



Developing production methods for rapid diagnostics and sample handling

This development project for rapid diagnostics and sample handling has helped advance the competitiveness of the Oulu area in the health and welfare technology sector. The project has created an environment, where businesses have better opportunities for developing and piloting new applications. The project has also produced solutions for developing rapid diagnostics products for consumer markets. The results of the project have been presented in national and international events and seminars. The project was coordinated by the Oulu University of Applied Sciences (OAMK) with VTT and the University of Oulu participating.



The road to top-level expertise in health technology

Rapid diagnostics is a quickly growing industry nationally and internationally. This project has enhanced the operational capability of the Oulu area in developing mass producible rapid diagnostics products. An increasing amount of companies are aiming towards the rapid diagnostics market. Their opportunities to develop application ideas into working prototypes have been improved by this project.

The development of new health and welfare enhancing rapid diagnostics products is limited by the underdevelopment of materials used in printed technology, production methods and testing platforms. The goal of this project was to find solutions to problems in the rapid diagnostics production methods and processes.

The development work was aimed towards creating rapid diagnostics products with integrated sample handling and measurement functionalities. The goal was to develop

solutions, where the sample could be added directly to the testing platform without complicated preparation stages. Solutions for integrating sampling and sample handling functionalities to the measurement platform were also developed.

“Rapid diagnostics enables quicker decision-making by healthcare professionals, and also permits better monitoring in home care. By combining point-of-care testing in home environments with telemedicine solutions, better

results in healthcare can be achieved and the necessity of visits to health centres reduced,” Project Manager Marja Nissinen explains.

Achieving new solutions by combining forces

All participants provided the project with their own special expertise. OAMK offered expertise in production methods, electrochemical measurement and an advanced and versatile laboratory environment. The VTT brought special expertise in the production of mass producible rapid diagnostics products and test platforms containing liquid flow channels, and the development of rapid diagnostics products based on optical reading. The university provided special expertise in optical measurement devices and the flow measurement of microfluidics.

“Co-operation with VTT and the university was extremely fruitful and very well-functioning in practice. Everyone shared their personal expertise with the whole team and participated in solving problems. The team was effective in harnessing the special competences of each partner,” describes Nissinen.

The results provide a road map to the future

Four different solutions were created in the project. Three of them have integrated sample preparation functionalities: an electrochemical paper-based glucose sensor for blood and spit samples, an electrochemical biosensor for glucose measurement from spit samples, and a microfluidics channel for CRP-measurement from whole blood. Additionally, production methods, materials, components and integration solutions for platforms usable for DNA rapid diagnostics were studied.

The project achieved its goal of developing mass production methods by using the PrinToCent Pilot Factory facilities of the VTT and OAMK. Screen printing, flexography, lamination, hot pressing and biomaterial dispensation were used in the production processes. The development work resulted in new knowledge about device capabilities and production costs. The developed processes and know-how can be utilised in rapid diagnostics production in the future.

The laboratory equipment of the PrinLab development laboratory in OAMK was updated and the building of an R&D quality system was also started there.

“Combined with the strong profile of biosciences and engineering education in Oulu, the Oulu area offers the diagnostics industry an excellent environment for developing new health technology products and services,” Nissinen summarises.

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Project code: **A70245**

**Oulu University of Applied Sciences,
VTT Technical Research Centre of
Finland Ltd, University of Oulu**

1.1.2015–31.8.2018

Budget: **790 000 €**

ERDF funding from the Council of
Oulu Region: **553 000 €**



Objectives

The goals were to develop production methods and processes for the mass manufacturing of rapid diagnostics products; methods for quality testing and monitoring of mass manufacturing and rapid diagnostics platforms; and rapid diagnostics platforms with integrated mass producible components for sample preparation and analysis. An additional goal was to develop competences and an environment for the development of health and welfare applications for use by businesses in the area.

Results

The results of the project were three rapid diagnostics solutions with integrated sample handling and analysis; new solutions for mass producible DNA rapid diagnostics platforms; printing processes for rapid diagnostics production; knowledge about the materials, methods and costs of production; and methods of optical measurement for production quality monitoring and process development. Additionally, the capabilities of the OAMK's PrinLab laboratory were improved to service the development of rapid diagnostics.

Oulu Regional Council allocates funding for regional development from the ERDF

Oulu Regional Council is a Managing Authority for the Sustainable growth and jobs 2014–2020 – Finland's Structural Funds Programme in Northern Ostrobothnia.

European Regional Development Fund's (ERDF) main objectives are to improve the competitiveness of SMEs and produce and use the latest information and knowledge.

'Sustainable growth and jobs 2014–2020 – Finland's structural funds programme' has two priority axes and seven specific objectives for ERDF. Each project must deliver at least one of these specific objectives.

ERDF priority axes and specific objectives:

1. Competitiveness of SMEs
 - Generating new business
 - Improving transport and logistic connections that are important to SMEs (Eastern and Northern Finland)
 - Promoting growth and internationalisation of enterprises
 - Promoting energy efficiency in SMEs
2. Producing and using the latest information and knowledge
 - Development of the centres of research, expertise and innovation on the basis of regional strengths
 - Strengthening innovation in enterprises
 - Developing solutions based on renewable energy and energy-efficient solutions

More information on Structural Funds in Finland from the dedicated website www.rakennerahastot.fi



European Union
European Regional
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Leverage from
the EU
2014–2020

 **POHJOIS-POHJANMAA**
Council of Oulu Region