The Future of Digital Infrastructure

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Abstract

• **ISO**: A new international standard (ISO 19650-1:2018) addresses the “organization and digitization of information about buildings... including Building Information Modelling (BIM), its concepts and principles”

• **Impact**: The UK BIM Framework, which includes ISO 19650, via a “Soft Landing” process, delivers a fully populated, digitalised infrastructure asset data set that supports AM and FM activities and improves the TCO; it is tracked by an EAM system, during the operational life cycle, especially in “Smart” buildings

• **Benefits**: There are notable data management, HSEQ and commercial advantages, specifically via CAFM systems, used by Operations & Maintenance (O&M) teams, to achieve CAPEX and OPEX reductions
Digital Infrastructure in FM

- Digital International Standards
- Total Cost of Ownership
- Smart building technology
- Post-COVID lockdown impact
- Top Ten Tips

IGA’s digitalised systems
New Digital ISO Standards
Digital Infrastructure Advances

Accelerating Growth in Technology

Technology compounding
(Autodesk, 2016)
Digital AEC Sector Infrastructure Advances

Accelerating Growth in AEC Technology

Technology compounding
(Autodesk, 2016)
ISO 19650 Series – Part 1:2018

**ISO 19650**
- Organisation & Digitalisation
- BIM & IM
- Planning, DEC & DMS

**Part 1**
- Concepts & principles
- IM @ maturity stage
- Flexible, via ORAT, TC\&H, O\&M, Refurb

**APPLICATION**
- Whole Life Cycle
- Any built asset
- Any scale or complexity
- Budget neutral
BIM Maturity Levels to Digital Sustainability

BIM Maturity roadmap
(Surbana Jurong, 2018)
BIM + FM = Digitalisation and Digital Twin

BIM methodology dimensions
(BibLus, 2018)
BIM and FM in UK

UK’s methodology for advancing digital infrastructure is a collaborative e-consortium:

- **BSI**
- **UK BIM Alliance**
- **Centre for Digital Built Britain**

[Diagram with BSI, UK BIM Alliance, and Centre for Digital Built Britain logos]
Total Cost of Ownership
FM (O&M) in Relation to an Asset’s Life Cycle

O&M = 85% of a property’s life cycle costs (IFMA 2016)
Digital Infrastructure Challenges

**Education**
- C-Suite + FM in digitalisation & BIM

**Justification**
- Business case, ROI, SWOT, PESTLE

**Timing**
- What information, when, how, & to whom?
Smart Building Technology
SMART = Building Technology?

<table>
<thead>
<tr>
<th>Concept</th>
<th>Language</th>
<th>“M by O”</th>
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| • Drucker, 1954  
  • Doran, 1981  
  • Management by Objectives | • Capitalisation  
  • Initialisation  
  • Acronyms  
  • Abbreviations | • Specific  
  • Measurable  
  • Assignable  
  • Realistic  
  • Time-Bound |

FM terminology, cliches and buzzwords:
- Hard FM, Soft FM, TFM, IFM
- PPE, PPM, BIM, BMS, FFE
- Smart building
Smart Building (#1 of 3)

**Infrastructure**
- Automated processes to control:
  - Lighting, security, vertical movement
  - Drainage, landscaping, BMS, HVAC, FFS
  - Water, energy, PPM & FFE upkeep

**Data Input**
- Hardware, Software & Systems
  - Sensors, actuators, fuzzy-logic & MPUs
  - Cloud & server-based ICT & ERP Systems
  - Asset Management, Tagging & Tracking
  - Information Requirements (Asset, Exchange, Organisational, Project)
Smart Building (#2 of 3)

Benefits

- Helps owners, operators & FMs improve asset reliability, value & performance:
  - Reduces HSEQ risk, CAPEX & OPEX outlay, energy consumption, waste, environmental impact
  - Over life cycle, optimises space, insurance cover
  - Enhances sustainable brand value & revenue

Connectivity

- Buildings not “connected” digitally, are often as built, decades ago, + WiFi
  - Criteria = only to provide “essentials” of shelter, temperature control & safety (so, at the same efficiency level for 60+ years, perhaps?)
Smart Building (#3 of 3)

Moore’s Law (1965, 1975)

- Doubling IC capacity in 2 years, storage costs per GB falling, each year
- New facilities, or upgraded “smart” structures, constantly improving in efficiency & performance
- Smart FM & BAS benefits = utility savings, asset preservation, workspace environment

System Integration

- Innovation & Technology
  - WiFi, 5G, IoT-linked FFE (Doors, fridges, IRRS, LEDs, RE)
  - IR & UV-reduction, toughened, ionised & opaque glass
  - Leading companies to research: CISCO, Schneider, Honeywell, Siemens, Johnson Controls, Engie, Bosch (each has an intelligent, digitalised network BAS system)

Dgarte, 1990
BIM Data for FM Systems: Implementation

Risk factors = abilities of C-suite’s experience, knowledge or qualifications; arbitrary decisions; false assumptions; finite budgets; short-term-focus, goals & capabilities

Institutes, associations & talented consortiums have experts to guide FM organisations on transferring data from BIM into CAFM, and other ERP and FM CMMS

Optimal asset naming & data-processing protocols from outset, based on: IFCs or COBiE; UNICLASS or OMNICLASS; GIS or GPS; 3D, 4D, 5D, 6D or 7D BIM usage; LOD level
Post-COVID Lockdown Impact
COVID-19 Impact on Digital FM (#1 of 2)

Hygiene & sterilisation: risk transfer interfaces

**Mitigation**
- PPE & testing regime: workforce metadata analysis
- Intensified cleaning regime: monitoring effectiveness of processes
- Workspace redesigns: gathering & meeting areas, flow & focal points
- Isolation facility; medical support; protocols, BCP, DRP, Reaction Team
- IR cameras: screening all entries & exits in premises; UV lights to sterilise spaces

**Verification**
- Entry & exit checks, access systems + high-footfall & transit areas: data records
- Education & analysis of workforce, impact of WFHR; testing records
- Hand-held temperature readers backed by fixed cameras: who reviews results?
- Black & UV lights to confirm cleanliness in high-traffic & heavy-footfall areas
- Benchmark with other organisations using similar workspaces
COVÌD-19 Impact on Digital FM (#2 of 2)

Risk mitigation: tools & measures

**Investment**
- Deploy space management software to plan social / risk distancing
- Adjust alarms in elevators & rooms to limit number of occupants
- Conduct customer surveys, employee satisfaction polls & space audits
- Need to integrate innovation, change, IoT and AI with new technology types
- Risk-based adjustment of cleaning KPIs & PPMs to reflect virus survivability

**Management**
- Mark flooring @ 2m (?) in canteens, corridors, bureaux, receptions, atriums
- QRC asset-tagging regime to register users of all FFE to tracing functions
- Communicate benefits of results vs intrusion of measures
- Monitor user feedback & employee satisfaction survey results
- Monitor productivity; resource & customer retention; metadata analysis statistics
New Techniques & Tasks (#1 of 2)

**Operational Management**
- Data analysis = managers make better business decisions, if MI system allows
- Health & wellness are strategic priorities for staff returning from WFHR
- CAPEX & OPEX budgets for 2020 Q3 & Q4 will need to be adjusted: digitalisation?
- Remote monitoring of AI & IoT output = competency grading, for best results

**Facilities Management**
- Identify daily priorities, upgrade opportunities & training for all FM teams
- Ensure each resource, in-house or outsourced is COVID risk-averse
- Integrated multidisciplinary task force: innovation + technology + portfolio
- Stakeholders develop balanced, resilient approach towards more resilience
New Techniques & Tasks (#2 of 2)

Variations

- Negotiated Relationship Management & Partnering
- Commercial and management impact on amended KPIs, SLAs, contracts & costs
- Risks to Supply Chain service and stock providers: spot checks, audits, QA & QC
- ICT and Access System security profiling to identify & track occupants

Communications

- Multi-media to engage more with workforce, vendors & clients
- Increase effort to enhance brand value and profile: use metadata facts
- Stress induces defensive measures: longer emails, internal politics, cliques
- Virtual meetings need not last all day, for one hour+ per session: manage time
Coming soon...

- **ISO**: Another new international standard, currently under development, is **ISO/WD TR 41016**
- **Impact**: The sub-title is “Technology in facility management — Scope, key concepts and benefits”
- **Team responsible**: ISO/TC 267/WG 6 (Working Group 6)
- **Benefits**: There are various broader technologies under consideration, incorporating:
  - Data, equipment and system integration
  - Change management and process adaptation: methodology innovation
  - Implementation goals, deliverables and benefits
  - Impact analysis of resource training and development needs
  - Measurement of output activities via Digital Twin, IoT, AI, AR, VR
Top Ten Points
## Top Ten Points: Digital Infrastructure in FM

<table>
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<th>Point</th>
<th>Detail</th>
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<tbody>
<tr>
<td>Smart buildings</td>
<td>Agile differentiators</td>
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<td>Technology</td>
<td>Moore’s Law + 2020 pace</td>
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<td>COVID-19 lockdown</td>
<td>Rethink old ways (Output, not Input)</td>
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<td>Employees’ rights</td>
<td>Act, educate, train</td>
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<td>Carpe diem</td>
<td>Upgrade opportunity, via ISO 19650</td>
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<td>Standards &amp; regulatory</td>
<td>Requirements to adapt (PBM)</td>
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<td>Learn what’s best</td>
<td>Benchmark, audit, test</td>
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<td>Communicate</td>
<td>Use best media to reach out</td>
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<td>Lead &amp; manage</td>
<td>Set example, explain, do</td>
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<tr>
<td>Plan ahead</td>
<td>Think long term, act now</td>
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Summary
FUTURE OF DIGITAL INFRASTRUCTURE IN FM?

Ensure Smart, safe, healthy workforce & buildings

Define & communicate your own Top Ten Tips

Differentiate from post-COVID competition

Qualify to new International Standards

Think long-term: TCO, LCC, LEED, BIM 7D
Thank you!

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