

Existing Buildings 2023: Building Technology and Retrofits

December 6, 2023 | Session Overview

Panel

John Turner, CEO, Gafcon Digital, Inc., San Diego

Beth Eckenrode, BS-IE, MBA, Co-Founder, AUROS Group,
Pittsburgh

Todd Lukesh, Engagement Manager, Gafcon Digital, Inc., San
Francisco

Moderator

Johnny Fortune, Executive Director, National BIM Program, National
Institute of Building Sciences

Building Technology And Retrofits Overview

Sustainability and resilience retrofitting are possible through the use of cutting-edge technology and tools.

Building information management and modeling are two keys to unlocking the success of existing building retrofits. Implementation of these tools optimizes the design and construction process.

Building information modeling has the capacity to coordinate numerous types of data input, such as energy models and 3-D design, which offers architects, engineers, and contractors the ability to visualize and simulate projects before they are built. In turn, the AEC community has the ability to control and track their projects in a highly effective manner.

On December 6, 2023, the National Institute of Building Sciences hosted a webinar on building technology and retrofits, discussing how these technologies help achieve

sustainable and resilient retrofitted buildings, while achieving ratings and certifications in shorter periods of time.

The panel included John Turner, CEO, Gafcon Digital, Inc.; Beth Eckenrode, BS-IE, MBA, Co-Founder, AUROS Group; and Todd Lukesh, Engagement Manager, Gafcon Digital, Inc. The webinar was moderated by Johnny Fortune, Executive Director, National BIM Program, NIBS.

Performance-Based Digital Twins to Bridge Gaps

Todd Lukesh, Engagement Manager with Gafcon Digital, Inc., kicked off the Building Technology and Retrofits webinar, covering building consumption and energy use.

“Buildings consume 40 percent of global energy,” Lukesh said.

He described different scopes of greenhouse gas (GHG) emissions, mostly covering direct emissions from

operations (Scope 1) and indirect emissions from purchased energy (Scope 2).

Scope 1 emissions come from sources that an organization directly owns or controls (i.e. burning fuel in a fleet of vehicles, if the vehicles are not electrically powered). An example of Scope 2 emissions are those emissions from the generation of the electricity they are powered by.

Performance-based digital twins can help to bridge the gaps of sustainability impacts. Digital twins:

- Generate data when there is poor quality data or data is unavailable
- Provide physics-based simulation using virtual sensors and to augment physical sensors
- Lead to proactive building performance using virtual time and money to run ‘what if’ scenarios
- Help de-risk investments through leveraging digital twin performance – ‘try before you buy’ metaphor
- Provide bidirectional communication between physical and digital assets for closed-loop optimization

“This allows us to make informed, intelligent decisions,” Lukesh said. “By using a calibrated digital twin, you have the ability to make a change to the model and in turn, it updates the building. You make a change to the building, it updates the model in real-time operations.”

Digital Building Lifecycle and a Building’s Potential

The Digital Building Lifecycle utilizes proactive digital twins for building performance and sustainability (BPS) components.

From the start, proactive digital twins can be used in planning to determine ESG+H potential scalability, risk, and financial impacts. In design, digital twins could simulate ‘what if’ options for existing assets. During construction, they can be used to monitor construction, retrofits, and aggregate data to make informed decisions that optimize building operations throughout the lifecycle of the building asset.

Beth Eckenrode, Co-Founder of AUROS Group, said a physics-based model with simulation abilities is “how we reduce risks.”

“Let’s say [we want to tackle] decarbonization of an existing building,” she said. “You don’t want to overspend or get your timing wrong. Digital twins will allow you to proactively predict performance, and we use that technique to decarbonize a building.”

“By leveraging a digital twin approach, you’re identifying where a building’s performance baseline is today how best to reach its optimum decarbonization potential”, Eckenrode said.

A Whole Building Optimum Decarbonization Model helps segment potential energy conservation measures (ECMs) into three categories based on active ECMs, passive ECMs, and renewables systems.

What Is a Digital Thread?

Gafcon Digital, Inc. CEO John Turner broke down the definition of a digital thread.

“[This] links all the phases of the building lifecycle together so we’re not losing data,” Turner said.

There are all sorts of digital twins uses cases throughout a building’s lifecycle.

Digital thread integration starts in the early concept phase through planning, design, procurement, construction, and lifecycle operations.

“When you are applying it within the existing built environment, it’s like taking pieces of a jigsaw puzzle and bringing them into this new form,” he said. “We need to gather the right data in the correct form.”

The Three Cs And Key Takeaways

The idea of the “Three Cs” allows everyone to start working together on a project with a common understanding of what everyone else is doing. This means:

- Communication. The elimination of paper and paper-

based systems through digitization allowing our communication to be more effective and delivered via users' system of choice.

- Collaboration. Communication enables and drives collaboration. Integrating a digital building lifecycle approach consolidates that collaboration and drives the need to rethink project delivery frameworks.
- Correlation. When all parts are coordinated, process standardization produces clean data that provides information and with learning can be transformed into knowledge.

When it comes to building retrofits, successful outcomes require collaboration of all stakeholders across the building lifecycle. The integration of a digital thread enables the collaboration to link the potential performance with reality to close the performance gap.

Thank You for Joining Us for Existing Buildings 2023

The Existing Buildings webinar series covered the whys and hows of retrofitting structures.

Revisit the series recordings and session notes:

- [July 12 – Green Building Retrofits](#)
- [October 24 – Retrofitting for Resilience](#)
- [December 6 – Building Technology and Retrofits](#)

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