FM Trends
Sustainability
Technology
Innovation

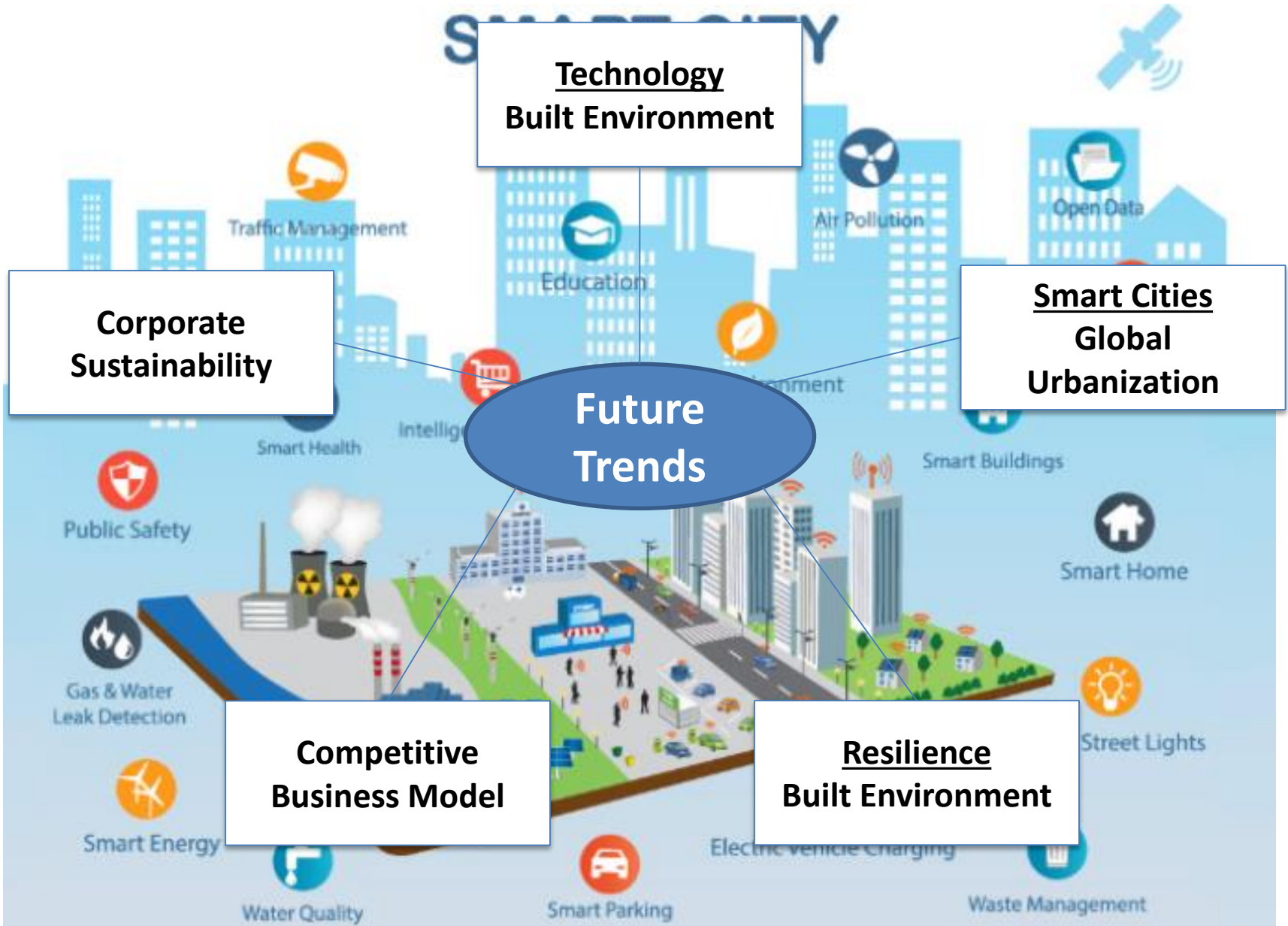**John Carrillo CFM, IFMA Fellow**
Global Chair – IFMA

FACILITY FORUM – JFMA
Edogawa ward, Tokyo
Feb. 19 – 20, 2020

- Why Technology, Built Environment, and Climate Change are Connected

- Key Built Environment Trends
    - Competitive Business Model
    - Corporate Sustainability
    - Smart Cities / Global Urbanization
    - Resilience / Built Environment
    - Technology / Built Environment

- Climate Change Collaboration

- Future Technologies

2

Global Sustainability Trends

Built Environment

Conservation / Corporate Social Responsibility

- LEED/Green
- Acid rain
- Sustainability
- Energy Conservation
- BMS
- Air Pollution
- Recycle materials

Digital Technology

- Renewable Energy
- Smart Cities / Transportation
- Reduce carbon footprint
- Going off grid
- Reduce demo waste

The Future

- Exotic energy
- AI grid
- 3D printed homes / bldgs.
- Non fossil fuel vehicles
- Urban development land use
- Rising sea levels control
- Net zero buildings emission

Global Warming Climate Change

Technology
Built Environment

Smart Cities
Global
Urbanization

Corporate
Sustainability

Future
Trends

Competitive
Business Model

Resilience
Built Environment

- Competitive market driving technology transformation
- Manage business remotely and in real time – Mobile work force
- Empower customer performance results
- Monetize assets (Excessive commercial office space – U.S.)
- Repurpose space with technology
- Financial targets established to improve operation effectiveness and efficiencies
- Supply chain data analytics performance – third party extension
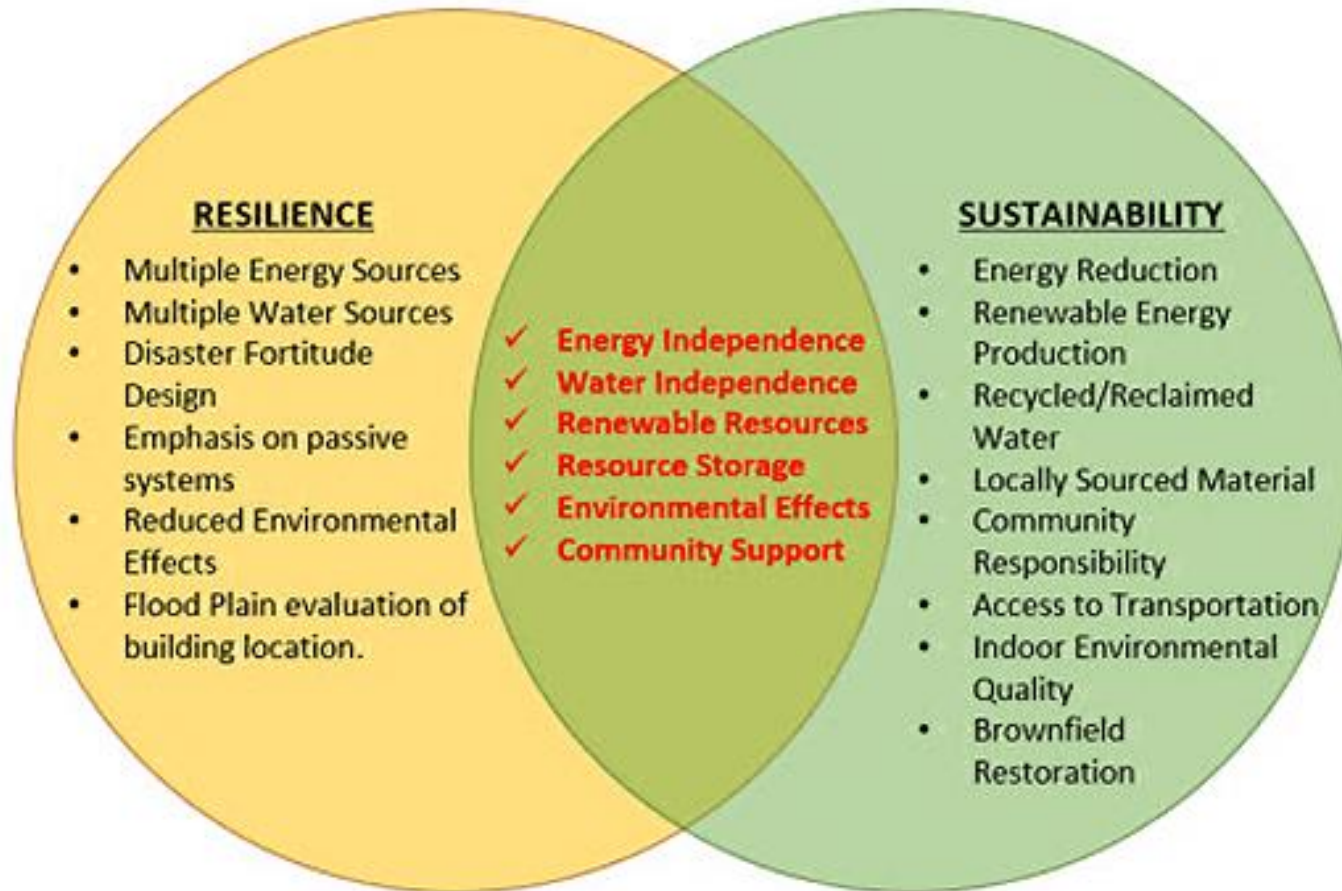- Create a wellness happy/productive work environment
- Enhance cyber security technology solutions

- Reduce carbon footprint
- Alternate renewable energy
- Resources conservation
- Waste minimization
- Move work to people rather than people to work
- Connecting rather than traveling
- Manage business remotely and in real time
- Improve transportation and distribution systems
- Connect people to knowledge economy (E-learning)
- Gender equality unlocks economic growth (U.S.)

- View compliance, environmental requirements, reduce waste emissions
- Focus on green products and reduce carbon foot-print
- Improve transportation and distribution systems
- Green house gas protocol
- Forest stewardship
- Renewable energies
- Rising food demand
- Land shortage housing
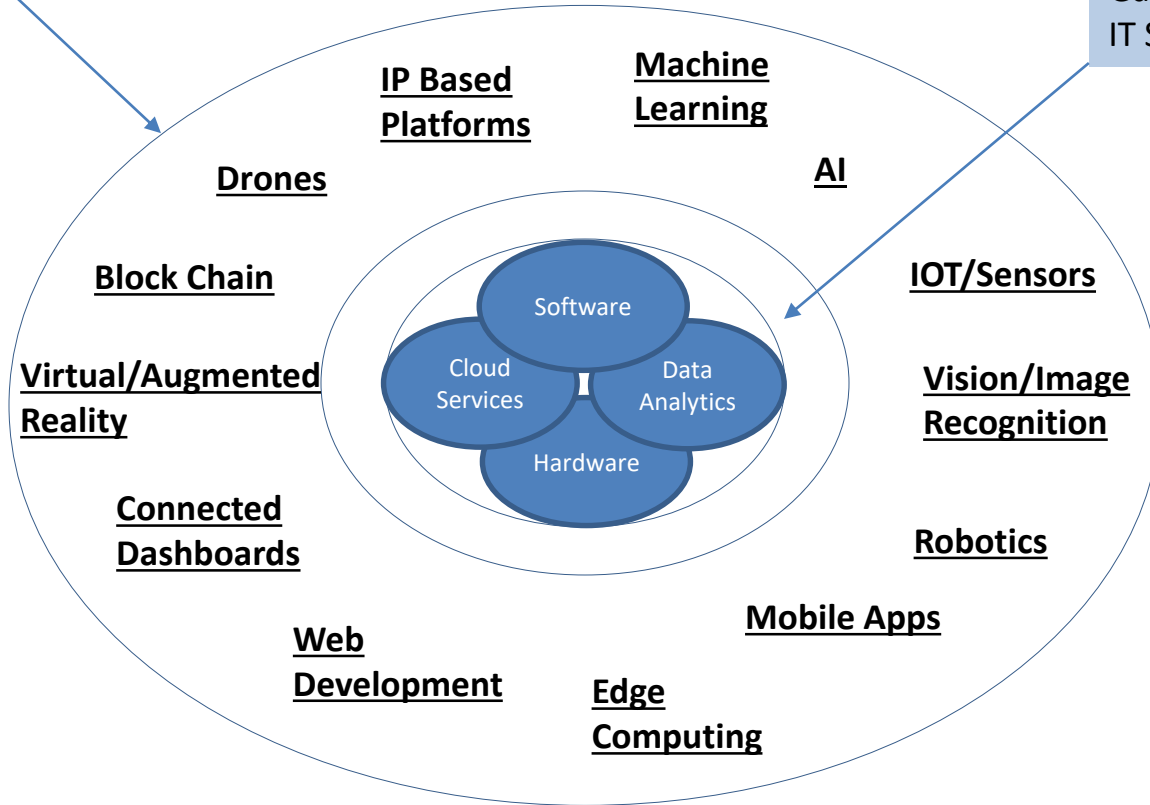- Sinking water resources
- Virtual/connected communities

RESILIENCE

- Multiple Energy Sources
- Multiple Water Sources
- Disaster Fortitude Design
- Emphasis on passive systems
- Reduced Environmental Effects
- Flood Plain evaluation of building location.

✓ **Energy Independence**
✓ **Water Independence**
✓ **Renewable Resources**
✓ **Resource Storage**
✓ **Environmental Effects**
✓ **Community Support**

SUSTAINABILITY

- Energy Reduction
- Renewable Energy Production
- Recycled/Reclaimed Water
- Locally Sourced Material
- Community Responsibility
- Access to Transportation
- Indoor Environmental Quality
- Brownfield Restoration

Why Building resilience is the future of sustainable buildings
Echotape.com

8

Asset Mgmt. IWMS:
Space Assessment
Optimization
Prop. Tracker
Lease Mgmt.
Constr. Mgmt.

Security &
Surveillance

Project Mgmt.
Smart Ceiling/Env. Solutions
AI – A&E/GC
Data Governance Cloud Framework
DC Power for Net Zero Bldgs.
Digital Twin Tech.

IP Based
Platforms

Machine
Learning

AI

Drones

IOT/Sensors

Smart Cities
Platform:
Electrical Grid
Water
Gas
Public Safety
Traffic Control
Environmental
Air Pollution
Waste Mgmt.
Car Charge
Parking
Fleet Mgmt.
Restroom
Carbon Footprint
Transportation

Integrate Exist. Bldg.
Sys. w/ Smart
Enterprise Software:
BMS
BAS
BIM
EMS
CMMS

Block Chain

Virtual/Augmented
Reality
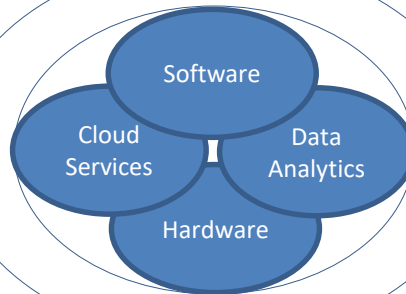
Connected
Dashboards

Vision/Image
Recognition

Robotics

Software

Cloud
Services

Data
Analytics

Hardware

Web
Development

Mobile Apps

Edge
Computing

Smart Bldg. Platform:
Corrective/Predictive Maint.
Extend Equip. Life
Live Temp Adjustment
Prescribed Equip. Replacement

Supply Chain Contracts
– Data Analytics

10

Corporate Built Environment <u>Sustainability Efforts</u>

- Green buildings / materials
- Zero net buildings targets
- Retrofit existing buildings
- Water usage conservation
- Building performance disclosures

TECHNOLOGY →

Human Impact Ecological <u>Elements</u>

- Pollution
- Air
- Water
- Heat
- Noise
- Waste
- Agriculture

…………………

AI: Climate models
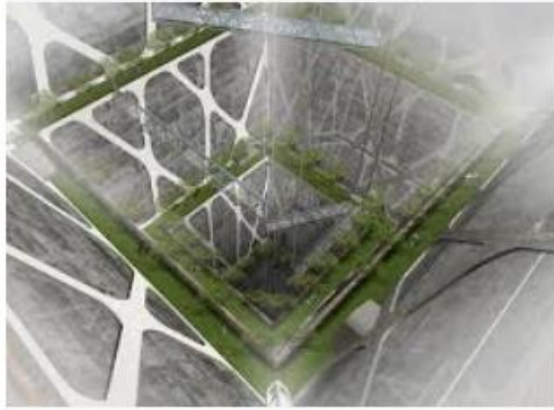
Blockchain: Renewable equip.

5G: Electric / driverless vehicles

IOT/Drones: Net zero carbon bldgs., traffic

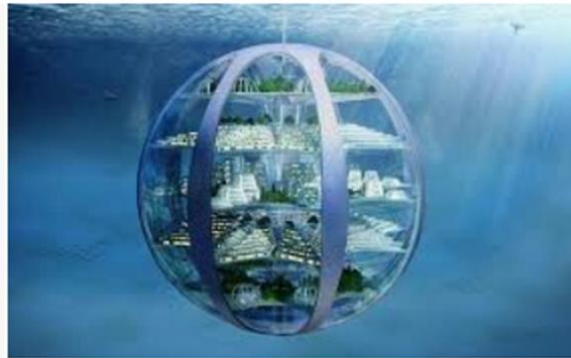← **TECHNOLOGY**

Global Urbanization / <u>Smart Cities</u>

- High traffic
- Urban warming
- Waste recycling
- Energy usage
- Air pollution
- Lack of bio-diversity
- Sinking water resources
- Rising populations / food demand
- Land shortage housing
- Weak social cohesion

11

Earth Scrapers, Inverted Skyscrapers ...
futureworkplace.uk

Too Two Late Bloomers: One Hundred ...
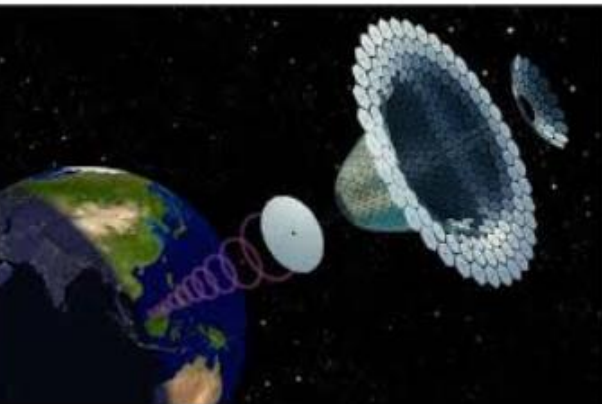twolatebloomers.blogspot.com

Humans will live underwater in 100 ...
telegraph.co.uk

5 Exotic Alternative Energy Proposals ...
listosaur.com

690 × 400
Technology Could Be Nanomaterials
strategy-business.com