QUANTUM SMART STRATEGY GUIDE

Your Step-by-Step Guide to Successful Quantum Adoption

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INTRODUCTION

In a world of growing complexities, staying ahead of the technological curve and maintaining a leg up on your competition can be challenging. Quantum computing has the potential to provide strategic advantage: by leveraging new approaches to problem solving, you can streamline operations and transform your business.

However, navigating the world of quantum computing can seem daunting. To help you venture into this cutting-edge realm, D-Wave has created this Quantum Smart Strategy Guide with practical and actionable steps designed to bring quantum to your organization. This guide outlines an approach you can take to ensure successful quantum adoption and start reaping the benefits of today's quantum computing technology.

A PHASED-APPROACH TO QUANTUM ADOPTION

To facilitate your enterprise quantum journey, we've defined three key phases, each with recommended steps.

PHASE 1: ASSESSMENT

Assess Your Current State

Understand your organization's overall needs, pain points, and long-term goals. These pain points or problems plaguing your organization could be due to your existing IT infrastructure, applications, data, or processes.

At this preliminary stage, approach your information-gathering efforts with a focus on identifying specific problems rather than evaluating quantum suitability. What lingering challenges have yet to be resolved? What problems have been deferred? Are there existing solutions that could benefit from enhancements? And what would you do with a better solution?

Define Clear Objectives

Establish clear, measurable objectives to be achieved through your quantum transformation. These objectives might encompass goals such as cost reduction, scalability, improved agility, or operational efficiency.

While examining the business problems and challenges you've identified, assess whether you can measure progress in a clear, data-driven way. Gather information relevant to the problem and identify the success metrics. These key performance indicators (KPIs) offer a clear direction, providing you with a focused approach to tackle the problem effectively. Moreover, consider the growing interest in quantum technology within your specific business verticals. According to insights from Hyperion Research, the top three value motivators of quantum adoption for decision-makers are enhancing business process efficiencies, increasing revenue, and improving research capabilities.

PHASE 2: STRATEGY DEVELOPMENT

Craft a Quantum Computing Strategy

After assessing your current state and business environment (integrating with existing systems) in which you will be adopting quantum technologies, the next phase involves defining a strategy that aligns with your objectives. A quantum strategy should consider the following five elements.

APPLICATION AND FEASIBILITY ASSESSMENT

This assessment involves a comprehensive evaluation to determine the suitability of quantum computing for various use cases.

Formulating a suitable application for quantum requires an evaluation of your problem's complexity and business relevance. Consider problems that have clear business value but lack a satisfactory solution. The aim is to identify applications that can benefit from quantum technology, considering the required technology stack, architectural considerations, performance requirements, and data dependencies. Additionally, this assessment identifies which applications need modernization to harness the potential performance gains offered by

quantum computing. For more information regarding problem discovery, read D-Wave's technical guide.

DATA PREPARATION

Next, you need to collect and assess data, ensuring its applicability to quantum computing. If your data isn't structured in a spreadsheet or formally cataloged by some other means, determine the best way to organize and visualize it. Consider how you would assess metrics based on your data. For example, will you evaluate your data through a mathematical equation or code?

Consider whether you understand your problem well enough to define a realistic formulation, whether you have instances you can use to test your model, and whether you have existing solutions with which to compare. This preparation process is designed to ensure your problem has enough data to use for building and testing. It also requires an assessment of your access to on-ground expertise. These experts could include individuals involved in packaging items, manually creating schedules, or any such activities related to your data. Their insights can be valuable in identifying improvements and limitations within the data – details that data scientists may not be aware of. To learn more about problem formulation, read D-Wave's technical guide.

SECURITY AND COMPLIANCE

Companies responsible for handling customer data have strict responsibilities when it comes to maintaining data security and privacy. Therefore, when determining what data you need when developing and running your application, consider the following questions.

Will you have access to the data throughout the process? Do you need permission to use it? If you'll be using a cloud service, will you have permission to distribute information through the internet? Additionally, identify any dependencies between your various systems and data sources. Your priority should be to ensure that you comply with your relevant regulations and your commitments to customers.

VENDOR SELECTION

Next, it's time to evaluate and select quantum computing service providers that align with your organization's goals.

When evaluating vendors, ensure that they have a track record of addressing tangible use cases relevant to your needs. Be wary of vendors who engage only in research. Look for those with expertise in a relevant vertical market. Consider also the vendor's ability to integrate quantum computing into your existing IT infrastructure. Finally, consider a vendor that can

demonstrate commitment to data security best-practices through compliance with relevant industry standards, such as SOC 2, attested by an independent auditor.

BUDGET AND INVESTMENT STRATEGY

To properly progress your quantum computing initiatives, from problem identification through to production application deployment, you must formulate an investment strategy plan.

When developing your investment strategy, make certain to allocate the necessary resources to comfortably advance your initiatives. While evaluating your strategy, compare your budget allocation for classical computational resources, such as energy consumption, maintenance, and long-term usage, with potential costs reductions of using quantum computing alternatives instead.

Leverage a Quantum Cloud Approach

To reduce time-to-solution, consider a quantum cloud approach that can optimize workload placements and leverage the strengths of both quantum and classical approaches to achieve the best possible results at the lowest cost.

At D-Wave, we offer the Leap™ quantum cloud service that delivers immediate, real-time access to quantum computers and hybrid quantum-classical solvers. These services are engineered for swift and timely problem solving, empowering enterprises to address diverse business problems varying in size and complexity. By using a cloud service provider, you can get started developing your quantum solution in a simple and cost-effective manner. To get started today, sign up for the Leap™ cloud service.

PHASE 3: INTEGRATION AND IMPLEMENTATION

Integration and Resource Coordination

You should develop a plan for seamless integration between your application and resource channels to ensure that you and your team understand how quantum will be involved in your operations.

A key question you should address: What does integration look like? How will other processes be affected? Consider the process of exchanging information between your resources. Your application will likely have multiple stages, such as submitting your core optimization code to a quantum computer, handling inputs and presenting results, and integrating with other applications. Assessing compatibility, data flow, and communication channels between classical and quantum components ensures a smooth integration.

Measurement and Iteration

As you build your initial proof of concept, continue to increase the size and complexity of your code to achieve a broader and more comprehensive solution, yielding better results towards a full-scale production-scale application. Ensure that you possess the appropriate tools and personnel to evaluate your progress and establish clear benchmarks for success. For more information on the technical aspects of testing and iterating on your application, read D-Wave's technical guide.

Training and Enablement

Successful onboarding of quantum technology requires experts who can leverage its benefits and guide a pilot proof of concept into production. This expertise ensures that members of your organization understand the quantum system's capabilities and can leverage it to support your business goals.

Training internal teams to use quantum computers is easier than you might think. Anyone who can code in Python can get started building quantum hybrid applications. Furthermore, in-depth training is more accessible than ever and can ensure familiarity with developing quantum programming models and encourage experimentation. An in-house team of quantum-educated developers can enable your organization to optimize existing applications and explore new ways to leverage the power of quantum.

For accessible, in-depth training, D-Wave offers Quantum Programming – Core, designed to ensure your team acquires the practical expertise required to leverage our quantum technology.

CONCLUSION

Getting started with quantum computing may seem intimidating. There are certainly a variety of factors to consider, such as identifying suitable problems, integrating applications into your existing systems and workflows, and training your team. By following this quantum-smart approach, you can create a detailed onboarding roadmap that outlines how to migrate your applications and workloads to quantum technology. You can drive your enterprise's quantum transformation while ensuring alignment with organizational goals and maximizing the benefits of today's powerful quantum computing technology.

Need help getting started? Engage with our in-house professional services teams and technical domain experts to help initiate your quantum journey and realize real business value faster. **Sign up for a complimentary 30-minute consultation with a quantum expert today.**

About D-Wave

D-Wave specializes in the development and delivery of quantum computing systems, software, and services and is the world's first commercial supplier of quantum computers — and the only company building both annealing quantum computers and gate-model quantum computers. Our mission is to unlock the power of quantum computing today to benefit business and society. We do this by delivering customer value with practical quantum applications for problems as diverse as logistics, artificial intelligence, materials sciences, drug discovery, scheduling, cybersecurity, fault detection, and financial modeling. D-Wave's technology is being used by many organizations globally, including Volkswagen, Mastercard, Deloitte, Davidson Technologies, ArcelorMittal, Siemens Healthineers, Unisys, NEC Corporation, Pattison Food Group Ltd., DENSO, Lockheed Martin, Forschungszentrum Jülich, University of Southern California, and Los Alamos National Laboratory.

For more information, please visit www.dwavequantum.com.