

Taking control of your Building Management and Control Systems and delivering the 'new digital promise'

David Oakeshott

A.G. Coombs Advisory





"We always **overestimate** the change that will occur in the next two years and **underestimate the change that will occur in the next 10**. Don't let yourself be lulled into inaction."

Bill Gates; From his book, *The Road Ahead* (Penguin Books, 1996).

25 years ago
- BMS - DOS
to Windows





20 years
ago...
Preparing
for Y2K

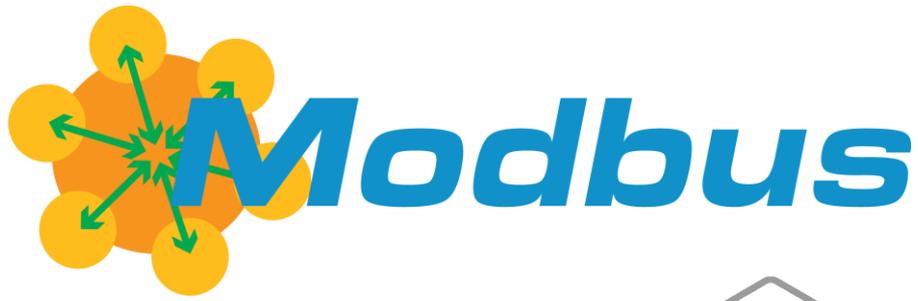
**THE HAVOC
CAUSED BY
THE Y2K
BUG**



15 years ago...
"Open Systems"



BACnet™



LonWorks





IFHE 2018
BRISBANE, AUSTRALIA



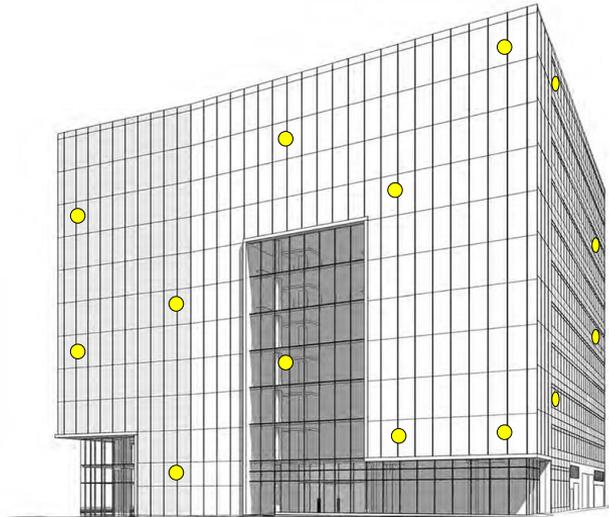
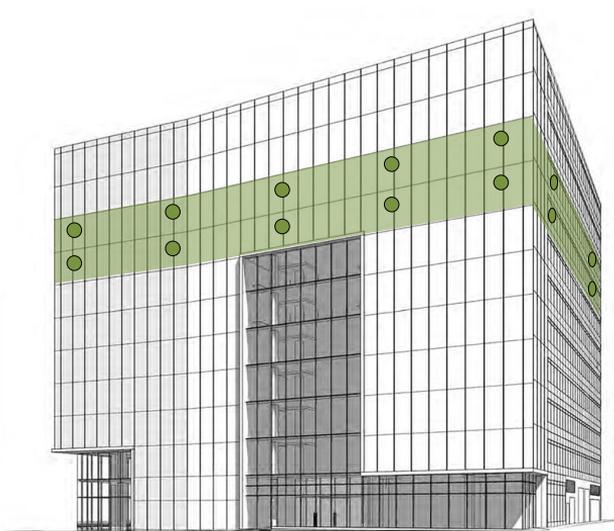
6-11 OCTOBER 2018
BRISBANE CONVENTION
& EXHIBITION CENTRE

10 years ago ...
Mobile and web
access emerging



#IFHEcongress2018

5 years ago ...



**Analytics and
Data Driven
Maintenance**



IFHE 2018
BRISBANE, AUSTRALIA



6-11 OCTOBER 2018
BRISBANE CONVENTION
& EXHIBITION CENTRE

Now ...

AI
IoT
BMS
big_data
cloud_solutions
hyper-connectivity
Fog_computing
data_lakes
multi-platform
information_driven_maintenance
framework





IFHE 2018
BRISBANE, AUSTRALIA



6-11 OCTOBER 2018
BRISBANE CONVENTION
& EXHIBITION CENTRE



#IFHEcongress2018



Sensor network

OCCUPANCY

- PRESENCE/OCCUPANCY
- TRAFFIC FLOW
- DOOR COUNTER
- PARKING

USER SATISFACTION

- FEEDBACK POLLING

POSITIONING

- POSITIONING

ENERGY METERING

- ELECTRICITY
- GAS
- WATER
- WASTE

WELL-BEING

- TEMPERATURE
- CO₂
- HUMIDITY
- NOISE



Big data platform

OTHER INPUTS

- CAFM/iWMS
- PERFORMANCE BENCHMARKS
- 3RD PARTY DATA
- ACCOUNTING
- BMS
- CAD/BIM

ADVANCED ANALYTICS

- DATA VISUALIZATION

USER OUTPUT

- IMPROVEMENT INITIATIVES
- END USER APPS
- KIOSKS



According to **Digi-Capital** the market for these technologies is **forecasted** to reach **\$108 billion globally by 2021**





Demand for more information, reliable data is coming...

As of **July 2017**, **Venture Capital firms** had invested approximately into the sector in the **previous 12 months**.

\$2 billion



Medical



Patient



Plantroom



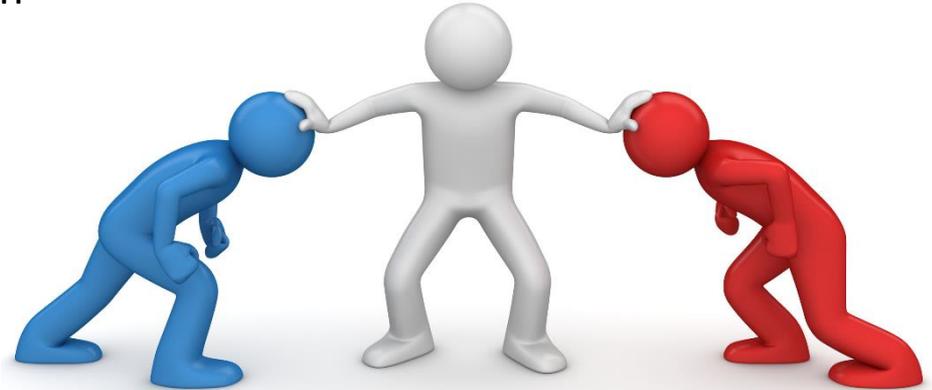
The reality for many healthcare facilities:

- still locked into a single manufacturer's platform
 - high maintenance costs
 - high repair or upgrade costs
 - depend on vendor for advice
 - Poor end user outcomes
 - Comfort conditions
 - Energy use
 - Mold



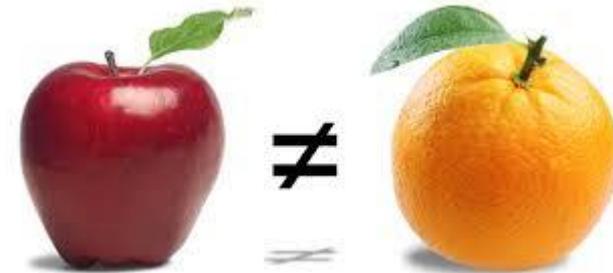
The reality for many healthcare facilities:

- Issue resolution
 - Mech and BMS contractors clash
 - high diagnosis and repair costs
 - depend on vendor for advice



The reality for many healthcare facilities:

- analytics promise (emerging market trends)
 - cheaper maintenance?
 - Improved energy efficiency?
 - Reduced reactive works?
 - More alarms
 - Duplication of systems and messages
 - Multiple vendors with competing interests
 - Downstream Networks overloaded?



The reality for many healthcare facilities:

- Timebomb
 - Incomplete commissioning
 - Poor metering or reports
 - Graphics not matching the physical installation / schematics
 - Poorly tuned systems
 - Inability of the end users to monitor, control, understand or change the BMS
 - Training
 - Properly accessible graphics, reports, alarms - intuitive
 - Good documentation



The reality for many healthcare facilities:

- Change management
 - Well intentioned technicians who:
 - Reprogram to address physical issues
 - Poor information leading to Incorrect diagnosis
 - Remote / offsite maintenance or changes
 - Using BMS to 'fix' other issues
 - Expansion and reconfiguration in a controlled fashion (change of use in the space to match the BMS)
 - Upgrade and lifecycle considerations
 - Fire, power and other life safety considerations



Where -

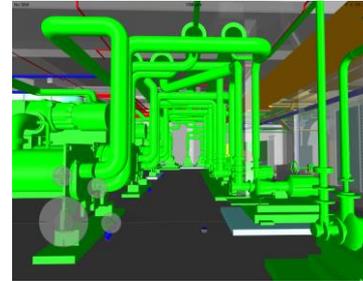
- Managed competitive environment where the most suited vendor is selected, and price is reasonable
- Either
 - Converged with IT – leverage systems and architecture already provided in a reliable and controlled manner
 - On an dedicated, managed Building Services network
- Well documented, intuitive system
- Analytics used to support a well configured BMS
- Future proof



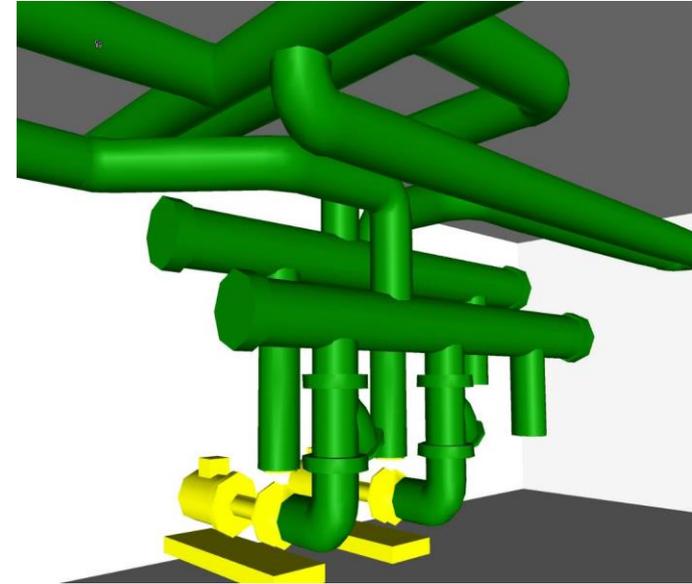
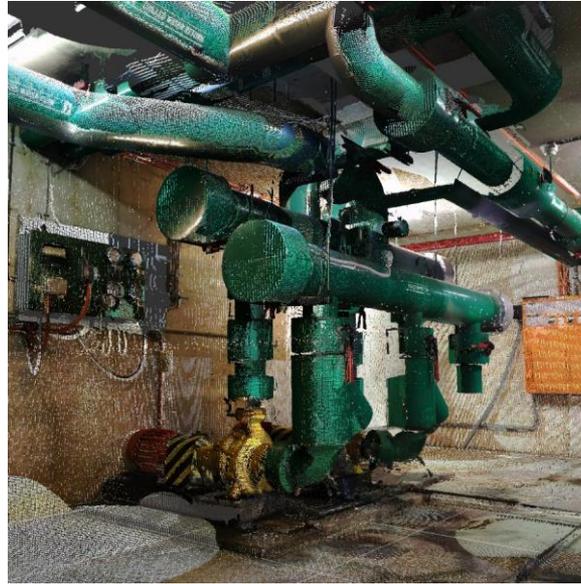
How?

3 scenarios

1. New Build
2. Migration
3. Upgrade / replacement



****Side note: BMS integration is the next logical step..**



Photo

Point scan

Revit Model

Specification – for any job

Mechanical consultants are **not likely** to have all the answers. Practical BMS and mechanical experience is required.

Close co-ordination is required between the mechanical contractor and the BMS specifier to ensure the BMS is effective in the control of the systems in the method intended in the mechanical design, however the mechanical consultants are not exposed to the details required for the correct audit, design and functionality to ensure a BMS is comprehensively specified for to meet the requirements of all of the electronic systems throughout the facility. Co-ordination with other services is also required.

Are you getting what you asked for?

Are you getting what you paid for???

Who / how is this being verified?



Who is working on your critical systems

Skills expected from your BMS vendor

- Programming language (specific to the vendor and sometimes multiple vendors)
- Graphics and human interfaces
- Trends and historical reporting – managing controller capacities and databases
- Mechanical design
 - Hydraulic / liquid flow
 - Airside
 - Chillers and staging
 - Energy management
 - Control loops
 - Sensor selections and proper locations
 - Control device selections
- Electrical systems and power analysis
- Cabling design – sensor and signal electromagnetic interference, RS 232 / 422 / 485 and IP network cabling designs and limitations
- Protocols
- Databases
- Other vendor integration
- Data presentation



You don't need to do it alone

Consult a BMS vendor independent advisor



Pre project planning...

Pre project audit

What information will be required from your system?

- BMS design requirements

- Network design

- Analytics requirements

- Operator skill, training and user interface

How will this be integrated into your facility?

What improvements can be made to reliability?

Detailed specification with measurable outcomes



Consult a BMS vendor independent advisor

≡ Identify who is best placed to control the system delivery

Project breakup

Control over vendor selection

Project management / Commissioning management

≡ Post construction requirements

System administration

Tuning

Energy management

CHANGE MANAGEMENT

Lifecycle planning



Recent Healthcare project Case studies:

Security vulnerabilities

– Problem:

- multiple sites hacked via remote access software – many hackers unaware of BMS function.
- Some targeted BMS attacks occur, usually via disgruntled vendors or staff.

– Solutions:

- Fire walls
- Individual passwords – with regular management (consider a BMS admin role)
- Converge with IT systems (or consider a specifically designed building services network- GPON)

Recent Healthcare project Case studies:

Remote management software

– Problem:

- Third party software vulnerable to hackers
- Hackers are often after a remote IP address to isolate themselves while conducting fraud
- BMS remote equipment / software is usually cheap and not routinely updated - often unmanaged

– Solutions:

- Use IT solutions, not third party software and keep updated
- High grade VPN
- Commercial firewall
- Use wireless with extreme caution

Recent Healthcare project Case studies:

Inflated costs to repair – Solutions:
or upgrade

– Problem:

- Vendors without competition
- Advice is provided by the contractor
- Outdated equipment (obsolete) no longer available

- Develop a plan toward vendor independence
- Engage an independent consultant to periodically review maintenance performance and system performance
- Set expectations (fixed repair prices) when maintenance contract is renewed
- Consider comprehensive (preventative + parts and labour)
- Have a lifecycle plan for all system components – this includes a comprehensive list of equipment installed, support dates, revisions, and strategic plan

Recent Healthcare project Case studies:

Poor commissioning

– Problem:

- Equipment not connected
- Sensors out of range
- Sensors scaled incorrectly
- Actuators unable to drive

– Solutions:

- Engage commissioning management
- Perform a whole system review (can be staged through various sections of the facility)
 - Conduct a review through the maintenance process (detailed audit of the maintenance results)
 - Ensure each point is checked and scrutinised



Recent Healthcare project Case studies:

Lack of co-ordinated specification of BMS over redundant plant

- Problem:
 - Hospital central plant dependant on a single BMS controller
 - Separate controllers installed on redundant equipment but a single sensor causing a single point of failure for all equipment
 - A fault changeover routine where the same fault can cause all redundant plant to lockout

– Solutions:

- Clear fault changeover and redundant control objectives specified for BMS
- Integrated system testing as part of commissioning management plant

Develop system tests as part of maintenance regime to verify the accurate and efficient systems (with appropriate contingency plans)

Recent Healthcare project Case studies:

Technical obsolescence

– Problem:

- A vendor has a long term installation which has been superseded in both lifecycle and obsolescence across a number of health facilities in a region. They feel like they own the system.

– Solution:

- Prepare long term lifecycle plans. Many aspects of BMS need to be treated like IT projects
- Consider progressive upgrades in stages. Products with open protocols can assist with migration. Some products are equipped with drivers with backward compatibility to their (and other vendor) proprietary protocols.
- Engage specialist BMS technical advice independent from the current BMS vendor.

Recent Healthcare project Case studies:

Change management

– Problem:

- BMS programming modifications used to address physical issues. Band-aid on a broken arm
- Well intentioned technicians trying to make plant perform tasks it is not designed for usually at the request of clinical staff (negative / positive pressure isolation rooms)
- Software updates which are incompatible with other systems

– Solutions:

- Close contractor management
- Single user passwords and password management
- Electronic log books
- Detailed backup routines
- Documentation update

Summary

Specification

Modernisation

- Data management and network
- Life Cycle Assessment
- Security
- Documentation and digitisation
- Vendor independence

Change management plan and enforcement

Get independent help

