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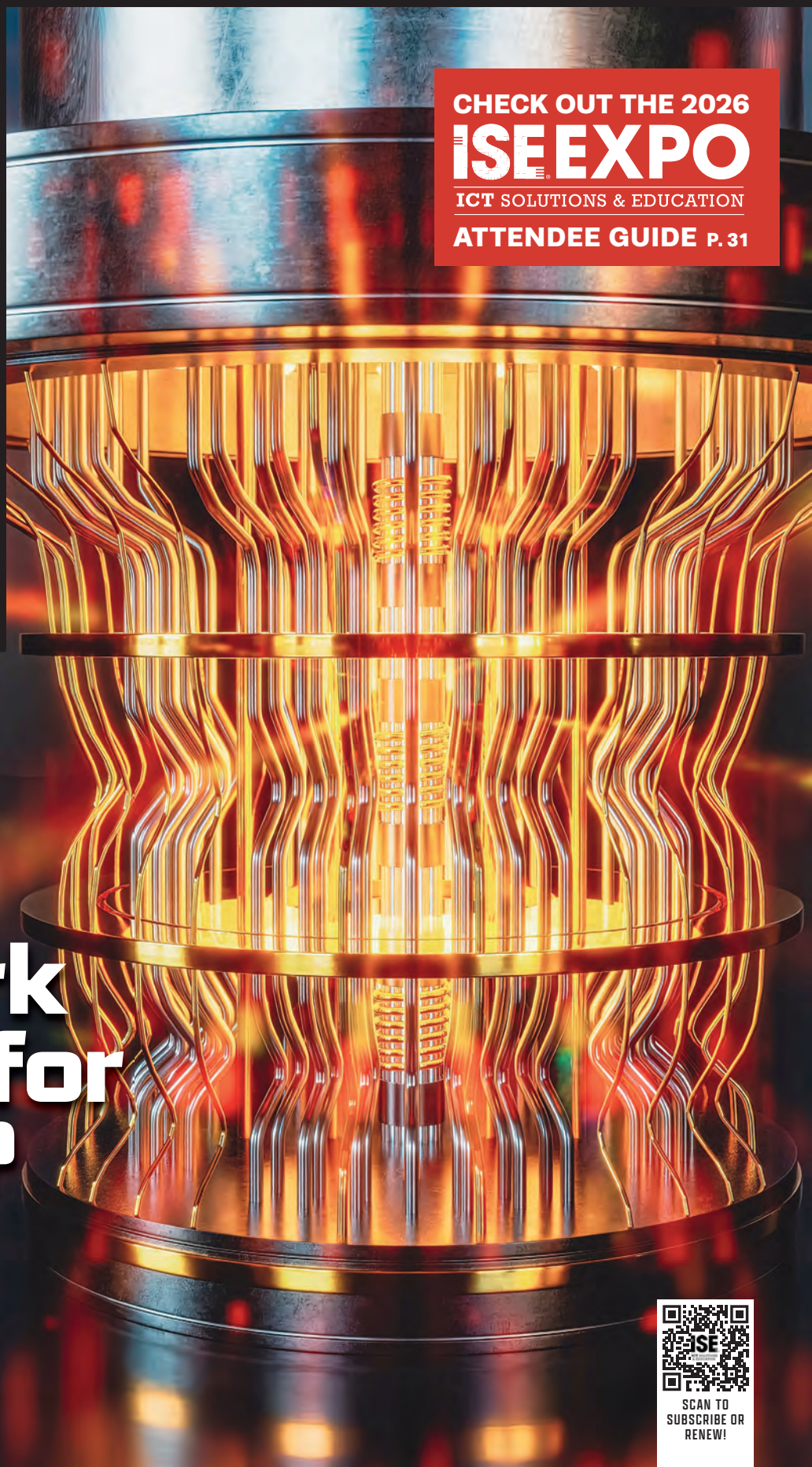

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"If 20% of operators have anything written down other than 'think about quantum,' I'd be surprised."

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"Autonomous networks change how decisions are made and who is held accountable when something goes right or wrong."

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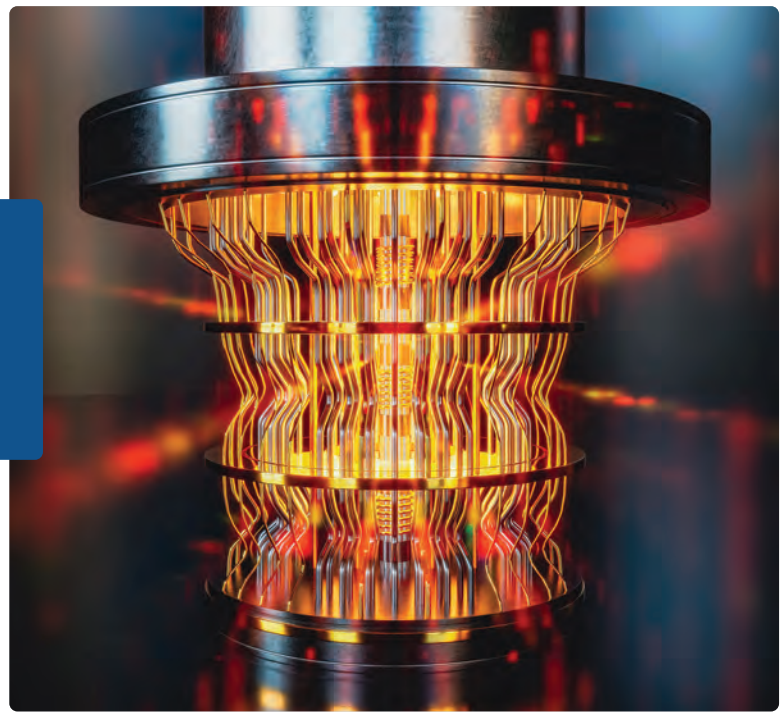

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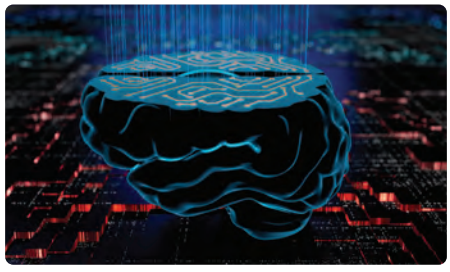

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ISE ICT SOLUTIONS & EDUCATION

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The Money is Moving. The Question is Where.

I ATTENDED THE Fiber Broadband Association's Regional Fiber Connect conference in Oklahoma City earlier this year, and I had the chance to talk with several contractors—the people actually doing the digging and installation for fiber deployments. More than one of them described recent jobs where they were laying fiber in neighborhoods already served by a half-dozen or more providers. They weren't complaining exactly. The attitude was more or less: if that's where they want to build, I'll happily take their money. But they were puzzled by it.

It doesn't necessarily make sense from a competitive standpoint, unless those builders have something that truly sets them apart from the other providers already there.

It's also a hard thing to square when you're sitting in sessions about tribal communities that still don't have reliable broadband, or hearing about the workforce shortage that's slowing deployments in genuinely underserved areas. The money is moving, but the question of where it's going is worth asking.

That workforce question runs through this issue. Deborah Kish of the Fiber Broadband Association joins us for Executive Insights to talk about where the talent gap is most acute and what the industry is doing to close it. On the operator side, we examine how OSS/BSS modernization can support everything else providers are trying to accomplish.

Hayden Beeson
EDITOR
hbeeson@endeavorb2b.com

Follow Hayden on LinkedIn for further conversation and insights.
@hayden-beeson-b2551a210

Visit www.isemag.com/contribute for more information on submitting an article to ISE Magazine in print, digital, and online.

Our Network Security Expert column this issue looks at how human expertise and AI can work together on cybersecurity, and the cover story explores both the threats and opportunities presented by quantum computing—I'd encourage you to read it and honestly assess where your organization stands.

Also in this issue: our 2026 ISE Buyer's Guide, an ISE EXPO 2026 attendee preview, and an advisory board Q&A ahead of what promises to be a great show.

Thanks for reading, and I hope to see you at ISE EXPO.

Applying AI to Resilience and Cybersecurity

Putting human expertise at the center of AI security.

MARK FISHBURN
Web cybyr.com
Email mark@cybyr.com
LinkedIn linkedin.com/in/markfishburn

I SUSPECT WE are all using AI daily by now. In last summer's issue of ISE magazine, I covered the strengths and limitations of AI and humans.

This article takes these ideas to a new level, harmonizing the human and AI strengths into a new way of thinking.

Intention

I used AI to create my expert-guided AI system software. It brings my subject matter expertise of cybersecurity and networking to strengthen and protect organizations, creating business advantage at minimal cost.

Impact

My focus continues to be on SMBs, who are driven by operating their businesses, not by these topics. There are one hundred million small and medium businesses that need help. The service provider readers of this publication

What are the human strengths that AI does not have (yet!)?

Humans	AI
Have Practical "on-the-court" use cases—actual experience with constraints and accountability.	Has no practical experience, as it's clever software reasoning from aggregated data "in the stands."
Have subject matter expertise and wisdom based on relevant context.	Only partially understands concepts, relying on user-supplied user context and vast quantities of incomplete third-party data.
Actions are governed by strategies, policies, tactical plans, perceived business and operational resiliency, governance, and competitive and financial goals.	Operates in limited dimensions based on specific tasks, limited by prompts.
Bring intellectual and contextual depth, for dynamic interaction and influence.	Is passive: "Ready when you are." "Ask me anything."
Proactive, questions users. Bring guidance and recommendations to users or collaborators based on responses and interactions.	Does not lead interactions. It does respond to prompts with extraordinary, filtered information to augment human understanding.
Measure results over time, track user-improved strength, and reduced risks.	Does not have the human wisdom to prioritize the importance of its data subjectively.
Continually track news in real time, evaluating opinions, technical and business impact from many sources.	Is not connected to the moment-by-moment news. Often in a narrow and sometimes dated focus, especially in private LLMs.
Make decisions based on many subjective criteria, often based on the power of language to influence emotions, spoken, written and visual interactions.	Is programmed to deliver flattering communications to support algorithm-based opinions based on insecure information or from unverified sources.
Listens slowly, playing new ideas against what they already know, often using collaborative groups.	Is an algorithm that uses non-attributed data, creating an error-prone, trial-and-error system. Unless constantly supervised, it drowns its human user with unrequested information.

serving those SMBs have an important part to play too. Let's begin by distinguishing our human strengths. (See chart on page 6.)

"Having resilience and security as executive accountability is the only way to consistently manage and be responsible across the whole organization."

Application

Next is a list of their application, structured as critical organizational layers that dictate the business strength and security of the organization.

Having 10 categories always goes down well. However, the reality is that they hide almost 80 areas that need investigating, taking recommended actions taken with weighted importance to strengthen vulnerabilities and reduce risk. This prevents the user from missing something important, since every one of these categories is critical ("you are only as strong as your weakest link"). Here are a few highlights from the list:

1. Executive Commitment and Accountability: Having resilience and security as executive accountability is the only way to consistently manage and be responsible across the whole organization. Don't do this, and you can forget the rest of the list. The use of language is so critical here to inspire and motivate the benefits.

2. Policy and Plans: Having a policy that includes a financial framework is the only way to create the context for a regular and measurable (say quarterly) plan. This creates a clear competitive advantage, not forgetting that good documentation can be the best defense against liability.

3. Asset Stewardship is about limiting exposure, protecting assets, and testing the resilience plan. Managing who, what, where, and how systems can be accessed is governed by policy.

4. Human & System Access & Interactions is about insider threat vetting, best practices for phishing prevention and policy for systems access.

5. Supply Chain Management requires knowledge of and verification of all manner of suppliers and third parties, with collaboration to avoid abdicating responsibility.

6. Holistic Organizational Integrity is an oversight of every department and their third-party contractors and suppliers to understand risks.

7. Basic Software Protection. It still amazes me that most companies still use passwords and have no multifactor authentication. This is the first place that requires some low-cost outside spend.

8. Zero Trust is the only recognized framework for real defense: identity management, authentication, policy and security management and enforcement being key.

9. Despite everything, **breaches will happen**. The key is detecting and removing breaches instigated with AI or Ransomware as a Service before they cause damage or worse. Service providers are best placed to address this threat.

10. Everything must be **monitored** for ongoing improvement, constant evolution in threats and measurement of planned actions.

Summary: Visit cybyr.com /integration

Space limited the depth of this introduction. So, to explore how and where the software implements the human characteristics in each of the above layers, follow the link above. There, the work continues, giving access to my Cybyr-AI Expert-Guided Cybersecurity Software and our consulting services.

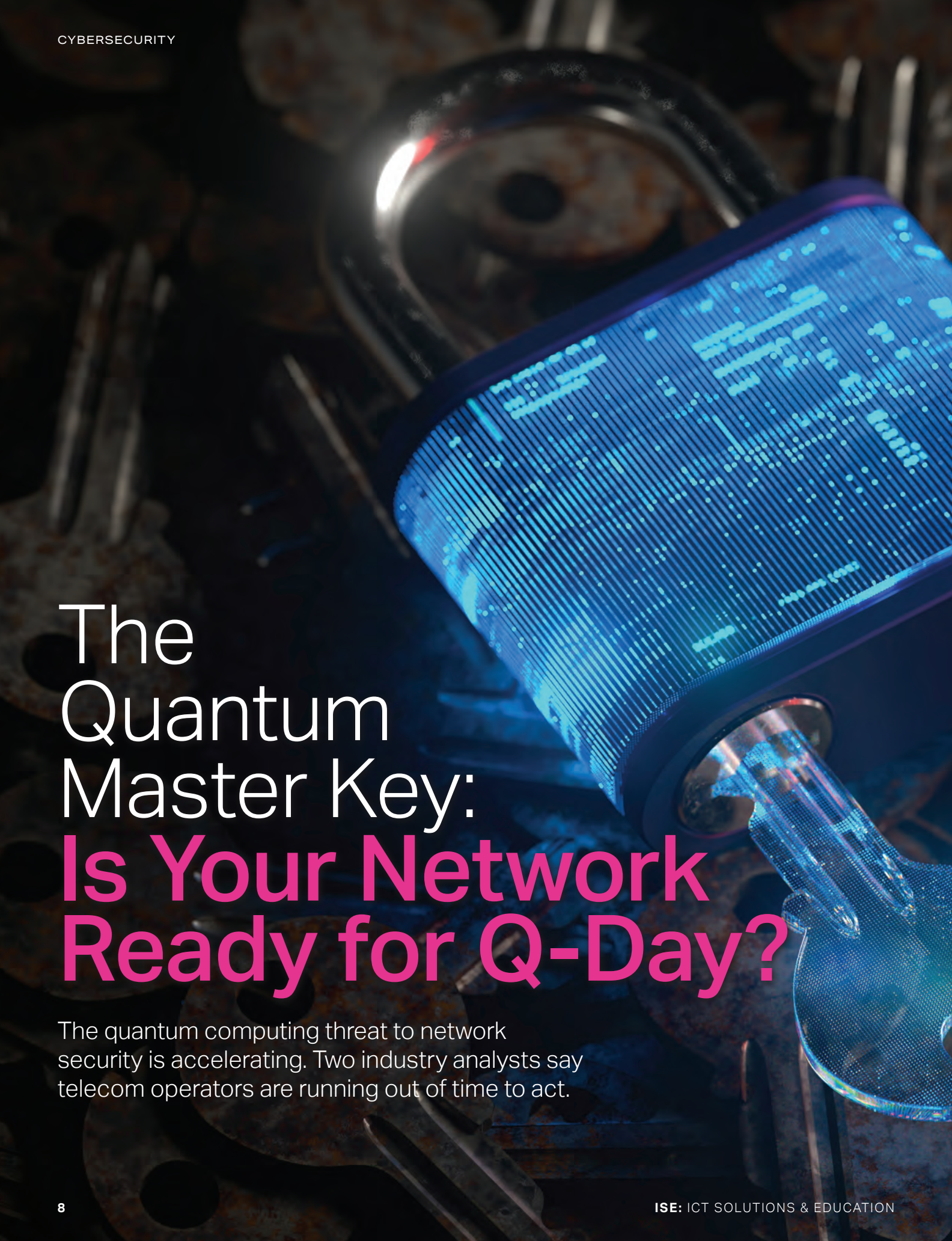
The human aspects engage in a transformative discussion, measurement of progress, and execution of recommended actions; this is combined with instant delivery of today's latest news, information in articles, selected sites and videos, the curated prompts generation to several AI agents, and much more.

This is augmented by having the implementation as a virtual chief security officer, carefully executed, step-by-step. I hope you enjoyed this. Happy to answer any questions. ■

Mark Fishburn is President of Cybyr.com, a provider of strategic network, cybersecurity, software, and marketing services.

The article is intended as an introduction and is intentionally incomplete.

This and all future articles continue their journey on my website, in extensions to my software, and in new dynamic versions of my books. This, therefore, now becomes a model for introducing new dynamic ideas that can contribute practical value, not information overload. Above all, they are not out of date the instant they are finished, let alone printed as articles, white papers, or books.



The Quantum Master Key: Is Your Network Ready for Q-Day?

The quantum computing threat to network security is accelerating. Two industry analysts say telecom operators are running out of time to act.

Just_Super / E+/ Getty Images

BY HAYDEN BEESON

Imagine your network as a house that you've spent billions of dollars building. Now, imagine someone is working to create a master key that can open every door and every window. This is how telecommunications analysts Mark H. Mortensen, Ph.D., and Liliane Offredo-Zreik describe the looming threat posed by advancements in quantum computing.

"We don't know when they're going to get their master key," warns Mortensen. "And you really ought to be thinking about what you're going to do when somebody shows up with that key."

This "master key" is a cryptographically relevant quantum computer (CRQC), a machine powerful enough to break the public key encryption systems, like RSA and elliptic-curve cryptography, that underpin modern digital security.

For years, this threat was considered a distant concern, a bridge to be crossed when the time came. But a combination of technological progress, a global quantum arms race, and new industry standards have changed that, and now the quantum threat is moving from the theoretical world into the real world.

"We've been talking about quantum computers for a long time: how they're going to be able to solve problems that conventional computers would take the lifetime of the universe to solve," says Mortensen. "They're getting closer."

The Ticking Clock

Quantum advances are largely being driven by progress from leading technology companies. In December 2024, Google introduced its Willow quantum processor, which demonstrated significant advances in error correction and qubit coherence. In November 2025, IBM published an updated roadmap targeting a large-scale, fault-tolerant quantum computer by approximately 2029.

"If you've been watching quantum over the past few months, you've seen there's been a lot of announcements about a lot of progress made," says Offredo-Zreik, "Some of the problems that have been plaguing quantum for some time are slowly being addressed."

Official bodies are also taking note and are developing guidelines and standards. After an eight-year evaluation process, the U.S. National Institute of Standards and Technology (NIST) finalized its first three post-quantum cryptography (PQC) standards in August 2024: ML-KEM for encryption, and ML-DSA and SLH-DSA for digital signatures. These standards are designed to protect against attacks from both classical and quantum computers and to provide a long-term migration path away from vulnerable systems.

The European Union, meanwhile, has recommended that member states begin post-quantum cryptography transitions by the end of 2026 and be ready for specific quantum security tasks by 2030.

Another troubling aspect of the quantum threat is that its danger begins long before the first quantum computer is publicly announced. Malicious actors, particularly state-sponsored groups, are likely already employing a strategy known as harvest now, decrypt later (HNDL). These actors are siphoning and storing huge quantities of encrypted data today, waiting for the day they can use a quantum computer to unlock it.

"Any information that is going to be still useful in somewhere between three and 10 years is harvestable now, and later on it will be possible to get to the information," Mortensen explains.

Mortensen warns that the quantum threat does not exist in isolation, and AI advances will make it far easier to exploit decrypted data.

"The AI advances compound the problem here," he says. "Once a quantum computer cracks the encryption, the AI is going to help tremendously in sorting through that data very quickly to find important nuggets."

While the financial sector is an obvious and attractive target, Mortensen says government institutions are the most exposed.

"We know the Chinese are working on it. We know the U.S. is working on it. We know Korea is working on it," he says. "We know a lot of countries are starting to keep track and just harvest as much data as they possibly can, stick it in huge data centers, and keep it for when they can decrypt it."

Q-Day

The arrival of this decryption capability, often called "Q-Day," will not be a singular, public event like Y2K.

"Somebody asked me once, 'When is Q-Day going to happen?' I said: 'at least six months before we find out about it,'" Mortensen says. "The first people who crack this are not going to be announcing that they cracked the problem. They're going to be harvesting, and they're going to be decrypting like crazy."

Unlike Y2K, wherein loomed a hard deadline that drove action, the ambiguity of Q-Day fosters complacency. As Offredo-Zreik notes, "the fact that we don't even know the date is actually worse."

While the quantum threat looms, it's competing for attention with other priorities.

"I think everybody is like 'let's invest in AI' because there's a FOMO," Offredo-Zreik says. "If you have to do some capital allocation, you're going to please everybody and say 'yeah, we're investing in AI.' We're so far into this whole AI thing that we may be missing some important things."

The problem is also compounded by other justifications for inaction.

"Some people will tell you, 'Oh yeah, the standards aren't good enough,'" she says. "We've heard those arguments many times."

"This quantum stuff, it makes people's heads hurt," Mortensen adds. "It makes businesses' heads hurt. You go to the board and say, 'Oh, we think we might have a horrible problem in the next couple of years.' And the board says, 'Well, we have a lot of horrible problems right now. Let's work on those.' Many are not ready to take out that insurance policy."

Other sectors, namely the financial industry and big tech, are moving faster.

"They've been working on this for several years," says Mortensen of the financial sector, "and they will be ready pretty darn soon."

Offredo-Zreik adds that "The big banks—the JP Morgans, the Morgan Stanleys—are spending hundreds of millions of dollars to secure their networks already."

The investment community is also paying attention: the Defiance Quantum ETF (QTUM), launched in 2018, offers public-market exposure to the sector, and several quantum companies, like IonQ and Rigetti Computing, are now publicly traded.

Tech giants are also ahead of the curve. According to Mortensen, "Google already has an encryption in place that should last them a good 15 or 20 years. They're already getting ready for Q-Day."

Others are also making moves. Apple introduced its PQ3 protocol for quantum-secure messaging, and IBM has built a quantum-safe technology stack into its z16 mainframes.

"IBM is one of the top vendors doing a lot of research," adds Offredo-Zreik. "Toshiba as well. And there are many startups. Companies like IonQ. There's a very vibrant private company space doing a lot of work as well."

European and Asian operators have also been public about their preparations. Orange Business launched a commercial quantum-safe networking service in Paris, U.K.-based BT has conducted quantum network trials, and South Korea's SK Telecom has rolled out Quantum Key Distribution (QKD) infrastructure.

Offredo-Zreik says the vendor community has also been working on it: "We've been talking to a lot of the vendors, and the telecom vendor community has been very, very active in developing."

Among the vendors actively developing quantum-safe network solutions are Cisco, Ciena, Juniper (now part of HPE), and Nokia. But whether operators are listening is another question.

"I don't know to what extent they've been successful in getting the attention of the operators, especially in the U.S.," she says.

Mortensen offered a stark estimate when asked what percentage of operators are genuinely prepared: "If 20% of them have anything written down other than 'think about quantum,' I'd be surprised."

That said, both analysts acknowledge that operators may be further along than their public posture suggests, with quantum planning happening internally, even where it hasn't been announced.

Offredo-Zreik also sees a challenge in staffing and strategy, noting the broader difficulty of hiring the right people. "It's hard to find people with that expertise," she says.

Both analysts worry that without proactive measures, it could take a catastrophic event to move the industry to action.

"I think that's what's going to happen," Mortensen concedes. "Somebody's going to really get in and really mess it up."

He envisions a scenario in which someone has been listening in on FBI phone calls and messages, for instance, or an attacker exploits a vulnerability in an operator's network to cause disruptions.

Data Theft and Network Collapse

For telecom operators, the risks of a quantum attack are twofold: The first is the confidentiality of customer data flowing over the network. The second is the integrity of the network itself.

"These days it's all computer-controlled and, in fact, most of it actually runs inside a data center," Mortensen explains. "So if you get into the data center—if you're able to crack into it, you can screw with the network. You can do things like listen in to all the government stuff that goes over here, or all the bank stuff that goes over there. You could reconfigure the network surreptitiously, or you could even do it maliciously and take down the network, overload networks."

A threat like this extends beyond telecom to all essential services that rely on network connectivity. "Anything essential can become compromised," adds Offredo-Zreik. "Energy infrastructure, healthcare—anything."

Blockchain and cryptocurrency systems are also exposed, as they rely on the same public-key cryptography that quantum

computers will be able to break. Wallets, transactions, and the integrity of blockchain networks could all be compromised.

While the initial threat will likely come from sophisticated (and well-funded) state actors, the abilities of quantum computing will not long remain contained.

"The really bad actors, probably the governments, are going to get it first," Mortensen predicts. "And then later on, it'll become more democratized and other people get a hold of it too. So, the second-level bad actors and third-level bad actors will eventually gain access to these tools."

Changing the Locks

For securing customer data in transit, new PQC encryption schemes based on the NIST standards will be sufficient. But for securing the core of the network itself, Mortensen stresses that operators are going to need QKD.

"What companies need to do is perform a cryptographic threat discovery by doing a thorough inventory of their systems to detect areas of vulnerability, perform a quantum risk assessment, and then determine the best quantum-safe strategy for their environment. This is a long and tedious process, but an important one, and given that it will take time, they need to start sooner rather than later," explains Offredo-Zreik.

In many cases, upgrades will require hardware replacements instead of software patches.

"The biggest problem actually is finding out where the outdated encryption equipment is and what vintage it is," Mortensen says. "In most cases, that's going to have to pull out a unit from the rack and stick a new unit in there with the new encryption schemes in it."

Despite the complexity, Mortensen lays out a clear, three-pronged strategy for operators to prioritize over the next few years:

- Secure the Customer Network: "Start securing their own network they provide to their customers to use. Develop a plan that gets all the new encryption schemes out there."
- Secure their Internal Network: "Operators need to start looking at their own security inside their own network, for managing their network."
- Explore the Opportunity: "Third, they should look at the opportunities for managed security services for enterprises in a post-quantum world."

Telecom operators are uniquely positioned to offer quantum-safe managed security services to their enterprise customers, and Mortensen believes the opportunity could be as big as SD-WAN.

"The telecom operators have missed out on so many opportunities," Mortensen says. "They just watch them. They just watch these opportunities go by. Hopefully not this time."

But quantum security could be different if operators act now, and Mortensen predicts that, in hindsight, they'll regret not acting sooner.

"They're going to say they should have been doing more earlier," he adds.

Industry research reinforces the size of this opportunity. According to McKinsey & Company's 2025 Quantum Technology Monitor, the quantum communication market was valued at approximately $1.2 billion in 2024 and is projected to reach $10.5 billion to $14.9 billion by 2035. McKinsey also projects that the telecom sector will account for 16% to 26% of overall spending on quantum communication products by 2035. The broader technology market, which consists of computing, communication, and sensing, could reach $97 billion by 2035 and nearly $200 billion by 2040.

"Telcos have a real opportunity with quantum," says Offredo-Zreik. "Besides securing their networks, they can offer quantum security as a service. Orange, for example, has gone this route; the firm offers quantum security-based advisory combined with quantum security as a service and a combination of PQC and QKD at the infrastructure layer."

Beyond Security: The Quantum Internet

The threat isn't the whole picture, though. The same technologies that pose a risk today will also give rise to a quantum internet: a network connecting quantum computers and a new generation of quantum sensors.

These sensors, Mortensen explains, use quantum physics to achieve sensitivity far beyond what exists today.

"You should be able to make these sensors a thousand times, maybe 100,000 times more sensitive," he says. "And then when you start networking them together using a quantum network, you're starting to pick up probably a million times more sensitivity."

The applications range from super-sensitive radar for military purposes and breakthroughs in astronomy to oil exploration and mineral detection.

Mortensen, who is working with the Quantum Economic Development Consortium (QED-C) to prepare for this future, sees a massive opportunity on the horizon. He estimates the quantum internet represents at least a $15 billion opportunity for telecom operators by 2040.

"It's going to be a whole new thing," he says, predicting it will start to have a real impact between 2035 and 2040.

This will also reshape the data center itself. Offredo-Zreik foresees "a new form of data centers that are more quantum. Or hybrids of classic and quantum."

"We originally built data centers around 8086 processors, and then we added the graphics processors for bitcoin mining and machine learning. The GPUs for AI are being deployed, the DPUs," says Mortensen. "There's going to be a QPU also—a quantum processing unit."

Mortensen acknowledges the quantum opportunity won't rival AI in scale. "It's not going to be as big as AI, but it's going to be 20% as big as AI," he says.

Offredo-Zreik adds that "quantum is not going to be as big as AI because it's not a consumer thing. But behind the scenes, it's a very, very powerful technology that actually can affect AI in a big way."

For now, though, the focus must be on the security risks, because someone is working on the quantum master key, and Q-Day may already be behind us. ■

EXECUTIVE INSIGHTS WITH Deborah Kish

Vice President, Research and Workforce Development, Fiber Broadband Association

As BEAD moves towards execution, the industry faces a labor crisis decades in the making.

BY HAYDEN BEESON

In this Executive Insights Q&A, we explore how workforce shortages, training gaps, and aging crews are slowing fiber builds and putting long-term network quality at risk. Deborah Kish, Vice President of Research and Workforce Development at the Fiber Broadband Association (FBA), explains why planning for labor is just as, if not more, important than planning for infrastructure.

ISE: From your research vantage point, where do you see the biggest disconnect between how broadband deployment is planned and how it unfolds in the field?

Deborah Kish: I think the biggest disconnect between broadband plans and actual deployment starts with the workforce shortage. The planning stage of a network build is obviously necessary: analyzing markets, demand, architecture, mapping, permitting and more. However, what's often overlooked is the trained technicians to build it. Fiber deployment is labor-intensive, and in our most recent Fiber Deployment Cost Study, we reported that 66% (aerial) to 73% (buried) of the cost being labor.

Without proactively accounting for this talent, projects get delayed or worse, not done right, resulting in more time and money (and frustration) when things need to be "fixed" before service can be delivered. Precious time is lost between getting communities connected to high-speed, reliable fiber networks, and not just weeks or months. I have spoken with ISPs where it has taken upward of two years just getting the network working properly. It's not a technology issue; it's a workforce and training issue. Training often is the last thing to be thought of or planned for, and the first thing to get cut when times get tough.

FBA published a Workforce Development Guidebook a couple of years ago because we saw the need for workforce planning. Everyone was waiting "with BEADed breath" for the funds to roll out, so we provided guidance on how to plan, including a webinar. We provided two basic models:

1. Input-based: Calculate the number of new jobs needed based on ongoing and anticipated private and public funding (including matching funds), using employer data about job creation from historical investments as a baseline.
2. Output-based: Divide the state into regions and calculate using regional estimates for new fiber miles generated by BEAD and industry data on fiber miles that can be laid per person, repeated for all regions in the state. Analysis should be done at the regional level to loop in region-specific ISPs and account for geographical differences that impact fiber pacing.

Based on the size of the project, employers need to evaluate their current workforce, whether contractor or ISP, and apply these same models and launch a strategy based on project timelines. Planning for the workforce is key to successful fiber deployments in both the public and private sectors.

ISE: Workforce challenges are often framed as a numbers problem. In your

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view, is workforce capacity or workforce readiness the bigger issue right now, and why?

Deborah Kish: It's actually both in potentially equal proportions, which is troubling. This industry has been struggling for some time to gain interest from young people. The fact is that we have around 70% of our workforce in the 50+ age group, with the majority of those 60+ in the next five years. That doesn't exactly put us in the pole position in either category of capacity or readiness. When they retire, the capacity problem will accelerate, and given that we don't have interest from our youth, it will become a much bigger problem very quickly. We do not have enough people working in the 20–50-year-old range as it is right now.

Workforce readiness means that you have enough people, trained crews ready to go, continually cross-training, and a true pipeline of workers. Nimble enough that when poaching happens, someone falls temporarily ill, or someone takes a vacation, the job can continue. The issue with our industry now is that —in my view—workforce is currently treated as "piecemeal," meaning network builders continue to find warm bodies for jobs as needed, rather than going "all in" on mentoring, recruitment, training, and marketing. We don't do enough to advertise all the great things about this industry to gain interest.

There is also a generational dynamic, and technology is partially to blame. Technology has made it really easy to earn a very decent living at home. Interest in learning how to write code and develop apps that "make life easier" is the direction young people started to go years ago, and they make money while making a difference. We should have started back then teaching about "hey, look what you can do over the internet, but isn't it cool how it is planned and built?" We never really did make THAT the cool factor.

Then there is a grouping of people who are encouraged to go to college because of the perception of better job opportunities and better pay. I do see some statistics now on how many young people are looking for technical training and certifications rather than a traditional four-year college degree, which is nice to see.

Honestly, I think we need to really consider doubling down on bringing training to Departments of Corrections, depending, of course, on a variety of important factors. Training "low security offense" incarcerated individuals could bring a lot of benefit to the industry and allow them an opportunity to become contributing members of society again. It has its challenges, but I do think we can work through them.

ISE: Looking across current deployments, what do you see as the most common reason projects slow down, and what concern stands out most as the industry scales?

Deborah Kish: I think it is a deadly combination of permitting, make-ready delays, and lack of workforce preparedness.

Permitting has been a long-time hurdle, depending on a variety of things, including local policies, utilities, and even litigation. It's almost like being in a relay race, but the first hurdles are too high and, for the industry, it ultimately costs time and money. It needs to be streamlined, and some general things should be automated using AI, while more complex things remain managed by humans.

ISE: With BEAD driving significant deployment volume, what risks do you see to long-term network quality, and how can build teams maintain standards at that pace?

Deborah Kish: It all comes down to workforce in my view. The longer we wait to invest in training and creating and maintaining interest in the generations to come, the worse things will get. Today, we don't tolerate "no service" from our broadband providers. Building a network is not a "once and done." Fiber is lights-on 24/7/365, and when something happens like a storm takes down a pole and service goes out, AI isn't coming to the rescue; a human is.

> "The issue with our industry now is that—in my view—workforce is currently treated as "piecemeal."

And it's not just construction (locate, trenching, etc.). We need premises installers to go to the home and actually install the service. We'll need troubleshooters, and all of them should be cross-trained to fill in where needed. These are real people, and the more of these we have, the better shape we will be. But we have to take training seriously in order to maintain a high standard of installation.

I mentioned AI, too. How about the Data Centers that are going to feed AI? We will need specially trained fiber splicers. What happens when we don't have enough of them? This all takes planning.

ISE: As BEAD moves from planning into execution, what aspect of workforce planning do you think is most consistently underestimated?

Deborah Kish: Training and certification attached to that training. Non-deployment funding seems to mean different things to different people, and training or workforce seems to be a word everyone looks at and talks about with respect to non-deployment funds.

Also, a hang-up that I constantly keep hearing is that contractors are not hiring now because they don't know where the jobs will be. That, to me, is not planning; therefore, execution suffers, the jobs suffer, because the lack of preparedness sends them in the direction of looking for warm bodies, training for the task at hand, and that's that. That leads to bad habits being passed along, lack of knowledge and therefore lack of opportunity for the worker—AND the chance of poor workmanship leading to a customer who might take a couple of years to figure out the mistakes. It is a decades-long practice, and in my view, there's no way to ensure you're prepared or efficient in deployment. ■

Deborah Kish is the Vice President of Research and Workforce Development at Fiber Broadband Association. For more information, visit https://fiberbroadband.org.

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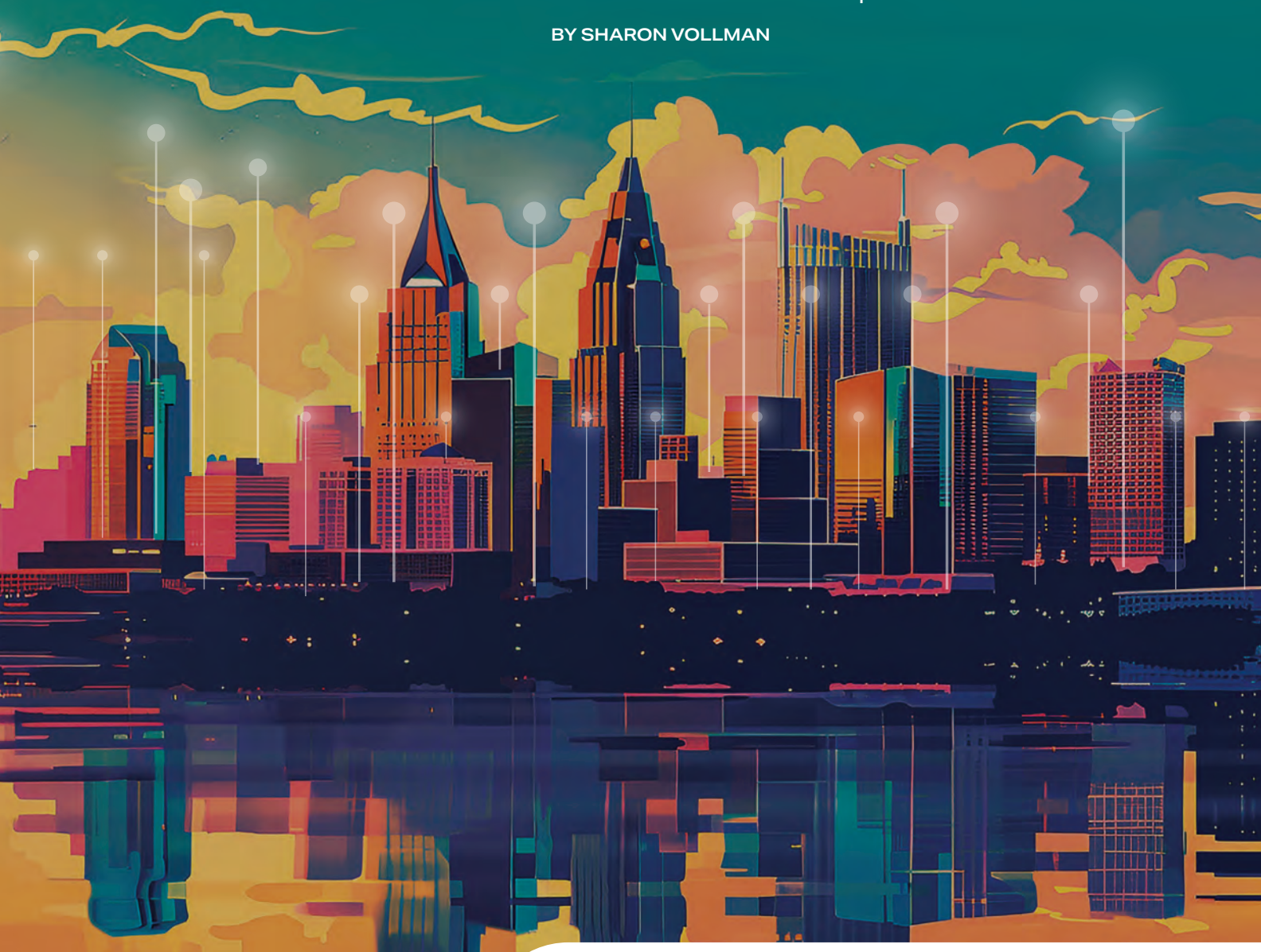
Topics: AI-Native Networks; Upskilling Team Members; Operational Realities

BY SHARON VOLLMAN



As fixed and mobile networks continue to converge, industry leaders face unprecedented challenges in balancing infrastructure evolution with emerging technologies. From AI and autonomous networks, edge computing, and next-generation wireless to permitting, deployment, operations, and long-term security/resiliency, ISE EXPO helps network professionals find practical solutions for ***every*** part of broadband's future.

To outline a plan for this transformation, we met with the distinguished members of the **2026 ISE EXPO Advisory Board.** Made up of visionary leaders from Tier 1, 2, and 3 service providers, this board reflects the collective intelligence of the ICT sector.

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TOPIC: AI-Native Network Operations

ISE: Share your thoughts on implementing autonomous systems that execute complex multi-step workflows across the fixed/mobile networks' operational cores, focusing on fully integrated intelligent networks. What are the primary technical and logistical challenges network service providers face when moving from AI assistants to these truly autonomous, self-healing network entities?

Randy Alderton, Bell Canada: The evolution toward autonomous network operations creates a fundamental shift in how fixed and mobile networks are managed. Modern autonomous systems aim to create intelligent, self-adapting, and self-healing ecosystems that optimize performance with minimal human intervention. This transition offers potential improvements in efficiency, resilience, and service quality. However, moving from today's AI-assisted environments to fully autonomous networks will require overcoming a complex set of technical and organizational barriers. Some technical challenges:

- Integrating advanced AI and machine learning capabilities across heterogeneous network environments. Modern networks often consist of multivendor components and legacy systems that lack standardized interfaces, making seamless interoperability difficult.
- Data quality and real-time data management present additional challenges. Autonomous systems depend on large volumes of accurate, high velocity information—from telemetry and logs to performance metrics. Yet these data sources often vary widely in structure and quality, complicating efforts to normalize and correlate them at scale.
- Security considerations further heighten the complexity. As AI becomes embedded in core operations, the systems that support automated decision-making become attractive targets for cyberattacks. Protecting data pipelines, automation workflows, and model outputs must be foundational to any autonomy strategy.

Some organizational and logistical challenges:

- Autonomous networks demand a workforce skilled in AI/ML, automation frameworks, data science, and systems engineering—while still retaining deep network expertise. Upskilling existing staff and attracting new talent is essential for sustainable transformation.
- Cultural change is also required. Organizations must shift from traditional human-centered workflows to models where machines play a central role in operational decision-making. This transformation requires rethinking processes, governance structures, and accountability frameworks.
- Achieving autonomy requires meaningful investment—not only in platforms and tooling but also in infrastructure and workforce development. Clear business justification, including operational efficiency, reduced downtime, and enhanced customer experiences, will be crucial in securing executive commitment and long-term funding.

Marc Durocher, Verizon Communications: From a technical perspective, this is the ideal end state. We've been working hard to build the best self-healing networks that identify issues and potential problems, then take the necessary steps to remediate them before our customers notice any adverse change in their experience. One technical challenge is accurately training the models to determine which actions should be fully autonomous and which may require human review and approval. Creating the right risk awareness intelligence is critical.

From an operational perspective, AI assistants are often less risky to implement because they still ultimately depend on humans to make the final call. Fully autonomous solutions are also much more complicated to integrate into existing systems and disparate platforms.

Steve Harris, UCL Swift NA | Harris DigiTech Academy: Implementing fully autonomous, self-healing access/core networks represents the next evolution beyond AI assistants, requiring broadband operators to unify complex multi-domain and multi-vendor systems across fixed and mobile infrastructures. Note: Many of these projects are underway. For example, big data databases, data ingestion, and data lakes will be fundamental, enabling our next-generation proactive networks. In my research for my Big Data peer-reviewed paper, I outlined the work Comcast is doing with PNM, Cox with Big Data, and Liberty with platform unification.

Our biggest technical hurdle lies in integrating our legacy operation support systems (OSS)/business support systems (BSS), access networks, regional area networks (RAN), core, network operations centers (NOCs) and transport systems into a single, real-time telemetry and control framework. Data quality and consistency are critical, as autonomous decisions depend on accurate, end-to-end network visibility. We also see a big push from

broadband operators to build out their central offices (COs) and headend sites into more data-center-like facilities, and to integrate hyper-scalers' data centers.

Organizational workstream silos (e.g., data islands), workforce skill gaps, and a lack of vendor community alignment compound the challenge, requiring new roles in AI governance, intent orchestration, and closed-loop assurance. Trust and explainability are essential to ensure broadband operators and regulators can validate automated actions in their networks without compromising customer experience. Security, privacy, and governance frameworks must evolve alongside autonomy to mitigate the risks of erroneous or malicious network behavior.

Investment uncertainty and legacy infrastructure limitations further slow adoption, particularly for service providers balancing CapEx and OpEx priorities. Ultimately, moving toward truly intelligent networks is less about AI sophistication and more about redesigning our current operational processes, workforce capabilities, industry standards, and infrastructure to enable safe, integrated, and autonomous decision-making.

William Kurtz, Norvado, Inc.: The transition from AI-assisted operations to fully autonomous, self-healing network systems represents a significant leap in both technological capability and organizational maturity. While the vision of intelligent networks that monitor, diagnose, and resolve issues without human intervention is compelling, the practical implementation is constrained by several core challenges.

From a technical standpoint, interoperability across legacy systems remains one of the most significant barriers. Many service providers operate with a patchwork of OSS/BSS platforms, vendor-specific network elements, and fragmented data environments. Enabling autonomous decision-making requires a unified data architecture, consistent telemetry, and a high degree of automation across all operational layers—from provisioning and fault management to security and policy enforcement.

Additionally, the development of AI models capable of contextual awareness, predictive analytics, and real-time orchestration demands not only massive volumes of high-quality training data but also continuous validation and governance to avoid unintended outcomes. This includes the ability to detect and resolve issues without exacerbating downstream dependencies—something that requires both domain-specific intelligence and a robust exception-handling framework.

Logistically, the shift to autonomous networks introduces organizational challenges as well. Service providers must reconcile existing operational models with the implications of reduced manual intervention, including changes to roles, accountability structures, and incident response protocols. Cybersecurity is another critical consideration—autonomous actions must be auditable, secure, and aligned with broader risk management frameworks.

Ultimately, the move toward self-healing networks will be evolutionary, not revolutionary, requiring phased integration, rigorous testing, and a parallel investment in change management and workforce readiness.

Chris Mitchell, AT&T HQ Wireless Engineering: Autonomous systems capable of executing complex, multi-step workflows across fixed and mobile networks demand far more than incremental improvements to today's AI-assisted operations. They rely on unified, real-time visibility across RAN, transport, and core domains, along with strong policy and intent-translation frameworks that convert high-level objectives into precise, safe operational actions. Achieving this level of autonomy requires harmonizing fragmented data sources, managing distributed AI/ML models at the edge and in the cloud, and ensuring consistent, closed-loop automation across multi-vendor environments. Providers must also prioritize trust, auditability, and security so autonomous systems can act independently without compromising network stability.

Beyond the technical lift, network operators face significant organizational and logistical challenges as they transition from manual, domain-centric operations to automation-first models. This shift requires rethinking workflows, governance structures, and workforce skill sets so operational teams evolve from hands-on troubleshooting to oversight, policy design, and exception management. Clear guardrails, standardized data models, and strong interoperability frameworks are essential to ensure autonomous behaviors remain aligned with business intent. Ultimately, this evolution represents a cultural transformation as much as a technological one—enabling networks to become proactive, self-correcting, and truly intelligent in how they manage complexity at scale.

Randall René, Waypoint 33: Across the network and operations teams I have worked with, the move from AI assistants to truly autonomous, self-healing network operations has much less to do with plugging in smarter algorithms. It has more to do with getting the basics right. Most service providers are still working with fragmented data, disconnected tools, and processes that rely on people to manually connect planning, construction, operations, and customer care. In that environment, AI can make suggestions, but it cannot safely act on its own.

Autonomous systems need clean, trusted, and current network data, clear rules around what systems are allowed to do, and a shared understanding of how decisions are made. That often means doing the unglamorous work first. Data must be cleaned up, systems must be aligned, and broken workflows must be fixed before autonomy can deliver real value. Skipping those steps only increases risk, drives up costs, and leads to frustrated employees and unhappy customers.

I believe the harder challenge is not a technical fix, it is people focused. Simply put, autonomous networks change how decisions are made and who is accountable when something goes right or wrong. Now, when these decisions affect their employees' pay, performance metrics, and satisfaction, there is a lot to carefully

consider. Providers need to rethink workflows, better align OSS and BSS platforms, and set clear guardrails for when systems act on their own and when people step in. After all, trust sits at the center of this shift.

Ultimately, operators must understand and be able to communicate clearly why an autonomous or AI-based system made the decision it did, especially when service reliability, safety, or regulatory requirements are involved. For that reason, the move to AI native operations must happen in steps. I believe it begins with integrated data and closed-loop automation in a few high-value use cases, building confidence over time, and only then grows into networks that can monitor, decide, and heal themselves at scale.

Michael Wilson, Oracle: Implementing fully autonomous systems can offer major benefits in efficiency and reliability, but providers will face big challenges when considering the shift. I personally believe trust is the most important obstacle we all must overcome with any AI/ML application. Will the company be able to convince employees and customers that they are better off with it in place? Ultimately, the shift is inevitable, but how we prepare and present it will make the difference in perception. Excluding trust, the industry has a patchwork of legacy technologies, making it difficult to scale comprehensive systems reliably and remain compliant with the various regulatory and reporting laws. Additionally, security concerns should be researched to ensure we are not creating a backdoor to critical infrastructure or automating safeguards against intrusion threats.

TOPIC: The 2026 Technician Skills Gap

ISE: As the network becomes almost entirely software-defined, how is the "boots on the ground" role evolving? What are the realistic strategies network service providers can use to upskill their field techs into hybrid network-software technicians?

Randy Alderton, Bell Canada: The role of a field technician is undergoing a significant transformation. The focus is shifting from purely physical hardware installation and repair to a more integrated approach that blends physical infrastructure knowledge with software understanding and automation.

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While this Q&A features insights from a few, the entire board's unwavering commitment drives our event's success. Thank you for your leadership, your passion for innovation, and your vital role in connecting the professionals who build the world's communication networks.

RANDY ALDERTON, Bell Canada

FRANCIS ALUETA, altafiber/ Hawaiian Telcom

JOHN AMUNDSON, TDS Telecom

MARC DUROCHER, Verizon Communications

STEVE HARRIS, UCL Swift NA | Harris DigiTech Academy

WILLIAM KURTZ, Norvado, Inc.

DINA MELO, Lumen

CHRIS MITCHELL, AT&T HQ Wireless Engineering

DENNIS PAPPAS, NextLight

RANDALL RENÉ, Waypoint 33

MICHAEL WILSON, Oracle

JOSEPH YEH, Verizon Wireless

How a technician's role will evolve:

- Hardware Swapping to Software Validation: While physical infrastructure (fiber, antennas, CPE, racks) still requires hands-on attention, the emphasis shifts from replacing faulty hardware to validating software deployments, configuring virtual network functions (VNFs) or containers, and ensuring the physical layer supports the logical, software-defined services.
- Augmented Troubleshooting: Technicians will leverage advanced diagnostic tools, augmented reality (AR) overlays for guided procedures, and remote access to centralized orchestration platforms. They become the eyes and hands of the remote operations center, executing tasks validated or initiated by software.
- Edge and CPE Focus: The physical edge of the network, including customer premises equipment (CPE), small cells, and edge computing nodes, remains a critical domain for field technicians. These locations are the physical anchors for increasingly distributed and virtualized services.
- Data-Driven Operations: Field technicians will increasingly interact with data dashboards, interpret telemetry, and provide structured feedback that feeds into AI-driven network management systems. Their reports become vital data points.
- Proactive Maintenance and Deployment: Instead of reacting to failures, techs will be involved in proactive tasks such as ensuring optimal physical conditions for virtualized deployments, performing planned upgrades of underlying hardware, and validating new service rollouts from a physical-to-logical perspective.

Realistic ways to upskill field techs:

- Modular, Role-Based Training Programs:
  - Curriculum Design: Develop training modules that progressively introduce concepts like basic Linux command-line interfaces, network automation scripting (e.g., Python), API fundamentals, virtualization (NFV/SDN concepts), cloud basics, and containerization (Docker/Kubernetes).
  - Tiered Approach: Offer foundational courses for all techs, with advanced modules for those moving into more specialized hybrid roles.
- Blended Learning and Hands-On Labs:
  - Online Resources: Utilize e-learning platforms for self-paced learning of theoretical concepts.
  - Virtual Labs: Provide access to simulated network environments (e.g., using GNS3, EVE-NG, or cloud-based labs) where technicians can practice configuration, scripting, and troubleshooting without impacting live networks.

Marc Durocher, Verizon Communications: The invention of the elevator didn't replace stairs. However, we've certainly adapted the way we use them. The same goes for our physical "boots on the ground." Instead of working on more repetitive issues and tasks that can be done remotely or virtually, we shift those resources to more technically specific work or new roles. For example, our technicians may not be physically plugging in cross-connect cables. Yet they are verifying that digital cross-connects are posted properly within software applications.

Many of our field technicians are experiential learners. So, we provide less formal class time and more time to watch and learn through hands-on activities. We don't just give them new tools; we involve them in the feedback loop. When a field tech sees how their physical intervention triggers a successful software "handshake" on their tablet, the "software-defined" concept becomes real.

Early exposure to new tools and time to work with them independently, with robust support, has proven highly effective. We use "over-the-shoulder" remote support tools, allowing a more experienced employee to help and see what the field tech sees in real-time when they need assistance. This turns every interaction into a live training session when needed.

Steve Harris, UCL Swift NA | Harris DigiTech Academy: As broadband networks become predominantly software-defined (SDN), the "boots on the ground/field operations" role is shifting from manual installation and break/fix work toward software-assisted, data-driven field operations. Field technicians are no longer just touching fiber, radios, or power; they are becoming the last-mile extension of the control plane (operations part of the network), validating KPIs, and translating field reality into the digital realm. The field operations team is increasingly guided by remote orchestration systems (e.g., proactive network maintenance, AI-driven diagnostics) and standardized workflows rather than by tribal knowledge and memorization of vendor metrics.

From an advisory standpoint, the most realistic upskilling strategies start with job role evolution, not role replacement. Broadband operators began focusing on building hybrid technicians who understand physical-layer fundamentals (e.g., fiber optics/wireless) and how those layers are represented in software—provisioning systems, at the packet level, digital twins, service models, and telemetry (our KPIs). This means teaching field techs how to interpret dashboards, validate automated configurations, capture/share structured data during installs (e.g., OTDR trace), and escalate issues with contextual insight rather than legacy raw trouble tickets.

Successful training programs use stackable credentials (e.g., FOA) and competency-based training rather than one-time retraining events. We also need to make sure the competency extends beyond knowledge (e.g., online courses/PPT); our workforce needs hands-on skills and abilities. We need to start with baseline digital literacy (IP fundamentals, networking fundamentals, virtualization/cloud concepts, application program interfaces (APIs) at a conceptual level), then layer in SDN principles (e.g., orchestration 101), remote testing tools, and AI-assisted troubleshooting. Hands-on labs should mirror real field behaviors: provisioning via orchestration tools, validating services with software-driven test sets, and feeding clean data back into the OSS/BSS/data lake.

Equally important is tooling that is easy to use and accurate. Modern field techs need guided workflows (e.g., augmented-reality-based), mobile apps tied to our orchestration

systems, and standardized test platforms that abstract complexity while reinforcing industry best practices. When our industry tools are designed correctly, technicians don't need to become software developers—they need to become software-aware operators!

Finally, providers should create clear career pathways that reward these hybrid skill sets: installer → field technician → OSP plant maintenance engineer → network automation specialist or remote operations engineer. When field teams see SDN as a growth opportunity rather than a threat, our adoption accelerates. In a software-defined world, "boots on the ground" don't disappear—they evolve into the next generation software technician/engineer that keeps our AI/autonomous networks aligned with physical reality.

William Kurtz, Norvado, Inc.: As networks become increasingly software-defined and virtualized, the traditional role of field technicians is undergoing a profound transformation. The historical emphasis on physical maintenance—splicing fiber, configuring hardware, and resolving discrete equipment faults—is expanding to include responsibilities that intersect with software-defined networking (SDN), automation platforms, and digital monitoring tools.

Field personnel are now expected to interact with software interfaces, interpret real-time network data, and, in some cases, execute updates or diagnostics via cloud-based management systems. This convergence of physical and logical layers necessitates a hybrid skill set that includes basic scripting, familiarity with network topologies, and an understanding of virtualized infrastructure components.

To facilitate this transition, service providers must adopt deliberate, scalable upskilling strategies. These may include:

- Modular Training Programs: Developing tiered curricula that introduce foundational software/networking concepts and progressively build toward SDN, NFV, and automation workflows. Training should include hands-on labs and simulation environments that reflect real-world field scenarios.
- Micro-Certifications and Badging: Implementing internal certification programs aligned with industry standards (e.g., MEF, CompTIA, Cisco) to validate specific competencies without requiring full reclassification of personnel.
- Mentorship and Shadowing: Pairing traditional field techs with network engineers or automation specialists to promote knowledge transfer in live operational contexts.
- Cross-Functional Work Assignments: Embedding technicians into cross-disciplinary project teams to expose them to design, provisioning, and troubleshooting workflows beyond the field environment.

The goal is not to turn every technician into a software engineer, but to cultivate a workforce that can operate effectively in a hybrid environment—bridging the gap between physical infrastructure and intelligent network control.

Chris Mitchell, AT&T HQ Wireless Engineering: As networks become fully software-defined, the traditional "boots on the ground" role is shifting from hardware-centric tasks to a more hybrid model that blends field expertise with software, cloud, and automation skills. Field technicians are still essential, but the nature of their work is evolving—from physical installation and troubleshooting to validating digital workflows, interpreting telemetry, and supporting remote, software-driven changes. Instead of manually provisioning or configuring devices, technicians increasingly interact with orchestration systems, assess data from intelligent network platforms, and ensure that automated actions align with real-world conditions. This evolution doesn't eliminate the need for field roles; it elevates them, turning technicians into critical extensions of the software-defined network's feedback and assurance loops.

To enable this transition, network service providers need realistic, scalable upskilling strategies that build software fluency without losing the operational intuition field teams already possess. Effective approaches include hands-on training tied to real tools—such as integrated workflow platforms, digital survey solutions, and orchestration systems—paired with structured learning paths that introduce cloud fundamentals, API-driven network operations, and automation frameworks. Providers can also leverage modular training environments, role-based certifications, and mentorship from engineering teams to steadily grow technicians into hybrid network-software practitioners. The goal isn't to turn every field tech into a software engineer, but to equip them with the skills to operate confidently in a software-orchestrated world where physical insight and digital proficiency are equally essential.

Randall René, Waypoint 33: Throughout the world and in nearly every network I have worked with, the field technician role is changing in clear and practical ways as networks become more software defined. The job is no longer only about installing or fixing equipment. It now includes finding problems using data, checking that work matches what the service is supposed to deliver, and working alongside automated systems. The physical network still matters, but software now guides much of the work and how success is measured. Technicians are being asked to review network data and confirm that their field work matches the network's digital view. The gap I see is not ability or effort. It is that many organizations still treat physical work and software systems as separate, even though the network no longer works that way.

The most effective upskilling approaches are practical and grounded in real-world work. Technicians learn faster when training is tied to the tools and tasks they use every day, rather than abstract software ideas. This means bringing GIS, network inventory, testing, and work management into one field experience and showing how each action updates the system of record. For instance, short, role-based training, combined with hands-on practice and mentoring, is more effective than long classroom programs. When technicians see that CONTINUED ON PAGE 42

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PREVIEW THE 2026 EVENT

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- **BEYOND FIBER:** While other events focus on a single technology, ISE EXPO encompasses the entire ecosystem—Fiber, 5G, FWA, Edge, HFC, Wi-Fi, Satellite and AI-Driven Network Operations.
- **OPERATOR-LED LEARNING:** Panel discussions deliver education led by service providers and field leaders grounded in day-to-day realities.
- **CROSS-SECTOR NETWORKING:** Decision-makers from telecom, utilities and municipalities casually meet on the exhibit floor.
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  - » Keynote Panel Discussion 1 (August 19): AI/Automation/Industry Outlook for 2030
  - » Keynote Panel Discussion 2 (August 20): Network Convergence Creates Technology-Neutral Realities
- **The Convergence Central Theater on the exhibit floor will bring conversation to the show floor. This new exhibit hall theater features must-see sessions—open to all attendees.**
- **Three educational tracks focused on what matters most to network professionals who drive network performance across complex hybrid fixed and mobile networks.**

2026 Conference Theme: Empowering the Future of Convergence

Tomorrow's broadband networks demand collaboration between technology, strategy, and innovation. ISE EXPO 2026 connects the professionals who design, build, and manage the converged infrastructure, delivering expert-led tracks focused on deployment, operational efficiency, and strategic leadership based on network realities. Attendees gain actionable insights to drive smarter, more resilient, and future-ready networks. ISE EXPO 2026 Conference Sessions empower the evolution of convergence—from the ground to the cloud, and everywhere in between.

Technology-Neutral Deployment Strategies for Converging Networks

71% of network operators say their most significant barrier to adopting next-generation network architectures is the lack of clear, technology-neutral deployment guidance that translates innovation into field-ready practice.

Trends and topics to be addressed include:

- **Practical and Proactive Design, Construction, Installation & Maintenance Tools and Tactics**
- **Insights into solving deployment challenges across the entire ecosystem—Fiber, 5G, FWA, Edge, HFC, Wi-Fi, Satellite, and Hybrid Infrastructures**
- **Proven methods that optimize performance regardless of platform or vendor, and facilitate the adoption of next-generation network architectures**

Reducing Network OpEx with AI, Automation, and Network Security

According to Analysys Mason, network operations can consume up to 40% of total OpEx, and 72% of operators say their biggest challenge is "translating AI and automation from proof of concept to daily operational use."

Trends and topics to be addressed include:

- **Efficiency, Resilience & Risk Mitigation for Service Providers**
- **Strategies telecom and broadband providers need to cut OpEx while improving network performance, uptime, and security resilience—all powered by AI, automation, and intelligent analytics**
- **Real-world tools that drive smarter maintenance, predictive analytics, faster fault isolation, and proactive threat detection**

Industry Outlook & Leadership

According to IDC's 2025 Telco Cloudification & Digital Transformation Survey, AI is now integral to telco transformation priorities—yet many operators cite a lack of leadership capabilities and strategic readiness as a key barrier to fully capitalizing on AI and cloud-native models.

Trends and topics to be addressed include:

- **Innovative strategies for leading through accelerating change**
- **How top decision-makers are tackling real-world challenges while building resilient, adaptable networks and teams for tomorrow's hyper-connected world**

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ISE EXPO 2026 will provide a variety of new offerings that will educate you on the next wave of Information and Communications Technology (ICT) to come. Don't miss this opportunity to stay ahead of the curve to ensure continual business viability with insights only presented at the show.

TUESDAY, AUGUST 18	
8:00 AM – 5:30 PM	Registration Open
9:00 AM – 11:00 AM	Preconference Workshops (additional fee required)
1:15 PM – 2:15 PM	Conference Educational Panels & Sessions
2:15 PM – 2:30 PM	Break
2:30 PM – 3:30 PM	Conference Educational Panels & Sessions
3:30 PM – 3:45 PM	Break
3:45 PM – 4:45 PM	Conference Educational Panels & Sessions
5:00 PM – 6:30 PM	Opening Night Reception in the Exhibit Hall

WEDNESDAY, AUGUST 19	
7:00 AM – 6:00 PM	Registration Open
8:00 AM – 9:00 AM	ISE Network Innovators' Awards Breakfast
8:30 AM – 9:15 AM	Women in Telecom (WiT) Breakfast & Panel
9:30 AM – 10:30 AM	Opening Keynote with Coffee and Pastries
10:30 AM – 5:30 PM	Exhibit Hall Open
10:30 AM – 11:00 AM	Sponsored Mimosas Kick Off in the Exhibit Hall
11:30 AM – 12:30 PM	Lunch in the Exhibit Hall
12:00 PM – 12:30 PM	Sponsored Session in Convergence Central Theater in the Exhibit Hall
12:45 PM – 1:45 PM	Conference Educational Panels & Sessions
2:00 PM – 2:30 PM	Coffee Break in Convergence Central Theater in the Exhibit Hall
2:30 PM – 3:30 PM	Conference Educational Panels & Sessions
3:45 PM – 5:30 PM	Networking Happy Hour in the Exhibit Hall
5:30 PM – 7:30 PM	Topgolf Networking Event in Partnership with ISE EXPO

THURSDAY, AUGUST 20	
8:00 AM – 2:30 PM	Registration Open
9:00 AM – 10:00 AM	Closing Keynote with Continental Breakfast *presented by UCL Swift North America*
10:00 AM – 1:00 PM	Exhibit Hall Open
10:00 AM – 10:30 AM	Sponsored Bloody Mary and Coffee Break in the Exhibit Hall
10:30 AM – 12:30 PM	Sponsored Session in Convergence Central Theater in the Exhibit Hall
12:45 PM – 1:00 PM	Attendee Vacation Giveaway in Convergence Central Theater in the Exhibit Hall

Networking Opportunities

On-Site Networking Receptions

Kick off the week at our NEW Opening Network Reception on Tuesday, August 18, 5:00 PM featuring live music, drinks, and appetizers on the show floor. It's the perfect way to reconnect with colleagues, meet new industry peers, and start the event strong.

Keep the momentum going at our Networking Happy Hour on Wednesday, August 19 at 3:45 PM. Join fellow attendees, exhibitors, and sponsors for another evening of relaxed conversation and meaningful connections.

ISE EXPO ADD ON

Topgolf Networking Event

Relax and enjoy our Topgolf networking event from 5:30 – 7:30 PM on Wednesday, August 19. Whether you're focused on networking, hosting customers, or just enjoying a fun night out, the event at Topgolf offers an entertaining, no-pressure way to kick off ISE EXPO week—no golf experience required.

ISE EXPO ADD ON

Women in Telecom (WiT) Continental Breakfast & Panel

Join your colleagues on Wednesday morning, August 19, for an insightful and interactive discussion on a variety of career advancement and professional growth topics.

ISE Network Innovators' Awards

The 2026 ISE Network Innovators' Awards will honor the best telecom infrastructure/network innovations that solve Communications Service Providers' (CSPs) AND end-users' pain points in a cost-effective manner. Honorees will be announced Wednesday, August 19, at the ISE Network Innovators' Awards Breakfast.

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200+ Industry Experts

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ADD-ON

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- Roundtable group discussions
- Light continental breakfast
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ADD-ON

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Wednesday, August 19 | 5:30 – 7:30 PM

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✓ Buffet + 2 drink tickets
✓ Networking in a relaxed setting

REGISTRATION FEE: $100

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—ISE EXPO Attendee

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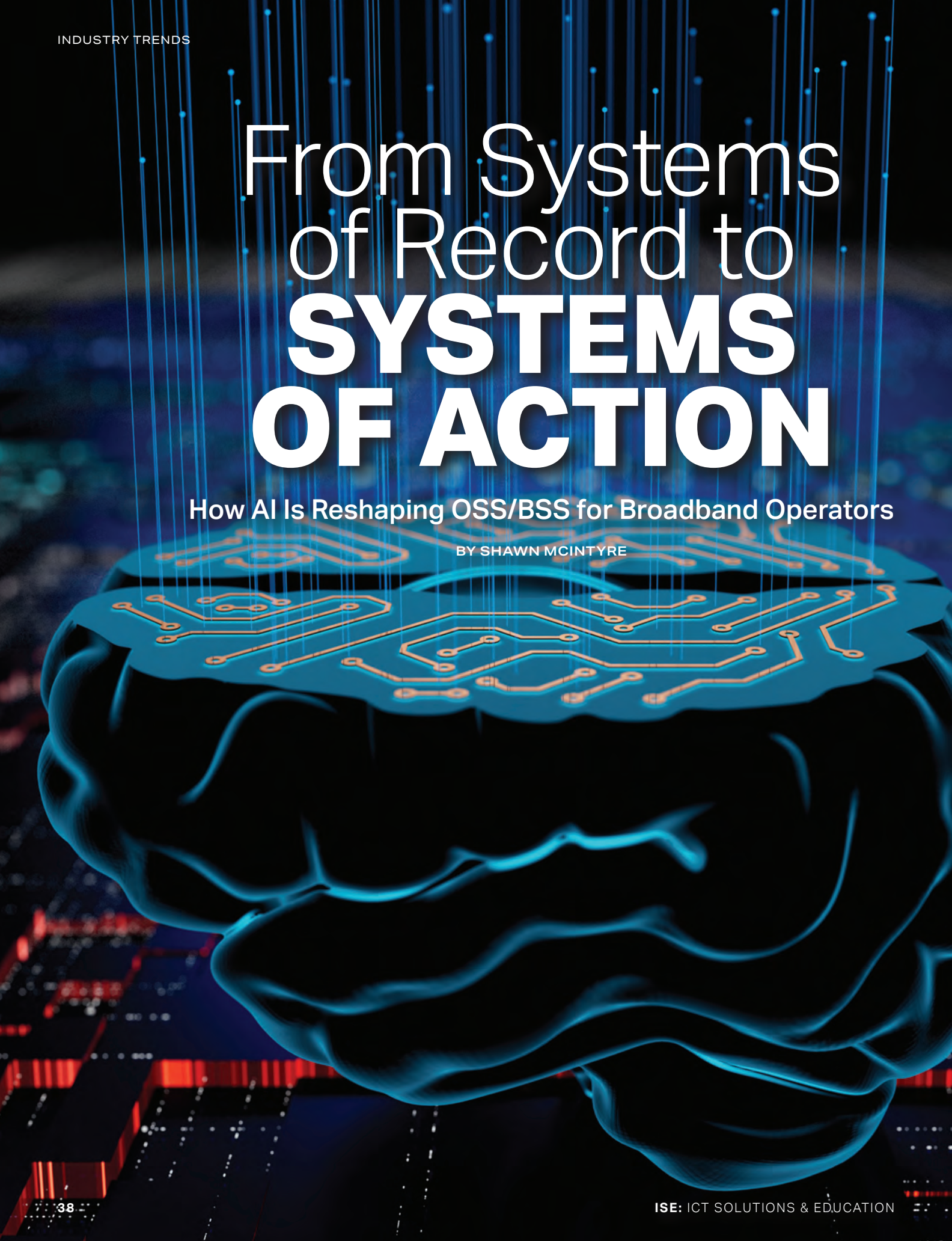
From Systems of Record to SYSTEMS OF ACTION

How AI Is Reshaping OSS/BSS for Broadband Operators

BY SHAWN MCINTYRE



For years, Operation Support Systems (OSS) and Business Support Systems (BSS) platforms have quietly done their job. They tracked subscribers, issued invoices, recorded service changes, and kept networks operational. For most broadband operators, these systems functioned as dependable systems of record. They told the truth about what had already happened.

But the operating environment for broadband service providers has changed dramatically. Customer expectations are rising. Networks are expanding faster. Public funding programs like BEAD are accelerating deployment timelines. At the same time, staffing constraints and cost pressures are forcing operators to do more with fewer resources.

In this environment, simply recording activity is no longer enough. Operators need systems that can act on data in real time, coordinate work across teams, and increasingly, learn from operational patterns. The industry is beginning a shift from systems of record to systems of action, and AI is accelerating that transition.

Why Systems of Record Are Reaching Their Limits

Traditional OSS and BSS platforms were designed for reliability and control. They enforced business rules, ensured billing accuracy, and supported compliance. Those strengths still matter. But many of these systems were built in an era when change was slow, and integrations were expensive.

Today, operators face common friction points:

- Launching a new product or pricing plan can take weeks of configuration.
- Simple service changes require multiple manual handoffs.
- Data is fragmented across billing, CRM, network management, and field tools.
- Operational teams spend significant time reconciling data instead of acting on it.

The result is operational drag. Processes technically work, but they move too slowly to support modern customer expectations like same-day installs, proactive outage communication, or rapid service upgrades.

Most legacy systems faithfully capture historical data, but that data is passive. It explains the past instead of driving action in the present. This is the core limitation operators are now confronting.

Defining a System of Action

A system of action builds on the foundation of a system of record, but adds intelligence, connectivity, and intent. In practical terms, a system of action is:

DATA-DRIVEN

Operational events such as failed payments, network alarms, or missed appointments automatically trigger workflows and decisions.

CONNECTED

APIs and event-based architecture enable real-time coordination across billing, customer management, field service, and network systems.

ADAPTIVE

Rules engines and machine learning adjust behavior dynamically, prioritizing work, flagging risks, and recommending next actions.

CUSTOMER-CENTRIC

Success is measured in outcomes like install speed, first-call resolution, churn reduction, and service reliability.

> A system of record tells an operator what happened. A system of action helps decide what to do next.

In short, a system of record tells an operator what happened. A system of action helps decide what to do next. This architectural shift is foundational to enabling AI in operational environments.

Why AI Depends on Actionable Architecture

Many operators view AI as an overlay. In practice, AI only delivers value when it is embedded directly into operational workflows.

This is where agentic workflows emerge. Instead of dashboards or standalone tools, AI-driven agents operate inside daily operations:

- A diagnostic agent identifies service degradation, correlates impacted subscribers, and routes tickets automatically.
- A retention agent flags customers at risk of churn based on billing behavior or support history and triggers proactive outreach.
- A field service agent dynamically reprioritizes technician schedules based on outages, SLAs, and real-time conditions.

These capabilities depend on clean, connected, and real-time data flows. Without them, AI remains experimental. With them, AI becomes operational.

Modern platforms are designed to support this shift by acting as a real-time coordination layer across OSS and BSS functions, rather than a collection of disconnected modules.

> **For operators planning their next phase of growth, the question is no longer whether AI will matter, it is whether their operational systems are ready to act on it.**

Data Is the Real Bottleneck

For most broadband operators, AI readiness is not constrained by models or algorithms. It is constrained by data quality and structure.

Common challenges include inconsistent customer records, heavy reliance on free-text notes, disconnected identifiers across systems, and historical data that is accurate but not usable for automation.

Before AI can act, data must be structured, validated, and owned. Practical steps operators are taking include:

- Standardizing core entities like customers, locations, services, and subscriptions.
- Replacing free-text fields with structured attributes that workflows can reference.
- Defining clear sources of truth for each data domain.
- Enforcing validation rules at data entry to prevent long-term cleanup work.
- Moving from batch synchronization to event-driven updates.

Platforms like gaiia support these practices through unified data models and real-time events that propagate changes instantly across systems.

From Automation to Orchestration

As operators mature, automation alone is not enough. The next step is orchestration. gaiia approaches orchestration through a visual workflow editor that allows teams to design operational logic across billing, customer management, field service, and communications. Workflows respond to real-time triggers and coordinate actions without requiring heavy custom development.

Recently, gaiia has taken this a step further by embedding AI directly into its workflow engine.

Within TypeScript-based workflow nodes, gaiia now provides an AI assistant that allows users to describe what they want to accomplish in plain language. The assistant generates production-ready TypeScript code that pulls the correct data from prior workflow steps, applies error handling, and formats outputs for downstream systems.

This capability lowers the barrier to building sophisticated workflows:

- Operational teams can build faster without memorizing syntax.
- Engineering bottlenecks are reduced for simple transformations.
- Error handling and best practices are applied by default.
- Teams learn by reviewing generated code.

More importantly, AI outputs become part of execution. Prompts, responses, and logic live inside the OSS and BSS workflow itself, rather than in external tools. This makes AI auditable, repeatable, and operationally safe.

The Human Impact of Systems of Action

Despite common fears, automation does not remove people from operations. When systems act on data:

- Customer service teams spend less time navigating exceptions and more time resolving issues.
- Field technicians receive contextual job information and dynamic schedules.
- Managers gain real-time visibility instead of relying on lagging reports.

The result is not fewer employees, but more effective teams that can scale without proportional increases in headcount.

Looking Ahead

The transition from systems of record to systems of action is incremental. Most operators begin with a single workflow, a single dataset, or a single integration.

Over time, those changes compound. Data becomes cleaner. Workflows become smarter. AI moves from experimentation into daily operations.

As broadband networks expand and operational complexity increases, platforms that can act, coordinate, and learn will define the next generation of OSS and BSS. Systems that only record history will struggle to keep pace.

For operators planning their next phase of growth, the question is no longer whether AI will matter, it is whether their operational systems are ready to act on it. ■

Shawn McIntyre leads growth at gaiia, a modern OSS/BSS platform transforming how broadband service providers manage operations and deliver customer experiences. For more information, visit https://gaiia.com and follow gaiia on LinkedIn: linkedin.com/company/gaiiasoftware and X: @gaiia_software.

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CONTINUED FROM PAGE 29 these skills help them fix issues faster, reduce repeat work, and improve network quality, software skills become a natural part of the job instead of an extra burden.

Michael Wilson, Oracle: While I do see a strong shift towards SDNs, many technicians are still going to be engaged in the physical construction, repair, and installation activities that remain consistent with what we see today. A computer will not run cable, splice fiber, set a pole, or dig a hole, which is why skilled trades will always be a safe and secure career pathway. However, upskilling is very important to upward mobility and being able to accurately troubleshoot/correct complex issues with shifting technologies. It is crucial to grow/retain talent by providing the current workforce with engaging opportunities and growth.

Employers should:

- Provide education reimbursement budgets and encourage the use of them.
- Provide rotational/mentorship programs for real world coaching and experience.
- Encourage vendor neutral certifications AND provide vendor specific SDN training.
- Build an internal culture of learning from the top down. ■

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