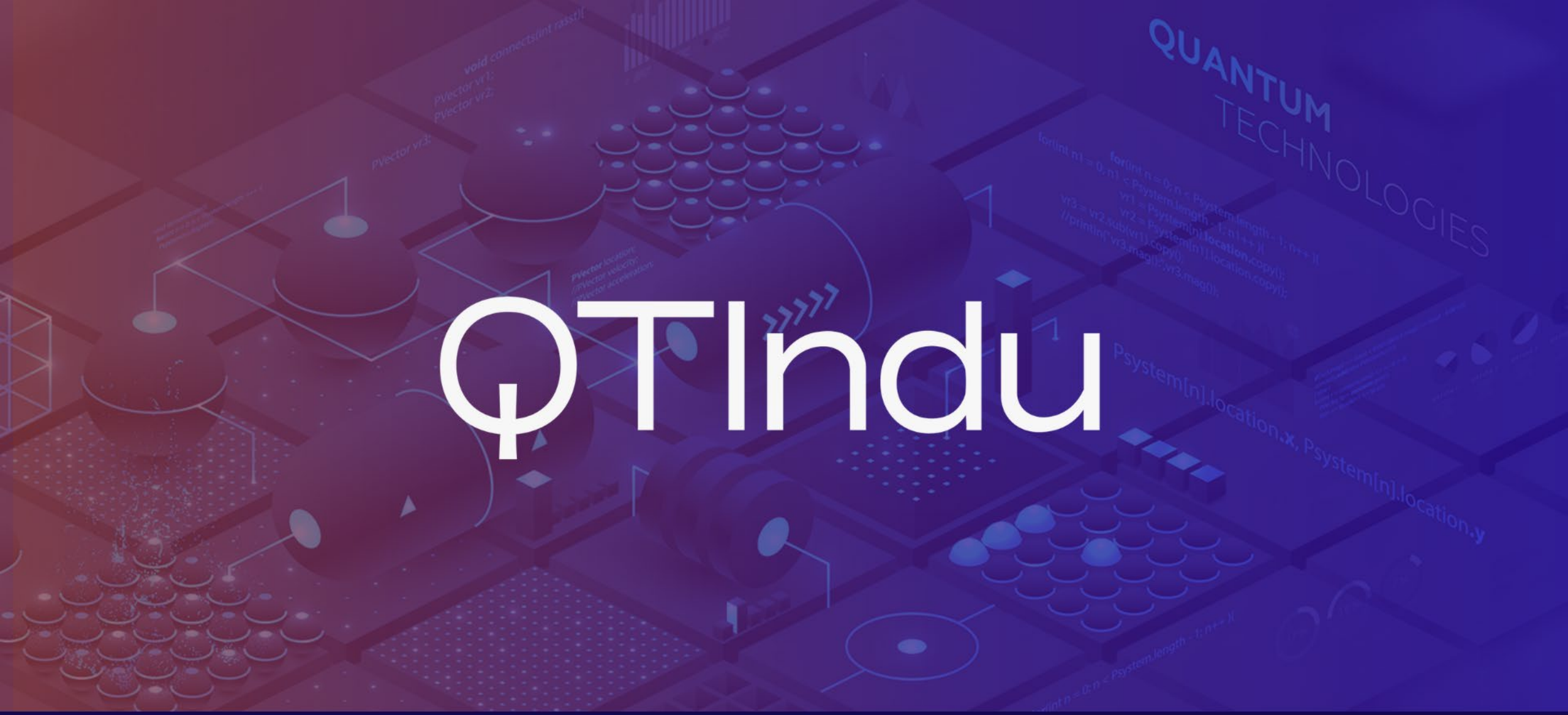


QUANTUM
TECHNOLOGY
COURSES FOR
INDUSTRY

Digital
Europe

The quantum workforce

Opinion **The FT View** + Add to myFT

A quantum future could be bright if managed well

The New York Times

The Next Tech Talent Shortage: Quantum Computing Researchers

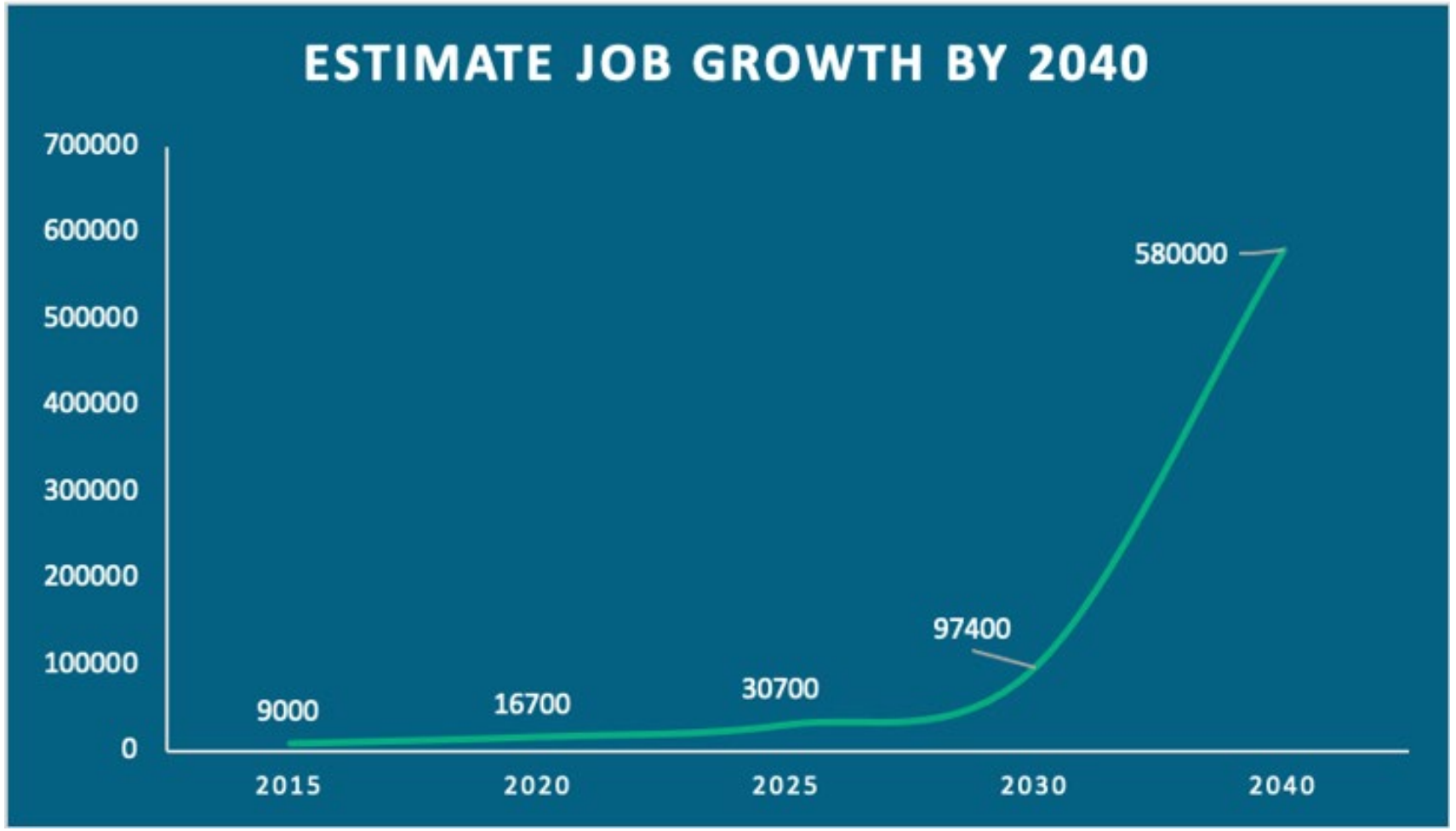
'How can we compete with Google?': the battle to train quantum coders

A major skills shortage in quantum computing could harm the UK economy unless universities recruit more students

In 2040, Australia's quantum technology industry could generate over **$4B revenue** and **16K new jobs**

QTIndu

Job market size

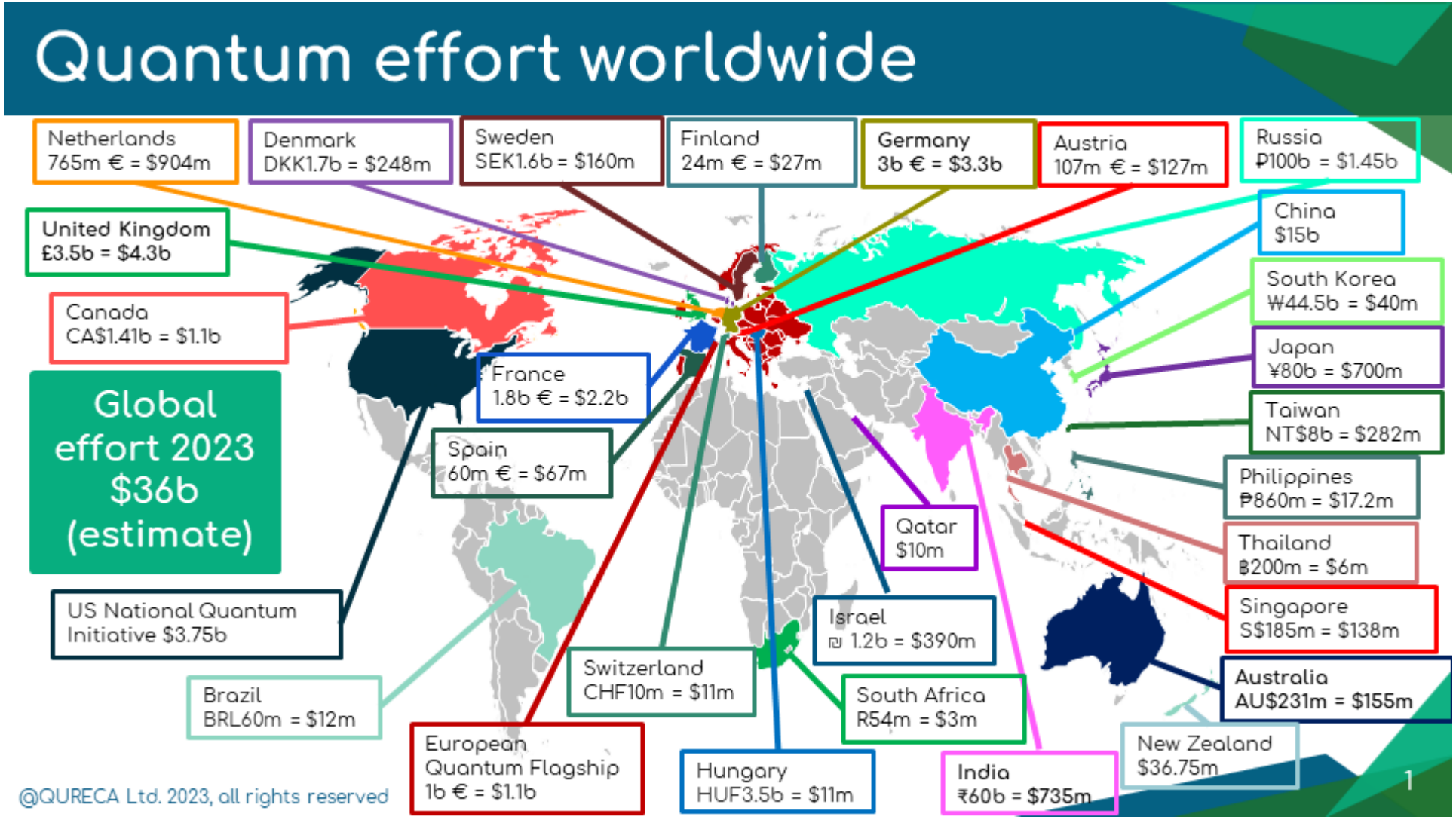


We need to train NOW the workforce of the present and the workforce of the future

Araceli Venegas-Gomez. Photonic views (2020).
https://doi.org/10.1002/phvs.202000044

QTIndu

Global public Investments



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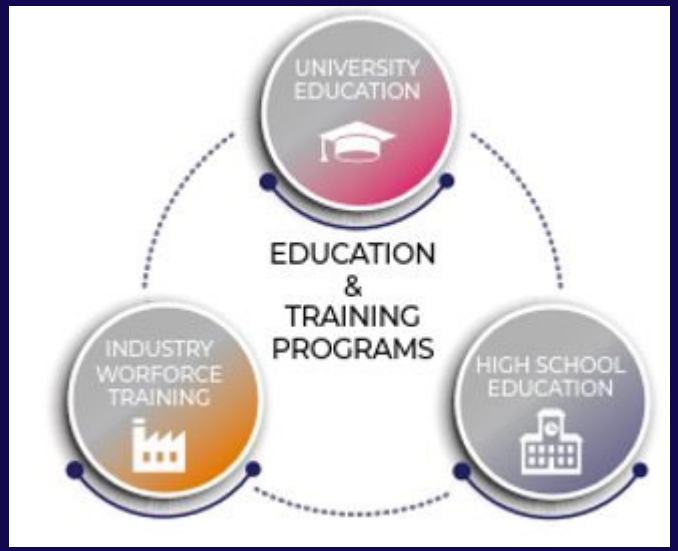
Goals of Education & Training

Strategic Research Agenda (2019): Overall goals for QT education & training:

- Create an ecosystem of a skilled quantum workforce
- Work against a shortage of quantum experts, especially in engineering
- Well-informed society with knowledge and attitudes towards the acceptance of quantum technologies

https://qt.eu//app/uploads/2020/04/Strategic_Research-_Agenda_d_FINAL.pdf



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Quantum Technologies courses for Industry

Why?

Shortage of talent with advanced training in Quantum Technologies

Solution

To create a training program for professional development of QT specialists for industries and SMEs

QTIndu

Objectives

Develop a pan-European short-term training program in Quantum Technology.

Offer training courses specifically tailored to the requirements of companies and SMEs from different business sectors.

Provide guidelines for scaling up the QTIndu project to a comprehensive pan-European scale.

QTIndu

Partners

Academic Institutions

AARHUS UNIVERSITY

TU Delft
Delft University of Technology

UNIVERSITY OF HELSINKI

PTB
Physikalisch-Technische Bundesanstalt
National Metrology Institute

Technische Universität Braunschweig

ICFO
Institut de Ciències Fotòniques

Industry Networks

STIFTERVERBAND

Quantum Valley Lower Saxony

MinacNed
Association for Microsystems and Nanotechnology

Munich Quantum Valley

UIC

ATV
Akademiet for de Tekniske Videnskaber

Corporates

AIRBUS

SMEs

QURECA
WE SPEAK QUANTUM

QTIndu

The structure ofthe content

Formats

virtual, physical, hands-on, off-the-shelf, custom-made
Durations

Duration

1. Short: 2-3 full time equivalent days
2. Medium: 4-7 full time equivalent days
3. Long :> 1 week

MODULES

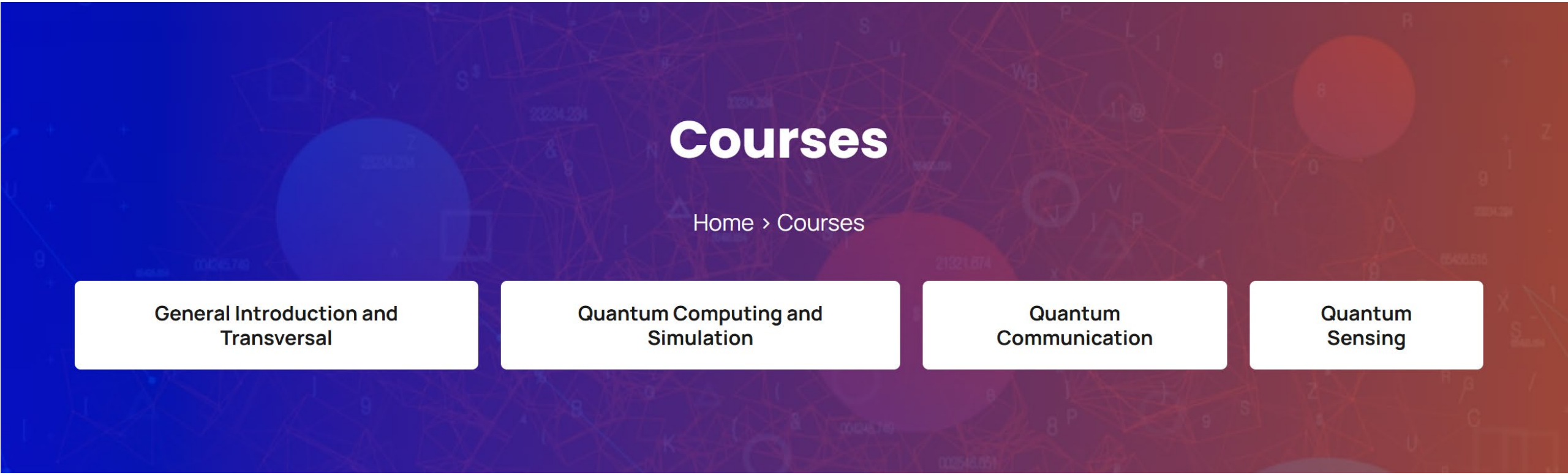
Fully documented 1-5 hours **interactions**.
E.g short soft skills symposia, digital educational modules (Composer, Qiskit...), remote access experiments, virtual training activities (games, VR...).
Module material will be made publicly available on relevant EU-platforms

COURSES

Courses will be hosted on an online commercial e-learning platform, linked to a diversity of academic platforms.

QTIndu

Course Topics



QTIndu

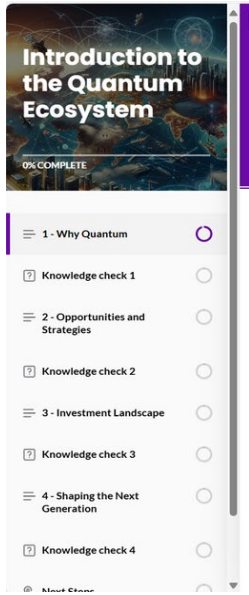
General Introduction and Transversal

Introduction to the Quantum Ecosystem

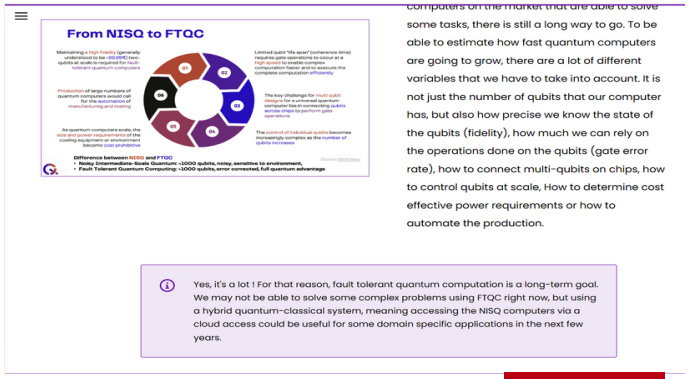
Non-Technical Managers
Engineers & Technicians
Researchers
Students
Quantum Enthusiasts
Software Developers
Data Scientists
Executives & Strategists
Marketing
HR

About

This module will present an overview of the ecosystem being built around quantum computing, providing a solid foundation to understand the potential, opportunities, and strategies surrounding quantum technologies.



Why quantum intro video



Also available in Spanish

This module is developed by

QURECA
WE SPEAK QUANTUM

QTIndu

General Introduction and Transversal

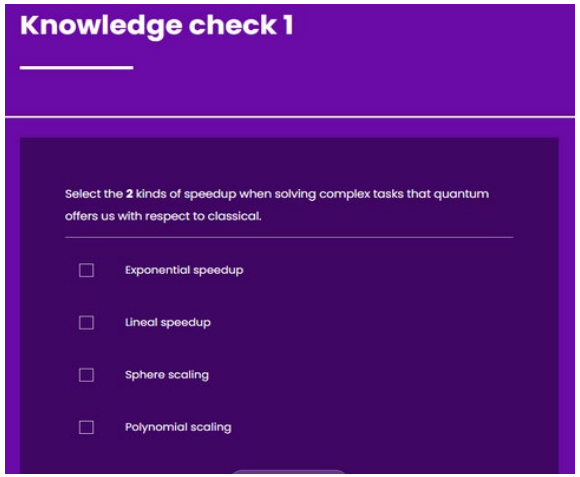
Introduction to the Quantum Ecosystem

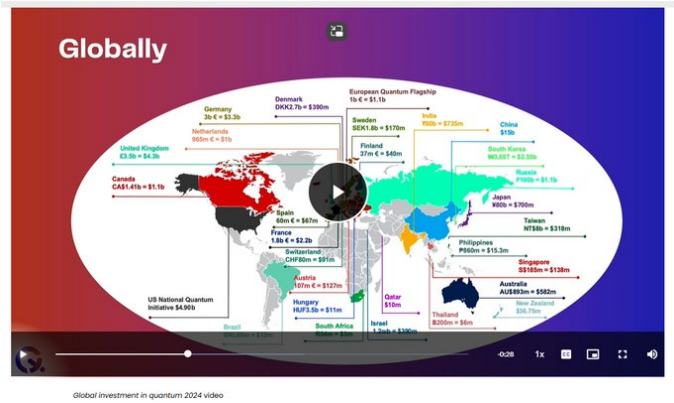
Non-Technical Managers
Engineers & Technicians
Researchers
Students
Quantum Enthusiasts
Software Developers
Data Scientists
Executives & Strategists
Marketing
HR

What you will learn:

If you successfully complete the module, you will:

- Assess the investment landscape of the quantum industry, including startups, venture capital, and key players.
- Understand the differences between classical and quantum computers abilities.
- Identify and articulate the potential applications and opportunities for quantum computing.





Global investment in quantum 2024 video

Also available in Spanish

This module is developed by QURECA WE SPEAK QUANTUM

QTIndu

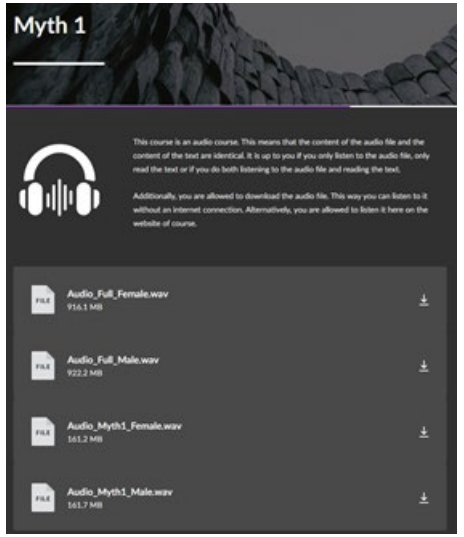
General Introduction and Transversal

Quantum Myths

Non-Technical Managers
Engineers & Technicians
Researchers
Students
Quantum Enthusiasts
Software Developers
Data Scientists
Executives & Strategists
Marketing
HR

About

This module gives you an insight into varying, mostly broad statements regarding Quantum Technologies – especially Quantum Computing. Together, we will review and clarify diverse myths regarding the performance, potential and accessibility of Quantum Computers. Additionally, we have a look at the relation to other important technologies too. You possibly met these interesting myths in your everyday life and asked, whether they are correct or not.



Also available in German

This module is developed by

Technische Universität Braunschweig

QTIndu

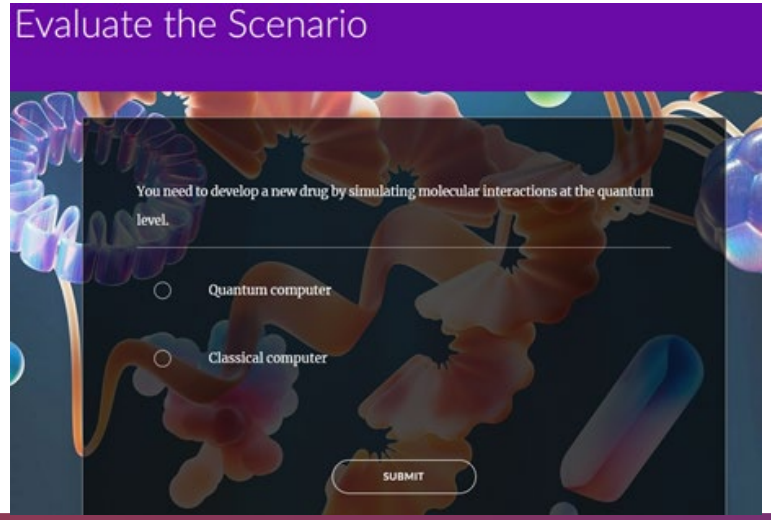
General Introduction and Transversal

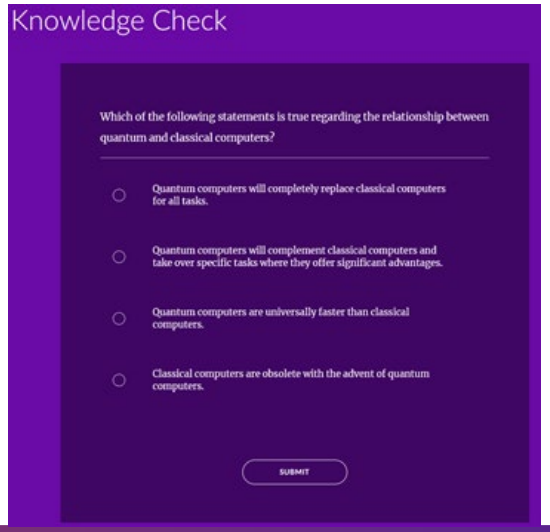
Quantum Myths

Non-Technical Managers
Engineers & Technicians
Researchers
Students
Quantum Enthusiasts
Software Developers
Data Scientists
Executives & Strategists
Marketing
HR

What you will learn:
If you successfully complete the module, you will:

- Deal with everyday statements about Quantum Computing in a differentiated way.
- Evaluate possible diverse scenarios of applications of classical and Quantum Computing.
- Distinguish myths and facts regarding Quantum Computing.





Also available in German

This module is developed by

Technische Universität Braunschweig

QTIndu

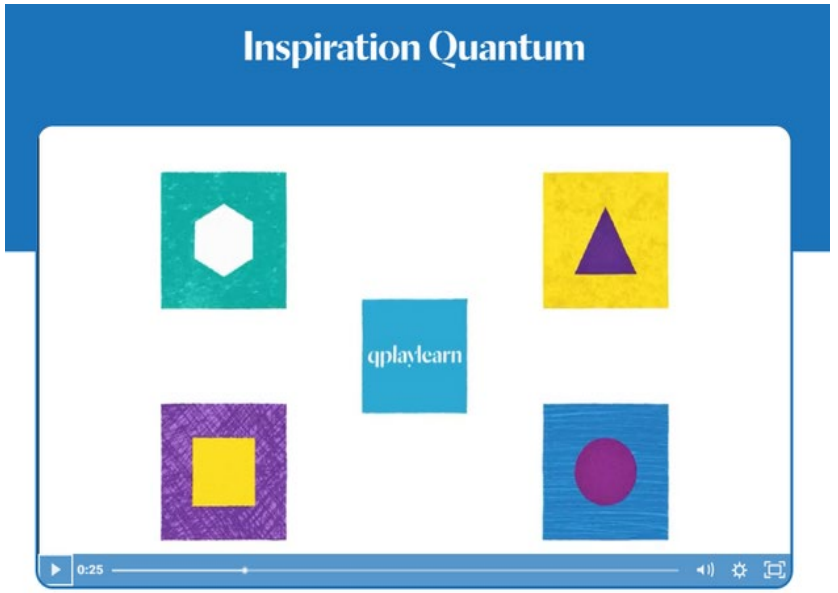
General Introduction and Transversal

Inspiration Quantum

Non-Technical Managers
Students
Quantum Enthusiasts
Executives & Strategists
Marketing
HR

About

This online course introduces basic concepts of quantum science and technologies to prepare you for your quantum computing journey. You will build intuition, familiarity, and competence about the topic without having to dig into its mathematical technicalities, while resting assured about the scientific rigour. At the end of the course, you will be able to read news critically and to distinguish, when it comes to the possibilities of quantum computers, truthful and accurate sources from misleading or hyped media sources.



This course is developed by

UNIVERSITY OF HELSINKI

QTIndu

General Introduction and Transversal

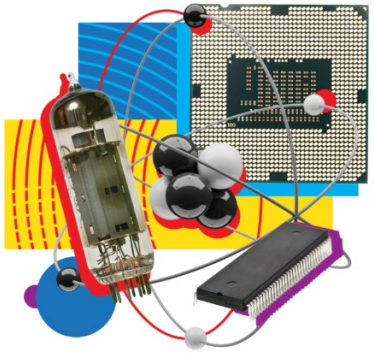
Inspiration Quantum

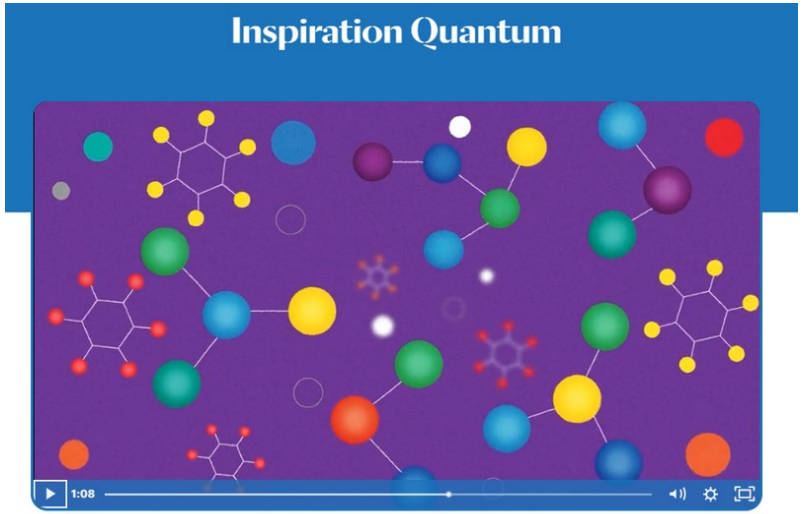
Non-Technical Managers
Students
Quantum Enthusiasts
Executives & Strategists
Marketing
HR

What you will learn:

If you successfully complete the course, you will:

- Understand the fundamental difference between classical and quantum computers
- Be aware of the distinction between fault-tolerant and near term quantum devices
- Identify possible fields of application of near term devices in the upcoming years





This course is developed by

UNIVERSITY OF HELSINKI

QTIndu

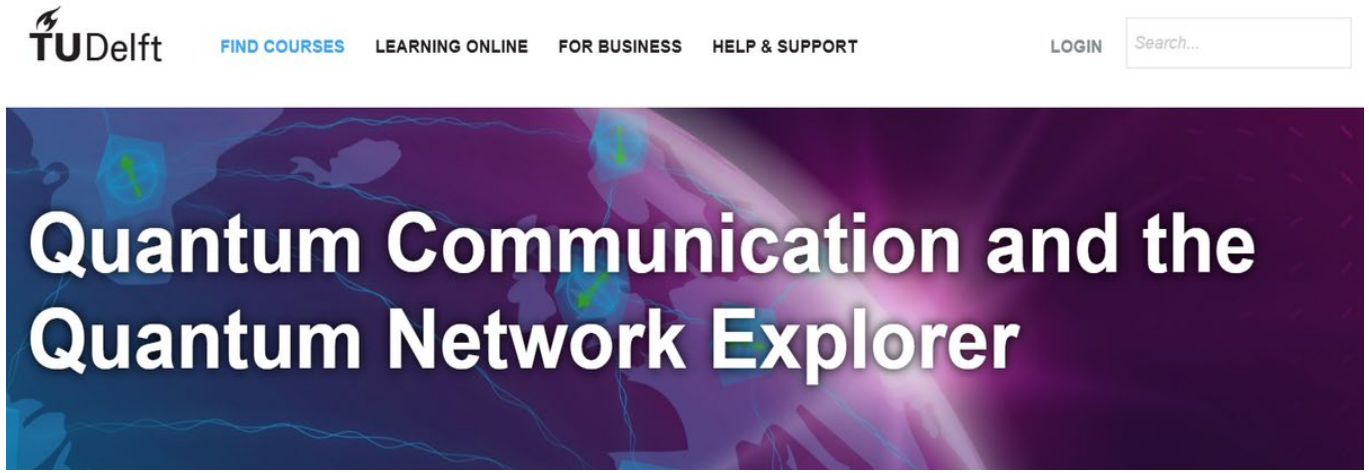
Quantum Communication

Introduction to Quantum Communication and Quantum Network Explorer (QNE)

Engineers & Technicians
Students
Quantum Enthusiasts
Software Developers
Data Scientists

About

Quantum Network Explorer (QNE) is currently the only educational platform wholly committed to the advancement of quantum networking. In this course, you will gain proficiency in QNE ADK for quantum network application development and learn to share your creations on QNE's Community Application Library.



This module is developed by

TU Delft
Delft University of Technology

QTIndu

Quantum Communication

Introduction to Quantum Communication and Quantum Network Explorer (QNE)

Engineers & Technicians
Students
Quantum Enthusiasts
Software Developers
Data Scientists

What you will learn:

If you successfully complete the course, you will:

- Understand the **fundamentals of quantum networks** and their future applications.
- Utilize the diverse resources provided by the Quantum Network Explorer to gain practical insight into quantum networks through hands-on experience
- **Run your own quantum network simulations** by leveraging the pre-built applications available in QNE's Community Application Library.
- **Develop customized quantum network applications** using QNE's Application Development Kit (QNE-ADK) and contribute to the global QNE community by sharing your work
- Use SquidASM as an advanced simulator for quantum network applications, elevating your research capabilities to the next level.

This module is developed by

TU Delft
Delft University of Technology

QTIndu

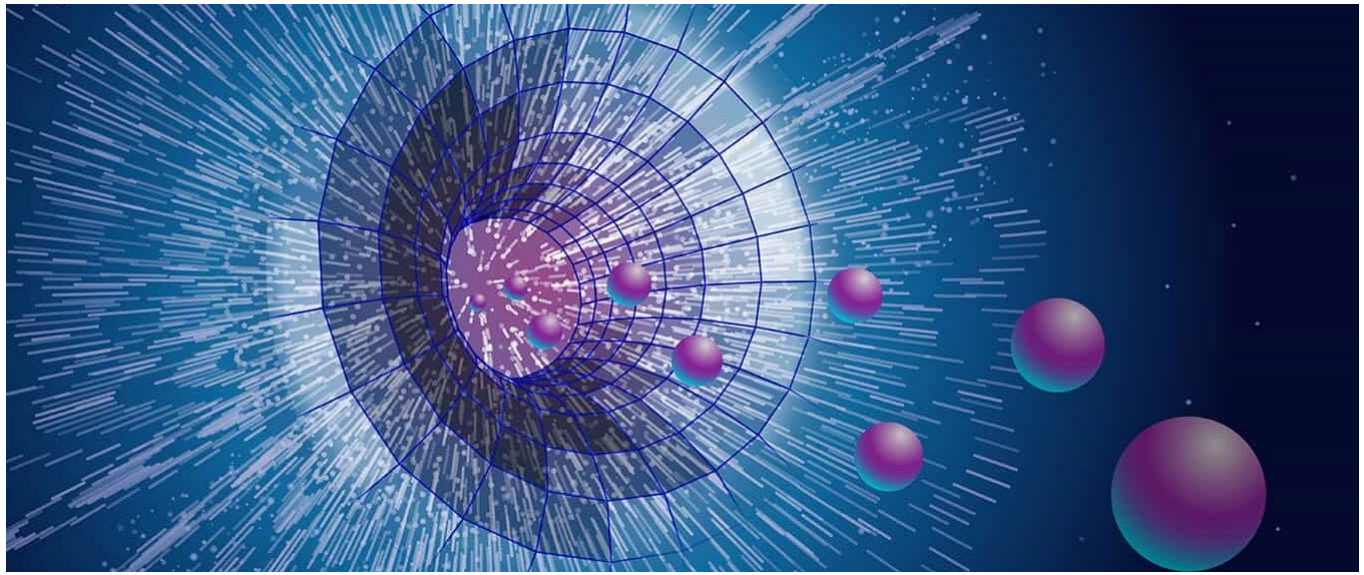
Quantum Sensing

Quantum Sensor Engineering

Non-Technical Managers
Engineers & Technicians
Researchers
Students
Quantum Enthusiasts

About

This is an introductory course to quantum sensing presented through the lens of quantum magnetometry. Three different technologies are discussed (diamond color centers, optical magnetometers, and superconducting devices). The course consists of theory, applications, and hands-on training.



This module is developed by

PTB
Physikalisch-Technische Bundesanstalt
National Metrology Institute

QTIndu

Quantum Sensing

Quantum Sensor Engineering

Non-Technical Managers
Engineers & Technicians
Researchers
Students
Quantum Enthusiasts

What you will learn:

If you successfully complete the course, you will:

- Understand the principles of quantum sensing.
- Acquire an overview of different technologies.
- Elucidate advantages and limitations.
- Qualitatively explain the physical phenomena involved.
- Become aware of use-cases and assess potential new applications.
- Perform measurements using our user-friendly quantum education kits.

This module is developed by

PTB
Physikalisch-Technische Bundesanstalt
National Metrology Institute

QTIndu

Discussion I

In your context and experience, what's the demand for (more or less) skilled Quantum professionals?

STIFTERVERBAND

QUANTIFYING THE WORKFORCE CHALLENGE IN QUANTUM TECH

Introducing a Study in Progress: QUANTiFaID

Andreas Land

Munich · June 24th 2025

With funding from the:

Federal Ministry of Research, Technology and Space

PROJECT MOTIVATION & GOALS

- Using an integrated approach, We aim to quantify the current and expected skills gap in Quantum Technology along the business and scientific sector.

- As a reference, we aim to quantify the corresponding course offerings of German universities.

→ Transparency will allow for an alignment of Demand and Supply and strengthen the QT-Ecosystem.

CONCEPTUAL BASIS

Based on Competence Framework for QT

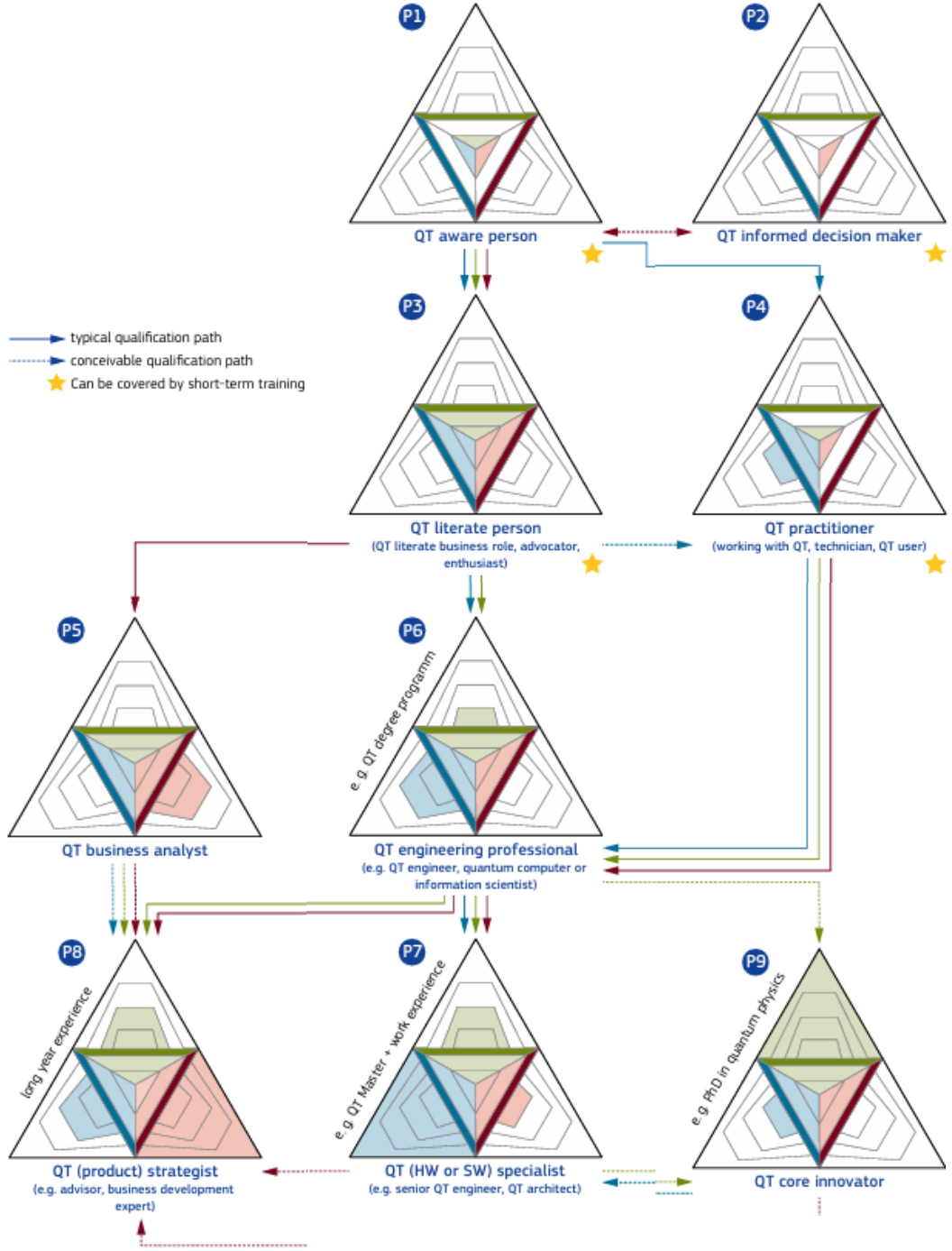
- **Three proficiency Areas** along
- **Eight Competence Domains**
- **Nine Personas** with specific competence levels

Quantum Background
1: Concepts and Foundations
2: Physical Foundations of Quantum Tech

Core Device Technology
3: Enabling Tech
4: Quantum Hardware

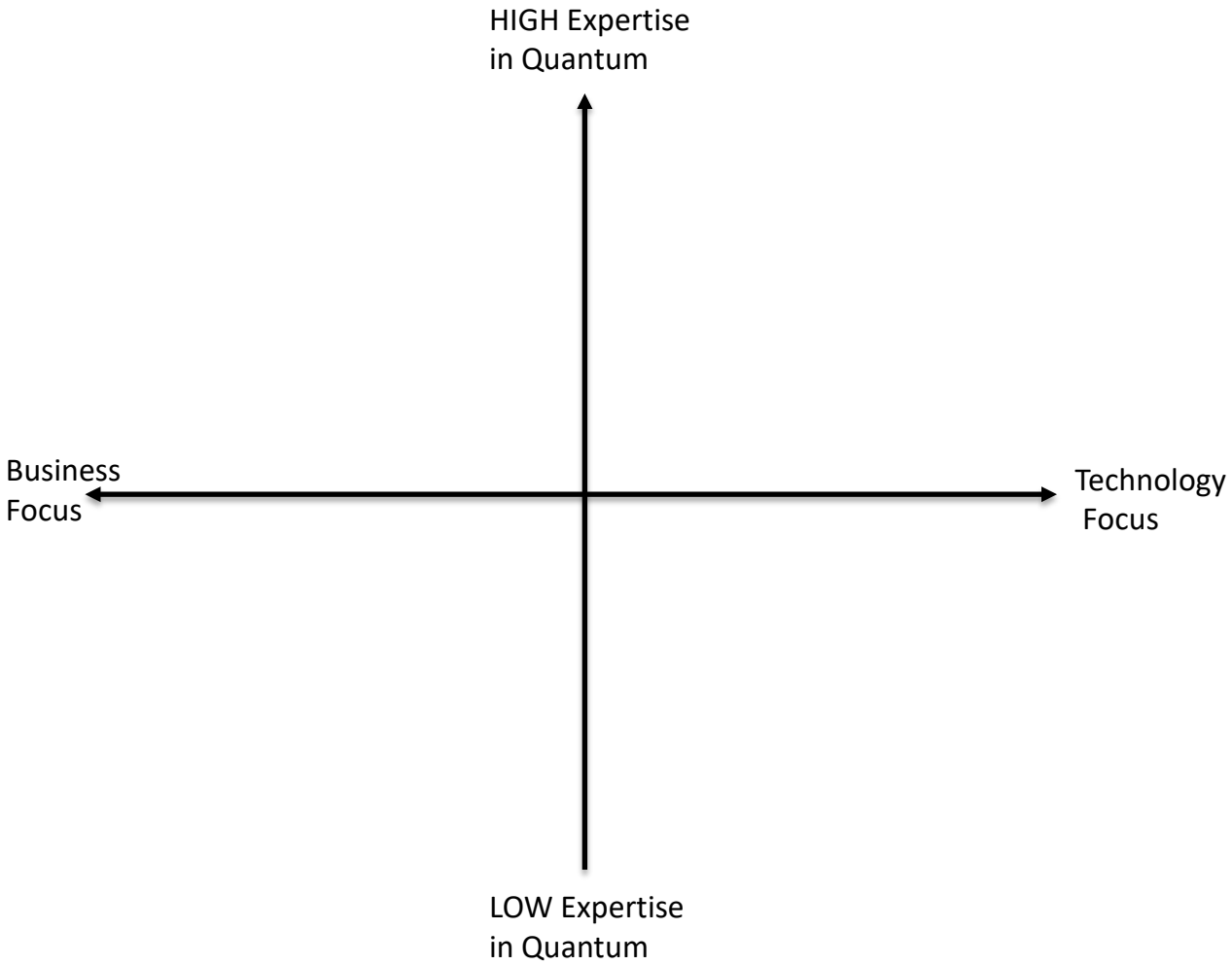
QT Systems and Applications
5: Quantum Computing and Simulation
6: Quantum Sensors and Image Systems
7: Quantum Communication and Networs
8: Valorisation

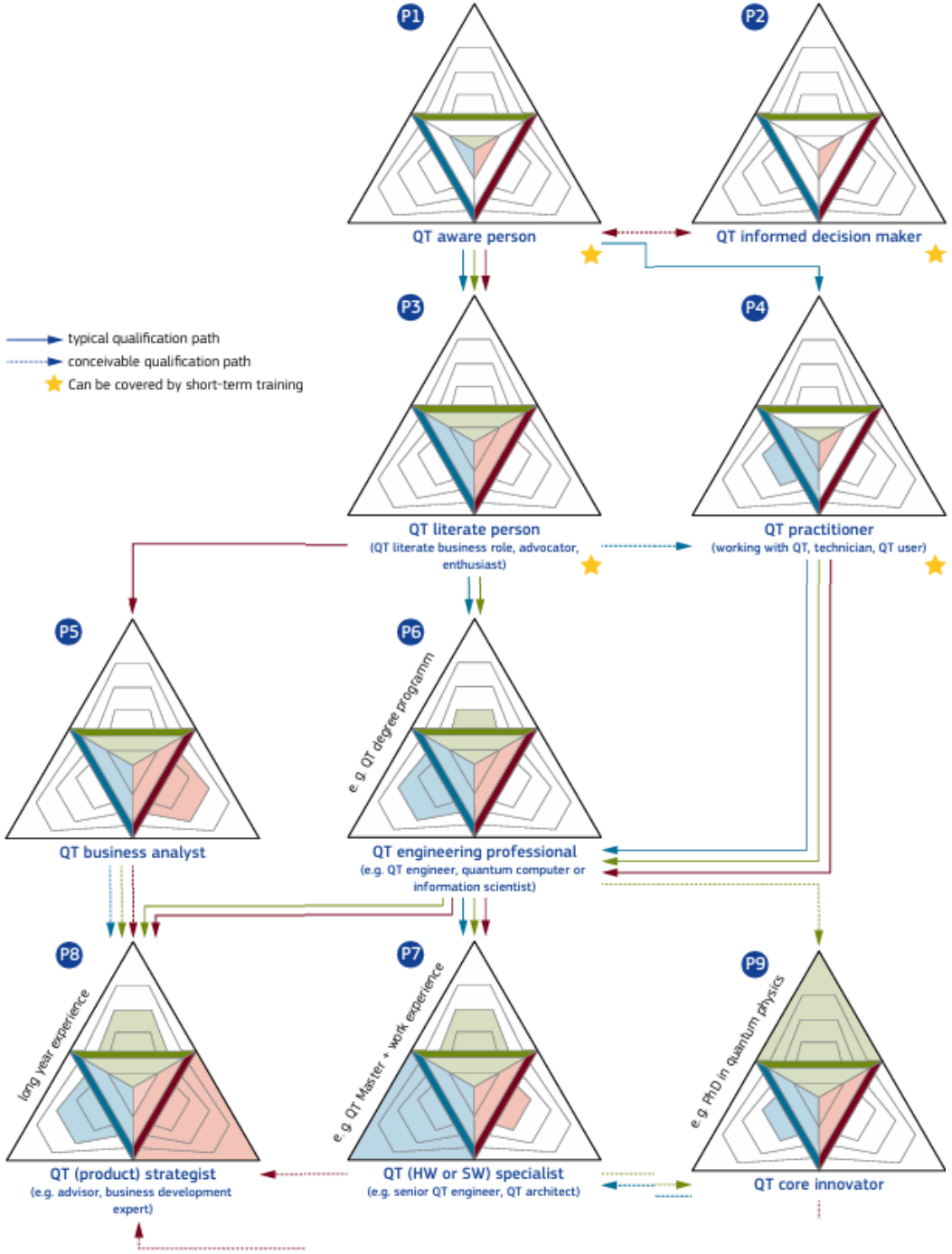
→Points to Potential Qualification Pathways



Greinert et al (2025)

PRELIMINARY RESULTS
QUANTIFAID PROFILES





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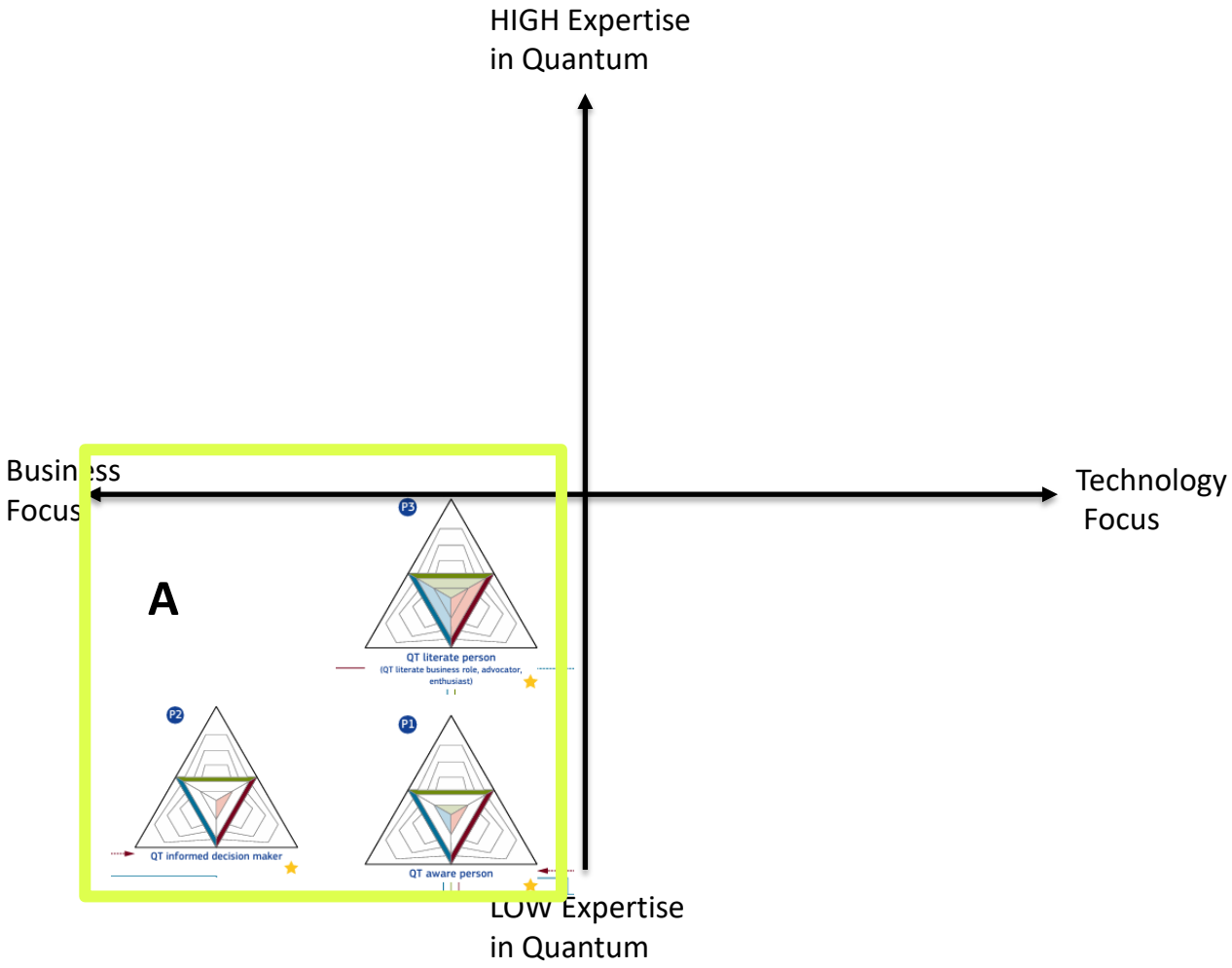
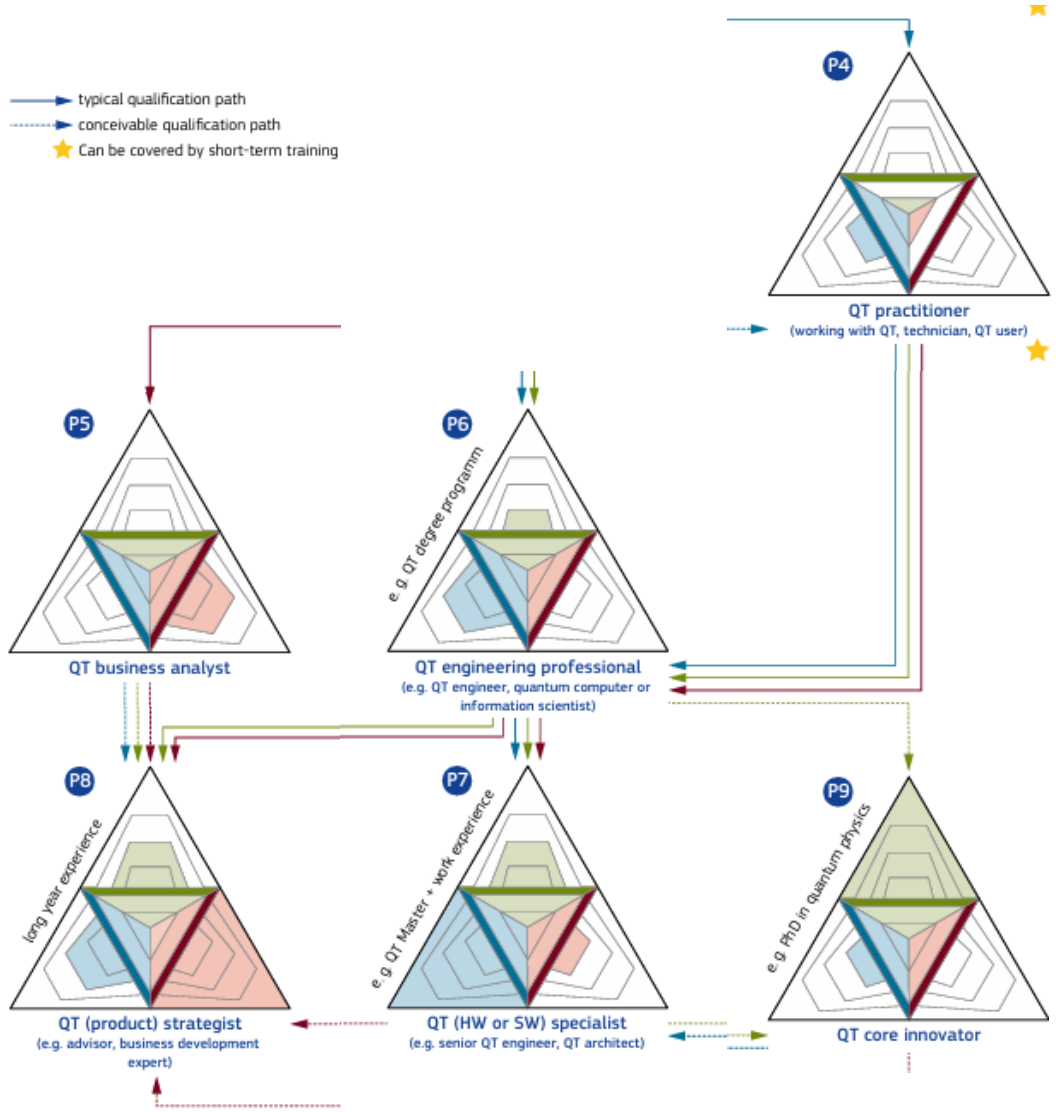
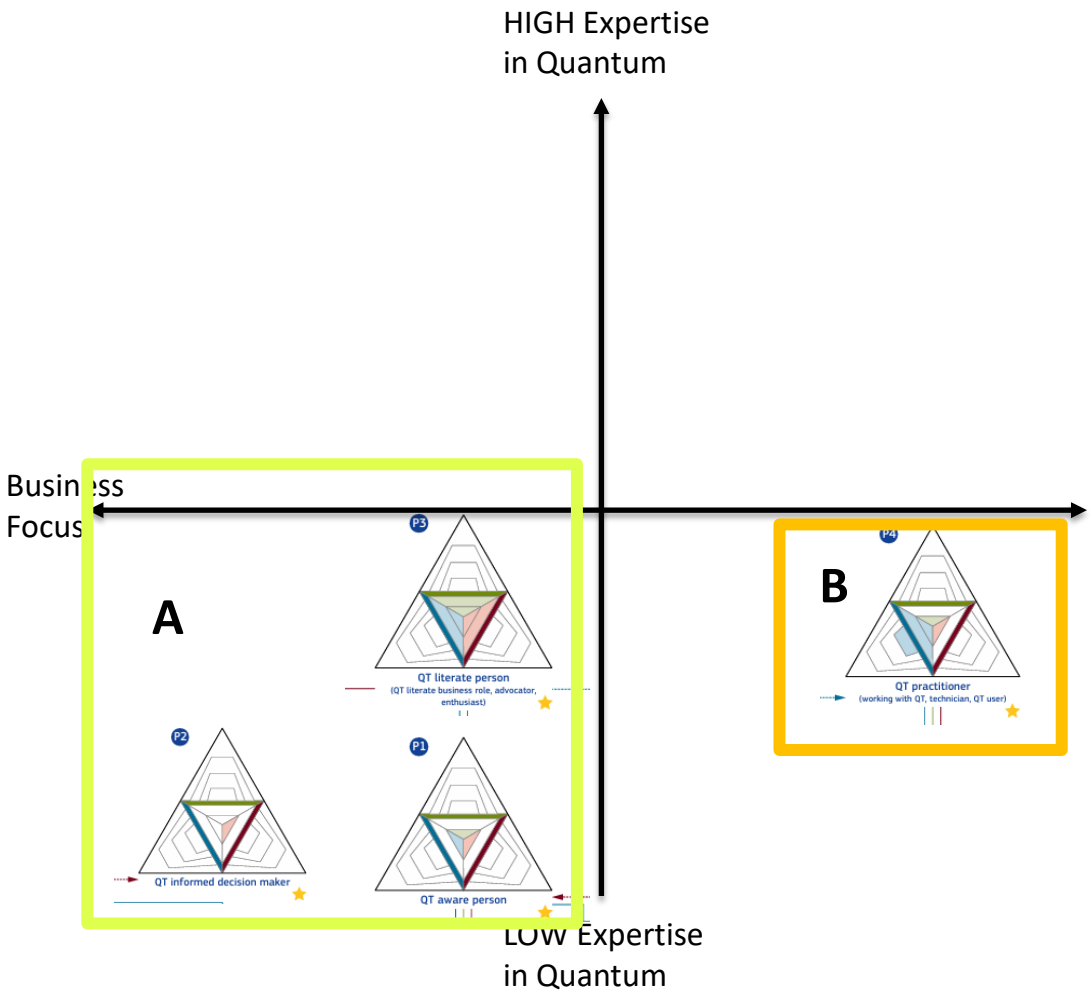
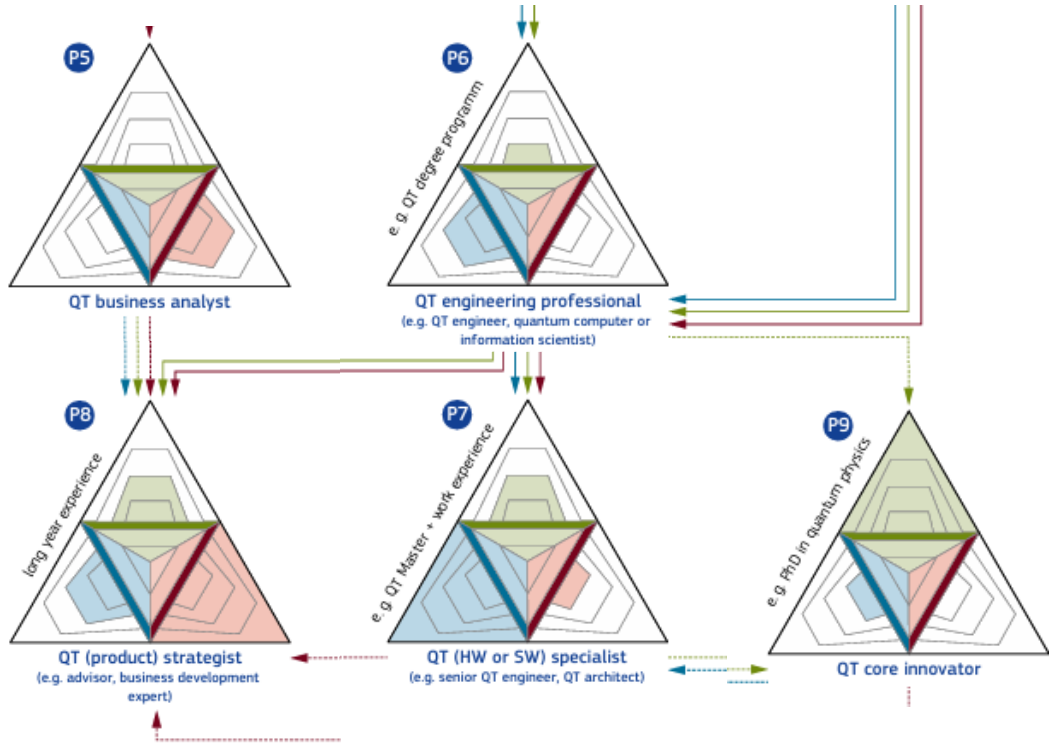




Greinert et al (2025)

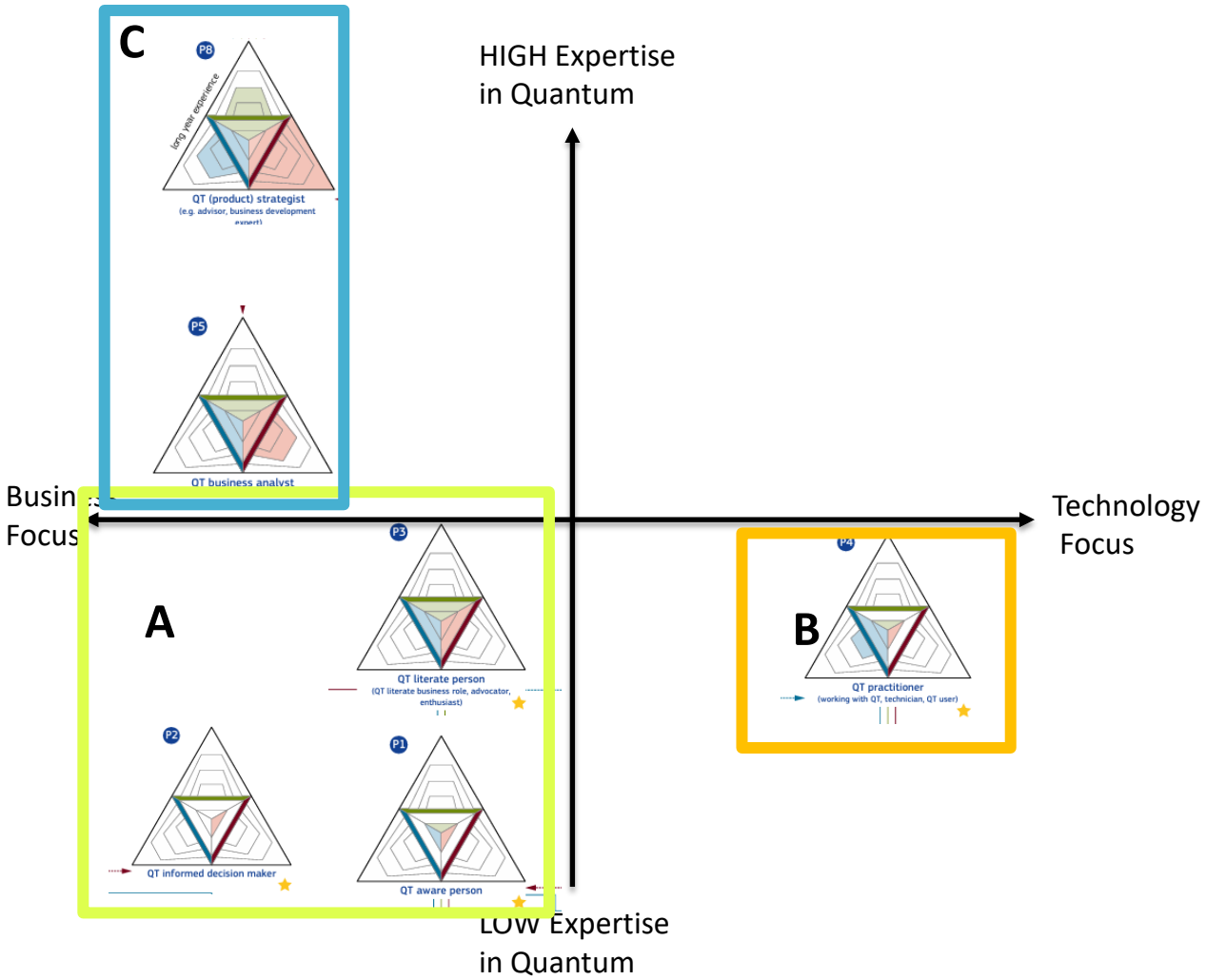
PRELIMINARY RESULTS
QUANTIFAID PROFILES

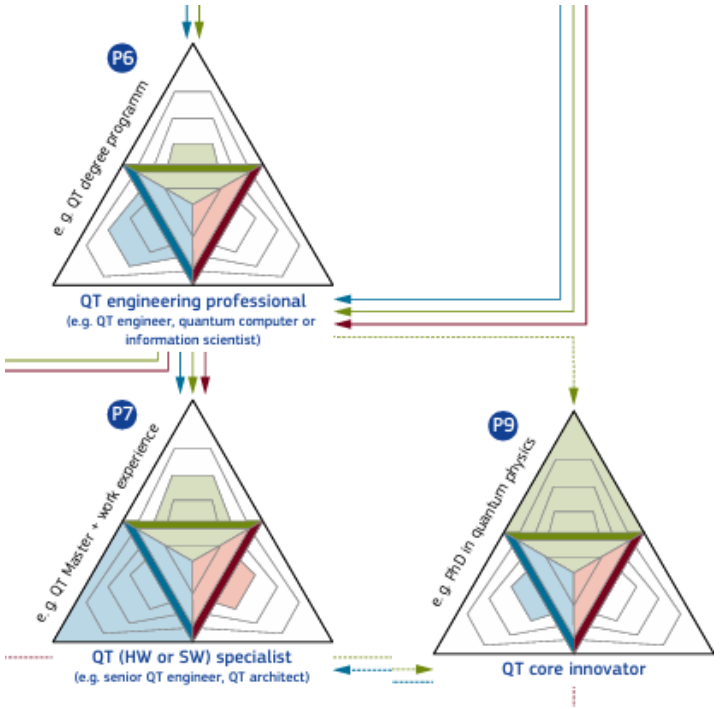




Greinert et al (2025)

PRELIMINARY RESULTS
QUANTIFAID PROFILES





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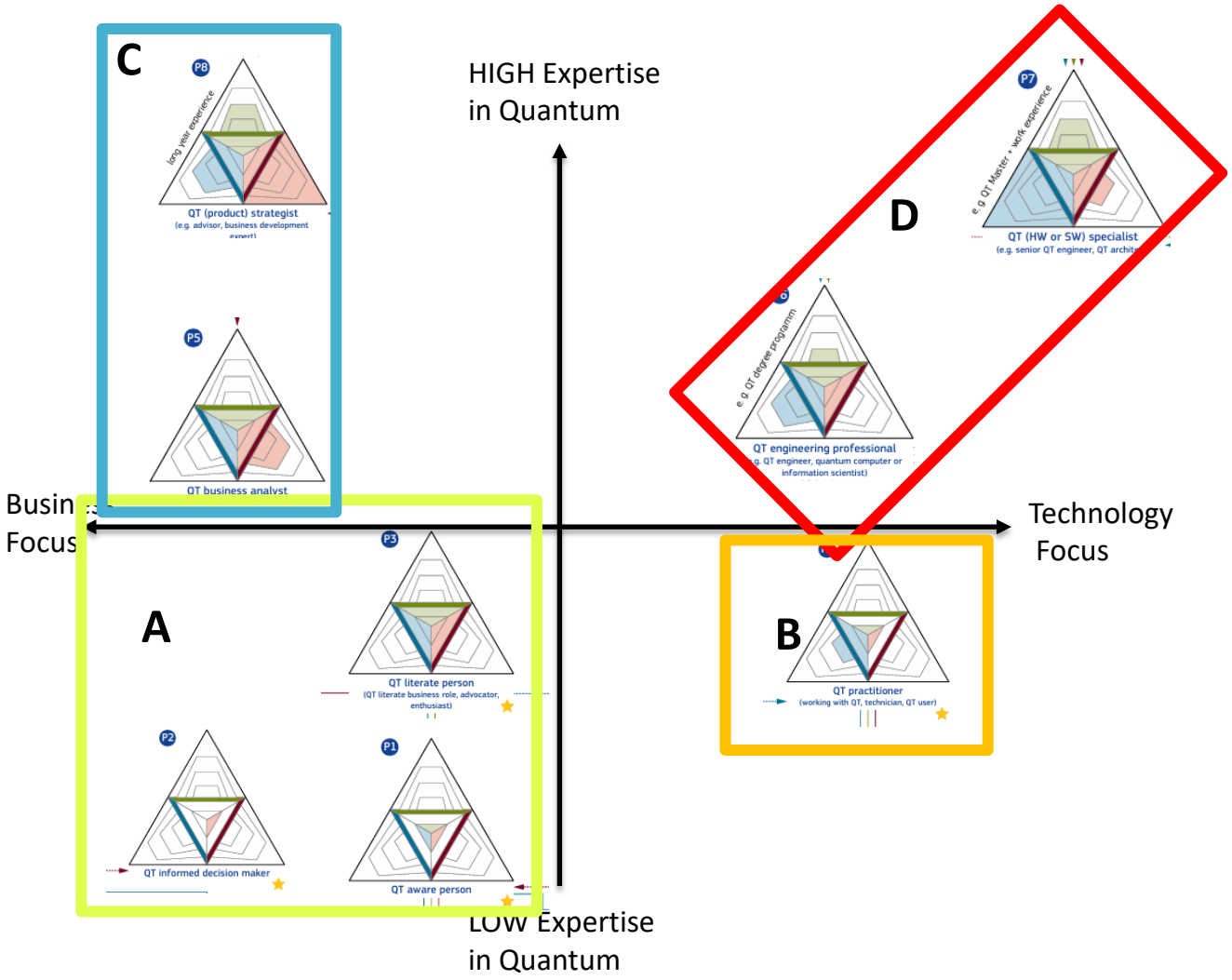
PRELIMINARY RESULTS
QUANTIFAID PROFILES



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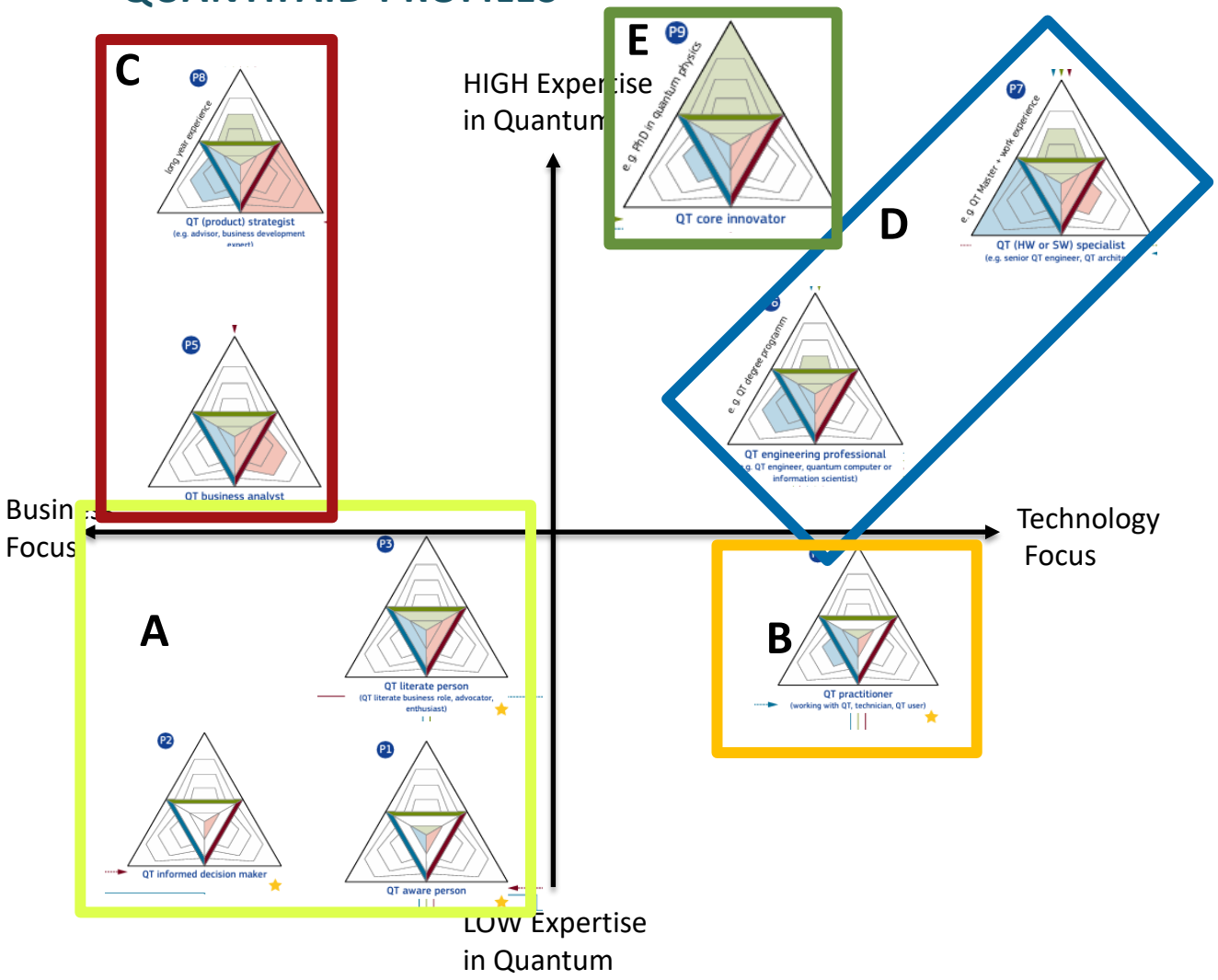
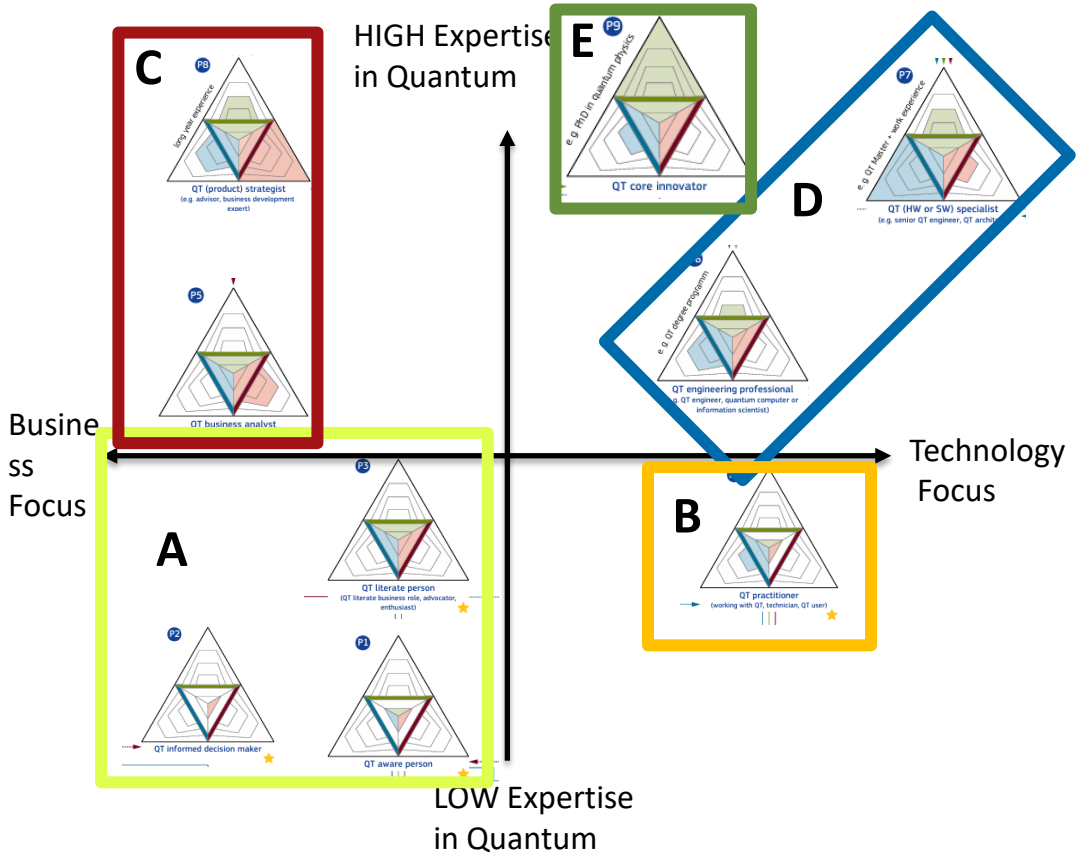
PRELIMINARY RESULTS

QUANTIFAID PROFILES



PRELIMINARY RESULTS
QUANTIFAID PROFILES



Quantum Native: Personnel with substantial QT-Qualifications

C: Quantum Strategists
- (preparation of) *strategic Decisions*
- High Level of Valorisation Knowledge

D: Engineers
- Product development
- Technology Realisation

D I: Hardware & System
- *Integration* and *Application*
- High Expertise in *Enabling Technologies* & *physical foundations*

D II: Quantum Software
- Development of *Quantum Based Software* Products
- Low expertise in physical Basics

E: Foundational Researcher
- *Quantum Physicist*
- Development of foundational Ideas for Technology.
- Low expertise in Application and Realisation

Quantum Ready: Personnel with Basic QT-Qualifications

A: Operational Support
- Marketing
- - Personnel Development
- Administration

B: QT-Aligned Skilled Labour
- Working *with* QT
- Engineers (BA)
- (Lab) Technicians

Discussion II

In your context, what's the biggest need or gap in quantum education?

Discussion III

Thinking about your future career, what domains and levels of quantum expertise do you believe will be most relevant to your work?

Thank you!

CONTACT US

info@qureca.com

FOLLOW US

www.qtindu.eu

This project has received funding from the European Union's Digital Europe Programme under grant agreement no. 101100757.

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Marco.hellmann@stifterverband.de

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