



THE 20TH INTERNATIONAL OPERATIONS & MAINTENANCE
CONFERENCE IN THE ARAB COUNTRIES

Impactful FM

In megaprojects and beyond

    #OmaintecConf

An Initiative by



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OMAINTEC
20 YEARS



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Driven by 25 years of FM evolution

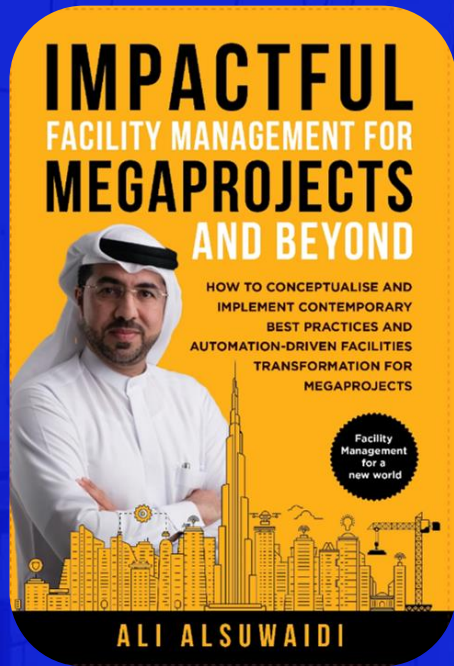


- Sr Executive Director –FM /Imdaad Group
- MEFMA Vice President
- Global FM Vice Chair
- IAAPA Board Member- Entertainment industry
- Stints at leading corporations – asset owner + service provider
 - Advisor & Consultant for various GCC government and private organizations
 - Sr Director Burj Khalifa
 - COO, Global Village
 - Dubai Parks & Resorts | SAM | Idama | Emaar | du | Etisalat



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The concept of Impactful FM



Impactful FM is my formula for the practice of Facility Management in acknowledgement of the impact it has – commercial, economic, social, environmental and more – beyond the apparent and immediately visible



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Introduction

1. Who is attending the workshop ? Short introduction
2. Which industry do you support?
3. What is FM for you ? Input vs output /Deliverables
4. How can you optimized your benefits from attending this workshop



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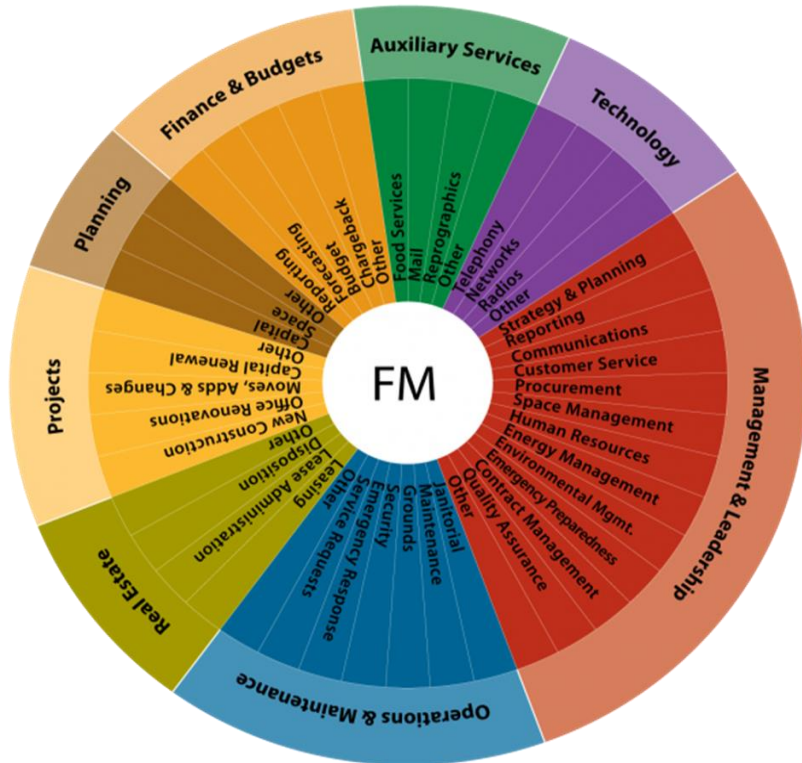
Introduction to FM

Snapshot of FM core competencies

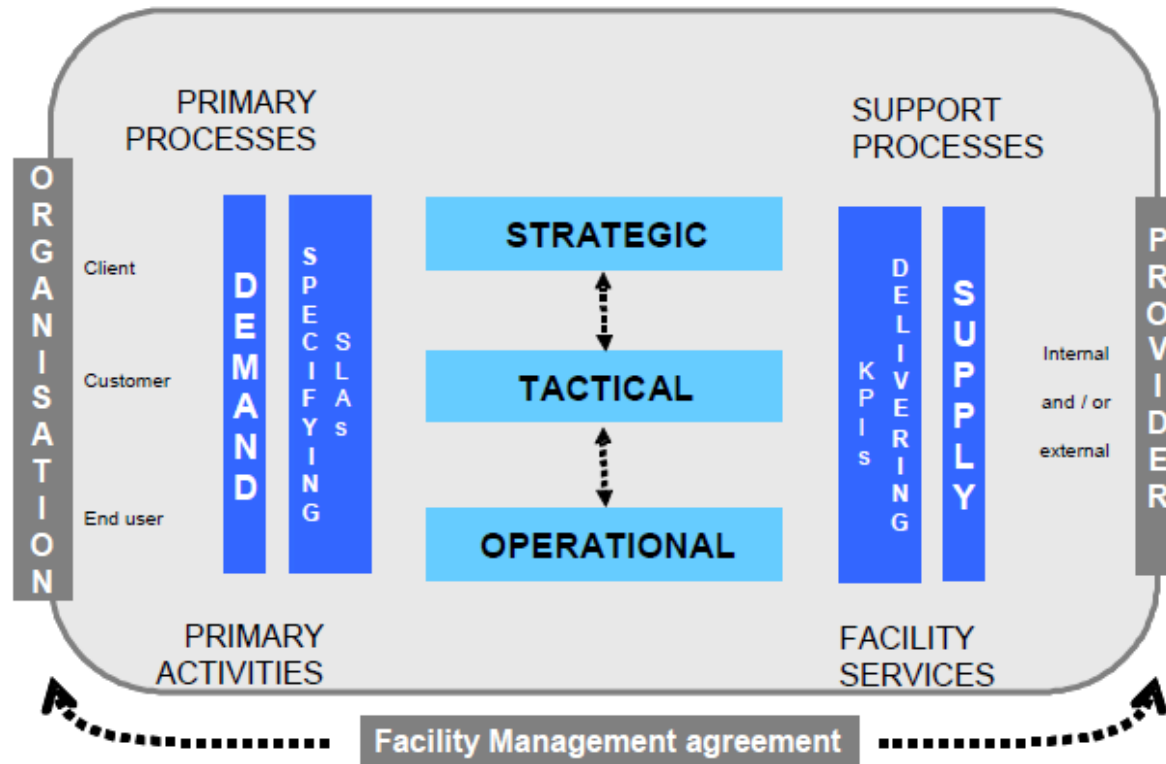
Facility management (FM) encompasses multiple disciplines to ensure functionality, comfort, safety and efficiency of the built environment by integrating people, place, process and technology.

To adapt to the **dynamics of client** requirements and **uphold our vision**, all the below 11 core competencies need to be well balanced and managed:

1. Leadership & Strategy
2. Finance & Business
3. Operations & Maintenance
4. Technology
5. Occupancy & Human Factors
6. Environment Stewardship & Sustainability
7. Emergency Preparedness & Business Continuity
8. Communication
9. Quality
10. Project Management
11. Real Estate & Planning



Introduction: the FM model of EN 15221-1





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Trends in FM



Sustainability

Energy, waste & water management
and environmental consideration



Risk management

Information security, business
continuity



Efficiency / cost control

Quality and budget control, information
& communication technology



Existing buildings

Maintenance, retrofits, energy/
water reduction



HR

Baby boomers, diversity, mobility



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What is a megaproject



Typically defined as a project that exceeds US\$1 billion in development cost



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Impactful FM and megaprojects

- Given their scale and complexity, megaprojects are the pinnacle of FM excellence
- Complex to define than with a numerical threshold
- Megaprojects are usually characterized by
 - Political sensitivity
 - Long delivery span (usually over four years which includes planning, design, and construction)
 - High complexity
 - High risks
 - Large number of internal and external project stakeholders
- In some geographies (notable example – China) most construction megaprojects are broken down into several constituent projects, which are then executed separately



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Megaproject lifecycle challenges

- Review of Total Cost of Ownership is rarely practiced
- Involvement of FM subject matter expert from design is required
- Setting up operational strategy as early as possible key to success
- Transition in various lifecycle stages lays ground for successful operational culture



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Impactful FM journey



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5. **Occupancy & Human Factors**
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7. **Emergency Preparedness & Business Continuity**
8. **Communication**
9. **Quality**
10. **Project Management**
11. **Real Estate & Planning**



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1. Long-term FM planning in megaprojects



Capital expense
Investment misalignment

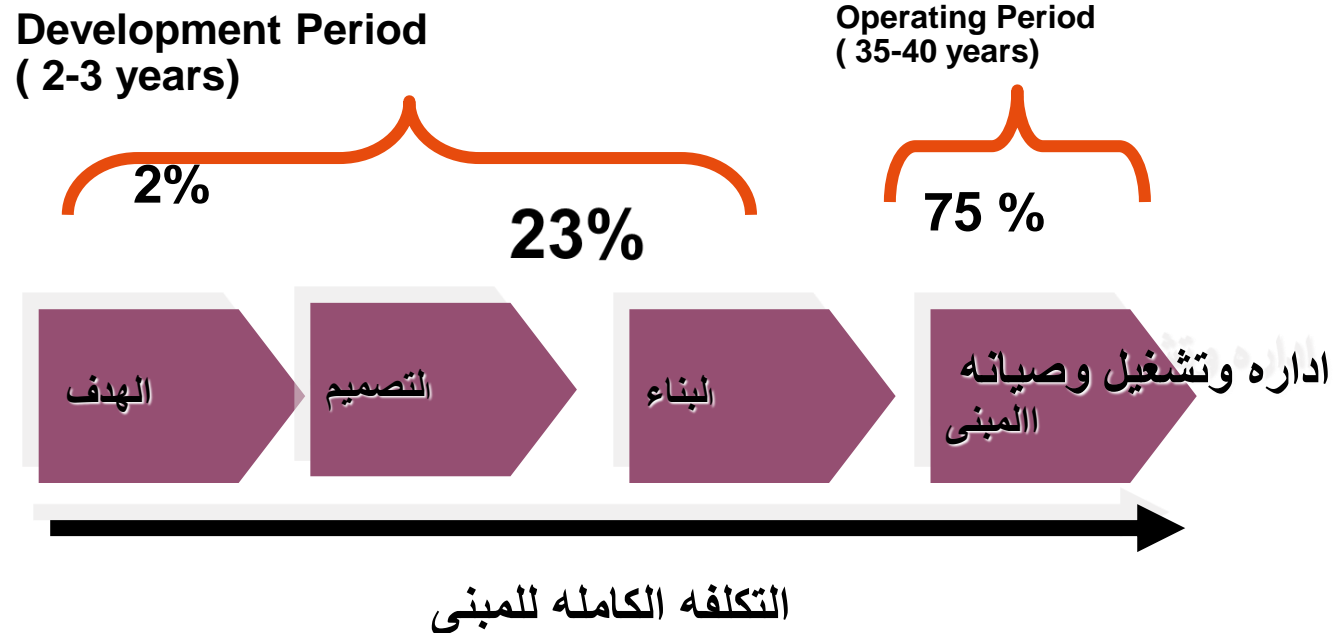


Budget
Pressure on Government operating budget



Environment
Sustainability drive

1. Long-term FM planning in megaprojects

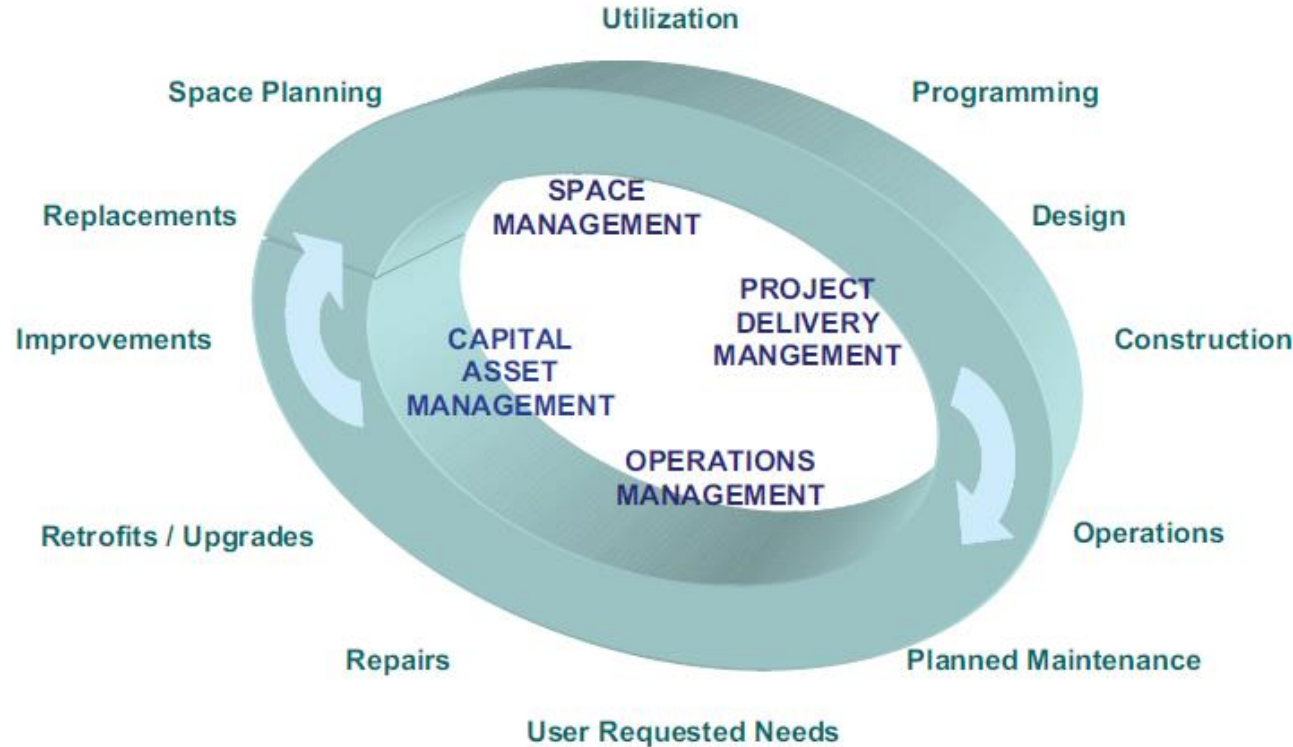


Reference ASHRAE

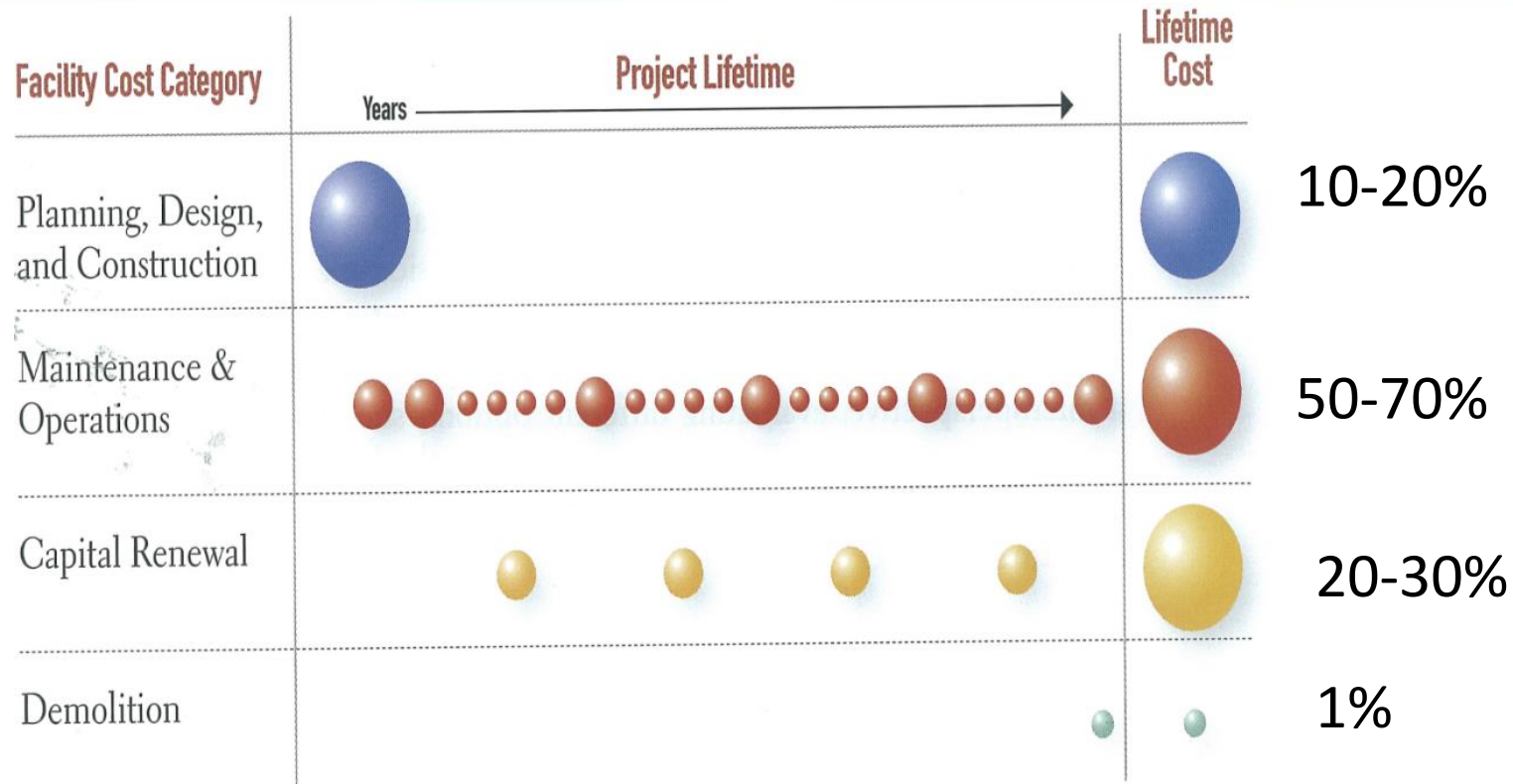


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1. Long-term FM planning in megaprojects



1. Long-term FM planning in megaprojects



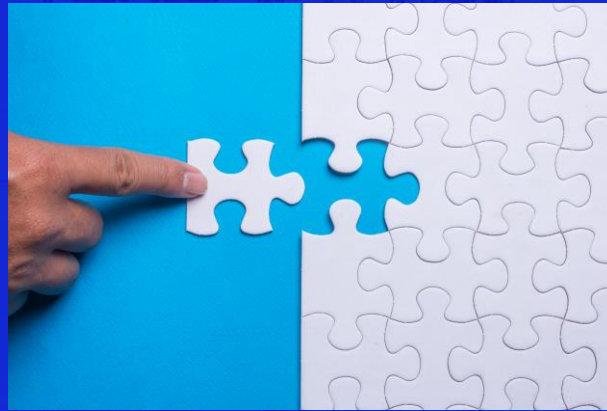


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2. Headache Management & Diagnosis Effectiveness



What is happening when you start
handover



Short-term solutions are needed



Lead by example –understand & align



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FM needs for headache management

- FM Strategy
 - Business processes and workflows
 - Operation budget and cost allocation
 - Complaint registration
 - Inventory control and tool management
 - Manpower management
- CMMS / CAFM Solution

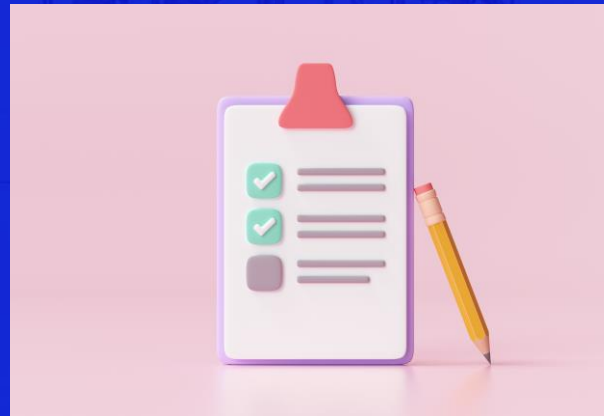


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3. Doctor's involvement, birth certificate approach - giga projects



Start right – how



Roadmap to success - PBC

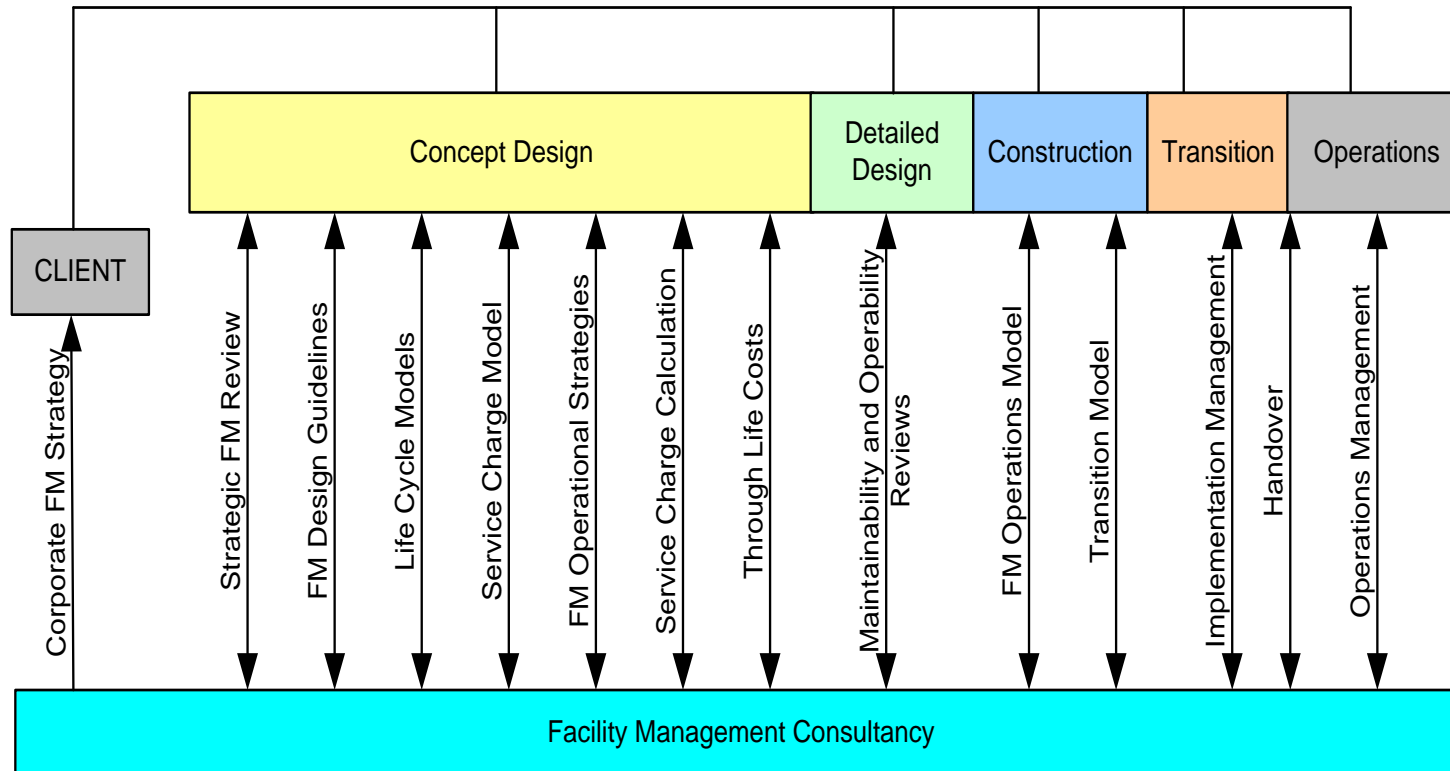


Clarity of drive - why

3. Doctor's involvement, birth certificate approach -

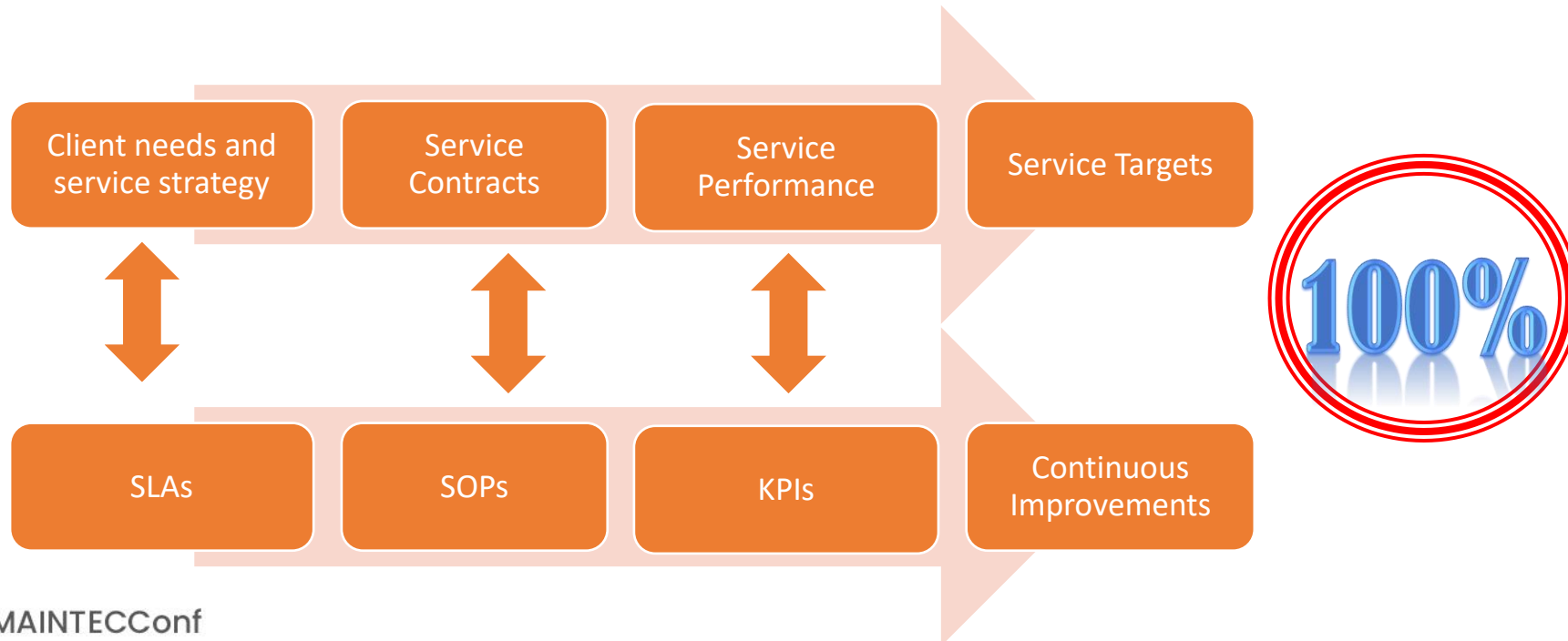


3. Doctor's involvement, birth certificate approach -



3. Doctor's involvement, birth certificate approach -

FM stakeholders roles to enhance FM industry standards





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3. Doctor's involvement, birth certificate approach -

Birth Certificate definition

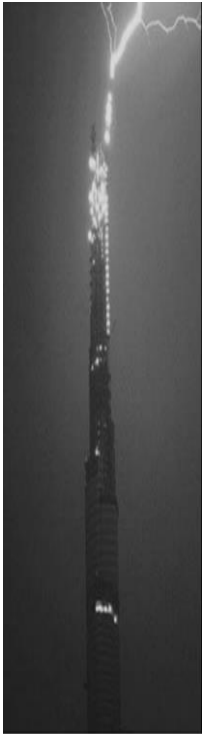
The Birth Certificate Approach [BCA] is the process of capturing all building details essential [but not limited] to managing all potential risks and ensuring all liabilities of construction stakeholders are identified...

Ali Alsuwaidi



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3. Doctor's involvement, birth certificate approach -



Birth Certificate approach

Creating Birth Certificate Approach for buildings and Facility Management value-add during transition and handover stage

- A Birth Certificate captures all essential information of a new “entity”
- A certification and documentation for use by building caretaker
- Risk is amongst the most essential detail of a building to be analyzed
 - BCA enables proactive management of risk
- Is prepared by those most intimately associated with project development
- **A powerful risk management tool**



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3. Doctor's involvement, birth certificate approach

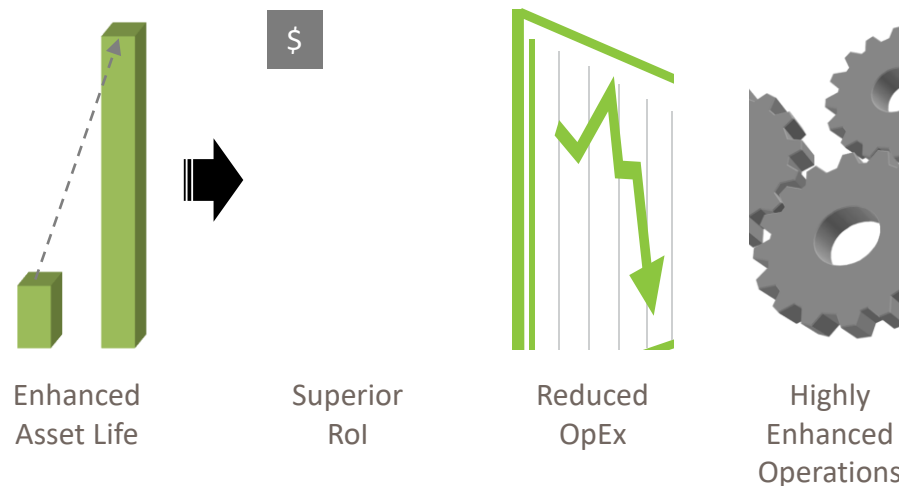
Handover and transition – getting it right

The golden handshake between the project stage and ongoing operations, transition & handover lays the foundation for long-term success...

- Ensures a smooth, hassle free process for all stakeholders – a primary success factor
- Minimizes disputes, helps with dispute resolution between developer and owner
- Buildings today are state-of-art, super high-rise – FM drives the handover
- Defines optimum levels of operation & maintenance to ensure sustainability
- Helps highlight gaps and methods to overcome gaps during construction close-out
- Has to be managed in a strategically planned, structured, process-driven manner
- Standard checklists, guidelines must – ensure transition teams implement best practice

3. Doctor's involvement, birth certificate approach FM input into design

FM related design reviews and gap analysis convert buildings from being great in form to being optimum in form & functionality





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3. Doctor's involvement, birth certificate approach

Understanding FM related design gaps

- Discussion on role of an FM consultant at design stage of a project
- Ideal situation is to have the FM consultant onboard along with the Project Design Consultant - why?
- What are FM-related design gaps



3. Doctor's involvement, birth certificate approach

Considerations for MEP Systems- risk analysis

Building System	Supertall – Unique Considerations
Chilled water, condenser water, hot water, domestic water, fire water systems	Hydraulic pressure
Supply air, exhaust air, life safety, smoke control	Shaft sizes, louvers, plant room location, stack effect
Electrical systems	Voltage drop
Lightning systems	Coordination with structure
Stack effect	Very high

3. Doctor's involvement, birth certificate approach

Key success factors in doctor involvement

Lifecycle Costing Brief – at Concept Design stage

FM Design Reviews | FM Space Requirements

Operational Brief, Strategies – at Detailed Design stage

Resolving operational limitations (risk)

Empowering the FM Consultant

Giant clock tower in holy city of Makkah

New building will be world's second tallest, after the Burj Khalifa in Dubai

Makkah Clock Tower

- ▶ Hotel operated by Fairmont
- ▶ 577 metres high
- ▶ 40 metre-clock (Five times larger than Big Ben in London, UK)
- ▶ 76 storeys
- ▶ 76 elevators
- ▶ Hotel will have 1,005 guestrooms
- ▶ Set to open: 3rd quarter 2010

Abraj Al Bait Complex:

- ▶ Seven towers, total floor space 15.6 million sq ft

Cost: 2 billion US dollars

Developer: Saudi Binladin Company

How it compares

Burj Khalifa DUBAI 828m	Makkah Clock Tower SAUDI 577m	Taipei 101 TAIWAN 508m	Shanghai World Financial Centre CHINA 492m	Petronas Towers MALAYSIA 452m	Willis Tower (ex-Sears) USA 442m
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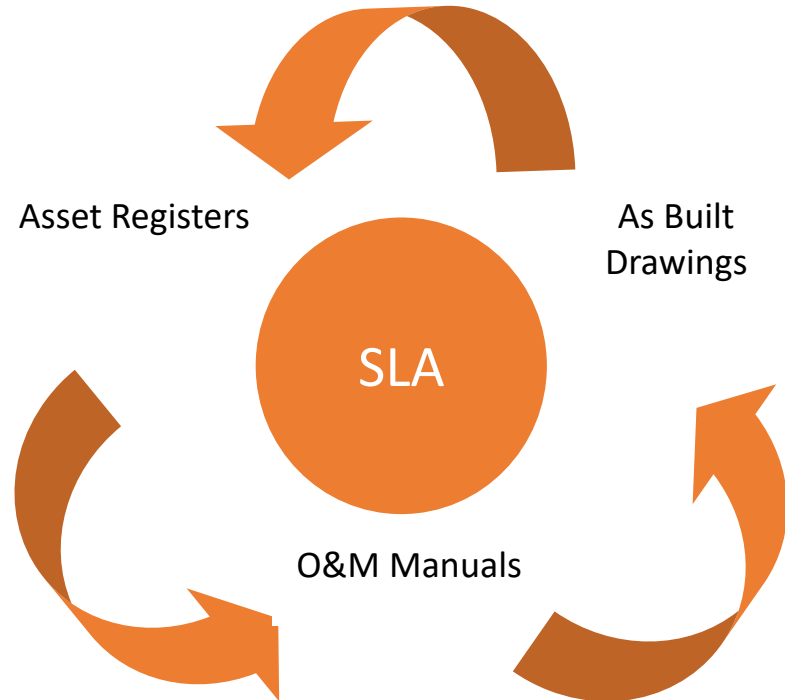
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3. Doctor's involvement, birth certificate approach

Criticality of handover resource

What it boils down to is this: a transition process, much like any other process, is only as good as the people who operate it...

3. Doctor's involvement, birth certificate approach



1. What is a transition?
 - a. How long does it extend?
2. The magic of a Responsibility Matrix
3. Integration of back-office and front-desk
4. Criticality of the SOP
5. Clear workflows a key success factor
6. Operational Dashboards – SLAs / KPIs
7. Defining training requirements



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3. Doctor's involvement, birth certificate approach

FM Manager's Communication Responsibilities During Handover

Agree who is **responsible** for the handover

Define the **contractor's liabilities**

Coordinate closure of **gaps** during DLP

Communicate what needs to be **handed over**

Define and control quality of **documentation**

Engage effectively with the **service provider**

Define and communicate all **training** needs





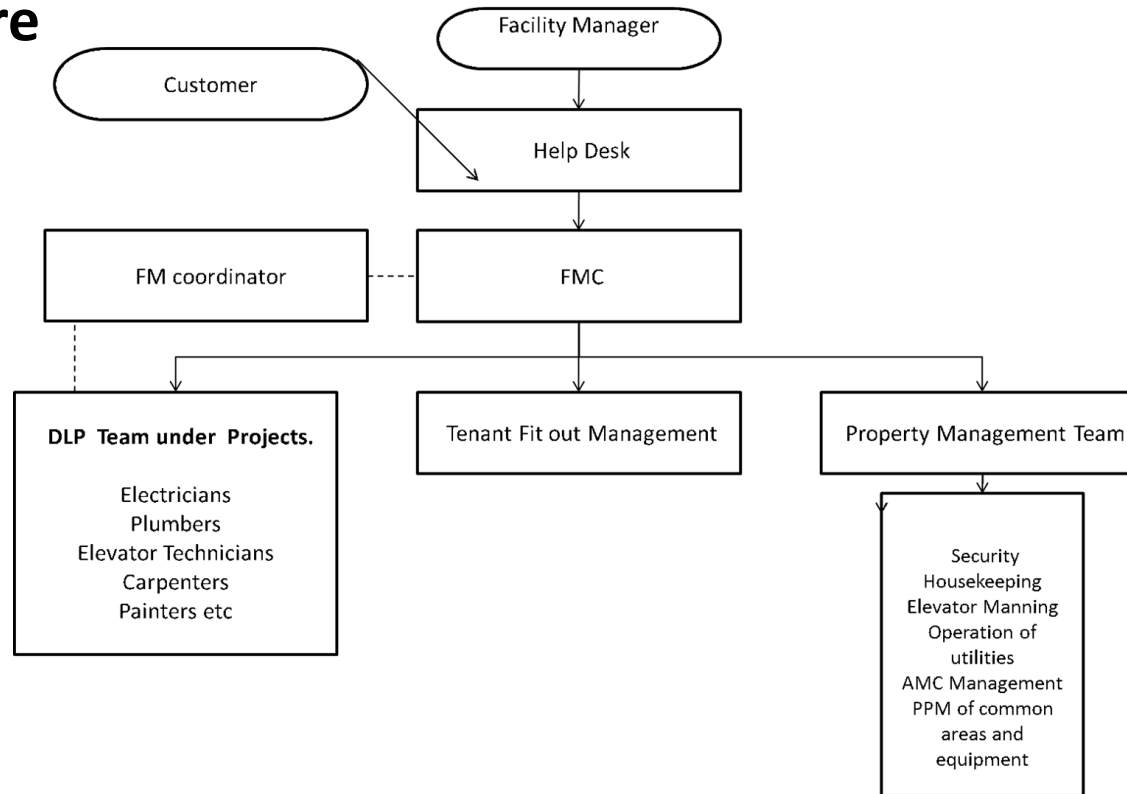
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FM FACILITIES																												
Facilities	Room Reference	Work Stations	PC / Telephone	Centralised Security System	Power - Mains	Power - 3Phase DB	Isolator	Wait Power sockets (double)	Dust / Fume Extraction	Fresh Air Ventilation	Water	Hot Water	Belfast sink	Kitchen sink and bench	Floor Drainage (water)	Oil Separator pit	Grease Pit	Water/damp proofing	Sound Proofing	Fire Protection Systems (as per code)	Emergency Lighting	Lighting	UPS / Emergency Power	Air conditioning	Statutory Signage	Fit Out		
Management Centre																												
Open Plan Office Space		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Access to Natural light	
Private Office		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Office For FM Management
Meeting Room			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Projector, IT comms, and consumables. To be sized by the architect
Toilets / Washrooms / Cleaners cupboard					<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		To be sized by the architect. Lighted cupboard. A consumables and cleaning
Security / BMS Control room - for Console operators / mobile backup		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Needs to be separate communications system and FACC. It will be reviewed when external

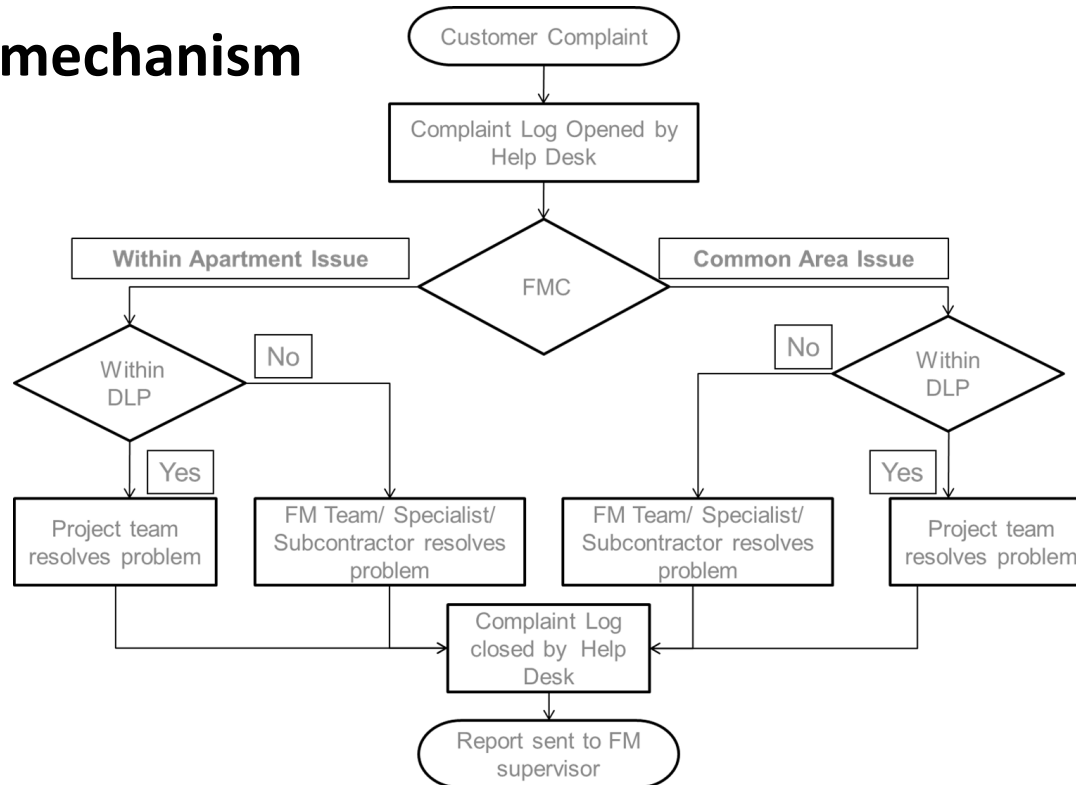
3. Doctor's involvement, birth certificate approach

Site management structure



3. Doctor's involvement, birth certificate approach

Complaint resolution mechanism





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3. Doctor's involvement, birth certificate approach

Controlled commissioning of equipment ensures that the facility goes live successfully and keeps ticking in good health

Critical to document **T&C Strategy** and sign-off on the same

Clear definition of **Roles & Responsibilities** of all parties involved

Ensuring verification of **Installation Standard** before T&C

Defining T&C role and reporting line for **third parties**

Partial T&C | Full verification

T&C for: BMS [+interface with MEP Systems], Fire Safety [with Cause & Effect], HVAC



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3. Doctor's involvement, birth certificate approach

Technology + testing & commissioning

Advantage of ELV/Technology Systems
During Transition & Handover

-  Centralized Monitoring & Control Facility
-  Time Scheduling
-  Graphical User Interface
-  System Integration
-  Alarm & Event Management
-  System Scalability
-  Data Logging
-  System Security
-  Reports and dash boards
-  Conclusion

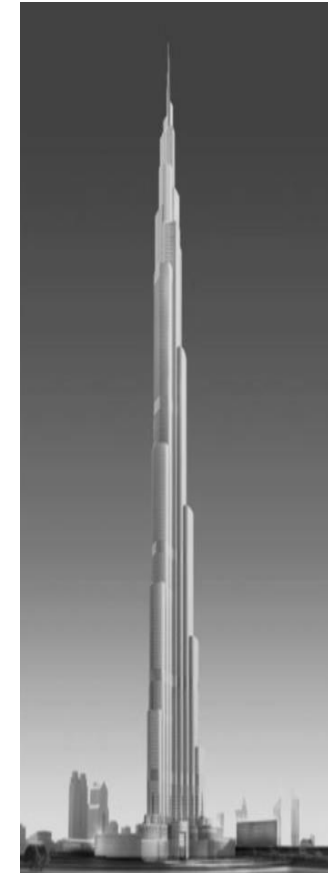


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Handover documentation

- Preparation of handover documentation strategy plays an important role in taking over a facility
- Takeover team should understand from the project team the contractual obligations of the Main Contractor and prepare handover checklists in line with contract





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3. Doctor's involvement, birth certificate approach

Critical references

As-built Drawings

Detailed Snaglists & Condition Assessments

Asset Registers

Official Documents [NOCs, Occupancy Certs.]

O&M Manuals

Cause & Effect Document – Firefighting

T&C Documents from Contractors

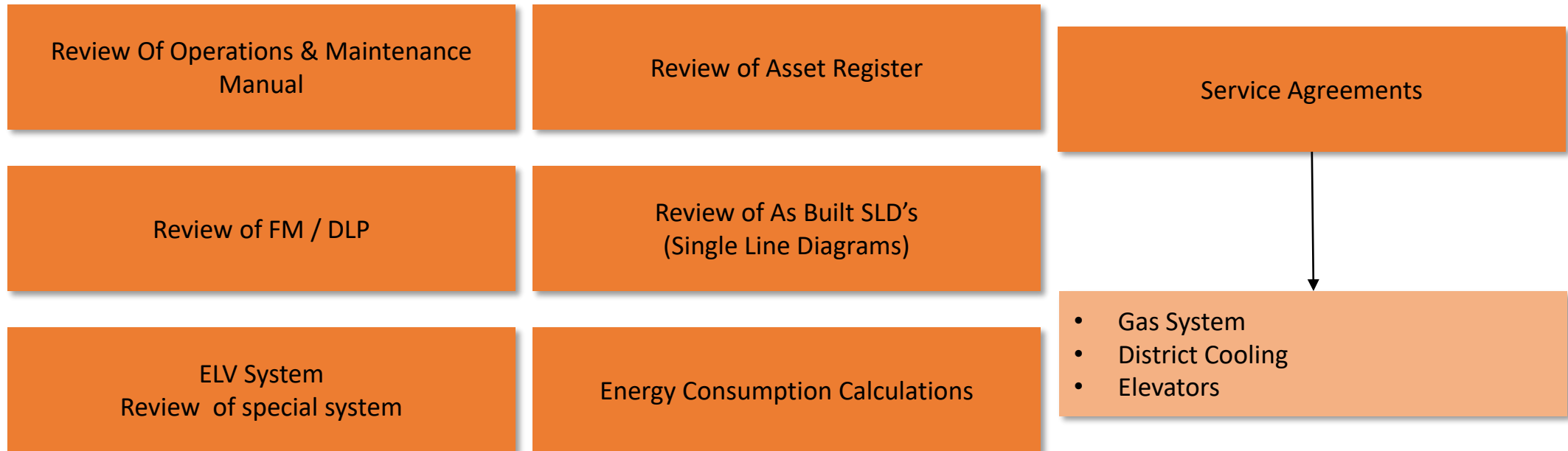
T&C Process & Reports



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3. Doctor's involvement, birth certificate approach

Operations readiness workflow process



4. Customer experience in FM as measure of success



User pain



Operator blind spot



Customer need reflection



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4. Customer experience in FM as measure of success

Guiding principles for customer experience

- Visibility is synergy
 - Act like a customer
 - Customer Journey & Experience – Peak hours
- Operations of strategy is a reflection of customer need



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5. Proactive strategy and data criticality



Roadmap to success

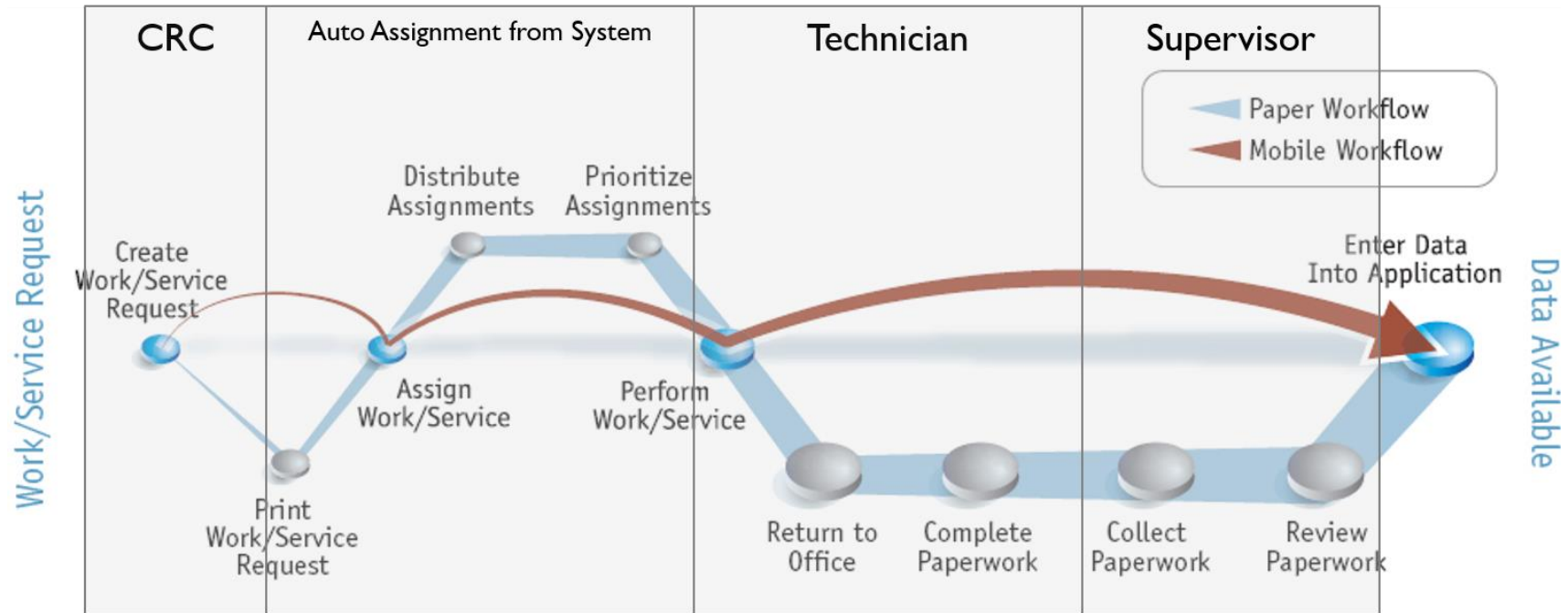


Long-term approach



Quick gain and clear diagnosis

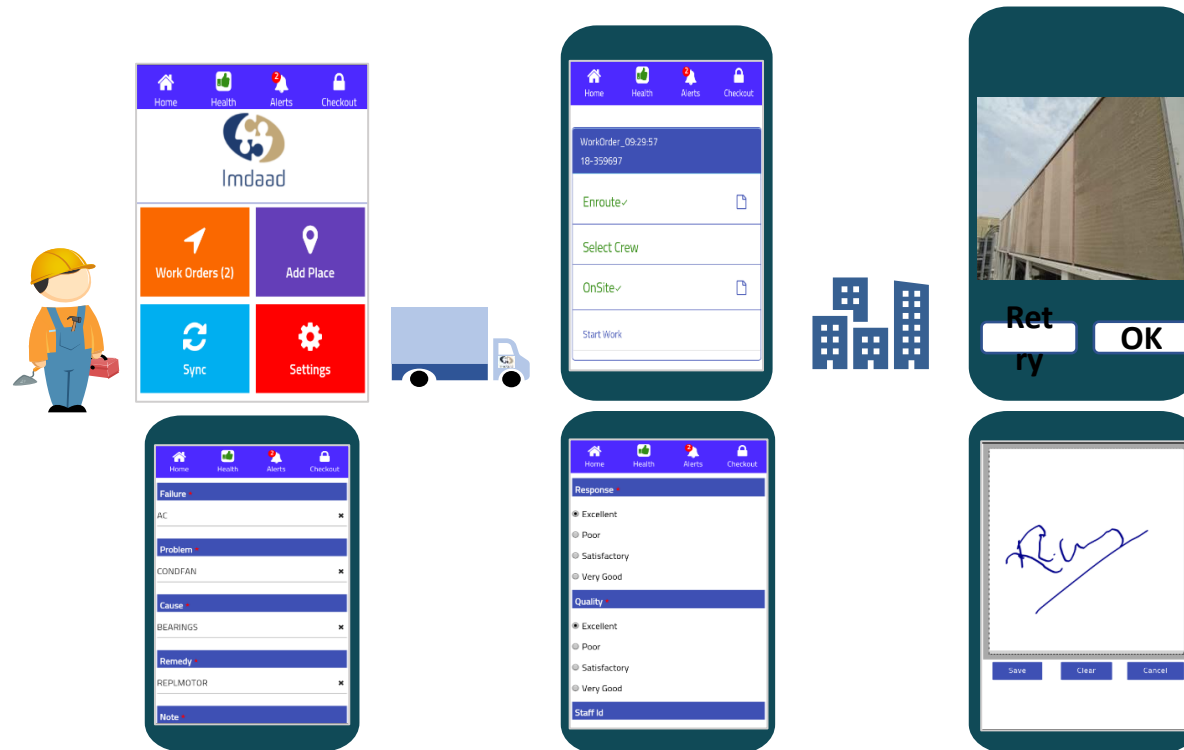
Proactive strategy and data criticality – mobility





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Proactive strategy and data criticality





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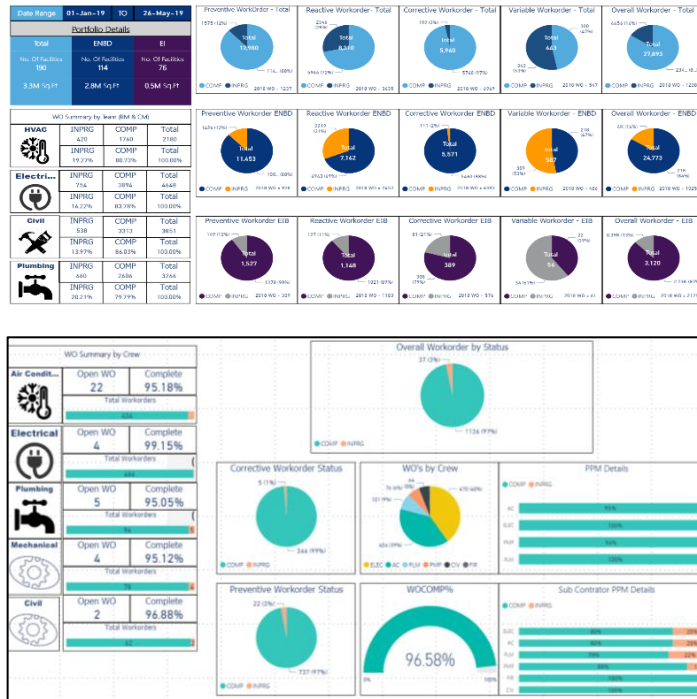
Proactive strategy and data criticality – monitoring, dashboards





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Proactive strategy and data criticality



FM SERVICE REPORT				
Insdad SR No./WO No		19-558907	Reported Date & time	2019-09-04 00:00:00
Customer /Facility Category		EMIRATES NBD - DUBAI OFFICES		
Location / Branch		ENBD-DXB-OFF		
Description of Service		PM SERVICE FOR FAN COIL UNIT, P1 PARKING AREA FEEDING TO GND FLOOR P		
Service Category		PM	Priority Level	Other
Service Call Reported By		604948	Phone No	048128847
Actual Date	Date (from)	2019-09-06 02:32:27	Date (to)	2019-09-06 04:43:13
Photos				
Before		InProgress		
Failure Report		After		
Problem		PM # Preventive Maintenance		
Cause		PM-CAUSE # Preventive Maintenance as per schedule		
Remedy		PM-REM # Preventive Maintenance done as per jobPlan		
Remarks		Ppm done		
Quality		Customer Feedback		
Completed by Team :		Response		
VIGNESH SAKTHIVEL # 609476		Confirmed by Customer :		
		Name		
		Signature		
Supervisor ID		Engineer/Supervisor Name		
608979				
Insdad Customer Response Centre: 80082000 helpdesk@insdad.ae				



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Proactive strategy and data criticality – incident reporting (app)



14:10 LTE

Cancel Incident Report Form Update

1 Incident Location & Date 2 Incident Details 3 Root Cause Analysis

Building Name / Location * Meydan M Building

Date & Time Of Incident * 18-Jun-2019 05:28...

Service Reference 19-12334

Name Bijoy
Doruado

Email * kannan.ramasamy@imd...

Reported Date 20-Jun-2019

1/4 Next >

14:10 LTE

Cancel Incident Report Form Update

1 Incident Location & Date 2 Incident Details 3 Root Cause Analysis

Root Cause Analysis

Machines/ Equipment * Lubrication failure, Power failure >

Manpower * None >

Methods * None >

Measurements * None >

Material * None >

Environment * Heavy rains / Tsunami / Typhoons >

< Back 3/4 Next >

14:11 LTE

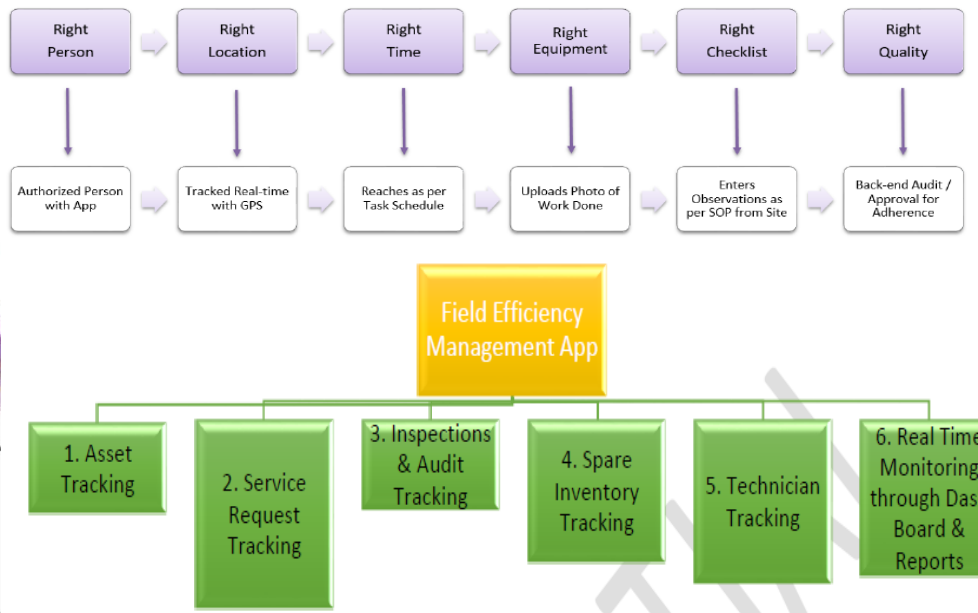
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2 of 3

Image Upload
image.jpg

Description Inorganic

Proactive strategy and data criticality – innovation and tech





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6. Pilot Position



Know the problem



Analyze with clarity



Reliability through more data

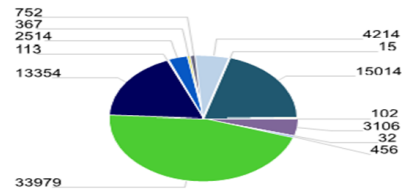


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Pilot position

- 24 X 7 monitoring and response
- Operation & Maintenance Management
- Performance Management
- Real Time Diagnostics
- Helpdesk, Contact Management

Work Order Since 2013 (By Status)



The screenshot displays a software interface with a sidebar menu on the left containing categories like Material, Accounting, Organization, Inspection, Zones, Equipment, Biomed, IT Equipment, Asset, Vehicle, and Group. The main content area is divided into two sections: 'Requests' and 'Open Work Orders'. The 'Requests' section shows a table with columns for Request #, Request Date, Requestor Name, Phone #, Action Requested, Building Name, and Repair Center Name. The 'Open Work Orders' section shows a table with columns for Work Order #, Request Date, Requestor, Request, Repair Center Code, Task Description, Scheduled Technician Name, and Sched Start Date.

Status	Value	Percent (%)
APPR	3106	4.2
BPAPPR	32	0.04
CAN	456	0.62
CLOSE	33979	45.89
COMP	13354	18.04
COORAPPR	113	0.15
INCOMP	1	0
INPRG	2514	3.4
PLANNED	367	0.5
PRPHASE	752	1.02
QUOTREC	9	0.01
WAPPR	4214	5.69
WNWP	7	0.01
WMATL	15	0.02
WSCH	15014	20.28
WSINSP	4	0.01
WSQUOT	102	0.14

Centralized monitoring & control

The image illustrates a centralized monitoring and control system for industrial processes. At the center is a control room where operators monitor multiple displays. This central hub is connected to various physical and virtual components:

- Process Schematics:** A detailed diagram of a refrigeration cycle showing components like the condenser, evaporator, compressor, and expansion valve, along with pressure and temperature indicators.
- 3D Models:** A 3D perspective view of a duct or pipe system with sensors and actuators.
- Alarm Management:** A table listing system alarms with columns for Date & Time, Source, Condition, Oper, Action, Priority, Description, Value, and Unit.
- Real-time Monitoring:** Several charts and gauges providing live data:
 - A sound level meter showing a peak near 100 dB.
 - A pressure gauge with a needle pointing to approximately 80.
 - A vibration meter labeled 'Vib. Meter 100X' showing a reading around 100.
 - A temperature gauge with a red needle pointing to approximately 80.
- Industrial Equipment:** Various pieces of machinery are shown, including electrical control cabinets, large industrial units, storage tanks, and a gas boiler.



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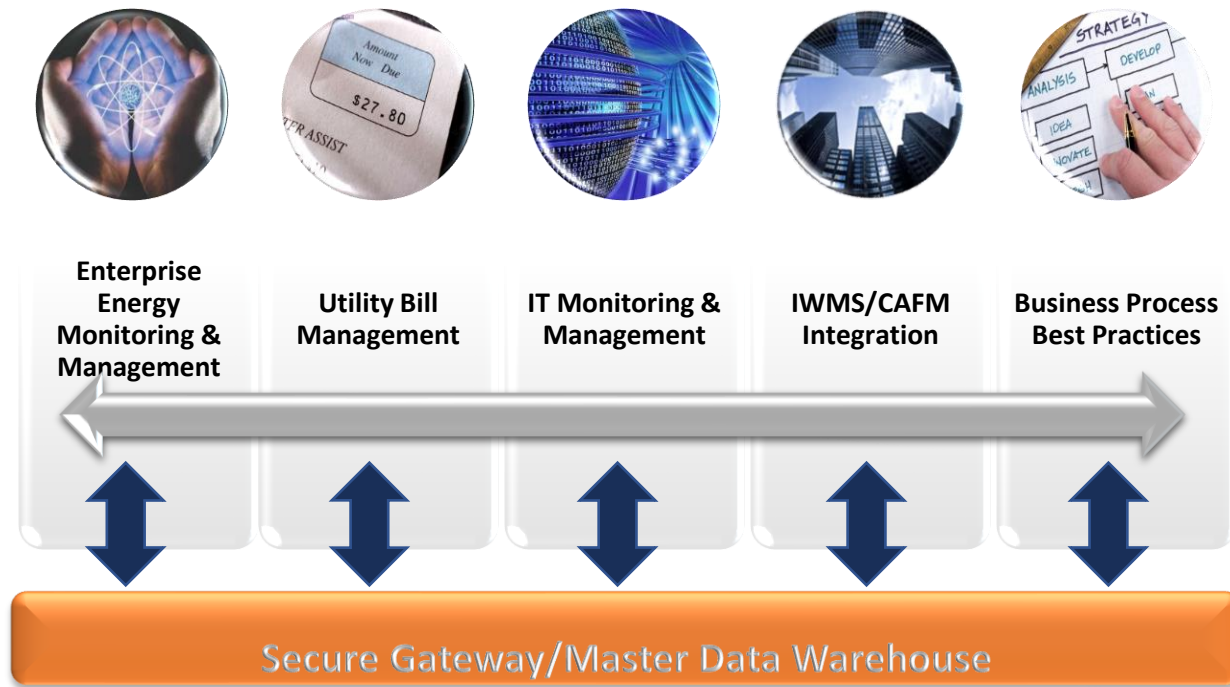
Reporting and dashboard





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Pilot position





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7. Scale up to get nuclear impact



Comparison approach (similar
buildings, similar systems)



Scale up the impact



True smart city approach

7. Scale up to get nuclear impact



**Enterprise Sustainability
Platform (ESP)**



**BMS / Energy
Management**

- Energy Saving
- Equipment Performance



**Enterprise Resource
Planning (ERP)**

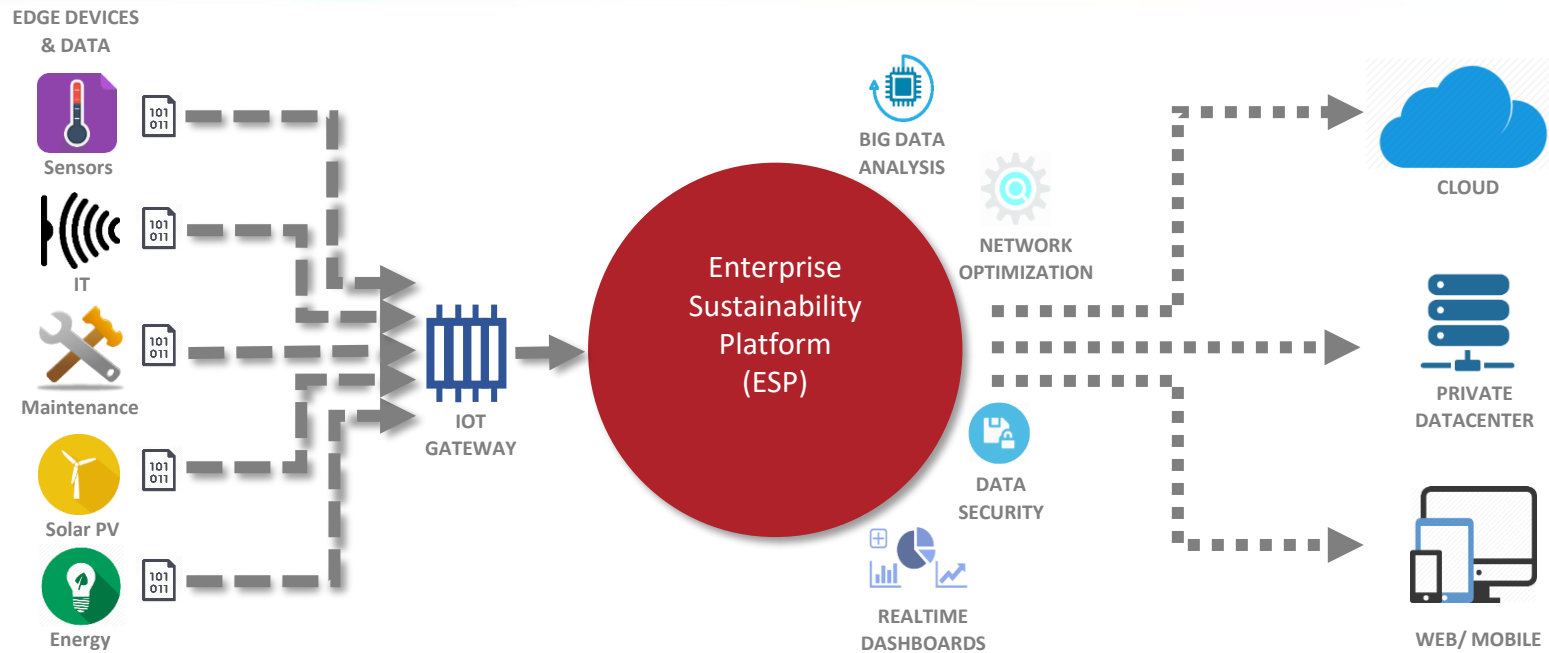
- CRM
- Finance



CAFM / CMMS

- Work Order Tracking
- KPI's
- PPM's
- SLA's

7. Scale up to get nuclear impact



ESP IoT Ecosystem



7. Scale up to get nuclear impact

MONITOR

- Use executive reports and dashboards to present KPIs related to the performance of their building portfolio

ANALYZE

- Collect building performance metrics (e.g. utility usage, cost data and mechanical system data) to perform analysis to determine where optimization can improve energy efficiency.

ACTION

- Implement Energy Conservation Measures (ECMs) based on ESP analytics to realize energy savings and validate through Measurement & Verification (M&V) analysis.





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7. Scale up to get nuclear impact

Proven cost savings with implementation of technology



Energy

25% - 30% energy savings



Operations

15% - 20% operational savings



Maintenance

Efficient utilization of resources



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8. Disruptive technology base FM sustainability

“It is very important to have a feedback loop, where you’re constantly thinking about what you have done and how you could be doing it better.”
Elon Musk

The leaders who drive FM are what make it impactful

Leadership with passion

Passion with drive

Drive with result

SCOPE FOR IOT SYSTEM PROJECT-CASE STUDY

Details of Assets for which daily inspection is performed

Asset Classification	Count	Daily Inspection	No. of inspection per day	Avg. Time of Inspection (Minutes)	Proposed location	Craft Required
CHILLER	6	Yes	3 Times	10	R441	AC Technician
CHILLED WATER PUMP	11	Yes	3 Times	3	R441	AC Technician
MAIN DISTRIBUTION BOARD	153	Yes	1 Time	5	R531 & R441	Electrician
CAPACITOR BANK	122	Yes	1 Time	5	R531 & R441	Electrician
AHU & FAHU	40	Weekly	1 Time	5	R531 & R441	AC Technician

FAHU and MDB/Electrical room has been selected for POC and below are the respective Daily inspection checklist

FRESH AIR HANDLING UNIT	
1	Check unit for physical damage, rust, deterioration, leakage
2	Check all panels, doors, door locks and light for proper operation
3	Check for any undue noise or vibration
4	Check & Note the water pressure gauge for inlet
5	Check & Note the water pressure gauge for outlet
6	Check the belt condition, clearance and adjust or replace if necessary
7	Check & Note the thermometer temperature for inlet
8	Check & Note the thermometer temperature for outlet
9	Check Electrical connections of panel board
10	Check unit mountings / anti vibration pads
11	Check the actuator / valves for proper operation
12	Check the chilled water pipe line leaks, insulation and cladding
13	Check the damper flap movements
14	Check and clean the condensate drain lines, drain tray
15	Check for any cooling coil leakages and damages
16	Check the physical condition of the ducts

MDB/ELECT ROOM	
1	Door, hinges, lock condition and lightings
2	Check if any unusual noise, vibration
3	Check selector switches (set to Auto-Mode)
4	Check if any trip/ overload indicated
5	Record the current
6	Record the voltage
7	Check if the Unit is properly operating
8	Check Thermostat Settings - Temperature 24 degrees, Auto mode
9	Check if any leakages

FRESH AIR HANDLING UNIT



* Room Temperature and Humidity
(External/weather is optional)



(Illustrative image)



* Room Open/Close door status



Know AHUs Duct Supply and Return temperature in real-time and act accordingly. This allow technicians to act before employees complain



**

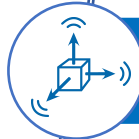
Air velocity helps facility managers gauge and track HVAC performance by measuring system airflow and building/room pressure



water leak detection will alert you in real-time if water has reached certain areas



Differential pressure sensors lets you know the status of your AHU filter thus allowing you to be reactive rather than predictive



High temperature means friction and high vibration can indicate bearing or alignment issue = time for predictive maintenance



*

Power consumption monitoring (combined with vibration analysis) allows you to know the status/health of your motor











Pressure sensor for inlet and outlet water gauge




* To be used with other asset



** Not Available in Stock

FRESH AIR HANDLING UNIT – POC PLAN

Sensor Type	How it looks like?	Where it is installed & Method of Installation	POC Qty	Result
 Duct Temperature Sensor		If there is existing entry point to the supply duct we will use it otherwise we need to drill. We will fix the side of the duct by double tape	1	This will return supply or return duct temperature in degree celcius to our online portal
 Water Leak Sensor		Placed inside the water tray of FAHU. The 3 meters rope will detect water anywhere along the rope.	1	Will return 'true' value when water is detected
 Differential pressure sensor		One pipe after filter (we saw existing entry) and other pipe in the same room to take the differential pressure	1	Will return differential pressure value in Pascals before and after filter
 Vibration sensor		Double taped on the motor to detect vibration pattern and temperature	1	Returns vibration frequency (Hz) and velocity (mm/s)

FRESH AIR HANDLING UNIT – POC PLAN (CONT'D)

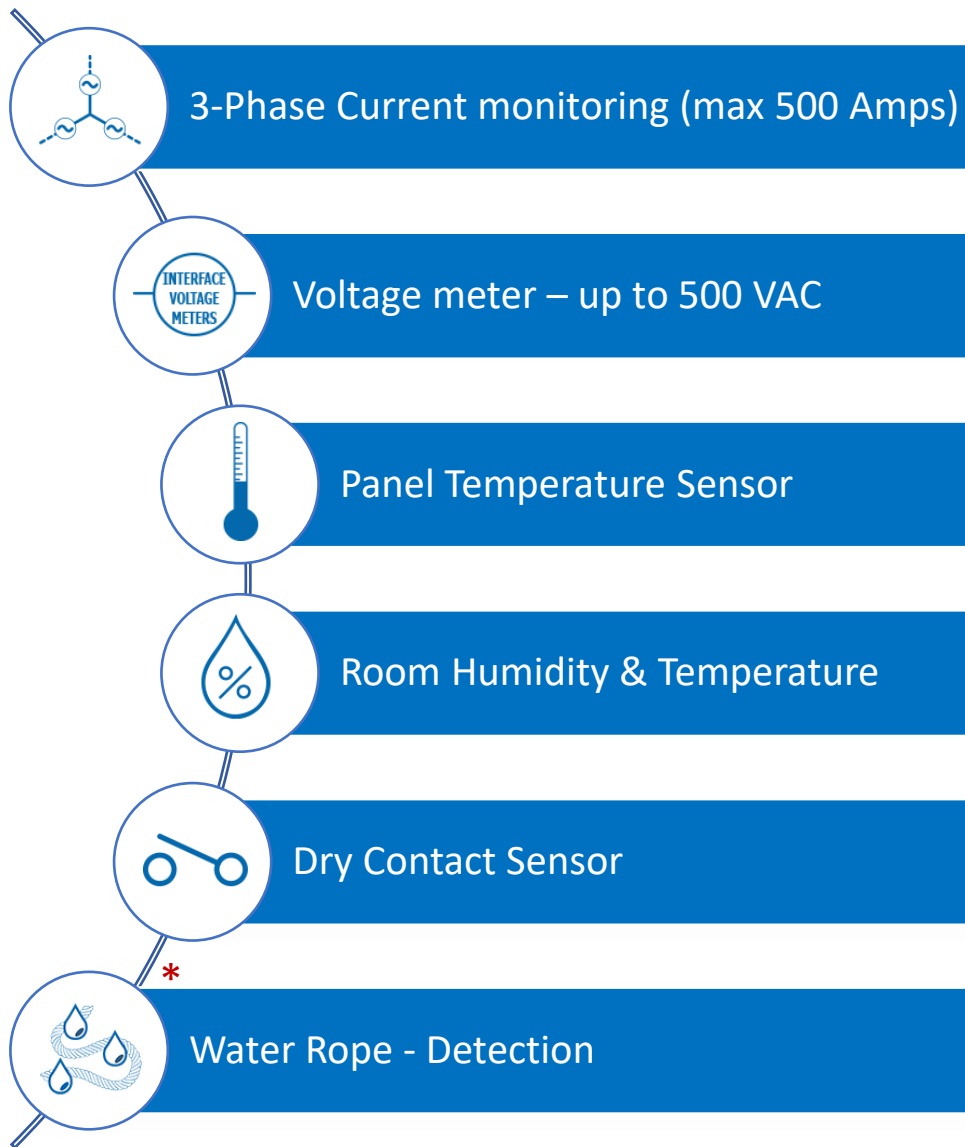
Sensor Type	How it looks like?	Where it is installed & Method of Installation	POC Qty	Result
 <p>Pressure Sensor</p>		<p>Requires T-gauge. The pressure transducer will connect to existing gauge and start measuring pressure (it works on gas and liquid)</p> 	1	This will return supply or return pressure readings in PSI

Gateway Type	How it looks like?	Where it is installed & Method of Installation	POC Qty	Result
 <p>Cellular Gateway</p>		<p>Placed on a flat service in FAHU room or double taped to the wall. One power plug is required. The Cellular gateway includes Data SIM card</p>	1	Will collect information from all sensors wirelessly every 10 minutes. However for triggering events (such as water detect) it is real time. The gateway pushes the data to our cloud based monitoring system.

ELECTRIC ROOM



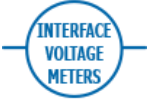







Room Open/Close
door status









* To be used with other asset

ELECTRIC ROOM – POC PLAN

Sensor Type	How it looks like?	Where it is installed & Method of Installation	POC Qty	Result
 <p>3-Phase Current Sensor (Up to 500 Amps)</p>		CT coils to be wrapped around the 3 phase wires.	1	This will return current consumption on Amps. If we manually add the voltage, it will calculate and plot the power in Kilo Watt Hours
 <p>500 VAC Meter</p>		Connected or wired to voltage source, this sensor will measure the voltage	1	Voltage sensor will return value in Volts
 <p>Room Humidity</p>		Placed in the room, the sensor measures ambient humidity and temperature readings	1	Returns humidity value in (%) and temperature value in deg C
 <p>Dry Contact sensor</p>		Wired to a switch, this sensor will be triggered whenever it detects a closed circuit	1	Returns loop closed or opened value. It has another usage with existing smoke detection.

ELECTRIC ROOM – POC PLAN (CONT'D)

Sensor Type	How it looks like?	Where it is installed & Method of Installation	POC Qty	Result
 Open/Close Sensor		Using magnet detection, open/close door will detect if room door or panel door is left open.	1	This will return open or closed values
 Temperature Sensor		Measures ambient temperature inside the panel	1	Returns panel internal temperature in deg C

Gateway Type	How it looks like?	Where it is installed & Method of Installation	POC Qty	Result
 Cellular Gateway		Placed on a flat service in FAHU room or double taped to the wall. One power plug is required. The Cellular gateway includes Data SIM card	1	collects data from all sensors every 10 minutes. However for triggering events (such as water detect) it is real time. The gateway pushes the data to our cloud based monitoring system.

MONITORING PLATFORM – SNAPSHOT(1)

Sensors Landing Page

Quick status indicator:

Green Color means sensor is reporting normal readings

Red Color means sensor is reporting abnormal readings which already triggered an alert

The screenshot displays the 'Sensors' page of a monitoring platform. On the left is a navigation sidebar with options: Overview, Admin, Home, Sensors (highlighted), Gateways, Actions, and Reports. The main content area shows the 'Local Time: 5:09 PM' and a '+ Add Sensor' button. Below this is a 'bmnr Network' header with a refresh icon. A list of four sensors is shown, each in a card format. The first card, 'AC Voltage Detection - 375278', is highlighted with a blue box and has a green status indicator. The other three cards, 'CO Meter - 492202', 'Humidity - 499581', and 'Water Area Sensor - 492223', also have green status indicators. Each card displays a signal strength icon, a battery icon, and a timestamp for the most recent reading.

Sensor ID	Reading	Time
AC Voltage Detection - 375278	Voltage Present	8 Minutes ago
CO Meter - 492202	0 PPM, 0 TWA-PPM, 21.2° C	38 Minutes ago
Humidity - 499581	34.82% @ 18.9° C D: 3.1° C	3 Minutes ago
Water Area Sensor - 492223	No Water Present	67 Minutes ago

Each rectangle represents a sensor

You can see most recent reported readings as well as signal and battery indicators

MONITORING PLATFORM – SNAPSHOT(2)

Sensor Display Page – Vibration Sensor Data Sample

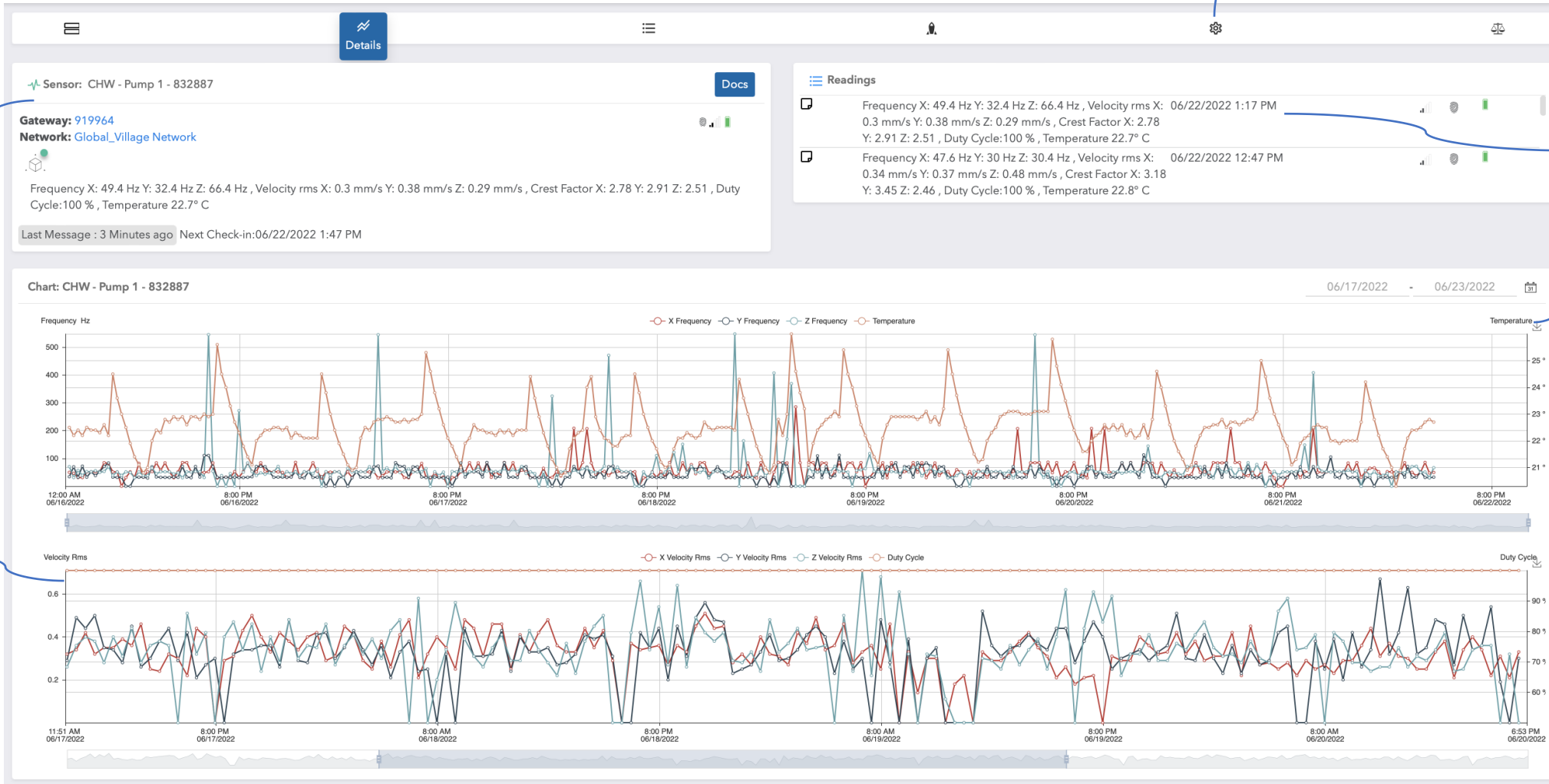
Sensor settings where you can define heartbeat and other parameters

Sensor Information Such as Name, Last check-in And next Check-in

Sensor data in Text format With timestamp

Vibration Frequency and sensor Temperature graph

Vibration Velocity graph



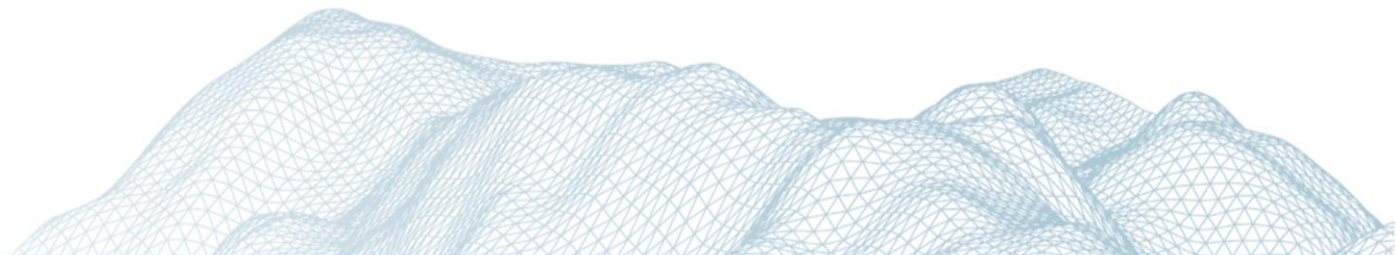


8. Disruptive technology base FM sustainability

Digitalization is changing the paradigm of how we engage with the built environment – as users and as its curators. Smart sensing, IoT, AI / ML, web and mobile apps are bringing technology and power of smart analytics to the fore.

The foundational change in culture:

- Data-centricity & continuous improvement as key drivers of strategy
- Quick wins and waste reduction
- Engaging tools to increase competencies
- Better integration
- Data-driven decision making



8. Disruptive technology base FM sustainability

Technology and data-driven culture – case in point

Dubai Silicon Oasis

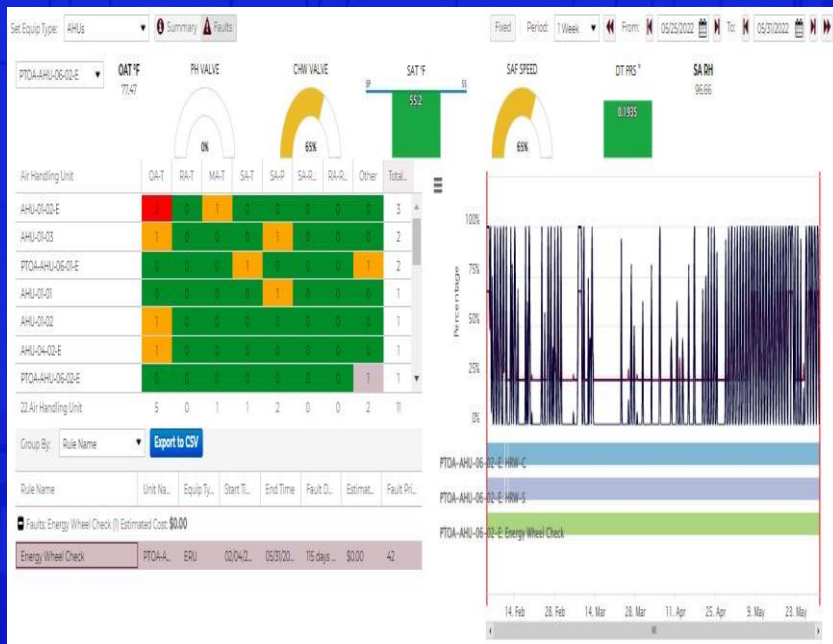
Enhanced health of systems while also looking at energy consumption with comparisons of day-to-day, month-to-month and year-to-year trends.

Harnessed data and made it actionable to enable proactive decisions

Strong example of how a data-driven strategy is a critical component of FM having the right impact on megaprojects



Technology & data-driven culture



- Observe facility operation at peak hours
- Analyze the data source, use data to improve effectiveness and customer satisfaction
- When facility is operating at peak (i.e. maximum number of users are present in the building) and weather condition is harsh, you can understand the operational parameters of the system at the full capacity of the various facilities.
- This is where you can analyze data from the system that will help you identify patterns to further improve your approach to managing, operating and maintaining this building
- This is the joy of collecting data, analyzing it and finally making a decision that is based on facts that enhance your own expertise and adeptness and reading the trends to make decisions.



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Impactful FM

In megaprojects and beyond

THANK YOU!

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