

D:wave

HOW QUANTUM CAN FUEL

**OPERATIONAL  
EXCELLENCE TODAY**



# HOUSTON, WE HAVE A PROBLEM.

In today's tough economic environment, businesses are seeking solutions to navigate headwinds and find more efficient and resilient ways to operate.

Companies are facing:

- Global competition
- Economic uncertainty
- Changing customer preferences
- Market and technology disruption
- Supply chain disruption

Finding solutions requires new ways of thinking, unlocking insight from all your data, and the creativity to look beyond conventional solutions.

**Quantum computers can help transform business challenges into business *advantage*.**



## PROBLEMS ARE GETTING MORE COMPLEX

Today's biggest problems are more complex than ever, with seemingly endless variables and exponentially larger solution possibilities. **Industry research** revealed that problem complexity was a major obstacle to solving computationally-dependent business problems, cited by almost 30% of the surveyed. As a result, 39% of companies abandoned the effort to solve those particular problems.

## TRADITIONAL COMPUTING CAN'T KEEP UP

Many problems are so hard that classical computers can't keep up—either solutions take too long or, in many cases, they lack the computational power needed to solve the problem at all. Greater amounts of power are required for even minimal speed gains, resulting in sustainability and environmental concerns.

WHAT CAN YOU DO?  
GO QUANTUM.



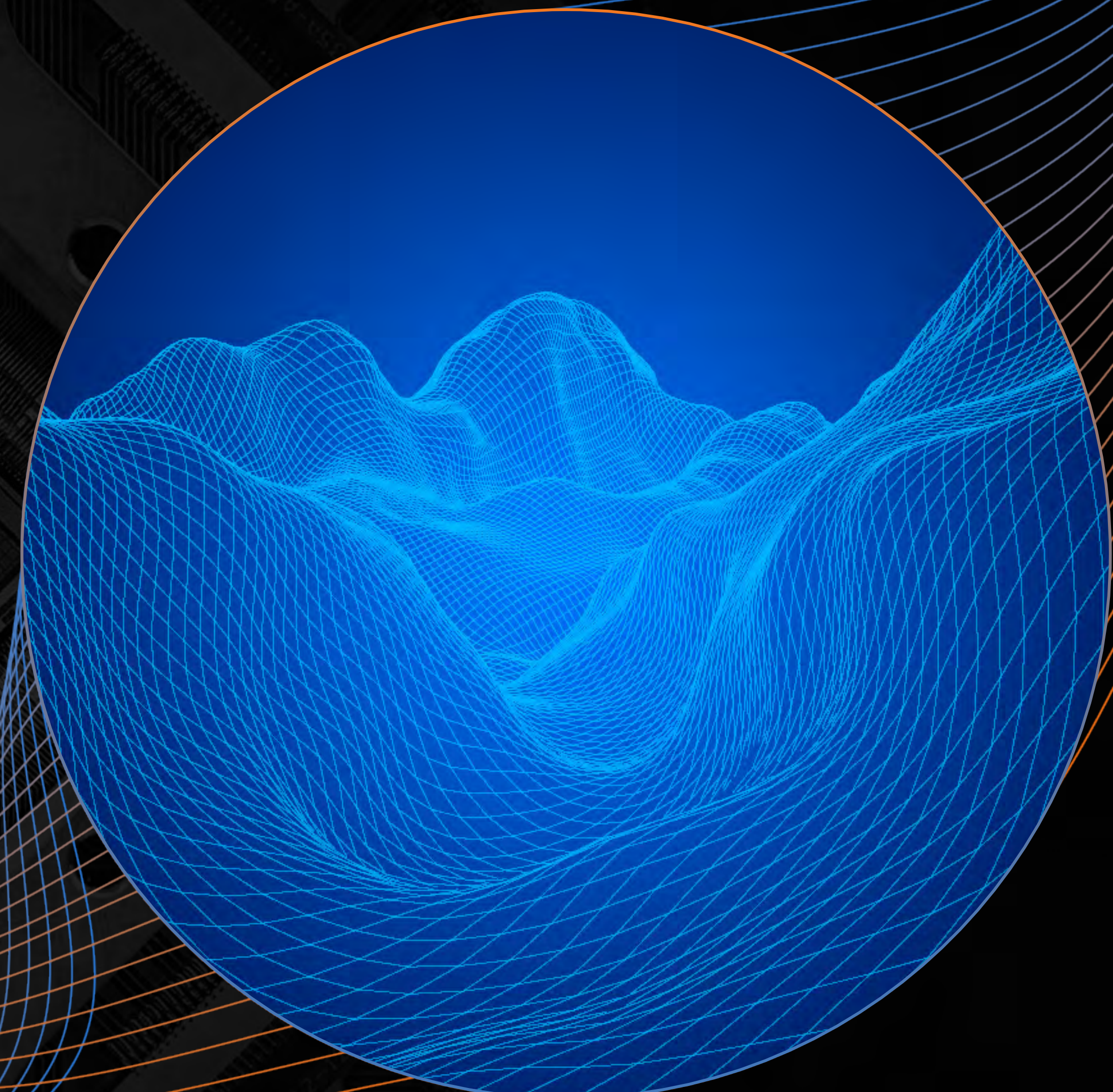
# WHAT IS DIFFERENT ABOUT QUANTUM COMPUTING?

Solving a hard computational problem requires searching a space of possible solutions. This is like looking for the lowest point in an enormous and complex landscape, as shown here.

**Classical computers use bits.** A classical computer can represent one square at a time, and it solves problems by stepping from square to square in search of the lowest point.

**Quantum computers use qubits.** Qubits can simultaneously be in multiple states, called superposition. Superposition allows quantum computers to perform computations on many possibilities at once.

Superposition and other quantum effects enable quantum computers to excel at solving complex problems, sometimes faster and more efficiently than classical computers.



## TWO APPROACHES: QUANTUM ANNEALING AND GATE MODEL

The two main approaches to building quantum computers are quantum annealing and gate model.

Annealing quantum computing uses the principles of quantum mechanics to search for the lowest energy state, corresponding to the optimal solution of a given problem. It is particularly well suited for complex combinatorial optimization problems. Solving these problems can help businesses make better decisions, reduce costs, increase production, and design better products. It can help researchers make new scientific discoveries, build better materials, and synthesize new medicine.

Gate model quantum computing involves manipulating individual qubits using quantum gates, which are analogous to the logic gates in classical computing. The gate model can be implemented using various hardware implementations, such as superconducting qubits, trapped ions, or topological qubits. Targeted applications include materials science, pharmaceutical research and prime factorization.

While gate model quantum computers are largely being used for small scale problems and lab research, D-Wave's annealing quantum computers are already being used in production for business applications.

## ENTER HYBRID SOLVERS

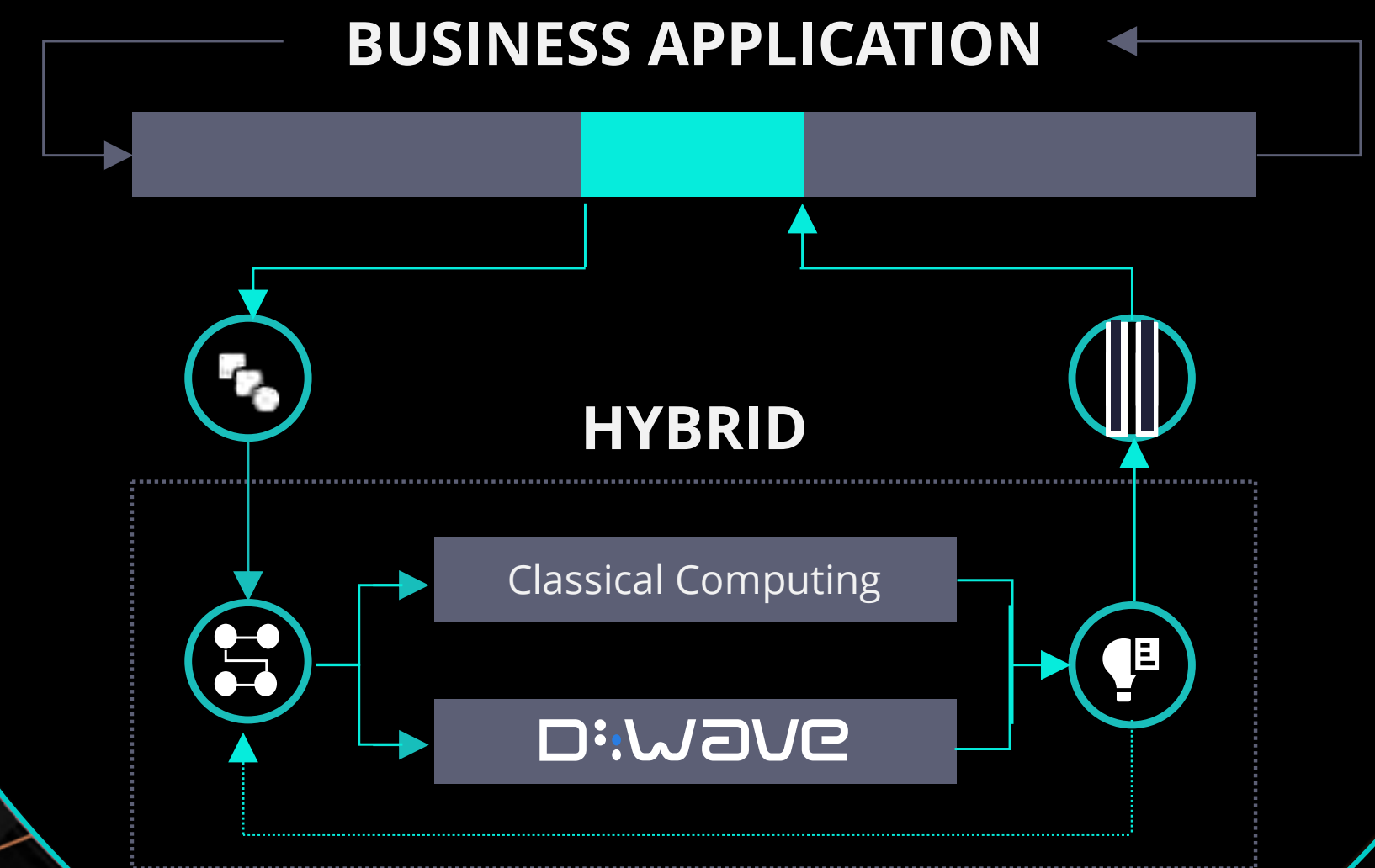
Quantum-hybrid applications bring together quantum and classical computation to solve highly complex computational problems. Our approach is practical: we facilitate applying current problem-solving knowledge to a hybrid platform so customers can increasingly use quantum power.

By automatically allocating the best resource, hybrid solvers can achieve better performance for real-world problems with hundreds of thousands of variables and huge numbers of potential solutions.

Available over the cloud, hybrid solvers also abstract the underlying quantum system. This enables users to specify their problems in business terms and more easily get started on developing quantum applications.

Hybrid solvers are being used by companies from diverse industries, many achieving remarkable results. This is a gamechanger for businesses who want to unlock the computational power of quantum computing.

### SOLVERS THAT RUN PROBLEMS ON A COMBINATION OF QUANTUM AND CLASSICAL RESOURCES





**While quantum computing is still in its early stages, many companies are racing ahead, enhancing operational efficiency and reducing costs.**

● **LET'S EXPLORE SOME EXAMPLES**



# THE QUANTUM ERA IN BUSINESS HAS BEGUN

A report from [Hyperion Research](#) showed that over 80% of enterprises surveyed are looking to move forward with their quantum computing efforts with increased funding and resources. In addition:

- Quantum computing (QC) early adopters see the promise of QC for a wide range of computational workloads, including machine learning applications, finance-oriented optimization, and logistics/supply chain management.
- One-third are aggressively looking to incorporate quantum computing into their overall computing environment.

The survey also explored the main drivers for quantum adoption. The most important was the need to overcome business challenges to achieve faster and more efficient operations as a means of saving cost and improving customer satisfaction.

Also cited were the ability to make complex data-driven decisions faster and more accurately, and the need to maintain their competitive edge in a rapidly changing technological landscape.



## Broad Interest in Quantum Computing as a Driver of Commercial Success



**SCIENCE**

**DEFENSE**

**AEROSPACE**

**MEDICINE**

**D:wave**  
UNLOCKING PRACTICAL  
QUANTUM COMPUTING

**TRANSPORTATION**

**COMMUNICATIONS**

**ANALYTICS**

**E-COMMERCE**

**LOGISTICS**

# SAVANTX AND THE PORT OF LOS ANGELES

Addressing the complex problem of supply-chain logistics

## OPTIMIZING LOGISTICS AT THE PORT OF LA

At the Port of Los Angeles—the nation’s largest facility for handling shipborne cargo—time is literally money. In 2021 alone, the equivalent of more than 10 million twenty-foot container units were transferred from ships to the trucks that convey them to their inland destinations. Optimizing how containers are sorted, sequenced, and delivered at the port by as little as a few percentage points can translate into tens of millions of dollars a year.

As part of a large project to streamline port operations, D-Wave’s quantum system has been used as part of the SavantX HONE optimization engine at the Port of Los Angeles. The goal was to expedite delivery of containers out of the terminal while increasing the amount of cargo that can be handled.

*“With HONE and D-Wave, each huge crane handled 60% more cargo per day, while the turnaround time for trucks was reduced by 12%.”*

— SavantX Team



# 60%

**MORE CARGO HANDLED  
EACH DAY PER CRANE**



# PATTISON FOOD GROUP

Optimizing e-commerce with quantum-hybrid driver scheduling

# OPTIMIZING DRIVER SCHEDULING FOR E-COMMERCE DELIVERY

Until recently, it took Pattison Food Group (PFG) 80 person-hours of work to build out the schedule for its delivery drivers each week, as developing schedules needed to consider a large number of variables and constraints. Now PFG is using D-Wave's quantum-hybrid technology to automate delivery schedules, preferences and history, and policies.

As a result, the weekly efforts for initial scheduling creation were reduced by ~80% within the first three months.

*"We will be the first grocery chain to actually use quantum computing to serve our business needs."*

*—Manager of Analytics Development at PFG*



# RECRUIT COMMUNICATIONS

Optimizing reach of TV commercials with quantum

## MAXIMIZING BRAND REACH

For many advertisers, the principal goal of TV ads is to promote brand or product awareness. This means that they want to be sure that they're getting the maximum exposure for their investment. Since there are a finite number of time-slots in the course of a day's programming and multiple advertisers who may run several different ads, this is a highly complex combinatorial optimization problem.

Recruit Group is a global technology company. They have been a pioneer in exploring the application of quantum computing in support of its mission to match users and businesses in the optimal way for both parties. Recent work on optimizing the timing of TV ads using D-Wave's quantum hybrid solver was so successful, it is now being used in production to determine when these broadcast ads run.

*"I think the most exciting part of this project is that millions of people in Japan watch TV commercials optimized by the D-Wave quantum machine."*

— Recruit Communications





# Getting Started with Quantum in Your Business Today.



● LET'S EXPLORE NEXT STEPS

# RESOURCES FOR BUSINESS AND TECHNICAL LEADERS

D-Wave has resources to help both business and technical people get started with quantum, such as:

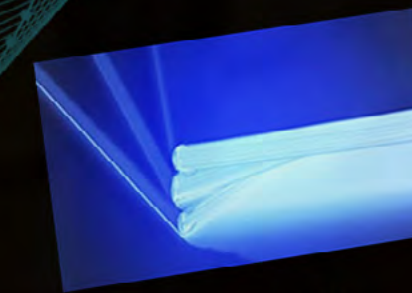
- Case stories that highlight quantum applications developed by enterprise customers
- Technical white papers such as how to choose the best use case for quantum
- Open source code and documentation
- Free access to D-Wave's Leap™ quantum cloud service

Visit [dwavequantum.com](https://dwavequantum.com)



## Developer Resources

Get started quickly and ramp up fast with robust documentation, real code examples, demos, libraries, templates, and more.



**DOCUMENTATION**  
Access our documentation for an overview of D-Wave's quantum system and software.



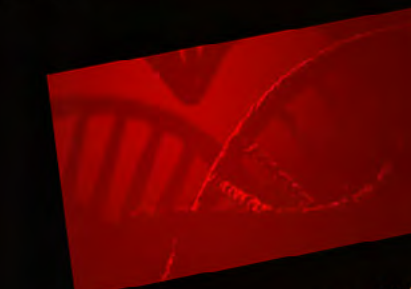
**CODE EXAMPLES**  
Search for and run working examples by industry, problem type, and tools or techniques.



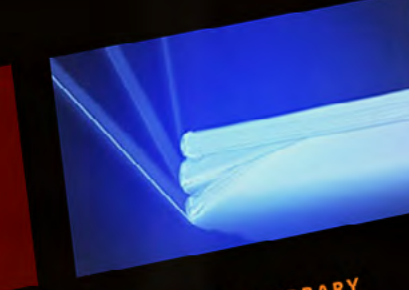
**D-WAVE GITHUB**  
Access the suite of Ocean tools on the D-Wave GitHub repository for solving complex problems with quantum computers.

## Business Resources

Learn how quantum computing can bring value to your business today through customer case stories, whitepapers, and more.



**FEATURED APPLICATIONS**  
Explore over 250 quantum applications across multiple



**RESOURCE LIBRARY**  
Access our resources library with business and technology



**CUSTOMER SUCCESS STORIES**  
See how our customers have built quantum applications in diverse

MacBook Pro



## WE CAN HELP

D-Wave makes it easy to start exploring quantum and its potential impact on your enterprise, helping every step of the way—from problem discovery through production implementation. What's more, we offer a complimentary 30-minute quantum consultation for businesses.

Interested?

[Click here to book your free consultation.](#)



**Problem Discovery**  
Identify the best use case for quantum



**Quantum Proof of Concept**  
Develop a quantum PoC and prototype application



**Production Pilot**  
Run a limited production-scale deployment



**In-Production**  
Get your application up and running across your business

The image features a dark background with a faint, repeating pattern of a quantum circuit board. In the center, the text "D:wave" is displayed in a white, sans-serif font. The letter "D" is stylized with a vertical bar on its left side. The word "wave" is in lowercase. Surrounding the text is a complex, glowing network of lines in shades of blue, cyan, and orange, which appears to be a quantum circuit or a network graph. The lines are interconnected and form a dense, circular structure. There are also several small, glowing dots in blue and orange scattered throughout the network.

D:wave