

# CONNECT2SMALLPORTS

## APPLYING **SMART** TRANSPORT TOOLS FOR SMALL AND MEDIUM-SIZED PORTS

Project co-financed by EU  
Interreg South Baltic Programme 2014-2020



European  
Regional  
Development  
Fund



2018-2022





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# 01 INTRODUCTION

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Starting the project journey in summer 2018, the **Connect2SmallPorts** project will finally come to an end in summer 2022. We sailed out to improve the digitalisation capacities and competencies of small and medium-sized ports in the South Baltic Sea Region through cross-border cooperation.

Nevertheless, it is worth to have a look back into four years of project implementation. Thus, this report in hands serves as a summary of key achievements developed by the project. We are proud and glad to offer this opportunity to you as the reader, but recommend to visit our website to get more detailed information on the content presented in this report.

From a Lead Partner's perspective, Connect2SmallPorts project succeeded in its content development and implementation thanks to the great motivation and work by the involved partners. The challenges mushrooming over time have been tackled and overcome jointly, resulting into great outcomes picked up by small and medium-sized ports for their digital transformation. Even more, big ports in Europe and beyond approached us to learn about our project and implemented digital approaches – this is another proof of the great work done by our partnership.

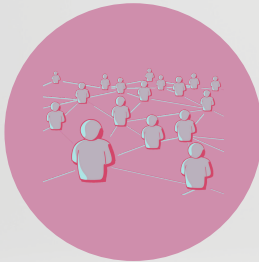
In the end, the consortium outperformed its ambitious goals, hence, the end of Connect2SmallPorts' journey is nothing else than a start into a new one. We are already working on Follow-Up initiatives to keep supporting small and medium-sized ports improving their sustainable competitiveness.

**Christopher Meyer**  
**Project Coordinator**  
**European Project Center**  
**Hochschule Wismar,**  
**University of Applied Sciences**

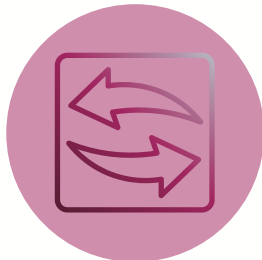


# The **5 PILLARS** of the project:

**Mobilise & Integrate  
Supply and Demand Side**



**Learn & Exchange**



**Test & Future Transfer**



**Design & Confirm**



**Sustain & Internationalise**

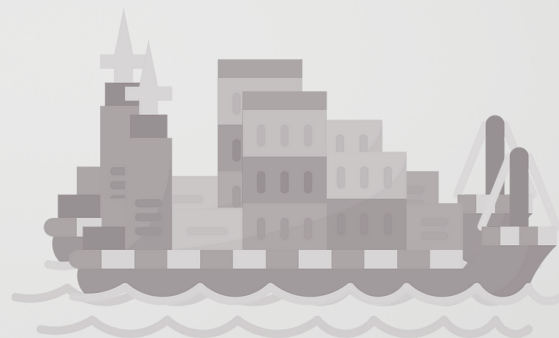
# 02 DIGITAL READINESS

## ABOUT THE DIGITAL READINESS

Connect2SmallPorts project conducted Digital Auditing in Small Ports. It aimed to develop a tool for the examination of a digitalisation status in the South Baltic Small Ports.

This digitalisation tool refers to a process-based approach that is applied to a given port. Furthermore, it covers different aspects that enable to track and evaluate the use of novel digital technologies in a port and its terminals and by port operators. Such technologies are already used by big companies or core ports. The aim of these digital technologies is to improve cargo flows, environmental and economic efficiency, e.g.

- reduction of parking space related to transport in port terminals;
- reduction of delays;
- shorter travel times; safety and security (Blockchain); environmental compliance (dynamic traffic control; less congestion); cost reduction;
- availability and reliability; financial business concepts; client attraction (e.g. from core ports) and branding.



## METHODOLOGY

Five stages of port development towards Smart-Port have been defined. This methodology can be used by small, medium and large ports for their digital improvement. In line with the development of digital auditing, the Connect2SmallPorts consortium has come up with a novel index for the measurement of digital port performance, the so-called **Digital Readiness Index for Ports – DRIP**.

The **DRIP** is calculated based on evaluation of:

- Management (20%)
- Human Capital (20%)
- Technology (30%)
- Information (5%)
- Funcionality (25%)

**DRIP** scores scale  
Ports are defined as follows:

- 1.0 - 2.5 = Analog Port
- 2.5 - 3.5 = Monitor Port
- 3.5 - 4.5 = Adopter Port
- 4.5 - 5.5 = Developer Port
- 5.5 - 6.0 = Smart Port

# DIGITAL READINESS

## RESULTS

The results of digital auditing of small and medium-sized ports in the South Baltic Sea showed their **Digital Readiness**.

**DRIP score** in average:

- Small ports 3,42
- Middle size ports 3,53
- Large ports 4,35

The higher DRIP score, the higher is a possibility of port's readiness to adapt and implement new digital technologies. Large ports have a competitive advantage by higher digital readiness to adapt and implement new digital technologies.



Ports are classified by different characteristics

It is important to classify ports by different characteristics (digitalisation level, port importance, port turnover, etc.). The aim is to find out which digitalisation level is reasonable for small and middle-sized ports.

**DRIP scores of port classifications**

- 3.08 - Monitor Ports
- 3.83 - Adopter Ports
- 4.89 - Developer Ports

Classifying ports according to TEN-T characteristics

TEN-T - Trans European Transport - Network

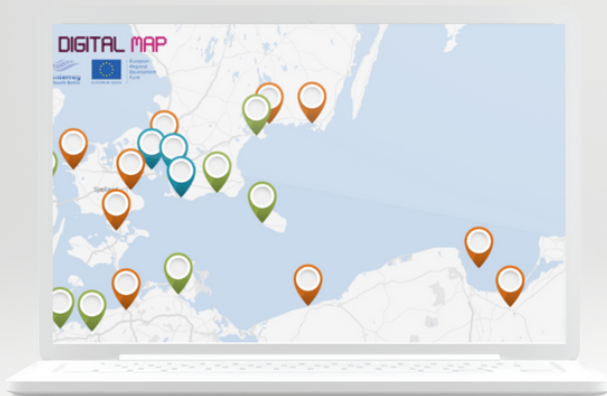
**DRIP scores acc. to TEN-T classifications**

- 4.25 - Core Ports
- 3.47 - Comprehensive Ports
- 3.46 - Non-TEN-T Ports

# DIGITAL READINESS

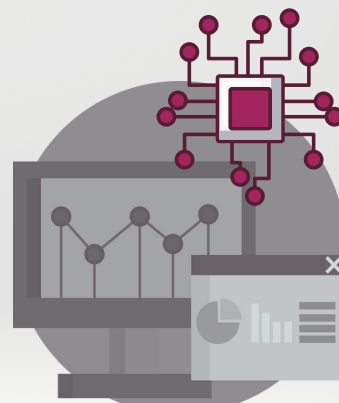
## RESULTS

### Interactive Map of Small and Medium-Sized Ports' Digital Readiness



The presented results on the map are based on the DRIP score, developed by the Connect2SmallPorts project consortium. Besides the final DRIP score, the map shows all detailed scores for the five dimensions: Management, Information, Technology, Human Capital and Functionality to illustrate the digital readiness of the ports. Furthermore, according to the final DRIP score, the ports are classified into categories which is illustrated with colored marks.

QR code to the map:



## CONCLUSIONS

### More digitalisation, more possibilities

- Digitalisation of small port activities and management is very important, because small- and medium-sized ports' digitalisation is today at a far lower level (app. 30%) in comparison with large ports.
- Low increases in digitalisation level of small- and medium-sized ports could have an accelerator effect in stimulating port activities and facilitate their service portfolio.



## 03 CAPACITY BUILDING

**QR code to the  
Registration page:**



Port and Terminal Digitalization and development has been driven by various factors: such as economy, inequalities of development, new technologies being developed, acceleration of digitalization demands, COVID19, climate change, environmental issues, etc. The Connect2SmallPorts Project offers some courses through generous support from the European Commission under the Interreg South Baltic Programme to introduce new or converging technologies that may be faced though a Digital Transformation Journey.



# CAPACITY BUILDING

## Online courses :

### 1 LEARN

### 2 INTERACT

### 3 APPLY

### 4 CERTIFICATION

#### **Blockchain, IOT, Converging, Technology**

It helps to gain a clear understanding of Distributed Ledger Technology, AI, and IoT.

*QR code to this course:*



#### **Digital Port and Terminal Management**

Digital Transformation technologies are presented in the context of “real-world” cases.

*QR code to this course:*



#### **Designing Creative Industries**

This course is designed as a set of learning activities based on both practice and theory.

*QR code to this course:*



#### **Fundamentals in Cyber Maritime Security**

The ever-increasing threats of cyber security are high-lighted in this course.

*QR code to this course:*

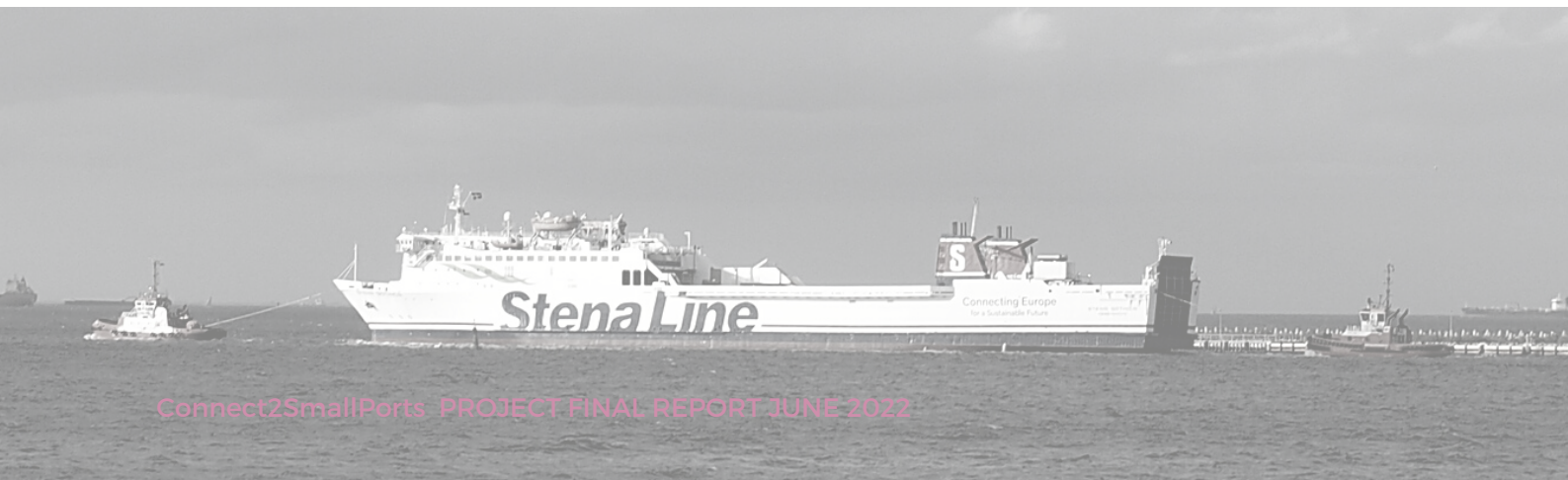


## 04 PORT PILOTS

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Connect2SmallPorts pilot activities were implemented in five ports in the South Baltic region. These pilots were thought to complement the results gained in previous project phases and work packages.

While DRIP score tool was developed for measuring the digital readiness of small and medium ports, online courses concentrated on getting and training skills with regard to the trends of design of a Blockchain Strategy and Internet of Things, port pilots focused on building tools and demonstrators for evaluating and testing ports. The simulation tools were used for visualisation and evaluation of business modelling and infrastructural scenarios.



# PORT PILOTS

## *Port Klaipeda (LT)*



In line with the pilot development, Klaipeda port as direct project partner developed a digital system to track and trace environmental impact of port operations. Due to the location of the port, being close neighbour to the old town of the city as well as to the national park Curonian spit, a high demand on reducing environmental impact in the area was identified. Therefore, a digital system was developed based on several stationary sensors between port and city area. Those sensors are able to measure occurring fine dust and deliver real-time data to a digital platform. Hence, it is possible to track certain environmental data and connect it to particular port operations. The platform itself was already incorporated to the running Port Management System as an additional layer.

The task of the pilot was an implementation of simulation and emulation for Small Ports for Digital Transformation. The modelled and developed scenarios for small ports in digital technologies use and value-added creation for transport services were to be simulated under the "real-life" conditions.

Digital compliance (Digi Comp) does the multiple areas of regulatory compliance through an E-Learning process to keep things simple by making self-management easier and digitalize the compliance activities quicker and more secure.

A digital compliance will be investigated during the development of an AI-based vendor management system.

## *Port Vordingborg (DK)*



# PORT PILOTS

## *Port Ystad (SE)*



In the port of Ystad a simulation and emulation pilot project was conducted. Application of Tool for Prototyping of Small Ports for Digital Transformation, the use of CHESSCON® and employing simulation method had a major impact on obtaining the results. In the case simulations aimed to design a layout for the pre-gate parking area of the ferry terminal that is close to bulk terminal. That pilot yielded many results and contributed to the generation of knowledge and sharing as regards improved RoRo operations. That could not be evaluated without a tool.

Regarding to sustainability and environmental goals of the port of Ystad, by optimising and locating efficiencies with simulations tool, this leads to less energy and less costs being realized.

The task of the pilot was to conduct a few simulations in a project with Karlskrona port, so as to test and evaluate the configurations, volumes, and impact of equipment on the operations at Verkö port terminal. The modelling of the port was assisted by the staff with Port of Karlskrona to input the data and information into the Chesscon® tool. The main challenge was that the port was not sure as to what service or volumes were to be expected.

The IT solutions helped and enabled an improved decision making under various scenarios and time horizons. As a decision support, the use of simulation gave confidence to the port managers in the outcomes and at the same time, helped to create or compare knowledge that some of the manager had or were quite sure.

## *Port Karlskrona (SE)*



# 05 PROJECT RESEARCH

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## Portfolio of research papers



Even though Connect2SmallPorts is not a research project, several scientists within the partnership picked up the project issues to contribute to the existing literature.

In scientific discourses, the specific area of small and medium-sized ports received little attention when it comes to researches in the maritime and port sector. Hence, the project identified different research problems and offered scientific approaches to overcome research gaps as well as answer research questions.

# PROJECT RESEARCH

One research problem identified was the general understanding of what a small and medium-sized port actually is. Existing definitions explain port's sizes using the cargo and passenger handling, other connect the definition to the TEN-T classification. However, our researchers paid more attention to the placement of smaller ports into the local and regional ecosystems as well as blue and green economies as functional units impacting regional and local (sustainable) development.

## *Research on Small and Medium-Sized Ports Ecosystems*



- Gerlitz, L. & Meyer, C. (2021). Small and Medium-Sized Ports in the TEN-T Network and Nexus of Europe's Twin Transition: The Way towards Sustainability and Digital Port Service Ecosystems.
- Meyer, C. (2021). Integration of Baltic Small and Medium-Sized Ports in Regional Innovation Strategies on Smart Specialisation.
- Meyer, C., Gerlitz, L. & Henesey, L. (2021). Cross-Border Capacity-Building for Port Ecosystems in Small and Medium-Sized Baltic Ports.

Next to the general integration of smaller ports into regional and local context of blue and green economy, scientists of the project focussed on strategic management improvements for small ports. The research undertaken serves as decision-making tools and literature for responsible port manager to adapt strategies and initiatives for digital transition or improving the digital capacities on management level.

## *Research on Digitalisation and Management*



- Meyer, C., Gerlitz, L., Philipp, R. & Paulauskas, V. (2021). A Digital or Sustainable Small and Medium-Sized Port? Sustainable Port Blueprint in the Baltic Sea Region based on Port Benchmarking.
- Paulauskas, V., Filina-Dawidowicz, L. & Paulauskas, D. (2021). Ports Digitalization Level Evaluation.
- Philipp, R. (2020). Digital Readiness index assessment towards smart port development.
- Philipp, R., Prause, G., and Gerlitz, L. (2019). Blockchain and Smart Contracts for Entrepreneurial Collaboration in Maritime Supply Chains.

# PROJECT RESEARCH

In addition to the mentioned research on port ecosystems and management level in the discourse of digital transformation, particular port operations have been elaborated in research items developed by the project partners. The research items provide digital solutions for improvements on operational level, utilizing on digital measurements which have been simulated to gather sufficient and proven data, which is the backbone of the recommendations and outcomes of this research parts.

## *Research on digitalising port operations*



- Henesey, L., Silonosov, A., Meyer, C. & Gerlitz, L. (2021). Smart Container Stacking in the Yard.
- Henesey, L., Lizneva, Y., Philipp, R., Meyer, C. and Gerlitz, L. (2020). Improved load planning of RoRo Vessels by adopting Blockchain and Internet-of-Things.
- Henesey, L. (2019). Blockchain with Multi Agent System: case of container stacking management.

One special research item to be mentioned is a contribution to a scientific conference including proceedings publication, which has been developed jointly by eleven partners – scientists and non-scientists. The research item is elaborating the impact of digital ports on local and coastal sustainability, what, indeed, thematically paves the road for the follow-up project of Connect2SmallPorts as well.

## *Research jointly developed by almost all partners*



- Paulauskas, V., Philipp, R., Henesey, L., Paulauskas, D., Sutnikas, A., Meyer, C., Gerlitz, L., Heine, N., Kozyczowski, K., Zigus, A. & Silonosov, A. (2021). Smart Port's Influence on Coastal Sustainability.

Last but not least, the partnership is proud of a successful PhD graduation based on the content developed and implemented in the project. The development of project's DRIP score has been a core part of the thesis, connecting scientific theories with practical application for small and medium-sized ports.

## *PhD Thesis based on the project*



- Philipp, R. (2021) Smart Seaports as Innovation Drivers for Blue Growth.

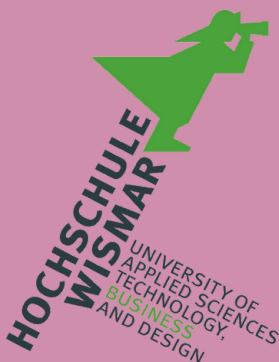
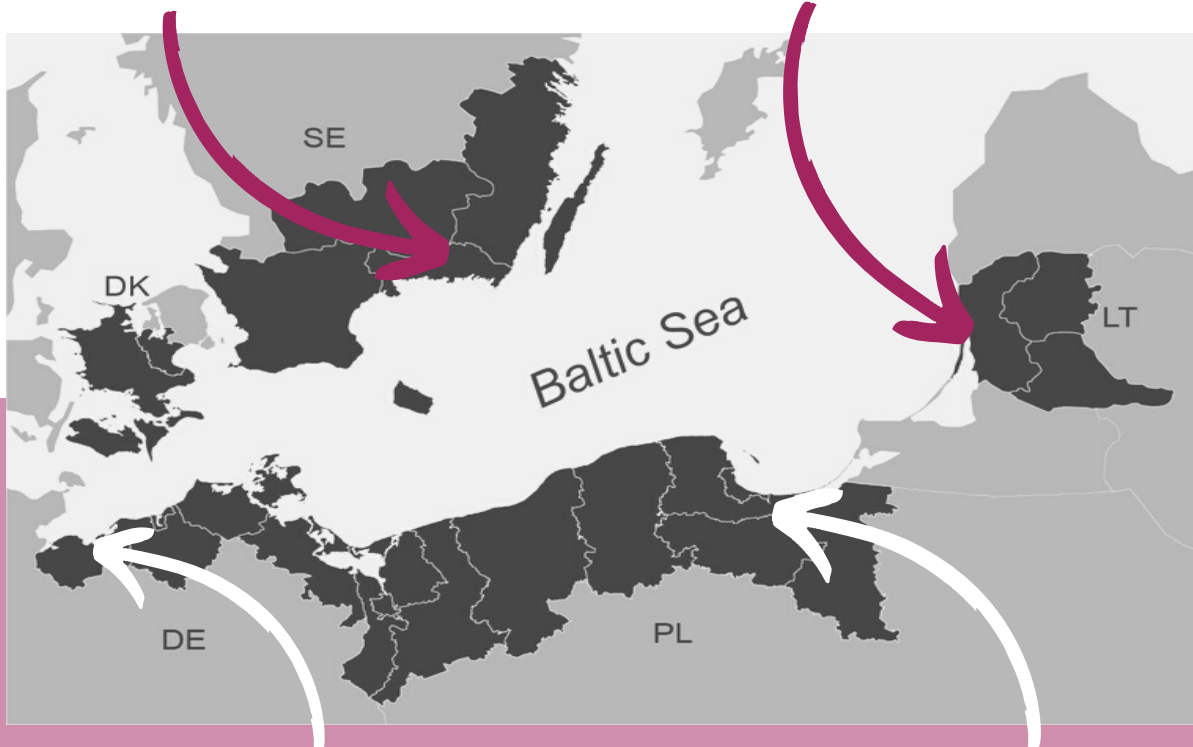


# 06 PARTNERSHIP

KLTC-KSRC



PORT OF KLAIPEDA



# PARTNERS

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**Hochschule Wismar**  
**University of Applied Sciences:**  
**Technology, Business and Design**  
**(Germany)**

**Lead Partner of the project**

**Seaport of Wismar**  
**(Germany)**



**INWL Institute for Sustainable**  
**Economics and Logistics**  
**(Germany)**

**Motus Foundation**  
**(Poland)**



# PARTNERS



**Port of Karlskrona – Municipality of Karlskrona  
(Sweden)**

**Blekinge Institute of Technology  
(Sweden)**



**KLAIPĖDOS MOKSLO IR  
TECHNOLOGIJŲ PARKAS**

**Klaipeda Science  
and Technology Park  
(Lithuania)**

**Klaipeda State Seaport Authority  
(Lithuania)**



**PORT OF KLAIPEDA**

**KLTC-KSRC**

**NPPE  
Klaipeda Shipping Research Centre  
(Lithuania)**



## 07 WHAT'S NEXT ?

Even though the implementation phase of **Connect2SmallPorts** ends at 30th of June, we are not about to stop our activities in the field of maritime industry with focus on small and medium-sized ports. Regulations such as IMO 2030 or Fit for 55 create several digital and sustainable challenges for the port sector. In addition, we have identified new approaches, enlarged our networks and contributed to knowledge creation on small and medium-sized ports. These steams bear great potential for future initiatives and starting points for new projects.

However, one of our lessons learnt is the missing link and capacities of small and medium-sized ports towards transnational funding programmes offered. There are tremendous technology applications to support the digital and green transition of smaller ports, but often those technologies are either unknown for smaller ports or the financial capacities are too small for such investments. Hence, the **Connect2SmallPorts** project is initiating the pathway to institutionalise the **DigiTechPort** initiative as an **Excellence Centre for Digitalisation, Internationalisation and Transfer of Key Technologies in Small and Medium-Sized Ports**. The Excellence Centre serves as contact point for smaller ports to overcome their challenges in becoming sustainable and more competitive through digital and green transition processes.

**The QR Code to the website:**



**DigiTechPort** received already the first funding, founding members declarations have been signed and other projects are already running under this initiative. Therefore, we are looking forward to continuing cross-border cooperation projects to support small and medium-sized ports in the Baltic Sea.

# 08 ACKNOWLEDGEMENTS

**Connect2SmallPorts** would like to acknowledge the contributions of all project partners and associated partners including ports who worked on the project.

Below, there are names of persons and organisations those highly committed through its implementation:

- **Project management & coordination:** Dr. Laima Gerlitz, Christopher Meyer, Hochschule Wismar.
- **Researchers:** Dr. Laima Gerlitz, Dr. Lawrence Henesey, Christopher Meyer, prof. Vytautas Paulauskas, Dr. Robert Philipp.
- **The partners behind the report:** Motus Foundation, Hochschule Wismar, Blekinge Institute of Technology (BTH).
- **The design of the report:** Motus Foundation (Hanna Ołdakowska, Joanna Kniter, Julia Kosiek).
- **Project's co-financing :** EU Interreg South Baltic Programme 2014-2020.

We thank all project partners and the other stakeholders engaged within the project for your continued support in our efforts to contribute to the Connect2SmallPorts goals.

## Contact

Connect2SmallPorts

HOCHSCHULE WISMAR, UNIVERSITY OF APPLIED  
SCIENCES: TECHNOLOGY, BUSINESS AND DESIGN

EUROPEAN PROJECT CENTER

Philipp-Müller-Str. 14

Wismar 23966, Germany

<https://connect2smallports.eu/>

[christopher.meyer@hs-wismar.de](mailto:christopher.meyer@hs-wismar.de)

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2018-2022

