DELIVERABLE

D5.7 – Smart City one-stop-portal V2

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P	Public	**X**
C	Confidential, only for members of the consortium and the Commission Services	

1. Revision history and statement of originality

1.1. Revision history

Rev	Date	Author	Organization	Description
1	12.05.2016	Jan-Philipp Exner	UNIKL	Preliminary Draft
2	15.06.2016	Jan-Philipp Exner	UNIKL	Updating Text
3	15.06.2016	Jan-Philipp Exner	UNIKL	Updating Text with input from OS and DIN
4	30.06.2016	Jan-Philipp Exner	UNIKL	Last revisions
5	30.06.2016	Irene Facchin	TRILOGIS	Quality Check
6	20.12.2016	Bart De Lathouwer	OGCE	Update to reflect endorsement of CityKeys project
7	23.12.2016	Martin Fabisch	UNIKL	Updating Text
8	28.03.2017	Martin Fabisch	UNIKL	Updating Text (CityKeys endorsement)
9	31.03.2017	Martin Fabisch	UNIKL	Updating graphics
10	18.04.2017	Irene Facchin	TRILOGIS	Quality Check

1.2. Statement of originality

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

2. List of references

Number	Full Reference
1	*Giffinger, R. (2007) Smart cities – Ranking of European medium-sized cities, TU Wien*
2	*Cohen, B. (2014) The smartes cities in the world 2015, http://www.fastcoexist.com/3061051/this-really-exists-a-battery-pack-for-your-electric-standing-desk*
3	*The CityKeys Project (2017)* CITYkeys indicators for smart city projects and smart cities, http://nws.eurocities.eu/MediaShell/media/CITYkeysD14IndicatorsforsmartcityprojectsandsmartcitiesD14Indicatorsforsmartcityprojectsandsmartcities.pdf

3. Table of Acronyms

Acronym	Description
BSI	British Standards Institution, the national standards body of the UK
CEN	European Committee for Standardisation
CENELEC	European Committee for Electrotechnical Standardisation
D	Deliverable
DIS	(ISO) Draft International Standard
ECP	ESPRESSO Content Portal
EDP	Espresso Discussion Portal
EN	Either, European Standard or, part of a document identifier, indicating the English language version of a document published by the European Commission
ETSI	European Telecommunications Standards Institute
INSPIRE	Infrastructure for Spatial Information in Europe
ISO	International Organisation for Standardisation
KPI	(CityKeys) Key Performance Indicators
LandXML	Land extensible markup language
NWIP	(ISO) New Work Item Proposal
OGC	Open Geospatial Consortium
PAS	Publically Available Specification, a specific kind of document from BSI
PD	Public Document, a specific kind of document from BSI
PRF	In ISO/PRF, this stands for "proof", a mature but not yet published draft of a an ISO document.
SCG	SmaCStak Coordination Group
SmaCStak	Smart City Stakeholder Network
SPEC	Standard Performance Evaluation Corporation
TB	Technical Board

4. Executive Abstract

This document contains additional information to Deliverable 5.7 "Smart City one stop portal" (marked as "Websites, patents filing, press & media actions, videos, etc."). Aim of this WP5 *Smart City business framework* is to launch a portal that will act as container of training material on Smart City standards. The portal will presumably be based on an online service and will be structured according to the different Smart City domains identified within the project work. ESPRESSO modified the idea from the Moodle/Wiki-approach into a two-stage approach towards a distinction in a Content Portal and Discussion Portal.

During the last quarter of 2016, the EPSRESSO project decided to endorse the CityKeys KPI's (see document D4.5). The ECP will contain relevant information and training material of the identified Smart City Domains (People, Planet, Prosperity, Governance, Propagation) to publish these to the open public. The EDP is suited on the consortium itself as well as the SmaCStak network and was launched in February 2017 with specific discussions regarding domain-related questions. The Technical Board (TB) and the SmaCStak Coordination Group (SCG) will select and moderate these topics.

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7. Concept of the Smart City one-stop-portal

Goal of Task 5.4 *Creation of a cross-SDOs single point of access for training material on Smart City standards* is to launch a single point of access, which will act as container of information and training material on Smart City standards. The current landscape of standards is vast and many SDOs have published a vast array of existing standards. Hence, aim of this work package 5 *Smart City business framework* is to create a platform containing the most relevant Smart City standards for sharing the knowledge within the consortium and the SmaCStak Community.

ESPRESSO modified the initial concept from the Moodle/Wiki-approach into a two-stage approach towards a distinction in a Content Portal and Discussion Portal. The platform both in its variations - ESPRESSO Content Portal (ECP) and ESPRESSO Discussion Portal (EDP) - is accessible from the project website. Partner UNIKL will develop this task with the help of partner DIN and will use results from the respective work packages and the input from the SmaCStak Community.

Figure 1. ESPRESSO One-Stop-Portal.

7.1. ESPRESSO Content Portal (ECP)

The content portal ECP will contain relevant information and training material of the identified Smart City Domains to publish these to the open public. This document contains an overview of all the most relevant domains, their descriptions, and an analysis of relevant standards and standardization activities.

7.1.1. Standards based on key sectorial systems based on ISO

The upcoming categories are based on work from D2.1, which is based on the subdivision based on ISO 37210 (and CityKeys, see below) and show a potential fine-grained distinction for the published regarding the respective categories:

- Economy
- Education
- Energy
- Environment
- Finance
- Fire and emergency response
- Governance
- Health
- Recreation
- Safety
- Shelter
- Solid waste
- Telecommunication and innovation
- Transportation
- Urban Planning
- Waste Water
- Water and Sanitation

7.1.2. Standards based on key sectorial systems based on DIN

Due to an unprecedented interconnectedness, categorizing these challenges is not trivial. The project provides a few categories and provide examples of early standardization activities in the following sub-sections.

7.1.2.1. "Buildings and built infrastructures"

For the digitalization of economy and society, the digital transformation of cities and communities plays a major role. Sustainable traffic flow, energy efficient lighting, and charging stations are only some examples of future lead markets. In the next years, many cities have to modernize their street lighting, mainly with LEDs. This is the chance to create a unique digital infrastructure for the Smart City: from the simple light source to the integrated multi-functional street lighting infrastructure with public WIFI, sensors

measuring CO_2, as well as harmful pollutant emissions and electric vehicle charging points. Cities can gather data on regulated emissions, offer new services, and generate revenue instead of coping with high energy costs and expiring permits for outdated street lighting. Citizens profit from the benefits of these new services based on anonymous data such as improvement of traffic flow, health or environmental information.

However, the integrated multi-functional street lighting infrastructure needs standards as a precondition for market development. Definitions of components, interfaces or quality requirements are lacking. Communities interested in investing do not have the necessary framework for the procurement process yet. Together with the Urban Software Institute, DIN has formed an industrial consortium currently creating the first technical standard bringing together various technologies and industry stakeholders. DIN SPEC PAS 91347 will be available by the end of 2016.

7.1.2.2. "Mobility"

The topic of mobility is not solely limited to the transportation of people. While the number of people relying on affordable means of transportation is increasing, environmental considerations are also of paramount importance when evaluating the global mobility sector. One of the goals is therefore the creation of technical standards supporting innovative technologies always with the premise of increasing environmental protection. In many cases, increasing a system's intelligence inadvertently decreases the (negative) impact it has on the environment. *Intelligent transportation systems* (ITS) illustrate this impressively. By making smarter use of a transportation network, roads, rails, etc. will be used more efficiently.

Within the topic of mobility, electromobility is continuously carving out a larger piece of the mobility sector due to its profound technological changes over the last couple of years. Again, we are at the intersection where a number of technologies meet. The silo structure is no longer valid and it is becoming increasingly important for experts in the individual professions to understand each other. The German institute for standardization (DIN) has published a terminology standard that will allow various stakeholders to communicate with each other. The standard, DIN SPEC PAS 91340 was developed with German automakers and city planners. It is currently only available in German.

7.1.2.3. "Production"

A joint working group investigates the need for standards in the realm of production processes, in particular, projects revolving around *Industry 4.0*, i.e. standards in automation, data transfer, and communication systems for suppliers and producers with the common goal of computerizing traditional industries in order to increase productivity and value of their products. Here, the term *Smart Factory* has been coined to elucidate the benefits business partners and customers can expect from the fourth industrial revolution. Again, one of the major obstacles is the creation of seamless interconnectivity that will not be facilitated without the proper installation of standards. DIN SPEC PAS 91345 is providing a reference architecture model that will help understand the new, interconnected structure of the industrial work space.

7.1.2.4. "Urban Logistics"

A number of international logistic providers are currently developing a technical standard on accessibility of parcel boxes, both for private and public use.

7.1.2.5. "Security and safety"

DIN SPEC PAS 91331 is providing a classification of risks in international large-scale infrastructure projects. The standard was written in German, together with the city of Hamburg, insurance companies, German Society for Quality, amongst others. The ESPRESSO consortium is also in touch with the Horizon2020 project Smart Mature Resilience, which will develop technical standards on the safety of critical infrastructures (hubs, power plants, water purification plants, etc.). Not necessarily limited to the topic of smart cities, this standard is going to be of interest to ESPRESSO as well.

7.1.2.6. "Energy"

The production and distribution of electricity is a crucial pivot point in the 21st century. Germany's national initiative *Energiewende* (Energy transition) has gained a lot of international attention but also caused some concern among traditional energy providers who consider a large fragmentation of the electrical grid a problem for regulators. Technical standards will enhance the progress of this initiative and provide the necessary support for sustainable, more efficient energy production.

7.1.3. Standards based on conceptual Standards Interoperability Framework

A further approach for structuring the content of ECP will be based on work of the conception of ConceptuAl StandardS InterOPErability framework (CASSIOPEiA) including Management standards, Maturity Models and Indicators reflecting information models. The detailed parts for the content will be described in the following paragraphs.

7.1.3.1. Management standards

One relevant standards is ISO/PRF 37101 (*Sustainable development in communities - Management system for sustainable development - Requirements with guidance for use).* Other consensus publications were seen in (BSI PAS 181 *Smart city framework Guide to establishing strategies for smart cities and communities*), the ISO/PRF TR 37152:2014 (*Smart community infrastructures - Common framework for development and operation*) and City Protocol Society's CPA-I_001-v2 (*City Anatomy: A Framework to support City Governance, Evaluation and Transformation.*

7.1.3.2. Maturity models

Most relevant standards for maturity models are ISO/PRF 37101 (*Sustainable development in communities - Management system for sustainable development - Requirements with guidance for use*) and ISO/NWIP 37153, which contains a maturity model. Other relevant consensus publications and documents are BSI PD 8100:2015 Smart Cities overview – Guide and The Smart City Maturity Model, developed by the International Data Corporation.

7.1.3.3. Information models

The most relevant standards in terms of information models are ISO/DIS 37102 (*Sustainable development and resilience of communities – Vocabulary),* the ISO/IEC DIS 30182 (*Smart city concept model - Guidance for establishing a model for data interoperability)*, as well as both OGC 12-019 (*City Geography Markup Language (CityGML) Encoding Standard)* and OGC 15-111 |*(Land and Infrastructure Conceptual Model Standard (LandInfra)),* which is currently under development. Also important to consider is INSPIRE by the European Commission, which has developed a set of compatible information models for exchanging environmental data. These cover a number of themes including Transport Networks, Buildings, and facilities that may be involved in energy production or waste management.

7.1.4. CityKeys - Key Performance Indicators

The CITYkeys assessment method and the indicators are to be used to evaluate the success of smart city projects and the possibility to replicate the (successful) projects in other contexts. As follows from the smart city definition, success is determined by the transition across the entire ecological footprint of urban areas, simultaneously promoting economic prosperity, social aims and resilience to climate change and other external disturbances. The CityKeys Indicator Framework is divided into five major themes (people, planet, prosperity, governance and propagation) and several subthemes (e.g. health, pollution & waste, community involvement). [3]

Figure 2. CityKeys Indicator Framework.

7.1.4.1. People

The People side of sustainability refers to the long term attractiveness of cities for a wide range of inhabitants and users. Aspects include quality of living for everyone, especially for the most vulnerable citizens, education, health care, social inclusion, etc.

Subtheme definitions:

- **Health:** improving the quality and accessibility of the public health system for everyone and encouraging a healthy lifestyle

- **Safety:** lowering the rate of crime and accidents
- **Access to (other) services:** providing better access for everyone to transport, amenities and affordable services in physical and virtual space
- **Education:** improving accessibility and quality of education for everyone
- **Diversity and social cohesion:** promoting diversity, community engagement and social cohesion to increase the sense of community.
- **Quality of housing and the built environment:** encourage mixed-income areas, ensure high quality and quantity of public spaces and recreational areas, and improve the affordability and accessibility to good housing for everyone. [3]

7.1.4.2. Planet

The ”Planet” aspect of sustainability in the first place refers to contributing to a ‘cleaner’ city with a higher resource efficiency and biodiversity and being better adapted to impacts of future climate change such as (in Europe) increased flooding risk, more frequent heat waves and droughts. Included in this theme are thus less consumption of fossil fuels and more generation and use of renewable energy, lower waste generation and less air pollution. As our planet extends beyond the city boundary, impacts of urban consumption in other parts of the world, are explicitly included.

Subtheme definitions

- **Energy and mitigation**: Reduce energy consumption, use waste energy and produce renewable energy
- **Materials, water and land:** Creating a society that treats its resources (materials, water, food and land) more efficiently and sustainably, among others by decreasing consumption and increasing recycling and renewable production (thereby considering ‘spill-overs’ to other resources).
- **Climate resilience:** Adapting to climate change by increasing the resilience of vulnerable areas/elements.
- **Pollution and waste:** Decreasing the emissions to the environment (in the city or elsewhere) (e.g. waste, noise and pollution to air, water and soil).
- **Ecosystem:** stimulating biodiversity and nature conservation. [3]

7.1.4.3. Prosperity

Contributing to a prosperous and equal society and supporting affordable, green and smart solutions. On the project level Prosperity stands for economic viability and the value of a smart city project for a neighbourhood, for its users and its stakeholders, and even its indirect economic effect on other entities. Economic or financial indicators often need to be accompanied with an in-depth description of the business case, as single indicators are insufficient to evaluate e.g. the distribution of costs and investments.

Subtheme definitions

- **Employment:** Improving local employment opportunities and skills
- **Equity:** decreasing poverty and income inequality
- **Green economy:** improving the circular and sharing economy and sustainable/local consumption and production.

- **Economic performance:** increasing GDP and project performance (internal performance)
- **Competitiveness and attractiveness:** Improving the appeal of the city for residents and businesses.
- **Innovation:** facilitates innovation and creativity (through e.g. open data, knowledge sharing and cyber resilience). [3]

7.1.4.4. Governance

Contributes to a successful process of project implementation as well as to a city with an efficient administration and a well-developed local democracy, thereby engaging citizens proactively in innovative ways.

Subtheme definitions

- **Multilevel governance:** Increasing support for smart city initiatives by providing smart city policies and budget at different government levels.
- **Organisation:** Facilitate the implementation of (integrated) smart city policies by improving the organisation of the project/city with regards to;
    - The composition, structure and quality of the project team/city administration;
    - The quality of the implementation process;
    - Sound leadership by the project leader(s) and city politicians;
    - Transparency of the organisation.
- **Community involvement:** increasing citizen participation and enhancing the active involvement of end-users, the community and professional stakeholders in city developments. [3]

7.1.4.5. Propagation

Improving the replicability and scalability of smart city project solutions at wider city scale. Propagation is about the potential for dissemination to other locations, other contexts and other cities. Propagation (both transfer to other locations and countries, and up-scaling from small single projects) depends in the first place on inherent characteristics of the (innovative) smart city project. In practice propagation also depends on external factors such as market conditions.

Subtheme definitions

- **Scalability:** Increasing the potential for scaling up successful SC solutions (considering both geographic scale and thematic integration potential) to achieve wider impact in the city.
- **Replicability:** Increasing the potential for replicating successful SC solutions in other cities. [3]

7.1.5. Realization

The realization was done using a designated section on the project website. During the 2nd project year ESPRESSO will analyse the pilot activities to develop training material for Smart City standards. The ESPRESSO Content Portal is closely linked the ESPRESSO Discussion Portal, which will use the ECP as basis for upcoming discussions and will help to define the requirements of the training material.

The first version of the ESPRESSO Content Portal was launched during M12. The ECP was integrated into the "ESSPRESO Tools" Section on the Website. The structure of the portal was influenced by the key sectorial sectors by DIN.

Figure 3. ESPRESSO Content Portal (Version 1 – M12).

During the last quarter of 2016, the EPSRESSO project decided to endorse the CityKeys KPI's (see document D4.5). The ECP was restructured during the redesign process of the website. Now the ECP is located in the "ESPRESSO Content" Section on the website and shows an overview of the major themes (People, Planet, Prosperity, Governance, Propagation) and the subthemes defined in the CityKeys project. As part of the website it can easily be used to provide training material to the users. The advanced features of the web page allow the direct integration of videos or multimedia contentinto the ECP.

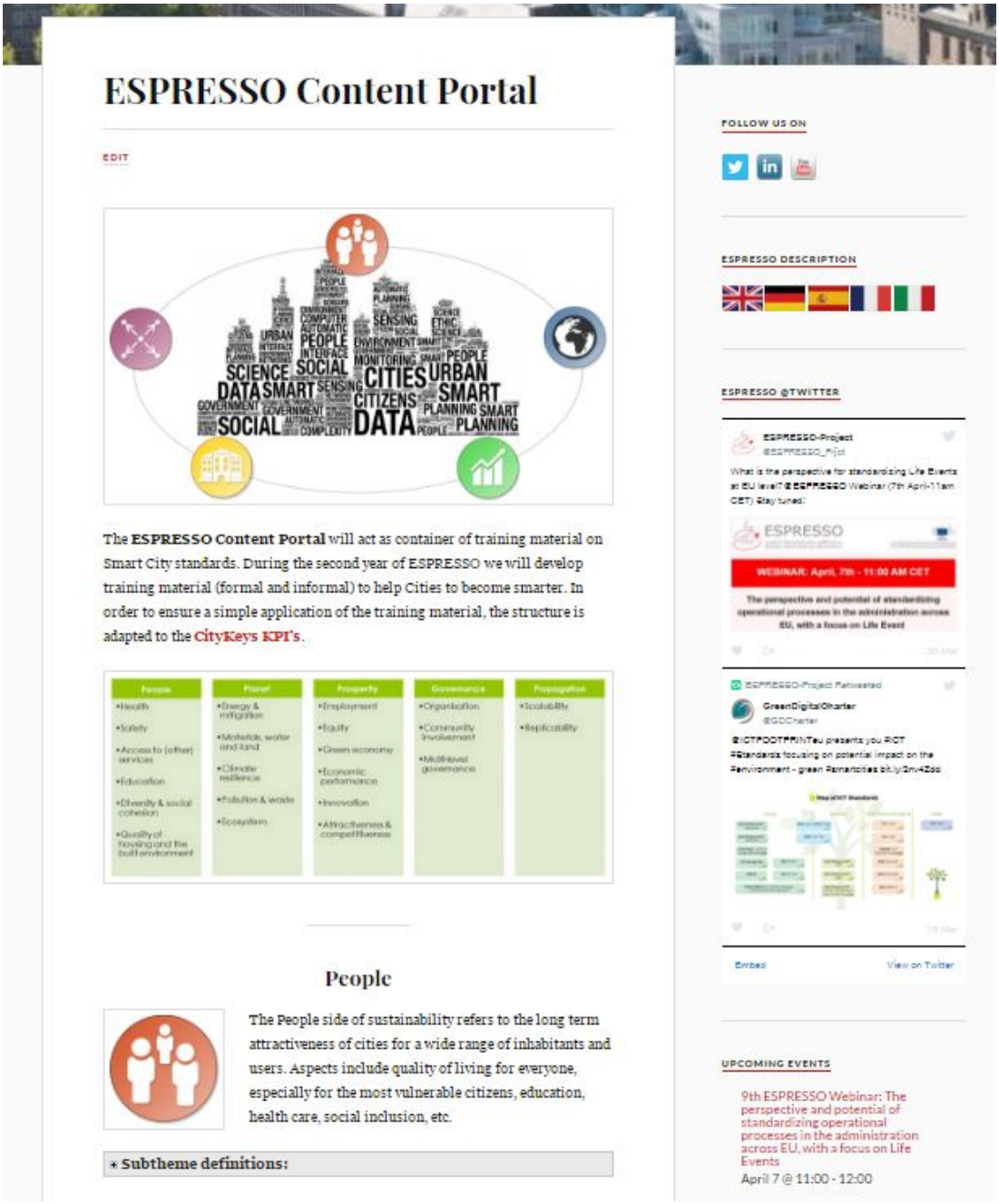

Figure 4. ESPRESSO Content Portal (Version 2 – M14).

7.2. ESPRESSO Discussion Portal (EDP)

Whereas the Content portal will be primarily for the open public audience, the EDP is suited on the ESPRESSO consortium and the SmaCStak Community. Within, the EDP, specific discussions regarding domain-related questions will be launched. The selection of these topics, as well as the moderation, will be done by the Technical Board (TB) and the SmaCStak Coordination Group (SCG). ESPRESSO will use the topics discussed on the regular ESPRESSO Webinars and transfer them to the EDP in order to provide a deeper elaboration of the topics and a continuous contact with the members of the SmaCStak. The portal is hosted by DIN and was launched in February 2017.

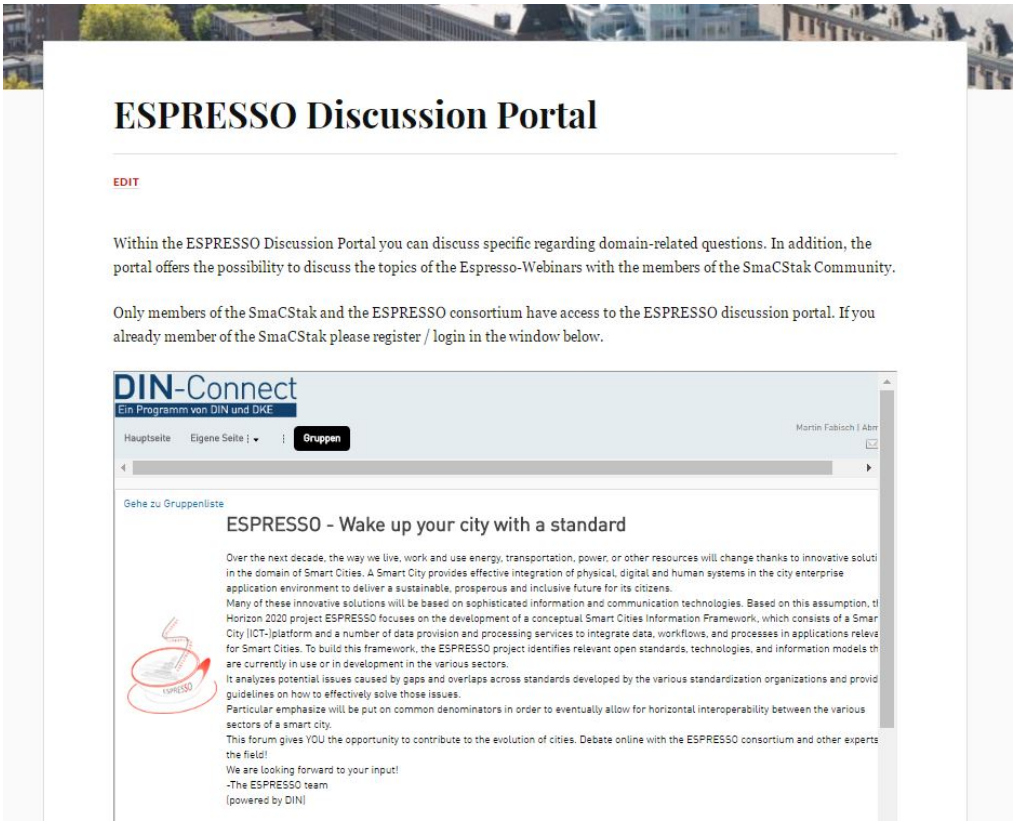

Figure 5. Screenshot ESPRESSO DISCUSSION Portal using the platform of "DIN-Connect".