

Quantum Inspired Optimization

Driving
breakthroughs for
business challenges



► Introduction

From industrial production and supply chain logistics to medical research and digital marketing, optimization is the backbone of efficient operations. But challenging modern business demands are pushing traditional optimization methods to their limits. With increasing need for real-time responses, higher precision, and solutions for problems that involve countless variables, many existing approaches are struggling to keep up – and it's impacting your bottom line.

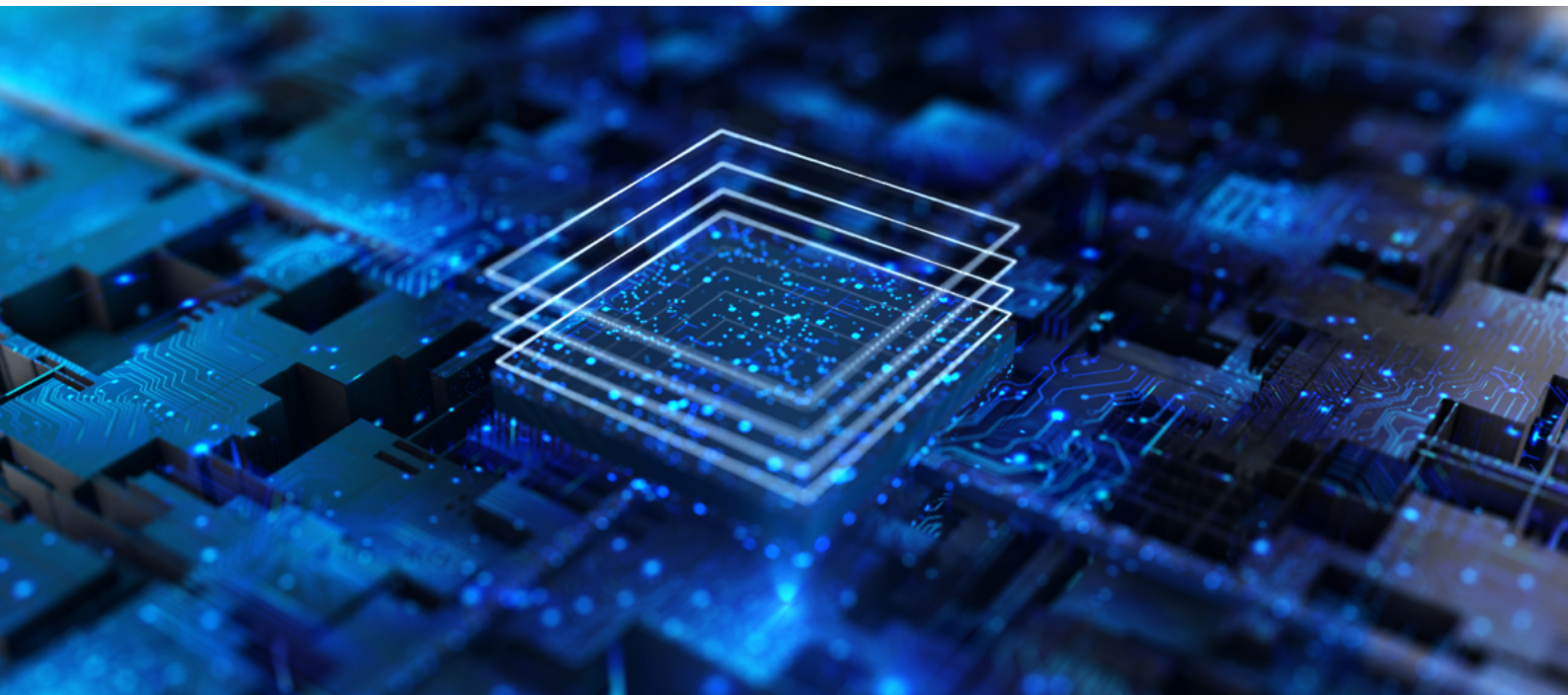
Quantum Inspired Optimization (QIO) offers a breakthrough approach. Inspired by the principles of quantum mechanics, QIO provides advanced computational capabilities to tackle these challenges, solving problems faster and more effectively. We spoke with Andreas Rohnfelder, Head of Consulting, Quantum Inspired Optimization at Uvance Wayfinders, Fujitsu Germany, to explore how this powerful technology is unlocking new opportunities and delivering game-changing results.

► Breaking barriers, unlocking potential

QIO is redefining what's possible in optimization. It's not a silver bullet, but in situations where existing solutions falter under the weight of increasingly complex real-world challenges, it can deliver real value. The key to success lies in evaluating what these improvements mean in practical terms, such as increased revenue, reduced costs, or enhanced operational efficiency. It's not just about solving problems faster – it's about solving them in a way that drives real impact.

"Every delivery schedule where you serve all your clients is a valid solution," explains Andreas. **"But you're not just interested in any valid solution. You want the best one, in the most affordable time, and QIO brings value when the results exceed what you're achieving today."**

From optimizing factory throughput to tackling complex scheduling demands, QIO empowers organizations to extract more value from their existing investments. And where traditional methods may start to reach their limits, QIO can break those barriers – delivering solutions for today while laying the foundations for businesses to leverage quantum computing advancements as they emerge. By unlocking this potential, QIO goes beyond just being a solution; it's a strategy for sustained success.

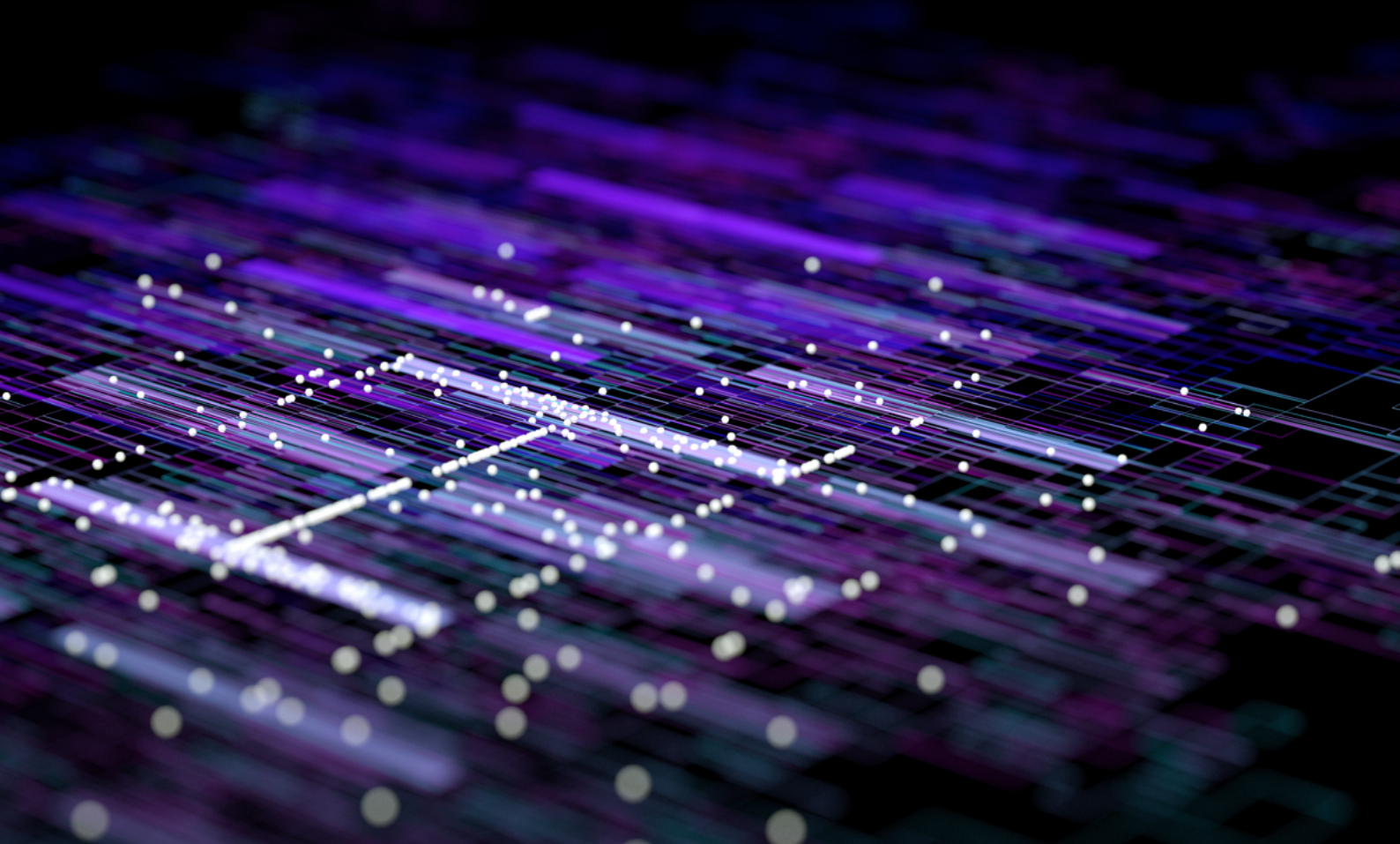


► Beyond algorithms: Fujitsu consulting-led optimization approach

At Wayfinders, we combine our industry expertise with cutting-edge technology to deliver a consulting-led approach to QIO – starting with a deep understanding of the customer's business and objectives. This foundation ensures that solutions are tailored, impactful, and aligned with strategic goals.

Our process begins with a comprehensive assessment, working closely with customers to identify and evaluate existing optimization challenges and prioritize scenarios that hold the greatest potential. By factoring in technical, business, and cultural readiness, this collaborative assessment ensures that we jointly focus on the challenges that matter most.

The next step is a Proof of Value (PoV), which uses the customer's own data (real or synthetic) to develop a simplified yet representative model of the challenge to demonstrate QIO's capabilities. This reduces risk while providing a clear indication of the expected results, whether it's improved efficiency, reduced costs, or better resource utilization. "What's special is working very closely with the customer – understanding their business, consulting with them on where QIO may bring the greatest benefits," explains Andreas.



Lastly, we work alongside our customers to integrate QIO seamlessly into their existing environments. Our priority is to help customers find the most effective solution for their needs, and one of the best options is Fujitsu's Digital Annealer. This unique technology is designed to rapidly solve complex combinatorial optimization problems, delivering high-speed, high-quality results without the complications and costs typically associated with quantum computing methods. While not a true quantum computer, it bridges the gap between classical and quantum systems. "Think of it as a future-proof on-ramp to quantum computing that solves real-world problems today," says Andreas.

Key to this approach is our breadth of expertise and technology-agnostic mindset, which means we can consider QIO alongside AI and other technologies to identify the best-fit solution for each scenario. This flexibility allows us to address optimization from every angle – technical, business, and human – so that we can continue to deliver solutions that go beyond algorithms to drive tangible, lasting value.

► Turning complex challenges into competitive advantages: Two real-world customer stories

To demonstrate how QIO can empower organizations to realize new opportunities for efficiency and innovation, Andreas takes us through two real world case studies.

Case Study: Reducing congestion and emissions at Hamburg Harbor

The Hamburg Port Authority (HPA) faces a formidable challenge: tens of thousands of trucks move through the port daily, leading to significant congestion, particularly during peak hours. As an inner harbor, expanding infrastructure like roads to alleviate the bottleneck isn't the way forward.

In their quest for an innovative solution to improve traffic flow, HPA partnered with Fujitsu to develop a QIO solution using our Digital Annealer.

By analyzing traffic data, the system optimizes the entire traffic light network holistically, and in real time, rather than managing individual intersections in isolation.

The results are significant. Truck travel times within the port can be reduced by 20% and CO₂ emissions could drop by 9%, helping HPA improve its operational efficiency while supporting broader sustainability goals.





Case study: Revolutionizing scheduling for a Rail Company

For a large rail company, the challenge lies in the shared use of a single rail network by both passenger and freight trains. While they have an existing scheduling system, it requires hours to generate conflict-free timetables that accommodate all freight train path requests. So, they invited Fujitsu to prove the capability of QIO for the scheduling process.

Using our Digital Annealer, we can process scheduling calculations significantly faster than their existing solution – delivering timetables in just four minutes, versus two hours.

In addition, we're able to introduce soft constraints that could address challenges that the current solution isn't yet able to handle appropriately.

This dramatic reduction in processing time highlights how QIO can improve the overall flexibility and quality of scheduling while opening up possibilities for real-time scheduling in the future. Beyond demonstrating a measurable ROI through approving more train path requests, QIO also presents opportunities for more adaptive scheduling to address operational disruptions.

► Data without limits: The future of end-to-end optimization

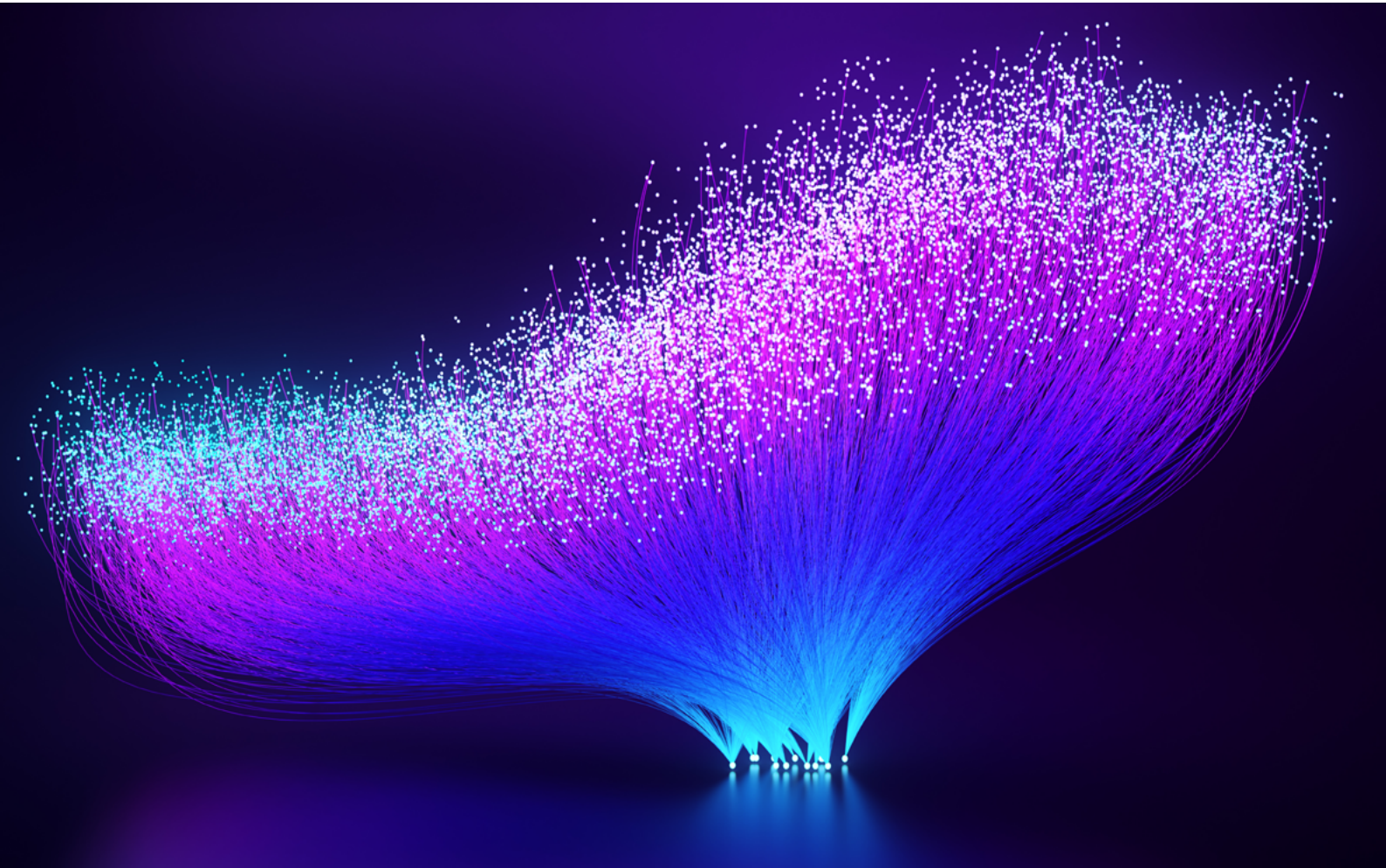


**Optimization can only be as good as the underlying data.
If you don't have the data to optimize, you can't optimize.**

– *Andreas Rohnfelder*



With the world becoming increasingly interconnected, data is the linchpin of effective optimization. Yet, many organizations still grapple with siloed data systems, restricting their ability to achieve holistic insights. Companies that break through these barriers will be able to generate efficiency gains through end-to-end optimization. "This is why," explains Andreas, "a crucial part of our process is to help customers identify, connect, and structure the necessary data for successfully applying data-driven solutions to their business processes."



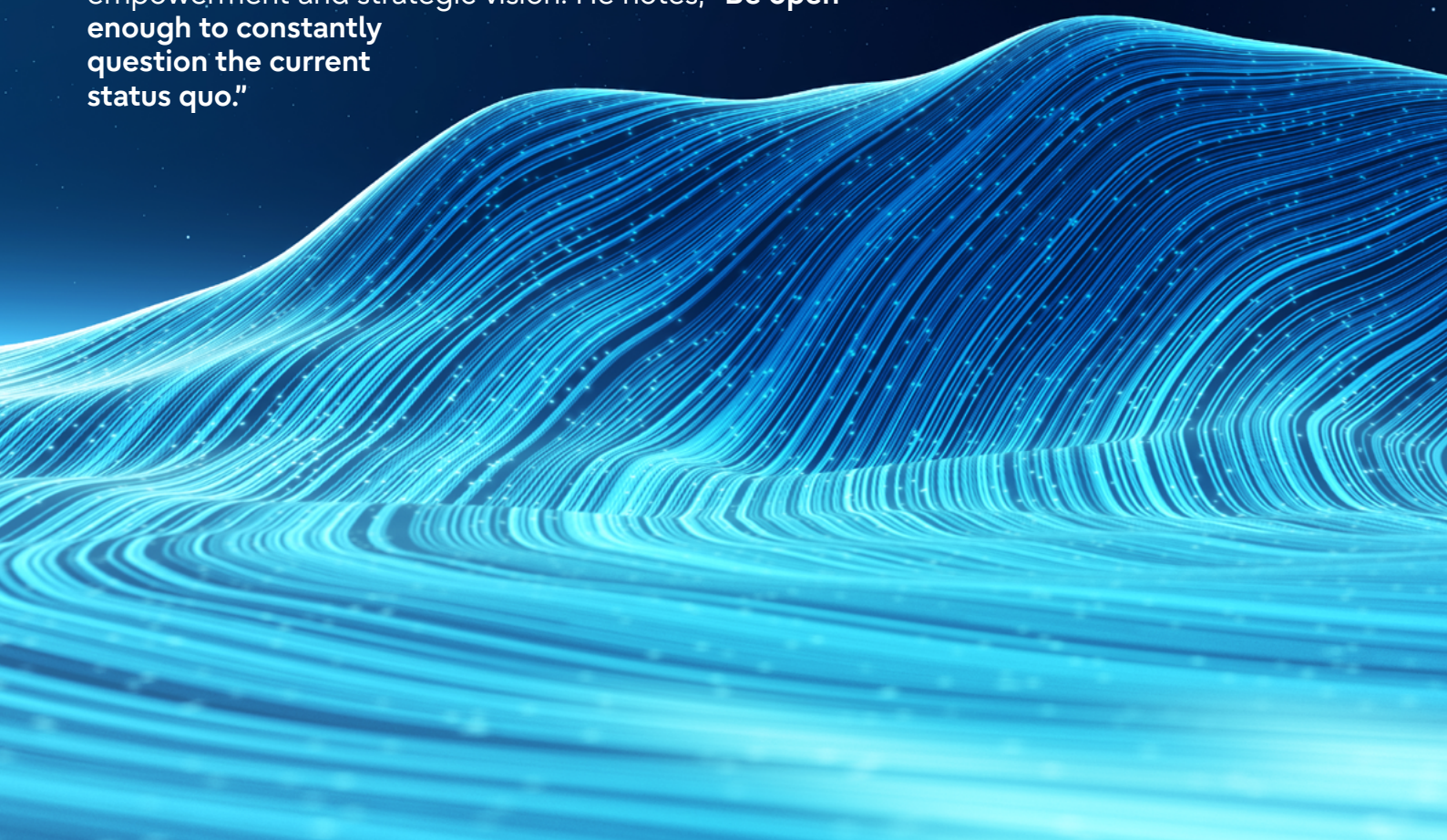
Looking ahead, Andreas believes that due to advancements in data spaces, secure and compliant exchange of data between companies and business eco-systems will further enhance the business benefits. "Imagine optimizing the entire supply chain in a single step," he says. "This leap defines the next frontier of optimization."

► Building a culture for optimization success

As organizations prepare for quantum computing's eventual mainstream adoption, QIO serves as a powerful precursor, providing immediate benefits while laying the groundwork for future innovations. Key to Fujitsu's QIO solutions is that fact that they are transferable to quantum computing platforms as they mature – equipping forward-thinking organizations with future-ready optimization capabilities, today.

However, technology is only one part of the equation. The cultural shift required to fully embrace QIO cannot be understated. "QIO is a digital transformation initiative," explains Andreas. "It relies on data and people." As such, true optimization success depends on more than just technology; it requires an integrated approach that includes fostering a culture of continuous innovation, executive sponsorship, and a willingness to reimagine boundaries.

To ensure your organization is ready for QIO implementation, Andreas suggests looking at critical success factors, including your data readiness, people empowerment and strategic vision. He notes, **"Be open enough to constantly question the current status quo."**



► Conclusion

QIO is revolutionizing the way businesses tackle complex challenges, offering unprecedented speed and precision in problem-solving. This innovative approach not only addresses immediate operational inefficiencies but also lays the groundwork for leveraging future advancements in quantum computing, ensuring a sustained competitive edge.

Explore how QIO can transform your business and drive breakthroughs in your industry!

Connect with Wayfinders and take the first steps towards a future-proof optimization strategy.



[Contact us to find out more](#)



▶ Contributors



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Andreas Rohnfelder is Head of Consulting, Quantum Inspired Optimization at Fujitsu Germany. He and his team work closely with national, international, and global customers to address and solve challenging combinatorial optimization problems using innovative approaches. He is also involved in the German Quantum Computing Ecosystem. Prior to his current position, he held management positions and responsibilities in the areas of Industry 4.0 and Digital Transformation.