterns
Many organizations hire personnel for a shorter timeframe and hire temp personnel - in many cases for specialty-jobs or projects. In many cases, this leads to a situation whereby facility management professionals and sometimes human resource management (HRM) professionals do not really know how large the current workforce actually is.
- The rise of project based work, based on matrix management⁶ (i.e., cross functional) principles, requiring team members to cooperate in a timely manner.

The following are examples of FM processes directly impacted by the technologies described above.

Space Management

The world of space management is fundamentally changing. With the emergence of new work styles and office concepts to support them, new types of space are created, facilitating new patterns of collaboration and teamwork. Most existing space planning software for stacking and blocking needs to be re-evaluated in the context of a shifting paradigm away from "one person, one desk."

We have seen workplace innovation projects in which even the issue of explicit adjacency planning is abandoned and replaced by the policy that people will decide themselves with whom to sit. In these cases, space design is aimed at fostering 'accidental encounters' between staff members.

Maintenance Management

Maintenance management staff is interested in the optimal expenditure of maintenance investments, providing desired results in terms of health, safety and asset quality within the boundaries of regulatory compliance. Technologies such as mobile devices, the Internet, networks and BAS/sensors have all impacted how maintenance and asset management is practiced.

⁶ For a discussion of matrix management concepts, see http://www.managementlab.org/files/u2/pdf/classic%20innovations/Matrix_Management.pdf

Service Management

'Soft services' refer to those activities primarily related to individuals of the workforce. Examples of soft services include catering, meeting services, helpdesks, and the issuance or collecting of work related goods associated with on- or off-boarding.

Service definition, contracting / supply chain management and performance monitoring are key concerns in this field.

Sustainability

In facilities management, certification systems such as LEED, BREEAM and ENERGY STAR are aimed at benchmarking the environmental performance of buildings as they are used by organizations. Sustainability reaches out to all disciplines of facility management. Technologies such as BIM show great promise in terms of enabling facility managers to make energy related decisions early in the design process when such decisions can greatly impact energy consumption and green house gas generation.

Digital Signage

Specifically in shared (flexible) office environments, there is a need to support employees and visitors in locating work spaces. Since there is no private ownership of workspaces anymore, people need effective tools to help them find their way around the workplace. Digital signage applications help people in identifying where workspaces are available. By integration of digital signage with space management and workplace reservation systems, people can (on-site as well as remotely) check for availability and reserve facilities, thereby ensuring their availability

Managing Reserved Spaces

Perhaps the simplest use of sensor networking is to be found in no-show applications. In facilities that have reserved spaces (e.g., meeting rooms), a simple (IR) sensor is either hung or an existing one is connected with the room booking system. There exist various suppliers of platforms that manage this hardware such as security system platforms or specific vendors who specialize in the management of AV equipment for meeting rooms.

Parking: Managing Supply with Demand

Parking places share many commonalities with meeting room workspaces: they are expensive, scarce and in high demand. Reservations systems that likewise use sensor and network technologies enable spaces to be reserved for parts of the day which is particularly important for visitor spaces. As with meeting rooms, parking no-show situations occur whereby the spaces goes unused.

5. Conclusion

This paper attempts to summarize how traditional FM technologies, augmented by new developments in networks (especially the Internet), mobile devices, sensors and applications, to name a few, have impacted how and where people work. The impact of many of these emerging technologies are just beginning to impact the workplace. Although not the only force at play that is described in "Work on the Move: Driving Strategy and Change in Workplaces," it is a significant enabler of change.