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ICT SUMMIT COLOMBIA 2024

Explorando Inteligencia, Digitalización y Sustentabilidad
para el Futuro del ICT.

M A Y O

MARTES 28 Y MIÉRCOLES 29

Agora Bogotá Centro de Convenciones
Bogotá | Colombia

ORGANIZA:

LATAM  **RED**

SMART BUILDINGS

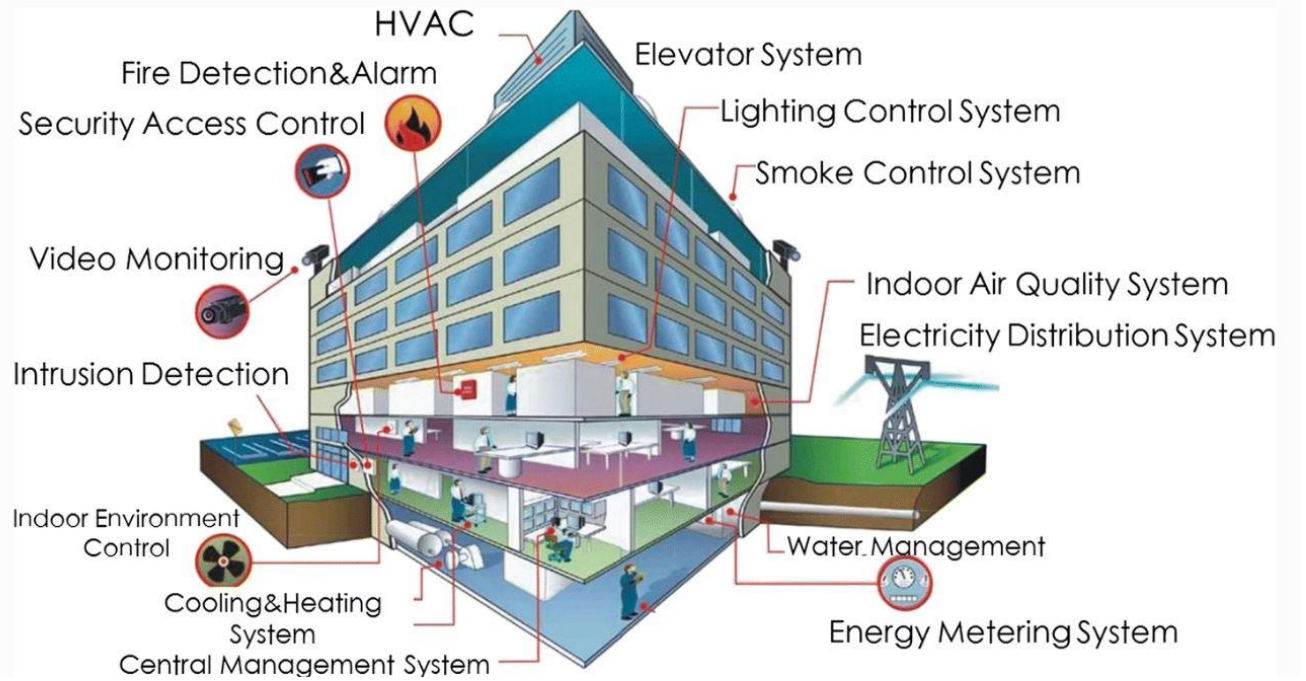
Key to Sustainability



Key Topics

- SMART Buildings
 - Definition
 - Standards & Organizations
 - Sustainability as Concept
 - Case Studies
- Artificial Intelligence & Smart Buildings
- Final Goal → Sustainability
 - Local Success Story





Smart Buildings

Smart Building – In The Beginning

Building Automation and Management			
Functionality and Usability	Building Automation	System Integration/ Interoperability	System Condition/ Performance Monitoring
Demand/User Responsiveness	Building System Control/ Management	Fault Detection and Diagnostics	Utility Management

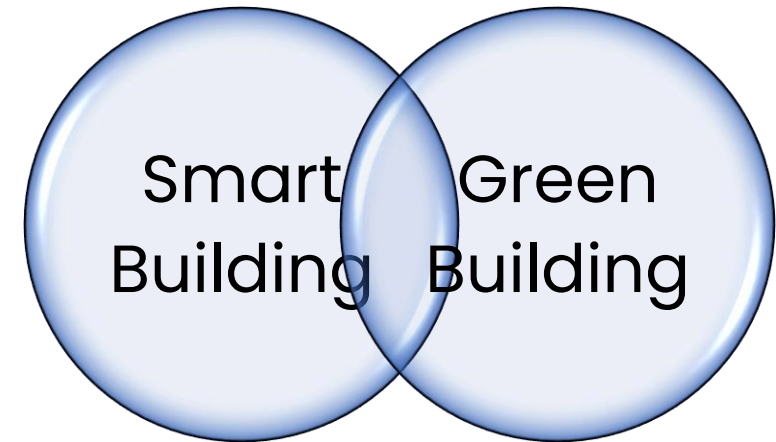


Smart Building - Definition

- Interconnected!
- A building must respond quickly to occupants' requests
 - Occupancy
 - Security
 - Environment
 - Processes & SOPs

Smart Building = Green Building?

- Green Buildings are best defined by GBC's Green Building Tool
 - A Performance Assessment model
 - Utilizes six performance areas:
 - Resource consumption
 - Environmental loadings
 - Indoor environment
 - Longevity processes
 - Contextual factors such as
 - Location
 - Transportation



Standards & Organizations

- Association of Energy Engineers

- Non-Profit dedicated to serve professionals promoting reduced GHGs, and Net-Zero goal

<https://www.aeecenter.org>

- EDGE

- Enables developers and builders to identify cost effective strategies to reduce energy use
- Integrated into the design of projects provided EDGE Auditor services

<https://edge.gbci.org/>

- CEELA

- Energy efficient and thermally comfortable housing & buildings
- Ecuador – Colombia – Mexico - Peru

<https://proyectoceela.com/>



Standards & Organizations

- Telecommunications Industry Association (TIA)
 - SPIRE Smart Building Assessment

<https://tiaonline.org/what-we-do/technology-programs/smart-buildings/>

- Underwriters Laboratories (UL)

- In collaboration with TIA offer – UL's Verified SPIRE Smart Building Rating

<https://www.ul.com/news/ul-and-telecommunications-industry-association-announce-spire-smart-building-verifications-now>



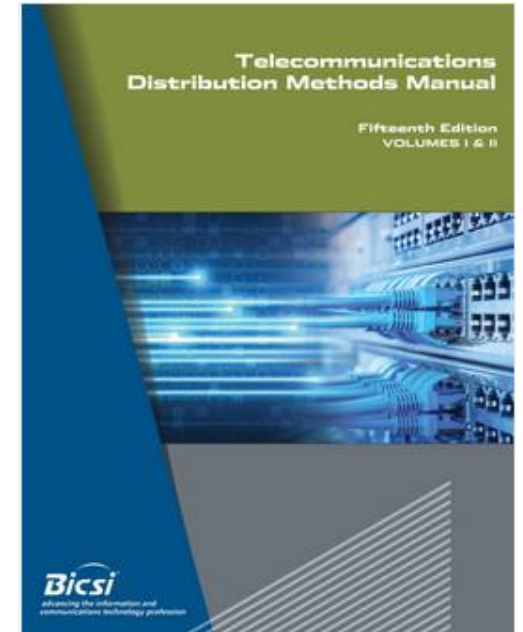
Standards & Organizations

- BICSI
 - Telecommunications Distribution Methods Manual (TDMM) 15th Edition

Chapter 15:
Intelligent Building Systems

Chapter SMETL: Beatriz M. “Betty” Bezos, RCDD, NTS, OSP, ESS,
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Mark Corp, RCDD, OSP, RTPM, BICSI TECH, CT;
Wal-Mart Stores, Inc.

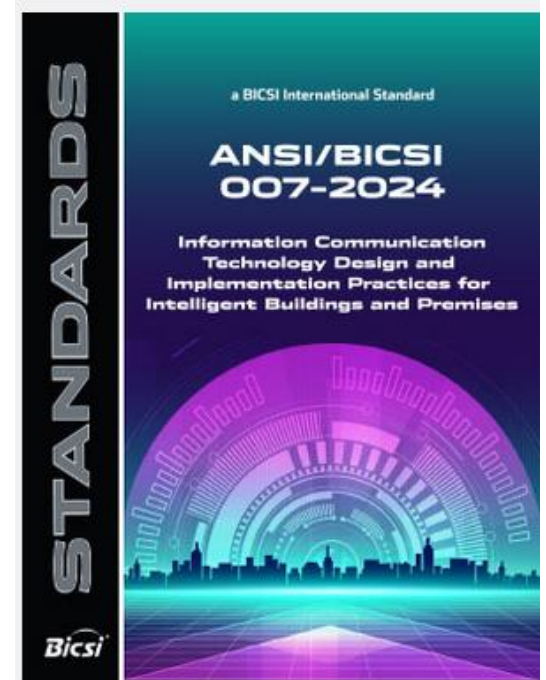


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Standards & Organizations

- BICSI
 - ANSI/ BICSI 007 – 2004
 - Information Communication Technology Design & Implementation Practices for Intelligent Buildings and Premises

<https://www.bicsi.org/standards/available-standards-store/single-purchase/bicsi-007-iot-intelligent-building>



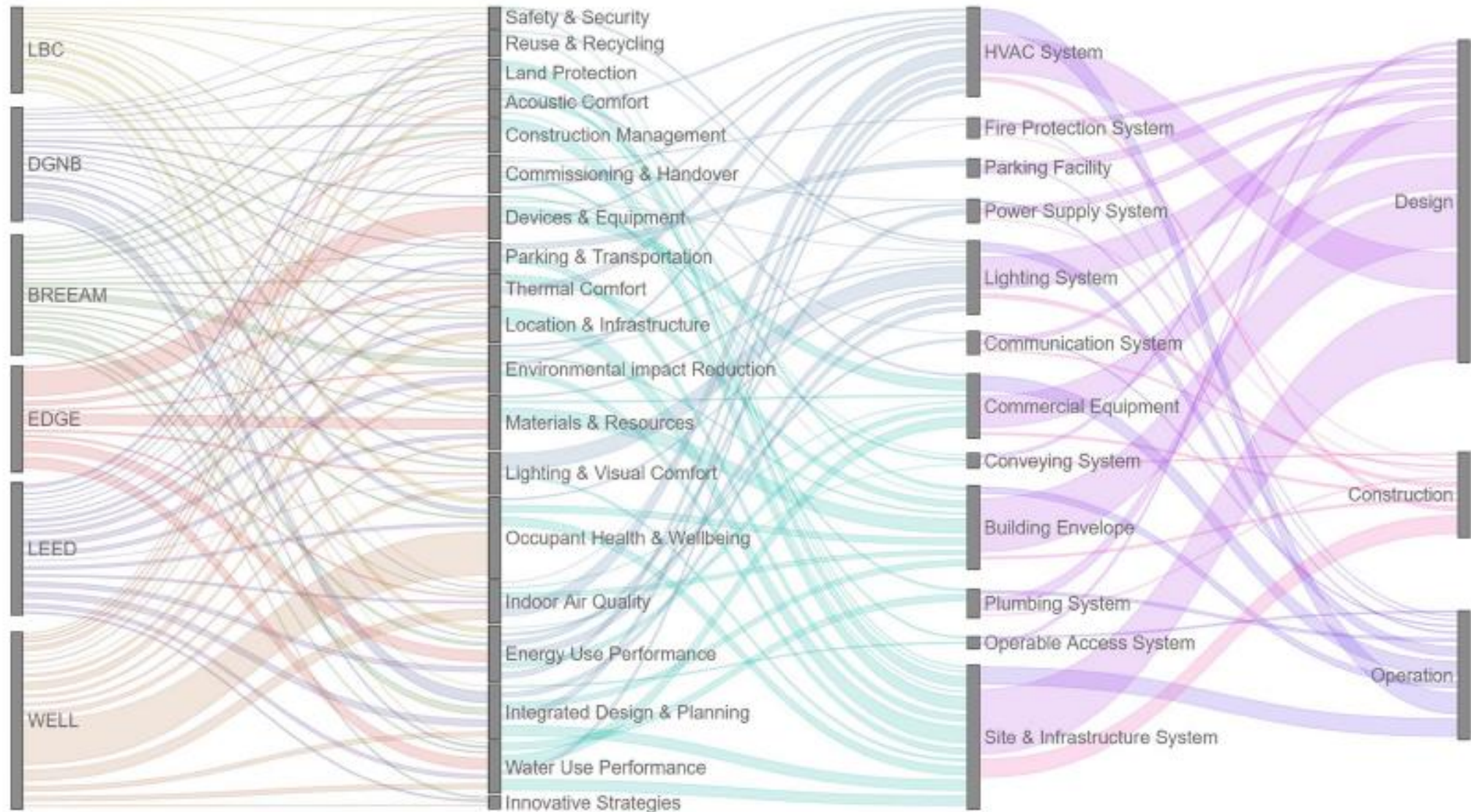
Standards & Organizations

- ISO 37173
 - Smart Community Infrastructure – Guidance for the Development of Smart Building Information systems
- ISO/ IEC 30145-3
 - Information Technology – Smart City ICT Reference Framework



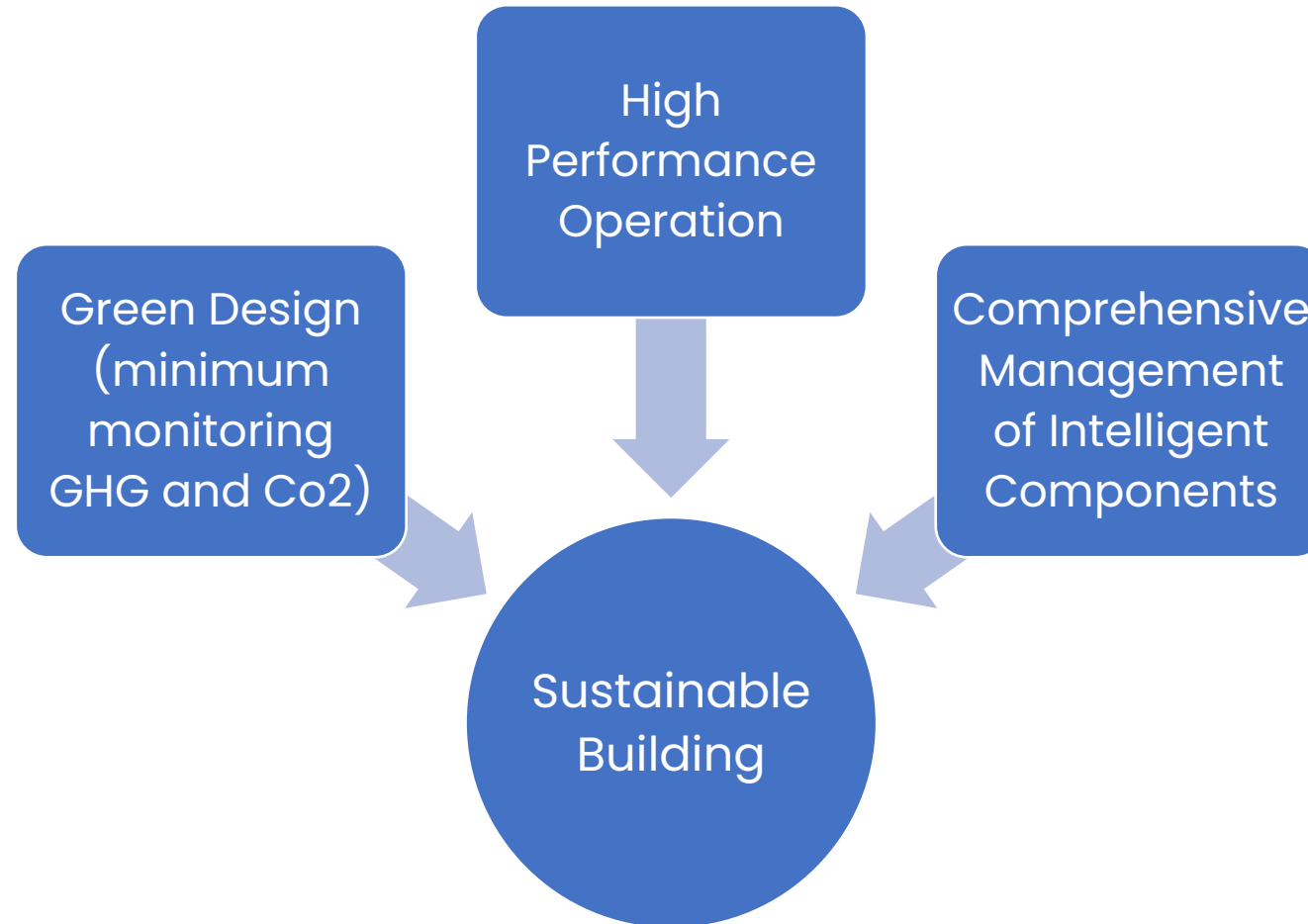
<https://www.iso.org/home.html>

Comparative Analysis of Sustainability Certification Systems



Source: borhani-et-al-2024-an-ontological-analysis-for-comparison-of-the-concepts-of-sustainable-building-and-intelligent

Sustainability as a Concept



Sustainability as a Concept

- Environmental – Economic – Social
- Sustainable Development as part of Architecture & Design

*“Sustainable development is a process in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change are all in harmony, and enhance both current and future potential to meet human needs and aspirations”
(WCED, 1987).*

WCED – World Commission of Environment & Development



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Environmental Sustainability

- Aging electrical power generation infrastructure – Both in Buildings and Cities
 - Increase in Projects promoting energy efficiency
 - Integration of communications using technology
 - Control and building systems in a unified network
 - Management from a central operations center
 - **GOAL – a building that knows when and where a building is occupied**
 - HVAC and Lighting management



Economic Sustainability

- Important concept
 - Business is making a profit while addressing environmental concerns
 - Contribute to financial welfare of the owners, the employees and the community
- Smart Buildings are not just for advanced countries & economies!



Economic Sustainability

- Smart Buildings

- Yield cost reductions through optimizing automated control & management systems

Source: Intelligent Buildings International (IBI)

- Example: A robust security infrastructure will reduce OPEX as fewer security personnel making rounds and physically monitoring doors, activities and entry/ exit points

- Occupancy & thermal sensors
 - Integration with calendars to assure access is validated



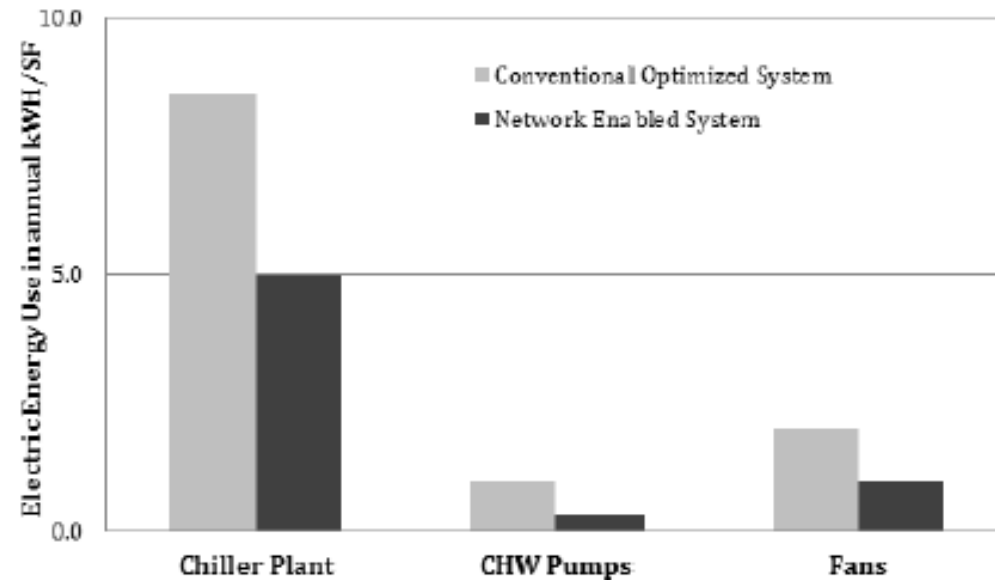
Economic Sustainability

- Occupancy & thermal sensors
 - Integration with calendars to assure access is validated & thermostats set when a meeting is planned for a conference room
 - Also – when a person returns to an office thermostats & lights are reset
- Great resource – USGBC documents



Economic Sustainability

- Cooling Systems



Conventional optimized control vs. network control: cooling system electric use per square foot for an office building (Source: Hartman, 2005)

Source: Journal of Engineering, Project, and Production Management, 2014,

Social Sustainability

- Based on the concept that

“Future generations should have the same or greater access to social resources as the current generation (inter-generational equity), while there should also be equal access to social resources within the current generation (intra-generational equity) ”

Social Sustainability

- Role of Human Intervention
 - In a Smart Building – Do people prefer to oversee their surroundings or are perfectly satisfied by the independent job done by the intelligent building systems?
- How to best communicate the actual reduction in Green House Gases (GHG) and CO₂ Emissions?
 - Use Apps to share relevant information with occupants!
 - No more Micro-Management of resources



Social Sustainability

Reuse and Recycling	
Reuse of Equipment/ Materials	Recyclables Collection and Storage
Waste Management Plan	Diversion of Waste Disposal from Landfill
Recycling Services for Occupants	Waste Input Reduction

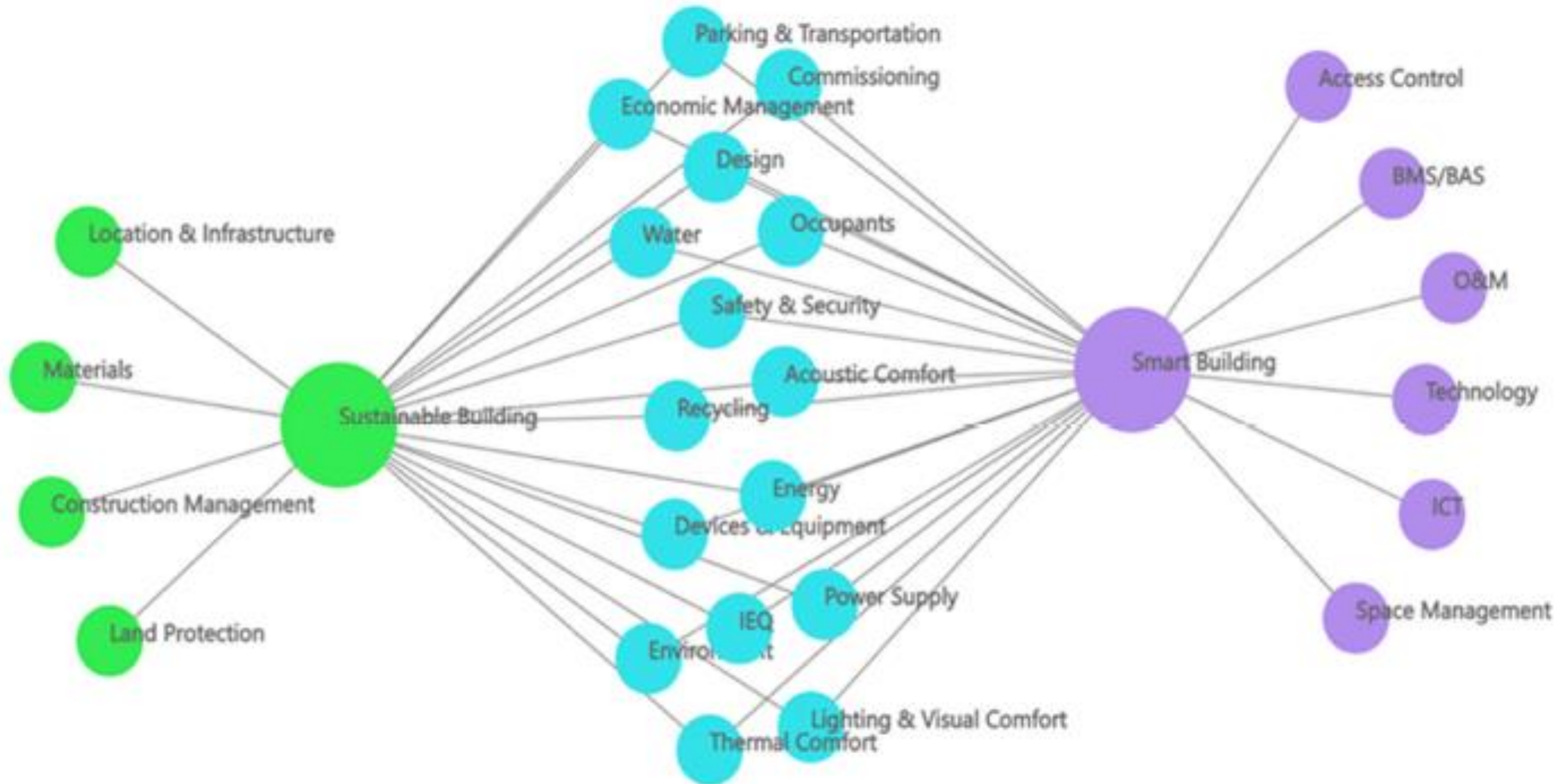


Fig. 8. Overall comparative analysis of the intelligent and sustainable building components.

Source: borhani-et-al-2024-an-ontological-analysis-for-comparison-of-the-concepts-of-sustainable-building-and-intelligent

SMART Building Technologies – Case Studies

The U.S. Green Building Council
(USGBC) Headquarters, USA

- Lighting system controlled off of an IT backbone
- Motorized window shades
- Occupancy sensors for lighting and plugs
- Automated temperature modulation
- Integrated lighting and HVAC system
- Ventilation system with two-position diffuser
- Sub-metering



SMART Building Technologies – Case Studies

Asia Square Tower 1, Singapore

- Integrated Intelligent Building Management System
- CO2 sensor system
- Photo sensors
- Air Handling Units with ultra-violet emitters
- Zoned HVAC system
- Property management system
- Smart card access system with proximity card readers
- Automated destination-controlled lift system
- CCTV surveillance
- Guard Tour System
- Fire Protection System
- Multiple communications and information risers





Artificial Intelligence & Smart Buildings

Integrating AI in Smart Buildings

- Power of AI
 - Compare large amounts of data and scenarios more quickly and accurately than humans can
 - During design
 - Analyze many design options, costs and energy performance
 - During operations
 - AI can predict failures by reviewing warnings
 - Predictive Maintenance can be scheduled before a failure eliminating down time in Mission Critical installations
 - Missions Critical – such as Hospitals, Data Centers...



Rethinking Buildings in the age of AI

- According to ASHB
 - An AI-enabled smart building can incorporate the use of IoT devices for real-time data capture, sensor technology for utilization metrics, intelligent automation for accomplishing day-to-day facilities tasks, and predictive analytics to optimize performance
 - AI will enable the building to leverage operational data to inform decisions and respond to the immediate and future needs of the occupants.

Rethinking Buildings in the age of AI

- Affordability of technologies have brought AI to buildings

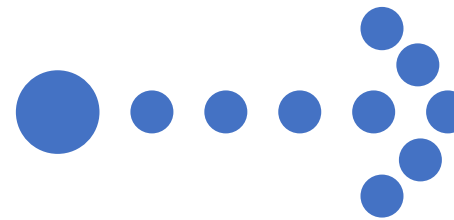
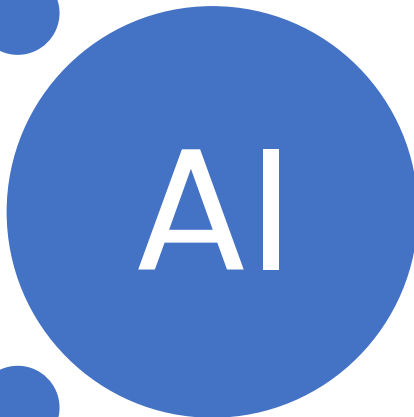
Analog Data



Siloed



BMS



Rethinking Buildings in the age of AI

- Occupancy data drives processes
 - Air quality?
 - Is the building safe for occupancy?
 - Where are the occupants?

Optimization of algorithms to predict and analyze

Rethinking Buildings in the age of AI

- Occupant's cellphone / ID badge
 - Optimize temperature
 - Minimize hot-cold calls to maintenance
 - Machine learning
 - If Fridays are low occupancy – learn!

AI Collects the Data and facilitate the operation of the Building

Rethinking Buildings in the age of AI

- Software innovation
- New generations expect AI & Machine Learning
 - They grew up with cellphones & Apps!
- App Driven World
 - Location based services
 - Where is the Conference Room?
 - Where are the restrooms?
 - Security - Environment

Rethinking Buildings in the age of AI

- Digital Twins
 - What??
 - Concept is to take data and create a 3-D version of the building that **pulls real time** data of the building operation from all sources
 - Prediction:
 - Weather
 - Predictive occupancy
 - Age of assets



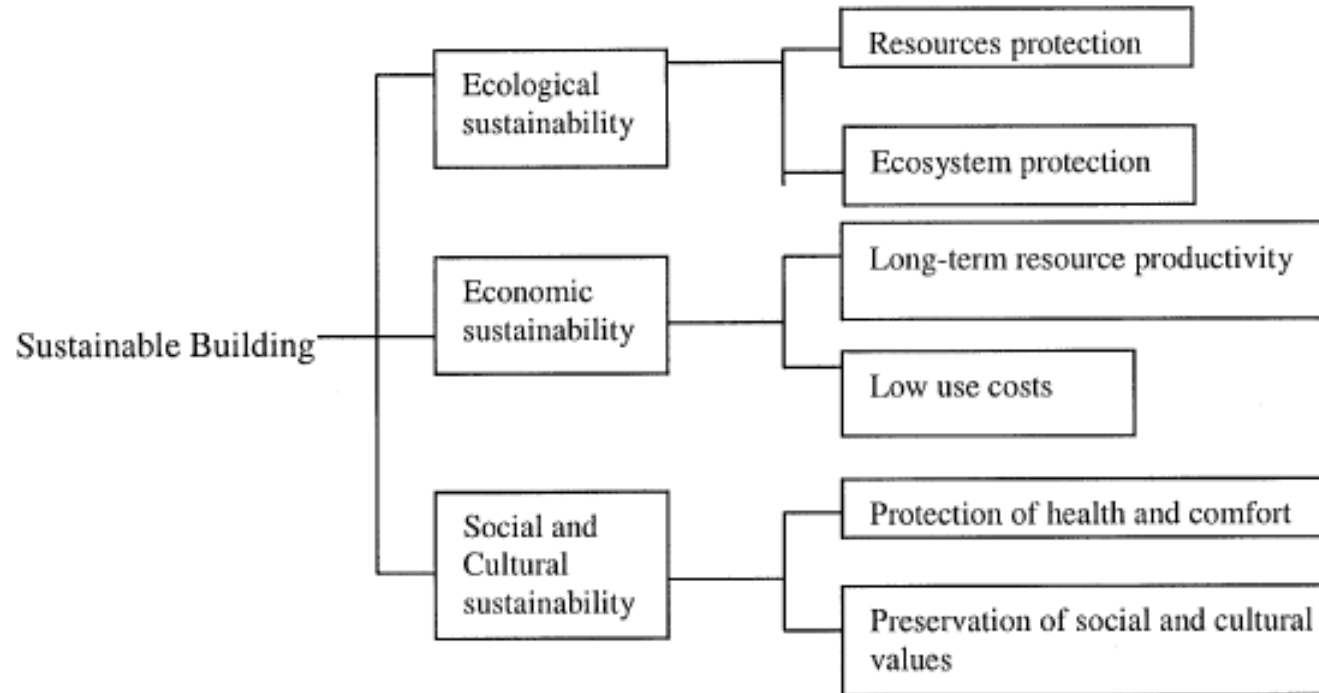
Rethinking Buildings in the age of AI

- A true SMART Building
 - Will NEVER have a work order ticket created
 - The Building will predict – schedule – resolve
- Will not ever have “Data Analysis Paralysis”



Final Goal → Sustainability

Final Goal -



Final Goal -



Local Achievements

How Colombia's "golden" airport achieved LEED Platinum



<https://www.gbci.org/how-colombia%E2%80%99s-%E2%80%9Cgolden%E2%80%9D-airport-achieved-lead-platinum>

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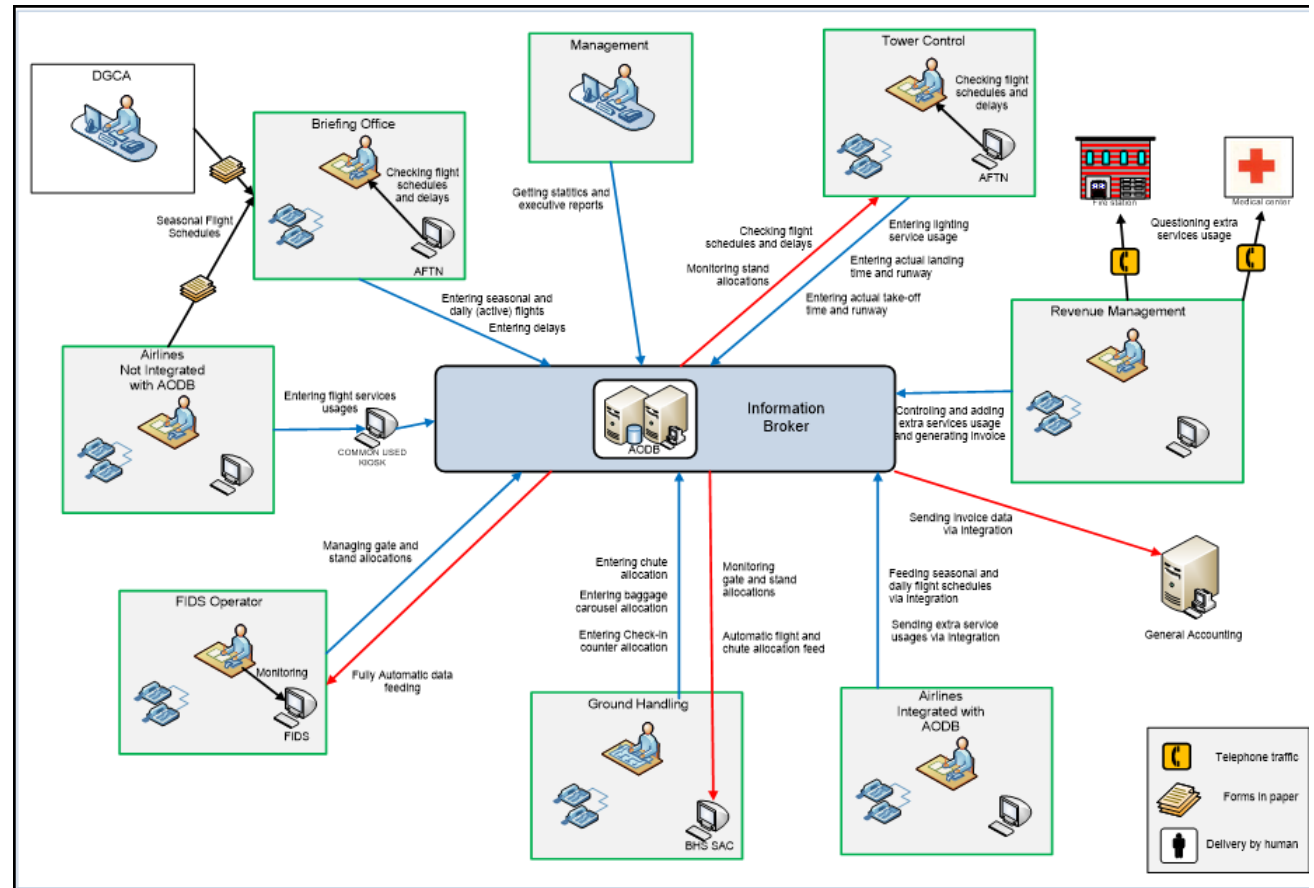
Aeropuerto El Dorado

- Goal of net zero waste using a local standard, followed by a commitment to reducing CO2 emissions, along with goals for energy efficiency improvements to lighting and HVAC systems, and the addition of onsite renewable energy generation
- Responsible consumption and production within the airport as an economic ecosystem, aligned with the U.N.'s Sustainable Development Goal 12



What is integrated at the Airport?

- **Airport Information Management System and Integration**
- Common Use Passenger Processing System
- Resources Management System
- Baggage Reconciliation system
- Electronic Visual Information Display System
- Computing and Storage Systems
- Security and Access Control System
- Video Surveillance System
- Passenger Screening Equipment
- BHS Security and Customs Screening Equipment
- Plus Many More!!



Additional Resources

- ASHB – ashb.com
- Demonstration intelligent building—a methodology for the promotion of total sustainability in the built environment (H.W. Kua, S.E. Lee)
- Intelligent Buildings: Key to Achieving Total Sustainability in the Built Environment (Tulika Gadakari¹, Sabah Mushatat, and Robert Newman)
- An Ontological Analysis for Comparison of the Concepts of Sustainable Building and Intelligent Building (Alireza Borhani, Ph.D.; Atieh Borhani; Carrie Sturts Dossick, Ph.D., M.ASCE; and Julie Jupp, Ph.D.)





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