



AQ Technology for Biopharma

SandboxAQ is an enterprise SaaS company that leverages the compound effects of AI+Quantum (AQ) technologies to solve computationally intensive challenges in drug discovery, and help your organization stay ahead of your competition. SandboxAQ helps you prepare for the quantum era to establish your competitive advantage long before large fault-tolerant quantum computers become commercially viable. building quantum-resistant infrastructure.

How AQ Impacts Biopharma

AQ technology holds tremendous promise in the healthcare and life sciences industries, with broad use-cases such as accelerating drug discovery, enhancing medical imaging and diagnostics, protecting patient healthcare and related data, and more.

SandboxAQ works with leading research hospitals, healthcare systems and pharmaceutical companies to innovate faster and cost-effectively by leveraging AQ technology.

AQ technology can provide many benefits that accelerate drug discovery. Key among these is the ability to better resolve atomic (i.e. quantum) effects which, in turn, allow the computation of more accurate electronic structures than possible through traditional approaches.

Our team of experts works with partners to develop customized approaches built on quantum insights and machine learning to uncover new drug candidates.



What AQ Does for Drug Development

NEW DISCOVERY & INCREASED ACCURACY

Modeling quantum-mechanical systems, such as molecules, polymers, and solids, which are presently inaccessible to in silico methods

SPEED UP OF DEVELOPMENT STAGES

We have been developing and deploying AQ solutions with major financial institutions, telecommunications providers, healthcare providers and government agencies.

REDUCING COST OF R&D

Boston Consulting Group estimates that the development of early quantum computers over the next 3-5 years will unlock the creation of \$5 billion to \$15 billion in increased R&D productivity, moving from in vitro to in silico development

AQ Solutions



QUANTUM SIMULATION & OPTIMIZATION

By using quantum simulation, you can significantly improve optimization for your lead drug candidates and reduce overall drug discovery time and cost. You can accomplish this by digitally modeling and simulating the effects of chemical compounds and their electrons at the molecular level. This could shave years and millions of dollars off the R&D process, making clinical trials and patient outcomes more predictable. Combining real world data with AI identifies potential off-label uses and can lead to combination therapies. It also promises to facilitate rapid prototyping of medical devices, accelerate research for currently incurable diseases, and help predict future pandemics and the global spread of disease.



QUANTUM SENSING

New generations of quantum sensors utilize quantum mechanics in new ways to enable the creation of medical imaging devices that are more powerful, more cost-effective, faster, and more portable. They can be used with multiple tissue types such as cardiac, encephalic, etc., and use-cases such as neonatal care. Quantum sensors are designed to empower you to deliver more precise diagnoses, more effective treatment, and better care for your patients.



AGILE CYBERSECURITY

Quantum computers will render today's encryption technologies obsolete, and adversaries have already begun to steal and store encrypted data for future decryption. Protect your patient data, medical records, and intellectual property against emerging quantum threats and maintain regulatory compliance.



Who can benefit from...	Agile Cybersecurity	Quantum Sensing	Quantum Simulation & Optimization
Bio/Pharma	✓		✓
Hospitals/Healthcare Systems	✓	✓	
Medical Device Manufacturers	✓	✓	✓
Researchers/Academia	✓	✓	✓
Health Organizations/NGOs	✓		✓
Patients	✓	✓	✓

Accelerate Your Pipeline — Cost-Effectively

From discovery to clinical trials, developing a new drug can cost anywhere from [\\$1.3B](#) to [\\$4B](#) and can take [10 to 15 years](#). The efficiencies of the process are so low that millions of compounds are screened in order to develop an effective drug for a single therapeutic target.

Artificial intelligence (AI) and high-performance quantum chemistry methodologies are revolutionizing the drug discovery and development process, allowing the virtual screening and synthetic

optimization of millions of drug compounds with unprecedented speed and accuracy.

Drug the “undruggable.” New quantum simulations allow us to answer questions previously accessible only through direct lab experiments, while AI techniques accelerate the design process through generative modeling and reinforcement learning, extracting possible targets from complicated disease pathways.

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SandboxAQ Drug Discovery Platform

AI was heralded as a solution for drug discovery, and progress has been made, but AI hasn't fully delivered. It has several limitations in regards to the nature of the data used in drug discovery, including uncertainty of the data and the inability to scale. Conventional ML may not be able to deal with the millions of compounds typical in this process.

Quantum computing is now promising to solve drug discovery again, but the hardware improvements necessary may be as much as 7-10 years away.

SandboxAQ brings the power of quantum mechanics to classical hardware on top of the existing AI layer. AQ is not one technology, but a sum of multiple techniques (Tensor Networks, DFT, GAI, NLP, and others.) By using these available technologies in an optimized stack, SandboxAQ can offer Molecular-Simulation-as-a-Service.

01 DEFINE PROBLEM

01

02 ENTER PROBLEM IN AQ ENGINE

02

03

03 AQ ENGINE GENERATES OUTPUT

04

04 CUSTOMER KEEPS IP OF OUTPUT

Achievement Snapshot

These are papers from just a single area of SandboxAQ's expertise, about scaling up quantum chemical simulations via massively parallel classical hardware.

[Tensor Processing Units as Quantum Chemistry Supercomputers](#)

we presently hold the record for the largest N^3 DFT simulation

<https://inspirehep.net/literature/2066106>

post-Hartree-Fock method called DMRG, scaled up to unprecedented size

<https://www.nature.com/articles/s41598-022-12543-4>

study using RWE to measure Covid-19 vaccine efficacy

<https://www.nature.com/articles/s41586-022-04623-2>

transitioning organizations to use post-quantum cryptography, an additional service we offer apart from simulation



AQ - Your Competitive Edge

The life sciences sector is rapidly adopting the use of AQ and our expertise can be leveraged by major healthcare providers and pharmaceutical companies. Let us help you gain and maintain a competitive advantage with our advanced technology. We have both the tools and the talent to help you harness the power of AQ technology. Our novel simulation platform combines quantum molecular dynamics with accelerated hardware, enabling you to do things that were previously impossible. Furthermore, SandboxAQ has a world-class team of scientists and engineers who are ready and eager to help you become AQ leaders in the life sciences.

About SandboxAQ

SandboxAQ is an enterprise SaaS company combining AI and Quantum technology (AQ) to address some of the most challenging problems impacting society. While our core team and inspiration formed at Alphabet Inc., we are now an independent, growth-capital-backed company that delivers commercialized AQ solutions for organizations in pharma, financial services, telecommunications, public sector, and other critical industries.