Can Smart Technologies Revitalize the Ruhr?

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Abstract((
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Recent enthusiasm about smart technologies, heavily promoted by cities such a
Vienna, may nurture hope in the Ruhr that the smart city paradigm could revit
The new smart technologies could certainly address some of the complex spat
challenges of the polycentric urban agglomeration, such as declining public s
people, energy conservation or more convenient regional mobility. Though all
accomplishments will undoubtedly contribute to maintain or even raise the qua
residents and households, there are not nay signs that smart technologies can
and attract new innovative industries and create new employment in the old in

The paper will explore whether and where smart technologies can revitalize th
discuss what kind of smart technologies may have a chance to impact the regio
polycentric old industrial region, and it will identify the constraints, obst
region-wide introduction of smart technologies. The ongoing project Innovati
serve as one exemplary case study.

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1. Introduction

Despite 50 years of continuous state support and the impressive efforts of th
to re-imagine the declining industrial region, economic development in the Ru
behind more prosperous regions in Germany. Unemployment is high and strategie
structural change and revitalize the regional economy do not show striking res

Recent enthusiasm about smart technologies, heavily promoted by cities such a
Vienna, may also nurture hope in the Ruhr that the Smart City paradigm could s
and accelerate efforts to revitalize the region. There is no doubt that new
could address some of the complex spatial and economic challenges of the poly
agglomeration, such as declining public services, aging of the people, energy
more convenient regional mobility. Although all such accomplishments will und
contribute to maintain or even raise the quality of life of residents and hou
indicators that smart technologies can and will generate and attract new inno
remains to be explored whether they will new employment in the old industrial
bring about new challenges.

The paper will explore whether and where smart technologies can contribute to
region, to turn-around the old industrial structure of the Ruhr. It will dis
technologies may have a chance to impact the regional economy in a polycentri
region, it will identify potentials as well as constraints and obstacles of t
wide introduction of smart technologies- It will also likely spatial implicat
technologies in the Ruhr and the consequences for urban and regional develop

In 2015, the Ruhr, once the industrial powerhouse of Germany is not in a good
with the city regions in Southern Germany (Munich, Stuttgart RheinNecker and Frank
region with its 5 million inhabitants, when measured by traditional economic
lagging behind, as much as the former industrial regions of Eastern Germany.
high, the budgets of many local governments in the region are under state sup
unnecessary expenditures for local development, be it for infrastructure, cul
legally not defined measures to support structural change.

Since coal mining and steal production and related forward and backward linka
decline in the 1960s not long after the second world war, structural change h
concern of state and local governments. Since, many strategies of the state h
address the numerous challenges of the region. The transport infrastructure h
Universities and technology parks have been built. The globally acclaimed IBA
initiative has successfully improved the notoriously bad image of the region
mediocre cultural profile. During the last decade of the 20th century regional marketing welcomed
the metropolitan fever of German city regions. Though branding the polycent
metropolis, it seems, did not impress investors young entrepreneurs to locate
Ruhr and talents to stay in or to move to the region.

Though economic indicators tell another story, the quality of life in the regi
once much polluted air is clean. Salaries and wages are high. Housing is comp
Excellent educational and health facilities are available. High quality and i
events are offered all over the year. Leisure infrastructure is abundant, ubi
Access to green corridors and nature is easy. The accessibility to other city
Europe (Amsterdam. Brussels, Cologne/D sseldorf, Frankfurt and Paris) is exce
2012).

However, all this could not impress investors from abroad to invest in the Ru
former image of an industrial region, or the fact that the region has no real
Or is it the fact that the Ruhr does not have an internationally read newspap
readers outside the regions about regional innovations, achievements and succ

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rather the unbroken dominance of decades of social democratic politics and th
local governments and five counties represent a complex political environment
long established regional authority, the Regionalverband Ruhr could not turn
regional economic development agency. Or is rather the influence of a few lar
corporations, which, supported by political networks they have not much inter
dominance. There are many other reasons, why the Ruhr has lost out in the fie
competition among city regions. One reason is that that it has been a working
strong unions for more than a century, where, in contrast to other German cit
Hamburg, Cologne of Munich, the bourgeois middle class has never evolved from
status. Hence involvement in regional political arenas was left to vey conser
working class union and party leaders. This also explains the fact that the r
developed an open, outward looking international mind-set. There has never be
to sell coal, steel and energy. Public subsidies made it easy for the energy
from the demand of 5 million people in the region and from the export of stee
water. And the fact that the state of North Rhine Westphalia lost its privile
Germany s capital city and the shift of public interest and funds to regions
did also hit the Ruhr.

In the end it may be the lack of urbanity, the lack of entrepreneurial spirit
lifestyle narratives, praising the immense potential of the region in interna
(Kunzmann 2014). It seems the polycentric region has to accept its diminishi
competitive urban region, very much like similar traditional industrial regio
(Detroit or Buffalo) Britain (Newcastle or Liverpool) or France (Metz and Lil

A very brief look into the economic structure of the Ruhr reveals its structu
region, which is lagging behind more modern metropolitan city regions in Euro
economy in the Ruhr is still dominated by energy production and related industries
influential agenda setting large energy giants are under strong economic pres
losing their power. In 2012 roughly 20 percent of the labour (around 1.5 mill
employed in industries, 20 percent in trade and commerce and another 20 perce
services and public administration (RVR 2012). Only recently, the last automo
Ruhr, Opel in Bochum, has been closed. Besides coal exploitation and energy
logistics and health are key competences in the region (RVR 2014, 43.) Both s
a long history of regional railway and water based-transport corporations and
evolving from health care services for miners and steelworkers. Unemployment
traditionally high. In 2015, the unemployment rate in the Ruhr was 10.6 perce
force, while Germany had 6.3 percent and North Rhine-Westphalia (without the
percent. Dortmund, the biggest city in the Ruhr (population 2012: 612.000) i
burdened by an unemployment rate of 12, 5percent.

According to official statistics, IT employment in the state of North Rhine-W
(self employed jobs only) was around 220.000 in 2013 (Germany as a whole 1, c
around 20 percent of the IT jobs were in the Ruhr (45.000), with Dortmund (11
(9.600) as the two most IT oriented locations (IAT 2015). Nevertheless the s
Westphalia is optimistic to becoming a hub for innovative, high-tech companie
home to some 23,000 ICT (IT and Communications) companies which generated a t
of EUR 92 billion in 2010, accounting for about 47% of Germany s total ICT-re
that year (ICT-NRW Cluster 2015).

On more fact has to be noted: The Ruhr is not an important Internet communica
Germany or Europe. Besides London, Paris, Amsterdam, it is Frankfurt, where
capacity is concentrated. Only Darmstadt shows a relative high score of inter
German NUTS 2 regions in 2009 (ESPON 2013, 14) -

Recently a new hope has risen on the economic horizon: Smart technologies (Ba
influence vested interests and with the support of larger corporations such a

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Siemens, many cities around the world are promoting smart technologies and bra
as smart cities. The Ruhr, so far, has not followed the new mainstream, at le
region and not under label smart Ruhr . The region, known for its pragmatism
Smart City paradigm to accelerate structural change, not even as marketing we
The paper aims to give some first answers to this question.

2. Smart cities: A new paradigm of urban development?

Since the beginning of the 21st century the Smart City concept is receiving c
and attention among media and local governments, searching for popular vision
development However, research on the importance and on the implications of sm
on city planning and development is still scarce (Kunzmann 2014) .

The convergence of information and communication technologies and the applicat
technologies by industries and citizens is changing cities and regions quite
anything experienced in the past. It is second wave of industrial revolution.

Cities are becoming smart not only in terms of the way we can automate routin
individual persons, buildings, traffic systems but in ways that enable us to
analyse and plan the city to improve the efficiency, equity and quality of li
time. This is changing the way we are able to plan across multiple time scale
prospect that cities can be made smarter in the long term by continuous refle
term (Batty et. al 2012 , 482)

Very much promoted by industries, like IBM, Cisco or Siemens, that are eager
sell their high tech and ICT products and services, the new paradigm of the S
emerged, based on GPS, I-phone, I-pad and similar technologies. Being smart i
agenda, on the agenda of city mayors, city planners, and city builders, in ci
Vienna or Berlin, and in China, were more than 80 cities have recently been s
cities for Smart City development.

The interest in Smart City development tells that in the beginning of the 21st century, the
infrastructure development is evolving and a new group of professionals made
communication specialists is entering the stage of urban development, similar
developments a century ago. They are the new urban engineers, designing and i
urban communication networks, without which the cities would not any longer b
organize e-shopping and mobility for young citizens, and public services for
rural areas. The technology driven products and services will certainly chang
will force local governments to act. So far, it seems, only very few cities h
hardly prepared to deal with the new challenge and to provide the expertise t
with the economic drivers of the new technology.

The emerging Smart City paradigm will add another dimension to urban developm
this paradigm a new type of urban planner will enter the stage, the Smart Cit
planner. While traditional planners are discussing with citizens about how fu
should look like, the new planners, together with powerful global ICT corpora
working behind the stage to develop a totally new urban infrastructure for sm
the future city. The brains behind all that reside in Silicon Valley; and, i
Zhongguancun in China.

The Smart City paradigm is in a process to conquer the minds of architects, a
policy advisors, politicians and CEOs of large international corporations, as
young urbanites, trapped in the hassle and information overload of daily urba
is gradually entering public and academic discourses on future directions of
The temptations of new mobility, information and communication technologies c

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software and communication industries are too strong to resist. The technolog
of a few global corporations and their regional subsidiaries and partners, wh
influenced locally and regulated by single national governments. The Smart Ci
promise and a temptation. Whether they are young or old, citizens can expect
accessible technologies can increase their individual quality of life, make th
enjoyable. The Smart City paradigm, clearly, has both a good and a dark side.

Smart City promoters argue that they aim to make life more convenient for all
they are rich or poor, old or young, privileged or underprivileged. Over long
Smart City s paradigm claim, all citizens will be equipped with i-Phones and
will have ubiquitous access to a plethora of related public and private servic
improving application software. Such software will allow them to get, whereve
hours a day, all the information they require to use public transport, to fin
or a car-sharing location; to find a doctor or a nurse, to make business, to
old and new partners, to find reasonably prized or designer hotels, to get ac
apartments, to sell whatever they wish to sell or buy consumer products they
cheaper price or in another quality, now or later. The new technologies offer
applications. The promoters of the Smart City promise that using smart techno
life in the city better and more enjoyable. They can easily convince mayors a
that (only) smart technologies guarantee human survival in a complex world, i
cities.

The term smart technologies covers a wide field of applications, from big dat
broad range of i-phone applications., from intelligent energy production an
mobility Smart technologies offer an endless range of applications, which eas
whether they are young or old to go for it. In everyday life there are manifo
improve quality of life, to solve problems, to overcome constraints, to save t
for information and locations, for partners and help, to save money, to econo
The community of Smart City developers argues that smart technologies can

- Improve individual mobility and orientation in cities and regions
- Create access to any kind of information
- Make consumers independent from opening times and locations (e-shopping)
- Raise personal security at home and safety on the road
- Save energy by numerous systems of controlling consumption
- Facilitate education and training (e-learning)
- Improve access to public services
- Make it easier for tourists and visitors to enjoy cities and city life
- Assist elderly and physically handicapped to get all kind of personal medi
- Help people to find a partner

Obviously, saving time in finding information and facilitating communication
motive for applying smart technologies, though even smart technologies can ra
stress at work and at home.

The areas of smart technologies vary from interest group to interest group. Ge
following fields are addressed: Smart mobility , smart energy, smart communic
governance, e-health, public safety, e-learning and public information.

The fascination, the smart technologies receive from customers a, clients, fr
professionals in many disciplines, is easy to understand and there is no reas
technologies should not be applied. Arguments that the individual application
technologies will eliminate privacy are mostly accepted or just pushed aside.

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that smart technologies in the end depend upon a few global corporations only
impress citizens and to alarm cities.

So far, however, not much research is done on the spatial impacts of smart te
development and on planning for city development (Streich 2014, Exner 2014) C
media do hardly report about negative implications and users are not alarmed.

3. Smart City Development Drivers

The Smart City excitement is driven by many, who consider the movement to be
instrument to address present and future urban challenges, to improve quality
just to benefit from developing and selling smart technologies to cities. Giv
no common understanding of the fuzzy Smart City paradigm, the approaches to t
considerably.

> Large and globally active corporations (such as Apple, Google, Siemens,
> or, Cisco have realized that smart technologies are the drivers of innov
> economic development in the 21st century, and that applying smart techno
> development is meeting global demand and support from a broad spectrum

> Governments at all tiers of decision-making and planning in Europe have
> Smart City development as a much valued policy field of public policies
> economic environments. The European Community stands not aside, when it
> smarting cities in Europe. Under the Horizon 2020 programme, it has laun
> initiative 'Fostering Smart Cities and Communities' This initative is pa
> Societal Challenge 3 'Secure, Clean and Efficient Energy', it aims at
>
> finding innovative energy solutions (e.g. energy efficiency, electric
> cooling supply systems, and integration of renewables in built environme
> with transport systems, smart construction and urban planning solutions,
> water treatment as well as ICT solutions for urban environment with the
> transform cities and urban areas towards a low-carbon society.
>
> Under the initiative 'Fostering Smart Cities and Communities', targeted
> funded
>
> . that support the convergence of industrial value chains of en
> and ICT sector for smart urban applications. At the same time, new techn
> organisational, planning and business models need to be developed and te
> scale according to the needs of cities and communities and their citizen
> needed to understand social, environmental, economic and cultural issues
> involved with this transformation. (CEC 2015)

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To speed up the deployment of these solutions, the Commission initiated European Innovation Partnership (EIP) on Smart Cities and Communities that European cities, industry leaders, and representatives of civil society to urban areas.

.So far, the EIP on Smart Cities and Communities has received some 370 commitments to fund and develop Smart City solutions in the areas of en transport. These commitments involve more than 3,000 partners from acro create a huge potential for making our cities more attractive, and create opportunities. (Laurila 2015)

Research institutions and researchers in a broad spectrum knowledge inc supported by industries, governments and research foundations are offeri competence to carry out basic and applied research in the field.

Encouraged by global success stories, and often supported by speculativ funds university graduates, young entrepreneurs and start-ups have reali cities are a fascinating field to start a business and make a fortune.

The community of architects and urbanists, continuously seeking innovat to make cities more liveable, and more beautiful, has discovered the Sma as an action field, which receives positive response from both politici

City governments, forced by globalisation and experiencing budgetary li addressing urban challenges, providing security and for the provision o to all citizens, expect that using the Smart City label will raise their i competitiveness , and allow them to offer better services to citizens.

Smart cities have become a favourite theme of the media. They are fasci images, Smart City promoters and smart technology developers can provid is easy to communicate and to sell to producing industries for placing advertisements.

The seemingly insatiable interest of consumers in smart technologies dr and encourages industries. Start-ups and public institutions to develop support smart products and services Young consumers, not just young fre cosmopolitan techno-affine generation, have welcomed the I-phone dominat which has changed information and communication modes of the 21st century.

It is a large group of people, enterprises and institutions, driving Smart Ci train is moving on, accelerated by software developers, hard ware producers a Two drivers deserve special attention: The internationally active German Frau and IBM, the influential US corporation.

Worldwide, the Fraunhofer-Gesellschaft employs a staff of nearly 24,000 scien and support staff, who work with an annual research budget totaling more than this sum, around 1.7 billion euros is generated through contract research fro and publicly financed research projects.
On their website the instituion is introduced as follows:

Europe s largest application-oriented research organization. Our resea geared entirely to people s needs: health, security, communication, energy and As a result, the work undertaken by our researchers and developers has a sign people s lives. We are creative. We shape technology. We design products. We

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and techniques. We open up new vistas. In short, we forge the future . (www.
retrieved 26.05.2015)

Four of the 66 institutes and research units of the Fraunhofergesellschaft, a
Ruhr.(https://www.fraunhofer.de/en/fields-of-research/science-year- 2015-cit
) .Already in 1994 the Fraunhofer Institute for Applied Photovoltaic had been
Gelsenkirchen, in the centre of the Ruhr,. Since 2007 the city hosts the Frau
Solar Energy. The other three focus on material flows and logistics, on micro
software and systems technology (RVR 2012, 53).

The German Fraunhofer Institute for Open Communication Systems in Berlin, spe
movement to turn cities smart, is selling the message as follows

> WE MAKE CITIES SMART : Smart cities have a lot to pull off.
> to be able to get from A to B at all hours, by car or public
> and telecommunications 24 / 7. They should even be able to ge
> at midnight, not to mention apply for a new driver s license
> arrival. Emergency rooms and hospitals can never sleep, and r
> Life in the city no longer comes to a halt when the sun goes
> isn t enough for nocturnal city-dwellers. The city should be
> adapt to the needs of everyone, offering the right thing at t
> efficiently, sustainably and ecologically. And yet, the city
> What s private should stay private, and it should be protecte
> want a digital garden fence so they can feel safe and secure.
> and the ability to lose oneself in the city s undergrowth are
> jungle. Ultimately, the success of the Smart City will be det
> reliability of critical infrastructures and the efficient use
> between freedom and control.

(Focus 2014,11)

The job of the Smart City is to help its inhabitants use scarce resources as
sustainably as possible. It should also enable its citizens to lead a good, s
them the freedom for creativity and innovation. The researchers at Fraunhofer
working on projects which aim to continually improve the everyday lives of re
of the future despite rising population numbers, more traffic, growing envi
many other challenges.

The Centre in Berlin presents their mission as follows:

Urbanization, globalization, demographic and climate changes are putti
demands on our cities. At the same time, however, greater opportunities to ma
material and human resources efficiently are also being created. It is the go
to seize these opportunities. An important basis for this process is the inte
and communication systems into the various technical systems and infrastructu
enables the flexible control of supply and disposal networks, especially for
gas as well as goods, and makes novel solutions for mobility, administration
the city possible. Citizens, businesses, institutions and government are in c
increase the quality of life and work of all parties through efficient and in
flows. The city becomes more of a service provider for its citizens and busin

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things keep running smoothly through seamless and transparent administration
optimally networked city not only makes everyday life easier in all aspects o
provides environmentally sustainable solutions. The Smart City is an informed
mobile, safe and sustainable city.
(Fokus 2014).

The IBM message is not much different. They sell the application of smartness
fields: Planning and Management, People, and Infrastructure. (IBM 2015):

Source: IBM

4. Smart City Development in the Ruhr

With the exception of Dortmund, neither the region as a whole nor any other c
visible promoting the Smart City paradigm. However, numerous activities take
region, which can be linked to the concept. These activities such as ICT. NR
Information and Communication Technology) , are mainly driven by government p
state of North Rhine-Westphalia. These activities (such as Innovationcity Ruh
by projects supported by the Initiativkreis Ruhrgebiet (an Association of 70
from across the Ruhr), by the Mercator Stiftung, an influential private found
Fraunhofer Gesellschaft., the traditionally strong logistic cluster in the Ru
SMEs developing and selling smart technology applications, such as the Matern
private IT company headquartered in Dortmund with more than 1500 employees on
in Europe, Qinscape, another IT Company located in Dortmund, developing softw
offering e-learning courses under the label Jaspersoft University., or CCS Ch
Systems , developing and producing magnet and chip card sysdtems in the city
addition there is a broad community of researchers at regional universities a
working in the field, benefitting from European or Federal German research pr
North Rhine- Westphalian policies and state subsidies.

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A few corridors to Smart City development in a broader sense will be briefly
smart city development in the Ruhr are presented thereafter, the ICT-NRW prog
state government, the logistics cluster initiative, the energy turn projects
research institutes, supported by the Mercator foundation, the Innovation cit
the ambitions of the city of Dortmund to brand the former industrial city as

ICT

ICT.NRW is a business cluster connecting companies, associations and individu
and Communication) sector in state of North Rhine-Westphalia. They describe t
follows (IKT 2015) (www.ikt.nrw.de , retrieved 125.05.2015)

The objective of ICT.NRW is the sustained promotion of the region as an impo
productive hub for IT and communication technology. Inspired by the motto In
Integrated. Innovative , the organisation focuses on using intelligent ICT to
generation of solutions for North Rhine-Westphalia s strong and long-establis
industries. Intelligent energy systems and government project Industrie 4.0,
key role in two of the biggest challenges facing Germany: the fourth industr
the country s wide-scale transition to renewable energy.

Drawn from the world of economics, academia and politics, its members are w
transform the ICT market in the state. ICT.NRW focuses on the early identific
strengths, its synergy potential and its forward-looking ideas, and on provid
the ongoing process of innovation. Raising awareness of North Rhine- Westphal
for the ICT sector is another important objective at ICT.NRW. As part of its
activities, ICT.NRW hosts cooperative and networking events, assists companie
fair exhibits and business trips, and also publishes sector and trend analyse
(IKT 2015)..

Efficient and Green Logistics

In 2010 the Fraunhofer Institute for Material Flows and Logistics in Dortmund
NRW EffizienzCluster Logistics upon initiative of the German Federal Ministry
Research, and supported by the Initiativkreis Ruhr, the agiplan GmbH, the Fra
Gesellschaft, PwC, Stute Logistics, the Business Development Agency of the Ci
as well as the Last Mile Logistics Network Herne. Around 170 companies and 28
facilities participate in the unique network, including the port authority of
biggest inland port. The Effizienz Cluster is well established as the leadin
innovation cluster for logistics in Europe! Now, the companies are invited to
potential of the Cluster and to transfer the ideas and concepts into innovati
The much praised research project Green Logistcs of the Cluster has receive
in the Ruhr.

In the EffizienzCluster LogistikRuhr, more than 180 partners from research an
working together on logistic challenges in about 40 research and associated p
requirement and target

The cluster aims to facilitate tomorrow s individuality - in terms of the
goods, mobility and production with just 75 per cent of today s resources.
And to develop concepts and solutions for bundling logistic and non-logistic
CEPs, nursing care) with regard to demographic changes and for bundling varic
goods flows in order to reduce logistics traffic in urban areas, partcularly

Taking solutions for navigation systems, access restrictions or require
innovative transport systems into consideration.

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Concepts that allow the integration of electro-mobility in urban supply

Innovative goods transfer systems for the last mile to round off the conc
supply.

In order to ensure urban distribution is upheld, the logistics services provi
partners will be bundled in a Smart Grid for Urban Supply a kind of an inte
power grid. The Smart Grid is considered to be a comprehensive supply networ

More than 160 companies and twelve scientific institutes work on joint and
in Europe s largest research and innovation cluster for logistics. The spectr
ranges from SMEs to international corporations. Furthermore, the efficiency c
collaboration with partners the development of a European technology platform
scientific establishment and think tanks, the Fraunhofer Institute for Materi
(IML), the Technical University Dortmund and the University of Duisburg-Essen
initi- ators of most of the research projects.

.(Effizienz Cluster Logistik file:///Users/Desktop/ index.php.webarchive

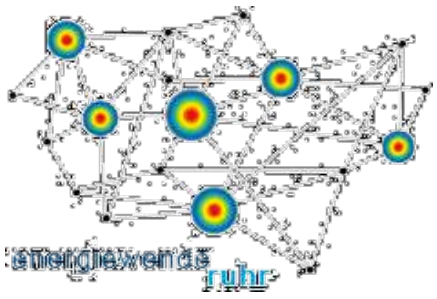
Energy Turn Ruhr

Smart technologies in Germany are mainly promoted to save energy. This coinci
German Government s decision to shift to renewable energy (wind, sun, water)
all coal and nuclear power plants. Knowing that most energy can be saved by b
focus is on measures to reduce energy consumption by better building technolo
isolation and intelligent heating systems.)

Another initiative to promote the reduction conservation of energy consumpti
the innovation city pilot project, in Bottrop, a traditional coal mining city
80.000? of is aiming to prove that innovations in

In recent years, like many other regions, supported by EU programmes and the
the Ruhr and the city of Dortmund have promoted cultural and creative industr
IHK 2013), Following mainstream hype the region has impressively contribution
industries to the regional economy is marginal. The region

A related comprehensive and interdisciplinary initiative supported by the reg
foundation is the ambitious energy turn research programme (Energiewende Ruhr
promote the energy turn in the region by developing elemnts of a regional imp
strategy (Schule et al, 2015) .



Innovation City Bottrop

In 2010, upon initiative of the "Initiativkreis Ruhr", an ambitious competiti
development project had been launched in the region. The city of Bottrop, a c

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population of around 80.000 won the fierce competition. The aim of the proje
complete urban district into an example for energy efficiency. The concrete a
emissions of a city district by half and thus to increase the quality of life

The pilot area of the InnovationCity Ruhr covers the inner city of Bottrop an
urban districts. 67,000 people live and 22.000 work in the pilot area in more
The area represents all well-known facets of the Ruhr region. The pilot area
function mix of uses (housing, shopping, offices, industries), grown over dec
incremental, semi-planned mode. The urban fabric is not spectacular. It refle
tradition of the region. Like most other urban districts in the Ruhr area is
pressure.

To carry out the project the Innovation City Management GmbH has been establi
private partnership. The City Management GmbH is a company borne by five shar
supporting the company as well as the project with staff and know how. The co
coordinates and controls an coordinates the InnovationCity Ruhr project. The
innovation process and offers expertise in climate-optimised urban redevelopm
energy transition to other cities and companies as a consulting service. In c
several partners, InnovationCity Ruhr | Model City Bottrop is run by an inter
engineers, urban planners, scientists and further experts in order to realise
redevelopment of the pilot area.

The project is developed along five integrated action areas: Housing, Industr
and urban development.

Housing: Reducing energy consumption of about 60 percent of the more t
privately owned single family houses.
Industry: Optimizing industrial production processes under energy reduc
perspective, and improving energy efficiency in about 2000 private
public buildings.
Mobility: A mix of actions to promote energy saving mobility in the pil
Energy: Decentralizing and optimizing and energy production and intelli
of energy production and energy consumption.
Urban development: Additional action to integrate the sectoral action f
supporting measures (lightning, greening, action research etc.), and
urban design.

To guide the work in the five action fields and to transfer the experience of
implementation to other cities. disseminate the experience of the project, a
handbook has been produced by a consortium of private consultants, who had al
the master plan (Innovation City Ruhr, 2015).

The project is still ongoing. So far no assessment has been made which could
achievements and transferability. No figures are available how much the proje

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the public sector (The state of North Rhine-Westphalia and the city governmen
much regional energy stakeholders in the Ruhr contribute to the pilot project
private house owners are subsidized, when renovating their homes to meet the
standards

Tough the ambitious project does deliberately not use the Smart City label an
smart technologies, smart technologies will be essential ingredients of all t
selected five action fields. If successful and financially feasible, the proj
impressive model for smart energy efficient urban redevelopment, in the Ruh
beyond (Bittrich 2014) . It could bring back the Ruhr into the league of Euro
are considered to be forerunners in sustainable development

Smart City Dortmund

In 2011 the city of Dortmund had successfully applied to IBM to partici
Smarter Cities Challenge Programme, launched by IBM in 2008 as a follow-up to
Smarter Planet initiative. Benefitting from its global network, IBM is commun
which aims to promote a more efficient use of Information in urban regions. I
City established the Dortmund Talent Initiative (IDT) to develop the talent
all Dortmund s citizens regardless of gender, nationality, religion or educat
their parents, and to enable them to live on a self-determined, socially inde
city (IBM 2012) .

Dortmund has been one of 100 cities worldwide that are participating in
Following Richard Floridas findings that cities have to attract talents to be
the Smart City initiative in Dortmund has been .to develop talent to prepa
the IT industry , to promote social collaboration in the city (. encourage
organizational boundaries to foster creativity and achieve better results) ,
new information and communication technologies can be used to improve the rel
between different actors in the city and to attract innovative talents to the
has been considered as an essential milestone for a road map to structural ch
becoming a Smart City (Dortmund 2015)

The Smart City imitative of Dortmund was linked to Smart NRW, a programme, wh
launched by the state government in cooperation with IBM to develop visions f
regions. The programme was interlinked as well with the Cluster IKT.NRW initi
state supported initiative to promote cluster development. The Ruhr has been
innovative in various forms.

However, as it happens quite often in the Ruhr, trendy new concepts are loud
started with much enthusiasm. Though, over time , when the financial contribu
government fade away innovative programmes are watered down and disappear fro
agenda. Not surprisingly, this also happened with the IBM supported Smart Cit
Dortmund. Loosing political and corporate interest, the project has been disc
really been a Smart City development project, rather a policy support project
management and raise the image of the city . The smart label was just used to
support, as well as to attract state subsidies and media interest.

Nevertheless, the city of Dortmund is very active, when it comes to promote i
activities and the Smart City concept. Under the roof of the very active loca
Development Agency It operates a special IT Bureau, which provides informatic
encourages networking among the 840 medium and small scale local IT firms an
mainly in the field of mobile applications, e-logistics and e-shopping.http:/

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Moreover, the city of Dortmund hosts an annual Smart City Forum, where the st
Smart City development is discussed. In line with such activities is the city
plan (Masterplan Energiewende) which aims to gradually replace traditional en
by regenerative energies and reduce energy consumption by measures to improve
efficiency, www. dortmund.de retrieved 25.05. 2015) The master plan which has
in cooperation with public and private partners, local unions and action gro
unanimously approved in 2014 by the local parliament. Masterplan Energiewende
Dortmund (http://www.dortmund.d

5. Can smart technologies contribute to a turn-around the Ruhr and what are
spatial impacts of smart technologies

Whether and where can smart technologies contribute to revitalize the region,
old industrial structure of the Ruhr. What kind of smart technologies may ha
impact the regional economy in a polycentric old industrial region? Which fac
which obstacles and limits will constrain the region-wide introduction of sma
What will be the spatial implications of the worldwide smart technology hype
will be the likely consequences for urban and regional development in the reg
bunch of questions can only be scratched on the surface.

The brief explorations above into the potential of the Ruhr in the field of s
shown that the region does not lag behind, when it comes to participate in th
and economic revolution. Obviously given the path dependency of its industria
are that are leading the smart innovation movement. Energy is the one of the
region is demonstrating its strength. Despite the traditional power of the tr
stakeholders, who were always hesitant to act on the forefront of innovation
traditional competence, and heavily supported by policies of the state govern
other drivers smart energy smart energy has become the most promising action
development in Ruhr. Numerous projects are undertaken in this field to demons
energy production and application, together wit smart building technologies c
efficiency and , together with intelligent transport systems, can contribute
reduction of CO2 emissions.

The number of projects in a second field of competence is evolving is smart m
absence of large automobile corporations in the Ruhr, who are an influential
mobility in Germany, smart mobility has become received more regional attenti
however, is rather on smart logistics, another endogenous field of competence
prominent Fraunhofer Institute this field or smart action has a regional focu
political status in the Ruhr. To certain extent smart logistics are also gree
long run are an indispensable action field in city regions, where optimizing
developments will challenge the existing transport system and physical urban
design.

Other areas, such as smart communication and information, e-medicine , e-gov
learning, smart safety or smart water management are not neglected, though in
these fields is less visible in the Ruhr and receives less political and publ
region is not in the forefront, when it comes to develop smart products, proc
applications This does not mean that the five million consumers in the Ruhr,
critical mass, would not welcome and not use smart technologies to earn their
their quality of life and enjoy convenient access to information.

Regional challenges constraining development in the arena of Smart City are t
always constrained innovation in the region, such as the power and the influe
industrial corporations and the related worker and public sector unions, a lo

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spirit, regional complacency, the tradition of state subsidies, a weak intern
but not least, the limited attractiveness of the region for inward investment
working on strategies to overcome such constraints, it will take a few more d
a change.

The Ruhr is known for its political pragmatism, but also for its lack of regi
second rate local media, a comparatively low profile of the universities, exce
disciplines. The region is always floating between, pragmatism, scepticism an
new media driven development hype. Moreover, the Ruhr is not the German Silic
offering an attractive job market for creative talents. When comparing with B
Cologne the region cannot offer trendy life style environments. Offering chea
not a key-attracting facet for talents and entrepreneurs. So far, such factor
caused the regional stakeholders, to abstain from marketing the region as a S

6. Spatial impacts of smart technologies in the Ruhr

Not much empirical research has been done so far to study the spatial implica
technologies in the Ruhr, the change of life spaces in neighbourhoods, urban
of urban production in the region. This is similarly true for other city regi
for Berlin, the city region, which claims to be the hub of smart technology d
Germany.

When exploring the possible impacts of smart technologies on the future spati
the Ruhr, it becomes soon evident that not much will change in the region. Sm
can neither influence the spatial system nor the transportation network, whic
more than 100 years.

The Ruhr is in a process to design a new regional master plan (RVR 2013). Wit
efforts to involve citizens and regional enterprises as well as a great numbe
and semi-public authorities, the Regionalverband Ruhr aims to develop a new s
the polycentric region. Given partial demographic decline in the region, econ
the weak tax base of all local governments in the Ruhr, the new regional plan
become a concept for turning around the region, a road map for change. Despit
its aim is not to develop a new vision for the Ruhr economy, it is rather an
citizen participation., aiming to legitimize the new regional planning author
Smart City dimension, neither its positive nor its negative feature is not a
planners.

There are only few dimensions of the regional urban system on which smart tec
have a positive as well as a negative spatial impact:

> Despite the significant theoretical decentralization potentials of sma
> a further concentration of economic activities in a few places in the R
> unavoidably happen. City centres of the four big cities (Dortmund, Duis
> Bochum) will certainly benefit, places around universities, established
> and other easy accessible locations with a certain urban quality, will
> appealing to IKT firms and businesses, as well as for real estate devel
> smart citizens, smart enterprises and creative talents working in the f
> segment of the regional economy. The much-favoured regional polycentris
> remain a planners dream. The North of the Ruhr will certainly remain an
> laggard.
>
> With smart technologies the chronically congested transit system in th
> optimized without building new roads and tracks. Such measures, which w
> be accepted by citizens and environmental watchdogs, nor financed by th

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government. To which extent the existing transport network, by applying technologies for both roads and metro-tracks, could absorb more and how traffic, has to be investigated.

Smart energy technologies contributing to energy efficiency will hardl impact, apart from revitalizing or stabilizing declining urban district projects as the Innovation Ruhr Project, would serve as models for othe in the region, they would just raise the quality and value for housing, modest gentrification processes. Undoubtedly the region-wide use of sma can reduce CO2 emissions and improve the ecological footprint of the Ru contribute to reduce some dependency on a few regional energy corporati the expected success of energy efficient urban design could raise the i and make the new competence a more innovative regional export product.

Growing e-shopping in the region will certainly have an impact on exis shopping landscape. Spatial concentration of shopping will further grow city centres will cope with the likely impacts by turning shopping stre fair grounds of international brands, combining visual excitements and access to e-shopping, the number of second and third tier shopping cent will further decline. Niche enterprises in the e-shopping field will fi locations all over the region to operate in and from the region .

Smart technologies will continue to change information and communicati habits of residents, businesses and visitors. The smarter access to inf locations, on attractions, on events, or on regionally available produc make it easier to look beyond local boundaries and discover the Ruhr as living space. This in turn can support building-up a new regional ident contribute to new regional communication networks, beyond and independe traditional political or corporate connections.

There is still another dimension: The Ruhr is not a place, like Paris Vienna, Milan or Florence, where business is always linked with some fo tourism and cultural entertainment. The new information technology allo communication without travelling to the Ruhr. This may facilitate busin support the regional economy in the Ruhr. Tourists, visitors and footba by the much-praised industrial heritage flagship projects and cultural Emscher Park, or by top football matches, will certainly have it much e dispersed locations in the Ruhr. This in turn could raise the profile o

The gradually changing regional economy is supported by a new generati labour. The demand for housing of this new labour force differs from th corporate or affordable (social) housing of the labour force employed i steel production. To avoid long commuting and to enjoy urban life, this labour force, the much sought after creative talents is searching for housing. Their demand could trigger off new developments at more appeal locations in the larger cities of the Ruhr.

With an emerging new middle class working in smart IKT segments of the economy, social polarisation in the Ruhr will further increase. Social will unavoidably bring about spatial polarisation, where the districts spine of the Ruhr and around the universities and technology parks will while the districts in the North, with the exception of a few gentrifyin former mining cities and ethnic communities with their own IKT milieus, or even marginalize

These were just a few assumptions, which positive and negative impacts smart have on cities in the Ruhr. More explorative and empirical research would cer better identify and assess the likely spatial implications.

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7. Conclusion

There is not doubt. Smart technologies cannot save the Ruhr. They cannot turn
economy of a region, certainly not one that has been dominated for more than
vested interests of a few large corporations and heavy industries. The reason
above: The dominance of powerful and politically influential coal and energy
together with the conservative social-democratic political milieus lacked mor
visionary perspectives, the lack of entrepreneurial spirit, the dearth of int
personalities, inward looking media and the difficult love-hate relationship
state of North Rhine-Westphalia.

Apart from technological innovations in the remaining industries and despite
the existence of numerous universities in the Ruhr, and five million consumer
technologies will not become a new export-oriented territorial capital of th
regions. Hence the Ruhr is not furnished to become a smart city region, a reg
producing smart technologies, not just using products and applying services,
produced and developed elsewhere in Germany and beyond. There are a few hidde
the region, such as Materna, though there are not enough innovative enterpris

Only in two areas of smart applications and benefitting from experience in th
the innovation city project in Bottrop, the Ruhr can excel and compete, and d
leadership, in energy efficiency and logistics. In these two fields, the Ruhr
certain renommØe. In all other fields the region as whole will rather apply w
developed in other regions have developed.

Nevertheless smart technologies will create sufficient jobs for the sons and daught
grandchildren of coal miners and steelworkers, graduating from the regional u
wish to remain in the Ruhr.

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