Defining, locating and supporting digital competences

Digital competences are necessary to allow all people to have a share in the increasing networking and digitisation of the city, also known as the Smart City.

But what competences are required to keep up with digitised private and professional worlds, digital transport and energy systems, urban services and online trading? Who has those skills? Where do the competent onliners live? Where are the (as yet) digital outsiders located? How can lacking skills be developed and encouraged? Which places are suitable for a digital education offensive? And how is life-long learning achieved?

This brochure names the current challenges of digital inclusion, describes the skills required by a Smart Citizen and attempts to locate those skills geographically. Last but not least, it describes tools aimed at developing competences in a targeted way.

On the road to becoming a Smart Citizen

Author

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Foreword

Photo: Milena Schlösser

Dear readers,

Digital networking is on the advance. This development not only affects the infrastructures of cities, but also its citizens: an increasing number of information and communication technologies (ICTs), apps, games, sensors and intelligent storage and measuring systems are aimed at greater civil engagement in urban development.

Promises of greater transparency, efficiency and innovation through smart business models are connected to dynamising and networking digital living environments. But at whom is this digital promise of success aimed?

Currently only few people can be considered to be digitally experienced, competent onliners. However, access, attitudes and skills have a key effect on self-determined participation in the digital city and in rural areas. A sustainable, digitally inclusive city and regional development policy must therefore take all these aspects into account: they must enable equal access for all, enhance trust in the sensible use of ICTs and encourage the development of digital competences.

That only works if public funding is used strategically. Tailored concepts must be developed to achieve digital mainstreaming based on the local and regional requirements (availabilities, accessibility, competence and use intensity) of specific population groups.

This brochure shows which skills could be relevant to the field of urban development, which use intensities and competences are concentrated in which areas, and which instruments could be used by public funding to achieve an empowerment of civil society.

I hope you find the information interesting.

Director and Professor Harald Herrmann

Digital competences and the Smart City of the day after tomorrow

Technology offers diverse potential for a forward-looking, sustainable urban development. It requires the intelligent, competent control and use of technologies by humans.

Urban infrastructures, for instance in the fields of transport and energy, are increasingly networked using digital technologies. But not only technical infrastructures are connected: city administrations, civil society, the economy and science are all expected to enter into a stronger mutual dialogue using digital information and communication technologies, thereby creating new synergies, innovation and new communities to manage urban challenges (Jakubowski 2016, Schweitzer 2015, Günthner 2017).
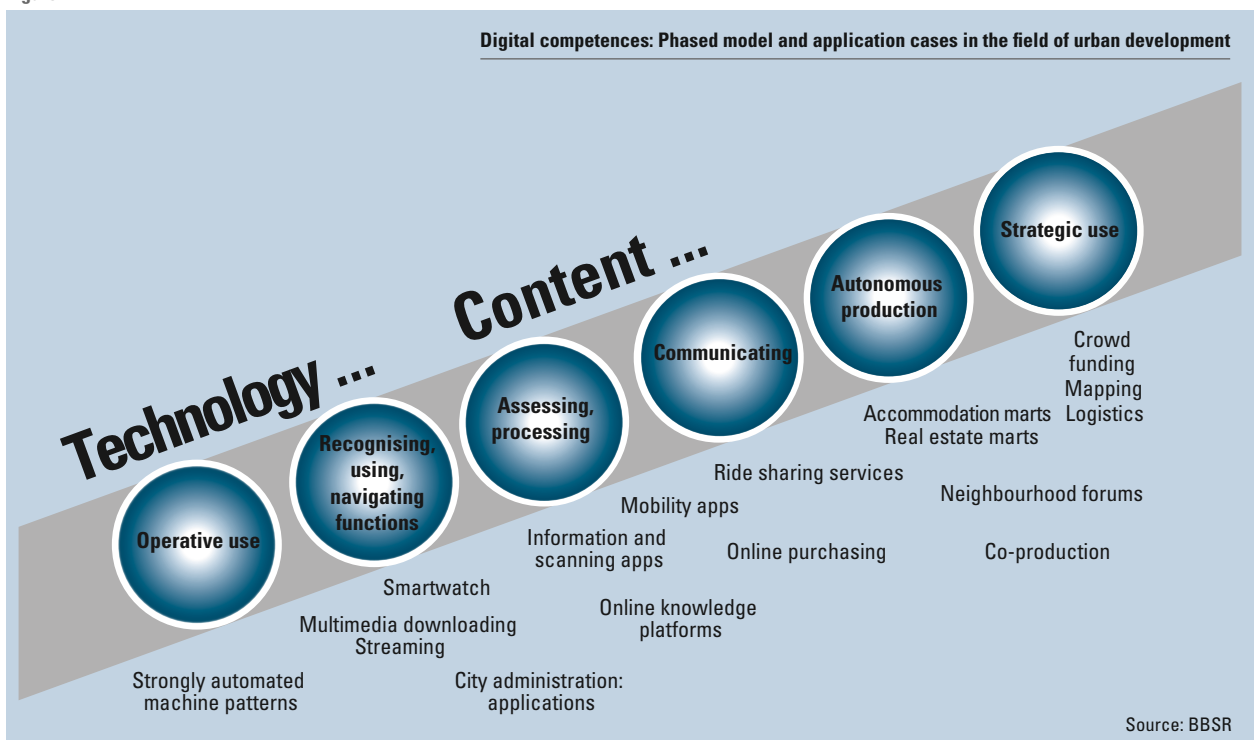
The Internet of Things, i.e. the networking of all objects, ranges from the (by now rather dated) idea of automated living to new types of sensitive clothing and accessories

(wearables and touchables), such as the Smart Watch, and new methods of digital production and robotics.

"Civic Technology" is technology that is developed and used by civilians themselves, for instance sensors to measure fine particles.

But what does the increased and faster use of digital technologies mean in all urban fields and aspects of life for the different participants? Whom are they aimed at? And who has the skills to master them? We will focus on the field of urban development and describe and locate relevant competences for that field, as well as indicating possible instruments for digital inclusion.

Figure 1

Digital competences: Phased model and application cases in the field of urban development

Technology ...
Content ...

Operative use
Recognising, using, navigating functions
Assessing, processing
Communicating
Autonomous production
Strategic use

Crowd funding
Mapping
Logistics
Accommodation marts
Real estate marts
Ride sharing services
Neighbourhood forums
Mobility apps
Information and scanning apps
Online purchasing
Co-production
Smartwatch
Online knowledge platforms
Multimedia downloading Streaming
Strongly automated machine patterns
City administration: applications

Source: BBSR

Regarding the use intensity and quality of digital media, a distinction is made between different levels of competence. Thus van Deursen/van Dyck (2014) made a fundamental distinction between Internet skills with respect to technical operation of the media, known as "medium-related skills", and those that process the content of the Internet use, or "content-related skills". The first group of competences includes using menus, entry forms, opening and saving files and navigation through the Internet. Content-related skills include handling information (defining, assessing and evaluating sources), communication structures (e.g. controlling networks), the ability to produce one's own online content and strategic use of the Internet. Thus there is a difference between simple clicking and navigating, and the ability to produce content and use networks in a strategic way.

We must therefore distinguish between the simple accessing of timetable information (low competence level) and the active use of various mobility applications (filtering of CO_2-neutral and/or low-cost transport services, smart ticketing and the supply of shared rides and capacities). The latter require a higher level of competences, especially with respect to mastering and filtering different information formats and the conscious management of entering and forwarding personal data.

Themes with complex content, such as education and health, also often demand higher Internet skill levels from users, at least when the focus is not on the simple consumption of unfiltered information or the fully automated "passive" use of prefabricated systems and preconfigured settings, but instead on the active, strategic and targeted use of ICTs.

To gain qualitative added value from, for instance, health and education offers, users must assess and compare information on the Internet. To do so, they must search, filter and use information networks. Many intelligent forms of ICT use (such as telelearning, eHealth systems and AAL) also require target-group orientated, on-location introduction and supervision by instructors.
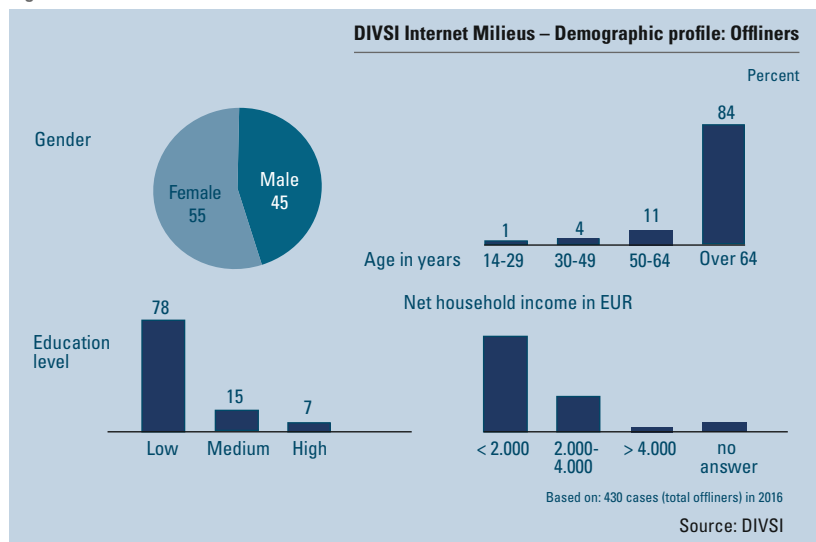
Overall, Internet portals based on the strongly communicative networking of interest groups, such as neighbourhood forums, housing marts or "crowd" applications require users not only to process content, but also – and more importantly – to actively handle information on the Net in a strategically conscious way.

Existing research leads to the conclusion that only few people have a high level of skills to use the Internet in a conscious and targeted way. It is heavily used for entertainment and consumption, but only relatively few people use the Internet to increase their own social or community capital, such as for professional purposes or in searching, assessing and targeted using of information on aspects of health, administration and policy (Witte/Mannon 2010). According to van Dijk (2012: 73), in industrialised societies with a high level of Internet access, it is assumed that only an "information elite" of around 15 % is able to use the different social networks and media in a targeted and conscious way.

The level of education, income and age of users are key factors with respect to their competent handling of digitisation. The latest milieu study by the Deutsche Institut für Vertrauen und Sicherheit im Internet ("German Institute for Trust and Security on the Internet", DIVSI) (2016), found that 78 % of offliners had an ordinary level of education, while 67 % had a net income of below EUR 2,000. 84 % of them were over the age of 64.

Figure 2

DIVSI Internet Milieus – Demographic profile: Offliners

Based on: 430 cases (total offliners) in 2016

Source: DIVSI

Regional distribution of the digital skills

Digital competences are spread unevenly through the regions. Education, income and age are possible criteria and indicators.

Looking at the age structure, there is a clear contrast between western and eastern Germany. The proportion of over-65 year-olds in eastern Germany was 23.1 %, compared to 20.6 % in the west. Furthermore, more over-65s live in rural areas (22.2 %) than in urban areas (20.5 %).

The median income of insurable employees is considerably lower in eastern Germany, at an average of EUR 2,212, compared to the west with EUR 2,970. In urban areas, the median income was EUR 3,064, compared to EUR 2,707 in rural areas.

In view of the presented socio-demographic distribution, one can also assume a regional contrast in skills between regions with strong structures and structurally weak areas. The presented differences are further highlighted by the current D 21 study (2016). It too makes a contrast between the numbers of "onliners" and "offliners" in the east and west visible.

In 2016, an average of 72 % of the population of eastern German territorial states were onliners (compared to 71 % in 2015). In western German territorial states, the average number of onliners is 79 % (2015 and 2016).

Precise statements on target-group-specific digital inclusion offers would require small-scale analyses both on regional and city levels. Existing access and skill levels would have to be recorded, demand formulated and tailored instruments developed.
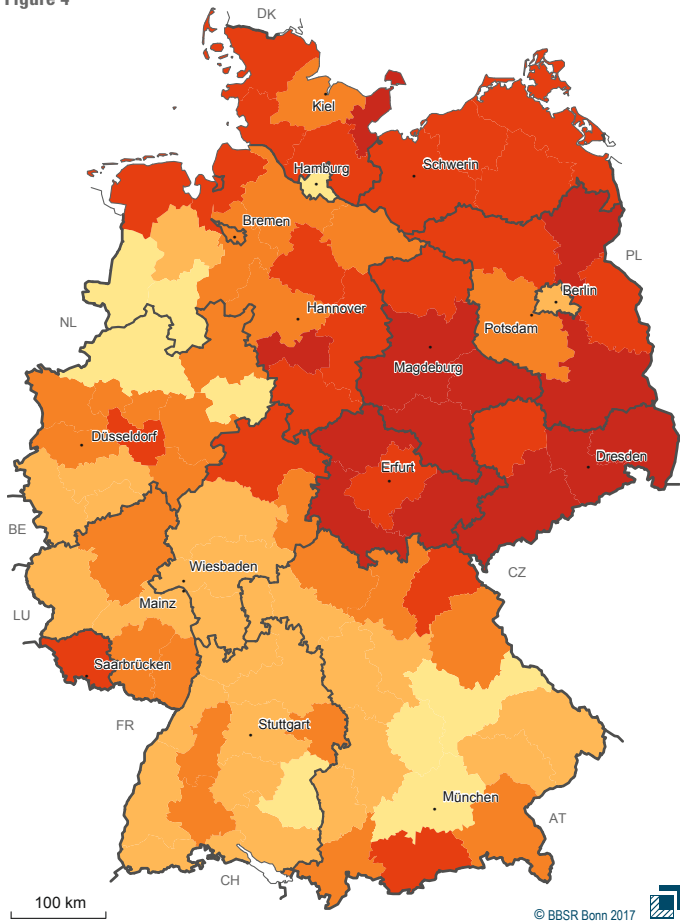
Figure 3
Internet use according to federal state
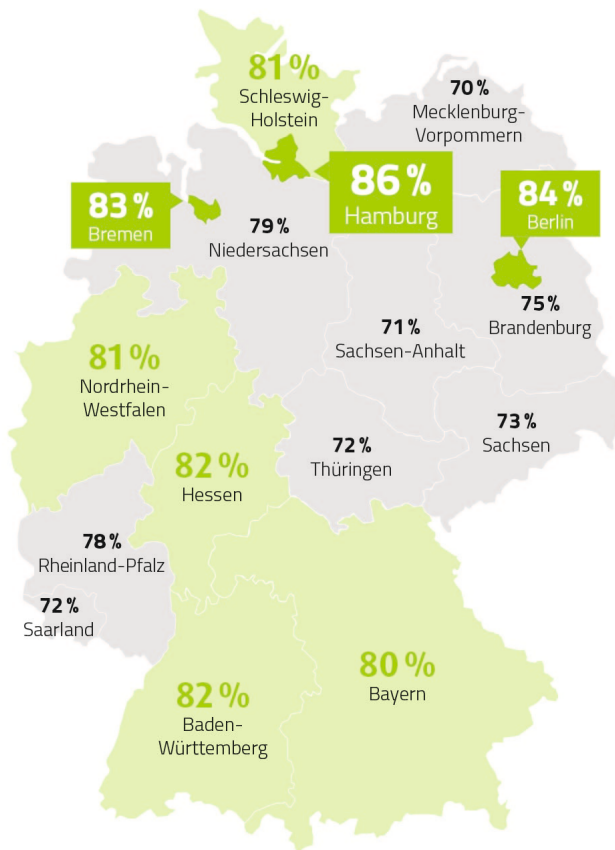
▲ Top 3   ▲ 80 % or more   ▲ Under 80 %

Based on: All interviewees: N = 30,175, figures in percent

Figure 4

Proportion of inhabitants aged 65 or over

Proportion of inhabitants aged 65 or over in % of total inhabitants

- Up to under 19.5
- 19.5 … 20.3
- 20.3 … 21.4
- 21.4 … 22.8
- 22.8 or more

Regional scale: German planning regions (ROR)
Year: 2013
Data basis: Continuous population statistics of the
federal and state governments, Eurostat Regio database
(as of 01.01 of the relevant year)

100 km

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Figure 5
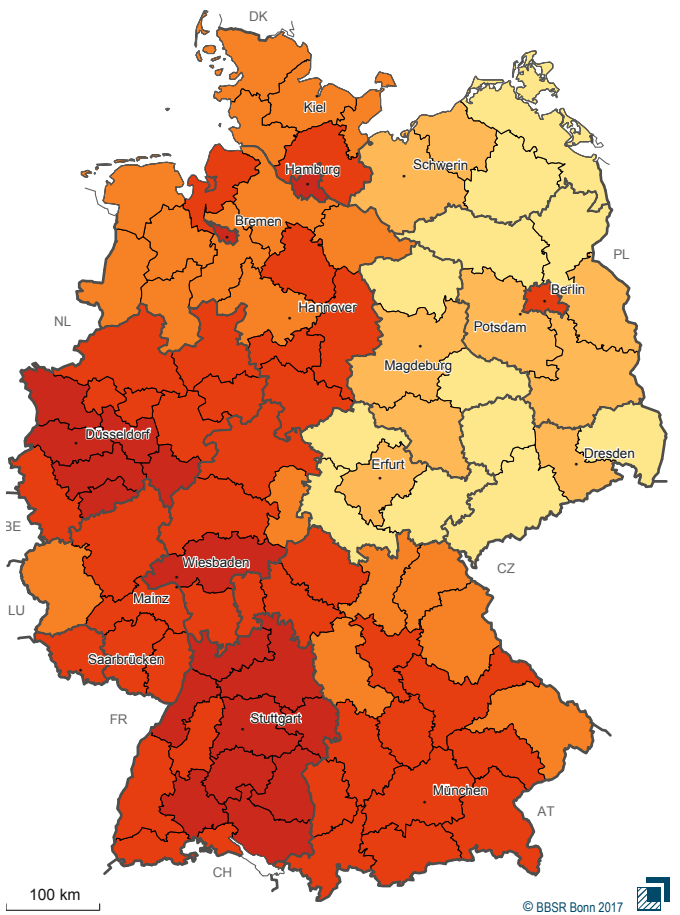
Median income of insurable employees

Median income of insurable employees in EUR

- Under 2,300
- 2,300 … 2,770
- 2,770 … 2,926
- 2,926 … 3,090
- 3,090 or more

Regional scale: German planning regions (ROR)
Year: 2013
Data basis: Federal Labour Office statistics

100 km

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Example case: Munich

Digital competences, use intensities and openness to using new ICTs also vary strongly between neighbourhoods.

1 Neighbourhoods were selected with populations that have a high proportion of residents with low and medium levels of education: "Hauptschulabschluss" (basic German secondary education certificate) (36 % to 51 %) and "mittlere Reife" (intermediate secondary education certificate (26 % to 32 %). Selected neighbourhoods were situated in the districts of Ramersdorf, Laim/Klainhadern, Lerchenau and Neuperlach. The average income in these neighbourhoods was EUR 1,482. (A total of 763 residents were interviewed.)

2 Selected neighbourhoods were in districts where over 40 % were university graduates: Schwabing 48 %, Obermenzing 44 % and Ackermannbogen 48 %, and where the net average income was EUR 2,281. (A total of 738 residents were interviewed.)

Using the example of the City of Munich in the contracted study "Älter werden in München" ("Ageing in Munich", Weeber + Partner 2015), it is possible to demonstrate the social and spatial structure of digital skills. A survey interviewed residents in the age group between 55 and 75 on their living conditions and prospects for the future. Small-spatial comparisons were made between different types of neighbourhoods. Several questions aimed at their use of digital media and technologies. For instance, interviewees were asked how often they used the Internet in general or for information on offers in the neighbourhood and the city as a whole. Questions on current and potential future use of technical assistance systems in the neighbourhood (known as AAL) were also asked.

The results of surveys in seven Munich neighbourhoods were assessed for the study. It became clear that despite the overall higher age of the interviewees, the education and income of the residents correlated strongly with the

quantity and quality of Internet use. In places where inhabitants have the lowest income and formally lower levels of education, significantly less than half use the Internet privately.[1] The proportion of those that (almost) never use the Internet was 38 % in such neighbourhoods, with almost 37 % going online (almost) daily. Typical neighbourhoods for such groups are major housing estates and buildings constructed in the 1920s to 1950s.
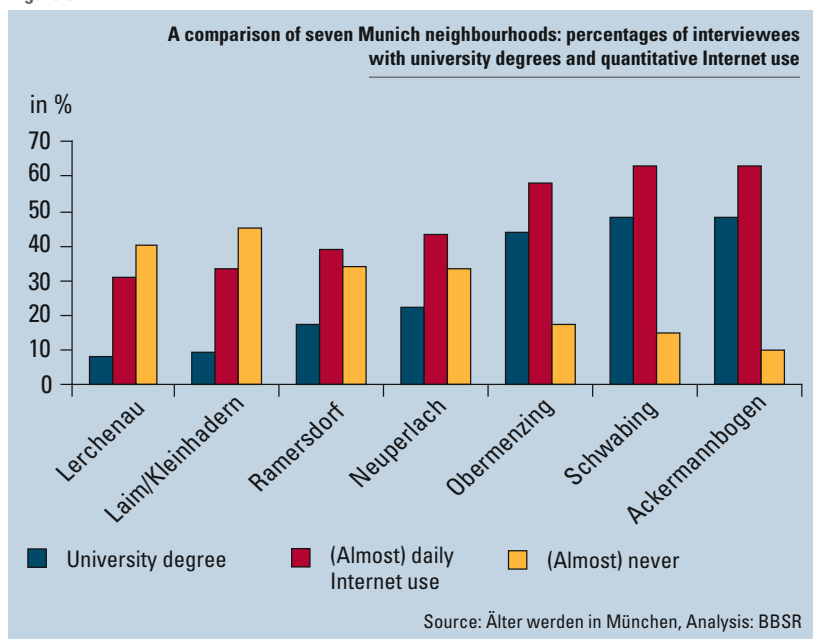
In the studied areas with the highest income and formally the highest level of education (in late 19th century housing neighbourhoods, single-family homes, terraced housing areas and new developments from recent years), use levels and an openness towards new media and technologies are considerably higher.[2] 61 % of interviewees there said they used the Internet on an (almost) daily basis, while those who (almost) never used the Internet made up an average of 14 %.

There are also differences with respect to using new technologies in the household. These technologies are as yet hardly used, but there were varying answers to questions on possible future use, i.e. use intentions. For instance in neighbourhoods with more highly qualified and economically affluent residents, there was a stronger positive willingness towards (37.33 % compared to 25 %) and less rejection (14 % compared to 18.5 %) of using such new technologies in the future.

Questions on gaining information on themes relating to the local city and neighbourhood also revealed contrasting results. Those who generally used the Internet more often (with a high proportion of tertiary education and higher income) also used the Internet to seek offers in the city more often (on average

Figure 6

A comparison of seven Munich neighbourhoods: percentages of interviewees with university degrees and quantitative Internet use

Source: Älter werden in München, Analysis: BBSR

59.66 %) and in the neighbourhood (on average 44.66 %). Among the less Internet proficient neighbourhood population (with lower incomes and lower education levels), 40.5 % and 26.5 % searched online for offers in the city and the neighbourhood respectively. On average, residents of socioeconomically weaker neighbourhoods used the Internet almost 20 % less to find information on offers from their city and their neighbourhood.

A lack of digital competence and openness to new technologies can also be presented according to social areas. Above all people in disadvantaged urban neighbourhoods and regions with poor infrastructures run the risk of losing touch through the increasing digitisation of urban life, including eGovernment, eHealth and smart energy and transport systems (see: Schweitzer 2015 and 2016).
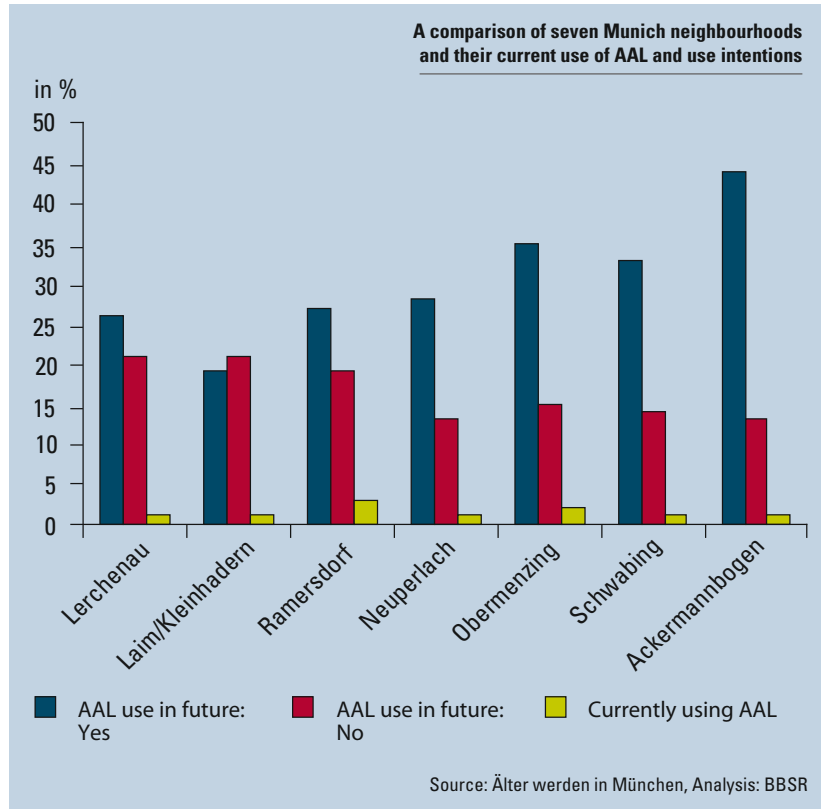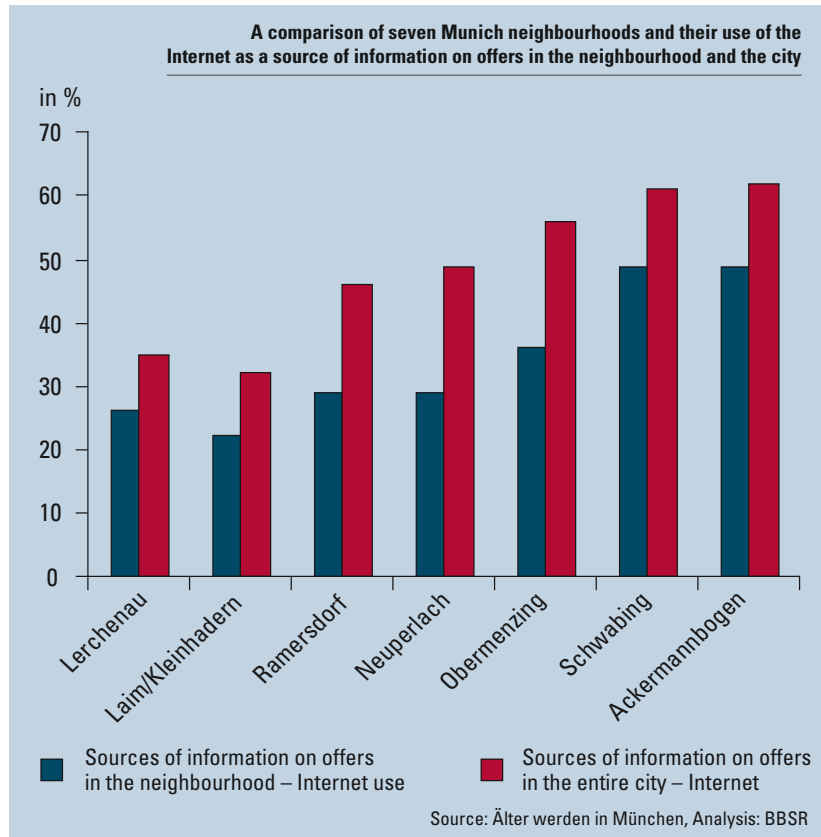
Figure 7

A comparison of seven Munich neighbourhoods and their current use of AAL and use intentions

- AAL use in future: Yes
- AAL use in future: No
- Currently using AAL

Source: Älter werden in München, Analysis: BBSR

Figure 8

A comparison of seven Munich neighbourhoods and their use of the Internet as a source of information on offers in the neighbourhood and the city

- Sources of information on offers in the neighbourhood – Internet use
- Sources of information on offers in the entire city – Internet

Source: Älter werden in München, Analysis: BBSR

Instruments and locations of digital inclusion

Telecenters and target-group orientated services can help to develop digital skills.

To counteract existing segregation trends, targeted measures must therefore be taken to support the digital inclusion of civil society, going beyond the pure support of access to ICTs (such as for instance broadband connection). ICTs must be designed in a target-group orientated way to provide easy access to all and thereby raise interest in using them and also improve trust in the personal added value of ICT use. Currently, pilot projects are testing target-group orientated digital tools such as SeniorPads and gaming products for young people (Croll 2016; Amsterdam Smart City, no date, Smart City
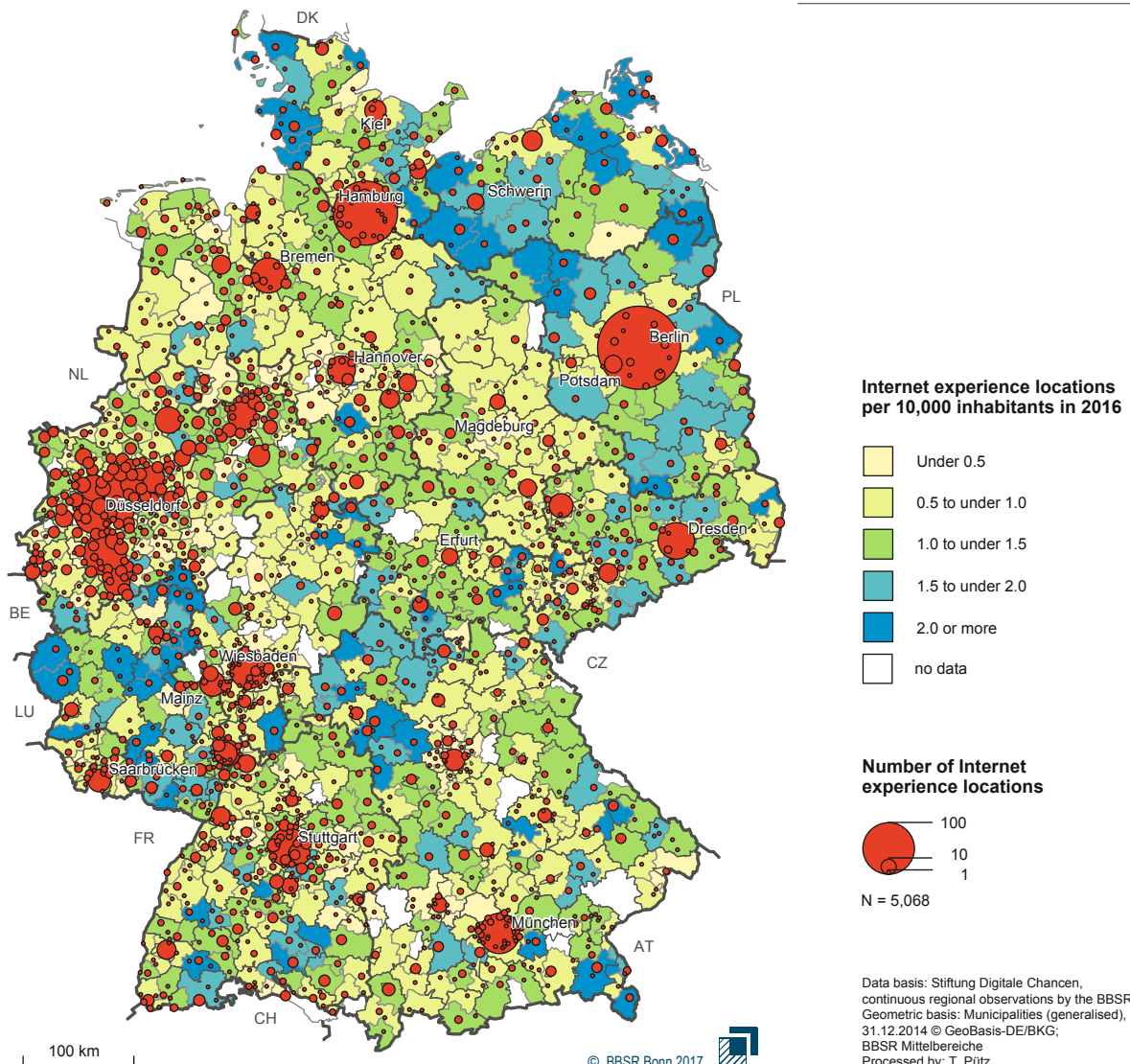
Wien, no date). A key aspect is encouraging media and information skills, i.e. empowerment of civil society. One important tool can be the development and/or expansion of public "telecenters" that can provide target-group orientated services using qualified personnel (Schweitzer 2016, Pelka/Kaletka/Ruseva 2014).

The database of the Stiftung Digitale Chancen (Digital Opportunities Foundation) lists 5,068 facilities that provided media educational services in 2016, ranging from advice on surfing the Internet to more advanced courses for various target groups.

Figure 9

Regional distribution of telecenters in Germany

Internet experience locations per 10,000 inhabitants in 2016

- Under 0.5
- 0.5 to under 1.0
- 1.0 to under 1.5
- 1.5 to under 2.0
- 2.0 or more
- no data

Number of Internet experience locations

100
10
1

N = 5,068

Data basis: Stiftung Digitale Chancen, continuous regional observations by the BBSR
Geometric basis: Municipalities (generalised), 31.12.2014 © GeoBasis-DE/BKG;
BBSR Mittelbereiche
Processed by: T. Pütz

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Libraries form the largest group in the database, with almost 2,000 entries. There is also a broad range of adult education facilities such as the official "Volkshochschule" adult education centres and careers information centres, as well as institutions aimed at a specific population sector. Examples of the latter are youth centres and senior citizens' computer clubs.

Generally, the regional distribution of telecenters corresponds to the regional differences in broadband Internet access. Almost a quarter of the population in Germany lives in a city or municipal unit without such telecenters, while 75 % of all telecenters are situated in medium-sized and major regional centres. The more central the location and the larger it is, the better the services.

The assessment clearly shows that there are fewer learning facilities to improve digital skills in rural areas and peripheral locations, i.e. in areas that are generally regarded to have a weak infrastructure and whose inhabitants are on average older and have lower incomes.

However, the database does not include schools and new forms of digital learning, such as the international movement FabLabs (fabrication laboratories). Such FabLabs were founded by the Massachusetts Institute of Technology (MIT) in 2002 and already exist in several German cities. FabLabs offer and develop target-group orientated services for the use of analogue and digital technologies, from sewing to 3D printing. One example is the MetroLab in the metropolitan region of Nuremberg, which is supported by national urban development policy and is developing a network of 14 FabLabs in the metropolitan region that is open to everyone. The tech labs are aimed at encouraging local creative potential and supporting the regional economy. At the same time, it creates new types of educational offers and a network for the transfer of knowledge and ideas between citizens, companies and public institutions.

The German federal and state governments intend to strengthen their activities in the field of education and digital transformation. For instance, the digital transformation of the education system was a key theme of the year 2016 for the Federal Ministry of Education and Research (BMBF) and the Standing Conference of the Ministers of Education and Cultural Affairs (KMK). Already in 2012, the KMK passed a revised recommendation on "Media education in schools". Media education (media competence, media classes) is also anchored in the school curricula of all federal states. In 2016, the KMK passed a comprehensive "Strategy for education in the digital world".

Conclusion and prospects

Public policy must develop strategies to strengthen digital participation and encourage digital skills.

Digital competences are necessary for the sustainable development of cities. Greater use of ICTs in all urban development fields requires a civil society that is able both to use new, constantly transforming technologies in an operative way, and to assess information and use it autonomously in a targeted and strategic way.

Understanding and self-determined processing of the massive, rapid networking of information and data is essential for an integrated urban development. Digital networking is based on sorting structures and criteria such as the use of filters and algorithms that must be well known and understood to enable conscious participation in the Smart City of the future.

These skills are currently distributed unevenly and reflect existing disparities in society. Income, age and the level of education are key determining factors. To prevent such trends from worsening, urban and regional educational landscapes must be supported. In cities and municipalities, networks of buddies and supporters, as well as targeted forms of help, must be developed to provide life-long learning for all age groups. For this purpose, different requirements and target groups must be recorded and tailored instruments must be developed and applied.

Public policy must develop strategies to strengthen digital participation. Technologies must be studied with respect to their suitability for the envisaged target group and their effectiveness in achieving urban development policy aims and values. Only in this way can the use of ICTs contribute to the ecologically and economically sustainable and socially fair city of the day after tomorrow: urban development in which digitally responsible, competent Smart Citizens can and should actively participate.

Smart City research by the BBSR is developing indicators on how digitally inclusive urban development and active skills in civil society can be encouraged.

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