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# How Can People Realistically Use Industry 4.0 Technologies?

**ATLANTA**—A portion of the HVAC&R industry moved from the office to working at home during the COVID-19 pandemic. This transition facilitated the implementation of Industry 4.0 technologies.

“All stakeholders in the HVAC&R ecosystem are pivoting to digital connection to survive and thrive during the pandemic,” said 2020–21 ASHRAE President Charles E. Gullledge III, P.E., HBDP, Fellow ASHRAE.

Gullledge talked with *ASHRAE Journal* staff about how people can realistically use these technologies.

## Why is now a good time for the HVAC&R industry to adopt Industry 4.0 strategies?

Force and maturation are driving the need to evolve with Industry 4.0. From a force perspective, the COVID-19 pandemic is exposing the need to distance people and exercise responsible administrative control as a risk mitigation response.

From a maturation perspective, innovators are realizing connected knowledge is critical to holistic collaboration, increasing productivity, removing waste, improving profit margins and eliminating rework. All stakeholders are realizing these benefits. Innovation is driving the market.

## What are some realistic ways people can use these strategies?

The journey to Industry 4.0 begins with all HVAC&R stakeholders embracing a shift in how we approach work. The simple, but monumental, pivot from static

geometry to dynamic information is where it all begins.

Allow me to expand on what that foundational evolution yields: the application of smart objects allows us to create an evolving 7D building information modeling (BIM) model of our built solution. One collaborative model reveals:

- Virtual precision shows where work results are to be performed. The model provides a constructible template.
- Procurement detail can be embedded with the objects to track cost.
- Labor factors can be linked to develop realistic schedules for on-site and off-site work results.
- A smart model provides the basis for real-time performative simulation and comparative analysis, all linked to economy and time.
- Operations and maintenance information can be embedded with the smart objects to facilitate knowledge transfer to the owner.
- The embedded model knowledge can facilitate vertical supply chain management of procurement for materials and equipment. Touch points are minimized.
- Data can be extracted from the model to cut and configure pipe, duct and supports. Productivity is improved. Waste is minimized.
- The vertical precision of the model allows work results that would normally all be done in the field to be strategically moved off-site. Correctly applied off-site work can result in shorter project schedules, reduced costs, improved

job-site safety, waste reduction, improved labor productivity and better quality control.

- The knowledge capacity of the model evolves into a dynamic digital twin for the owner to use for effective building operations. Data collection points



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are identified and linked. Data is collected and stored representing an evolving profile of past and current behavior. Algorithms are used to mine the data lake searching for trends and patterns. Actionable intelligence, reactive and predictive, is identified for owner resolution.

This is a simple narrative of how we connect the cyber-physical transformation that Industry 4.0 offers. ■

## Explore Industry 4.0 Technologies

**ATLANTA**—The inaugural ASHRAE Virtual Design and Construction Conference will help the industry learn how to apply cutting-edge technologies in the design, construction and operation of HVAC systems. The March conference will address augmented reality, digital twins and generative design. Visit <https://tinyurl.com/y6cvosdm> ■

# Innovation Awards Winners Named

ATLANTA—AHR Expo announced the winners of the 2021 AHR Expo Innovation Awards in 10 industry categories in November. The awards recognize some of the most inventive and original products, systems and technologies in the industry.

The 2021 AHR Expo Innovation Awards winners are:

- **Building Automation:** Infinitem Electric
- **Cooling:** Emerson
- **Green Building:** Advanced Cooling Technologies
- **Heating:** Viega LLC
- **Indoor Air Quality:** Des Champs Technologies
- **Plumbing:** Caleffi Hydronic Solutions

- **Refrigeration:** Officine Mario Dorin Spa
- **Software:** Willdan
- **Tools & Instruments:** INFICON
- **Ventilation:** Aldes

Show Management, co-sponsors ASHRAE and AHRI and the Innovation Awards panel of judges wish to honor the 2021 award winners despite the recent cancellation of the live event.

For the full list of winners and finalists, visit: <https://tinyurl.com/2021-ahr-today> ■



# BACnet Standard Could Increase Cybersecurity

ATLANTA—New capabilities in the 2020 version of the BACnet standard include lighting and elevator device profiles that provide a standardized description for these types of devices, along with audit reporting and logging to capture auditable actions.

The 2020 edition also includes BACnet Secure Connect, a BACnet datalink layer that is fully compatible with all existing BACnet datalinks and provides an interoperable and secure path for BACnet communications.

Michael Osborne, P.Eng., Member ASHRAE, chair of Standing Standard Project Committee 135, discusses the standard's latest update.

## What do engineers need to know about the 2020 edition of the standard?

In the last four years, SSPC 135 has added significant features and subtle improvements to the standard. The features include audit reporting, lighting and elevator profiles and a secure datalink. Improvements include clarifying schedule BACnet Interoperability Building Blocks (BIBBs) and improving BACnet Web Services.

## What are some of the most significant changes?

The most significant three additions to the standard are audit reporting, the new lighting and elevator BIBBs and profiles and BACnet Secure Connect.

## How will BACnet Secure Connect (BACnet/SC) affect engineers/industry professionals on a building-level and on a community-level?

BACnet/SC adds interoperable cybersecurity to the IP level of a building automation system. BACnet/SC is

designed to work with existing infrastructure to allow a building automation system (BAS) to be strategically updated without incurring a large initial cost outlay or, if desired, BACnet/SC can be deployed across the entire system.

BACnet/SC was added to the standard to allow BTL Listed BACnet devices to add BACnet/SC while not incurring excessive retesting costs. Cybersecurity is not free. Engineers and facility managers will need to understand the consequences of adding cybersecurity to a BAS system. They will also need to understand how to deploy BACnet/SC and how to support and expand it to maintain a secure and viable system.

## What were some challenges the SSPC faced when updating Standard 135?

Of the 17 addenda to Standard 135-2016, the most significant effort was BACnet/SC.

Understanding cybersecurity and understanding the complexities of providing a secure solution to a BAS system were significant challenges. Developing an interoperable, extensible and deployable solution was an even bigger challenge.

Many members invested significant time and effort to research cybersecurity and how it could be deployed in both new and existing BAS systems. Other members brought expert insights to the committee meetings to assist in understanding the complexities of cybersecurity. In the end, it took the committee over five years and three public reviews to publish BACnet/SC. ■