

## INNOVATION IN TECHNOLOGY AND SYSTEMS

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### Winner

#### Digital FM – The New Era, Emaar Facilities Management LLC

Most people know it as the tallest human-made structure in the world, but for those in FM and property services consider the Burj Khalifa a benchmark of success in smart buildings.

At over 2,715 feet tall spanning 163 floors, the Burj Khalifa comprises 5.67 million square feet with 300,000 square feet for office space and 1.85 million square feet for residential space.

Owned by property developer Emaar Group, the Burj Khalifa is maintained Emaar Facilities Management, but specifically Emaar Asset Management (EAM) which has four core objectives:

- Optimising Opex;
- Enhancing customer service and customer satisfaction;
- Promoting excellence in FM services; and
- Educating staff and improving the work environment.

To achieve these, EAM partnered with a technology firm to develop a new maintenance methodology underpinned by the Internet of Things with knowledge of building ecosystems.

The transformation shifted traditional planned and preventative maintenance into predictive maintenance by connecting the HVAC sensors to the building's cloud platform. Data is analysed in the cloud by sophisticated algorithms and major successes include improved asset management and increased longevity, as well as reduced Opex and optimised Capex.

Major achievements include asset availability greater than 99.55 per cent and asset reliability at 95.97 per cent, as well as 15 per cent reduction in unplanned maintenance and 40 per cent in maintenance hours.

## Best practice learning points

- Set up an IoT committee with the relevant and necessary personnel to conduct a thorough feasibility analysis of what an IoT-based maintenance plan would entail and what would be required for implementation;
- Identify the major challenges of IoT implementation;
- Align the FM function's objectives with the capabilities of the tools and systems to be employed;
- Measure everything the building data provides; and
- Don't stop searching for improvements.
- Working together reduces risks when adopting technology;
- Competition among businesses can sometimes hinder progress;
- Financial savings and reduced environmental impact can be pursued simultaneously; and
- Cross-sector sharing can shift approaches to problem-solving.

## Starting position

EAM wanted to deliver safe, secure, green, comfortable and smart environment for users and sought technological innovation to do so, as well as meet increasing customer demands and improving overall satisfaction.

Attached to the above was the desire to reduce the frequency of costs and services, as well as optimise Capex and Opex.

The major challenges to overcome for success were:

- High operational and maintenance costs;
- Retrofits impacting extended areas of the building;
- Technical complexities, including operations and emergencies, due to the building's height;
- Restriction of movement and space;
- The building's high profile and mixed-use occupants.

The means of overcoming these challenges was to set up a radically new maintenance system powered by the IoT. The objectives included using the IoT to provide optimised predictive maintenance based on real-time data analytics.

The EAM team also wanted to extend asset life to optimise Capex while also focusing on boosting the user experience, simplifying operational processes and automating workflows for a wholly connected building.

Additionally, with the site having been commissioned in 2010, the digital transformation required major revamping of existing infrastructure.

## Action taken

An IoT committee was set up including members of senior management and the technical services team to conduct a feasibility analysis of the electrical and plumbing systems, and the existing maintenance regime for IoT readiness.

Time and costs, as well as risk and return analyses were also conducted.

Findings included that 80 per cent of assets were routinely maintained according to a designated plan, even if they did not need servicing while only 20 per cent of maintenance was carried out due to a degraded asset.

EAM decided to install sensors in all assets for complete data gathering.

The technology procured collated real-time field data and sent it to the cloud for analytics via smart algorithms. The physical layer or sensors sent data to a DDC controlled, which transferred it to building automation software for algorithmic analysis (analytics layer). Information included vibration, temperature, humidity and spectrographic analysis.

Finally, the portfolio integration layer connects the CAFM, SMS, mobile apps and online dashboards for up-to-date information on KPIs and tailored outputs such as building issues, comfort performance and status service work orders.

## Final position

The major gains from the project include asset availability greater than 99.55 per cent and asset reliability at 95.97 per cent, as well as cost savings with 15 per cent reduction in unplanned maintenance and 40 per cent in maintenance hours.

Other benefits of the IoT-based maintenance plan include:

- Increased operational performance with improved efficiency and maximised uptime;
- Focused attention on high-impact activities;
- Better life cycle management and predictable costs for IT compliance and system performance;
- Improved systematic reviews of operational performance to reduce critical incidents occurring;
- Informed decision-making;
- More effective maintenance at lower costs;
- Higher quality FM skills levels; and
- An integrative framework for better structuring, direction and focus of maintenance activities.

Furthermore, EAM found that implementation has brought greater protection of the owners' investment in the buildings and systems.

On a more operational level, building comfort has improved, including temperature, air quality and light levels. Waste has been reduced as have disruptions from failed equipment.

Most importantly perhaps is that costs have been reduced and environmental impact has been lessened.

After the successes, there's more to be done. EAM will continue to seek smarter algorithms and better machine learning capabilities. The Enterprise Service Bus will also bring about better management of system requirements by identifying issues, checking inventory, ordering parts and tracking deliveries and warranties.

The group also has eyes on combining advancements in 3D BIM with augmented-reality-driven fault identification to avoid errors through better root cause analysis and equipping site technicians with more accurate information.

### The judges said...

Emaar Facilities Management has used Internet of Things (IoT) technology to develop an automated maintenance regime which has improved customer service, reduced cost and optimised asset life cycle. The company has developed a system which analyses the data and automatically identifies faults as they arise, enabling the engineer to service assets more efficiently and pro-actively, and ultimately reducing cost - thus creating some real value to the operation.