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The impact of Smart HVAC Controls on Engineering Resources and Budgeting

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Agenda

- ✓ *About Neptronic*
- ✓ *Define Component of a HVAC Control System*
- ✓ *Define what is a Smart HVAC Systems*
- ✓ *Objectives of Smart HVAC Systems*
- ✓ *Open protocols ...the Impacts*
- ✓ *Decentralization of the "Smarter Controls"*
- ✓ *Reality of budget during Construction phase vs life impact on the Operations*
- ✓ *Example : VAV – Programmable or configurable?*
- ✓ *Mix and Match...Reality or myth?*
- ✓ *QA*



About Neptronic



- ✓ Established in **1976**
- ✓ Design and manufacture innovative HVAC products
- ✓ HQ and manufacturing facility (80,000 sq ft /7, 500 m²) located in Montreal, Quebec, Canada
- ✓ Over 300 dedicated employees

ISO 9001:2015
Certified



About Neptronic

Office Locations

- ✓ *Montreal, Canada*
- ✓ *Colorado, USA*
- ✓ *Oregon, USA*
- ✓ *London, England*
- ✓ *Dubai, UAE*
- ✓ *Singapore*

Worldwide Presence

- Exports over 75% of its sales outside of Canada
- Highly skilled distribution network of 135 agents around the globe



About Neptronic

Product Lines



**HVAC
CONTROLS**



**ELECTRIC
ACTUATORS**



**ACTUATED
VALVES**



HUMIDIFIERS



**ELECTRIC
HEATERS**



Define Component of HVAC Control System

Definition HVAC Control systems:

Ensemble of electronic, digital components in an Ecosystem connected together to control, exchange, monitor, supervise, diagnose, inform and permit a fully integrated operation of HVAC equipment typically for none residential applications.

Andrew Smith, Building Management Systems, web site <https://www.melbourne.vic.gov.au/SiteCollectionDocuments/bms-the-basics-explained.pdf>



Objectives smart HVAC Systems

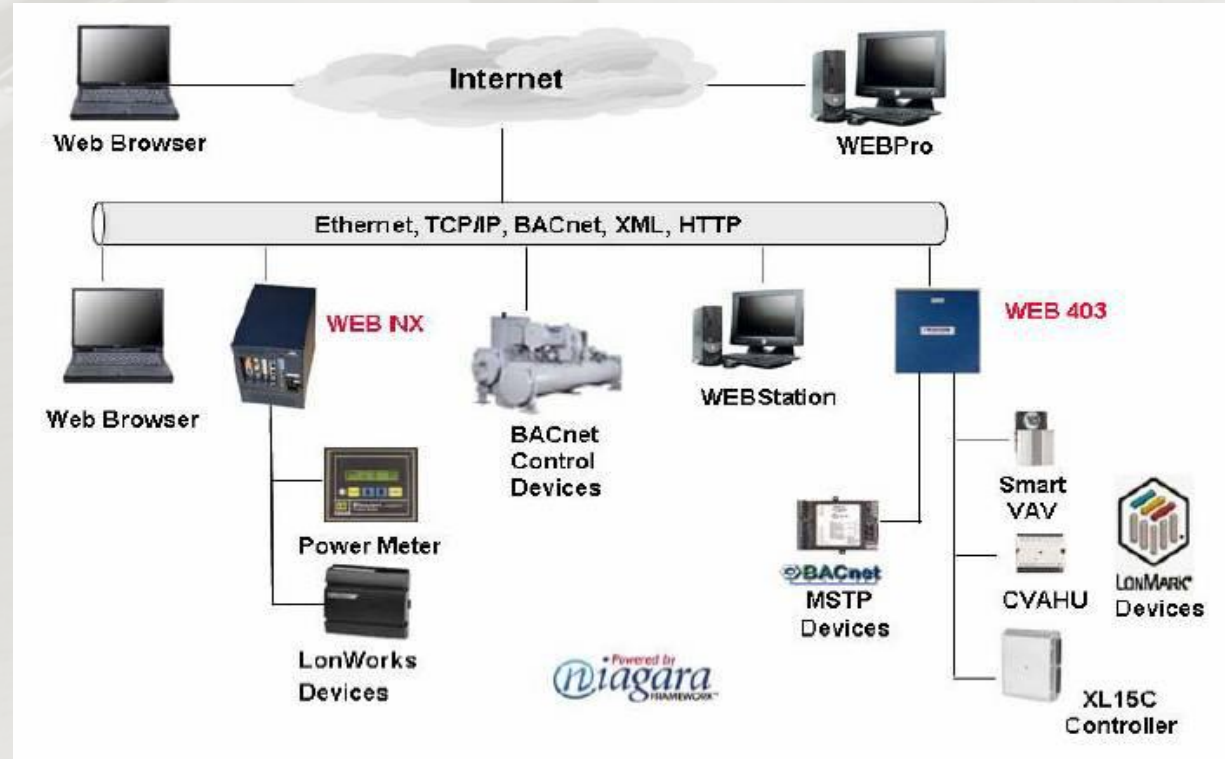
- *Control of Building*
- *Occupant comfort*
- *GUI*
- *RT Monitoring*
- *Trending Logging Operation & performance*
- *Fault/Alarming*
- *Tailored Application Programming*
- *User/Event monitoring*
- *Energy reporting Management*



Defining the Components of HVAC Control System

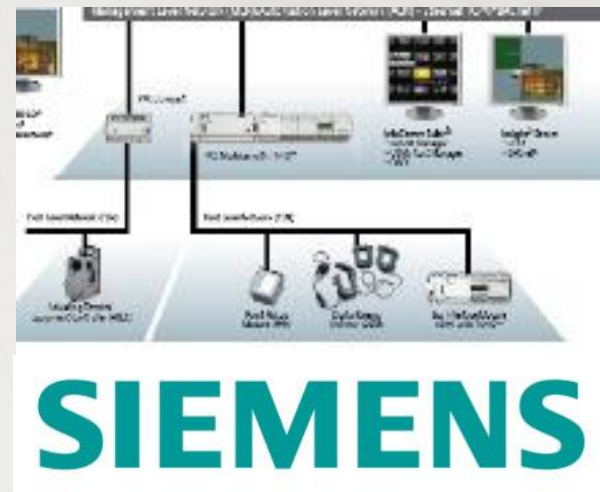
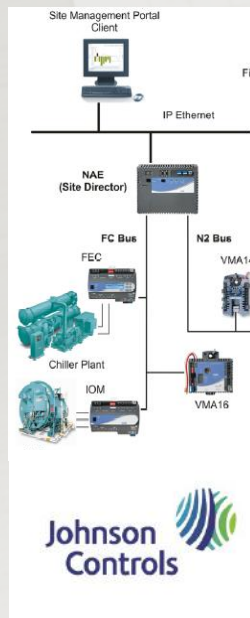
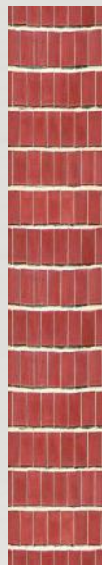
What's up...

- Main & Sub Controllers
- Sensors
 - Temp, RH, IAQ, presence
- Actuated elements
 - Dampers, valves
- Interfaces,
 - Protocols, HMI
- Routers
 - Switches
- Mobil devices



Smart HVAC System: In the Past...

- *Many Decades: One stop solution provider*
- *No cross-pollination possible between them*
- *Silo approach*
- *Main Controller, VAV, FC, IAQ, Occupant Comfort*



Smart HVAC System

- *Reality of today: Is needed more than comfort and general unit overview*

Expectations 3.0

- *Multi-platform providers*
- *Open Protocols*
- *Integration of HVAC products with/and lateral disciplines in the building*
- *Suit Operational/Facility requirements*
- *Provide accurate Financial requirements*
- *Mobility/Social media*
- *IoT*



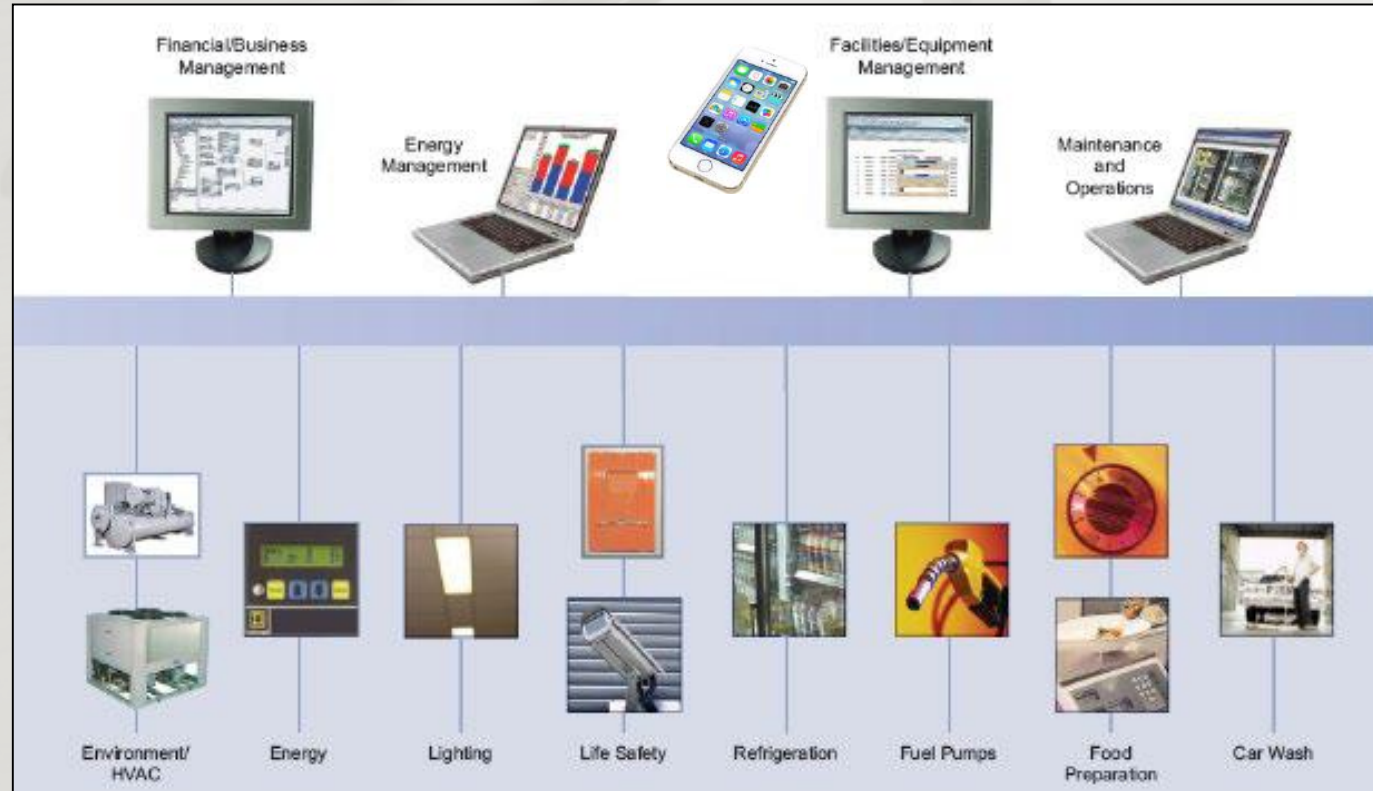
Objectives smart HVAC Systems: Today...Technology Change

Application Specific Controllers

- *Applied intelligence...
...not only distributed*
- *Ambient Controllers*
- *Sensors*
 - *Temp, RH, IAQ, presence*
- *Motorized elements*
 - *Dampers, valves*
- *Interfaces,*
 - *Protocols, HMI*
- *Routers*
 - *Switches*
- *Mobile devices*
- *No programming, Configurable*



Smart HVAC System



Open Protocols /Impacts

- ✓ *Proliferation of Control Manufacturers*
- ✓ *Greater Choice*
- ✓ *Increased Integration possibilities*



Decentralization of the “Smarter Controls”

- ✓ *Birth of Application Specific Manufacturers (ASC)*
- ✓ *Equipment Manufactures*
- ✓ *Specialized Control HVAC wholesalers*



neptronic®



CONTEMPORARY CONTROLS

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Connecting minds and machines

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COCHRANE
SUPPLY

meitav-tec

alpscontrols.com

oneSIGHT
SOLUTIONS



Open Protocols /Internet Giants/IoT/Impacts

- ✓ *Openness*
- ✓ *Integration*
- ✓ *Technology bulldozer*



Reality of budget during Construction phase vs life impact on the Operations

« Every budgetary decision taken during the construction phase of cutting down on the original design will have an exponential impact on the operational life cycle of the building for the following decades... »



Reality of budget during Construction phase vs life impact on the Operations

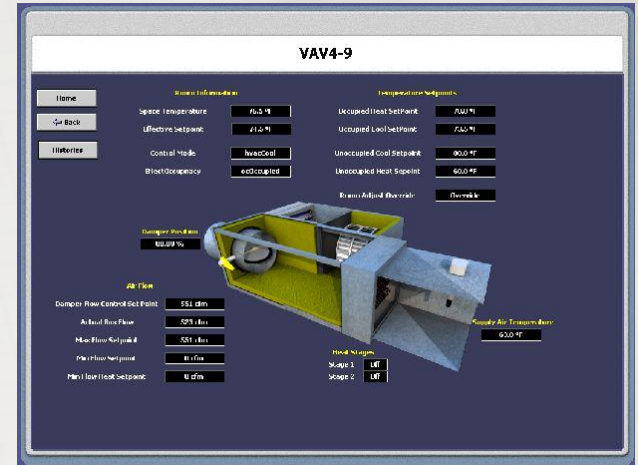
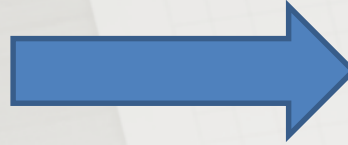
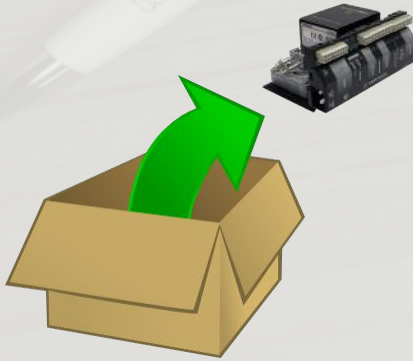
How to fight it

- ✓ *Taking advantage of decentralized systems (distributed intelligence)*
- ✓ *Opting for Opened protocols (BACnet, Modbus...)*
- ✓ *Selecting Integration platforms (OPC, Tridium...)*
- ✓ *Maximizing IoT products (products on IT)*
- ✓ *Selecting IP platforms (BACnet IP, Modbus TCP/IP...)*
- ✓ *Certified Opened products (BTL listed)*
- ✓ *Opting for configurable controllers for Application Specific (FC, VAV, E-Con, Lighting, Shedding, Energy, Water)*



Example : VAV – Programmable or configurable?

Around 4h/device!



Example : VAV – Programmable or configurable?

Advantage of Application Specific Controllers

Ex: VAV Controller

Steps:

- Installation
 - Wiring
 - Programming
 - Addressing
 - Create graphics
 - Networking speed
 - Start up
 - Balance
 - Fine tune
 - Dynamic GUI/HMI
 - ... For every controller
- Around 4h/device!



Example : VAV – Programmable or configurable?

Advantage of Application Specific Controllers

- How can we save money?
 - ✓ Manufacturer takes the responsibility.
 - ✓ Ensures interoperability
 - ✓ Provides easy integration tools for the BMS/BAS

Reduces Steps:

- No programming – configuration *Copy config*
- Addressing – pre addressed *MAC Addressing*
- Networking – *Auto baud rate*
- Start up – No need for field tech *No main Controller required*
- Balance – No need for field tech *No software required*
- *These steps mean cutting down, on average, half of the standard time required time from 4 h to 2h*



Example : VAV – Programmable or configurable?

Ex: VAV Controller



$$10 \text{ VAV} \times 2\text{hr/avg} = 20 \text{ Man/hr}$$

$$100 \text{ VAV} \times 2\text{hr/avg} = 200 \text{ Man/hr}$$

$$1000 \text{ VAV} \times 2\text{hr/avg} = 2000 \text{ Man/hr}$$

This is for only for one of the Smart ASC in this project.

- How many more possibilities do you have in your project?
- How much money can be saved?
- Is your B.A.C. or S.I. offering/providing you with the best technological solution?
- Whose interest are you overseeing??

Reality of Construction vs Operating

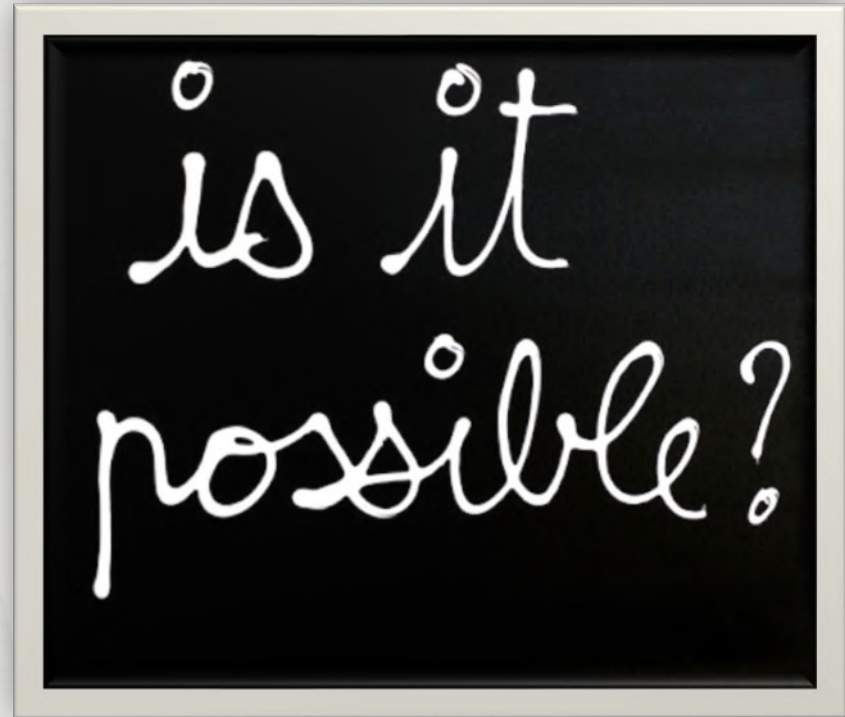
... Same exercise

- ✓ *More equipment manufacturers are providing integrated decentralized solutions,*
 - ✓ VAV
 - ✓ Fan coils
 - ✓ AHU/RTU
 - ✓ Drives
 - ✓ Actuators, etc...
- ✓ *Integration platform*
- ✓ *IP, IT, open Protocols*
- ✓ *Lighting*
- ✓ *Energy*
- ✓ *Equipment*

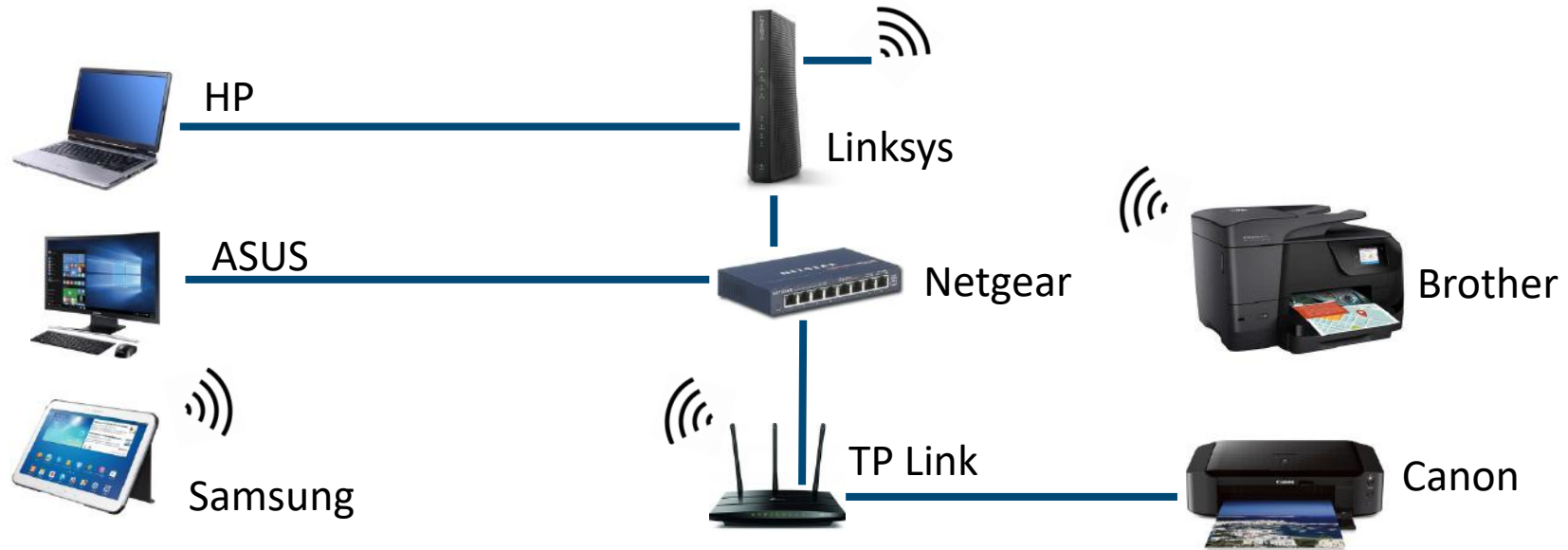


Mix and match... Myth or Reality?

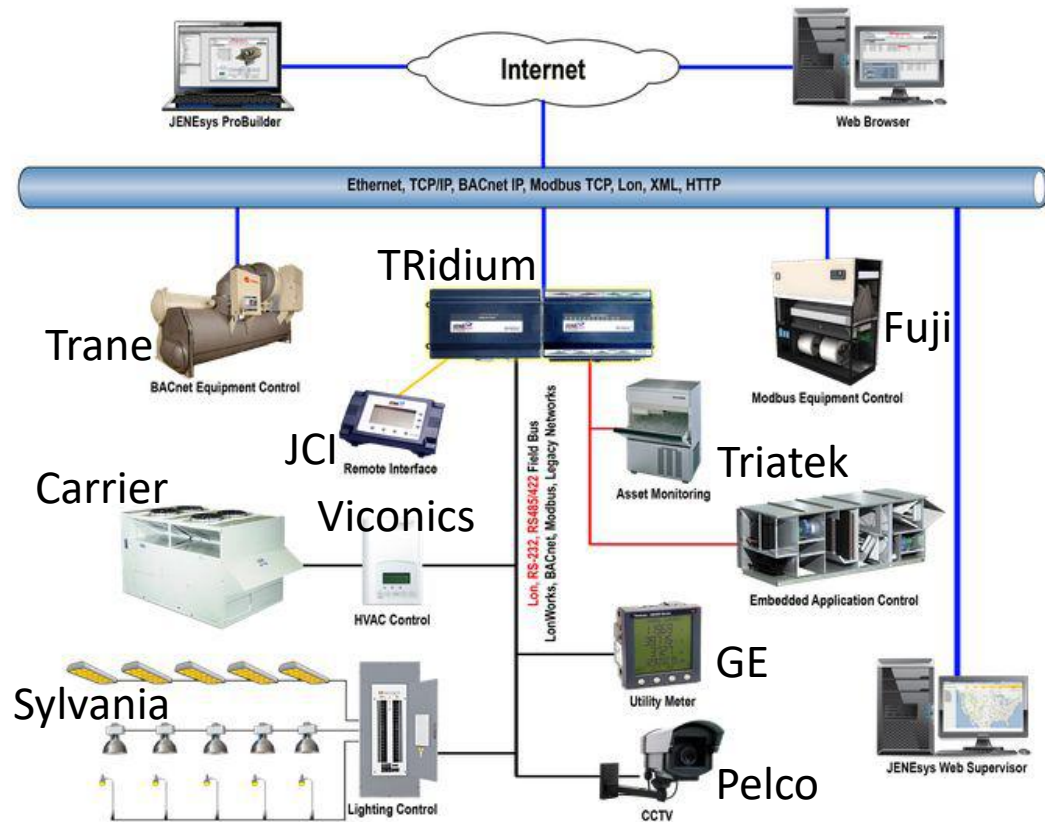
- ✓ *Different Manufacturers connected together*
- ✓ *Opened protocols*
- ✓ *Configuration not programming devices*
- ✓ *Maximizing IP, Bluetooth, Wi-Fi and IT*
- ✓ *IOT*
- ✓ *Connected, exchanging, networking together*



Mix and match... Myth or Reality?



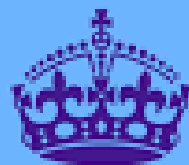
Its a reality...



You have the choice ... to think out of the box

« Every budgetary decision taken during the construction phase of cutting down on the original design will have an exponential impact on the operational life cycle of the building for the following decades... »





**KEEP
CALM
it's
QUESTION
TIME**

