

‘Designers are not always focused on operability during the design process. They need to transfer their great design into effective operations.’



Darryl K. Boyce, P.Eng., 2019 – 20 ASHRAE President

Building for People and Performance:

Achieving Operational Excellence

Growing up my father owned a logging company. In order for him to keep work, we regularly moved to new locations, including remote islands off the west coast of British Columbia, Canada. My childhood memories are of being around large equipment and the rugged individuals who operated and maintained that equipment.

After the logging business closed, we continued to move around and I attended several schools.

At 14, my father left our family. My mother, younger sister and I were left on welfare.

I was thrust into the role of “man of the house” and became the chief operating officer of our sub-standard housing. There was no money to hire a plumber or electrician, so I was in charge of repairing any plumbing or electrical problems in the house.

I began to appreciate the importance of safe, healthy and effective building operations.

At 15, I went on a junior high-school trip to the local university. We toured the power plant. Again, this large

equipment fascinated me. So, I asked, “Who is responsible for all of this equipment?”

The tour guide replied, “mechanical engineers.”

When we returned to class, we had to write a paper about future careers that interested us. I wrote about mechanical engineering.

It was then I caught the bug.

My first post-high school education was mechanical engineering technology, production orientation. But my first permanent job was as an HVAC mechanical systems designer at the University of Alberta.

When I received my assignment to design a ventilation system, I went to the senior designers and asked for

some help. They pointed to the *ASHRAE Handbooks* and said, “All you need to know is in those four volumes.”

I was on my ASHRAE journey.

At 27, Francine and I were married. I quit my full-time job at the university and enrolled in the engineering program—mechanical engineering! During those four years, I continued to work part-time as a mechanical systems designer.

Looking back I can see the thread. My thread:

- A 14 year old maintaining sub-standard housing;
- A junior high schooler learning about mechanical engineering; and
- A young technologist discovering the value of THIS society.

I was learning and becoming passionate about the idea that “making or building things” is just not enough. We must ensure operational performance for the people who live, work and interact in them.

People must succeed within the buildings we create.

It makes sense to pause and ask, “Why?” Why should we care about operational performance?

There are four reasons this message makes sense for us:

1. We own the buildings we design, build, commission or operate. “That’s MY building.” It’s part of each of us.
 2. It aligns with our ASHRAE mission of “advancing human well-being.”
- I bet most of you think that the “HR” in ASHRAE stands for heating and refrigeration. It really stands for people, the human resource—the “HR” at the center of ASHRAE.
3. As a building owner-operator, I can assure you that the building operators need your help.
 4. It’s good for the planet by reducing the environmental impact of building operations.

So, now we know why operational performance is important. Now let’s take a look at the current state:

Buildings are falling short on operating to the expectations of the building designers and operators.

- The Alice Turner Branch Library in Saskatoon, Saskatchewan, Canada, is using 58% more energy than the design intent;
- The Roblin Centre at Red River College in Winnipeg, Manitoba, Canada, is using 69% more energy than the design intent; and
- The Surrey District Education Centre in Surrey, British Columbia, Canada, is using 203% more energy than the design intent.

Here’s why:

There are three key reasons.

1. First, our great designs are not always delivering great operations. Designers are not always focused on operability during the design process. Designers need to transfer their great design into effective operations. Great designs warrant great operability.
2. Second, buildings are more complex. Technology. We design technology to help improve operations, but it doesn’t always end up that way.

Technology is not evil. We can have unrealistic expectations and it can be misused. In 2010, we opened a state-of-the-art engineering building with Power over Ethernet (PoE) controls, as well as enhanced sub-metering of equipment, lighting and plug loads. But we found that the additional data/information was overwhelming our control technicians.

3. Third, operators are lagging behind. Operators are being overwhelmed. Generally, they do not have the skills to operate today’s buildings and are not properly trained. At building turnover, operators are rarely properly oriented.

Several post-occupancy studies, “Do our green buildings perform as intended,” the UK-based “1996–2001 PROBE Project,” and “2006–2010 Low Carbon Buildings

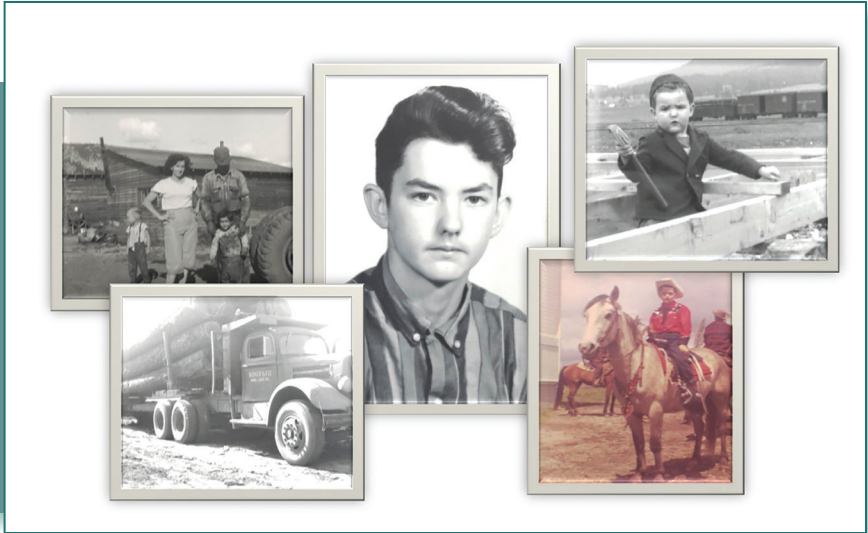


Darryl K. Boyce, P.Eng, Fellow/Life Member ASHRAE, is ASHRAE’s President for the 2019–20 term. Boyce has previously served on the board of directors as treasurer, vice president and director-at-large. He is the recipient of ASHRAE’s Distinguished Service Award, Exceptional Service Award and Regional Award of Merit. In addition to his time served on the Board of Directors, Boyce has served as chair and coordinating officer for the Finance Committee and chair of the Members Council, Appointments Roadmap Committee and President-Elect Advisory Committee.

Boyce has held ASHRAE Society-level leadership roles on many standing committees, technical committees and presidential ad hoc committees. Equipped with his extensive ASHRAE experience, Boyce plans to focus on how to improve operational performance of buildings by understanding and reducing the challenges between design, construction and operations.

Learn More About the President | www.ashrae.org/president

‘My childhood memories are of being around large equipment and the rugged individuals who operated and maintained that equipment.’



Performance,” identified the following key causes of performance slippage, resulting in energy consumption being much higher than modeled targets:

- Buildings were designed with systems that exceeded the capacity of the building managers to operate them. The study found a correlation between building performance and the quality of the management.
- Systems were complex and/or innovative, requiring several years to refine and understand.
- Insufficient commissioning. The study found a correlation between performance and level of commissioning.

We are not the only organization that is concerned about the state of building operations.

A 2017 IFMA Research study, “Raising the Bar: From Operational Excellence to Strategic Impact in FM,”

concluded that:

- Facilities management must adopt technology more quickly and far more deeply. It must move beyond technology to monitor space utilization and energy consumption. And we need to focus on using technology, data and analytics to enhance the workplace experience. *“We believe that mastering the ‘digital age’ means applying new forms of technology both to enhance the management of facilities and to create new kinds of work experiences.”*

This may be the single most important challenge facing facilities management professionals today.

So, let’s talk about what we can do to ensure that people succeed in the buildings that we create:

- Include the building operations team representative all the way through the design, not solely at the “end

Operational Excellence: That’s My Building!



Costas Balaras
Athens, Greece



Farooq Mehboob,
Adeeba Mehboob, Farhan Mehboob
Karachi, Pakistan



Ng Yong Kong
Putrajaya, Malaysia



Current ASHRAE HQ
Atlanta



‘The design should reflect the capabilities of the people who will be operating the building.’

of design.” At Carleton University, we learned our lesson and established building controls review by our operating staff all the way through the controls design and installation.

- The design should reflect the capabilities of the people operating the building. As a result, we will not be leaving operators wondering, “How do I make this work?”
- Establish an effective turnover and orientation training process.
- Understand what life is like after the building is handed over.
- Design buildings for the occupant operators who will occupy the space.
- Design decisions must be evaluated for their impact on indoor environmental quality (IEQ).
- Remember humans, the occupants, are the best sensors of comfort.

We must learn about the use of analytical/fault detection software to enhance the operation of building systems. A comprehensive study by the National Research Council in Canada determined that with today’s building automation systems we have a lot of data, we just need to use it effectively.

ASHRAE needs to work with building owner-operator organizations to develop strategies that will prepare the operators to effectively operate the building through enhanced training, effective use of the building automation system and analytical and other operational tools.

We need to consider adding the concept of a digital twin to improve the understanding of the building operations as a base model.

For example, in the United Kingdom, the Building Services Research and Information Association (BSRIA) operates a program called Soft Landings to “improve the operational performance of buildings and meet the client’s expectations.”

Let’s discuss what actions we can take to ensure people succeed in the buildings we create.

In the past year, ASHRAE formed a Multidisciplinary Task Group, Effective Building Operations.

MTG.EBO will coordinate the activities of multiple TC/TG/TRG and other stakeholders in the area of training and tools to support the operation of buildings to enhance the indoor environment and use energy



Russell Lavitt
Winnipeg, Canada



Alyse Falconer
San Francisco



Chandra Sekhar
Singapore



Heather Schopplein
San Diego

effectively. Responsibility will include suggestions for research as well as the development of technical programs and special publications on effective building operation to achieve quality indoor air quality while not wasting energy.

It has been my pleasure to serve on the Building Ad Hoc committee for the last 18 months. We plan to learn from the renovation and upgrades of a real-world building owner dealing with the balance between energy use and indoor environment.

That's Our Building!

What does the building operator bring to the design discussion? The design, construction and transition to operations will be fully documented and will serve as a learning process for our members. The project is also being documented by the Building Owners and Managers Association (BOMA) Research committee as a case study in repositioning of an existing building.

What can we as ASHRAE Members do? We can LEARN, get ENGAGED and ACT differently.

Advertisement formerly in this space.

We should LEARN:

- Get a copy of the new guideline, "Designing for Effective Building Operations," which will be available by June 2020.
- Review the Centre for the Built Environment to understand what people think about working in buildings.

We should ENGAGE:

- Engage with building operators at the Chapter and Society level to improve our understanding of their problems and develop educational and training programs to reduce the gap between design, construction and operations.
- Listen to what they are saying.
- Meet at least once this year to talk about operational challenges.

- Conduct follow-up discussions one or two years after buildings are turned over.

We met with representatives of APPA, the higher education facilities officers, to review a renewed agreement. They are committed to working with us in these areas.

ACT differently:

- Follow the principles outlined in the new guideline, "Designing for Effective Building Operations."
- Add computer-assisted building operations enhancements into the design program.
- Transfer the design operational concepts to the operations team.
- Learn and apply well-building fundamental principles to the design.

We launched a section on the presidential web page, ASHRAE.org/president, that provides resources to help us achieve operational excellence.

At 14, I was thrust into the role of operating a sub-standard building, a position I was not prepared or qualified for.

We can do better. We will do better for those who operate our buildings. People must succeed within the buildings we create. Let's ensure we take the steps to achieve effective operational performance and enhance the operator experience.

It's good for the building. It's good for the people who live and work within those buildings. It further advances our mission and moves us closer to achieving our vision of providing a healthy and sustainable built environment for all.

Thank you. ■