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How INFORMS can contribute to the Second Quantum Revolution

Sridhar Tayur

Quantum Technologies Group, Tepper School of Business, Carnegie Mellon University, Pittsburgh PA 15213 stayur@cmu.edu

Abstract. The Second Quantum Revolution – comprising of Quantum Computing, Quantum Communications and Quantum Sensing – promises further abilities to improve the human condition, security and sustainability, hence mass prosperity, across the world, in a variety of ways, including improving health (through better diagnosis as well new drug development, via exciting applications of Quantum Machine Learning and Quantum Sensing) as well as by enhancing communication and cybersecurity. It also promises to do so using less energy than purely digital methods, thus providing an environmentally sustainable approach to global sustainable development in a hybrid quantum-classical future.

Integer Programming. Queuing. Markov Decision Processes. Semi-definite Programs. These are some of fundamental methodologies in Operations Research (OR) and Management Science (MS) that are used to tackle practical applications from Business (Supply Chain, Finance), Engineering (Communication Networks) and Medicine (Cancer Genomics, Image Recognition). At Tepper Quantum Technologies Group, we are exploring the twin questions: (a) what can quantum do for OR/MS and (b) what can OR/MS do for quantum. This article, a companion to my 2025 INFORMS Keynote, provides a brief summary of our research spanning Algorithms, Hardware and Applications (AHA). I hope that it helps illustrate how our community can contribute to the Second Quantum Revolution.

Key words: Quantum Mechanics, Semidefinite Programming, Queuing, Markov Decision Process, Integer Programming

1. Introduction

Quantum Mechanics (QM) began in 1900, matured in 1925, and 2025 was labeled as the International Year of Quantum Science and Technology (by UNESCO). INFORMS also celebrated the 100th anniversary of QM with a variety of activities, including my Keynote at our annual meeting in Atlanta (October 2025). The purpose of this brief companion article is to provide illustrative examples on how INFORMS research[1] can contribute to the Second Quantum Revolution that is underway with the goal of encouraging more researchers to join this exciting opportunity to advance the frontiers of the scientific and technological capabilities of our civilization. A central theme of this article is that Operations Research and Management Science are not merely downstream beneficiaries of quantum technologies, but must be foundational contributors to their success. As quantum systems scale, they confront challenges that are not primarily physical but decisional: fragility under noise, non-additivity of resources, stochastic degradation over time, and the need for optimal control under severe uncertainty. These are precisely the regimes where OR/MS has historically made its greatest contributions. The Second Quantum Revolution will therefore not be realized by physics alone, but by the co-evolution of physical insight and decision science, with INFORMS methodologies playing a central and enabling role.

1.1. The First Quantum Revolution

The First Quantum Revolution, spanning roughly from the 1940s to the 1980s, transformed modern civilization through technologies that exploited quantum mechanical principles without requiring direct manipulation of individual quantum states. Let me illustrate this with a few examples. The transistor, invented in 1947 at Bell Labs, used quantum mechanics to control electrical current flow through semiconductors, replacing bulky vacuum tubes and enabling the miniaturization of electronics. This breakthrough paved the way for the integrated circuit in 1958, which packed multiple transistors onto a single silicon chip, exponentially increasing computing power while reducing size and cost—a trend that would follow Moore's Law for decades. Meanwhile, the laser, demonstrated in 1960, harnessed quantum principles of stimulated emission to produce coherent light with unprecedented precision, revolutionizing communications, manufacturing, medicine, and research. The charge-coupled device (CCD), invented in 1969, exploited quantum effects in semiconductors to convert light into electronic signals with remarkable sensitivity, becoming the cornerstone of digital imaging in cameras, telescopes, and scientific instruments. Finally, magnetic resonance imaging (MRI), developed for medical use in the 1970s, applied quantum mechanics of nuclear spin to create detailed images of soft tissues inside the human body, transforming medical diagnostics without invasive procedures or harmful radiation. Together, these innovations laid the technological foundation for the information age and modern healthcare, demonstrating how understanding quantum mechanics at a fundamental level could yield practical tools that reshaped human society.

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[1] I do not cover the business of quantum computing here: see (16) and (20). Our community has already begun to recognize that Operations Research can play an important role in advancing Quantum Computing; see (1).

1.2. Quantum Information Science (QIS) and the Second Quantum Revolution

Quantum Information Science emerged in the late 20th century as researchers realized that quantum mechanics wasn't just a framework for understanding nature or building useful devices, but could itself be harnessed as a computational and informational resource. Pioneering work in the 1980s and 1990s revealed that quantum phenomena like superposition—where particles exist in multiple states simultaneously—and entanglement—where particles remain mysteriously correlated across vast distances—could enable fundamentally new ways of processing and transmitting information that were impossible with classical physics. This theoretical foundation sparked the Second Quantum Revolution, characterized by technologies that actively create, manipulate, and exploit individual quantum states rather than merely applying quantum principles in bulk materials. Quantum sensing leverages the extreme sensitivity of quantum systems to external perturbations, enabling measurements of magnetic fields, gravity, time, and other quantities with unprecedented precision for applications ranging from brain imaging to underground resource detection. Quantum communication exploits entanglement and quantum key distribution to create provably unbreakable encryption, as any attempt to intercept quantum-encoded messages inevitably disturbs the quantum states and reveals the eavesdropping. Most ambitiously, quantum computing seeks to harness superposition and entanglement to perform certain calculations exponentially faster than classical computers, promising breakthroughs in drug discovery, materials science, cryptography, and optimization problems that are intractable for even the most powerful conventional supercomputers. Seen through a data-science lens, quantum technologies are not only physical systems but also data-generating systems whose calibration, validation, and control depend on statistical inference and learning under uncertainty. Unlike the First Quantum Revolution's passive use of quantum effects, this second wave represents humanity's attempt to engineer and control the quantum world with exquisite precision, opening possibilities that seemed like science fiction just decades ago.

1.3. Structure of the paper

Table 1 provides a map between methodologies that we are familiar with and topics of interest in the Second Quantum Revolution. In Section 2, we discuss how Semi-definite programs provide a natural bridge to QIS, forming the basis for many Quantum Sensing applications. Section 3 illustrates two applications in Quantum Communications: (1) Buffering, using queuing theory, and (2) Entanglement Switch, whose optimal operation can be modeled as a Markov Decision Process (MDP). Section 4 covers quantum (and quantum-inspired) computing and demonstrates how nonlinear binary constrained optimization (NOBCO) models can be solved very differently and are

Semi-definite Programs (SDPs)	Quantum Information Science (QIS) Quantum Sensing
Queuing Models	Buffering in Quantum Communications
Markov Decision Process (MDP)	Entanglement Switch
Integer Programming	Quantum (inspired) Computing

Table 1 INFORMS methodologies and Second Quantum Revolution topics.

surpassing classical best-in-class algorithms. Section 5 concludes this brief article with suggestions for further reading.

2. SDPs as a Natural Pathway for INFORMS Researchers to Enter QIS

Among the many entry points into Quantum Information Science, semi-definite programming occupies a special position. This is not accidental. The near-term quantum landscape is dominated by noisy, intermediate-scale quantum (NISQ) devices where uncertainty, mixed states, and partial information are the norm rather than the exception. In such regimes, exact characterizations are often unattainable, while bounds, relaxations, and certificates become essential. SDPs provide a mathematically principled and computationally tractable framework for reasoning about precisely these questions, making them a natural bridge between OR/MS and quantum technologies in the NISQ era. In practice, the power of semidefinite relaxations in QIS is amplified by data-driven estimation: noise models, density matrices, and confidence bounds are inferred from finite, imperfect experimental data rather than assumed a priori.

Semi-definite programs (SDPs) thus provide an accessible and natural entry point for Operations Research and Computer Science professionals to contribute meaningfully to Quantum Information Science without requiring deep mastery of quantum mechanics. As highlighted in the tutorial by Siddhu and Tayur (13), SDPs extend the familiar framework of linear programming by replacing element-wise non-negative vector variables with positive semi-definite matrices, preserving many desirable properties such as duality theory and efficient solvability through interior-point methods. What makes SDPs particularly relevant to QIS is that quantum states are mathematically represented as positive semi-definite density operators, and many fundamental problems in quantum computing and communication—including state discrimination, channel capacity, and entanglement detection—naturally formulate as SDPs. This alignment creates a ’trading zone’ where INFORMS researchers can leverage their existing expertise in convex optimization, cutting-plane methods, and computational techniques to tackle pressing challenges in quantum technologies, while the quantum context provides novel problem structures that can inspire new algorithmic developments in optimization theory itself.

2.1. Example: Entanglement Detection using SDP Heirarchy

The paper by Peña, Siddhu, and Tayur (10) on entanglement detection exemplifies how INFORMS expertise in first-order methods (FOMs) and interior-point methods (IPMs) can advance quantum information science by making previously intractable problems computationally feasible. The authors introduce the PST hierarchy, a new SDP hierarchy offering tighter approximations. By developing compact, polynomially-scalable formulations using partition mappings and operators, they transform entanglement detection into optimization problems well-suited to both FOMs (Frank-Wolfe, projected gradient, and fast projected gradient) and a custom primal-dual IPM. Their numerical experiments demonstrate that these tailored algorithmic approaches enable solving deeper levels of the SDP hierarchy (up to k=15) than previously possible with off-the-shelf solvers, successfully detecting entanglement in challenging quantum states. This work not only provides practical tools for the quantum computing community to verify entanglement in high-dimensional or noisy systems—a critical requirement for quantum communication and computation—but also demonstrates how careful integration of problem structure with algorithmic design can overcome computational barriers, showcasing the unique value that INFORMS methodologies bring to the Second Quantum Revolution.

3. Quantum Communication: Beyond Classical Information Transfer

Quantum communication replaces the classical transmission of bits with the transmission of quantum bits (qubits), whose ability to exist in superposition and become entangled over long distances enables correlations and security guarantees impossible in any classical network. Because qubits cannot be copied or amplified without disturbance, building a quantum internet requires fundamentally new infrastructure, notably quantum repeaters that create and swap entanglement across many short links to span continental scales (19). Such a network would not replace today's internet but augment it, allowing tasks such as provably secure key distribution, private access to remote quantum computers, ultra-precise clock synchronization, distributed sensing, and coordinated computation between distant quantum processors. Even modest end nodes handling only single qubits can already unlock advantages, since the power of the quantum internet derives from entanglement itself rather than large local quantum computers, making the stepwise development of multinode quantum networks a realistic path toward a future global quantum internet.

Quantum communication thus represents a revolutionary paradigm in information transmission enabling fundamentally new protocols. Quantum key distribution (QKD) provides provably unbreakable encryption by leveraging the fact that measuring quantum states inevitably disturbs them, making eavesdropping detectable. The capacity of quantum channels—the maximum rate at which information can be reliably transmitted—depends critically on whether classical or quantum information is being sent, and whether product or entangled encoding strategies are employed. Understanding these capacity limits through quantum Shannon theory is essential for designing practical quantum networks, including quantum repeaters that extend communication range despite decoherence. As quantum communication networks scale from laboratory demonstrations to metropolitan and intercontinental systems, addressing practical challenges like noise, buffering delays, and the non-additive nature of quantum channel capacities becomes paramount for realizing the full potential of quantum information transmission.

A defining challenge of quantum communication systems is the breakdown of assumptions that underpin classical information theory. Noise is no longer independent and identically distributed, memory effects cannot be ignored, and operational decisions—such as buffering, scheduling, or switching—directly influence physical decoherence. This makes queuing theory and Markov decision processes not merely convenient abstractions, but structurally necessary tools for understanding and optimizing quantum communication networks. As quantum networks evolve from point-to-point links to operational systems, their performance becomes inseparable from the data they generate—arrival processes, waiting times, fidelity decay—making statistical modeling and online inference essential complements to information-theoretic analysis.

We briefly discuss two applications[2] next. Taken together, queue-channel models and quantum switch control illustrate a broader lesson: In quantum networks, information-theoretic performance is inseparable from temporal dynamics. Waiting times, storage decisions, and control policies shape the effective noise experienced by quantum states, creating feedback loops between physical degradation and operational choices. These interactions are largely invisible in static or asymptotic models, but become central once quantum communication is treated as a networked, resource-constrained system.

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[2] For an advanced application, Quantum Money, see (15).

3.1. Quantum Queue-Channels

The paper (14) addresses a critical yet often overlooked aspect of quantum communication networks: the decoherence that qubits experience while waiting in buffers before transmission. Traditional quantum Shannon theory assumes independent and identically distributed (i.i.d.) noise across channel uses, but in realistic quantum networks, qubits waiting in transmission buffers continue interacting with their environment, experiencing waiting-time-dependent decoherence that introduces correlations in the effective noise process. The authors characterize the classical capacity of unital qubit queue-channels—where the noise depends on queuing dynamics governed by arrival and service rates—and demonstrate that surprisingly, simple product (non-entangled) encoding and decoding strategies achieve maximum capacity for this broad class of channels. Their key insight is that every unital qubit queue-channel has an induced binary symmetric queue-channel whose Shannon capacity equals the quantum channel's classical capacity, providing explicit capacity-achieving measurement strategies. For the important special case of symmetric generalized amplitude damping (GAD) queue-channels, which model realistic decoherence in optical fibers and quantum memories at finite temperature, they derive closed-form capacity expressions and provide crucial design insights: Simply maximizing qubit preparation rates can be counterproductive, as high rates cause longer buffer waiting times and increased decoherence, with optimal operating points depending on the physical characteristics of the buffer environment. This work demonstrates that explicitly modeling buffering effects through queue-channel analysis is essential for practical quantum network design, revealing fundamental tradeoffs between throughput and decoherence that are invisible in idealized i.i.d. models.

3.2. Quantum Switches

Kumar et al. (5) investigate optimal entanglement distillation policies for quantum switches in entanglement distribution networks. The authors model a quantum switch with two clients that generates elementary entanglement (Bell pairs) probabilistically, which are stored in noisy quantum memories where they decohere over time. Using a Markov Decision Process framework, they determine optimal policies for when the switch should wait, perform entanglement distillation (combining two noisy Bell pairs into one higher-quality pair), or perform entanglement swapping (connecting Bell pairs from both clients to create end-to-end entanglement). The key finding is that for intermediate fidelity thresholds, allowing entanglement distillation significantly improves throughput compared to policies that only use swapping, as distillation helps preserve link quality in the face of decoherence. However, at very low or very high fidelity thresholds, distillation provides minimal benefit. Through simulations, they demonstrate improvements in average throughput, average fidelity, and timing jitter when using the optimal distillation-enabled policy, establishing the value of distillation in mitigating decoherence effects in quantum switches. From a data-science perspective, optimal switch policies are not merely computed but learned and adapted, as empirical transition probabilities and decoherence rates evolve over time.

4. Quantum Computing (QC)

Quantum computing differs from sensing and communication in one important respect: many of its target problems already lie at the heart of Operations Research. Optimization, search, and decision-making under constraints are familiar territory. What changes in the quantum setting is not the objective or the constraints, but the computational substrate. Energy landscapes replace feasible regions, noise replaces numerical precision, and driving computational performance is the practical focus. This shift plays directly to OR/MS strengths in modeling, algorithm design, and empirical evaluation. How can we solve hard non-linear objective integer programs - that are used to model many important practical problems in many industries in healthcare, humanitarian logistics and finance - in an entirely different and creative way?

4.1. Tutorial: A rapid introduction to QC

The tutorial (7) provides a hands-on introduction to solving Quadratic Unconstrained Binary Optimization (QUBO) models using current quantum computing platforms. This bridges the gap between theoretical quantum computing concepts and practical implementation by covering both IBM's gate-circuit architecture and D-Wave's quantum annealing systems. The tutorial is structured to reach undergraduate and graduate students as well as industry professionals seeking to explore near-term quantum applications, offering five companion notebooks in an associated GitHub repository with detailed implementation guides.

The tutorial demonstrates QUBO formulations for three canonical NP-complete problems and two practical applications. The canonical problems include number partitioning (dividing a set into two subsets with minimal sum difference), max-cut (partitioning graph vertices to maximize edges between partitions), and minimum vertex cover (finding the smallest vertex set covering all edges). The practical applications include order partitioning for A/B testing in hedge fund portfolio management, which extends number partitioning to balance both portfolio sizes and risk factors across multiple dimensions, and cancer genomics pathway identification using mutation data from The Cancer Genome Atlas, which identifies driver genes based on coverage and exclusivity criteria. After providing a comprehensive foundation in quantum computing, covering essential concepts like qubits, superposition, quantum gates, and Hamiltonians, it introduces three solution approaches. Simulated annealing serves as a classical baseline, using temperature schedules and probabilistic acceptance to escape local minima. Quantum annealing leverages the adiabatic theorem and quantum tunneling to navigate energy landscapes more effectively than classical methods, gradually evolving from a simple driver Hamiltonian to a problem-encoding cost Hamiltonian. The Quantum Approximate Optimization Algorithm (QAOA) represents a gate-based approach that discretizes quantum annealing through trotterization, alternating between cost and mixer operators across multiple layers while optimizing parameters classically to minimize the objective function.

The tutorial also provides detailed implementations across multiple platforms: vanilla QAOA with custom circuit construction, OpenQAOA for multi-backend compatibility, Qiskit Optimization for IBM's framework, simulated annealing using classical processors, and quantum annealing on D-Wave systems with significantly more qubits (thousands versus IBM's 127). Performance comparisons on small number partitioning instances show that simulated annealing and quantum annealing outperform QAOA in both approximation ratio and runtime, though all current approaches face limitations from noise, decoherence, and hardware constraints in the NISQ era. The authors identify critical future research directions that include circuit decomposition methods, error mitigation strategies, hybrid quantum-classical algorithms, hardware-aware compilation, and the development of quantum-inspired classical methods to bridge the gap toward scalable and fault-tolerant quantum computing.

4.2. Quantum-inspired Computing

It is increasingly clear that some of the earliest large-scale impacts of the Second Quantum Revolution may come not from fully quantum computers, but from quantum-inspired algorithms and specialized hardware. By translating quantum principles into new algorithmic paradigms or physical substrates, these approaches deliver practical gains while avoiding many of the fragilities of universal quantum computation. For OR/MS, this represents a particularly fertile opportunity: physics-inspired methods that expand the algorithmic toolbox without requiring radical changes to problem formulation. Quantum inspired algorithms replace QUBO solving using Simulated Annealing (3), which is classical, or use a semi-classical photonic devices (11) to obtain solutions.

4.2.1. Application and Algorithm: FRNDP Karahalios et al. (17) introduce the First Responder Network Design Problem (FRNDP), which addresses a critical challenge in disaster management: determining which road lanes should be reserved exclusively for first responders (FRs) following a disaster, while minimizing the total evacuation time for civilians. The problem arises from a proposal by Turkey's Ministry of Transportation and Infrastructure to designate specific lanes on certain road segments for FR use after disasters such as earthquakes. The authors formulate FRNDP as a bilevel mixed-integer nonlinear program where the outer problem selects links for lane reservation to ensure FRs can reach all demand points from entry nodes, while the inner problem models evacuees' selfish routing behavior under user equilibrium traffic conditions. A key constraint is that the lanes must be reserved bidirectionally to allow FRs to transport immobile victims back to exit points and medical centers. To solve this computationally challenging problem, the authors developed GAGA, a novel quantum-inspired bilevel optimization algorithm. GAGA employs the Graver Augmented Multiseed Algorithm (GAMA), at both the outer level (to search over feasible FR paths) and the inner level (to approximately solve the traffic assignment problem), followed by an exact gradient descent method to refine the final solution. GAMA uses Graver basis elements—a set of candidate improving directions from algebraic geometry—as a test set for iterative augmentation. The algorithm generates partial Graver bases by converting the problem constraints into quadratic unconstrained binary optimization problems, which can be solved using simulated annealing or quantum annealing; see (18) and (3). For FRNDP, the authors customize GAMA to search only over feasible FR paths and evacuee paths, using multiple initial seeds to explore the solution space more effectively. The computational experiments demonstrate GAGA's effectiveness on both synthetic graph instances (with 10-30 nodes) and realistic case studies based on Istanbul's Avcılar district, which faces significant earthquake risk. Comparisons with a state-of-the-art branch-and-bound algorithm show that GAGA generally produces superior solution quality with competitive or better runtime performance: For Istanbul instances with 179 nodes and 234 links, GAGA achieved objective values 5-15% better than branch-and-bound within the same time limit. The results reveal that approximately 60% of potential FR road segments were selected for lane reservation in different disaster scenarios, and the lane reservation strategy remained remarkably consistent regardless of evacuation levels. The study also found that total evacuation time increases in an S-shaped curve as FR demand increases, with a sharp increase after 50% of nodes require FR access, highlighting the importance of optimal lane reservation and proactive infrastructure reinforcement.

4.2.2. Hardware: Photonic Ising Machines From an Operations Research perspective, Photonic Ising Machines[3] (PIMs) raise familiar but newly urgent questions. When does specialized hardware outperform general-purpose solvers? How do solution quality, time-to-solution, and energy consumption trade off as problem size grows? And how should such devices be benchmarked fairly against classical and quantum alternatives? Framing photonic annealers through these questions highlights their relevance not as curiosities of hardware design, but as decision-making tools operating in a new physical regime.

Prabhakar et al. (11) present two types of PIMs as alternatives to quantum and simulated annealing for solving NP-hard optimization problems. The authors demonstrate how quadratic unconstrained binary optimization problems can be mapped to Ising Hamiltonians and solved using photonic systems, benchmarking their performance against classical solvers like Gurobi and quantum annealers like D-Wave. The first implementation is a temporal multiplexed Ising machine that uses the bistable response of an electro-optic modulator (specifically a Mach-Zehnder Modulator) to represent spin states. Time-multiplexed photonic states encode different spins, with optical output detected, sampled, and fed back through an FPGA that calculates the Hamiltonian and updates spin values iteratively. This system tackles the Max-Cut problem with up to 1000 spins, performing comparably to Gurobi and outperforming it for graphs with 100 nodes and density less than 50%. The authors derive stability bounds for the gain parameters that optimize the system's performance and demonstrate FPGA parallelization strategies to speed up matrix multiplications. The second implementation is a spatial photonic Ising machine (SPIM) that solves the Mattis spin glass model by convolving a coherent laser wavefront with a spatial light modulator (SLM) pattern. This system tackles the number partitioning problem by encoding problem instances as phase masks on the SLM and using adiabatic tuning—gradually transitioning from an easy initial problem (equal numbers) to the target problem. The SPIM successfully partitions arrays of 2^{14} (16,384) integers, vastly outperforming both Gurobi (limited to 1024 spins) and D-Wave (limited to 121 spins due to embedding constraints). The authors demonstrate that the quality of the solution generally improves with the size of the problem, suggesting favorable scaling properties for this photonic approach.

4.3. Current activities in QC hardware

Quantum computing's promise hinges on overcoming the fragility of qubits through robust error correction, where physical qubits are encoded into logical qubits that can detect and correct errors

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[3] PIMs are specialized analog processors that use interacting laser or optical oscillator networks to physically emulate Ising spin systems, enabling extremely fast approximate solutions to hard combinatorial optimization problems by letting the system relax to a low-energy configuration. Ising formulations of many NP problems are in (6).

in real time so that deep, useful quantum circuits can run without collapsing from noise—a concept formalized in quantum error-correcting codes like surface codes and more recent low-overhead schemes. IBM's roadmap tightly integrates error correction into its development path: over the next several years IBM plans incremental hardware and software advances (e.g., higher-connectivity processors and improved mitigation) culminating in demonstration of fault-tolerant modules by 2026 and the delivery of its first full fault-tolerant system, Starling, by 2029, capable of running millions of gates on hundreds of logical qubits. Alongside organic technological progress, the industry has seen strategic M&A activity aimed at accelerating development: Google purchased Atlantic Quantum, D-Wave Quantum agreed to acquire Quantum Circuits Inc. (QCI) to blend QCI's dual-rail error-detecting technology with D-Wave's control stack and speed its gate-model roadmap, while IonQ acquired SkyWater Technology to bring chip fabrication in-house and support its long-term hardware scaling. Fair benchmarking across heterogeneous quantum and quantum-inspired hardware ultimately relies on data-scientific rigor—careful experimental design, uncertainty quantification, and statistically meaningful comparisons of solution quality, runtime, and energy use.

5. Further Reading

Looking ahead, the opportunities for INFORMS researchers extend well beyond the examples discussed here. As quantum technologies mature, questions of verification, certification, resource allocation, and control under uncertainty will only grow in importance. Hybrid classical–quantum systems will demand new modeling paradigms, while fair benchmarking across heterogeneous hardware platforms will require careful experimental design and statistical rigor. By engaging early and deeply, the OR/MS community can help ensure that the Second Quantum Revolution is not only scientifically impressive, but operationally robust and societally impactful. Beyond the turorials mentioned above on quantum information science (13) and quantum computing (7), a popular reference text for a comprehensive introduction to Quantum Information Science (including Quantum Computing) is (9). See (8) for an accessible introduction to Adiabatic Quantum Computing (AQC) and (12) for a gentle introduction to gate-based models. A systematic mapping study of quantum and quantum-inspired algorithms for Operations Research is (2), an illustration of Quantum Machine Learning (for image recognition) is (3) and research on quantum approximate multi-objective optimization is (4). I hope that this invited article encourages INFORMS researchers to contribute further to the Second Quantum Revolution.

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