

# Preparing for the Quantum Future: Perspectives of an Entrepreneurial Innovator

—RAFAEL SOTELO 

Universidad de Montevideo, Montevideo  
11600, Uruguay

Senior Member, IEEE

—TERRILL L. FRANTZ

Harrisburg University of Science and Technol-  
ogy, Harrisburg, PA 17101 USA

Member, IEEE

(Corresponding author: Rafael Sotelo.)

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**Abstract**—Commercial use of quantum computing technology is in our future, and the CEO of one quantum technology company is positioning his company to deliver a first-mover advantage for enterprises. However, the focus is on satisfying customers today, so he is—without pause—preparing customers to leverage the most advanced quantum technology today and into the future. Christopher Savoie, a serial entrepreneur and a founder of Zapata Computing, recently discussed his views on innovation processes, forming companies around emergent technologies, and how he is building a business within the nascent quantum computing industry.

**Key words:** Business innovation, innovation, nascent industries, quantum computing, quantum technology

**T**HIS article gives an account of the evolution of the business strategy for Zapata Computing, which is shepherded by the personal experiences and insights of its Founder and CEO, Christopher Savoie. His desire is to prepare and position the company for the eventuality of the quantum computing market demand reaching a consequential level. But his approach is unlike others due to his judicious perspective on emerging technologies and company building, as born out of his exceptional personal experiences.

As both an idealist and pragmatist conjoined, Savoie holds the view that Zapata should deliver quantum-ready infrastructure and applications that help customers maximize available compute resources, including quantum-inspired classical technology, to solve their most computationally complex problems. That is, it is best to drive the company forward today by providing products

and services that can produce a revenue stream now, while also positioning the company for the inevitability of a sustainable quantum computing marketplace.

He is not solely relying on the advances of technology to pull his company forward; instead, he takes a both today and tomorrow approach. This seems to be a view not held by Zapata's competitors, as many have their attention looking only to the longer term quantum computing opportunities—when the hardware is more mature.

To level-set readers on quantum technology: Quantum Computing looks to be the next great advance in the computing revolution, promising to aid in solving complex problems presently out of reach for today's classical supercomputers. Quantum computers harness the unique properties of quantum mechanics to perform complex mathematical problems at speeds and complexity that are not possible with today's computing devices. Target uses

reach into logistics, pharmacology, biology, finance, and more. Advocates agree that some computational problems can be solved in significantly less time on a quantum computing device than on a classical supercomputer farm [1].

Quantum computing technology is rapidly approaching an inflection point for business users [2]. While the technology is still experimental, with control engineering and algorithm development being the focus, some hardware providers do offer remote access to their quantum computing devices via the cloud (Quantum Computing as a Service), and in rare cases, access to the devices themselves. However, capabilities remain nascent at present. But the roadmap of those providers is promising in which, in the near future, there will be new kinds of solutions for large problems that humanity faces. Although there is still uncertainty about the role quantum computing will play and when it will be possible [3], there is a lot of activity in the field, attracting attention from academia, government, industry, and investors.

Returning to the main topic, Christopher Savoie, CEO, cofounded Zapata Computing with several others as a spin-out of Harvard University in 2017. Today, Zapata Computing is a U.S.-based quantum software and services company that has raised USD 64 million in three funding rounds [4]. Investors include Ahren Innovation Capital, BASF Venture Capital, Robert Bosch Venture Capital, Comcast Ventures, The Engine, Honeywell Venture Capital, Itochu Corporation, Merck Global Health Innovation Fund, Pillar Venture Capital, Pitango Venture Capital, and Prelude Ventures.

Zapata has over 100 employees, including over 60 quantum scientists and engineers, who have collectively published over 790 peer-reviewed research articles. The company has

developed its own software platform—Orchestra—allowing clients and partners to upgrade their infrastructure to build and deploy quantum-classical solutions for machine learning (ML), optimization, and simulation problems.

Savoie holds a Juris Doctor in Law from Nashville School of Law. He has served as the Vice-Chairman of the Big Data Committee of the American Bar Association. His legal expertise includes liability issues on data privacy, information security, big data, and artificial intelligence (AI). He also led big data analytics' efforts at Nissan.

While quantum devices are maturing, Savoie has taken an active role in the development of the quantum ecosystem—above and beyond his business interests. He is personally active in the activities of the U.S.-based Quantum Economic Development Consortium, where he is on the Steering Committee providing oversight and is a founder of the Law Technical Advisory Committee. He catalyzed the formation of the M.S. in Quantum Computing degree at the University of Rhode Island, USA.

## TECHNOLOGY DEVELOPMENT IN THE PAST PARALLELS TODAY

There are several parallels between Savoie's experience of 25 years ago and today. In the late 1990s, after completing a Doctor of Medicine Degree from Kyushu University (Japan), Savoie embarked on a pathway of creating value as an inventor, founder, and CEO of companies in the technology and pharmaceutical fields.

In 1998, Savoie imagined the notion of voice-controlled home appliances. For one product, he envisioned giving television viewers control of their TV and VCR, using only their voice; so,

he founded the company Dejima. Dejima had a lucid plan for creating a new future in the home—indeed, a novel concept at that time—but there was a multitude of crucial enabling technologies just in idealization form. The supporting technology was still too impractical for developing the voice-controlled idea into a commercial product and business, e.g., natural language processing.

At the time, numerous Dejima stakeholders adamantly rebuked the necessity for and even the applicability of such a capability. While he had a working prototype to show how one could talk to control the TV and VCR, many were not prepared for it. Surprisingly, Christopher and his colleagues had to explain the advantages of voice activation of home appliances. But Christopher was steadfastly convinced that the technology would ultimately succeed and that it was sensible to forge ahead regardless. Christopher holds a U.S. patent in this technology [5]. The company was sold to Sybase, which later was acquired by SAP.

Savoie's path regularly leads to him innovating and by extension taking business risks. He holds other U.S. patents in computing software [6] and gene-based biology [7]. In 2015, he cofounded a technology company, Kyulux. The company develops next-generation organic light-emitting diode technology and operates in Japan and the United State. Of course, he also cofounded quantum technology-focused Zapata a short time later.

Today, quantum computing technology is not yet ready to deliver a practical and consequential advantage over classical methods. We still have to somehow be convinced that the technology will succeed and that the promised advantages will become a reality. From Savoie's vantage point,

quantum computing has a similar dynamic to his past experience. However, he notes that quantum computing may be an easier climb than others around the world, which are understandably seeing the same future as Christopher.

Just as in his past, despite the uncertainty surrounding a specific technology, Savoie is confident about the impact that quantum computing will have on organizations. While we are still in search of a killer app for quantum, wisely, we all should be getting ready.

## ZAPATA'S STRATEGY FOR QUANTUM COMPUTING

From a conversation with Savoie, there are several key aspects of the Zapata strategy.

- 1) Position the company for success — quantum technology or not: Quantum entrepreneurs have to be convinced that the technology will succeed. Savoie believes that they should position their business so that the company thrives regardless of the timing of quantum supremacy. Zapata is hedging its business exposure to downside quantum risk but is positioned to benefit on the upside. One tactic is to hire exceptionally smart people that are able to contribute to a strong bottom line with skills that are outside the core of a quantum computing skillset, especially in AI and ML.
- 2) Satisfy customers today, while preparing for a quantum future: While Zapata is engaged in advancing quantum computing technology, the company is providing solutions to customers today in a prequantum setting that can easily swap in more powerful quantum methods and devices when they become available. Through Zapata's Orquestra platform, customers can build quantum-ready workflows that leverage immediate-term solutions to problems, whether that means using classical, quantum-inspired, or hybrid quantum-classical methods, while remaining forward compatible with the more powerful quantum devices of the future.
- 3) Engage with early adopters: Zapata publicly states "We help industry-leading companies understand—and capitalize on—the capabilities of quantum devices in the next 2–5 years and beyond" [8]. Savoie adds that quantum computers available today may not provide an advantage over classical methods but now is the time for businesses to engage and ready themselves for the "eventuality" of quantum advantage. Zapata offers services to clients with their platform so they, together, can uncover promising quantum computing use cases that can be consequential to the end-user business.
- 4) Orient the company toward financially valuable business problems: Throughout the quantum technology ecosystem, much emphasis is on solving technological problems, either in quantum engineering or hard problems in the solutions space. Zapata places its focus on solving large business problems—those problems that have high value to the economy and to the enterprise customer.
- 5) Savoie tells, "The company must be devoted to the largest problems of business," those solutions that have an impact on clients' business. Zapata focuses on use cases that have large markets and is not looking at, for example, the molecular simulations—which have a relatively lower level of market potential and are, therefore, not large enough to warrant "betting the company." The problem is not so large. It is just a \$25M problem. The interest should be in large problems, in terms of business problems, and not necessarily large scientific problems. This way, the developments will later be supported by future investments and will cover the cost structure.
- 6) Prototyping in a reasonable time frame: After identifying high-potential use cases with a client, Zapata commits to delivering an informative pilot application within 12-to-18 months, intended for implementation. After this phase, Zapata and the client have good sense of the relationship and the business solution to evaluate any future steps on the way to production.
- 7) Balance the team: exploring versus exploiting: Nowadays, the potential of a quantum computing team is measured by its scientific capabilities, publications in peer-review journals and conferences, and patents. Zapata has many scientists on its team and is pushing quality scientific publications and obtaining intellectual property from the research. The research and development team has the scientific freedom to study what they think will be important to customers and our platform. However, that must be balanced by the engineering team that develops the real products or prototypes. The scientist benefits from working on a real problem. The engineer benefits from creating ways to put Zapata research methods in our software platform.
- 8) Get the "right" venture capital. It is, of course, a key to raise capital for a new company, but capital from who is critical to ensuring success. Savoie's previous experience was a grand lesson in the importance of having investors with a matching

mindset to the fund-seeking entrepreneur. The quantum computing market is attractive to investors, but it will be a longer play. Savoie cautions entrepreneurs that they should refrain from promising returns to avoid fiscal disappointment and place undue negative pressures on the forward progress of quantum computing overall.

### BOTTOM LINE

Savoie and Zapata are accelerating what the industry can do with quantum computing through their research and their software. They are wisely hedging in their business model by offering services and products that respond to clients' needs today with classical, quantum-inspired methods, while

simultaneously preparing both themselves and their clients for a quantum computing future. Savoie's past personal experience in creating leading-edge technology and building businesses around his ideas have well-informed him on how to best position Zapata for a classical present and for a quantum future.

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**Rafael Sotelo** (Senior Member, IEEE) received the Ph.D. degree in telematics engineering from the University of Vigo, Spain, in 2010. He is currently with Universidad de Montevideo, Montevideo, Uruguay. He is the Director of Research with Universidad de Montevideo, a Cofounder with Quantum-South, an AdCom Member at IEEE Broadcast Technology Society, and a Distinguished Lecturer and a Regional Director (Region 9) at IEEE Consumer Technology Society.

**Terrill L. Frantz** (Member, IEEE) received the Ph.D. degree in computation, organization and society from Carnegie Mellon University, USA, in 2014. He is currently with the Harrisburg University of Science and Technology, Harrisburg, PA, USA. He is an Associate Professor of eBusiness and cybersecurity, a University Lead in Quantum Information Science (QISC) programs, a member of IEEE Quantum Initiative and engaged in several IEEE SA, ITI, ISO quantum standardization projects.