

# FBK with PROMISE to build an innovative magnetic imaging

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**From the lab to businesses: a pioneering initiative set to revolutionize quantum sensing technology.**

**Fondazione Bruno Kessler** is part of the international consortium that initiated the [PROMISE](#) (**PRO**types of Magnetic Imaging **S**ystems for Europe) research project.

With a dual focus on cutting-edge technology development and rigorous industrial use case testing, PROMISE aims to bring diamond color-center-based **quantum imaging sensors** to a pre-industrial level of technological readiness for practical everyday use applications.

**FBK's role** is to provide the hardware part of the project, namely the imaging sensors used in the final set up of the microscope, built to detect and display magnetic properties.

“We are starting from a high-level technology and bringing it to a finished product. The consortium was formed precisely to take these existing technologies out of the laboratories and make them usable. The magnetometer will have wide-ranging use, in different sectors and applications: from industry to health care and electronics.

*For example, it will be able to detect corrosive effects in aircraft wings, identify cancer cells and understand their properties, or measure very small currents in microchips and fields generated by micromagnets. It will be like building a new meter,”* **Enrico Manuzzato, Project Steering Committee Member and FBK researcher for the [Center for Sensors & Devices](#), explained.**

The PROMISE **project** brings together expertise from both research and industry to build a precise yet manageable tool. Currently, such machines take up an entire laboratory. With **PROMISE**, the magnetometer will be scaled down to a cubic meter size, so that it can be easily transported and marketed.

Some use cases

- Semiconductor metrology: ultrafast, high-resolution measurements critical for future-generation microelectronics.
- **Materials engineering**: advanced imaging capabilities for the development and analysis of advanced materials.
- **Biotechnology**: dynamic, real-time monitoring tools that could revolutionize diagnostic and research processes.

### Developing quantum sensing for tomorrow's industries

Quantum sensing is emerging as the quantum technology with the most immediate market potential, and NV center-based sensors are leading the way due to their remarkable simplicity and performance. Operating without the need for vacuum systems, cryogenics or magnetic shielding, these sensors offer quantitative, robust and absolute measurements that do not require calibration. By interacting with local magnetic and electric fields, temperature, strain, and pressure, NV centers provide rich image-based insights that surpass traditional optical systems

. Traditional systems such as scanning probe microscopes, though powerful, are hampered by slow, point-by-point measurements, making them poorly suited for dynamic, real-time applications.

**PROMISE** addresses this challenge by developing industrializable wide-field magnetometers that capture rapid changes with speed and efficiency, opening up new possibilities for sensing, imaging, analysis, and monitoring. In addition, the prototypes to be developed will have significantly reduced size, weight, power consumption and cost compared to current laboratory configurations, paving the way for rapid market adoption.



The international consortium of the PROMISE (PROtotypes of Magnetic Imaging Systems for Europe) research project.

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