Synergien. NRW

Best Practice – Innovation Field "HEALTH"
Aachen Telemedicine Centre of University Hospital RWTH Aachen

ICU cockpit for optimal patient care

Since its foundation in 2012, Aachen Telemedicine Centre at University Hospital Aachen, part of RWTH Aachen University, has been one of Germany's leading digital health institutions for intensive care and infectiology. By bundling medical and technological expertise, the first university-based, interdisciplinary telemedicine centre Europe-wide is ideally placed for launching groundbreaking solutions in this cross-sectional field. The challenges of demographic change, for example, will lead to an ever-rising number of older and often chronically ill people requiring treatment in the future. At the same time, there is a need to provide medical care in structurally weak rural areas. Here, telemedicine is called on to find medical, technical, organisational, economical and legal solutions. In addition, patients' acceptance towards telemedicine needs to be improved. Aachen Telemedicine Centre is dedicated to these tasks. Professor Gernot Marx is head of the centre, which, for example, puts telemedicine projects into practice – ranging from telematics in intensive care to remote emergency care. The centre has also established itself as the platform for the digital healthcare network in North Rhine-Westphalia (NRW).

The use of regional NRW-ERDF funds (ERDF = European Regional Development Fund) as well as of national and European research and structural funding has facilitated synergies, advanced the emergence of new technologies and organisational forms and boosted the further development of telemedicine approaches. For example, innovative telemedicine concepts have opened up new fields of application, e.g. in the area of life-threatening infections (early detection of sepsis) and rolled them out via clinical application. The successful pilot project Telematics in Intensive Care Medicine (TIM) was financed from NRW-ERDF funds (Objective 2 Programme ICT-Gender-Medicine).

Building on this, with the ICU cockpit for intensive care units the EU projects THALEA I and II in the field of telemedicine have shown how innovative ideas can be transformed into new products in a short time in a needs-based approach. Both EU projects and the results of the subsequent application-related projects form the foundation for the next stages in the further roll-out of telemedicine, e.g. in the battle against the coronavirus, supported by big data applications and artificial intelligence in diagnostics and treatment. This requires a Europe-wide network in intensive care medicine for the next ten years. Since the COVID-19 pandemic, there is no question that telemedicine holds tremendous future potential. The further expansion of technical infrastructure and the corresponding research framework will have a positive influence on the presence of telemedicine in the healthcare system. The many awards the projects have reaped show that telemedicine in North Rhine-Westphalia is effective, efficient, extremely patient-oriented and leading Europe-wide.
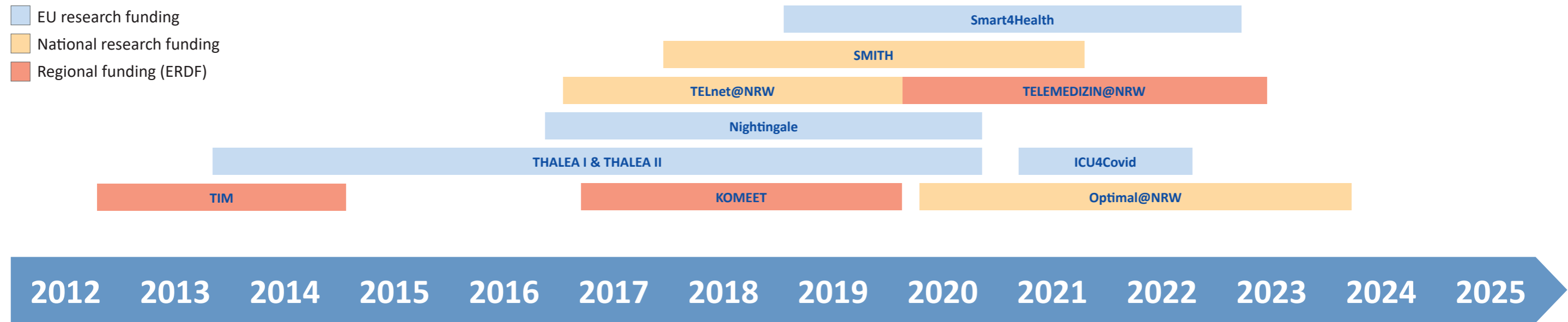

Presentation of EU project THALEA at the 2017 Digital Summit

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Research and innovation projects of Aachen Telemedicine Centre

Legend:
- EU research funding
- National research funding
- Regional funding (ERDF)

Timeline bars:
- Smart4Health (EU research funding)
- SMITH (National research funding)
- TELnet@NRW (National research funding)
- TELEMEDIZIN@NRW (Regional funding)
- Nightingale (EU research funding)
- THALEA I & THALEA II (EU research funding)
- ICU4Covid (EU research funding)
- TIM (Regional funding)
- KOMEET (Regional funding)
- Optimal@NRW (National research funding)

Timeline years: 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025

TIM (10/12 – 01/15)

Project content: Setting up a remote intensive care network for the detection and optimal treatment of severe, life-threatening infections.

Project objective: To establish an innovative telemedicine platform using the basic infrastructure of the electronic "case file" in order to roll out highly specialised university-based intensive care.

Patient benefit: Improved diagnostics and treatment through audiovisual visits by physicians in the ICU.

EUROPEAN UNION Investing in our Future European Regional Development Fund — ERDF.NRW Investment for Growth and Employment — Ministerium für Gesundheit, Emanzipation, Pflege und Alter des Landes Nordrhein-Westfalen — Ministerium für Wirtschaft, Energie, Industrie, Mittelstand und Handwerk des Landes Nordrhein-Westfalen

Funding = € 2 million

THALEA I & THALEA II (11/13 – 11/20)

Project content: Development and procurement of a manufacturer-independent interoperable cockpit for data extraction from existing source systems in ICUs.

Project objective: Use of the instruments Pre-Commercial Procurement (PCP) and Public Procurement of Innovative Solutions (PPI) for application of the THALEA solution in everyday operations in the ICU in order to establish an additional safety net for patients and save more patient lives.

Patient benefit: More lives are saved through the earlier detection and treatment of complications in intensive care patients.

Co-funded by the Seventh Framework Programme of the European Union — Co-funded by the Horizon 2020 programme of the European Union

Funding = € 5.5 million

Nightingale (11/16 – 10/20)

Project content: Development of a monitoring and communication system which connects patients and medical experts and warns of acute deterioration in good time.

Project objective: To commission the development of an innovative monitoring solution for inpatients and out-patients in the framework of a Pre-Commercial Procurement (PCP) project.

Patient benefit: Earlier treatment through earlier detection of deterioration in a patient's condition and, as a result, reduction of unplanned periods in the ICU and organ dysfunctions as well as enhanced quality of life through independent care.

Co-funded by the Horizon 2020 programme of the European Union

Funding = € 5 million

TELnet@NRW (02/17 – 01/20)

Project content: Networked collaboration in the field of telemedicine between 2 university hospitals, 17 clinics and 2 networks of physicians.

Project objective: Long-term establishment of a telemedicine network to structure and steer intersectoral care processes, using digital information and communication technologies.

Patient benefit: By making expert know-how available, patients can receive long-term, high-quality care close to home, even in structurally weak regions.

Gemeinsamer Bundesausschuss

Funding = € 20 million

KOMEET (03/17 – 02/20)

Project content: KOMEET delivers an innovative telemedicine solution for digital data capture by means of optical character recognition (OCR) and integrated workflow support. In connection with the "Case File+", KOMEET networks the care of critically ill patients across institutions and sectors.

Project objective: Development of an innovative solution for the continuous digital recording and interlinking of complex, patient-specific data from monitoring, treatment and care procedures.

Patient benefit: KOMEET increases patient safety, facilitates quality assurance and improves treatment results.

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Funding = € 0.9 million

SMITH (01/18 – 12/21)

Project content: Collaboration between 8 university hospitals, 6 data integration centres and 3 use cases (ASIC, HELP, PHEP), which are steered from Aachen, Jena and Leipzig.

Project objective: Collection of treatment-relevant data for the development of algorithms and use of artificial intelligence in the form of decision support systems.

Patient benefit: Long-term and individualised patient care using algorithms and artificial intelligence.

Federal Ministry of Education and Research — MEDIZIN INFORMATIK INITIATIVE

Funding = € 45 million

Smart4Health (01/19 – 03/23)

Project content: Development and testing of a Europe-wide, citizen-centric case file with 18 partners from science and industry and 8 citizen-oriented application cases for test purposes.

Project objective: Patients should have access to their health records Europe-wide and make them available to physicians in the framework of their treatment.

Patient benefit: Individual medical treatment anywhere in Europe. Therapy decisions can be made in a targeted way with the help of the health data available.

Co-funded by the Horizon 2020 programme of the European Union

Funding = € 20 million

TELEMEDIZIN@NRW (01/20 – 06/23)

Project content: Design of a platform with provision of an information and evidence portal, a modular consultation service and central technical services via telemedical resource sharing. Individual telemedicine solutions can be purchased from the service providers for everyday medical use.

Project objective: To set up an extensive, permanent, viable, counter-financed telemedicine network structure with digital medical applications.

Patient benefit: Sustainable organisation of local, quality-oriented patient care for citizens in North Rhine-Westphalia.

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Funding = € 4 million

Optimal@NRW (04/20 – 03/24)

Project content: New approach to care structures in emergency medical situations for care patients through an innovative early warning system in homes for the elderly, equipped with teleconsultation systems, cross-sectoral documentation in electronic patient records and a virtual digital reception desk.

Project objective: Measurable improvement of emergency medical care and avoidance of unnecessary hospitalisations of geriatric patients.

Patient benefit: Needs-based, interdisciplinary care and avoidance of unnecessary hospitalisations as well as earlier detection of health deterioration with the aid of an early warning system.

Gemeinsamer Bundesausschuss

Funding = € 15 million

Aachen Telemedicine Centre: Nine successful research, innovation and networking projects, of which three EU, three national and three regional projects with a total volume of approx. € 119 million.

The focus of Aachen Telemedicine Centre lies on the entire research and innovation process chain for telemedical products and services for high-quality patient care.

Prof. Gernot Marx, MD, FRCA, Head of the Department of Intensive Care Medicine, University Hospital RWTH Aachen

"Today's telemedicine bundles interdisciplinary expertise in cross-sectoral digital networks across the board and over long distances, disseminates knowledge and at the same time delivers the results of cutting-edge university research straight to the patients."

Professor Marx, you were in charge of TELnet@NRW, Germany's largest telemedicine project, and also play an active role on a large number of committees, for example as chairman of the German Society for Telemedicine. Is telemedicine the key to the digitalisation of medicine?

Digitalised processes have long been part of intensive care. We continuously record all the relevant data concerning a patient's condition. However, it's telemedicine that is now opening up completely new perspectives by networking and bundling medical expertise and cross-sectoral skills. This applies for diagnostics and for patient care, particularly when it's a matter of connecting smaller hospitals across the country with university medical centres. This is especially crucial in the area of intensive care and infectious disease because here the earliest possible diagnosis of any developing complications, such as ones caused by infections, and immediate therapeutic measures are the deciding factors for treatment quality and can be life-saving. "Co-action and Competent Treatment" was the motto at the launch of the TELnet@NRW project. Over 150,000 treated patients and the broad acceptance of all those involved show that telemedicine is the right way to even better medical care.

Telemedicine is now an established part of standard patient care. How long have you been working on these solutions?

We've been working specifically on these solutions since 2012, when we wanted to set up the first telemedicine centre in the framework of the TIM project with funding from the Federal State of North Rhine-Westphalia under the ERDF Objective 2 Programme. With TIM, we were able to establish the medical and technical foundations. Examples are the telemedical IT platform, digital medical records or adaptions to diagnostic and therapeutic approaches. We gathered important experience in a network that was still small, and the positive results encouraged us to continue. But existing shortcomings, e.g. in data evaluation, also manifested themselves.

To finance research, you use funding programmes ranging from regional to EU level. Which criteria do you apply when opting for the one or the other?

The question requires a differentiated answer. University Hospital and basic medical research are inseparably connected.

One of our main research interests is sepsis, that is, the infection situation and the consequences, which are particularly threatening for patients in intensive care. EU and national programmes are suitable for this. Research on telemedicine runs parallel and delivers solutions for transporting the results of our basic research as quickly as possible and with maximum outreach into everyday hospital life. This kind of implementation is strongly linked to the respective region, not just because of existing regulations. Here we use both EU and regional funding, which, as in the Telemedizin@NRW project, always demand a strong focus on translation into clinical practice and patient benefit.

What special significance does EU funding have for your clinic?

For Aachen Telemedicine Centre and University Hospital, cutting-edge medical research at EU level is the premier league in which we want and have to be present. The EU funding instruments "Pre-commercial Procurement" and "Public Procurement of Innovative Solutions" are suitable for creating a win-win situation for us as users and companies as developers. In THALEA I, a risky, customised concept was developed and then in THALEA II the product (ICU cockpit) with all medical and technical CE approvals was purchased. We now have an IT solution for telemedicine and the companies have innovative products for the European market.

Do you include synergy potential when choosing between programme worlds for funding?

From the very outset, we had the clear objective of a patient-centric type of intensive care, both in our clinic as well as in the surrounding region, and a vision already even before the first TIM project. This formed the basis for our research agenda, which we're putting into practice in the framework of research projects. Criteria such as EU or regional context, research or application focus and, of course, availability of funds are taken into account when selecting funding options. Synergies then occur automatically from projects that follow a holistic agenda. But individual initiatives, such as Aachen Telemedicine Centre set up by University Hospital RWTH Aachen, are also needed and part of a successful strategic approach. For example, we are directly putting into practice the new EU project "ICU4Covid", which started in 2021 and is aimed specifically at COVID-19 patients, within the new Innovation Center Digital Medicine (IZDM).

In the Synergien.NRW project, North Rhine-Westphalia's Ministry of Culture and Science wants to dovetail funding programmes much more closely. What do you expect from this?

We've been able to achieve synergies by using the positive results from our EU projects in projects funded by the regional government. For the future, we'd like to see thematically broad calls for proposals both in Horizon Europe as well as in research funding from the ERDF in North Rhine-Westphalia. Together with targeted information, we can then use both programme worlds even more effectively for patient-oriented telemedicine.

Status: January 2021