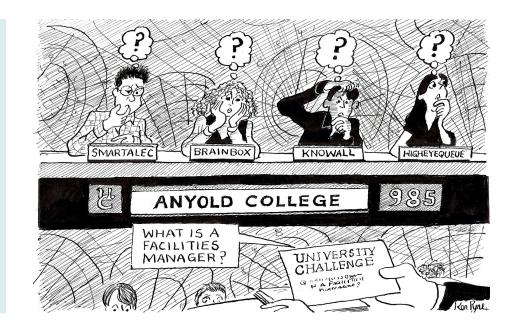
### **Workplace Futures Conference**

### Time's Gone

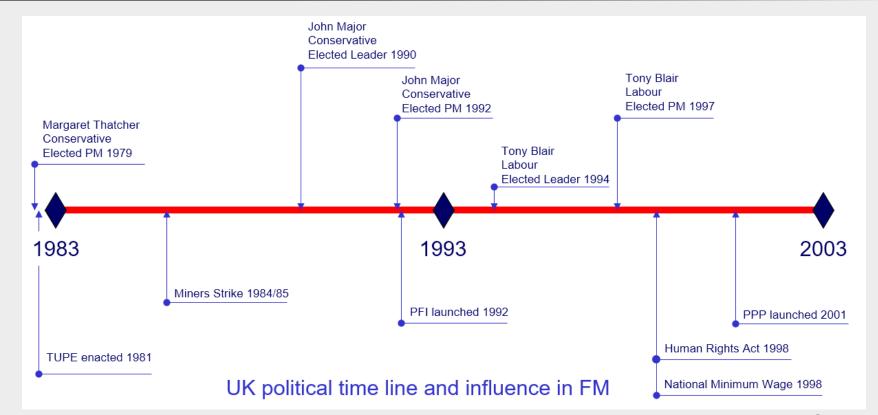
## The influence of technology in FM over the years

Lionel Prodgers Managing Director Agents4RM International www.agents4rm.com



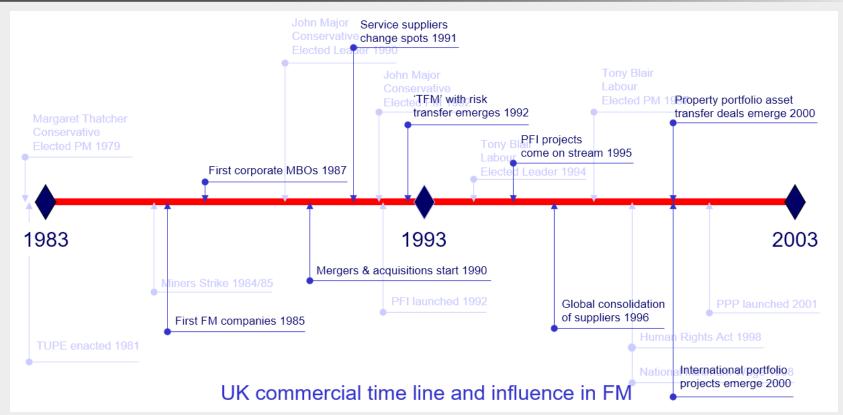


#### **EuroFM Conference - Budapest 2003**



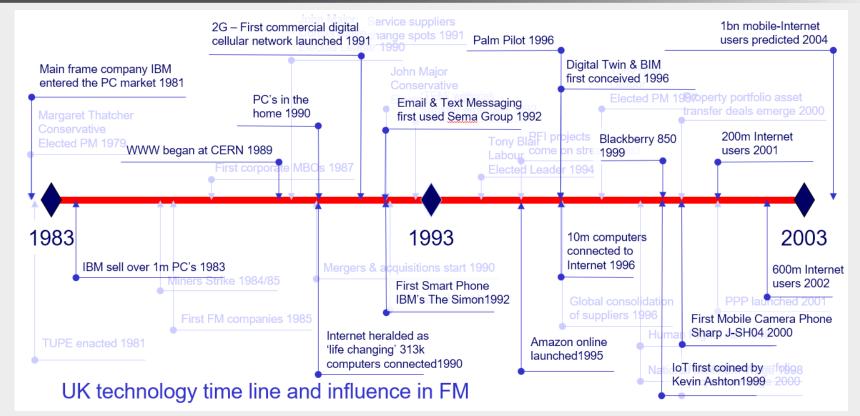


### **EuroFM Conference - Budapest 2003**





### **EuroFM Conference - Budapest 2003**





### Inventions relating to facilities and the built environment

### Glass

- Vending machine
- Flush Toilet
- Thermostat
- Elevator (passenger)
- **Reinforced** concrete
- Light bulb
- Sky scraper (steel frame) Revolving door

- 2500<sub>BC</sub> Phoenicians
- 100 BC Hero of Alexandria
- 1591 Sir John Harington
- 1830 Andrew Ure
- 1852 Elisha Graves Otis
- 1867 Joseph Monier
- 1879 Thomas Alva Edison
- 1884 William Le Baron Jenney USA
- 1888 Theophilus von Kannel

- Lebanon
- Egypt
- UK
- UK
- USA
- France
- USA
- - USA



### Inventions relating to facilities and the built environment

Vacuum cleaner	- '
Air conditioning	- '
Fibre optics	- '
Laser	- '
Light emitting diode (LED	) - (
Email	- '
Radio Frequency ID (RFI	<b>D)-</b> 1
Mobile phone	- '
World wide web	- '
Global Positioning Syster	n - <i>'</i>

-	1901	Herbert Cecil Booth	UK
-	1902	Willis Hallivand Carrier	USA
-	1955	Narinder S Kapany	India
-	1960	Hughes Research	USA
-	1962	Nick Holonyak (GE)	USA
-	1971	Ray Tomlinson	USA
)-	1973	Mario Cardullo	USA
-	1977	Bell Laboratories	USA
-	1989	Tim Berners-Lee	UK
-	1993	Department of Defense	USA



### Innovation in elevators...





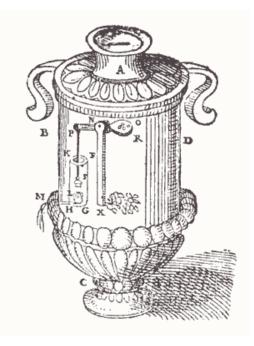


Multi-level automated car parking – Sarojini, Nagar, Delhi





### Innovation in vending...







### Innovation in cleaning

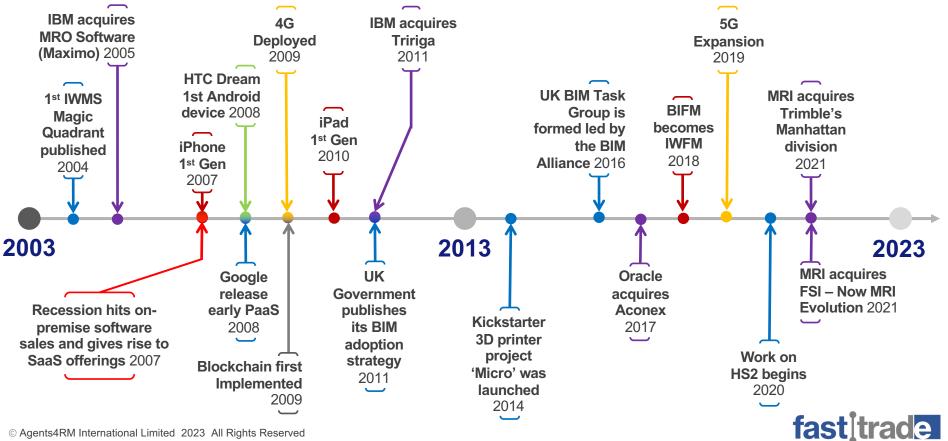


### Street cleaning

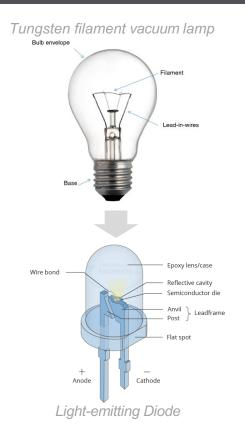




### Snapshot of innovation and events in technology over the past 20 years



### Innovation in lighting and energy...





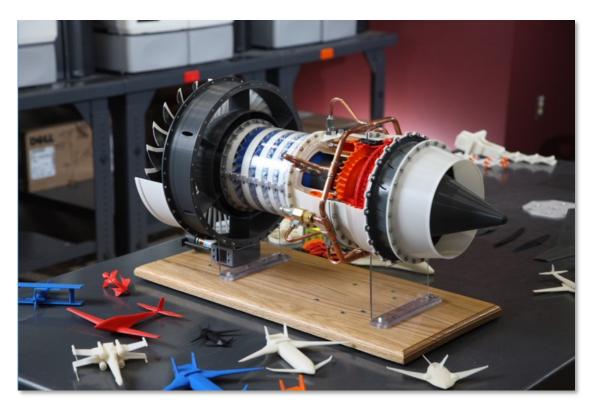
### Doha, Qatar – night time skyline



### Innovation in 3D Printing

Dr. Sheffler's class at the University of Virginia built a 1/4 scale, 3D-printed jet engine replica that was able to spin at 2,000 RPM.

Photo courtesy of David Sheffler





### **Innovation in Augmented Reality**





### Innovation in monitoring - IoT

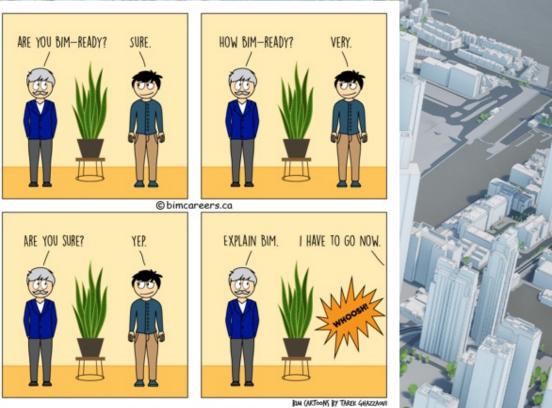






### Innovation in design – Building Information Modelling (BIM)





fast trade

### Innovation in design - BIM

1D

SCRATCH POINT

RESEARCH EXISTING CONDITIONS REGULATIONS WEATHER SIMULATIONS

FUNCTIONAL PROGRAM

IMPLEMENTATION -CONSULTING -BIM EXECUTION PLAN -SERVER REPOSITORY

CONCEPT DESIGN

-STRATEGIES -AREA ESTIMATION -COST ESTIMATION -GENERAL VOLUMETRY -ACCESIBILITY -VIABILITY PRODUCTION -2D DRAWINGS -DOCUMENTATION -VIEWS AND PLANS

20

VECTOR

IMPLEMENTATION -PROGRAMMING -PARAMETERIZATION -FILE MANAGEMENT -COMMUNICATIONS

DS DEVELOPMENT ROOM DATA SHEETS -ILIOT OF DELIVERABLES -SCOPE DEFINITION -MATERIALS -STRUCTURAL LOADS -ENERGY LOADS

#### SUSTAINABILITY

LIFE CYCLE ESTIMATION CONSTRUCTION SOLUTIONS PRIMARY MEP SYSTEMS ENERGY PRODUCTION CERTIFICATION STRATEGIES



3D

REPRESENTATION -RENDERINGS -WALKTHROUGHS

-LASER SCANNING

IMPLEMENTATION -BIM OBJECT CREATION -VISUAL PROGRAMMING -CLASH DETECTION -MODELCHECKER

#### FINAL DOCS

-ASSEMBLIES -STRUCTURAL DESIGN -MEP DESIGN -SPECIFICATIONS

SUSTAINABILITY

-INSOLATION VALUES -SUN PROTECTION -DAYLIGHT REQUIREMENTS

PRODUCTION -MODEL FEDERATION -VIRTUAL CONSTRUCTION -SCHEDULING -PROJECT PHASING -TIME LINING -CONSTRUCTION PLANNING -GOUPMENT DELIVERIES

-VISUAL VALIDATION

#### SYSTEMS

STRUCTURAL CONSTRUCTION MEP CONSTRUCTION

#### SIMULATIONS

-LIFE CYCLE SIMULATION -SUN SIMULATIONS -WIND SIMULATIONS -ENERGY SIMULATIONS -CERTIFICATION CHECK



10 Para 6

PRODUCTION -QUANTITY EXTRACTIONS -DETAILED BILL OF QUANTITIES -FABRICATION MODELS

-FEES COMPARISON -TRADE SELECTION -LOGISTICS

SUSTAINABILITY

-LIFE CYCLE COST -COMPARATIVE STUDY

SAVE ESTIMATION

6D

PERFORMANCE

RESULTS

VALUE

-SIMULATIONS

ARCHITECTURAL

PERFORMANCE

CONSTRUCTION

PERFORMCE

CERTIFICATION

KNOWN ALTERNATIVES

PERFORMANCE REPORT

ENERGY PERFORMANCE

-SYSTEMS PERFORMCE

AUDITED BIM MODEL

ENGINEERING

-COMPARATIVE COST -CONSTRUCTION BENEFITS -RETURN ON INVESTIMENT -TIMING RISK -SELECTED ITEMS TO BE OPTIMIZED

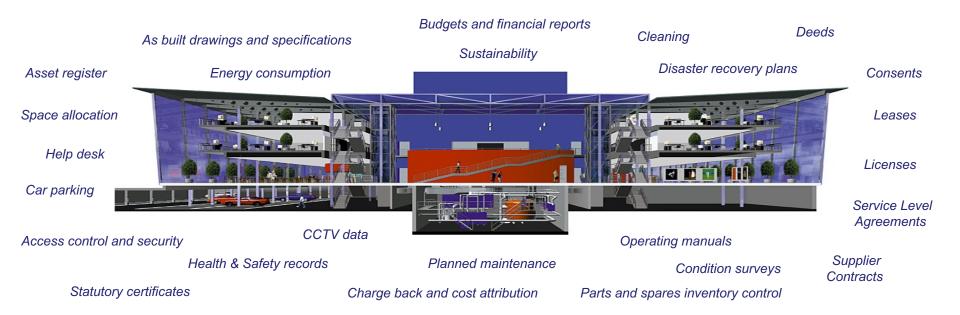
RE-DESIGN -CERTIFIED BIM MODEL





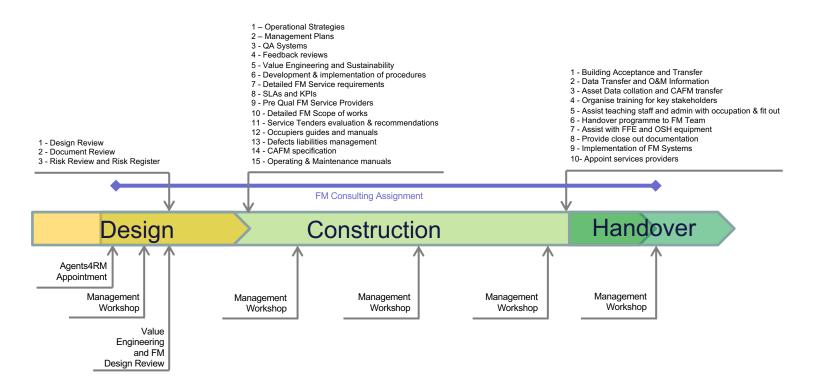
### **Operational perspective of FM**

Managing information is a key component of operations and maintenance...



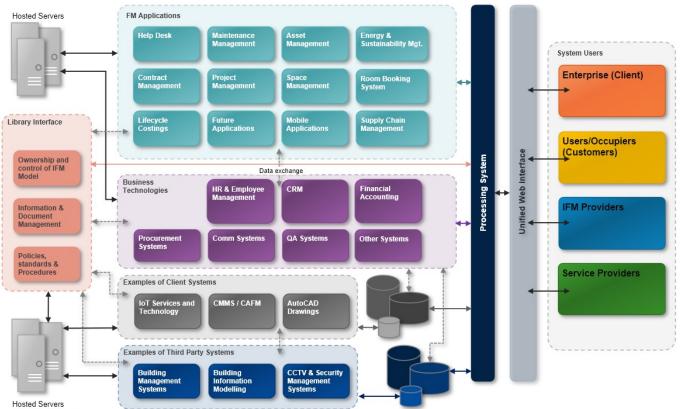


### Whole life cycle perspective of FM





### Agents4RM Integrated FM Model - Technology Schematic





### More to come – today – and in the future...



