

Final Report



Access & Acceleration

German-Danish network for innovation
and cooperation in healthcare



Interreg
Deutschland - Danmark



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Imprint

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Project management
DSN Connecting Knowledge, Kiel
www.dsn-online.de
Kiel, March 2022

This final report presents a compilation of the key findings provided by the partners working in the following work packages:



Project management



Ideation process



Project communication & PR



Development process



German-Danish platform for
innovations in the health sector



Market access

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The Access & Acceleration project

The aim of the Access & Acceleration project is to provide an overview of the relevant players within the medical innovation sector in the German-Danish border region (*access*), and to signpost ways to speed up the cycle of medical innovation (*acceleration*). In the last three years, the Access & Acceleration project has examined both the fundamental barriers to market entry and the innovation process in the healthcare sector. The results were integrated into a digital platform where users from the clinical, academic and industrial sectors can find the skills to develop new ideas and create new products for the healthcare markets in Denmark and Germany. The partners participated in pilot projects, pursuing the innovation process from the ideation stage to testing and evaluation, right through to the prototype phase. All of the stages were also documented on the platform. The platform also contains examples of good cooperation between research institutions, hospitals and companies. A database linking regional stakeholders offers the opportunity for future cooperation and the further use of the platform even after the end of the project.

Project facts



March 2019 – March 2022



2.9 million Euros budget, thereof 1.7 million Euros funds



7 partner organisations from Denmark and Germany

Project aims

- ✓ strengthen cooperation between medical providers, companies and universities in the German-Danish region
- ✓ promoting the involvement of patients and healthcare professionals in the user-centred development of innovative services and technologies in the health sector
- ✓ increasing the innovative capacity of companies and supporting them in accessing cross-border markets

Project partners



Work package 3: German-Danish platform for innovations in the health sector

Introduction to the challenges addressed

Our medical sector faces constantly changing requirements, sharing and exchanging knowledge is increasingly important. Various areas of the healthcare industry, research and new technologies, and innovation management require specialist expertise. Companies are also particularly reliant on support to gain professional experts and innovation partners.

Cross-sectoral and cross-border networks represent an important success factor for innovation activities. Nowadays, stand-alone projects on health innovation are not working out, but a network is required. Therefore, under the umbrella of Access & Acceleration, such a network was built up and expanded to increase innovation capacities in the region.

Health innovation platform

In an intensive exchange process, project and network partners, under the leadership of the Mads Clausen Institute of the University of Southern Denmark (SDU), contributed to the newly established web-based healthcare platform (www.access-platform.eu). During three online workshops and individual stakeholder dialogues, the platform's setup and contributions other projects could give were discussed. These results form the basis of an online platform designed to make all this data available to as many players in the healthcare sector as possible.

The health innovation platform provides **expertise, background information and case studies** (<https://www.access-platform.eu/en/cases/>) for interdisciplinary and cross-sector collaboration throughout the innovation process. It is aimed at small and medium-sized enterprises, scientists in hospitals and public institutions, and business development institutions within the healthcare sector. The Access & Acceleration project wants to support them in realising ideas and promoting new products, whether in Germany or Scandinavia.

The platform aims to bundle access to **competencies and resources in the German-Danish border region**. This is not trivial, as introducing a medical device to the market requires a lot of experience. The platform, therefore, offers different entry points: *Idea, Development, Prototype* and *Roadmap to market*. It provides information about the differences in the healthcare system on the German and Danish sides and links and information on the regulation of medical devices. In all stages of development, funding plays an essential role; therefore, we also included funding information. Practical examples of cooperation across sectors round up the content.

A particular part of the platform is an **online database** that allows searching within specific fields for cooperation partners or support offers. The database is extended as information gets available, and it can be adapted to particular needs in the future. Products are not included unless they offer a specific service beneficial for others. Apart from the project consortium, 12 companies and institutions are listed in the database. A questionnaire link helps people to contribute their offer.

In establishing the platform and its contents, all project partners **contributed** with their experience (see table 1). In addition, further projects that are important for the network have been added to the database to keep links to essential results and as a reference for future projects within healthcare. Furthermore, companies and advisory board members provided valuable feedback at all stages (see appendix list 1 for details). The platform's contents were adjusted for ease of access (see also work package 6). For a detailed introduction to the platform, SDU provided two videos, one explaining why to use the platform and another one going into detail on how to access the presented information. Both are available on the platform's starting page.

| Work package | Partners | Contribution |
|---|---|--|
| WP3 | SDU Mads Clausen Institute | <p>Hosting and design of the platform</p> <p>Intro to platform podcast with <i>Ideachamp</i></p> <p>Finalising cases</p> <p>Contribution of cases for cooperation</p> <p>Funding</p> <p>Links and setup translations, implementation of the database</p> <p>Promotion of platform incl. leaflet for the platform</p> |
| WP4 | Kiel University, Institute for Innovation Research | <p>Topic 'Idea', contact Ideachamp, a new network partner</p> <p>Case on Idea collection</p> |
| WP5 | Stryker and SDU | <p>Product development, involvement of students</p> <p>Discussion about usefulness for companies</p> |
| WP5 | UKSH, Labor für Biomechanik und Biomechatronik | 'Prototype' section on the platform and identifying specific test facilities |
| WP6 | Centre for Innovative Medical Technology and UKSH and Mærsk McKinney Møller Institute | <p>Graphic and design of <i>Roadmap to market</i></p> <p>Identification of barriers and how to overcome them</p> <p>Case on <i>Alcohol Use Disorder</i> (Pilot 1)</p> <p>Funding in part</p> |
| Anna Maria Bloch Münster | Board member | 'User Feedback' section |
| Life Science Nord and Danish Life Science Cluster | Board member, partner | Contributions to matchmaking from their websites and overall discussion and promotion |

Table 1: Specific contributions from partners

| Project | Programme | Contribution |
|--------------|----------------------------|---|
| BFCC | Interreg Baltic Sea Region | 2 graphs on the differences between DE and DK |
| Bonebank | Interreg 5a | Case study and inspiring our comic film intro |
| Demantec | Interreg 5a | Go-to guide for elderly care in DE and DK |
| InnoCAN | Interreg 5a | Test centres were contacted and will be added to the platform as feedback is available Syddansk Sundhedsinnovation Test Center is included in the platform |
| NorDigHealth | Interreg 5a | New ways to run matchmaking |
| CellTom | Interreg 5a | Contribution to our portfolio for new imaging technologies |
| MMT | Interreg 5a | Combined events |
| HealthCat | Interreg 5a | Consultancy on use of platform by Leon Bodenhagen |

Table 2: Contributions from other projects

Student-industry collaboration

Students pose an important source for new ideas, and therefore, they were initially included in our project in the form of workshops. Due to the restrictions of Corona, we could not run the workshops as planned. Instead, we reached out to the students and suggested several projects for their active participation and cooperation. This led to successful developments and collaborations with industry partners.

Methods to initiate projects

We tried several methods to include the students:

1. Involvement of students in pilot projects with the company Stryker. This worked nicely, but the pandemic suddenly stopped the activity. Students were unsure if they could cross the DK-DE border until the end of their project. Therefore the interest in this collaboration form went down.
2. A successful source to include students in a project is the well-established concept of 'Experts in Teams' at SDU. A group of students works one term on a specific project chosen among different offers from their supervisors.

They cover all aspects of a commercial case from idea, product development, market access, and finally, a prototype. Three such projects involved together 30 students.

3. It takes longer to contact hospitals and introduce offers to them directly. We had several such meetings with hospitals in Southern Denmark that resulted in some exchange and will most likely result in projects and joint applications. Here the importance is building trust (compare list of activities).

Another successful collaboration approach was directly established between a clinician and a researcher due to a direct request for help. Here, SDU MCI could invest the researcher's time to look into the biomechanics relevant to breastfeeding (compare case <https://www.access-platform.eu/en/2021/09/17/a-university-and-a-specialist-private-practice-cooperate-to-address-long-existing-problem-in-nursing/>). The project will continue, and they are currently applying for further funding. Involvement of students in the future is possible.

An attempt for matchmaking to challenge clinicians' experience led to only two proposals. This was due to a heavy workload at the clinicians' side end of 2021-beginning of 2022. Therefore the matchmaking could not take place. However, the two challenges are elaborated with the Center for Artificial Intelligence (CAI-X), and the second one is under investigation at the MCI. We believe that such matchmaking also gives good opportunities to initiate new projects.

Challenges:

Vibeke Andersen, Sygehus Sønderjylland: Inflammatory bowel disease – clinical challenges, Personal medicine – Looking into the possibilities of AI

Else Marie Pinholt, Univ. Hospital of Southern Denmark, Esbjerg: Light microscopy to enhance information from 3 D SRuCT images – in contact with researcher Till Leißner.

The health innovation platform's sustainability concept

Introduction

The health innovation platform aims to increase the visibility of competencies, services and knowledge within life science, medical technology and healthcare in the Danish-German border region. It seeks to facilitate innovation and supports new partnerships and the initiation of joint projects across the border addressing companies (Medtech), knowledge institutions, medical staff, patients, associations, clusters and health insurances. The platform is available at: <https://www.access-plattform.eu>

The platform was developed under the Access & Acceleration project from 2019 to 2022. This document shall outline what long-term organisational, managerial and financial structures look like after the end of the Access & Acceleration project.

Organisation and management structure

| | |
|---|--|
| Main responsibility | Horst-Günter Rubahn, University of Southern Denmark |
| Platform administration | Katharina Rubahn, University of Southern Denmark |
| Consultancy on platform use, development and communication incl. networking and thematic dialogue | Supporters (Letter of Intent), future project consortia |
| Input provision | University of Southern Denmark, project consortia of running and future projects |

To ensure a frequent dialogue, University of Southern Denmark plans to involve the supporters and, if required, additional stakeholders to meet once a year at least. These meetings shall take place under the network umbrellas of new projects, if possible, to ensure broadening their involvement in the platform.

The University of Southern Denmark plans to make the health innovation platform an essential element in future health innovation related projects, e.g., future Interreg 6A Deutschland-Danmark projects. In addition, the platform shall be used to support the cross-border master studies on 'medical microtechnology' offered jointly by Technische Hochschule Lübeck, University of Lübeck and University of Southern Denmark, which at present is an Interreg funded project but is run as a permanent cross-border study programme on the long-term.

The platform as a service

The platform shall be continued after the runtime of the Access & Acceleration project. Activities in this regard comprise of the following ones:

| Activity | Responsibility | Frequency |
|---|--|--|
| Update of platform contents | SDU | At least once a year |
| Update of database entries | SDU | At least once a year |
| Matchmaking activities (in an online or physical event format) | SDU, all supporting organisations | Depending on resources; ideally under the umbrella of new projects |
| Short introductions of the platform in upcoming healthcare projects | SDU, all supporting organisations | Depending on resources; ideally under the umbrella of new projects |
| Short introductions of the platform in meetings of clusters and consulting agencies during their regular events | SDU, all supporting organisations | Depending on resources; ideally under the umbrella of new projects |
| Provision of input for updating the platform | All supporting organisations, running and future project consortia | When applicable |

Finances and funding

Keeping the platform in its setup of March 2022 and ensuring regular updates, is financed by University of Southern Denmark.

Further developments, e.g., to include additional functionalities, improve usability, address new target groups, shall be funded by future health innovation related projects within the programme region if needs become apparent. For the time being, revenues are not expected.

Supporters

A number of organisations within the cross-border region aim to support the University of Southern Denmark in sustaining the platform and its ambition through, e.g.

- actively taking part in selected meetings, thematic workshops, surveys and events to exchange recent developments on medical technology and arising requirements,
- providing input for updating the platform's content,
- communicating the platform within our network where applicable,
- paving the way for new contacts to be displayed in the database,
- supporting the discussions amongst network partners.

Conclusion and perspective

After the three-year project Access & Acceleration, the project partners have successfully implemented a platform for those seeking help bringing a medical device to the German or Danish market or developing a medical idea. The platform bridges a gap between various available information on both sides of the border. In three languages, it makes this and additional information available to a broad audience in the region, facilitating collaboration and market access within healthcare.

A database allows for direct search of experts within the region and can connect the various stakeholders. It will benefit from more entries of service providers in the future. The platform is mentioned on the web pages of Life Science Nord, Syddansk Sundhedinnovation and Danish Life Science Cluster, and SDU continues to promote it.

A model for a sustainable continuation of the platform resulted in expressions for support by several organisations in health innovation. Our newly established connections are part of them.

A platform like it is presented is not possible without the contributions from other healthcare projects and stakeholders on both sides of the border. We keep a list of healthcare projects with descriptions and links in our database for future reference.

Several methods were used to include students in innovative projects and follow them. The methods that could be connected to their curriculum worked best and gave valuable results in collaboration with industry partners. Some companies continue with the ideas or prototypes.

Results in a nutshell

- 1 cross-border innovation platform (<http://www.access-platform.eu>)
- 1 cross-border database for health innovation related services (<https://www.access-platform.eu/en/search-filter/>)
- More than 30 consultancies for the innovation platform (see [appendix list 1](#))
- 6 events on health innovation, Corona limited more events (compare [appendix list 2](#))
- 8 projects involved in the platform concept and content, another couple of projects contributed to events (compare [appendix list 2](#))
- 3 concepts for student-industry collaboration tested
- 7 cases as input to the platform (<https://www.access-platform.eu/en/cases>)
- Portfolio of imaging capabilities for promotion
- Promotion of platform and *Roadmap to market* on 5 events and 20 posts on LinkedIn (compare [appendix list 3](#))

Publications list

Platform related publications

- Health innovation platform, available at <https://www.access-platform.eu>
- Communication concept for platform marketing
- Platform video, available in English (we generate subtitles)
- Platform flyer and contribution to brochure
- 6 case studies plus one on idea campaign coming
- Podcast on ideation
- Video on Pilot 2 *Alcohol Use Disorder* (AUD) for case study

Student-industry-collaboration related publications

Nanoclay Reinforced Biomaterials for Mending Musculoskeletal Tissue Disorder, Itsasne Erezuma, Tatiane Eufrazio-da-Silva, Nasim Golafshan, Kaivalya Deo, Yogendra Kumar Mishra, Miguel Castilho, Akhilesh K. Gaharwar, Sander Leeuwenburgh, Alireza Dolatshahi-Pirouz, Gorka Orive, *Advanced Healthcare Materials*. 2021 <https://doi.org/10.1002/adhm.202100217>

Revisiting the optical dispersion of aluminium-doped zinc oxide: New perspectives for plasmonics and metamaterials, *Advanced Photonics Research*, Alireza Shabani*, Mehdi Khazaei Nezhad, Neda Rahmani, Yogendra Kumar Mishra, Biplab Sanyal and Jost Adam, *Advanced Photonics Research*. <https://doi.org/10.1002/adpr.202000086>

Functionalized Surfaces as a Tool for Virus Sensing: A Demonstration of Human mastadenovirus Detection in Environmental Water, Juliana Schons Gularte, Roana de Oliveira Hansen, Meriane Demoliner, Jacek Fiutowski, Ana Karolina Antunes Eisen, Fagner Henrique Heldt, Paula Rodrigues de Almeida, Daniela Müller de Quevedo, Horst-Günter Rubahn and Fernando Rosado Spilki, *Chemosensors* 2021, 9(2), 19; <https://doi.org/10.3390/chemosensors9020019>

Surface Modification Enabling Reproducible Cantilever, Functionalisation for Industrial Gas Sensors, Daniel Mamou, Lawrence Nsubuga, Tatiana Lisboa Marcondes, Simon Overgaard Høegh, Jeanette Hvam, Florian Niekietel, Fabian Lofink, Horst-Günter Rubahn and Roana de Oliveira Hansen, *Sensors* 2021, 21, 6041. <https://doi.org/10.3390/s21186041>

Bio-acceptable 0D and 1D ZnO nanostructures for cancer diagnostics and treatment, Brandon Ortiz-Casas, Andrés Galdámez-Martínez, Jorge Gutiérrez-Flores, Andrés Baca Ibañez, Pritam Kumar Panda, Guillermo Santana, Horacio Astudillode la Vega, Mrutyunjay Suar, Citlaly Gutiérrez Rodelo, Ajeet Kaushik, Yogendra Kumar Mishra, Ateet Dutt, *Materials Today* (2021). <https://doi.org/10.1016/j.mattod.2021.07.025>

Sheetal Kaushik Bhardwaj, Mubarak Mujawar, Yogenda Kumar Mishra, Nicoleta Hickman, Murthy Chavali and Ajeet Kaushik. "Bio-inspired graphene-based nano-systems for biomedical applications". In: Nanotechnology (2021), p. 32 502001. doi: <https://doi.org/10.1088/1361-6528/ac1bdb>

Anjali Khunger, Navneet Kaur, Yogenda Kumar Mishra, Ganga Ram Chaudhary and Ajeet Kaushik. "Perspective and prospects of 2D MXenes for smart biosensing". In: Materials Letter (2021), p. 130656. doi: <https://doi.org/10.1016/j.matlet.2021.130656>

Monika Nehra, U.T. Uthappa, Virendra Kumar, Rajesh Kumar, Chandra Dixit, Neeraj Dilbaghi, Yogendra Kumar Mishra, Sandeep Kumar and Ajeet Kaushik. "Nanobiotechnology-assisted therapies to manage brain cancer in personalised manner". In: Journal of Controlled Release. doi:<https://doi.org/10.1016/j.jconrel.2021.08.027>

Zirconium Nitride: Optical Properties of an Emerging Intermetallic for Plasmonic Applications, Alireza Shabani, Matiyas Tsegay Korsaa, Søren Petersen, Mehdi Khazaei Nezhad, Yogendra Kumar Mishra, Jost Adam. <https://doi.org/10.1002/adpr.202100130>

Surface plasmons in silicon nanowires, Giovanni Borgh, Corrado Bongiorno, Antonino La Magna, Giovanni Mannino, Salvatore Patanè, Jost Adam, Rosaria Anna Puglisi. <https://doi.org/10.1002/adpr.202100130>

Student thesis/projects

Lab-on-a-chip interface for portable microfluidics-based water quality sensors. Master Thesis 2020, Pulkit Saluja, Supervision: Roana de Oliveira Hansen.

Hardware optimisation for meat freshness cadaverine sensors, Master thesis 2020, Josep Maria Carmona Domingo, Supervision: Roana de Oliveira Hansen, Jost Adam. Company involved: AmiNIC.

Pierlou Ramade: X-Ray classification and segmentation using machine learning in Stryker's ADAPT project, 2020, Supervision: Jost Adam and Alireza Shabani from SDU and from Stryker Bernd Simon, Lars Metz, and Andreas Petersik.

Henry John Lewis: Simulation of Autoclave Processes for Medical Device Sterilization, 2020, Supervision: Jost Adam and Alireza Shabani from SDU and from Stryker Bernd Simon, Lars Metz, and Andreas Petersik.

'Anti-collision system for LINAK HOMELINE' Experts in Teams 2021, Ioannis Andromidas, Maram Daood, Anina Hasse, Maria Lunau, Dennis Riess, Erik Winkler, Esben Sørensen, Horia-George Iotu, Magnus Christesen, Mohammed Mohammed, Nicklas Lyck & Pablo Paniagua, Supervision: Roana de Oliveira Hansen and David Grube Hansen, Company: LINAK.

'Breathalyzer' Experts in Teams 2022, Arthur Blaser, Arune Lapinskaite, Boris Kacer, Cadence Anderse, Carlos Moyá Gual, Lucas Weber, Oskar Skoczylas, Richard Jenis, Tobias Schult. Supervision: Roana de Oliveira Hansen, Company: AmiNIC.

'Sortena' Experts in Teams 2022, Abdallah Abdel Qader, Alberto Miro, Christina Joy Moses, Judith Andrea Kröll, Paul-Ioan Maghiari, Povilas Janusauskas, Rolandas Kraujelis, Ronan Machado Sharva Yatin Neman. Supervision: Roana de Oliveira Hansen, Company: Abena.

Ali Ebrahimi: Predictive Models to Identify Patients with Alcohol Use Disorder; PhD thesis 2021, Pilot 2, Ali Ebrahimi on alcohol use disorder (WP5.2).

Appendix

List 1: Involvement of stakeholders in the innovation platform

Reported were 6 involvements of the project advisory board (PAB) until end 2020 / also contacts to lead partners of other projects count, as we want to profit from them. From the list below, a minimum of another 30 consultancies of board members or leaders of other projects can be counted.

Consulting for the platform via Zoom and phone:

- 12.11.2020: Karen Maria Elsted Hansen, SDU Public Health: Making our platform useful
- 12.11.2020: Jana Vogelsberger, NOSCO: Ideation on the platform, include NOSCO?
- 15.02.2021: Niels Jørgen Langkilde – Patientforeningen: Hvad could be of interest for patients?
- 18.02.2021: Mette Thiel, Welfare Tech: Userfriendly design of the platform
- 18.03.2021: Anna Eckers, Mette Thiel, Thomas Huynh: What companies should be addressed for feedback on the platform?
- 26.08.2021: Svenja Jaffari: Introduction and content of the platform
- 22.09.2021: WHINN conference: Matchmaking profile and distribution of a flyer
- 23.09.2021: Access web seminar 2 (10 projects + 2 PAB members)
- 27.09.2021: Else -Marie Bladbjerg: Introduction and discussion of content on the platform
- 22.11.2021: Matchmaking in healthcare: How to approach clinicians, online meeting (Frederike Fahse, Till Leißner, Ditte Louise Hartvig, Søren Stig Tvilsted – NorDigHealth project)

Consulting for brochure:

- 1 board member Anna-Marie Bloch Münster, represented by 'quote'
- 15.03.2022: Svenja Jaffari and Krista Blaabjerg participate in evaluation meeting (PAB members)
- An idea campaign ran within WP4 involved 3500 physiotherapists in Germany, 8 projects were evaluated, 2 ideas are carried on.

In 2020, we provided consultancy and idea generation via dialogue to the following companies:

- AmiNIC ApS: Idea about electronic nose for detection of infectious diseases
- Abena Holdings A/S: Idea about advanced facemasks with improved viral protection and sensing

- Region of Southern Denmark: Development of sensors for water quality monitoring
- WaterCare Guard: Common project about the development of online water quality monitoring systems
- Aarhus University hospital: Idea about a nanotechnology-based method for coronary artery disease assessment via plaque identification and immune system modulation
- JW-Teknik: Detection of Geosmin in water pipes
- Danish Clean Water: Collaboration on potential sensors for pathogen detection in farms
- LandBoSYD: Collaboration on potential sensors for pathogen detection in farms

In 2021, we provided consultancy and idea generation via dialogue to the following companies:

- CPH Nano: Application of UV-vis spectrometry into water quality
- Hartmann Packing: Sensing technologies for packaging characterisation
- Lachenmeier Monsun: Digitalisation of the products by integrating sensors to measure failures and predict maintenance needs.
- LINAK: Anti-clamping devices for elevation beds
- Mærsk Container Industry: Ethylene sensors in a container for fruit freshness
- Bitzer: CO2 and O2 sensors
- Agramkow: Predictive maintenance

List 2: Events that involve other projects and stakeholders

9.12.2020: Symposium Nano Meets Medicine organised by ninA SH, Till Leißner presents Access and Acceleration

20.01.2021: Meeting between MCI and Hospital of South West Jutland in Esbjerg, participants: 8 Esbjerg, 7 MCI

14.06.2021: Webseminar – Open Innovation in Healthcare, participants: 31, 2 board members + 2 other projects (Anna Eckers, Jonas Drefeld, Keld Hundewadt, Till Leißner)

23.09.2021: Webseminar: Health innovation in the cross-border region

Participants: 31, 2 board members (Svenja Jaffari, Leon Bodenhagen + 10 other projects)

7.12.2021: Innovation perspectives – Sygehus Sønderjylland (SHS) and SDU Sønderborg Representatives from “Lærings og Forskningshuset” at SHS visited SDU to learn about our work within innovation. The intention is to engage in more future collaboration on innovation across research projects, student projects and services, participants: SHS 6, SDU 5+3 students, from Access & Acceleration: Till Leißner, Katharina Rubahn, Frederik Gottlieb, Roana Melina de Oliveira Hansen

10.02.22 Final Conference Access & Acceleration, participants: 38, 3 board members + several other projects

30.03.22 Collaboration visit at the Hospital of Southern Jutland in Aabenraa, participants from Access & Acceleration: Frederik Gottlieb, Katharina Rubahn, Till Leißner, Horst-Günter Rubahn

List 3: Promotion of the platform for innovation

Apart from promotion material, the platform was introduced to stakeholders at several events:

23.09.2021: Web seminar: Health innovation in the cross-border region, participants: 31

22. - 23.09.2021: WHINN conference, Odense, participation, flyers to people and profile in matchmaking for our platform

25.12.2021: Intro to platform on BioMedTec Ideas, online (IHK Lübeck)

7.12.2021: SDU Sønderborg, Meeting Sygehus Aabenraa

10.02.2022: Final conference Access & Acceleration

08.03.2022: Arbeitskreis Innovation, Life Science Nord (online), participants: 12

30.03.2022: Collaboration visit at the Hospital of Southern Jutland in Aabenraa

List 4: Innovation concepts with companies/hospitals

13 innovation concepts with companies/hospitals were performed:

WP 3:

- Anti-collision system for LINAK HOMELINE with LINAK
- Breathalyzer together with AmiNIC
- Gas Sensor together with Abena
- Collaboration with Horsens clinic
- Microfluidic device (Gut-on-a-Chip) that models microbiological processes in human intestine with Odense University Hospital
- Collaboration with Hospital Esbjerg, Else Pinholdt

WP 4

- Method of the idea campaign
- 2 Case studies to innovation potentials

WP 5:

- Predictive model for AUD, OUH
- Stryker Gamma Nail
- Stryker Adapt

WP 6:

- Roadmap to market

List 5: Innovation ideas

WP 3

- 1 innovation platform
- 15 idea generation dialogue with companies (see p. 13 f)
- 13 ideas in innovation concepts (compare List 4)
- 3 methods for student-industry projects

WP 4

- 8 initiatives (report WP4)
- 10 ideas from the idea campaign

Contact

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Work package 4: Ideation process

Introduction to the challenges addressed

Both German and Danish healthcare sectors are confronted with challenges such as the demographic change, shifting treatment requirements and rising costs. To meet these challenges and develop new innovative ideas, technologies and products in the healthcare sector, the continuous exchange between companies, hospitals and research institutions is of great importance. With its interdisciplinary approach, the Access & Acceleration project aims to establish a cross-border platform that will enable key players in the health sector to connect and cooperate with each other to initiate innovative processes. To effectively utilise the potential of the two different healthcare systems and to support projects that are already further advanced, the project partners consider the different stages of the innovation process:



Figure 1: Project goals in the different stages of the innovation process

The *Chair of Technology Management at Kiel University* (CAU Kiel), Germany, focused on the ideation stage. In this regard, the CAU Kiel aimed, as lead for the project work package 4, on the following specific goals:

- 1) Application and development of an empirically validated approach and management system for collaborative idea generation for innovative products, processes, and services in the health sector. The purpose of this was to strengthen the competitiveness of regional technology companies and the integration of health service providers in the innovation process
- 2) Accelerating the uptake of innovation potentials and cross-sectoral cooperation between medical services providers, companies and universities by supporting innovation teams to accelerate the innovation processes and innovation activities in the programme region through various research and project activities as for instance:

- The identification and evaluation of future market and technology trends (strategic foresight) in order to support regional companies and health professionals/hospitals in the strategic management planning
- Identification and match of needs of health professionals and hospitals to emerging health trends and regional conditions and competencies
- Identification and evaluation of driver and barriers in the acceptance and implementation of promising health technologies that possess the potential to achieve permanent improvements in the quality of treatment.
- Identification of complementary competencies within and outside of the programme region and the consideration of the global market situation as a basis for future local R&D collaborations and research projects

Empirically validated ideation process: Innovation Physio – A digital idea campaign with German physiotherapists

Background

Innovations in ambulatory cross-sectoral patient care are gaining relevance. Coordination problems and a lack of patient adherence lead to efficiency and quality deficits. This downtrend is exacerbated by an increasing number of older people as well as by the significantly growing number of chronically diseased and multimorbid patients (Goodwin et al., 2017). In particular, the ambulatory care of multimorbid patients of advanced age (e.g., with osteoporosis) or patients with complex multiple traumas is very challenging (Marsh et al., 2011). To achieve sustainable innovations in the ambulatory care that meet the actual requirements, it is not only necessary to involve medical doctors, but also secondary healthcare providers as physiotherapists in the innovation process. Today, often only physicians are included as possible innovators and in addition, there is no systematic approach to integrate all relevant stakeholders into the ideation process. Many classic approaches and models are not applicable due to the particularities of the health sector.

The CAU Kiel focused their study and digital idea campaign on the German ambulatory care, which is recognised for their mainly independent organised and autonomous health practices (Busse et al., 2014). More concretely, the CAU Kiel focused on the integration of ambulatory physiotherapists as further relevant innovators apart from ambulatory physicians. To create sustainable healthcare innovations that meet actual requirements, doctors and other relevant healthcare providers need to be involved in the innovation process. In an ideation drive across Germany, the CAU Kiel examined how the systematic involvement of physiotherapists in the ideation process helps to increase acceptance and willingness to innovate.



Aim and activities

The objective of this research project was to apply and empirically validate an approach for strengthening the integration of physiotherapists as innovators in the collaborative ideation process in the ambulatory care of postoperative patients in Germany. The CAU Kiel conceived an idea campaign with a web-based ideation platform for this purpose. The content of the initiative was designed in collaboration with the *Deutsches Institut für Therapieforchung (DIT, German Institute for Therapy Research)* and the Kiel-based company *Buchner & Partner (B&P)*. In this context, the following research question has been examined:

- Under what conditions are physiotherapists able and motivated to determine concrete problem areas and to collaboratively develop ideas for new health solutions?

To reach the purposed research objective, the project partners conceived in cooperation with B&P and DIT a four-stage project plan:

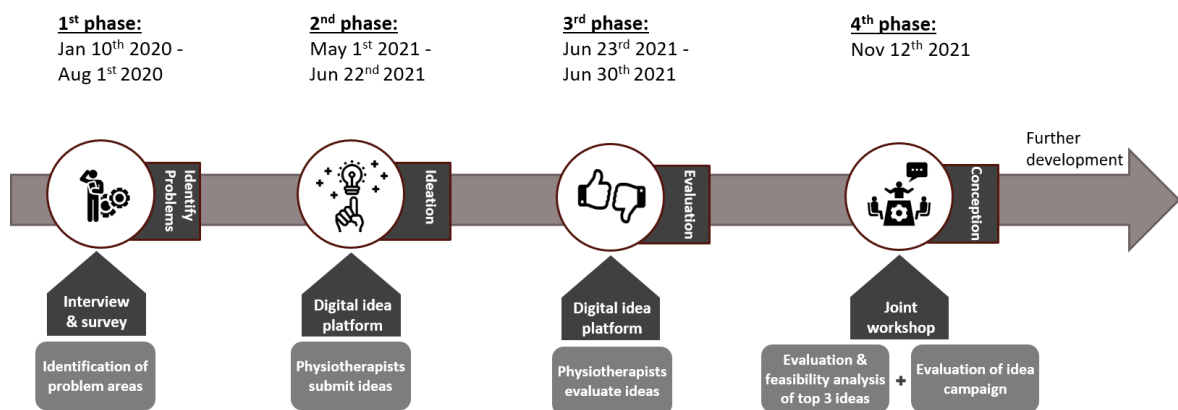


Figure 2: Project phases of the digital idea campaign in Germany conceived by B&P, DIT and the CAU Kiel

First phase

In total, the CAU Kiel conducted qualitative interviews with 20 physiotherapists. Subsequent, an online survey was created to complement and further validate the interview findings and distributed throughout Germany. With both measures of this explorative research method the project partners were aiming on the determination of:

- 1) potential barriers that hinder the integration of physiotherapists in the ideation process,
- 2) potential effects of the integration of secondary health service providers as physiotherapists in the ideation process and adoption of user-driven innovations,

3) existing challenges in daily treatment of postoperative patients in Germany

The interviews and web survey and the following idea campaign were promoted by *B&P* with newsletters and two articles in the professional magazine *UP – Unternehmen Praxis*. In total, 4.320 German physiotherapists were contacted using the *B&P* and *DIT* networks.

Second phase

The digital idea campaign addressed the following problem areas explored in the first phase:

- The planning and quality assurance of physiotherapeutic treatment,
- Lacking activation of patients through education, participation and co-decision-making,
- Lacking integration of physiotherapists in the holistic health value chain with insufficient intersectoral cooperation with further health service providers

All registered physiotherapists were asked to submit ideas based on the beforehand explored problems areas in the daily treatment of a postoperative patients. Despite of the above-mentioned research question, the purpose of the campaign was to collect innovative ideas in a larger scale as prospective solutions to improve in long-term the treatment quality of postoperative patients. For the idea collection, the CAU Kiel developed a digital ideation platform based on a professional platform toolbox provided by the Danish company *Nosco*. All participants were also able to comment, discuss and like submitted ideas of their colleagues on the idea platform (only accessible by previous registration). In order to make the idea submission process as easy as possible, the CAU Kiel created a customised standard form with different key questions about the idea.

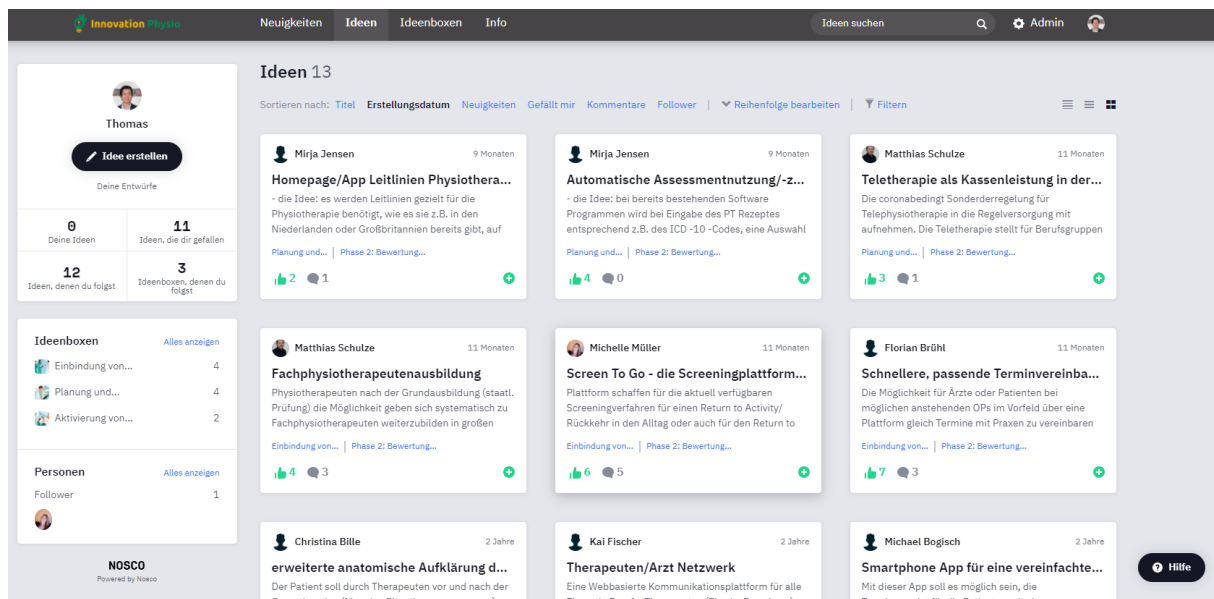


Figure 3: Idea platform for the idea submission and evaluation

Third phase

The participants then condensed the ideas they had collected. On the platform, participants had the opportunity to evaluate each idea based on the following four criteria:

- 1) Innovativeness: How novel and innovative is the idea? Do you already know this solution?
- 2) Feasibility: How can the idea be realised in your opinion? What challenges to you see?
- 3) Benefit for patients: How high do you assess the potential of the idea to improve the quality of treatment for patients in the long term?
- 4) Benefit for the physiotherapists: Does the idea simplify or improve existing processes, relieve the daily workload, and thus save valuable time?

Subsequent, a jury of experts in the field of the physiotherapy and health innovations from B&P, DIT and from the CAU Kiel evaluated the ideas as well. In this manner, all submitted ideas were evaluated and the best 10 were elected.

Fourth phase

The participants validated and analysed the feasibility of the top three ideas in an online workshop. As an incentive, the participants who created the top three ideas were given

the opportunity to further develop the concepts for their ideas, either as part of study projects or as part of another workshop with B&P and the CAU Kiel. The data from the participant surveys and their activities are available on the digital *Access & Acceleration* platform and provide a useful basis for the future integration of ideas into the innovation process. The online workshop was as well applied by the CAU Kiel for the validation of the integration of physiotherapists in scope of an idea campaign supported by a web-based idea platform.

Results

In the conducted idea campaign, a total of 80 registered German physiotherapists submitted, commented and evaluated ideas on the idea platform. After the duplication check, in total 13 usable ideas were submitted during the campaign on the idea platform. Apart from an internal jury (experts from B&P, CAU Kiel and DIT), 22 registered physiotherapists also evaluated the submitted ideas in the third phase of the campaign. Based on this, the project partners selected the top 10 ideas. And finally, five physiotherapists and three graduated physiotherapists with lecturer role at a university or research institution attended the online workshop for the deep discussion, feasibility analysis and further conception of the top three ideas.

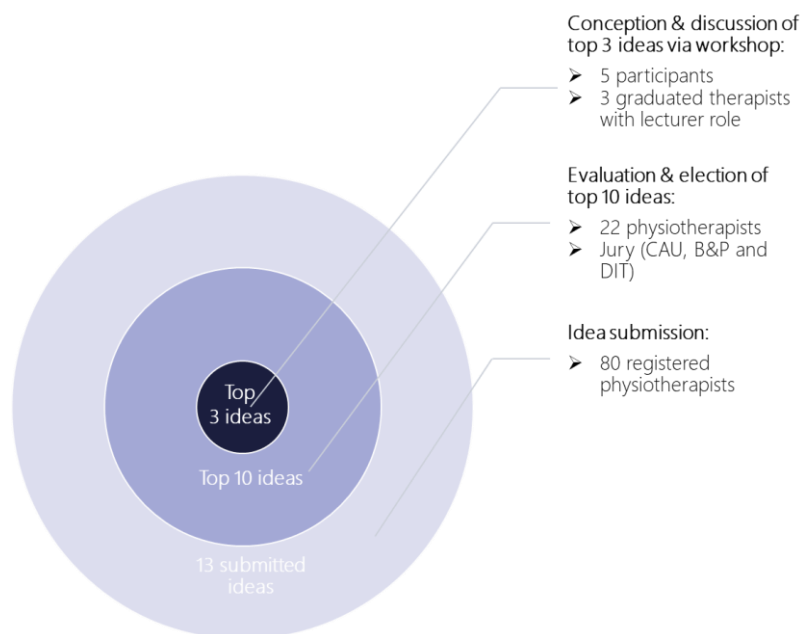


Figure 4: Output overview of the digital idea campaign with German physiotherapists

The scientific evaluation of the conducted research in the first phase and the workshop in the final phase of the idea campaign resulted in the following key findings, which are recommended to be investigated in further research:

- **Motivation of the integration in the innovation process:** A latent urge exists on the side of German physiotherapists to be involved in the ideation and thus,

development process of novel tools, products, services and technologies in the ambulatory care. But for the motivation of physiotherapists to participate in innovation projects as the conducted digital idea campaign, intrinsic and extrinsic incentives are both essential. The involved physiotherapists all underlined the strenuous working conditions of physiotherapists that restrict the possibility and motivation to deal with digital health innovations and to be part of the development process. In this regard, the research findings highlight the key role of intrinsic motivation to take over tasks beyond their formal responsibilities, especially in absence of extrinsic drivers such as high monetary payoffs.

- **Perceived relevance of the integration in the innovation process:** In the perception of German physiotherapists, the lacking system integration of secondary health service providers as physiotherapists and the insufficient intersectoral collaboration with particularly physicians affect both the development of digital health innovations and daily business of patient treatment. On one hand, the overall missing system integration of physiotherapists and the lacking collaboration between the different involved health disciplines were described as main barrier in the German ambulatory care that negatively affect the patient treatment, as the correct treatment planning relies on the knowledge and expertise of all involved professions. On the other hand, most of the asked physiotherapists underlined the missing integration of physiotherapists in the innovation development process as an important prerequisite for the emergence of new promising innovations in the ambulatory care. The rising complexity of the health system and particularly patients' needs make an efficient knowledge transfer between related health disciplines in the innovation process necessary to improve the full spectrum of care.
- **The personal innovation behaviour and academic education background of physiotherapists significantly affects the intention to participate in innovation projects:** All participants of the workshop consistently agreed that an idea campaign with an integrated idea platform was a promising and appropriate approach to encourage physiotherapists to participate in the ideation process. Thus, the underlying problem is not the selection of the approach itself, but rather the lacking awareness of the relevance of the topic "innovation" on the part of German physiotherapists. In this context, the workshop participants emphasised the relevance of
 - the revaluation and standardisation of the physiotherapy education throughout Germany, and
 - an early confrontation and sensibilisation with long-term oriented strategies such as the pro-active engagement with novel tools or the

standardisation of quality assurance measures as well as the sensitisation of the use of evidence-based therapies.

In this regard, the workshop participants highly recommended to conduct further innovation projects such as idea campaigns in educational institutions and centres for physiotherapist students.

Publications

Huynh, T. A case study of digital idea campaign with German physiotherapists - *scientific article (in progress)*.

Accelerating innovation activities in the ideation and development process by integrating healthcare professionals

The objectives of this part of work package 4 were to improve the idea generation and acceleration of innovation activities in companies and organisations in the programme region through the intensive analyses of user requirements and market trends (as systematic technology forecasting). In order to achieve these overall goals, the CAU Kiel was collaborating with several companies in the programme region in scope of eight different project initiatives. The objective within these project initiatives is to support companies in their innovation activities – particularly the ones with the most promising innovation potentials – through scientific investigation, while taking into account the needs and requirements of relevant stakeholders in the healthcare sector.

The following initiatives were carried out within the work package 4:

- **Initiative 1:** Identification of existing user needs and challenges in the German ambulatory care from the perspective of physiotherapists
- **Initiative 2:** Investigation of effects of interprofessional boundaries between ambulatory physicians and physiotherapists in adoption of user-driven health innovations
- **Initiative 3:** An empirical analysis of German hospitals' medical technology innovation behaviour
- **Initiative 4:** A digital idea campaign at the UKSH Kiel
- **Initiative 5:** Cochlear implants digital aftercare
- **Initiative 6:** “The New Normal” – A survey research about potential effects of COVID-19 on the shift and emergence of new healthcare trends
- **Initiative 7:** Online workshop with integrated survey about potential effects of CoVID-19 on the German healthcare system
- **Initiative 8:** Accompaniment and support during the project application process
BlueHealthTech

A more detailed description of the eight project initiatives can be found at the Access & Acceleration project website: <https://accessinnovation.eu/ideation-stage.html>

Case studies on innovation potential

The concrete objective was to examine, evaluate and thus to foster the development of two innovation potentials that have the potential to improve the patient situation in the programme region. In this regard, the CAU Kiel conducted two deep scientific studies of two different promising technology-related health innovations. They are presented as case studies in the following.

First case study: Individual barriers to use of digital information systems in ambulatory care from the perspective of physiotherapists

Background

In 2018, the Bertelsmann Stiftung's study *SmartHealthSystems - Digitization Strategies in International Comparison* measure the degree of digitisation of the healthcare system of selected EU and OECD countries. According to the results, Germany is on the second-to-last place, while even economically weaker countries such as Denmark and Estonia have the highest level of digitisation in healthcare (Thiel et al, 2018). According to further recent studies, the reasons are diverse, such as the high number of different stakeholders and the low appreciation for digitisation were stated by several surveyed healthcare institutions in Germany (Baierlein, 2016). Telemedicine, eHealth (electronic health) and mHealth (mobile health) are recognised as important digitisation drivers in the German healthcare system. The German Federal Ministry of Health defines these modern information and communication technologies as relevant applications that can provide decisive support in the care and support of patient treatment in the future (Zimmermann, 2021). This goes hand in hand with the findings from conducted interviews with German physiotherapists during the idea campaign (see chapter 1). For example, one interviewed physiotherapist stated:

Digital applications or comparable novel digital health technologies will be the future, also for the German care and thus, also for us therapists. But colleagues are not dealing with this topic [...] either the practices have simply no time and resources to deal with the implementation of new tools or the [digitisation] topic is still for many not tangible yet.

Aim and activities

The objective of this research was to develop an empirical validated better understanding about individual drivers and barriers affecting the acceptance and thus, physiotherapists' adoption and use of digital health innovations. The research team was supported by a master student that conducted further interviews (personal and via phone) with German physiotherapists.

Based on a previous literature analysis, a semi-structured interview guideline was created to examine potential barriers in the personal acceptance and use of digital health innovation in form of new health information systems.

Results

The research findings show that the interviewed physiotherapist's use and acceptance of digital information systems are meaningfully affected by the following individual characteristics:

- **Perceived system security risks:** The risk barrier arises when the user (here the physiotherapists) cannot assess the risks and uncertainties associated with the new technology e.g. by unauthorised third-party access of users' or patients private information (based on Wunderlich et al., 2015).
- **Perceived system complexity:** The system complexity is the degree to which a digital health information system is perceived by the user as relatively difficult to understand and use (based on Rogers, 2003).
- **Need of human interaction:** This personal barrier arises when new services or technologies poses a radical change in the human (patient) interaction and thus, physiotherapist's established working routine (based on Gelderman et al., 2011).

Publications

Kisla, S. F. (2021). Innovativeness of healthcare providers: An analysis of the innovative capacity of German Physiotherapists– *Master thesis*.

Second case study: Implementation and utilisation barriers of clinical decision systems

Background

Despite the deficits in the quality of care and the consequently increasing pressure to improve the efficiency, the implementation of particularly technical innovations is often very challenging due to different characteristics of the healthcare system (Groß, 2017). A successful adoption of new medical technology products or services does not only comprise the adoption on the organisational level, but also requires the acceptance within the organisation, on the individual level of the employees (Schiavone, 2020).

The wide accessibility of sensor data, the thorough digital documentation of medical processes and intelligent evaluation and prediction procedures (machine learning) enable digital systems for clinical decision support and automated quality control (Wendt et al., 2000). Nevertheless, such clinical decision support systems (CDSS) often go hand in hand with a higher transparency of the hospital processes and outputs and, at least in partial, a transfer of competencies and responsibilities to technical systems (Buenestado et al., 2013). Regardless of the promising positive effects on the quality of care and efficiency, both aspects might have a negative influence on the acceptance of health professionals as for instance physicians (Chang et al., 2007).

Aim and activities

In this study, the CAU Kiel focused on the investigation of individual barriers of health professionals (e.g., physicians, nurses) as end users with respect to the acceptance of new medical services and products in the German-Danish programme region. Furthermore, the aim was to use the findings and derived implications to gain insights how to systematically enhance the individual acceptance of physicians. The strengthened adoption rate of new medical products and services comprises the chance to improve the treatment quality and cost efficiency in healthcare. Based on the research results companies can also derive valuable impulses for optimising the development and commercialisation of new medical innovations. The following research question will be answered in the course of this study:

- Which individual barriers, concerning the fear of a possible loss of control or higher transparency, reduce the acceptance of clinical decision support systems among physicians?

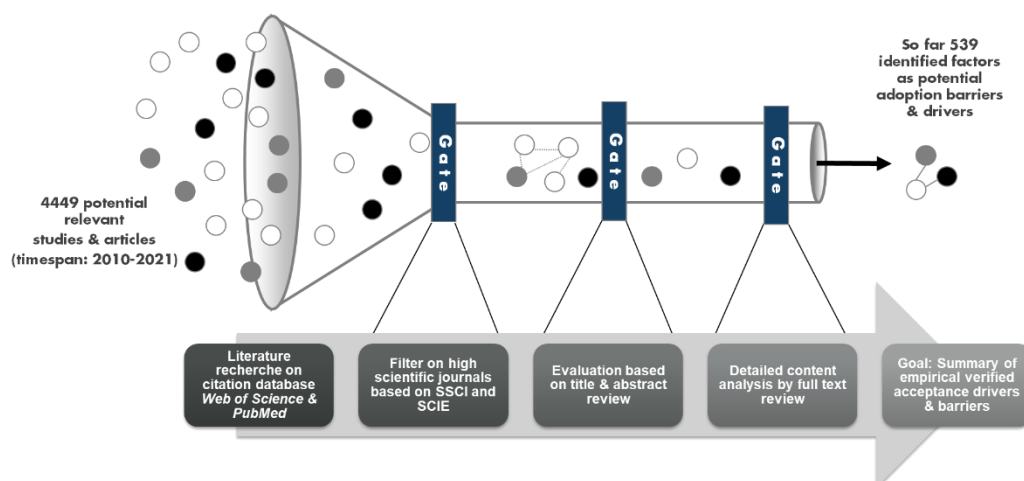


Figure 5: Procedure for the conducted systematic literature review on adoption barriers of CDSS

Results

The findings emphasises that the focus in previous empirical studies lied on the investigation of technological and organisational CDSS adoption barriers. In contrast, a clear neglected research area is the scientific investigation of environmental, individual and social relational adoption factors of CDSS:

| Technological factors | Frequency* | Organisational factors | Frequency* |
|---|------------|--|------------|
| Perceived usefulness (+) | 43 | IT knowledge & expertise (+) | 28 |
| System quality (+) | 38 | IT infrastructure & resources (+) | 18 |
| System ease of use (+) | 20 | Organisational structure/decision making (+) | 18 |
| System compatibility & workflow fit (+) | 14 | Related financial & time costs (-) | 15 |
| Perceived user benefits (+) | 13 | Organisational innovation culture (+) | 12 |

| Environmental factors | Frequency* | Individual and social relation factors | Frequency* |
|--|------------|---|------------|
| Training and education by supplier (+) | 10 | Social influence/pressure (-) | 17 |
| Competitive pressure (+) | 5 | Attitude towards new technologies (+/-) | 15 |
| Supplier IT/computing support (+) | 5 | Self-image (perceived image effect) (+) | 9 |
| Affiliation with network (+) | 3 | Personal innovativeness (+) | 6 |
| Government support (e.g. funds) (+) | 3 | Professional experience (-) | 4 |

* Frequency the factor was empirical investigated in the evaluated scientific articles

Table 1: Scientific verified impact factors (top 5) on adoption behaviour and usage of CDSS categorised in technological, organisational, environmental, individual and social relation factors

Conclusions in a nutshell

The generated output in work package 4 serves on the one hand the concrete identification and investigation of innovation potentials considering the needs of the stakeholders in the healthcare sector in the programme region. On the other hand, the results of the project initiatives can be processed and published on the Access & Acceleration knowledge platform as valuable case studies for cross-sector innovation cooperation. The latter primarily serves as a positive signal for the success and benefits of the entire health innovation platform and thus, serves to attract new collaboration partners and the formation of the network in the programme region.

- **Value of cross-sectoral collaboration:** During the project initiatives, the advantages and added values of cross-sector collaborations have become apparent. The advantages are not only one-sided, but also valuable advantages arise on the side of the industry through the cooperation in the context of

innovation (see [project initiatives](#)). The combination of cross-sector competencies and capacities yields essential synergies.

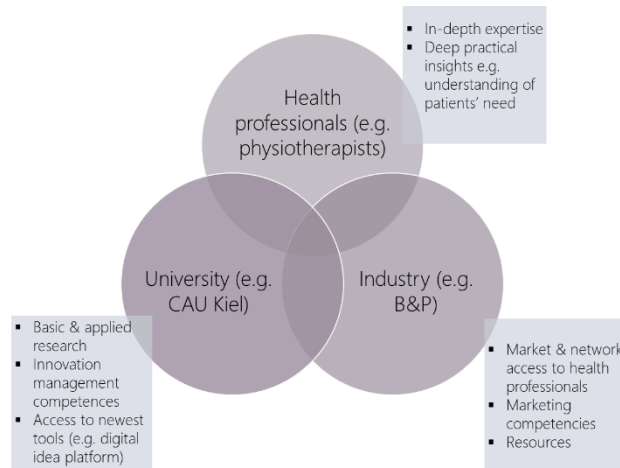


Figure 6: Reciprocal synergies through cross-sectoral collaboration

- Investigation of drivers and barriers of high innovation potentials in healthcare:** Clear evidence can be provided on the basis of the investigations carried out by the CAU Kiel. New health information systems or CDSS and thus, systems with high innovation potential and potential to improve the quality of treatment in the long-term face various barriers in implementation and user acceptance. The conducted scientific research of the CAU Kiel accelerates and provides a foundation in the development and broad diffusion of promising medical technologies as CDSS in the healthcare system. As illustration of the benefits of the conducted scientific research of the CAU Kiel (e.g., 2nd Case study on innovation potential) are summarised in the following figure:

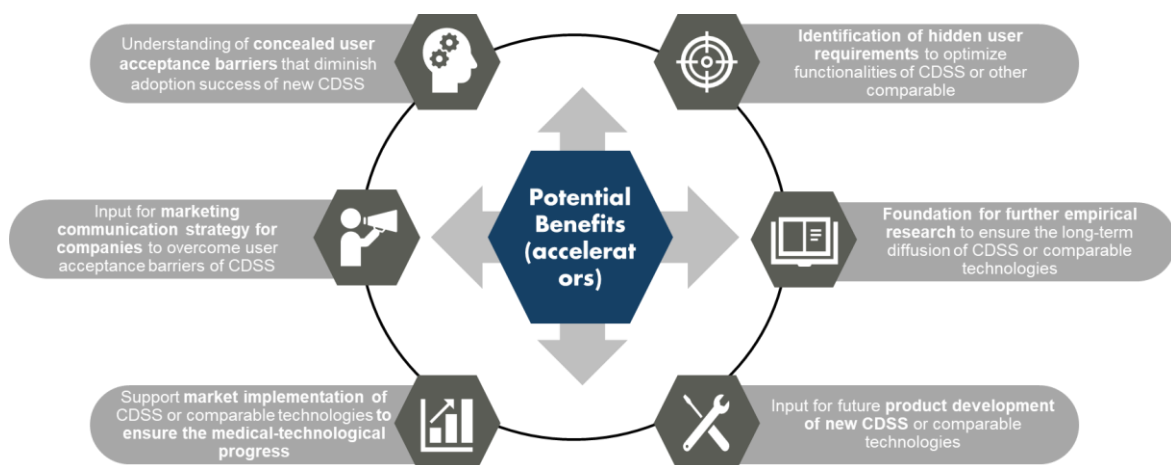


Figure 7: Benefits of research findings from systematic literature review for the acceleration of the diffusion and implementation of novel medical technologies as CDSS.

- Drivers and barriers in the integration of health professionals in the ideation process:** The collected research data as for instance from the digital idea campaign highlights that the integration of secondary health service providers is evidently desired and perceived as mayor factor to ensure the emergence of promising new health innovations but are hindered through different challenges. The findings from the CAU Kiel provides a fundamental stepstone for future open innovation research and practical implications also for further innovation projects that aiming to strengthen the integration of health professional in the innovation process. Today, physicians are often involved and consulted by the industry that develop novel health tools and services. In contrast, non-doctors as nurses and physiotherapists are rarely or not at all considered as relevant development partners (Schiavone, 2020).

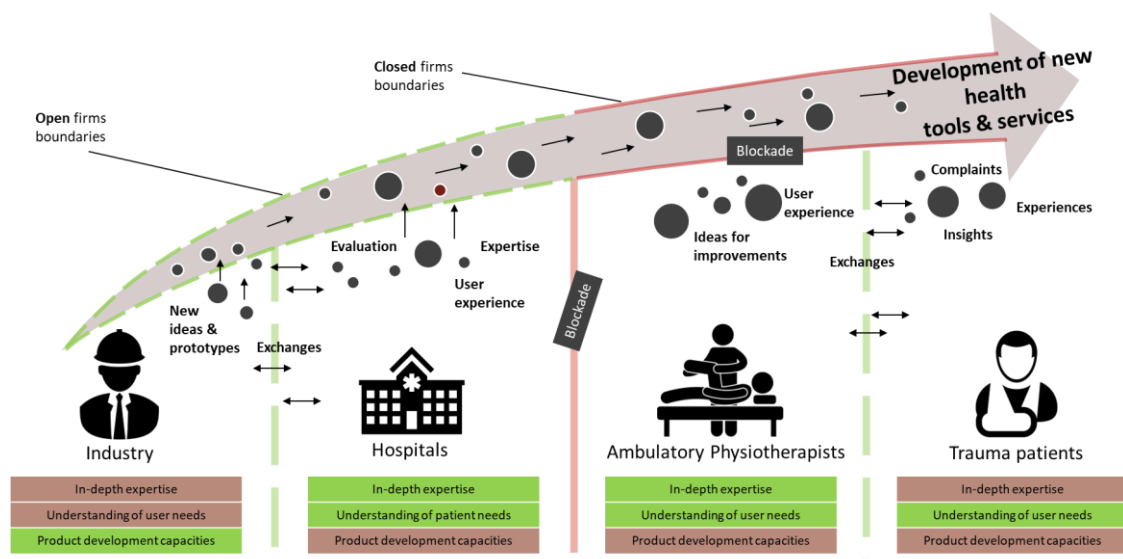


Figure 8: Lacking integration of non-medical health service providers and patients in the innovation process of new health tools and services

However, to create more sustainable innovations that meet the actual requirements of all system-relevant users, the existing user integration approaches need to be expanded. Health innovation needs to be an “interactive process” involving a broad set of relevant disciplines, with not only close relations emerging between the industry, clinicians, and academia but as well on the profounder level between the various health professionals (see results from [initiative 2](#)). To cope with individual requirements and resistances against digital health solutions, it is important to actively integrate not only physicians but as well physiotherapists in the ambulatory care. The integration of different knowledge bases fosters the innovation adoption by a higher number of innovation alternatives that covers the perspectives and needs of both professional groups to face efficiently existing multifaceted problems in healthcare.

The rising complexity of the health system and particularly patients' needs make an efficient collaboration between related health disciplines in the innovation process necessary to improve the full spectrum of care.

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Work package 5: Development process - pilot projects

Introduction to the challenges addressed

The aim of the Access & Acceleration innovation platform is to cover the entire range of innovation processes and also to promote projects that are already further advanced. This work package therefore develops pilot projects that have a higher technology readiness level (TLR), either because they are linked to previous products and the first stages of the innovation process have already been initiated and carried out or because they are the first ones to be developed.

The advantage of including such projects into the health innovation platform also include the difficulties that can develop at the various levels, and which must also be taken into account. However, these advanced projects can have a pilot character for all other projects starting in an earlier stage of the innovation process. Here, the projects can learn from each other by having a lively exchange between the respective work packages and by identifying critical core issues.

In principle, the closer the pilot projects are thematically to each other, the greater the expected synergy effects, since certain techniques and environmental parameters are more similar and therefore occur more frequently and thus the problems that arise are more comparable. However, the exchange of information between projects that are thematically more distant from each other can also lead to synergy effects, especially in regard to administrative functions as well as innovation management. Another advantage of including advanced projects is the expected completion of a product at a pre-commercial level or a launch system within the project funding period. This has a stimulating effect on further projects in earlier stages that should not be underestimated.

Pilot 1 “Treatment of geriatric fractures”

Introduction – „Gamma4 with ADAPT”

“Gamma4 with ADAPT” unites partners from universities, clinical practices and the medical technology industry in the German-Danish border region, with the aim of improving the care and clinical practice around geriatric hip fractures.

Stryker Trauma GmbH specialises in the development and production of trauma surgical implants and instruments, for example for treatments using cepha/intramedullary nailing. Medullary nails stabilise broken bones very effectively using a comparatively simple and gentle surgical technique.

The gamma nail has been developed to provide rapid, stable treatment of geriatric hip fractures. Now in its fourth generation, the focus is on innovations that will simplify operational challenges for users. The process uses the ADAPT digital assistance system, which supports the operation and makes it safer, with automated X-ray image analysis and increased position accuracy.



Figure 9: Gamma nail © Stryker

Medical device development at Stryker

Product safety and quality are paramount in the development of medical devices. All legal and regulatory requirements of the global target markets must be met. This includes a large number of safety and quality-specific verifications that are part of the development process: During the design and phase reviews of the development process, defined in quality management procedures, the evidence is developed, documented and regularly reviewed and approved at each step.

The development of every product is supported by the findings from a continuous innovation process rooted in knowledge. Regular exchange with users, employees and cooperation partners is not aimed at receiving suggestions for new products or approaches for problem solving, but at looking for unsolved problems or potential for improvement. The focus is on how to measure the success of a problem solution. With the help of creativity techniques, problem solving approaches are developed, compared and evaluated according to measurable success criteria. This ensures that optimal

approaches and new technologies are taken into account. In addition, cross-departmental analyses accompany the innovation process. The data collected is documented and fed into ongoing development projects as part of regular reviews. The company's internal priorities are set according to economic and strategic aspects and resources and budget are allocated according to the priorities.

Elements of the innovation process

| Interaction | Analysis | Strategy |
|--|--|--|
| <ul style="list-style-type: none"> • Users • Partners • Employees | <ul style="list-style-type: none"> • Publications • Patents • Market development and trends • Product performance • Evaluation of proposals and ideas • Research and feasibility study | <ul style="list-style-type: none"> • Product pipeline • Business models • Project strategies • Development plans |

The product development process follows defined phases, each with several design reviews assigned by topic. A new phase only begins after a phase review has been completed and approved. The project phases ensure that the required framework is completed for optimum product specification, quality control, production, testing (verification and validation), clinical evaluation and regulatory approval procedures.

Elements of the development process

| Research phase | Planning | Development | Verification and validation | Launch |
|--|---|---|--|--|
| <ul style="list-style-type: none"> • Feasibility studies • Project and development plan • Customer and product requirements • Regulatory plan • Resource plan and schedule • Financial plan, including order-volume plan | <ul style="list-style-type: none"> • Design input and performance requirements • Risk management plan • Design concepts • Risk assessment • Investment plan for process design • Labelling plan • Update of documentation from the previous phases | <ul style="list-style-type: none"> • Product specifications • Product master records • Packaging checklist • Functional interface analysis • Finality analysis and design transfer plan • Verification and validation reports • Product and process freeze • Update of documentation from the previous phases | <ul style="list-style-type: none"> • Marketing materials • Evidence of usability • Evidence of verification and validation for product and process • Labelling and instructions for use • Clinical evaluation • Technical records • Regulatory approval process • Update of documentation from the previous phases | <ul style="list-style-type: none"> • Training modules • Product approvals • Logistics approvals • Early Product Surveillance |

Prototype development for Gamma4 and ADAPT 2.1

Cooperation partners from universities and clinical practices were involved in both the innovation and development processes of the project. Two students from the University of Southern Denmark (SDU) contributed to the foundational knowledge for the innovation process with their Master's theses, with a focus on simulation. In total, more than 50 trauma surgeons participated in design reviews and prototype testing in the form of operation simulations on human specimens, and contributed to optimising the designs.

Voice of Customer (VOC)-Concept

Integration of the customer is an integral part during the design process as it secures the clinical need to be sufficiently taken into consideration. For this reason, a detailed system requirement specification sheet was developed in the beginning of the project based on the previous Gamma generation development phase and subsequent continuous improvement process. Within the project we therefore had three cadaveric laboratories with surgeons involved, evaluating the design's usability. At the same time EU and international design panels in the US and Japan secured novel the geriatric osteosynthesis device to be in line with the clinical need observed in the various hospitals worldwide. As treatment patterns differ between countries and regions, we also include special feedback from our partners at the Odense University Hospital to match the specific local needs in the German-Danish border region. In this feedback rounds key aspects of improvements were communicated via interview, tangible design results or by practical work with the demonstrators, resulting in a world-class next generation medical device arising in the programme region.

Conclusion and outlook

A main objective of the project was to find medical solutions for an aging population in the program region suffering from demographic change with reduced bone quality and limited regenerative capacity on the one hand, and exploding healthcare costs for society on the other. This main issue was successfully addressed by a new osteosynthesis device that allows fracture treatment of fractures with low bone quality and the often-associated complication of cutting out. On the one hand, this represents an improvement for the future medical care of the program region, while at the same time making the medical device industry at this location more resilient, securing local jobs and enabling the generation of revenue and added value. The new developments in this high-value manufacturing sector thus have an impulse effect on other economic and social sectors that goes beyond the effect within the industry. Furthermore, the intended lighthouse character of the project could be successfully integrated into the Access & Acceleration platform, as it is located in the higher range of the technology readiness levels. Thus, more basal projects within the platform can learn, for example

how to deal with approval regulations at an early stage. Within the project, the design review process was considered from a static model of sequential point processing to a dynamic method with overlapping process stages, thus enabling faster development and introduction of innovations into the healthcare market with a streamlined system. Speed is an important criterion here in this highly regulated but competitive area to allow for later market penetration. This is of crucial importance for the German-Danish healthcare border region to succeed in the competitive global market that the industry faces. Furthermore, the collaborative character of the innovation platform should be emphasized, which not least allows the important cooperation of local research, clinics together with industry in the first place, which will also play an important role in the formation of clusters in the future.

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Pilot 2 “Clinical decision support based on electronic health records”

Introduction to the challenges addressed

Most individuals suffering from Alcohol Use Disorder (AUD) never undergo specialist treatment during their addiction due to the poor performance of conventional AUD identification methods, the lack of systematic screening for alcohol problems, and the stigmatisation associated with harmful drinking. Qualitative studies have shown that hospital staff wishes to be rather sure that alcohol use plays a key role for the patients' health issues before starting a conversation about alcohol and the benefits of reducing its intake. The recent availability of Electronic Health Records (EHR) and the advancement of Machine Learning (ML) algorithms have made it easier to offer clinical reasoning when advising patients. Therefore, this pilot project aimed to use patients' EHRs and ML algorithms to develop predictive models which can be used to allow an identification and early detection of patients with AUD.

This project was a multidisciplinary research project that was developed in close collaboration with computer scientists from University of Southern Denmark and clinical alcohol researchers from Odense University Hospital. In this research project, clinical researchers have been involved through all the phases of the methodology. For example, as the dataset owner, they have stored data in a secure database and declared the main idea of labelling patients based on the Relay study. Moreover, medical reasoning about the set of the selected feature was discussed in detail with them.

Methodology

The partners proposed an iterative and exploratory research methodology based on the Agile Scrum framework in this project. It consists of three phases: Planning and Design, Development, and Testing and Documentation.

The planning and design phase started with the setting of the initial problem statements, formation of research questions, aims, and objectives of this project.

In the development phase, the partners started with data handling which consisted of data collection and data pre-processing. The data for this study was collected from two sources, including the Relay Study and EHRs. After that, the collated data were pre-processed to overcome challenges such as imbalanced classes distribution as well as data scaling. Through the social network analysis, feature selection, and the ML methods, novel insights were extracted from the pre-processed data. The main elements being considered in this research encompassed the imbalanced class distribution, high dimensionality, the selection of an appropriate ML model, and the complexity of models for the identification and early detection of patients with AUD. For each step in this research, several evaluation metrics were considered to describe the predictive performance and validation. The outcomes of all analyses and development have then been compiled into several documents such as a Ph.D. thesis, scientific articles, and internal reports which also served as contributions to this research.

Conclusion and outlook

In the context of a multidisciplinary research project, which used the Agile Scrum framework as a methodology, and through the close collaborations of computer scientists and clinical alcohol researchers, this project contributed to the body of knowledge involving the identification and early detection of patients with AUD, based on EHRs using ML techniques. The partners' efforts pinpointed several contributions which have implications for the development of accurate predictive models for AUD related studies. This project had designed and developed a novel comorbidity network which can be used to identify the most exclusive comorbidities for the Hazardous and Harmful drinkers. This can aid clinical staff in understanding the high-risk comorbidities of AUD, hence their ability to consider suitable interventions. Moreover, this project had investigated the different sampling approaches, to overcome the imbalanced class in the datasets, and to boost the performance of the ML models, thereby achieving better predictive accuracy.

This project had also promoted the development of a novel multilayer feature selection framework which was useful for condensing the number of features to a manageable number, for improving the predictive accuracy of ML model to identify AUD-Positive and AUD-Negative, and for identifying the clinical factors that were strongly correlated with AUD. This, therefore, proved that gender disparity should be considered when building predictive models to identify patients with AUD. And finally, this project had established several predictive models that can identify Normal, Hazardous, and Harmful drinkers. It had utilized ML algorithms to develop a novel approach that aids in the early detection of patients with AUD. Three retrospective time periods were used to accurately detect Hazardous drinkers, thus initiating interventions in the advice level.

The complexity of a multidisciplinary project may result in the loss of central control, thereby leading to a breakdown. To overcome the possible challenges of a multidisciplinary project, we proposed an iterative and exploratory methodology in which medical researchers played vital roles.

There were a lot of factors related to data collection which could cause delays in projects, or the poor quality of the final product. Having access to a multidimensional dataset would be the most ideal situation. However, due to the sensitivity of EHRs, collecting such datasets was restrictive and time-consuming.

An important factor in ML based studies is to train a variety of ML and deep learning models based on well pre-processed data, well-defined features, and the best possible hyperparameters. The generality of our approach, in terms of methodologies and techniques, was to examine as many scenarios, techniques, and algorithms as possible in order to achieve the best possible solution as noted in the intended objectives.

In future work, the partners would like to set up a procedure in order to validate the results in the hospitals of the regions of Southern Denmark. This will be done by collaboration with Cambio, which is well on track, and an agreement with Odense

University Hospital (OUH) which has been settled to implement the developed model. Up to now, the model has been developed based on Danish EHRs only and will be tested at the OUH site. Together with Cambio and OUH, the adjoining partners are looking for additional funding options. The idea is to spread the model first to different departments of OUH and then to further hospitals and regions in Denmark.

Integrating German data could be the ultimate goal, but it takes that time and focus are laid on the above-mentioned steps first. In order to have the predictive model tested in other hospital settings, a CE marking is required. With regard to German data, data structure and protection are relevant issues that are not taken up easily.

The project partners have tried to publish most of their findings in scientific journals to make sure that clinicians can use them, and it can be followed up by others in practice and science.

Scientific Publications

Analysis of Comorbidities of Alcohol Use Disorder – by Ali Ebrahimi, Uffe Kock Wiil, Marjan Mansourvar, Amin Naemi, Kjeld Andersen, Anette Søgaard Nielsen. Submitted to the in 2021 IEEE Symposium on Computers and Communications (ISCC).

Deep Neural Network to Identify Patients with Alcohol Use Disorder – by Ali Ebrahimi, Uffe Kock Wiil, Marjan Mansourvar, Amin Naemi, Kjeld Andersen, Anette Søgaard Nielsen. Accepted in 31st Medical Informatics Europe Conference (MIE 2021).

A Predictive Machine Learning Model to Determine Alcohol Use Disorder – by Ali Ebrahimi, Uffe Kock Wiil, Marjan Mansourvar, Anette Søgaard Nielsen. Published in 2020 IEEE Symposium on Computers and Communications (ISCC), Rennes, France.

Prediction of Alcohol Use Disorder: A Scoping Review – by Ali Ebrahimi, Uffe Kock Wiil, Marjan Mansourvar, Anette Søgaard Nielsen. Published in 2019 IEEE Symposium on Computers and Communications (ISCC), Barcelona, Spain.

Predicting Risk of Alcohol Use Disorder Using Machine Learning: A Systematic Literature Review – by Ali Ebrahimi, Uffe Kock Wiil, Thomas Schmidt, Amin Naemi, Anette Søgaard Nielsen, Ghulam Mujtaba Shaikh, Marjan Mansourvar. Published by the IEEE ACCESS.

Clinical Factor Identification for Alcohol Use Disorder from Electronic Health Records using Feature Selection Methods – by Ali Ebrahimi, Uffe Kock Wiil, Marjan Mansourvar, Kjeld Andersen, Anette Søgaard Nielsen. Under review in the BMC Medical Informatics and Decision Making.

Early detection of Patients with Alcohol Use Disorder from their Historical Electronic Health Records: A temporal and Machine Learning comparative study – by Ali Ebrahimi, Uffe Kock Wiil, Marjan Mansourvar, Kjeld Andersen, Anette Søgaard Nielsen. Submitted to PlosOne.

AUD-DSS: A Decision Support System for Early Detection of Patients with Alcohol Use Disorder – by Ali Ebrahimi, Uffe Kock Wiil, Marjan Mansourvar, Kjeld Andersen, Anette Søgaard Nielsen. On process of writing.

Other Publications

- Video on pilot 5.2 at project website: [Clinical decision support based on health records](#)

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Work package 6: Market access

Introduction to the challenges addressed

It is notoriously difficult to access the Danish and German markets for healthcare products with existing and new technological solutions. It is especially hard for SMEs that do not possess the necessary knowledge and market insight.

One of the main objectives of this work package was to create and provide access to an ecosystem in which members know the healthcare sectors and have clear market access strategies.

Involved in this work package were: Centre of Medical Technology (CIMT), The Maersk Mc-Kinney Moller Institute at the University of Southern Denmark (MMMI) and the Clinic for Orthopaedics and Trauma Surgery, University of Lübeck (UKSH). These partners have close contact to the clinic and companies. CIMT and UKSH are placed in the hospital whereas MMMI is specialised in health informatics and technology. Some of the partners have previously worked with ecosystems in the health sector, which involved research institutions, companies, consulting companies, start-ups among others.

To overcome these challenges, the project partners aimed at

- identifying market barriers, including regulatory standards, guidelines, health economic opportunities and (lack of) financial incentives,
- developing strategies for market access as well as tactics for innovative healthcare solutions,
- identifying opportunities to support processes for adaptation and dissemination of new technological solutions in the health and care sectors, and
- attracting health providers such as hospitals, general practitioners and municipalities in Denmark as well as health insurance providers in Germany to facilitate access to the market.

Within the Access & Acceleration project, the partners worked to reach these goals through three main activities:

- Improvement of the innovation dialogue for identifying market access barriers in Denmark and Germany;
- Development of strategies for access to markets in Denmark and Germany;
- Validation and dissemination of market access strategies.

Market access barriers in Germany and Denmark

Methods and activities

Firstly, the stakeholders and market access barriers were identified through interviews and workshops with actors from SMEs, consultants and researchers. Both interviews

and workshops were performed in parallel on the Danish and German side of the border.

The interviews were conducted as semi-structured interviews by phone and were afterwards confirmed by mail. The interview questions were constructed with input from project partners from the hospital, university and the cluster organisations.

A semi-structured interview is a type of interview in which the interviewer asks predetermined questions, but can ask other questions if there occurs a possibility to gain more or deeper information from the interviewee. This method is used because the companies have different characteristics. The semi-structured interviews provided us with the opportunity to be more adaptable in the interview questions.

Some market access barriers were already pre-defined and listed in the interviews, but it was also possible for the interview participants to name others. The pre-defined market barriers were given by Welfare Tech which is a cluster organisation with close contact to companies and their challengers:

- Different laws and regulations
- Language barriers
- Different healthcare systems structure
- Different user needs
- Access to funding for internationalisation activities
- Access to qualified counselling
- Lack of knowledge of how the healthcare system is organised
- Different culture
- Difficulties in collaborating with Danish/German partners

The procedure of the workshop was based on the barriers (or challenges) mentioned in the interview guide. The workshop was divided into three stages:

1. Prioritise the challenges
2. Elaborate and discuss the top 3 challenges in groups
3. Presentation and plenum discussion on the challenges

The addressed market barrier was verified later in the project in a survey with the aim to identify barriers and strategies to overcome these.

Results

In both Denmark and Germany, five qualitative interviews were conducted with partners from different industries and institutions. In total, 20 participated in the workshops.

Main market access barriers identified through the interviews and workshop

1. Barriers regarding the Medical device regulation and national legislation

- Tender process and the high demand for evidence-based products cause problems [Danish company]
- The legislation and structure for the *Hilfsmittelverzeichnis* in Germany [Danish company]

2. Different structure of the healthcare system

- The legislation and structure for the *Hilfsmittelverzeichnis* in Germany [Danish company]
- In Denmark, there is an open innovation environment. However, Denmark struggles with scaling [Danish company].
- The German market is not interested in new innovative ideas because of how the reimbursement system works [Danish company]
- The different health care systems mean different financial incentives in terms of treating patients [Danish and German companies]

3. Market barriers related to language especially German companies pointed this as a barrier

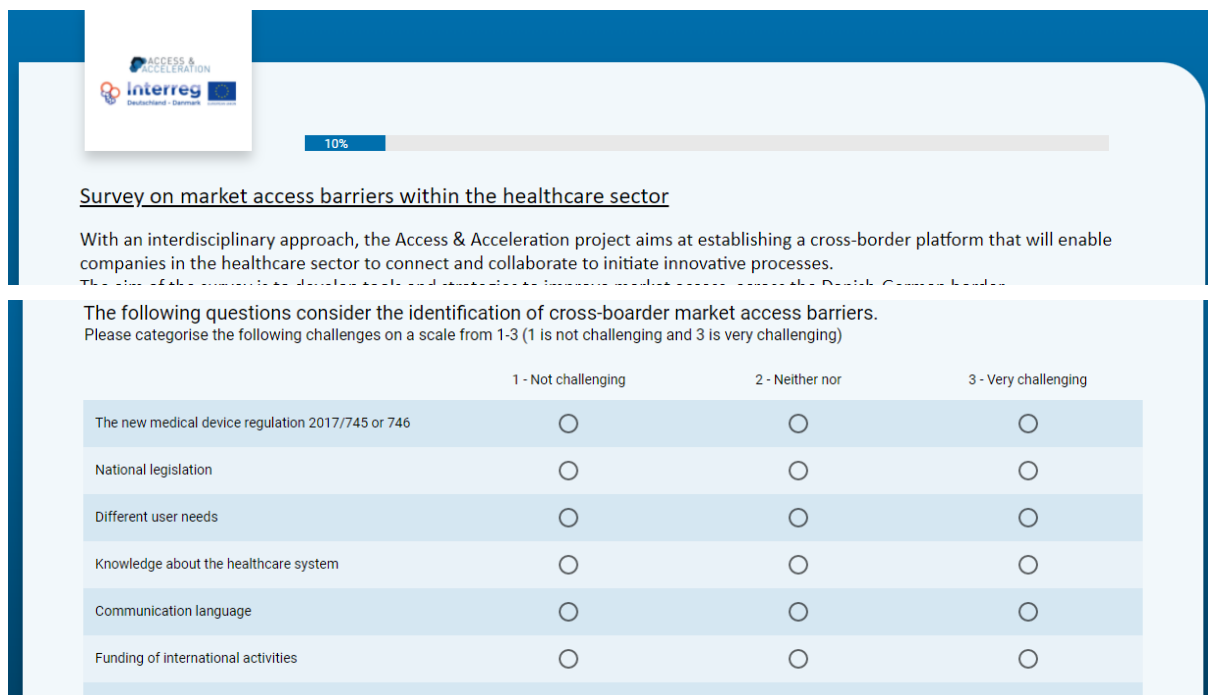
- Relevant information is only available in national language [Danish and German companies]
- Germans prefer to speak German [Danish company]
- Lack of knowledge on tender processes across borders [German company]
- Information and knowledge are in the national language [Danish and German companies]

In the workshops and interviews, the stakeholders addressed the large amount of information available, which can be a big disadvantage for small companies because it takes a lot of resources to go through all the information. Read more about the method and address market entry barriers in the *Report on market entry barriers* [2].

Roadmap to market

Methods and activities

To develop market access strategies, an online survey and desk research were conducted in an attempt to secure input from a wide range of partners from industry, research and public institutions to help define an overall methodology.



Survey on market access barriers within the healthcare sector

With an interdisciplinary approach, the Access & Acceleration project aims at establishing a cross-border platform that will enable companies in the healthcare sector to connect and collaborate to initiate innovative processes.

The aim of the survey is to develop tools and strategies to improve market access across the Danish-Corpus border.

The following questions consider the identification of cross-border market access barriers.
Please categorise the following challenges on a scale from 1-3 (1 is not challenging and 3 is very challenging)

| | 1 - Not challenging | 2 - Neither nor | 3 - Very challenging |
|---|-----------------------|-----------------------|-----------------------|
| The new medical device regulation 2017/745 or 746 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| National legislation | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Different user needs | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Knowledge about the healthcare system | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Communication language | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Funding of international activities | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Figure 10: Survey on market access entry barriers

Aim of the survey was to verify the identified market entry barriers found earlier in the project and further investigate how to overcome these barriers. Aim of the desk research was to identify tools and strategies already available and open source on the internet.

Based on the barriers, strategies and information were combined in a detailed strategy report, made for addressing the challenges and solutions. The report is included on the roadmap, which you can find online at [the Access & Acceleration project website](#). The strategy report showed the complexity of the topics and indicated that the large barrier was to get an overview on the information available.

In the desk research, it was found that a large amount of information was available on the internet about getting access to other markets. Therefore, the aim of the tool/roadmap developed in Access & Acceleration was to provide SME with a good overview on useful information on how to start the journey of getting access to other markets. This was done with inspiration from similar tools with other topics like the

OPI- guide from Welfare Tech and Atea's overview of software in the healthcare sector (see Figure 2).



Figure 11: <https://www.atea.dk/brancher/sundhed-og-velfaerd>

Since usability was a high priority in the development, a usability test was both conducted as interviews and later on as a survey more focussing on the content.

Results

More than 300 Danish companies and more than 100 German companies were contacted for participation in the survey. Furthermore, a large number of institutions, business development associations and network partners were contacted as well to assist with finding participants for the survey. In total, 30 individuals from 27 different companies participated in the survey, most from micro-enterprises (n=15).

Four market barriers were identified:

1. The new medical device regulation 2017/745 or 746
2. Lack of knowledge about the healthcare system
3. Structure of the healthcare system
4. Funding of international activities

The language barriers were not verified (n=2) by the survey, but mostly addressed as a barrier in the German workshop and therefore deselected. Access to funding was more prominent and therefore included in the strategy.

The roadmap can be found at <https://www.accessinnovation.eu/roadmap.html>

The roadmap is structured by an interactive image showing the addressed barriers and works as a menu for the roadmap, (see Figure 3), a video is showing how to use the roadmap. For each barrier, possible actions are described with corresponding links to more detailed information. The relation between actions and links is shown with

illuminated links when the user scrolls the mouse over an action. (3) at last a detailed background information on the barrier. At the bottom of the roadmap the case studies and contact information is found.

For each identified market entry barrier, companies find tools on what actions they can take to overcome existing barriers. In addition to the measures, companies will find valuable links to

- webinars that provide guidance on the different problems,
- documents and illustrations that explain structures and processes in more detail,
- databases and portals that facilitate access to calls for tender or cluster intelligence,
- cooperation exchanges and networks to better discuss and solve problems with each other,
- web pages with more in-depth and further information, so that a topic can be examined from many different angles and the user can build up a broad knowledge for themselves.



Figure 2: Interactive introductory picture to the roadmap

1. How to comply with the European legislation?

In the section below the new medical device regulation is shortly described and we will provide you with information and tools that will help your company to solve the challenges:

- Understand and get an overview of the MDR/IVDR
- Share and get knowledge
- Get contacts for clinical investigation/collaboration
- Getting access to a notified body

Actions to comply with European legislations (MDR)

x

Note: Scroll the mouse over actions (bullet points) to see related links.

- Exchange experience with companies from your own network
- Register in cluster organisations
- Participate in a knowledge exchange through networking
- Organise workshops for knowledge exchange
- Appoint an adviser
- Found a special department
- Find and hire a specialist for the company
- Hire an external service provider
- [Obtain an overview of MDR, notified bodies and Eudamed](#)
- Participate in webinars

Networks

- [Find international partnership in Enterprise Europe Network](#)
- [Become a member of Medico Industrien \(DK\)](#)
- [Find the perfect network in Denmark \(DK\)](#)
- [Find your cluster in Germany](#)
- [Improve your network](#)

Information

- [Introduction to MDR \(Danish Medicines Agency\) \(DK\)](#)
- [Understand EUDAMED \(DE\)](#)

Tools

- [Get ready for the MDR \(factsheets\)](#)
- [Find a notified body in the NANDO database](#)
- [Participate in international matchmaking events and trade missions](#)

Webinar

- [Safe and performant Medical Devices for all \(EC webinar\)](#)
- [A Danish angel on the MDR \(DK\)](#)
- [Different angels on the worldwide regulatory process](#)
- [Webinars and lessons learnt by BSI](#)

Background information (MDR)

+

2. Understand the structure of the healthcare systems in Denmark and Germany

Figure 12: Screenshot of the information displayed for the identified barriers

The usability interview suggested changes to primarily make the roadmap less text heavy, and other adjustments. The survey showed subsequently that the user found the roadmap user friendly and useful.

Case studies on strategy application pilots

Methods and activities

To validate the developed strategies for market access, the work package aimed to test these strategies on two use cases. The results should be used to test the usability of the strategies and as basis to further spread the knowledge of the strategies and the roadmap.

The two pilots in the Access & Acceleration project functioned as the case study.

Semi-structured interviews were performed with Henrik Lindholm from Cambio and with Nils Reimers from Stryker. These interviews were transcribed and analysed and placed in a format of one page under the same headlines as the ones in the interview guide.

Results

Case study - Cambio

The case study was structured with first an introduction to the case study, then an introduction to the company (Cambio), information on their process and first steps when they decide to enter a new market, then their experience with some of the prominent market barriers, which tools they use to overcome this barrier, and finally the usefulness of the roadmap.

Henrik mentioned that one of the main barriers they meet is the fact that the healthcare system on new markets are structured very differently compared to the their existing market setup.

Further, he mentioned that the tool they primarily use is network.

He believes that the roadmap is a smart and useful tool for overcoming some of the basic barriers and that it is useful to have a kind of overview map helping to get better understanding of the 'mechanisms' in new markets regarding how healthcare is organised, how it is funded, main features of registration requirements for national bodies and authorities with more.

Case study - Stryker

The largest barrier Stryker faced at that time and what drove their market entry strategy was the level of regulation on medical devices. Ten years before, the European market was much easier to gain access to compared to the US market. Today, it is vice versa.

In terms of overcoming the barrier, Nils mentioned that they had focused a lot on getting their medical device approved on the US market in order to gather data to validate their technology. With clinical data they could prove to the European hospitals that their technology was safe and a viable solution.

Nils mentioned that the roadmap was a useful tool for overcoming some of the basic barriers in terms of registration and certificates.

Dissemination

In the final part of the project work package 6 has focused on disseminating the achievements and results of the work performed in the tasks.

Due to corona, we decided to share our results on a different way than described in the DOA. Instead of hosting knowledge sharing workshops we developed a flyer that we handed out on multiple conferences (WHINN, E-sundhedsobservatoriet, Medicoteknisk

Selskab Landsmøde). Furthermore, we participated in a Networking meeting for Danish companies wanting to enter the German companies hosted by the Danish Life Science Cluster (former Welfare Tech). Finally, we have made an article presenting results that we plan to publish in multiple newsletters and webpages.

Conclusion and perspective

In summary, there is no one perfect strategy for overcoming the various market entry barriers. Every company has different prerequisites and consequently needs a different strategy. Not every company that wants to enter the other market necessarily has to struggle with all the barriers mentioned in this document. The content of this work package has focused on identifying the most common barriers to entering new markets. To overcome these barriers, a digital roadmap to market has been developed to enable companies to access the information they need to develop a successful market entry strategy as easily as possible.

For each identified market entry barrier, companies find tools on what actions they can take to overcome existing barriers. In addition to the measures, companies will find valuable links to

- webinars that provide guidance on the different problems,
- documents and illustrations that explain structures and processes in more detail,
- databases and portals that facilitate access to calls for tender or cluster intelligence,
- cooperation exchanges and networks to better discuss and solve problems with each other,
- web pages with more in-depth and further information, so that a topic can be examined from many different angles and the user can build up a broad knowledge for themselves.

In the interviews and online surveys, it was repeatedly emphasised how extremely important and valuable a well-functioning network is. It facilitates the exchange of knowledge and ideally enables joint action and mutual support in the attempt to access the German or Danish market with their own innovative products.

To ensure usability, the developed strategies were validated through two case studies with Stryker and Cambio. Both case studies indicated that the roadmap was a useful tool and that contained the knowledge on the barriers and tools needed on a basic level.

The final part of the work package focused on disseminating the achievements of the project. The results concerning the knowledge on the different markets and how to overcome the barriers, specifically the roadmap reached the relevant target groups

which were companies aiming to access the German or Danish market and accelerate their process.

Results in a nutshell

- 10 companies included in interviews
- 4 defined market entry barriers
- A roadmap to improve overview on available data on useful information to facilitate market access: <https://www.accessinnovation.eu/roadmap.html>
- Two case studies address companies' journeys and how they could use the roadmap
- 49 participants in the workshops
- 3 knowledge sharing events
- 2 strategies reports

List of publications/references

1. One pager on market access barriers in Germany and Scandinavia, available in [German](#) and [Danish](#)
2. Report on market access barriers, available in [English](#)
3. Report on market access strategies, available in [English](#)
4. Roadmap on market access, available at <https://www.accessinnovation.eu/roadmap.html>
5. [Flyer on the roadmap](#)
6. Video as introduction to the roadmap, available at the [roadmap website](#)
7. Evaluation report on the roadmap and its usability, available in [English](#)

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Key facts

- Total budget: 2.9 million Euros
- Around 1.7 million Euros funding granted by Interreg Deutschland-Danmark
- Project duration: April 2019 – March 2022

Project partners

- Centre for Innovative Medical Technology (CIMT)
- Danish Life Science Cluster
- Kiel University, Institute for Innovation Research (Technology Management)
- University of Lübeck, Clinic for Orthopaedics and Trauma Surgery (University Hospital Schleswig-Holstein), Campus Lübeck
- University of Southern Denmark, Mads Clausen Institute
- University of Southern Denmark, Maersk Mc-Kinney Moller Institute

Network partners

- Business Development Agency Kreis Plön GmbH
- Exoprosthetic network.SH
- Hochschule Flensburg
- Kalundborgegnens Erhvervsråd
- KiWi, Kiel Economic and Structure Development Corporation
- Life Science Nord Management GmbH
- ScanBalt
- Sorø Erhvervn, Sorø Kommune
- Syddansk Sundhedsinnovation