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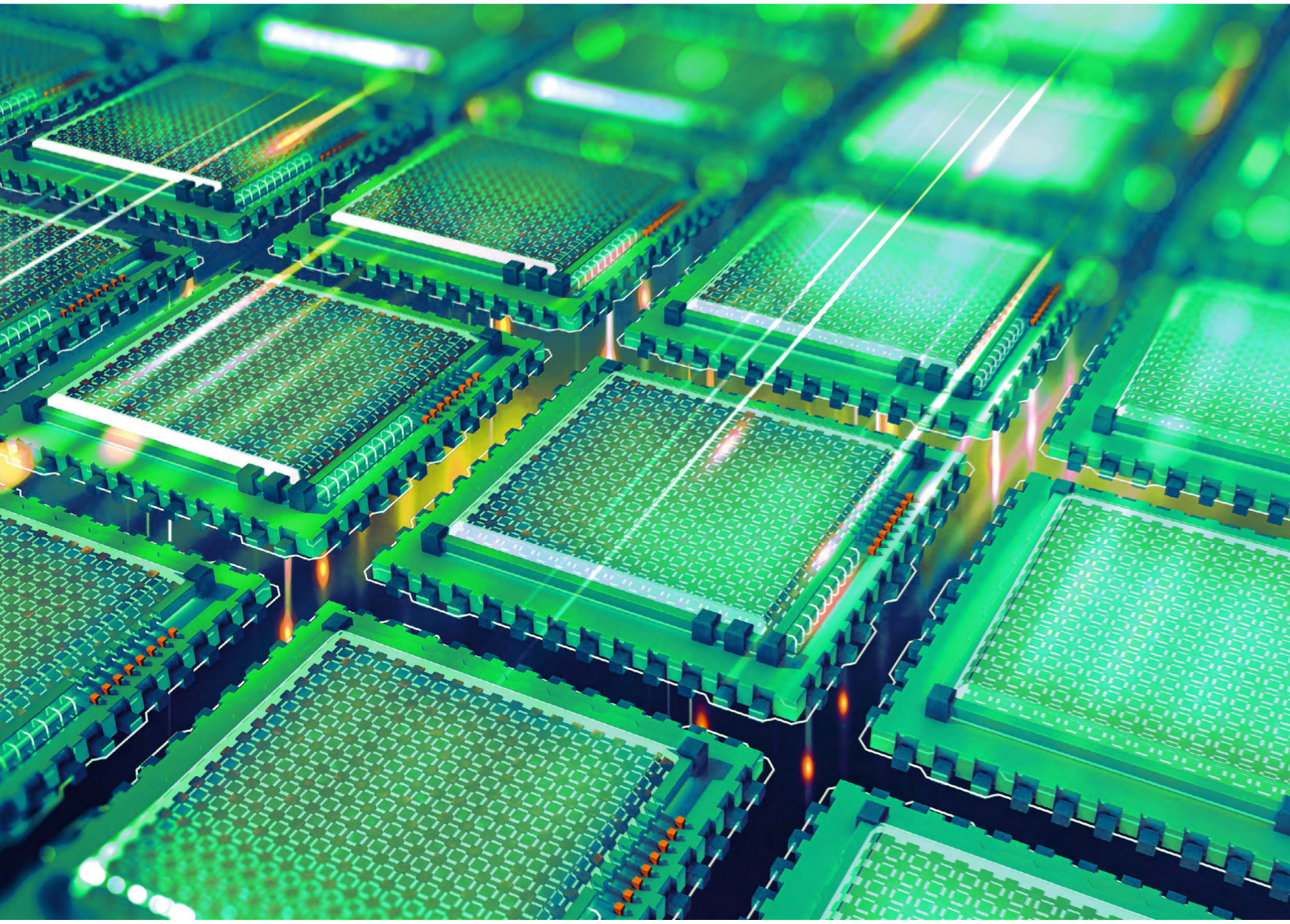


# Qualification Profiles
## for Quantum Technologies

compiled by Franziska Greinert and Rainer Müller

Beta Version (January 2022)

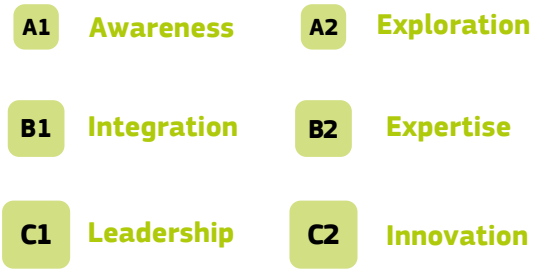
# Information on the Qualification Profiles

The European Competence Framework for Quantum Technologies (see appendix for reference) aims to map the landscape of possible competences and skills in Quantum Technologies. It has been compiled by the QTEdu CSA in order to facilitate the planning and design of education and training projects in Quantum Technologies.

On the following pages you will find a collection of sample qualification profiles for individuals working in Quantum Technologies. These profiles are intended to provide examples of the competences an individual has acquired through education or further training in preparation for employment in industry. They are not meant to represent specific job profiles in a particular industry position – any such description would have to be much more specific. Instead, they describe the Quantum Technology-specific competences available through education which can best prepare an individual for a job in industry.

The qualification profiles are based on community input that was refined in several iterations. The first input came from the Delphi study that led to the competence framework. Initial example profiles were collected through interviews with experts from industry, academia and education. They were modified and adapted in several discussion rounds, resulting in the present beta version.

The proficiency level indications use labels similar to the ones used in language learning: A1, A2, B1, B2, C1 and C2. The following keywords from DigCompEdu, the Digital Competence Framework for Educators, give an idea:




The first level, A1, can be reached easily, but it takes more effort to reach A2 from A1, and even more for the transition from A2 to B1. To make the qualification profiles more readable, competences with lower proficiency levels are greyed out. Competences not required in a profile are invisible.

There are some more specific qualification profiles (pages 4 to 7) where QT is only a small part of the qualification. Competences from other fields like electrical engineering or computer science are not considered in detail here.

This is a beta version. In order to update it and reflect current developments, we ask for feedback, questions, comments, etc.

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This might be achieved e.g. in a short course of about 2 to 3 days.

# General QT Awareness

Description: Such a person is aware of the general landscape of available quantum technologies. They understand key words and know where to look for further information (level A1). The basic concepts related to use cases may have been explored in more depth (level A2).

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This might be achieved e.g. in a longer course of about 3 to 4 weeks.

# Quantum Technology Strategist

Description: Such a person has explored all basic quantum technologies (level A2) and at least heard about more specific aspects, hardware and enabling technologies (level A1). Through their education they have explored the basic concepts (level A2), heard about the physical foundations of quantum technologies (level A1) and closely linked these to the application-oriented aspects (level B1).

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This might be achieved e.g. in a combined study programme of electrical engineering and quantum technologies.

# Quantum Hardware Engineer

Description: The focus is on the hardware and enabling technologies combined with some practical skills and use cases (level B1). Such a person has an overview of the current technologie areas (level A1) and has explored in depth the concepts and physical foundations (level A2).

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This might be achieved e.g. in a combined study programme of computer science and quantum computing.

# Quantum Computing Software Engineer

Description: Such a person has expertise in classical and quantum programming (level B2). In this context, they have explored quantum concepts and use cases (level A2), and are also aware of hardware foundations and applications in the field of communication (level A1).

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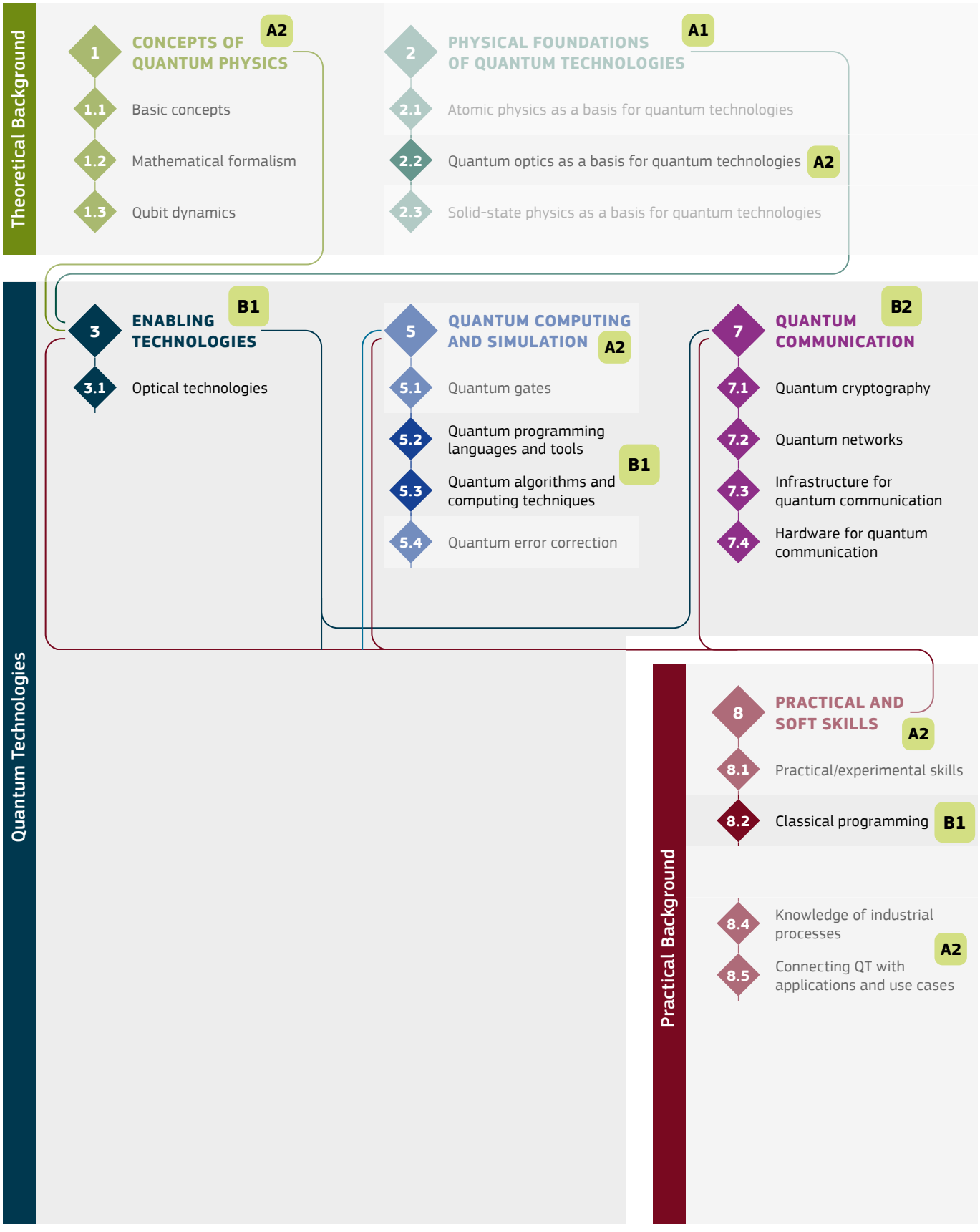
This might be achieved e.g. in a combined study programme of applied computer science and quantum communication.

# Quantum Communication Engineer

Description: Such a person has expertise in quantum communications (level B2) with a strong background in optical technologies (level B1). To achieve this, they have explored quantum concepts and optics together with some aspects of quantum computing (level A2), focusing on quantum and classical programming and algorithms and the implications for secure communications (level B1).

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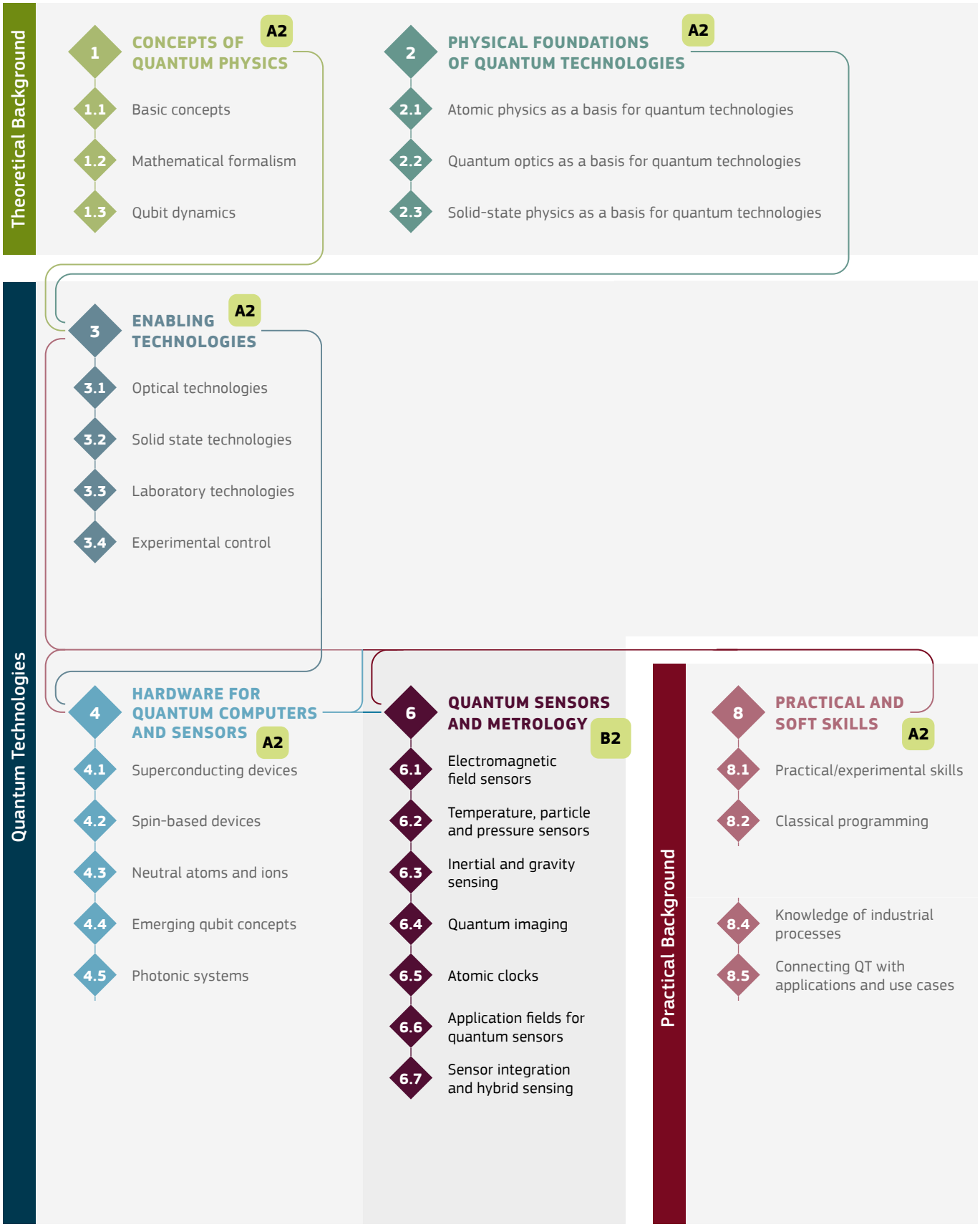
This might be achieved e.g. in a combined study programme of mechanical/electrical engineering or similar and quantum sensor technologies.

# Quantum Sensor Engineer

Description: Such a person has expertise in the field of quantum sensors and metrology (level B2). They have explored the general concepts, associated fundamentals and basic technologies along with some hardware aspects (level A2).

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# Appendix: Competence Framework for Quantum Technologies

This is the overview page of the European Competence Framework for Quantum Technologies, version 1.0 from May 2021, and the basis for the qualification profiles.
Complete Framework and more information on qtedu.eu.

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