

Managing Facilities with Technology



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The office/workplace is where most of us spend at least a third of our working lives. These days, with the construction of smart and green buildings, it is even more important to ensure that the workplace has an environment that offers safety, security, health, comfort and operational efficiency.

When smart facilities are well managed and maintained with industry best practices, the overall productivity of its occupants will also increase and the goal of environmental sustainability will be attained.

This is where Facilities Management (FM) plays a crucial role in meeting the ever demanding challenges to provide a sustainable built environment. To do so, we can use modern technology to complement existing FM systems.

WHAT IS FM?

Facilities Management is made up of multi-disciplined activities to ensure the built environment of a building, from which desired returns of its investment is generated through satisfactory performance of its facilities assets, by integrating the 5 strategic pillars of FM (people, process, workplace, technology and sustainable environment).

The complementary competencies to uphold these five pillars are: ^(IIFMA)

- a) Operations & Maintenance,
- b) Quality, Safety & Health Assessment,
- c) Planning & Project Management,
- d) Space Planning of Real Estate,
- e) Technology & Innovation,
- f) Human Capital & Environment,
- g) Financial & Capital Budgeting,
- h) Leadership & Stakeholder Management,
- i) Communication.

It's not just about operations and maintenance, although these are a substantial part of FM. Other non-technical competencies, such as leadership, communication, human resource management etc., are equally important to ensure the proper management of the built environment.

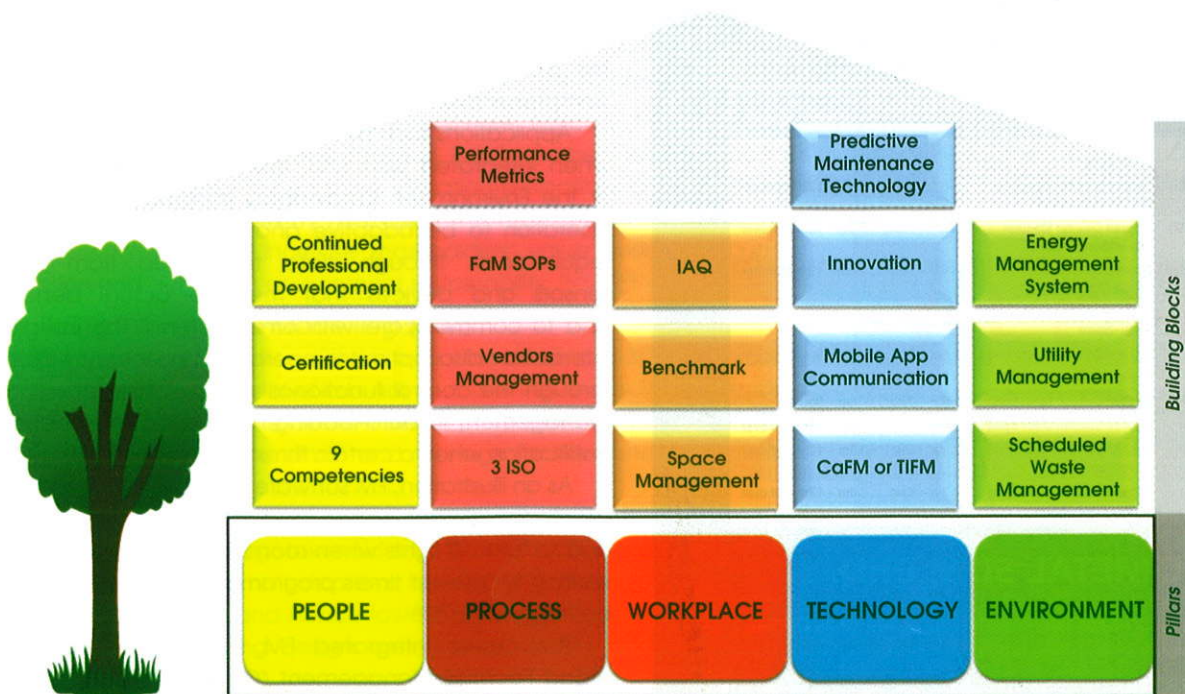


Figure 1: The Five Strategic Pillars of FM



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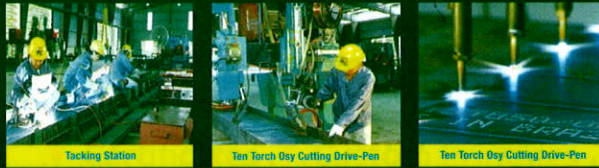
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		BUILDING WIDTH	SIDEWALL HEIGHT
Multi-Span			
(TCM1)	Tapered Column Modular One Interior Column	18m - 100m	3.5m - 12m and over
(TCM2)	Tapered Column Modular Two Interior Column	28m - 120m	3.5m - 12m and over
(TCMSS)	Tapered Column Multi - Span Single Slope	20m - 160m	3.5m - 12m and over
Clear-Span			
(SS)	Straight Column Single Slope	4.5m - 22m	3m - 9m
(LT)	Straight Column Lean To	3m - 22m	2.4m - 9m
(SCS)	Straight Column Clear Span	6m - 22m	3m - 9m
(TCS)	Tapered Column Clear Span	6m - 30m	3.5m - 12m and over
(TCS)	Tapered Column Clear Span - Two Piece Rafter	12m - 85m	3.5m - 12m and over
(TCS)	Tapered Column Clear Span - Three Piece Rafter	12m - 85m	3.5m - 12m and over

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If you look at the permutation of the 5 pillars and the nine competencies against those of active and passive building systems, as-built and in-operations, you will see that the management of these technologies, data, skill-sets, activities and information, in order to provide a clean, safe, secured, comfortable and satisfactory built environment for the occupants, is a huge challenge.

With modern smart buildings, where information and functionality of major building systems are integrated and shared over a common network to improve operational efficiency and to increase the return on investment for building owners, the challenges for FM are raised to new levels in view of wider, more varied and colossal information to be managed.

Therefore, a holistic and professional approach in smart FM is necessary.

Smart FM is the ability to utilise the integrated and huge library of digital information to plan, measure, analyse, monitor, deliver the expected service level and to present a performance dashboard. To achieve the desired results in a sustainable manner, it is important that Facilities Managers equip themselves with some new and not-so-new technologies to leverage on their technical competency and management acumen.

Here, we will discuss 2 types of facilities management technologies:

1. Facilities Management Software

Managing smart facilities is not so effective when software tools such as Computerised Maintenance Management System (CMMS), are applied as these are functional specific and have inherent limitations. Recent developments in FM software offer a complete end-to-end solution which provides rapid integration to legacy systems with Resource Planning (ERP), Customer Relation Management (CRM), Building Automation System (BAS) and others. It links the information silos and diverse applications supporting the 5 Pillars discussed earlier and physical assets into a comprehensive and seamlessly integrated solution.

Applications such as Building Operations Management, when integrated with BAS, Internet of Things (IoT) and/or the Environment Sustainability program, allow facilities operation to be adaptive and responsive to prescribed requirements through data transmitted from meters, sensors and devices that measure actual behaviour, and to communicate with other systems. This integrated interaction also optimises operations in energy efficiency through the control functionality of switching on-off, load management in auto-loading, auto-shedding and alarm notification when a certain threshold is breached.

As an illustration, FM software with IoT solutions is able to spontaneously reduce the load of air-conditioning systems and to turn off lights when rooms are vacated, instead of waiting for pre-set times programmed by the engineer, to be triggered. ^(2.Intel)

The newer integrated FM software are Computer Aided Facilities Management (CAFM) System, Integrated Workplace Management System (IWMS) and Total Infrastructure Facilities Management (TIFM) system. These



Figure 2: IoT (source: INTEL)

are able to provide enhanced facilities asset tracking and utilisation, better performance reporting via balanced scorecards or personalised dashboards using cloud technology, and to maximise the useful life of smart facilities through redeployment.

Apart from the ability to integrate the data from all facilities to improve operational effectiveness, energy and water efficiency and indoor environmental quality, smart FM software also has other added functions which promote business transformation. The much talked about business transformation solution includes:

- a) Benchmarking against industry best practices and metrics.
- b) Compliance to statutory and regulatory requirements and mitigate business risk through its supports in internal controls for life-safety and facilities protection.
- c) Quality assurance methodologies that support Six Sigma efforts, associates costs and variation with processes and measuring results, thus setting the stage for continual improvement and decision-making processes.

As more than 35% of a building facility assets are, typically, tied to the cost of real estate, infrastructure and facilities, it is incumbent on the Facilities Manager to significantly improve the utilisation of facilities and to optimise the ROI of the facility assets by minimising the total cost of ownership. The net result is to ultimately increase shareholders' value besides occupant satisfaction and achieving environment sustainability. ^(3.Archibus)

2. Building Information Modelling (BIM)

Building Information Modelling (BIM) is a tool for creating a 3D digital model which visualises every aspect of a building and which shares this information across the entire building life-cycle. It allows professionals in the construction industry to plan, design, construct and manage facilities and infrastructure more efficiently.

The advantages of BIM are many, such as increasing the accuracy of information-sharing among stakeholders in a construction project, reducing redundancies and miscommunications, identifying clashes in piping, cabling, structure, openings etc and hence lowering the cost of re-works, reducing EOT as well as improving design optimisation, quality and efficiency in remodelling.

The amount of information, data, technical specifications, dimensions and bills of quantity to build a BIM model, is so comprehensive and complete

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that it makes FM, especially maintenance and repairs of the built environment, a relatively easier task. When BIM is integrated with FM software, its usefulness is extended to the entire life-cycle of the building or infrastructure.

Though the benefits of BIM are well documented to include data and life-cycle management, its application is, at present, largely confined to construction. Generally, developers of private properties do not want to spend that little extra 0.5% or less of the project costs, to include BIM in their projects as they will not reap the benefits to the life-cycle of the facilities if they should sell their properties. Due recognition must be given to government ministries and agencies such as MOW, MOH, JKR, CIDB which not only champion the need for BIM but have also had BIM implemented in their projects.

BIM is useful even in older facilities. The benefits are the same as that for new buildings. For older buildings, BIM can be generated from the original and retrofit design drawings and, in some cases, laser scanning. It can also be used to monitor and benchmark systems, recommend retrofit opportunities, establish emergency evacuation routes and for training.

Conclusively, BIM is most effective when used in conjunction with smart buildings which involve the dynamic integration of building and information systems and the most complete picture of the status of a building is possible and accessible in real time. ^(4.Frost & Suvillan)

While there are other technologies, applications and tools which enhance the effectiveness and quality of FM delivery, the 5 Pillars (people, process, workplace, technology and environment sustainability) remain the cornerstone of FM. Managing facilities of smart buildings does not diminish the need for the 5 Pillars and FM technological tools nor does it reduce the cost of maintenance of smart facilities, but their operating expenses.

There is an increasing demand for engineers and engineering technologists with a heightened penchant for operations and maintenance, IoT, macro, micro and financial management, for the FM of smart buildings.

FM markets are huge, both locally and internationally. The Gulf Cooperation Council (GCC) of 6 Middle East nations spent an estimated US\$36.5 billion on FM in 2015, which is the equivalent of 300% of Malaysia's development budget. But there are not enough FM professionals to meet the demand of the growing market. The lack of awareness of the profession and its low stature, which does not commensurate with its professional roles and responsibilities, are what contributes to the shortage of FM professionals.

The big challenge for the industry is to grow a pool of FM professionals to maintain the smart facilities of world-class standard in a cost-effective and sustainable way lest the facilities decimate into obsolescence in double quick time. However, the reverse is true when FM professionals are equipped with FM technologies as an increase in occupants' satisfaction in the built environment will reap higher financial returns to the owners. ■

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- [1] International Facilities Management Association (IFMA) www.ifma.org
- [2] Intel Solution Brief Smart Buildings "Increasing Property Owner Profitability with the Internet of Things"
- [3] ARCHIBUS "Total Infrastructure and Facilities Management That Makes a World of Difference"
- [4] Frost and Sullivan "The Importance of BIM in Facilities Management"

Authors' Biodata

Ir. Ong Ching Loon, currently the Managing Director of Cofreth (M) Sdn. Bhd., holds a BSc Hons degree in Mechanical Engineering and a MBA from University of Bath, UK. A Professional Engineer with Practising Certificate and an ASEAN Chartered Professional Engineer, Ir. Ong is a Fellow and Vice President of the IEM.

Dr Lee Siew Teng is Senior Analyst of Strategic Management Unit in the CEO Office of Cofreth (M) Sdn. Bhd. She received her BEng (Hons.) Electrical and Electronic Engineering and PhD in Engineering from the University of Nottingham in 2008 and 2015 respectively.

IEM DIARY OF EVENTS

Title: Talk on "Grenfell Tower Fire Disaster - Lessons Learnt"

15 August 2017

Organised by : Mechanical Engineering Technical Division
 Time : 5.30 p.m. - 7.30 p.m.
 CPD/PDP : 2

Title: Technical Visit to Yakult (M) Sdn. Bhd.

19 August 2017

Organised by : Chemical Engineering Technical Division
 Time : 8.30 a.m. - 1.00 p.m.
 CPD/PDP : 4

Title: 1-Day Practical Workshop on Arbitration and Adjudication

19 August 2017

Organised by : Chemical Engineering Technical Division
 Time : 9.00 a.m. - 6.00 p.m.
 CPD/PDP : 7.5

Title: 2-Day Course on the Fundamentals Knowledge for Project Managers

21 - 22 August 2017

Organised by : Project Management Technical Division
 Time : 9.00 a.m. - 5.30 p.m.
 CPD/PDP : 15

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