Spotlight on the Hub's Industry Collaborations: the case of Craft Prospect

The company

Craft Prospect is a space engineering company looking to harness new approaches to support the emergence of Quantum Key Distribution from space. The company aims to enable 'smart secure space' systems through the development of their mission-enabling products and architecture services that include AI-enabled space technologies, quantum technology products, and mission systems design. Since its inception in 2017, Craft Prospect has quickly built a reputation for agile, smart satellite architecture, as recognised through their involvement in various UK (UKSA) and European (ESA) Space Agency funded missions.

The partnership with the Hub

Craft Prospect's earliest collaboration with the Quantum Communications Hub was in 2017, ahead of their successful bid for an Innovate UK funded study to look at the commercial and technical feasibility of deploying CubeSats to deliver QKD, and as part of future communications networks (project AQKD – Augmenting QKD with nanosatellites). The company credits engagement with the Hub during the proposal process and subsequently throughout the project for gaining an understanding of the quantum technology landscape within the UK and opportunities for a smaller satellites to contribute to wider quantum communication goals and capability. Following on from this, the company formed a consortium with several other Hub partners (and other industry) to propose an In-Orbit Demonstration (IOD) mission in part funded by the Satellite Applications Catapult; the project aimed to investigate how CubeSats could be operated and provide value as part of future QKD networks.

During Phase 1 of the Quantum Communications Hub, Craft Prospect was an industrial partner on a Hub Partnership Resource funded project 'CubeSat QKD and Groundstations' which aimed to provide space systems engineering knowhow for minaturising QKD systems. Through Hub and UKSA support, Craft Prospect then looked to begin the real engineering challenge of taking these demonstrations of quantum technology from the lab into an industrial setting for space applications. The work culminated in a technology roadmap, tested engineering model and terrestrial demonstration of a CubeSat QKD system and optical ground station, ready for full mission capability and in-orbit-demonstration ahead of the Hub's Phase 2 ambitions for satellite quantum communications R&D.

In 2020, the Hub established discussions between a consortium led by Craft Prospect with Hub partners the Universities of Bristol and Strathclyde, and the University of Waterloo, in the context of the joint UK/Canada Quantum Technology Programme CR&D competition. The successful submission, project JADE, will implement a new approach and protocol that improves the integration and alignment of a quantum transmitter on a satellite. The technology developed on this project will be tested on the upcoming Canadian QEYSSat mission, which originally aimed to demonstrate ground-to-satellite QKD and is being extended through JADE to demonstrate satellite-to-ground transmissions through links to ground stations in both countries.

Looking ahead

Craft Prospect is currently involved in a number of other high-profile collaborative quantum projects, both within the UK and internationally. Following the award of the IOD mission, the company is now leading efforts to deliver a complete payload for the mission thanks to the UK Space Agency National Space Innovation Program. They are also leading the 'PRISMS' consortium project which aims to address the vulnerability of nanosatellites or small hosted payloads to backdoor attacks on quantum payloads through the satellite platform.

With the development of quantum technologies continuing at pace, and increasing interest in space-based quantum technologies for a range of applications, the capability developed at Craft Prospect positions the company as a UK supplier of products and services within the space vertical feeding future quantum communication networks. With a capable team including space, AI, quantum and embedded engineers, the company is able to respond with agility to prime and major system integrator needs in the quantum technology domain, as part of a wider emerging secure ecosystem and value chain.

"The emergence of Quantum Key Distribution, will mark an important and further stepping stone towards radical new capabilities for quantum-enabled sensing and computing underpinned by a future communications infrastructure. Taking these demonstrations from the lab into robust and secure space systems presents a fantastic engineering challenge and commercial opportunity for our business. The Quantum Communications Hub has been a fantastic resource for us to engage with in our start-up and scale-up journey, allowing our whole team from graduate through to myself to upskill in this strategically important area and contribute our own expertise in space systems. We look forward to further opportunities to align our capabilities to their growing network developing unique offerings for global markets within the UK."

Steve Greenland, Managing Director of Craft Prospect

"Future worldwide quantum communications will necessarily involve QKD in space. The Hub is therefore expanding and developing its R&D in this sector. We very much value the collaboration with Craft Prospect, as the UK takes the next steps to establish and operate quantum communications in space."

Professor Tim Spiller, Director of the Quantum Communications Hub

To view the full text of this case study please visit: quantumcommshub.net