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The Difference Between What & Why

There's a theme that continues to shape the way I approach our industry, and it began with a simple question: Are we building technicians or are we training people to memorize products? They aren't the same thing. Product knowledge is valuable, but products change. Models evolve. Control strategies become more sophisticated. New regulations force manufacturers to rethink designs. If our understanding never extends beyond the product itself, we find ourselves starting over every time the next generation of equipment arrives. Technicians don't simply memorize equipment, they learn to understand systems.

That idea led me to another realization. Every mechanical room is a system, and every component influences something else. Pumps affect flow. Flow affects heat transfer. Controls influence combustion. Water quality determines longevity. The equipment itself is only one part of a much larger picture.

The more we understand those relationships, the better we become at diagnosing problems we've never encountered before. Lately, I've found myself applying that same way of thinking to another kind of system: organizations. At first, that may sound like an unexpected leap, but the connection is closer than it first appears.

The Difference Between *What* & *Why*

One example I often use during combustion training involves today's negative regulation gas trains. Recently, during a *Combustion Fundamentals* class, we discussed how we tend to teach combustion from a product perspective. We explain that the control sends a signal, the fan speeds up, the boiler firing rate increases, the fan slows down and the boiler modulates lower. None of

that is wrong, but it isn't the complete story.

When we slow down and explain what is actually happening inside the combustion system, the picture changes. The fan is creating a pressure differential and the reference hose communicates the pressure ahead of the venturi to the gas valve. The gas valve is constantly responding to that changing pressure

technician who understands *why* it happens can often diagnose equipment they've never seen before. The product may change, but the physics rarely do.

That is the difference between learning procedures and understanding principles. In many ways, that's the difference between teaching someone *what* to do and helping them understand *why* it works.



FIA's resident tekmar expert, Jeff Laliberte, discusses the control strategy for a multi-manufacturer hot-water and chilled-water system with system designer Andy Richards of Plumbers Supply.

relationship so the correct amount of fuel is drawn into the air stream.

Suddenly, I could see the "a-ha" moment on their faces. It all made sense. These technicians were no longer memorizing a sequence of events. They understood *why* those events occurred and that distinction matters.

A technician who memorizes what happens can often service equipment they've seen before. A

The Actual Goal of Training

The longer I teach, the less interested I become in helping someone memorize another sequence of button presses or another wiring diagram. Those things have value, but they aren't the goal, which is to help someone build a mental model of how the system works.

Once technicians understand the relationships inside that system, they begin asking different ques-

tions. Instead of asking, “Which component failed?” they begin asking, “What condition caused the component to behave this way?”

That shift changes everything. Good troubleshooting has never been about replacing parts until the problem disappears. It is about understanding the system well enough to identify the condition that produced the failure.

An Unexpected Observation

It wasn't long before I realized this way of thinking wasn't confined to mechanical rooms. The same questions that helped diagnose boilers kept appearing everywhere else. Somewhere along the way, I noticed something unexpected.

I didn't set out trying to understand organizations. I simply wanted to become a better troubleshooter and instructor. Yet the same thought process that helped me understand combustion systems kept appearing in customer interactions, training programs, project meetings, decision making and, eventually, entire organizations.

The same questions still applied: What are we seeing? What conditions produced it? What information are we missing? What changed?

That made me wonder whether we sometimes make the same mistake with people that we make with equipment. We teach procedures that tell us what to do. Principles help us understand why it works. The challenge is that we often spend far more time teaching the procedures than we do the principles. As a result, we explain what people should do without always explaining why the organization works the way it does.

As long as nothing changes, procedures work reasonably well. Then a new product enters the market, a different software platform is introduced, a new piping strategy becomes the standard or a younger technician asks why we've always done something a certain way.

That is often when we hear one of the most familiar phrases in our industry: “We've always done it this way.”

Sometimes that is exactly the right answer. Experience matters. Many practices have survived because

they've proven themselves over decades. Not every new idea deserves to replace an old one, but sometimes that statement deserves a follow-up question: *Why?*

If we can't explain why something works, there is a good chance we are defending a procedure rather than understanding the principle behind it.

Diagnosing the Real Problem

Every experienced service technician knows that symptoms can be misleading. A lockout code, low system temperature or poor combustion isn't a diagnosis. Each of those things is information.

The real work begins when we understand the system well enough to determine why the symptom appeared. Organizations work much the same way. Resistance to change is often treated as the diagnosis. I don't think it is; resistance is information.

Every symptom encountered while troubleshooting tells something about how the system is responding. Our job is to understand what produced it. Sometimes people resist change because the new idea genuinely creates risk. Sometimes they've seen similar ideas fail before, or they're protecting quality or safety. Other times, they're protecting the only mental model they've ever been given.

If we've spent years teaching procedures without explaining the principles behind them, every change can feel like a threat. Not because people dislike learning, but because the foundation they've relied upon no longer explains what they're seeing. The problem isn't always resistance. Sometimes we simply haven't explained why.

Thinking like a Troubleshooter

The best technicians I've met share something in common: they are curious. They ask questions, gather information and work to understand the conditions surrounding the problem. Only then do they build a diagnosis. They don't immediately assume the equipment is defective or assume the manufacturer overlooked something.

Imagine if we approached organizations the same way. Instead of assuming people are resistant, what

if we asked what part of the system produced that response? Instead of assuming change is being rejected, what if we first determined whether we've clearly explained the principles behind it?

That is systems thinking, whether looking at combustion or culture.

Beyond the Mechanical Room

Over the years, I've become convinced that the greatest value our industry provides isn't boilers, pumps, controls or water heaters. It is people who know how to think, who understand systems instead of isolated components and who ask questions before drawing conclusions or diagnose before they decide.

That mindset doesn't stop at the mechanical room door. It travels into meetings, training rooms, customer conversations, project planning and eventually leadership. Maybe that's because organizations are systems, too. They have different components, different feedback loops and different ways of failing, but are systems nonetheless.

Looking back, I think that's the real goal of education, regardless of the subject. We can teach people *what* to do, and that will usually get them through today's task. However, when we help them understand *why* a system works the way it does, we've given them something much more valuable. We've given them the ability to diagnose problems they've never seen before, adapt to change they didn't expect, and continue learning long after the training is over. That's true whether the system is mechanical or organizational.

Whether we're troubleshooting a boiler or working within an organization, the same principle applies: the difference between *what* and *why* is often the difference between memorizing information and truly understanding the system. **ICM**

Robb Ellis is a Technical Trainer with FIA, Inc., working with contractors, technicians, engineers and wholesalers throughout New England. Drawing on his experience in both law enforcement and the plumbing and heating industry, he focuses on helping technicians develop the system-level thinking needed to troubleshoot, diagnose and optimize modern comfort systems. His forthcoming book, Leadership Troubleshooting: Lessons Hidden Inside the Experiences We Thought We Understood, explores how troubleshooting principles can help us become better leaders.