WISO

06/2021

René Bormann, Antje Christmann, Werner Faber, Tine Fuchs,
Michael Groß, Tilmann Heuser, Annette Jensen, Elke Pahl-Weber,
Christiane Schönknecht, Martin Stuber, Petra Weis

SMART CITY – SOCIAL CITY

Putting People First

FRIEDRICH EBERT STIFTUNG

WISO DISKURS
06/**2021**

The Friedrich-Ebert-Stiftung

The Friedrich-Ebert-Stiftung (FES) is the oldest political foundation in Germany with a rich tradition dating back to its foundation in 1925. Today, it remains loyal to the legacy of its namesake and campaigns for the core ideas and values of social democracy: freedom, justice and solidarity. It maintains a close connection to social democracy and the free trade unions.

FES promotes the advancement of social democracy, in particular by:

- political educational work to strengthen civil society,
- think tanks,
- international cooperation with our international network of offices in more than 100 countries,
- support for talented young people,
- maintaining the collective memory of social democracy with archives, libraries and more.

Division for Economic and Social Policy

The Division for Economic and Social Policy of the Friedrich-Ebert-Stiftung advises and informs politics and society in Germany about important current issues and policy making concerning social, economic and environmental developments.

WISO Diskurs

WISO Diskurs are detailed analyses examining political issues and questions, containing sound policy recommendations and contributing to scientifically based policy consultation.

Authors

René Bormann, head of the Shanghai Office of the Friedrich-Ebert-Stiftung
Antje Christmann, research assistant, Bundestag
Werner Faber, managing director of Regional Group East, Association of German Transport Companies (VDV)
Tine Fuchs
Michael Groß, Bundestag MP
Tilmann Heuser, managing director of the Berlin branch of the environmental organisation BUND
Annette Jensen, journalist and author
Prof. Elke Pahl-Weber, TU Berlin, Institute for Urban and Regional Planning
Dr. Christiane Schönknecht, formerly AWO Bundesverband
Martin Stuber, DGB federal executive committee
Petra Weis, SPD executive committee

Responsible for the English version of this publication in the FES

Mareike Le Pelley, head of the working group on urban development, building and housing of the Division for Economic and Social Policy of the Friedrich-Ebert-Stiftung.

06/**2021**

WISO DISKURS

René Bormann, Antje Christmann, Werner Faber, Tine Fuchs, Michael Groß, Tilmann Heuser, Annette Jensen, Elke Pahl-Weber, Christiane Schönknecht, Martin Stuber, Petra Weis

SMART CITY – SOCIAL CITY

Putting People First

1

INTRODUCTION

Getting to grips with digital development is a must for municipalities. There are both risks and opportunities and the situation is complex. The Friedrich-Ebert-Stiftung's project »Smart City - Social City« is intended to provide orientation and foundations for policy guidelines and to help municipalities to find a compass for navigating future pathways. Innovations should improve the lives of as many people as possible, make things more attractive and stress-free – and exclude no one. Data security and a better life for all are key guidelines in the project.

According to Bitkom, 58 million Germans now own a smartphone. Smart technology can be found not only in telephones, computers and tablets, but also in cars, waste bins, sprinkler systems, security technology and much more. The Smart City, too, is generally framed in terms of technology and its linkages to digitalisation seems incontestable. But the fixation with technological innovations and possibilities cannot serve as the basis for a »smart city« in the true sense. Instead it must encompass a wide range of opportunities for the residents and local businesses to have their say and make a difference, decent, healthy living conditions for all, sufficient and decent jobs, and sustainable supply structures that conserve resources and are climate-friendly. Digital tools can help with these things, but technology must not become an end in itself. Ongoing digitalisation harbours both major opportunities and significant risks.

The logical sequence is thus to identify social and ecological changes and trends, to evaluate benefits and dangers, and then to come up with an appropriate support framework. Qualitative goals must be defined and codified, as a basis for identifying the most useful digital and analogue instruments. The focus should be on people's needs in the town or city in question, not what Cisco, Google or Siemens happen to be offering. Clearly, different areas have different needs. Those living in the centre of a major city, for example, have different priorities and wishes from people living in socially deprived neighbourhoods, small towns or rural areas.

The uniform solutions and centralised structures of the age of industrial mass production are pretty much obsolete. What is really needed are diverse, small-scale, regionally adapted and participation- and needs-oriented approaches. The diversity of the populace should not only be taken on board but recognised as a resource. Widespread participation is a constitutive element of this kind of urban policy.

The starting point is what already exists locally – and how it could be used for a better future. The internet makes it possible to exchange good ideas and approaches across the world. Experience gained, building and construction plans, and information about organisational structures or software could perhaps be used elsewhere in the world and should therefore be open source. Taking such an approach to knowledge-sharing will give everyone the chance to benefit from the information generated.

To accomplish all that, a wide range of actors should be given the opportunity at an early stage to have their say and make a difference – and not only those who have a lot of time on their hands or a specific interest to pursue. The local administration is usually asked to coordinate such development projects, but private initiatives may also play a role.

Having one's own laptop or smartphone should not be a condition for getting involved. Those population groups who, experience shows, tend not to participate on their own initiative should be sought out and given encouragement. Bolstering what is available locally, protecting jobs in local supply, and promoting cooperation and self-organisation make municipalities more attractive.

Politics is facing completely new challenges as a result of digitalisation's rapid advance. Municipalities – and other actors – need a dependable legal, personnel and financial framework. Recalibrating relations between the state, civil society and the economy is a major task. This also entails the establishment of infrastructures under public control that guarantee that private data remain private. Such platforms should also integrate different administrative, practical and social aspects effectively and smoothly and identify interactions between decisions at an early stage. Genuine public participation is not confined to the provision of information, but also enables real exchange and lively debate. Precisely because so much is changing at once and everything is affecting everything else it is imperative to establish experimental spaces and field testing.

Transport, environmental, commercial, residential and social issues are intimately linked. Planning processes must therefore be integrated so that apparent solutions in particular areas do not cause massive problems elsewhere. In future, politics should

provide guidelines to link technical issues together. That includes, for example, the redesigning of public spaces to achieve a higher quality of life and environment.

Benchmarks and criteria are needed to assess developments pertaining to the Smart City. To ensure quality of life, more attention than ever before needs to be paid to exploiting new possibilities for creating or safeguarding decent work. This includes both decently paid income-earning opportunities and working conditions that offer employees possibilities to exercise some sort of say and leave room for other areas of life.

If particular measures improve everyone's quality of life in a town or city they should be regarded as unequivocally positive and form the basis for further development. Where they only benefit certain groups one might ask whether they may be detrimental to others – and whether it is fair if, for example, existing privileges have to be given up or some people might be harmed by new benefits that others may be enjoying. Dialogue here is key to achieving consensus and common values.

Data protection and security for citizens and local businesses is an important factor in assessing smart-city developments. No doubt about it, everyone should be protected from being spied on, whoever might want to do it.

How and where value creation takes place is also vital for quality of life. Do the city, the region and its inhabitants benefit? Or are the profits instead creamed off by distant corporations, or lost in opaque tax havens?

This publication looks at these multi-layered challenges from a number of perspectives. First, it provides an overview of the current context of the Smart City discussion. Many providers are reaching out to cities with new products and services. At the same time, it is clear that existing administrative instruments and compartmentalised thinking are no longer adequate to the problems.

In a second step we address the problems in different areas of key importance to cities. Congested streets, increasing social divisions and neglected city centres are only three examples of where something needs to be done. What can digital tools do here – and where might they be counterproductive?

Every city is different – there can be no ready-made solutions. Thus, in this publication we also present four examples where Smart City initiatives have been implemented, examining implemented projects as well as future planning. But every city encompasses multiple perspectives – with policymakers and residents often perceiving things quite differently. Hence, we also hear the voices of residents, business people and administrators in local governments.

2

SMART CITY AND SOCIAL AWARENESS

Cities are diverse and complex. Nevertheless, administrations and policymaking are still generally organised in terms of separate disciplinary fields. This is increasingly creating problems. Digitalisation is a tool for organising complexity, but it should not be an end in itself. Most important is the discussion of what the city of the future will look like and how it will appeal to its inhabitants, as well as how living and working can be organised better and more fairly. To that end, it is essential that diverse actors come together in the real world.

The Smart City is on everyone's lips – but there is no consensus on what it is

Big technology companies have dominated the debate for quite some time. For them it's all about marketing new products: self-driving cars and drones, washing machines controlled over the internet, and apps that can mine valuable data. But this focus on commercial services neglects the key point for society: the desire for publicly-minded urban development to create favourable conditions for the city, its inhabitants and its businesses. Thus, quite different issues should be the centre of attention. What kind of city do we want? What are the needs of different neighbourhoods, population groups and the local economy? How can the diverse wishes and needs best be reconciled with one another, without shifting the cost onto other people, future generations or the environment?

The challenges are complex and, what is more, differ from place to place. What really matters is good housing, clean air and mobility, as well as aspects like gender equality, decent work and employment, demography, migration and the prevention of further social divisions. Many actors are involved and many people are affected – and their interests are intertwined on many levels. The Institute of the Future (Zukunftsinstitut) has come up with a global megatrends map demonstrating how the various social and economic elements are interlinked (Zukunftsinstitut, n.d.). Furthermore, cities need to get to grips with what kind of changes Work 4.0 is likely to bring in its train and what, for example, that might mean for commuter flows and public transport. All these areas are extremely dynamic, but also explosive. Feedback processes are to some extent black boxes, and no longer predictable either by individuals or by institutions. Seeking solutions for isolated problems area working through plans step by step is no longer good enough. This traditional approach is incapable of dealing constructively with the consequences that arise in the process. The various aspects need to be integrated in a common process. This includes consultations and discussions, some of which need to take place on an analogue basis. Such processes can be organised better with the help of digital tools.

In other words, the Smart City needs, but is not limited to, digitalisation. Cities are facing fundamental changes. It is far from clear where the journey will take us. But the course of future urban development is being set now. Digitalisation is a tool that can be deployed in many ways. What development paths and possibilities it advances will depend on which problems are to be solved and what values are to be conveyed. Technological progress is neither an end in itself nor a law of nature, but depends on the decisions people make. Who makes these decisions is central to our urban future.

Big companies initiate the process

Many drivers of Smart City developments come from Asia and from Silicon Valley. Anyone who is able to impose standards here will rapidly find themselves in a monopoly position. All the more important, then, to put protecting citizens and their data, good working conditions, higher quality of life, and strengthening the local economy at the heart of progressive policymaking.

Standard-setting in the Smart City sector takes place at global, continental and national levels. At international level, the relevant bodies are heavily dominated by representatives from Asia and the United States. But some German companies, such as Siemens and the car manufacturers, are also active here. What they all have in common is that they are interest-driven and strongly technology-centred, and have little understanding of how municipalities function.

Risks and opportunities for public welfare

The German Advisory Council on Global Environmental Change is calling for digitalisation to be harnessed in the service of

global sustainability. If its social pillars – such as fair distribution of opportunities and financial resources – continue to be neglected, society is at risk of becoming so deeply divided that democracy will be imperilled. Many mayors are well aware of the significance of digitalisation, and the issue remains high on the agenda in relevant surveys. At the same time, they are receiving offers from global firms that regard them as a potentially lucrative new business segment. Larger cities in particular now have initiatives such as Google Urbanism or City 2.0 being dangled in front of them. In this context some firms are trying to muscle their way into traditional municipal and government domains and turn them into business opportunities. Sidewalk Labs is buying up enormous tracts of land in North America, including the port area in Toronto for 300 million dollars. This area is now being fitted out with sensor technology and marketed via platforms. The solutions offered by these firms leave citizens largely in the dark: what information is being gathered and what happens to it?

This state of affairs has unsettled local politicians, and with good reason. Much of what is being offered is a Pandora's Box. Development is rapid and spilling over to Europe, even though cities on this side of the Atlantic, whose administrations tend to respond very slowly, are unprepared. The spread of Uber and the initially supine handling of the company illustrate this. The activities of Facebook, Google and similar giants make the need for broad-based regulation self-evident. The window of opportunity in which political alternatives can be implemented has to be seized because it will have closed before we know it, as technological developments can create unscrutinised path dependencies.

Defensive strategies and denial are not really a good approach to shaping the habitable city of the future. Rather municipalities should apprise themselves of their options for using digital tools to develop their neighbourhoods along social lines. One crucial issue here is who gets to influence the approach to infrastructure. Who is to decide the function of algorithms; who gets to shape their features and aims; who is to have access to the data? These parameters are key to whether the commercialisation of urban public spaces will continue to grow or whether they can be reclaimed for the community.

It is important to look at how digitalisation can be harnessed to promote public policy objectives. »We now have a chance for people-centred innovation that puts people's needs at the forefront and thus makes them partners, not customers, of development«, says Elke Pahl-Weber,[1] professor at the Institute of Urban and Regional Planning at TU Berlin. At the same time, guidelines have to be established to lay down a direction of travel. Protection of data and the private sphere, the local economy, employment rights and the climate are only some examples of the relevant limits. Together with process-oriented goals and corresponding participation structures, focused on improving quality of life in urban areas, a framework can be developed for political decision-making about the digital tools that a municipality might like to deploy and who it would like to cooperate with.

The prospects are certainly tempting. After years of neglect, towns and cities can turn public spaces into meeting places again, encourage the inhabitants to participate in decision-making, support local providers, revive local neighbourhoods, foster the so-called compact city and bolster the quality of amenities in streets and squares, get different generations and population groups to mingle more, and lots more besides. In the course of all this, relations between the state administration, civil society and the economy will have to be recalibrated.

Creating a framework for social improvements by means of digital tools

In 2017, the German government got involved in a big way with its »Smart City Charter«. This lists the challenges facing the state and its municipalities. The Federal Ministry of the Interior, Building and Community announced that over the next three years it would support a total of fifty Smart City pilot projects to the tune of around 750 million euros.

From the outset it is important not to lose sight of the fact that digitalisation can widen the social divide. This must not be allowed to happen. People must not be excluded as a consequence of digitalisation. Not everyone can have a smartphone and signal coverage is sometimes patchy, especially in rural areas. Also age, social milieu, lack of technical knowhow, language and cultural barriers, not to mention regional factors can hinder people's participation. Educational provision for all age groups and a simple, amenable design of municipal platforms are essential for the social city of the future. But analogue access options and gatherings in public space are also necessary if everyone who is interested is to be able to get involved. Particular care should be taken with population groups that are more difficult to reach when it comes to developing more socially integrated neighbourhoods. Finally, a habitable city also needs digital-free havens.

It is also crucial that citizens retain control of their own data. If they wish, they can make them available for commercial purposes. But no institution or enterprise must be permitted simply to siphon them off at will.

Instead of relying on uncontrolled competition and the market, the state should be responsible for decision-making concerning the process, organising and monitoring it. Municipalities must call the shots in the Smart City. That means that they will need the anonymised data of residents and visitors for the purpose of transport planning, including the data of both private and public mobility providers, as well as their operational performance data. This does not mean that a municipality will run everything itself, but it must possess or have access to sufficient capabilities in order to identify needs, draft appropriate tenders, evaluate offers critically, issue licences and monitor compliance.

Control over personal data also presupposes that one can decide whether or not to use certain services. Someone who agrees to allow the data on their personal movements in public spaces to be collected and processed can, for example, benefit from an app that helps them to find a parking place. But it must be equally possible to forgo the service and, accordingly, to supply no personal data. The public authorities should issue licences for such services. It is also important that civil society is able to monitor that data is only used for the purposes it was collected for. Blockchain technology has the potential to

1 Professor Elke Pahl-Weber heads the Institute of Urban and Regional Planning (ISR) at the Technical University (TU) Berlin, where she has established the »Smart City« competence centre, providing important ideas and understanding for this publication.

grant citizens control over their own data and provide them with a monitoring tool. The technology is extremely energy-intensive, however.

It is also vital that the process be transparent in order to enable participation. But that does not mean that all concrete planning at any time has to be made public – as sometimes that can be to the detriment of the public good.

Financial and mental barriers to digital transformation

Undoubtedly, conferring such capabilities on cities costs money and many municipalities are already underfinanced. Without a solid financial foundation many desirable and necessary initiatives will remain unrealised. The legal framework and staffing must also be attended to. On top of that, far from everyone is enthusiastic or even open to ongoing changes. In many cases, citizens' creative initiative is restricted to preventing a project in their own neighbourhood. By no means everyone has access to the relevant devices (or only to those associated with age-related or other restrictions). To many people, habits count as personal freedom – so public negotiation and debate about readiness to change are inevitable.

Everyday life is shaped by both real and mental infrastructures. And even though it is increasingly becoming clear that habitable cities and a sustainable economy can only be realised in this way, many people feel that changing course is not for them: they are afraid of change, of personal losses and restrictions, and see no advantages.

The funding landscape must be adapted to the new challenges. Programmes in the EU set priorities, but they are often out of kilter with current and real needs in cities. While sustainability (of districts, buildings and energy) was the centre of attention a few years ago, today the focus is on more on mobility and business models. And there has been too little exchange of experience between cities. Such exchange and communication is important though, so that mistakes do not keep being repeated, and to enable scale effects. Here the central local government organisations have to step up.

At the same time, fundamental changes are emerging in many areas of life. For many young people the car has lost its symbolic power as a promise of freedom: according to the Federal Statistical Office the proportion of car owners among the 18–25 age group fell from just under 56 per cent in 2011 to around 40 per cent in 2016. Access when they need it and a good network of mobility provision seem to be more important than permanent ownership. Combining different means of transport has become much easier today because the quickest and most affordable connections can be found easily on the relevant platforms.

There are already good examples of individual aspects. Munich and Hamburg demonstrate how citizens' data can be protected from commercial exploitation. Zürich sets an example in relation to public transport and car sharing, Vienna on resource conservation, Barcelona in relation to citizens' participation, Copenhagen on reclaiming public spaces, to name only a few. Experimental spaces in which different actors can try out and explore the mutual interaction of different developments are also needed. Blueprints for ideal development cannot be expected from this, but rather ideas and incentives that can be used by other municipalities like a kind of modular construction kit. Which elements make sense can differ considerably between neighbourhoods and decisions about them have to be made locally.

Municipalities must have the necessary capabilities to ensure that the Smart City can contribute to social progress. They need a financial, legal and personnel framework that enables them to boost the local economy, ensure good working conditions, and protect citizens from social or environmental upheavals and data theft.

Smart cities should be characterised by decent work

Digitalisation now plays a central role in virtually all areas of work. The Institute for Employment Research (IAB) estimates that by 2035 around 1.5 million jobs will have been lost to digitalisation (Zika et al. 2018) – but just as many will be created. Predictions in this area are difficult, however, because technological development is not a law of nature, but man-made and interest-driven.

What problems need to be solved? This question needs to be answered at the outset of a development process – whether consciously or otherwise. While the digitalisation debate is frequently dominated by the question of what new business areas might emerge or how much money can be saved on labour costs, equally good but quite different questions could also be posed: what improves the quality of work? How can we make our cities more habitable? How can new, sustainable market places be fostered in town and city centres and what are their characteristics? How can highly qualified jobs be relocated outside major cities and commuter flows be avoided? The key are the criteria applied to the design of the underlying algorithms and infrastructure: Are they aimed at rationalisation or at alleviating boring or physically demanding work? Is the aim to generate as much profit as possible in public spaces? Or is the idea to make public spaces more attractive, more peaceful and more beautiful for employees and residents?

Digitalisation in production to boost competitiveness is a constant topic in the business pages of newspapers. The slogan »Industry 4.0« first emerged at the Hannover Fair in 2011. The Frankfurter Allgemeine Zeitung raised the prospect of networking 3,400 sextillion (36 zeros) production machines worldwide by the end of the 2020s (Giersberg 2013). Mass production should also become viable in Germany again due to the seemingly paradoxical promise of providing customers with custom-made products: integrating all the stages from ordering through production to delivery for batch size one. In other words, each item would meet the individual wishes of the person who ordered it. It cannot be foreseen whether developments will go in this direction on a broader basis. But it is clear that the industries involved are trying to divert as many subsidies as possible into this.

In the meantime the discussion is focusing more on services. Mobile work is increasing, and in particular networking PCs means that desk work can be decentralised. That creates flexibility, ideally for both employees and employers. On top of that, working at home reduces traffic.

As the downside of digitalisation, economists have outlined a scenario in which many simple office and administrative tasks will be carried out by computers. Data-crunching will for

example allow software to make decisions on insurance liability claims. Massive upheavals are also to be expected in banks, which plan to place much of their consultation and wealth management in the hands of »robo-advisors«. Heavy rationalisation is already under way in these areas. At the same time, more and more poorly paid jobs are arising in the platform economy, in which the workers shoulder the risks while the service providers take a cut for each job. This includes delivery services, caring for children and older people, daily help, massage, transport and removal services, and agencies for skilled trades and cleaning services. Unregulated, these services threaten established jobs and lead to poorer working conditions, not least because the workers concerned have no opportunities for workplace participation or association.

At the same time, software specialists, robot technicians, engineers and, not least, those working in the so-called creative economy are in strong demand. In these occupations not only will more people work and for longer, but the pay will improve. The only condition is the right qualifications.

New tasks will also emerge in an older and more diverse society. Schools will have to prepare children for a life in the age of digitalisation, which not only means lifelong learning, but also offers everyone the opportunity to take the initiative. In these circumstances mentoring programmes will have to be developed for a society with significant immigration, and to support older people as digitalisation progresses.

The internationally networked platform economy must not be allowed to undermine conditions in the analogue world. In principle, the same wages and working conditions must prevail there as elsewhere. That also applies to taxation. Where necessary, international agreements must ensure that no unregulated space comes into being. As the cases of Uber and Airbnb show, cities can fight back.

In any case, in many areas these new developments are leading to the decentralisation of work, which is also affecting transport and residential structures. If more people carry out at least part of their work at home, that cuts traffic and the separation of commercial and residential areas dating from the 1930s is no longer necessary everywhere. In particular modern manufacturing is often quiet and no longer associated with smoky chimneys. The trend is towards the mixed city, even though architectural and settlement structures change only slowly. Municipalities that are able to offer affordable living and working space in attractive surroundings are at a particular advantage.

But economic power is also being increasingly centralised. From a business standpoint it is ideal if a standard product can be manufactured at a single location for the whole world. One extreme example is the Taiwanese company Foxconn, which produces 40 per cent of the world's consumer electronics – albeit under inhuman working conditions. Amazon's central warehouse concept, too, is based on low wages, stress and strict monitoring. In Germany, Amazon has put bricks-and-mortar retailers under enormous pressure; many medium-sized shops in towns and cities have closed as consumers prioritise convenience. Although many bricks-and-mortar retailers now also use the internet as an additional sales outlet, and the new possibilities have created new speciality businesses, the trend is increasingly towards larger shops, in which fewer and fewer people work per square meter of sales floor. Even in trades formerly characterised by handmade goods, such as bakeries, the market is now dominated by chains. That means not only that regional variety is disappearing, but also that staff are being cut and deskilled.

As a result, the money spent by consumers is increasingly finding its way out of the home region and ending up where the big companies have their headquarters. For most cities, this kind of economic and employment development is certainly not »smart« in the sense of wise.

On the other hand, economies are striving to be environmentally sustainable over the long term, to meet local needs and to create local amenities. This goes hand in hand with positive employment effects and strengthens the regional economy because the money is earned locally and can now be spent locally, too. In this way, transport costs and (climate-relevant) emissions can also be reduced considerably. This works best when flows of goods are bundled, for which purpose digital platforms can be very helpful.

Products that are built to last and easy to repair are also beneficial for the environment, the local labour market and the local economy. They not only conserve resources but create employment, for example, for maintenance. In many cases, it also makes sense to organise shared use as a professional service. Furthermore, the internet makes it possible to share knowledge and designs freely and to implement them quickly and locally. Although decentralised production in high-tech workshops, such as FabLabs, is still at the experimental stage, they may expand and enable demand-driven supply with special individualised products.

The federal government, the Länder, which are the German federal states, and the municipalities should share responsibility for balancing the environment and employment in policymaking and administration. With an orientation towards small-scale, diverse and regionally adapted supply structures tailored to public needs and strengthening the regional economy, win-win situations are feasible in both areas. Conducive conditions need to be created and fair and equal competition should be ensured in relation to international service platforms such as Uber and Airbnb.

3

SPHERES OF URBAN AND RURAL LIFE

In this chapter we look at different spheres of urban and rural life, in which digitalisation and new forms of networking play a role. These areas have seen an uncontrolled growth of developments, ideas, exploration and preventive strategies. A lot has come into being without prior political and social reflection about opportunities, benefits and unintended effects.

Digital networking has turned the world into a village: information can be sent to the other side of the world instantly. For most people's daily lives, however, developments closer to home are much more important. From large cities to digital villages in Rhineland-Palatinate, new structures are emerging that breach the existing anonymity and enable new forms of networking. Neighbourhoods provide one another with information, share and exchange things, and organise meetings and festivities. But political actions, such as tenants' protests, can also be easily organised in this way. And because so much information flows together here and is accessible to everyone, administrations often find themselves having to deal with citizens who have enormous knowledge at their fingertips.

Furthermore, for example, regional food deliveries, networking of small businesses, promotion of regional specialities and much more can be organised over digital platforms. Often digital platforms and offerings in real space have to be interlinked. However, developing logistics and professionalising websites is often very challenging for the actors concerned. Cities and municipalities can help here, enabling networks to grow and enjoy economic success.

3.1 PARTICIPATION

Promoting more participation is on everyone's lips. It is supposed to confer weight and legitimacy on decision-making. In this connection, digitalisation arouses expectations that such participation can be better informed, faster, more transparent and more solution-oriented, enhancing the democratic process. The participation debate is part of society's negotiation process regarding the desirability and democratic necessity of public participation, and the question of how open the process should be.

In order to enable people to participate effectively the framework should be clear from the outset. What is actually possible, what can actually be influenced? What questions and conflicts ought to be solved, what conflicting interests are involved? And who ultimately has decision-making authority?

In a socially-oriented Smart City, participation improves public projects for citizens and local businesses, equalises the balance of power, and provides for better job quality and quality of life.

If people learn that even though they were asked their opinion they have no real influence and their ideas at best will end up in a nice glossy brochure, they will not only be discouraged, but may even lose faith in democracy.

Many administrations only want to provide residents and businesses with information about upcoming new construction or renovation. But a Smart City is distinguished by the fact that citizens and regional businesses can have a real say – or the administration may even help them to implement their ideas or proposals.

Access to all plans

The key condition of an open decision-making process is that all participants have access to basic information and plans and are aware of the general framework. All processes must be transparent and negotiable. All information relevant to political decision-making should be prepared in such a way that interested lay persons can also make something of it and, in case of doubt, have the opportunity to ask an expert to explain things to them. It must be evident which organisation is providing what input. The goal must always be to strengthen everyone's ability to assess the situation and create a solid basis for fruitful discussions, negotiation processes, compromises and joint decision-making.

Those who cannot be present need committed advocates

Representativeness is a key aspect of public participation. In contrast to elections or referendums – where representatives are chosen by universal suffrage or the majority position is implemented – public meetings, online surveys and most participation formats are not representative of the opinions of the population as a whole. Older graduates, especially men,

are particularly likely to sign up for such bodies. People with little spare time and substantial family responsibilities are much less likely to attend. It is also difficult to recruit young people and people with fewer qualifications to formal participation formats. Nevertheless, no one would dispute that their needs and requirements should influence decision-making. The interests of future generations should also factor into the process somehow.

Interests that cannot represent themselves need committed advocates. This is of particular importance because in many political decision-making processes well-funded lobby groups represent powerful special interests. Elaborate campaigns can sway the public debate on particular points and neglect key aspects. This asymmetry must be avoided.

Ambivalence of digital tools

In many discussions the Smart City is equated with the new digital tools. Online tools present both opportunities and risks for participation in the social city. Interest groups can also network over large distances and work on documents together. They do not need much in the way of financial resources for this. Furthermore, information is easier to obtain today. At the same time, there are also dangerous trends. So-called »shitstorms«, targeted manipulation and exaggeration of particular aspects can influence voting or exclude alternatives.

SUMMARY

When it comes to strengthening the social city, the Smart City cannot be limited to expanded online participation. A complex, open negotiation process with many participants requires intense discussions and collective reflection. Bringing together different perspectives and experiences and collective brainstorming can give rise to innovative solutions. Feedback loops that reflect the effects of a new proposal on other areas or prior commitments also figure among participation processes aiming at win-win situations for all.

Digital tools can accelerate decision-making and make it more transparent, as well as facilitating voting, reflection and decision-making processes. In this way they can help to bolster representative democracy.

3.2 MOBILITY AND LOGISTICS

Cities are growing all over the world and a further increase in goods and delivery traffic is expected, notwithstanding the fact that increasing traffic congestion is hampering mobility. Climate change and harmful air pollutants are global problems, to which traffic contributes a lot. Fundamental changes are needed. On one hand, transport emissions must be radically reduced, and on the other, decisive measures need to be taken to counteract the constant and growing overburdening of infrastructure in cities. In the interests of urban mobility, better solutions than the private motor car need to be found and, where possible, traffic should be avoided altogether. Urban transport must be fundamentally reorganised.

In a social Smart City, digital services contribute to reducing the stresses associated with transport and driving, thereby optimising business transport and improving quality of life overall. Residential and supply structures are key to traffic volumes. In the compact city, local services must be available to satisfy daily needs. Out-of-town shopping centres, on the other hand, only enhance dependence on cars.

A good overall approach to transport management can help to regulate growing movement of people and goods more efficiently and provide climate-friendly solutions for changing mobility needs. Digitalisation helps with planning and implementation, making it possible to achieve more mobility with less traffic. If different means of transport are well networked digitally, users can work out personalised routes with substantial use of public transport. If routes and systems are reliable, the actual speed on a particular section becomes less important. Overall journey time will become the focus. This assumes that connections are reliable and easily accessible.

Better use can be made of infrastructure by means of algorithms. They can bundle transport, direct traffic flows to the most environmentally friendly means of transport and distribute them better over time. There is already real-time data for public transport and logistics, season tickets that are also valid over regional and national borders, as well as bike and car sharing. Some cities are restricting vehicle access into the centre or individual neighbourhoods, and are reorganising delivery traffic and impeding through traffic.

Digitalisation creates new spatial structures

The new technologies will exert a massive influence on settlement structures, working practices and lifestyles, as well as changing demands on the transport system. The course set at the beginning will shape the future development path. Once infrastructure has been established it attracts further infrastructure that builds on it, as well as products, technologies and everyday practices. Changing course then becomes increasingly difficult and alternatives are harder to implement.

Such processes are only susceptible to planning to a limited extent because early assumptions can prove to be wrong, having emerged from previous experience. Residential structures today are strongly influenced by the Athens Charter of 1933, which recommended separating industrial and residential uses. Since then, cities have increasingly expanded into their hinterland, driven by extensive car ownership since the 1960s. Journeys to work have become longer and goods travel further. The centralisation of production locations, worldwide supply chains, just-in-time manufacturing and short delivery times have greatly increased global transport flows. In the age of Industry 4.0, digital networking, decentralised and smart production these structures are increasingly dysfunctional. Today the issue of mobility is the strongest driver of digitalisation in cities. The pressure to change is particularly intense here because the rebound effects are strong and competition between alternative uses is substantial. For decades now traffic growth has nullified all efficiency gains. All the more important then to exploit the potential of digitally supported transport management and networking, making transport run better and creating traffic-reducing structures.

Fixation on technology is not the solution

The car industry and many political actors are banking on technical solutions, such as autonomous and networked vehicles or new drive systems. Given the current energy mix electromobility is scarcely any more climate-friendly, with additional major question marks over raw material needs, recycling, and battery disposal. Furthermore, electrification alone solves neither the congestion problem nor the unbalanced use of public space.

In theory, autonomous vehicles could provide a remedy, as long as they can pool mobility needs. Nothing is gained for the community if drivers read their emails or make online purchases during their commute or while stuck in a traffic jam. On top of that, autonomous driving requires an effective digital infrastructure.

At present, the public debate on autonomous driving focuses almost exclusively on two sets of issues: What kind of global market opportunities will emerge for the German car industry? And who will the car hit in the event of an accident – the group of pensioners or the baby? Are we following a development path that will compel other road users to carry devices that send warning signals to vehicles for their own safety? Low-income urban areas already bear the brunt of traffic problems: rents are lowest along major arterial roads, while noise and pollution levels are highest. The Federal Environment Agency and the Federal Environmental Ministry identified the links between social inequality and environmental impacts at a conference over ten years ago. As important as industrial policy considerations are, in the social Smart City the focus on technical innovation should not be permitted to exacerbate injustices in the distribution of traffic problems.

City and countryside have different needs

The focus of the public debate should therefore not be on technology alone, but also where it will be applied: How should public space be used in future? How will the traffic space be divided up? What will be the role of quality of public or residential space? Could lower speeds make public space safer and more attractive for all residents? What would self-driving community taxis mean for public transport, for people in urban and rural areas, for jobs, children and old people? What rules and incentives are needed to promote desirable developments and prevent negative consequences?

The discussion on the Smart City and mobility has to date focused largely on the centres of big cities. Rural areas, by contrast, are rarely considered. Many of these regions are suffering from falling populations and declining provision of doctors, pharmacies, shops and other important everyday amenities. The people who live there are particularly dependent on mobility and their ability to travel to service centres, where these amenities are available. Although there are axes in rural areas where traditional public transport can perform to its strengths services are needed that are both affordable and attractive for passengers. So far these two features have been mutually exclusive. Self-driving cars and buses on demand could ensure mobility for all at a socially acceptable cost, in particular in rural regions.

Policymakers need a transport strategy for the Smart City

Many of the ideas concerning mobility in the Smart City that have appeared thus far are driven by large companies and consortia and the processes involved are largely uncontrolled. Provision is tailored either to higher-income groups or to gathering user data. In this instance, products and services are oriented towards consumers demand and not towards any transport policy end. In particular when a business model relies on offering services cheaply or free of charge in exchange for selling-on the data they generate there is a risk that traffic growth and resource waste will be exacerbated and, at the same time, public transport will be undermined. In parallel with this, the more sparsely populated suburbs and the hinterland risk being left behind because investment there is not profitable.

Moving quickly around the city with a smartphone

Antonia Blasi decides how she will travel to work by looking out of the window. If the weather is not too bad, she will get on her bike; if it's raining she will take the underground. The 29 year old doesn't need to carry any cash: she just takes out her smartphone and clicks on the square logo of the Munich Transport Company. Two taps and she has already bought her ticket; the money is taken from her account a couple of days later.

If the sun comes out a bit later on, she can still cycle: a map on her mobile phone shows where there are rental bikes nearby. They cost her 8 cents a minute – what is more, she can reserve her chosen vehicle before she sets out. If it is getting late, her smartphone can simply show her the best bus, tram and underground connections home. Or she could use the platform »MVG more« to order a car share or a taxi. And – new in Munich – there are bright red electric mopeds with a display indicating whether the battery is sufficiently charged. »I haven't used one yet, but some of my friends really love them«, says Blasi, who plans to try it out soon. To do so she only has to scan her driving licence, upload a photo of herself and then she can drive off for 19 cents a minute. She could even take her sister or a friend with her, as each moped comes with two helmets.

Antonia Blasi is thus moving around the city »multimodally«, as the experts say. She uses many means of transport – often several different ones for a single journey. Sometimes she also combines several platforms in her planning. »If I see on Google that it is only eight minutes on foot then I prefer to walk than use public transport.« Although in principle Antonia doesn't like data vampires

>

such as Google and Facebook, to neglect them completely would be tantamount to saying goodbye to her smartphone, which is incredibly useful for organising her everyday life.

The Munich Transport Company's apps are very well designed, Blasi says. It usually only takes her a few seconds to plan the different segments of her journeys. She's always delighted when a new service is added. Punctuality is important to her and she often activates a phone setting that notifies her in real time about a blocked line or replacement bus service.

Blasi has never owned her own car and has no need for one. If she ever needs to transport something her friends or relatives lend her their car. In Blasi's circle a car is not a status symbol, but just something practical. She can't think of anyone she knows who lives in Munich and drives to work. Such people certainly exist of course: when she cycles towards the centre in the morning she regularly passes long traffic jams.

Rising rents in Munich, however, are forcing more and more people to move further out of town and commute into the city. Perhaps she too won't have any other option if her little flat becomes too small for her and her boyfriend. One thing is clear to Antonia, however: her highest priority when looking for somewhere else to live will be good public transport connections.

Environmental planner Antonia Blasi (29) is climate protection manager in the department for city planning and building regulations of the state capital Munich and organises her mobility largely through her smartphone.

In the Smart City the considerable potential of digitalisation should be used for better and more efficient – more customised – mobility provision, as well as better working conditions, lower emissions and more safety, in sum, for a higher quality of life. Public transport lies at the heart of all this. It must be given the financial, personnel and technical resources it needs to run services according to needs. Private sharing services should be incorporated in public services, and directly linked to callout and regular services. The municipalities must be given the personnel and funding they need to fulfil their responsibilities as central coordinators and organisers of the whole mobility system. They must have authority over all transport and mobility data in their area. They can implement services by issuing licences for. On this basis the slogan »private transport is becoming more public and public transport more private« can become a positive pledge and a new quality of public provision of mobility services.

If all are to benefit, digital infrastructure needs to become a public good. That does not automatically mean that the state takes over construction and financing. But it is important that the state defines the framework and basic provision, laying down affordable minimum standards that even the inhabitants of rural areas can rely on. Mobility is a basic need and thus integral to public services. Furthermore, an attractively designed public space as a meeting place in a liveable city can be achieved only with political and administrative guidance. It must also be ensured that data handling is transparent and users are able to monitor and decide how their data is used.

That will not work without funding. There has to be investment in a massive expansion of expertise in public services. The railways and public transport as the core of future mobility need resources, both hardware and software, as well as training and recruitment of the requisite personnel. The political focus on balancing the budget is thus absolutely the wrong approach. If nothing is done, it will enhance the concentration of economic power among digital companies and thus lead to a reduction of citizens' rights and data protection. At the same time, social divisions will be exacerbated.

Transport does not organise itself – the Smart City must be regionally networked or become a desert

Traffic volume is largely a dependent variable: residential, industrial and commercial structures and the organisation of work define the extent to which people and goods are on the move.

When organising transport it must be considered which movements it makes sense to centralise and bundle and where decentralisation is indicated. Increasing sales via platforms has complex effects and has to be carefully considered. On- and offline are increasingly merging.

On one hand, cities' regional goods supply can be strengthened. The link between producers and consumers is becoming closer and delivery distances shorter. According to the DIHK economic report for 2018 bookshops now sell more than 50 per cent of their books online. Initiatives such as »Buy Local« in Baden-Württemberg demonstrate that customers can help to maintain their local bookshops without giving up door-to-door delivery.

On the other hand, however, more and more producers are becoming distributors. Above all, local suppliers are coming under massive pressure from online providers, especially Amazon. Equal competition must be ensured.

In parallel with this the volume and frequency of parcel deliveries by small vans is increasing. Business models such as Amazon's Marketplace – where the provider dictates the contractual conditions – lead to a race to the bottom and ultimately to the closure of more and more shops. Now the post office wants to get into the retail business, announcing that it will concentrate on the big cities. Even towns such as Flensburg and Passau will fall by the wayside.

Without political guidance the concentration process will be stepped up, more and more inner cities will decline, while rural regions will be left behind. The public authorities should establish standards.

Logistics: cooperating in competition, centralising in decentrality

What is to be done? Experiences with pilot projects and initiatives can offer some pointers. For example, in response to the traffic congestion caused by delivery services, traders and property owners in downtown Hamburg got together under the auspices of the cooperative urban development project (Business Improvement Districts, BIDs). The chambers of industry and commence seized the opportunity to encourage logistics companies to organise their package deliveries (and returns) through a microdepot based on electromobility.

Simple networking of regional companies

It began at Lent in 2014. The region's Protestant Church (Nordkirche) proclaimed the slogan »for seven weeks buy as much as you can regionally and fairly«. The people running the village shop in Gessin took a critical look at their stock and had to admit that almost everything came from far afield and almost nothing from the local area.

Their efforts to link up with local producers failed. The logistical cost was too great. However, the idea did emerge of setting up a trading platform for producers, shop owners, restaurants and other businesses within a radius of fifty kilometres or so around Gessin. The initiators named their initiative »Meck-Schweizer« (referring to the name of the region, »Mecklenburg Switzerland«.

There is now an internet platform on which cooperative members can make purchases. Around fifty producers offer their wares there: for example, buttercream cakes, cartons of mushrooms, ostrich steaks and craft beer in gift boxes can be found there. Besides food there are also occasionally handicraft products or natural cosmetics. There are no costs for the sellers, who can decide whether the goods can be collected from them, they will send them or the Meck-Schweizer logistics service will provide the transport.

The – At present twenty buyers are registered on the platform. They cover the running costs of the platform through a commission on top of the net price set by the vendor. If the wares are delivered via the Meck-Schweizer distribution system, run by a separate company, there is also a delivery fee.

In 2017 the project went online and quickly won a sustainability prize. A Meck-Schweizer regional store was opened in Gessin, selling primarily conventional and organic food from the surrounding area. The model could be transferred to other areas and the Gessin cooperative advises other initiatives on how they can set up such a regional market place themselves.

The experiences of these private initiatives can be used for the so-called »last mile« in city centres and residential areas. Cities and municipalities can issue licences for whole areas of the city or for individual districts and also provide spaces for microdepots and deliveries. They can define the service in more detail, for example, when and how often package deliveries are to be combined or that distribution must be carried out using environmentally friendly means of transport. The pros and cons of microdepots should be investigated.

With the advent of digitalisation relations between competition and cooperation, centralisation and decentralisation are shifting because of trading platforms and delivery services. Here, too, problems can arise in dealing with the data. In this case, it is less about data protection than the need to share information with other market participants. Many business models are based on the collection and analysis of data, but many companies do not wish to give much away. In order to design useful interfaces, however, the different systems need to be coordinated and ideally constructed as a single unit right from the outset.

In order to ensure that small-scale retail and supply structures survive or come into existence in the first place they need to be located where there is substantial passing trade. Railway stations are one such hub. If a number of municipalities cooperate and reach agreement on equalising business taxes, economically sustainable supply points are likely to emerge. If all their daily necessities are at hand, the chances increase that older people will be able to remain independent for longer without a car. The quality of life in small places is also more congenial if bread, cheese, newspapers and vegetables are available nearby – jobs are also created in this way.

One example of how everyday services can work even in small municipalities is the DORV approach (see www.dorv.de/) developed by local people in Jülich-Barmen, North Rhine Westphalia, with just under 1,400 inhabitants. There is an internet café, a travel agent, a cash machine and doctors' surgeries (open at limited times).

Other considerations should also be borne in mind. New kinds of platforms such as Foodora or Lieferando may even boost sales for local restaurants. On the other hand, the employment conditions of the delivery workers are unacceptable and the platforms impose certain stipulations on the restaurants. Furthermore, such services go hand in hand with a high volume of waste.

Policymakers must establish new rules here and the question arises, whether the permanent expansion of the logistics and transport sector indicates adverse economic development. Although three million people now work in this sector many workplaces are precarious. Furthermore, such transport services go hand in hand with a significant impact on people and the environment and give rise to high infrastructural costs. Fundamental policy questions must be addressed: Is transport too cheap while causing high costs elsewhere? What labour regulations are urgently needed in this area?

An alternative to the Amazon strategy of wiping out local retail

Competing with Amazon and boosting the local retail trade: that is the aim of the platform Lokuza. Lokuza, which was founded in Siegen, is short for »Lokal zu Hause kaufen« or »Buying local at home«. Since 2016, customers there have been able to order from local traders and receive their orders only a few hours later. The first Lokuza franchise business has been set up in Arnsberg, while it is getting ready to launch in Isartal, Emsaue, Spremberg and Emmendingen.

Before the manager of this internet agency, Patrick Schulte, started the platform he took a good look at where previous ventures had failed. First and foremost, small shops had problems presenting their products. Photographing each article and uploading the relevant information is very time-consuming, especially if there is no barcode/scanner system. Furthermore, local platforms have often tried to get the customers to pay for delivery; in some places a taxi delivers every order. But buyers expect free delivery these days.

Schulte drew two conclusions from these experiences. On one hand, a platform operator has to pay attention to the online presentation. In Siegen, Lokuza now has the goods of 36 vendors in the system. If there is a barcode/scanner system the internet agency programs the interface; where a lot is still done by hand, Lokuza takes care of photos and the digitalisation of product information. All that finds its way into a database so that franchise operators can easily make use of the information, if they offer the same items. In this way costs per business are gradually reduced.

Second, businesses using Lokuza pay 7 per cent of the gross purchase price for delivery. Orders received before 10 am are with the customer by 3 pm at the latest. There is a second round in the afternoon. The delivery vehicle has a fridge and a freezer so that frozen goods can be delivered. Purchasers pay for their orders by card on delivery; if they are not at home they can agree on a place to leave the goods and pay by direct debit. Once a month, Lokuza settles up with the retailers. They must also pay a basic fee of between 99 and 199 euros a month, depending on when they joined the platform.

In Siegen, four thousand customers have registered with Lokuza, and can select from 2.3 million different articles available through the platform. They typically order from two different retailers per purchase. In this way 300,000 euros have stayed in the region rather than flowing out to the big companies. And the system has matured to such an extent that it would be relatively simple to set up franchises elsewhere, on a decentralised and modular basis.

SUMMARY

New digital offerings are fundamentally changing mobility conditions. Platforms can bundle individual travel needs and integrate car, bike and scooter sharing into public transport offerings. Another key aspect is to regulate to prevent new competitors undercutting public transport and taxis, which will otherwise ultimately lead to the emergence of more cars and poorer working conditions for drivers. The aim must be to use digitalisation to organise growing mobility in such a way that public space becomes more attractive.

On the other hand, it cannot be expected that forms of new mobility will emerge independently in less affluent sub-urban and rural areas. The key to solving these problems and preventing risks lies with the municipalities. In large cities such offerings will complement public transport and perhaps even be created by municipal transport companies themselves. Alternatively, licensing models that enable municipalities to exploit the potential of digital platforms in the right places and times for them are conceivable. In rural areas such licensing models will have to be commissioned and financially supported.

If these new digital tools are implemented in the right way users can be involved in planning, and development and thus help to cultivate a new quality in the mobility options provided by the public authorities. The public debate on mobility and its influence on urban living spaces can also be intensified in this way and shaped on a participatory basis. However, mobility in urban districts can only become smart if the conditions are improved for public transport, cycling and walking. A broader range of options in a much improved infrastructure will strengthen public service–oriented mobility. But more state money is needed for this at all levels.

3.3 SOCIAL INFRASTRUCTURE IN URBAN NEIGHBOURHOODS

Digitalisation harbours risks and opportunities in the domain of social infrastructure, too. It can lead to more participation, strengthen neighbourhoods and public involvement, and enable older people to live longer in familiar surroundings. But there is also a danger that personal encounters will diminish.

If digitalisation is to help more people to participate in social life and different generations and milieus to come together, attractive, real spaces have to be available in urban neighbourhoods. On- and offline have to be interlinked. Digitalisation must not be regarded as a stopgap for cutting jobs or compensating staffing shortfalls.

On an everyday basis, reducing the separation of different spheres of life and bringing together diverse inhabitants is most likely to happen in urban neighbourhoods or at municipal level. Many projects, however, are designed exclusively for children and young people, or for older people; those in between are often neglected. The local economy, too, is often sidelined in networking activities.

Participation requires competence – it has to be learned. And structures have to be created to enable volunteers to participate in decision-making. Education is needed at different levels. This includes not only media skills but also the communication of experiences that strengthen collective perspectives

and social responsibility. Offerings should be based on an analysis of specific local needs, but the focus should be on existing local resources, rather than deficits. And every group needs to be taken into consideration when it comes to planning. All of this costs money: neighbourhood work is not a way of making cuts. However, many municipalities are hard up. Structurally weak regions and disadvantaged urban areas are thus at risk of falling further behind.

Generally speaking, internet offerings for older people are limited to providing information on activities and services in the local district. The website www.welper-aktiv.de, for example, is a platform on which a network of organisations posts information. Such websites are not usually self-organised; the city administration often provides support and ensures continuity. Housing companies may also function as sponsors. One example is Wohnbau Salzgitter (Wohnbau Salzgitter n.d.), which is largely owned by the city. What is needed are concrete individual neighbourhood concepts. Short-term projects and pilot projects, by contrast, tend to be a flash in the pan.

Tertiary-sector organisations such as AWO are increasingly campaigning for digital learning and participation processes. There are now long-term housing projects involving AWO and municipal housing companies, which support »smart living« by providing assistance and self-reliant living at home. Here, older people can use tablets to obtain medical supervision and call for help in an emergency, but also shop for their daily essentials or order transport services. A tablet allows many visually impaired older people to read books and newspapers on their own again, because text size and brightness can be adjusted. Everybody is given instruction in how to use the system. Not everyone makes use of every function, but many options are available.

In regions in which charity organisations are well organised there are new voluntary activities aimed at improving people's ability to cope with the digitalised world. For example, AWO is increasingly involved in schemes in which young people teach older people how to handle smartphones and tablets.

The internet is not suitable for reaching the one-third of older people who live in seclusion. Butcher shops or bakeries are much better. One outreach initiative that cities can develop is neighbourhood benches. If they do not exist and neighbourhood development strongly emphasises digitalisation, certain groups are at risk of falling behind even further.

Meeting in real space

Ursula Kreutz-Kullmann is very well known in Merkstein. She often strolls through the streets, chatting with people and regularly looking in at the pharmacy, hairdresser, baker, doctor and other service providers because they know a lot about the neighbourhood and people's local concerns. Anyone who has a question about aging, care or prevention can simply pop into her office in the centre of town.

Around a third of the 2,800 residents in the project area »In the middle of Merkstein« have already passed their sixty-fifth birthday. Many men, in particular, suffer from respiratory diseases or musculoskeletal problems. Many are former miners. What most people really want is to live independently for as long as they can in familiar surroundings. That is why the neighbourhood development project »In the middle of Merkstein«, set up in 2015, aims to build and maintain sustainable neighbourhood structures. The idea is that, when the project is wound up in 2020 and Kreutz-Kullmann is no longer around, the social network will remain firmly established in people's minds so that the feeling of security and belonging continues to pervade the neighbourhood.

Because voluntary engagement is on the wane, social worker Kreutz-Kullmann is quite reluctant to offer new services that might place further strain on existing voluntary structures. Rather she is trying to bundle and strengthen what already exists. Associations, projects, self-help offices, Alzheimer's society and hospice association are available options. On top of that she has woven a diverse, often small-scale everyday network based mainly on information exchange. Mrs F is soon moving away, so could Mr S, who finds it difficult to manage on the third floor since his hip operation, get her flat? And why has no-one seen Mrs O around the neighbourhood for four days, when she usually keeps in regular contact with people? Blind Mrs U would like someone to help her go for walks. Who might be willing to do that?

Twice a year, Kreutz-Kullmann organises a network conference, to which she invites representatives of the housing companies, the church, associations, nursing and care facilities, and policymakers. This might, for example, give rise to ideas on how contacts might be cultivated between the generations. At present research is being conducted into how and whether older people with a car and younger people with a driving licence might form tandems to their mutual advantage. A cross-generational choir and a teaching project in which young people help older people to get to grips with computers or smartphones is also envisaged.

Kreutz-Kullmann has set up a website focused on practical needs to make it as easy as possible to participate in community life in the district. For example, there is a guide to neighbourhood activities: what kind of approval do I need for a street party and where can I get it? How do I organise a neighbourhood info point in my street in order to disseminate important information at low cost?

Differing time budgets often prove to be a problem when it comes to helping out in the neighbourhood. Many working people have little free time and are rather reluctant when it comes to making contacts with neighbours, above all because they are afraid that, if they offer some help, sooner or later more will be expected of them. That being the case, it is good to know that other people are willing to pitch in, too. For people who live a fairly secluded life or are prone to depression Kreutz-Kullmann has developed a very low-key weekly game event. Anyone who actually makes it through the door is greeted by volunteers and only left to their own devices once they have sat down with other people at a table and are really participating.

Care at home

When it comes to home care and digitalisation there are a number of aspects whose impacts on different participants still have to be properly investigated. New programmes and tools make it possible to slim down the care record, which saves working time. Platforms such as www.betreut.de are online employment agencies for cleaners, babysitters and care workers for private households. Because it enables such workers to plan their working time better it (like temping) exacerbates the problems of established care services, where staff shortages lead to employees being asked to work extra hours.

SUMMARY

Digitalisation affects the service sector to a considerable extent. Far-reaching changes are looming in the care sector in particular. Collective bargaining coverage should be extended and a generally binding collective agreement for social services should guarantee a baseline. Well-functioning labour law, employment protection and data protection standards are a major challenge for smart cities. On top of that, the foreseeable skilled labour shortages and the desire of many older people to continue to live as long as possible in their own homes means that neighbourhood assistance for older residents must much better networked.

It is still unclear whether telemedicine and online prescriptions, which are currently under discussion, will help people to live longer in their own homes. New options are being trialled throughout the world. Examples indicate that basic medical care can be provided much more easily and rapidly if a region establishes the relevant structures.

The new smart technology, whose surveillance and control possibilities appear to be rather sinister in relation to healthy adults, can, for example, improve freedom of movement for people suffering from dementia. Care-giving families or institutions can thus allow those concerned to leave the home environment because they can be quickly located again. That can be extremely helpful in making it easier for people to live together.

As regards the future of care the debate today often focusses on care robots and other technological devices. In this area, too, the Smart City is often associated with digital tools. A different conception of the »smart city« lies behind the approach taken by an innovative outpatient care service in the Netherlands, set up by a carer who loves his job. Buurtzorg (www.buurtzorg-deutschland.de) has, within just a few years, grown from a ten-person firm into the biggest provider in the country. This is because it is much more attractive than traditional operators to both the employees and clients (Krinninger 2018). What makes it different is that the entire organisation is modular. Each team has around a dozen care workers and organises its own work locally. Company headquarters is tiny and serves mainly to provide local teams with communications infrastructure and put them in touch with one another in case of need. The focus for the work groups is the particular needs of their clients and using the resources available locally. Relatives, neighbours and others are actively involved and the community is reinforced. Buurtzorg's motto is »humanity before bureaucracy«. The company organisation is congenial to all those involved and boosts their independence and shared responsibility, while for society this approach is much more affordable than traditional service providers.

3.4 EDUCATION

Children and young people have an almost natural affinity with all smart devices and surf the worldwide web as if they were born to it. All kinds of language, behaviour and learning, but also sport and games can be found here. While public institutions such as primary and secondary schools and training institutions are only slowly being equipped with the latest technological devices, the kids have long been active online. Instagram, Snapchat, Facebook and so on are a fixture of young people's lifeworld. This generation is growing up with smart technology. While parents, teachers and educators are still arguing about the age from which tablets, smartphones and game consoles can be used, the kids learn from each other and are often familiar with what is going on in the smart world long before their parents' generation.

New career aspirations such as Youtuber or blogger are on a par with footballer or policeman among primary school kids. Whether after school or at the sports club, communication and arrangements to meet run smoothly via chat groups, mainly using the free WhatsApp. Notes and emails are only used to include people who do not own a smartphone or for long-term planning. Even menus for day care or school are put online daily in many places.

Besides the computer courses included in the curriculum, dealing with the internet and social media remains unorganised and dependent on the involvement of individuals in an adolescent's milieu. On average, 95 per cent of young people between 12 and 19 years of age use WhatsApp several times a week or daily, according to the Southwest Media Education Research Service (Medienpädagogische Forschungsdienst Südwest) in 2016 (Feierabend et al. 2016). Almost the same level of usage was established for Instagram, Snapchat and Facebook. Children and young people are long-term social media users, who, depending on their development phase, know little or nothing about the real dangers that lurk there.

For example, playing Pokémon in a familiar environment is relatively harmless, even though it can be painful if someone with their eyes glued to their smartphone trips up over non-digitalised real objects while they are on the hunt (a swift learning experience for grasping the difference between the smart world and the real one). But children tend not to realise of their own accord, depending on their age, why it is not advisable to post their route to school or to put too candid news or clips online. But even now this does not form part of regular education. Similarly, in online chats social interaction can get out of hand. More than one school has complained that class chats or online school blogs can lead to so-called shitstorms or personal abuse.

A lot of things happen in social networks that are harmful to children: disturbing images and videos, sexual abuse via chat, misuse of data. Quite a few adults lack media skills and judgement concerning the consequences of certain actions online, but of course children and young people are at even more of a disadvantage: how should I behave in social networks, who reads what I write, what photos should I post, how

widely does my news spread, who should I block and what effects might something have on participants' real lives?

SUMMARY

Children should acquire effective skills in dealing with digitally networked media from the very outset and their schools and parents should help them. Up to now, there have been only isolated recommendations for schools and parents – about cyber bullying or external material for classes on the digital world. But it is important to integrate media education in all school subjects. There must also be regular in-service training for teachers and educators, as well as educational options for parents. Social networks and their mechanisms must be understood, but digital tools can also enrich teaching and promote learning. Digitalisation and understanding how to handle these media should therefore become part of teacher training.

Similarly, federal and state funding instruments, such as the education and participation support package, should be adapted to cover students' needs for digital teaching aids. School requirements that pupils have to use laptops must not lead to exclusion due to poverty. Legal certainty must be created here and job centres must be given room for discretion.

3.5 HOUSING

Digital controls are increasingly encroaching on living space, for example, for heating, shade or lighting. Some smart homes have information displays and district wifi; energy supply and usage can also be managed intelligently. Integrated assistance systems for older people combining digital instruments and analogue services and marketed as »ambient assisted living« (AAL) belong under the same heading. Smart living encompasses a broad range of offerings including automatic pet feeding or deterrence of burglars by means of variable lighting in the evening. You can talk to some coffee machines and fridges and a digital assistant can let you know what medicines you need to take. Comfort, security, energy management and self-determined living in old age are at the forefront of smart living.

There are also possibilities for saving energy through sensors and other devices, whether it be through shutters in the summer, adaptation of lighting to daylight or turning down the heating if no-one is at home. Other applications contribute to saving water or simplify the calculation of consumption costs. Also, associations of small electricity generators and consumers can organise digitally, thereby gaining more independence from the big suppliers. Smart control systems can also help to select the right energy source and timing. Protection systems also exist, for example, for cookers in households in which people suffering from dementia live. Personal alarms linked to motion detectors have already proved their worth in daily use. But whether, for example, a talking fridge only benefits the blind and otherwise is just a pointless gadget remains to be seen.

The networking of many household devices via the internet offers major gateways for hackers and thus creates barely estimable dangers as regards data protection and cyber security.

One thing is certain: there are considerable risks involved in linking household devices to the internet. Both Google and burglars are keenly interested in data that reveal the occupants' rhythm of life or state of health. Experts believe that it is impossible to safeguard every last coffee machine against hackers, which means that there are major risks to the system overall. And what happens if there is a power cut?

Applications save resources and make life easier. Or do applications make everyday life more expensive, taking all costs into account, and do they entail increased maintenance costs? Are programs too complex to use, leaving potential savings unrealised? How can it be ensured that energy saving applications also benefit people in social housing? Can support schemes be developed in this connection?

In the case of new buildings, heating or cooling effects can also be achieved through clever design and use of sunlight. The roof ridge or a balcony above can block direct sunlight in summer, while the low-lying winter sun can shine in. Triple-glazing and heat exchangers in the ventilation system keep the heat in the house during the winter, while in summer they keep it cool. Such construction demands little of the inhabitants in terms of technology, while complex programming options are often not used at all or are set wrongly, with the result that the theoretical energy savings are not realised.

Smart home initiatives of the federal government, especially the Ministry for the Economy are aimed at value added and the jobs of the future. The business initiative Smart Living calls for uniform quality and safety standards, comprehensive broadband coverage, a robust legal framework, targeted innovation efforts, and training and qualification measures.

What is still lacking, however, is a cross-departmental strategy for a social Smart City, which besides the economic considerations also has social issues on its radar, such as citizens' participation and inclusive neighbourhood development. It is also worth exploring whether new opportunities for affordable living space might emerge from, for example, a space-saving, modular and flexible design of the kind practiced by the multi-award winning firm Goldbeck in Bielefeld. At the Wikihouse project (www.wikihouse.cc) architects from all over the world are developing houses and making the plans freely available on the internet.

SUMMARY

The question is, what problems can actually be solved by means of digital controls in living space? At present, the dominant perspective remains that companies offer goods or services for which they assert a need or seek applications.

Instead, the focus should be on desirable and necessary developments: energy and climate protection, for example. Innovations should be judged on whether they serve their purpose or whether manufacturers just claim that this is the case and, for example, foreseeable application errors and additional applications might even have conflicting effects.

What definitely appear to be needed are standardisation and structures that enable solutions independently of particular manufacturers or providers. Here, too, a key issue is who has access to data, how transparent the process is for users and the public, and what happens to the data. The state has to ensure that children and young people in particular are protected from carelessly surrendering their personal data. The issue should be dealt with critically as early as primary school and also in the training of planners and architects..

4

EXAMPLES FROM GERMAN TOWNS AND CITIES

The population is growing, especially in the major cities, so more housing is needed. New neighbourhoods are developing, but existing areas also need to be adapted to changing circumstances. Smart City concepts need to provide answers for both kinds of neighbourhood. We present four municipalities of different sizes and with different »Smart City – Social City« priorities.[2]

4.1 WENNIGSEN

Wennigsen has 14,500 inhabitants, 5,500 of whom live in the central district. The municipality lies in a rural area south of Hannover (the capital of Lower Saxony), in the catchment area of Hannover, Braunschweig, Göttingen and Wolfsburg. The bulk of the working-age population is not around during the daytime. The Wennigsen administration is employs around 170 people, including services such as kindergartens and sewage treatment.

Since 2006 extensive experience has been accumulated with digitalisation, which can be attributed above all to the young mayor Christoph Meineke, a local man who in his first election campaign – while still a student – put strong emphasis on the use of social networks such as SchülerVZ and StudiVZ, as well as on direct communication with the public. Over the past twelve years he has been as good as his word.

Wennigsen is heavily in debt – although in Meinecke's view this is no reason to prevent it from developing intelligent solutions to benefit the residents. »Smart countryside and digitalisation are not a question of money, but of will« is the mayor's credo. His digitalisation focuses on public services and their use by local people, not the creation of new markets. In these circumstances, it is eminently possible to boost value creation in this rural area.

Meineke has a lot to say about central topics of the future for Wennigsen and other small municipalities, in relation to which digitalisation can play a facilitative role: provision of food and other daily essentials, lifelong learning, avoiding commuting, care and multifunctional housing. The municipality has accumulated a wide range of experience in all this in recent years by means of workshops, its own projects, and participating in projects run by others.

Wennigsen relies systematically on participation projects, with technology regarded as a useful tool. Under this approach, the municipality would like to create a digital region and has sought partners, for example in the academic realm. The University of Bremen's Institute for Information Management (IFIB) has included Wennigsen in a Europe-wide comparative study and helped in strategic development and the transfer of experiences. Wennigsen has also been involved in the initiative »Digital Region: From the Countryside for the Countryside« as a model region (Internet & Gesellschaft Collaboratory e. V. n.d.). Until not so long ago rural regions were largely ignored in relation to the issue of digitalisation, apart from the expansion of broadband, because it was assumed that the low population density meant that there were scarcely any scale and network effects. Many examples from Wennigsen show how digitalisation can be utilised for the benefit of the population and the community in small towns.

The Smart City and the Smart Countryside need a participatory basis

After Stuttgart 21[3] the topic of »participation« was on everyone's lips; many towns and municipalities adopted statutes on participation. After the hype had died down, however, the issue was shelved in many places. What municipalities generally have to contend with these days are digital solutions offered to them by private companies – and sometimes also by public agencies – offering services almost like mail-order companies. This harbours a considerable danger for democracy and participation because many administrations are ordering everything

2 The information in the main text is based mainly on reports by those responsible for the issue in their town or city or neighbourhood. They are: in Wennigsen mayor Christoph Meineke; for the planned neighbourhood Berlin-Tegel the managing director of Tegel Projekt GmbH, Philipp Bouteiller; in Wolfsburg the head of the department for business, digital matters and culture Dennis Weilmann; and in Munich, Klaus Illigmann, head of the department for population, housing and outlook, based in Munich's department for urban planning and building regulation.

3 Stuttgart 21 is a transport and urban development project to reorganize the Stuttgart railway junction.

under the sun, according to Meineke, but are not taking their citizens and their interests into account. He advises that instead of a top-down strategy digitalisation should serve a kind of neighbourhood development in which citizens are actively involved and the municipality itself decides what tools are best suited for its purposes.

A broader discussion began in Wennigsen after the municipality participated in a competition run by Wikimedia e. V., the German-language community around Wikipedia. The project initially appeared attractive to a relatively highly indebted municipality seeking regeneration: citizens and other interested parties were asked to photograph monuments, upload them to the internet and write Wikipedia articles about them. Since there were very few photos of Wennigsen the municipality expected a publicity effect. In fact, many people participated and the press response was gratifying, but at the same time unanticipated conflicts arose. The owners and inhabitants of monuments and notable buildings complained that their privacy had been invaded by people who wanted to photograph them from outside and inside. »This opened up the first rupture in the wonderful new digital world«, says Meineke. How should one deal, for example, with the fact that nuns still live in the 800 year old convent and have every bit as much a right to protection of their privacy as those wishing to encroach upon their space? On top of that, almost at the same time Google vehicles arrived with their dome cameras and the debate over Google Street View broke out. For example, municipal and village councillors discussed in some detail issues that later came to be debated at national and international level: privacy, freedom of panorama, people's rights to their own image and so on. In response to all this, local people set up their own special committee in the council to specifically address digital issues, one of the first in Lower Saxony. Since then fundamental issues of digitalisation have been discussed in relation to specific problems and on occasion the committee even invites experts for consultation.

The involvement of all age and social groups forms the basis for participation and digitalisation in Wennigsen. The municipality ensures that processes are low-threshold from the outset. Segmentation is avoided at all costs: the risk is that only those who can afford it participate and subsequently they derive the most benefit. The municipality would also like to find out whether certain stereotypes have some basis in fact – for example, that older people are not interested in the digital realm or are excluded from certain formats.

In the »Hohes Feld« participation project the initiators were surprised in this regard, says the mayor, because reality contradicted prior assumptions. The idea was to make improvements in the somewhat run-down residential area, dating from the 1970s, which was in a sorry state: pavements and walkways were not barrier-free, the football pitch had been closed for years because of a legal dispute, and young families were reluctant to move here because it had an increasingly bad reputation. Two-thirds of residents were over 60 years of age.

Together with the University of Bremen, Wennigsen launched a pilot project for online-supported participation. The aim was to address specific problems and conduct research on how and whether digital participation can work with all age groups. To the astonishment of many participants it turned out that participation was very high and the 60 plus age group proved to be particularly comfortable in the online world. Here it seems that a lot of potential for digital volunteering lies untapped because these people often accumulated significant experience with computers during their working lives and now have both the time and the inclination to get involved. But even the over 80s got on board, often by organising help from younger people.

This project also raised unexpected issues. Who may participate? Neighbours were afraid that outsiders would interfere and dominate the process with their proposals, an aspect that the researchers had not taken into consideration because they had assumed that no-one outside the 550 inhabitants of the neighbourhood would want to take part. First came a proposal that all adults eligible to vote should be given a password, but that was associated with high costs and in any case might have excluded children and young people. Finally, the participants agreed on one password per street. Statistical outliers would have quickly revealed any abuses. The compromise strengthened the basis of trust among the residents and also kept costs down.

For the design of this online participation process Wennigsen won the inaugural »prize for online participation«. A subsequent survey showed that 88 per cent of residents were happy with the project, 70 per cent considered the process to be democratic and 61 per cent declared that policymakers had gone up in their estimation. The available funds were spent well because, for example, the young people had to decide among themselves whether they wanted a football pitch with full size goals or rather smaller goals plus a basketball hoop. Participants also gained a better understanding of municipal processes. Often citizens were able to explain to others on the online platform who in the town was responsible for what and what a municipality was (and was not) able to accomplish.

Meineke became convinced that an appropriate design and sometimes also new tools are important for digital participation platforms after the results of a comparative study on climate protection carried out by citizens (in which his municipality had also participated) became available. It turned out that although »offliners« kept much better accounts of their CO_2 emissions and devoted more time to it, the savings made by the »onliners« were much more significant. Meineke says that this is because of the interesting design of the online platform, which, for example, made it possible to compare oneself with others in a similar situation and to enter into a kind of »saving competition«.

Rural digitalisation is different

Problems in rural areas tend to be similar everywhere: because far fewer people live in close proximity than in urban areas many options are not feasible there. However, the benefits of scale effects can also be achieved through digitalisation in rural areas, for example, in health care or public transport. If implemented well, digitalisation can make up for the disadvantages of rural space and regional value chains can be developed if corresponding structures are fostered. Federal legislation has also now recognised this.

Hohes Feld seven years after the participation project

»The approach taken to citizens' participation was very good and very enjoyable, but implementation did not work so well«, according to Wennigsen resident and teacher Annette Schroer. Together with her then sixteen year old daughter Rike, Annette was involved in the »Living environment and accessibility« working group. The six- or seven-person group looked primarily at the four playgrounds that had fallen into disrepair and the – in some places – bumpy pavements. »I used these playgrounds a lot when I was a child. A lot of the equipment is now broken. I thought that was a shame because more and more children are moving into the area«, said Rike Schroer.

All the participants are happy with the design of the large open spaces at the Vogelkamp, but a couple of streets away things look bleak: on a threadbare patch of grass there is a small roundabout next to a tree in a square frame, surrounded by interlocking paving stones. There are also still some bumps in the pavement, poorly lit corners and unevennesses – all obstacles for older people who use their walking frames here. Annette Schroer is particularly annoyed that the roots of a big plane tree in front of her home are lifting the flagstones higher and higher. Her neighbour already finds it difficult to drive her car into her garage over the curbstones. But so far the residents have asked in vain for the trees to be felled. Further up the street, by contrast, two plane trees have gone. »Allegedly they were rotten«, says Schroer. She suspects that there is a different reason, however: quite simply, the municipality is responsible for clearing the autumn leaves there.

The residents of Hohes Feld are affluent. Most of the private homes were built in the 1970s and each has a garden. There are no through-roads here and the area is green and crisscrossed with footpaths. Around 550 people live in the neighbourhood, most of whom moved in over forty years ago as young families. »Only people with children were allowed to build here at that time« reports pensioner Gerhard Krick. »Gas connections were also mandatory, black roofs and no farm animals« adds Eberhard Fulst. And while housing developments built later on were leasehold, here everything is freehold. The proportion of graduates in Wennigsen is one of the highest in Lower Saxony, and in Hohes Feld it is probably above the local average.

The launch event for the citizens' assembly was jam-packed, the four-person pensioner group recalls. They have different views on the option of participating online. While conservationist Gerhard Krick is open to such new forms of participation and takes the view that this approach has set a number of things in motion, Heino Kebschull takes a rather negative view. He thinks that the young mayor was only interested in becoming better known outside the region. »With computers everything is supposed to be speeded up. His main interest was to get the project with the University of Bremen into its final stage«. The older women living alone in the neighbourhood had no idea about computers anyway, he said, and thus had not taken part. Krick disagrees: »there was also a possibility to hand out leaflets«. Jürgen Rudloff is also critical of the mayor: »He starts a lot of things but doesn't follow through with them«.

When the public participation project at Hohes Feld began to involve practical work in autumn 2011 around twenty people indicated their interest. A former mayor coordinated the process and three working groups were formed. Gerhard Krick, chair of the local conservation group, took over leadership of the green spaces working group. »Naturally I want to keep as many trees as possible«, says Mr Krick, who also advises the environmental committee at the town hall. He has often asked himself whether this is really a democratic process – ultimately, as working group chair and with time on his hands he has more influence than other people in his neighbourhood. »But how else can citizens' participation be well organised?« he mused.

Annette Schroer stresses the social learning process that the project has triggered. It has also become clear that next time the framework for citizens' suggestions must be transparent from the outset. The fact that changing the adjacent main road, for example, was out of the question should have been made clear, along with the financial constraints. How the results were to be dealt with should also have been made clear. For example, one of the playgrounds in Hohes Feld has now vanished and no one knows who made the decision and why.

On the uppermost level of the Vogelkamp playground there are two football goals, a basketball hoop and a boules court. Every Monday Gerhard Krick and some friends meet here to play. In the early days of this part of town there was a football pitch, but it was locked up for years. A resident had been disturbed by the noise of children playing and forced the council to erect a fence. The neighbour has now died and the pitch can be used once again. This shows once again that citizens have very different needs and interests concerning how public space is to be used. Sometimes their wishes and ideas are mutually exclusive. There will never be a solution that pleases everyone – not in Hohes Feld or anywhere else.

Wennigsen has an extremely high proportion of commuters: 87 per cent of those in work leave the town for that purpose. This has deleterious effects on voluntary institutions, such as the voluntary fire brigade. In a workshop of the non-profit Collaboratory e.V. from Berlin involving experts from all over Germany the main question was, what could be done about this? The idea arose of establishing a co-working space, a community office in which desks and rooms could be rented temporarily. The calculation is that as well as encouraging freelancers from Wennigsen to work and network there, it might also attract others from nearby cities.

A co-working space must be easily accessible and technically well equipped. The former Raiffeisen warehouse in Wennigsen lies directly next to the railway station and is

generally well connected. On top of that, the building can be connected to the fibre optic network installed by German Railways along its tracks. To enable its conversion into a modern community office the Federal Ministry of the Economy is supporting the project with around 200,000 euros. Architects and tax advisors have shown an interest in occasionally using it, as have school initiatives, reports Meineke and adds: many solo self-employed people would like to work in Wennigsen, but not within their own four walls.

It is too early to say whether people from the big cities will be attracted here. The mayor of Wennigsen himself is in contact with many digitalisation and participation experts and points to model projects by rural communities in the Black Forest. They promote commuting by the highly qualified in the opposite direction from the usual one: employees from high tech firms located in a small place are picked up in larger places and can go online on the well equipped bus on the way to work. Another thing that will promote the regionalisation of digital infrastructure is the expansion of real-time applications. This includes, for example, autonomous driving. The companies store the relevant data in their clouds. However, for physical reasons real-time applications require servers located no more than 70 to 100 kilometres away because otherwise the necessary response times cannot be achieved. The speed of light sets limits on possible transport distances for the data.

Meineke regards the requisite data cables and server capacities as part of public services, for example, if autonomous buses are controlled in this way or road transport increasingly depends on it. Now such infrastructure offers an opportunity for value creation to take place in rural areas too, and not only in cities.

Thinking and working »outside the box«

In order to foster development it can help to try things out in a limited realm and accumulate experience on whether they work there – or not. This applies especially when rural communities venture into the Smart Countryside segment or Digital Regions and thus into an area that in urban areas is promoted under the aegis of the Smart City.

The community's entry into the so-called »internet of things« (IoT) is open-ended but full of promise, according to Meineke. This is the trend towards networked and intercommunicating devices. In a cooperation project the municipality made roofs available to a private company for the installation of a »low-range/wide-area network« (LoRa). This involves smart control over IoT devices over greater distances, which is of particular interest to rural areas. Whether the use of an open network really is a practical prospect will now be put to the test. The potential applications for the municipality lie in meter data from its own buildings, car parking sensors or intelligent street lighting. Wennigsen has gained Hannover's public utility company as a partner in this, one of the biggest municipal energy suppliers in Germany. Meineke is convinced that the opportunities offered by digitalisation can be demonstrated in particular by small, people-oriented applications that simplify processes such as meter reading.

There are also discussions in Wennigsen on the topic of the future of mobility. Because it is unclear how things will develop here over the coming years development work must leave a range of possibilities open. At present the municipality is renovating Wennigsen's town centre and main street. This street has not changed for over a century. »We need to think today about mobility of the future«, says the mayor. While at present parking next to the supermarket is essential, in future it may be much more important for the area in front of the store to be given over to drop off and pick up by autonomous vehicles. With that in mind, Meineke is calling for zones to be defined with different future uses in mind.

Wennigsen has already achieved the expansion goals for glass fibre ahead of schedule. The community can therefore already build on this standard. Sensor technology is now always a factor when new infrastructure is being installed. But Wennigsen's residents want to decide how and whether they are equipped for further functions, if they identify a local need – not simply because a corresponding offer has been made. In Meineke's experience, the colourful brochures produced by electronics manufacturers in the Smart City sector are often impracticable for small rural communities.

What has been recognised as useful for Wennigsen are sensors that react to heavy precipitation events. On several occasions the day-care centre has suffered water damage and cellars in the vicinity of the Mühlengraben channel are often flooded. In order to prevent that as far as possible detectors will now ensure that when that happens some of the weirs will be opened immediately.

Many digital offerings for municipalities these days are priced fairly reasonably – not only sensors for street lighting that react to pedestrians and natural lighting conditions, but also, for example, for litter bins. To fit them with this kind of technology costs less than 100 euros a year for the device, the batteries and use of the wireless network. This kind of equipment can help municipalities to avoid pointless journeys. In the coming years such equipment will probably be ordered by many towns and communities in the hope that they will be able to save money on emptying public litter bins. Meineke, however, recommends that people take a broader view and involve practitioners in decision-making because otherwise undesired side-effects may ensue.

The Smart Countryside can interrupt the demographic vicious circle

Social philosopher Harald Welzer takes the view that the Smart City is a hobby for young, technophile men who are supposed to be explain how towns are run. Although there is no shortage of offerings to which that certainly applies, Wennigsen's mayor sees the potential of new technology for decentralised development to offer his community new opportunities.

Rural areas are particularly hard hit by the increasing shortage of skilled workers. Previously it was primarily well educated women who left rural regions, rarely to return because of the lack of suitable job opportunities. Another fear is that by remaining in the countryside they risk being forced into traditional women's roles. Digitalisation and the Smart Countryside debate could now open up new prospects: young, qualified people have better chances of finding suitable employment in rural areas because of teleworking and co-working spaces. Local government can create the necessary conditions – and once good examples exist they can be replicated elsewhere.

Other issues, such as public transport and the possibility of local supply, also need to be addressed of course. In recent years, Wennigsen has been consistent in keeping the town's »green belt« off limits in order to retain shops in the centre. Besides small owner-operated shops there is also a big supermarket and a family-run department store. What makes life difficult for the latter, however, is when other vendors, such as drugstores, start selling toys and household goods at bargain prices. There is nothing a municipality can do about such developments.

Towns can learn from smart experimental spaces in rural areas

As a rule, programmers tend to come from metropolitan areas – and that tends to shape the apps they develop. However, small towns and communities have traditional advantages when it comes to public participation. People tend to talk to one another directly. Such analogue communication can be intensified digitally. Technology is not primary in this context, rather communication and the exchange of different perspectives come to the fore.

As successful examples Meineke mentions apps in small places on the Austrian-Czech border where programmers have created platforms for their home region that are oriented towards tourists every bit as much as locals and both create networks and collectively gather data. It can be helpful if specific individuals are responsible for setting up and looking after such structures and trying to get people involved. In Wennigsen, however, there is nothing like that. When it comes to the community's innovative spirit, however, this needs to be looked into more closely, says the mayor in relation to a possible new pilot project for a »hack day« in the region.

4.2 NEW CITY DISTRICT IN BERLIN-TEGEL

As soon as Berlin's Tegel airport (TXL) is closed a new urban quarter will emerge there. The aim is to work with diverse interest groups to develop a liveable, resource-conserving and environmentally friendly neighbourhood. City-owned Tegel Projekt GmbH was set up for this purpose in 2011. The original intention was that air traffic at Tegel should be discontinued in 2012 and building preparations commence shortly afterwards. Because the opening of the new airport outside the city kept being postponed, however, the go-ahead for the first phase of construction in Tegel has been rescheduled for 2021.

»For me ›smart city‹ stands not only for technical innovation, but first and foremost for ›well planned city‹«, says Philipp Bouteiller, managing director of Tegel Projekt GmbH. The social scientist and technology entrepreneur sees himself as a facilitator and translator. His aim is to get overwhelmingly analogue-oriented urban planners to work together constructively with the developers of digital technology. He takes a broader view of the Smart City than industry-driven discourse, in which digital offerings are touted as solutions for problems that most people do not even think they have. From the standpoint of urban planning and practical life these solutions thus often appear superfluous or unworldly and are rejected. But according to Bouteiller, this overlooks digitalisation's potential for efficiency and sustainability. »Improving our quality of life while reducing our resource consumption at the same time can only be achieved with digital support – unless people change their behaviour fundamentally overnight. But I see no sign of that.«

In Berlin TXL digital technologies are to be used for many purposes. It is asserted that the focus will be on the aims and wishes of a broadly integrated urban society. Digitalisation here is to serve as a means of realising social policy goals – and thus, according to Bouteiller, the guidelines for technological development are to be derived from the intended functions. At the same time, facilities and programmes are to be constructed in such a way that data protection cannot be compromised, because only in this way can mistrust and resistance be overcome.

Planning process and participation

Thought was first given to the future of the 500-hectare site as early as 2008. To start with, there was a discussion in which institutions such as the Berlin Chamber of Commerce and Industry (IHK), the environmental organisation BUND and many other stakeholders participated. The conclusion was that the community must be included in basic decision-making over future use. In an open-ended process numerous site conferences were held, each attended by several hundred citizens.

In addition, numerous citizens' assemblies were convened over a two-year period in the surrounding parts of the city. Bouteiller reports that joint solutions were found to improve the social infrastructure in the surrounding area and to create links with neighbouring districts. Local residents were supposed to experience [the project not as »a UFO that had just landed«, but rather to see advantages and improvements in it for themselves. A total of 16 million euros of financial assistance was made available.

Experts, public officials and interest groups were involved from the outset. In this way different viewpoints and aspects entered into the planning and did not have to be laboriously integrated later on. According to Bouteiller, the delayed closure of the airport turned out to be beneficial for the quality of the project because it allowed more time for the planning and approval process.

The upshot of the diverse participation process was a masterplan with segmented areas of use: housing, industrial and commercial, a research campus in the centre and also large semi-natural open spaces.

The fact that working and living are separated in the planned new quarter does not really correspond to current urban development requirements: today, according to Bouteiller, people would be more interested in mixed uses. However, the advantage of the existing plan, in our view, is that all participants back the outcome, because their respective ideas and interests in the new urban space have been given adequate consideration. Based on this general acceptance of usage the master plan has been put on a stable basis, which cannot be said of many major projects.

»A good feeling that sometimes things happen in Berlin«

»For me, Smart City is a meaningless term. I wince inwardly whenever I hear it and wonder what it's supposed to mean. If ›smart‹ is equated with ›clever‹, however, then it fits the development of the concept for post-closure use of the airport site in Tegel, in my view, because it is robust and sustainable in the best sense of the word.

The land-use plan still shows an airport on the site. When it is closed, it will leave a virtually blank space and for us as the management that meant that an urban development plan had to be developed. In the terminology of the Building Code that sounds very dull: preparatory urban development planning, early citizens' participation and interpretation of the plan. But that is only the day-to-day administrative business. In fact, this kind of project involves creative process design, in which the procedure itself is creative.

Normal practice in such situations is to call in five or six teams, all of which are given the same brief. Then the public and politicians are asked which option they prefer – A, B or C? By contrast, we asked five renowned design offices to come up with distinct scenarios for the whole site: a commercial-industrial concept, a leisure-oriented scenario, a scenario for a mixed town, a largely green concept with lots of natural areas and finally, as a wild card, an open concept with no specifications at all. The firms presented their proposals at public meetings, in addition to which there were further specialist meetings with representatives from politics, chambers of commerce, associations and civil society.

In this way, many conflicting interests could be brought on board in a preliminary conceptual phase, before the actual planning began. A cross-party consensus was achieved on solutions that remain valid today. In fact, the project was supposed to enter its implementation phase in 2012, but because the new Berlin airport was not yet ready Tegel had to stay open longer. Nevertheless, planning is still ongoing. That is characteristic of urban society, that it can be very changeable. It is also a good feeling for me that sometimes things do get done – in a city where it's mostly the opposite.

This new part of the city will have cutting-edge infrastructure. Resource conservation is also to play a key role. Naturally a new city district could also be approached in terms of opulence and complexity – the technical possibilities are numerous. It would be smarter to regard infrastructure and technology as the backbone of urban development here. Smart infrastructure creates functional sub-areas and intimate social environments; it is capable of development, well functioning and can thus serve as a basis for lasting quality for the whole site. It is like a tree: it can be described in terms of its roots, trunk and branches, or one can look at it and pick out one leaf, then another and then another. When it comes to quality, it all depends on the roots, trunk and branches and not on individual, isolated elements.«

Reiner Nagel (59) was formerly head of the department of urban development planning in Berlin and responsible for preliminary urban land use planning. Today he is chief executive of the foundation Bundesstiftung Baukultur.

»We were able to influence relatively small matters«

»Here in the neighbourhood a couple of years ago there were posters announcing an information event about what was going to happen when the airport was closed. Out of interest, I went along. The event was very well attended. They said: ›We not only want to provide information, but we're also looking for people from the surrounding four neighbourhoods who would be willing to participate, make proposals, offer criticisms and introduce their own ideas.‹ I found that interesting, without really knowing what I would be letting myself in for. Four or five local people had signed up and everyone on the list was invited. Although, as I mentioned, the event was well attended, only a few people were also willing, without being paid, to meet more often and to contribute.

A little while later we were invited and the office responsible for the citizens' participation procedure gave us a presentation on what was planned and what guidelines had been issued by the city government. This included, for example, the demolition of the airport, new university buildings and businesses on the site and a housing development for 30,000 people on sports facilities next to the Scharnweberstraße underground station.

We met more or less once every two months; there was a meeting on Saturday once, too. We commented on the plans, the whole process lasted around two years and concluded in March 2017. I thought it was great that I had the opportunity to experience such a wealth of insights. Before that, I'd had no idea about urban planning. I also appreciated the contact with other citizens. People were between 20 and 80 years old and from all kinds of occupations and levels of education.

I was most interested in Kurt-Schumacher-Platz and access to the new residential area behind the underground station. In my view, the problem is the additional densification. 30,000 people were supposed to be moving there – and they would have to travel with the underground, which is already very busy in the mornings and at peak times. There was supposed to be no through traffic in the new neighbourhood. But in that case the question naturally arises of where the traffic would flow. Would more come via Scharnweberstraße? Everything is supposed to be constructed ecologically, attractively and in a socially acceptable fashion. That sounds really good, but one has the feeling that it is not always entirely realistic.

>

We were all in favour of keeping the sports facilities, but we had no chance. I understand that we need housing and also that the city government has to make decisions. But in my opinion they didn't pay much attention to our basic questions, for example, about densification. We were only able to influence relatively small matters: for example, a cycle path will now be built through the Rehberge Park, which we proposed. We felt that we were taken seriously during the process, but less so when it comes to the outcomes. It was my impression that the real aim was to pacify people to some extent. At Tempelhofer Feld there wasn't even any citizens' participation and that turned into a complete disaster.«

Dr Simone Frede has lived near the busy Kurt-Schumacher-Platz since 2012 and was involved in the citizens' participation process for the area around Tegel airport.

»We didn't really get much out of participation«

»We're based at this sports ground – at the moment we have eleven children's and youth teams and two men's teams, with players between 3 and 60 years of age. Our sports ground is slated to be redeveloped and tower blocks are set to be built on it. This beautiful, well-established ground planted with lots of trees is a bit like a park and many people living around it also use it for picnics and leisure activities. The sports ground is going to be relocated 500 or 600 metres. Why can't they just build the tower blocks where the sports facilities are planned?

We didn't really realise that there was a citizens' participation process concerning Tegel, although we have a lot of contacts here in the neighbourhood and are constantly in touch with them. We first really heard about the plans at the awards ceremony three years ago, when the district mayor presented the new land-use plan for this area. We were shocked. The site belongs to the district but if it's wanted for urban development I don't see how the district can stand in its way. We attended the information event in the Borsighallen, and also a meeting with the planning office here in the clubhouse and other meetings – and we always made our objections known. Finally, this is also the sports ground for the Max Beckmann secondary school. At the moment, the kids only just have enough time during break to get to the sports ground – if they have to go another half a kilometre I suspect they'll spend the whole time commuting instead of doing sport.

Smart city? I'm not really familiar with the idea. They say they are developing a smart city in Tegel. Cars are supposed stay outside. I'm in two minds. It doesn't sound a very good idea if a family with kids goes shopping and has to leave the car a long way away in a garage and cart all their shopping home. For the city of the future I think it's important that development is a bit more spaced out – not just tower blocks in which they cram in as many people as possible.«

Peter Hahn (73) is a youth leader at the Reinickendorf football club Liberta 14, which is based right next to the airport site.

»I like the city as it is now«

»Of course I'm aware that the airport will be redeveloped when it's closed. But I didn't hear anything about a public consultation. I've heard that the sports ground is going, but I'll believe it when I see it. The airport was supposed to be closed down in 2012 but nothing has happened yet. It seems that no-one really knows what's happening. To keep on announcing something and then not sticking to it is ridiculous.

It's good that the airport is only 20 minutes away from our home. I fly once a year, more or less, and I wouldn't really want to have to go to Schönefeld.

I've never heard the term ›smart city‹. I wouldn't really want the city of the future to be much different from what it is today – I like it as it is. Naturally there should only be electric cars to protect the environment. And less plastic.

I'm only 16. In general, I don't have much influence over anything. That doesn't really bother me. We should just let the adults get on with it, in my opinion. At 16 you tend to be a bit naïve, and so I'll wait and see. But when I'm mature enough then I'll know what I'd like to change politically.«

Pirinthan Sivaharan (16) is in the sixth form and will take his abitur in 18 months. He would really like to study engineering. He lives east of the airport and plays football at Liberta 14.

Site for research and industry

There will be a research and industry site in the heart of the new city district, the Urban Tech Republic. The idea behind this is to find solutions to future urban challenges including water-, energy- and resource-conserving technologies, innovations in mobility and logistics, and innovative infrastructure and building materials. Cities are growing across the world – Berlin's population is growing at rate of 40,000/year – and the need for innovative solutions is growing apace. The Urban Tech Republic will provide an opportunity to reindustrialise Berlin and create new, high quality jobs.

Housing

Besides the research and industry site there will be an ecologically and socially mixed model neighbourhood for over 12,000 people. Half the homes in the future »Schumacher neighbourhood« will be built by three public housing corporations. They are only supposed to be granted approval for smaller-scale and dispersed properties in order to avoid the development of a uniform neighbourhood design. They will be obliged to demonstrate that half of the flats are publically subsidised. The other over 6,000 homes are to be built by »Baugruppen«,[4] cooperatives, foundations and other non-profit organisations.

Tegel Projekt GmbH works closely with the German Sustainable Building Council e. V. (DGNB). The plans for the campus site have already been awarded the DGNB's Platinum Standard, while the aim is to achieve at least DGNB Gold Standard for the other buildings. This is based on the conviction that rents can be kept sustainably affordable only construction process is freed from the constraint of minimising costs. Over the longer term it is more economical and more ecological to invest more at the outset because the renovation cycles will be longer and the ongoing operating costs lower. Another aspect of the ecological model project is that all the rain water on the site will be captured and used, or allowed to seep into the ground in situ. For the most part natural materials will be used, especially timber and timber hybrid materials.

Social infrastructure

Although the participating architects initially wanted to spread day care, primary schools and the secondary school across the site, the outcome of the integrated participation and consultation process was instead an open education campus on which an adult education centre will also be accommodated. Here children, young people, the middle aged and old people will cross paths on a daily basis. The education campus will allow facilities such as the assembly hall, dining hall and sports hall to be used in common, instead of having to duplicate them. This means they can be more spacious and of higher quality. The decision will also have positive effects on the quality of school food: the number of meals will now reach a volume at which it is worth preparing them fresh on the premises.

But social infrastructure also means mixing different population groups and maintaining attractive spaces for the community. As an example Bouteiller mentions the Via Verde project in the South Bronx in New York, finished in 2012. Around two-thirds of the 222 apartments in the building are reserved for low-income tenants. There are gardens on many of the terraces and a fitness room. The loft, which would usually be reserved for the wealthy is open to all here as a community space. The residents are proud of their building – and as a socially integrative project it is evidently safe from the vandalism that is otherwise widespread in the neighbourhood.

Integrated mobility and energy concept

The future Schumacher neighbourhood has access to two underground stations. Taxis, delivery vans and ambulances can enter the area, but there is no through traffic and – apart from for people with disabilities – no parking places in the streets. Instead, neighbourhood garages are planned with a ratio of 0.3 places per dwelling. They will be conceived as mobility hubs with rental vehicles, cargo bikes and a package station. The bicycle infrastructure in the new urban district will offer high safety standards. Broad cycle lanes are planned to accommodate overtaking and even cycling two abreast. Intersections and roundabouts are to be designed with good visibility.

An electrical charging point is planned for every car parking place. Because many e-vehicles – exactly like motor cars today – are stationary most of the time, they can be used, while parked, for electricity storage for the neighbourhood. Energy will be captured on facades and roofs; photovoltaic facilities and wind turbines are also planned, as is the use of geothermal energy.

Because it will be possible to store a lot of electricity in batteries in the neighbourhood the cable infrastructure will be smaller than has been customary hitherto, which will also save on valuable resources, such as copper.

Heating and cooling supply in the neighbourhood will be via a so-called »low-exergy« network, a low-temperature network that provides heating or cooling as needed by adjusting network temperatures. Thus, on hot summer days heat is extracted from buildings and dissipated through the network. In winter it will function like a conventional heating system.

Temperatures in the low-exergy network thus do not exceed 40°C even in winter and in summer do not fall below 20°C. That is achieved through a two-pipe system, which is controlled by the external temperature. It is designed as a »prosumer« system: not only can energy be withdrawn, but waste heating/cooling energy, for example, from commercial production processes, can also be fed in.

This mode of operations is conditional on heating and cooling supply being considered from the outset in the planning. This makes it possible to heavily reduce the use of individual heating and cooling systems. A completely new urban neighbourhood – such as Urban Tech Republic or the Schumacher neighbourhood – provides ideal conditions for this because the innovative energy concept can be incorporated in all planning stages. The energy concept also makes low

4 »Basically, collectives formed with the intent of building housing – but eliminating the developer in order to keep costs down significantly.« Michael Eliason of the Seattle design firm Brute Force Collaborative, https://www.shareable.net/baugruppen-germanys-sustainable-community-housing-model/

»Finally, a holistic approach«

»For me, the term ›smart city‹ implies that municipal community tasks can be properly implemented. Currently one department is responsible for road works, another for water, then there is a parks and gardens department and so on. In the case of the Smart City we can finally take a holistic approach. Now that everything is in the hands of the Tegel project, the planners can be brought together.

The concept that we are implementing has never been done this way or on this scale before and its management is very ambitious. Rain water in Tegel is allowed to run off locally as far as possible, and the soil filters it. In addition, the canal network is used as a reservoir. Water can be constantly drawn from this reservoir, for example, for toilet-flushing, or a business may be interested in using it. The system is emptied only when heavy rain is forecast, so it can take in and store the incoming precipitation. As far as possible we want only treated rain water to enter the Berlin-Spandau ship canal via the rainwater drainage system.

The Berlin water utilities have been responsible for needs planning. We have been involved since the planning phase. In my opinion, in our planning we have been able to develop this needs planning further. I would have preferred to have become involved before the planning phase because that way we would have been able to introduce a few more aspects into the concept and been able to do it a bit better. Our sustainability approach involves taking account of the entire period of utilisation of investments and regenerating groundwater locally. What I see as a problem in the whole process is the demarcation of responsibilities. Normally, we only have one client. We talk to them about their expectations and we are then responsible for satisfying them. The Tegel project, on the other hand, faces many demands and has to reconcile all the conflicts of interest. For this purpose there are specialist group meetings every two weeks on the water issue. The public authorities do not always speak with one voice at these meetings and a consensus tends to be reached only at this stage. That makes things more difficult but probably it couldn't be done any other way.

From our point of view there are definitely risks. Ultimately something has to be built that reconciles all these contradictions. As planners, however, we have to know exactly what the client wants. But the water authorities for example will only take a definitive position at the approval stage. And we can only file an application if a certain level of progress has been achieved with the project. As planners we can understand if no firm commitments are made in the initial stages but sometimes it is just too vague for our purposes. Needless to say, that causes considerable disruption.«

Klaus-Jochen Sympher is managing director of Dr.-Ing. Pecher und Partner Ingenieurgesellschaft mbH. The company belongs to the Aquanet network and, together with five Berlin engineering offices, and the IGR AG planning office, won the European tender for water-related development in Tegel.

heating prices possible in parallel with very good sustainability values. The approach to heating and cooling is an important component of the intelligent concept of Berlin TXL, as an innovative and sustainable urban location, according to the head of Tegel Projekt GmbH.

Digitalisation and data protection

Although Bouteiller's sees digital technologies as very useful for boosting the efficiency of urban processes, making better use of public space and conserving resources, he believes public infrastructure must also guarantee protection of the private sphere. Tegel Projekt GmbH has formulated clear guidelines for this purpose: data obtained in public spaces in the new Berlin district belong to the public.

Bouteiller and his team are in talks on this issue with the leading firms in the sector, including Google, Cisco, Microsoft and Siemens. They have indicated to these firms that cooperation in Berlin TXL will be possible only if their business models, which are based on data collection and exploitation, are run as open systems. For Bouteiller that means that a municipality that decides to adopt a particular system must always have the option of allowing a different provider to run it in the future. It must also be possible to source components from other firms and to integrate them without problems. Furthermore, the city must always be able to use the relevant data at any time without further cost. The key terms here are interoperability and open data. These are exacting requirements for the traditional digital providers, who make a considerable portion of their profits not from the sale of software and technology, but during the utilisation period. Here, too, new paths have to be opened up in Berlin TXL and cooperation options have to be developed.

Multi-function masts are planned in the new neighbourhood, to be equipped with power and data cables. Street lamps and environmental sensors will also be attached to them, as well as charging stations for electro-mobility because combining functions saves resources. Cameras and movement detectors serve the purpose, for example, of detecting traffic congestion or switching lamps on and off at night. If the devices are built in such a way that data is processed immediately on the spot and only statistical data are transferred to the centre – and not facial images or vehicle registration numbers. The misuse of personal data is thus excluded by technological means. Information on the current situation in the street can thus be compiled without jeopardising protection of the private sphere. After all, it should be out of the question in a free country to allow constant camera surveillance of the entire streetscape, which in combination with automatic image recognition has the potential for total surveillance.

Implementation problems

The city's rules and regulations largely date from the twentieth century and are often incompatible with new needs. Although, for example, it is clear that because of climate change heavy rain events will be more frequent in future the guidelines concerning the diameter of drainage pipes have not been adapted accordingly. In Bouteiller's experience, although the relevant directive does not prohibit larger cross-sections it is hard work to persuade the authorities of the need.

Planning innovations such as multi-function masts usually prove to be difficult because many authorities are involved and their approval has to be obtained. The relevant tasks continue to be divided up between the various authorities in terms of thematic pillars. What is really needed is a view of the whole in order to recognise opportunities and reap benefits. The thirty-five employees of Tegel Projekt GmbH spent a considerable portion of their working time trying to reach agreement with the authorities and coming up with solutions outside the established standards.

It is important to identify and avoid possible obstacles at an early stage. That is why some consultation rounds on cross-cutting issues involve up to 30 people. Bouteiller is convinced that administration of major projects using cross-administrative special units allows many processes to be handled much more quickly. But interdisciplinary project work is still the exception.

A concentration of powers is also desirable at the political level. In Hamburg, Düsseldorf, Amsterdam and Barcelona, for example, there is a chief digital officer for digital decision-making, while in Berlin this task is distributed between the various state secretaries. On top of that, those responsible for Smart City affairs have so far not been provided with sufficient resources.

In order to get the process moving forward swiftly and purposefully, we need people who are familiar with the issues and administrative processes, with decision-making powers and have sufficient staff. Experiences in Berlin, furthermore, show that drastic cuts do not result in efficiency, but on the contrary lead to frustration and defensiveness in the administration and can undermine a creative atmosphere.

Bouteiller hopes that the administration will increasingly think of itself more as a service-provider and enabler. To that end the traditional system needs to be overhauled. If more administrative departments were allotted funding on a project-related basis and jointly managed, a process of internal incentives might emerge, especially if major financial contributions to progress had a positive effect on staffing levels. Conversely, poor cooperation and results should have a negative impact on funding, the head of Tegel Projekt GmbH believes.

Experience has also given rise to calls for policymakers to create structures that enable a cross-departmental perspective and bundle functions in larger administrative units, rather than addressing individual fragmented areas. In tenders it is often a good idea to bundle offers for several functions or to conduct functional tenders: »Maybe bus shelters can also be used as WLAN stations«, Bouteiller suggests.

4.3 WOLFSBURG

Wolfsburg has 125,000 inhabitants and 121,000 jobs subject to social security contributions. If freelancers and civil servants are included, the number of employees exceeds the resident population. In the past, new housing has not been able to keep pace with employment growth. At present, three large housing estates are being developed in order to turn many commuters into Wolfsburgers. But it is clear that in future not all commuters will live in Wolfsburg.

There is a lot of enthusiasm for digital and technological issues in Wolfsburg. That is hardly surprising, given that a disproportionate number of engineers live there. The town was founded in 1938 next to the new VW works and the carmaker still dominates the community. However, the head of the department for the economy, digital affairs and culture has declared that »even though Wolfsburg is the headquarters of a global company we do not want the Smart City concept to be confined to business, but to play an active role in progress for the community«.

Digitalisation and the Smart City are major issues in Wolfsburg

According to Dennis Weilmann, politicians in Wolfsburg have recognised for a number of years that digitalisation is a central issue that needs to be taken seriously. For that reason a dedicated department for information technology, central organisational management, digitalisation and the economy and culture was set up. The various areas work hand in hand to make digitalisation a feature of everyday life for the population.

Two important, mutually reinforcing events in 2016 gave considerable impetus to the topics of digitalisation and the Smart City in Wolfsburg. Under the heading #WolfsburgDigital the city administration and VW launched a joint initiative to respond effectively to the digital transformation. The main aims of #WolfsburgDigital are to improve citizens' quality of life and to keep the city an attractive business location. The participants jointly defined ten priorities. They include mobility issues (such as autonomous vehicles and electro-mobility), the designing of an attractive living and working environment, lifelong digital learning, future-oriented housing, digital administration, citizens' participation, and e-government. The issues cover large parts of the classical Smart City concept. A high-level steering committee drives implementation forward and every field is covered by experts from various institutions, who jointly plan and execute the various projects.

Another milestone for Wolfsburg was entering the »digital city« competition run by Bitkom and the German Association of Towns and Municipalities. This entailed creating certain structures and support networks within a very short period of time. According to Weilmann, this time pressure proved to be very helpful in introducing the issue of digitalisation into the city and raising awareness. At the beginning, the #WolfsburgDigital initiative benefitted from structures that had already been established.

The city is organising broadband rollout

Developing a functioning digital infrastructure is a precondition for implementing Smart City concepts. Wolfsburg regards

high-performance internet a basic public service. The public utilities, which are 100 per cent municipally owned, will have achieved comprehensive glass fibre coverage by 2021. This is a challenge because Wolfsburg is an extensive city (it has the same area as Hannover) and connecting up its more remote areas is not economically viable,. It is estimated that public investment of 88 million euros will be required, but will pay for itself over the long term. In order to firmly embed the topic of digitalisation in the education system schools will be equipped with glass fibre connections city-wide.

New residential neighbourhood as a living laboratory

Smart living is also a central issue in Wolfsburg. At present, three large neighbourhoods are being redeveloped. One of them, Steimker Gärten, is set to be a living laboratory, in which certain technologies, such as e-mobility, will be tried out. The city intends to develop a strategy to enable half the vehicles on Wolfsburg's streets to be electric-powered by 2025. Besides the relevant vehicles a charging infrastructure is needed, as well as people who would like to utilise this technology. Many issues need to be clarified: should there be charging stations in supermarket carparks? Special pillars at petrol stations? The issues extend beyond the technological aspects and user behaviour to include such things as the funding of infrastructure.

While businesses would be happy to see the public authorities take care of this, Wolfsburg policymakers would like business to take responsibility. Petrol stations, for example, were also not funded by the state. In contrast to the internet, according to Dennis Weilmann, something like this is not a public service.

At the same time, however, the municipality has an interest in developing uniform standards and in ensuring that there is neither uncontrolled growth nor shortages. To that end it wants to be involved in organising this especially in the early stages. It is also possible that a business model for municipal utilities will emerge from this.

There are similar debates in Wolfsburg on car- and bike-sharing. In smaller cities it is much more difficult to make such offerings profitable. Wolfsburg is therefore prepared to provide support in this instance and to assist in coordinating the different interests. The city sees itself as performing a consultative function here, with organisation and financing also coming from third parties. The issue of data protection, given the many participating partners, will also play an important role, according to Weilmann.

Some of the housing units in Steimker Gärten are to be fitted with smart home ideas. The participants hope to learn from this whether options such as ridesharing are taken up. All three new city neighbourhoods are also to be linked to the city centre by a »green route« served exclusively by electric buses.

Wolfsburg intends to proceed with the Smart City approach not just in the new housing developments, but also in existing residential neighbourhoods. Possibilities for residents living on the upper storeys to charge their electric vehicles are to be trialled in a neighbourhood with multi-storey residential buildings. Questions such as what data will be collected and who will have access to it will be investigated and analysed. Furthermore, the city wants to find ways in which social participation can be ensured for people without internet.

Taking the lead in autonomous driving

The Lower Saxony testing ground is located in the Wolfsburg-Braunschweig region, with autonomous vehicles already in operation on the A39 motorway. Wolfsburg would like to extend the test area into its city centre and trial the manufacturer-independent traffic communication system pWLAN, as well as 5G. The aim is to enable decentralised real-time communications between autonomous vehicles and their surroundings.

»First and foremost the city has to solve its traffic problems«

»Electrical technology is one of the core offerings of my business. We have been fitting out the buildings of industrial companies and smaller businesses since 1946. We also use smart home for this purpose, first of all the KNX standard. Bus systems of this kind can be used, for example, to seal entrances, ensure uniform lighting in the building or get the heating to come on only when people are around. In principle, such technologies are also suitable, for example, for optimising energy supply in a city. When the energy company itself belongs to the city, it can save money and also promote e-mobility. But all this is still in its infancy.

By Smart City I understand a digital city. Part of this is that official channels are streamlined and simplified for the citizens. Some progress has been made with this already. In Wolfsburg, for example, it is already possible to apply for a kindergarten place online. At present, unfortunately, they do not get back to you online; you still receive the relevant documents by post.

Many cities are trying to coordinate all this, but so far no overall concept has been developed anywhere. Here in Wolfsburg, too, there a many separate activities: each department makes a few online forms available. But for me that is not a smart city. I would approach things differently if it was up to me. We have a department for digitalisation; we'll see what that leads to. In any case, it's crucial that the internet is upgraded. We're on the right track in that regard in Wolfsburg. But attention also has to be paid to rural areas, where there are many gaps.

The most important thing for the future of the city, in my opinion, is to solve the traffic problems. We have one big, dominant employer here in Wolfsburg, no-one can deny it. Every morning virtually all the traffic heads to the VW plant and in the evening it heads out of Wolfsburg again. If it goes on like this, in ten years' time we won't even be able to move. Even today there are always traffic jams. Almost every household has three cars, sometimes even

>

four – in my opinion that's the biggest problem of all. Traffic is choking us. We have always been a car city, no question, but a car city has to remain functional, too.

Therefore above all local public transport has to be improved. It has to be ensured that people can get where they're going faster by public transport than by car. That's why I'm in favour of bus lanes – I think that's much more important than new cycle lanes. A bike is OK in summer, but in winter?

Naturally, digitalisation also has to be used to direct traffic better and, for example, to optimise roadworks. And no one will be able to avoid self-driving cars. But that is still years away. Apart from that, in my opinion traffic technology should be adapted in the roads – instead of fitting out cars with more and more computer technology.

Changes must be made at technical, social and organisation level. How it is done is something clever people will have to rack their brains about. We need a concept for the whole city and also for the surrounding area. But every city is getting in on the act these days: Wolfsburg, Braunschweig, Hannover, Peine. First and foremost the public authorities have to become well networked. Cities have to cooperate and develop overarching approaches.«

Rolf Berheide (58) is a master electrician and managing director of SME Elektro-Germey GmbH. The company is located in east Wolfsburg and employs 29 workers.

Building digital places

Wolfsburg is renovating an empty property in the city centre to become a »digital hub«. The »Markthalle space for digital ideas« will house not only the existing co-working space, but also the city youth centre »Haltestelle« (Stop) and a maker-space for manufacturing products with 3D printers and other devices. Volkswagen AG will move a department here and the e-sport team of VfL Wolfsburg will also relocate to the Markthalle from the Volkswagen Arena.

Furthermore, low-threshold offerings such as a Youtube studio, a repair café and a smartphone school are planned. Some event formats will be oriented towards a specialist public, others towards laypeople. The Markthalle should also prove interesting for start-ups as a lively and creative hot-spot for digitalisation.

Another project in Wolfsburg is the Digitale Mutterboden Agentur (DMA) [Digital matrix agency], in which, the city administration, VW, the Chamber of Industry and Commerce, and the public utilities all participate. There are no fixed organ-isational structures, however. The DMA is intended to become a first port of call for start-ups, at which they should be able to receive coaching and attend seminars.

Including the analogue world

The Online Access Act compels municipalities throughout Germany to offer their main processes and services online by 2022. Parents in Wolfsburg can already reserve a kinder-garten place in this way. The city library and waste disposal services, too, already offer a lot online and are constantly expanding their offerings. In many areas, however, stan-dards need to be laid down at state and federal level because municipalities are responsible for only around one third of the relevant processes.

It is clear to all participants in Wolfsburg that digitalisation – no matter in what area of life – can only work if people are enabled to play an active role in its development, according to Weilmann. There is, for example, an online platform »Du bist gefragt« [You have been asked], where citizens contact with policymakers and the administration. »Talking with Mohrs« gives citizens have a regular opportunity to put questions directly to the mayor, offline as well as online. Wolfsburg considers communicating with the population through new digital channels to be very important. Besides that, it will of course remain possible to contact the relevant personnel via more traditional methods.

»It should never be the aim of e-government just to cut staff«, says Weilmann. Even though online services might mean that there is less work in certain areas, new tasks are likely to arise in other places, for example, in the develop-ment and maintenance of online services. »The work remains, it's just the tasks that change«, according to Weilmann.

The »Protective Satchel« app was initially supported within the framework of #WolfsburgDigital. It was supposed to pro-tect children against traffic accidents. With the help of the app children's satchels were adapted to send signals to passing vehicles and improve visibility. Because of public worries about who might get access to the data, however, this project was discontinued after a short period.

The »Smart City – Social City« editorial team discussed fundamental issues on the basis of this example. If such technologies are to spread, pedestrians might increasingly be compelled, in the interest of their own safety, use them. But what about people who either cannot afford the new technology or simply do not want it? Will their freedoms in public space be restricted even further in favour of motor traffic? And in any case, why should pedestrians always have to adapt to motor traffic instead of organising the traffic in such a way that it doesn't harm pedestrians?

The digital bus route Digiline has been well received, according to Weilmann. It integrates various online offerings in an ordinary public bus. All passengers are able to try out the various possibilities during the journey. The so-called »Digiday« at the central shopping centre was also well attended. Any Wolfsburger who wanted to could take a look at the digital offerings of the city and other partners and also try them out.

»Networking within the administration is increasing significantly«

»For me, Smart City means a city in which people enjoy living, which continues to develop and is in good economic shape. That includes attractive residential areas, digitalisation, glass fibre rollout, e-mobility and an administration that knows what its citizens want and need.

We here are the telephone service centre of Wolfsburg city administration. We have been in existence for eight years and when citizens call the city they almost always land here first. Initially, there was a boom, but for the past couple of years or so the number of calls has been falling because people can take care of more and more online. The conversations have also changed. People ask less about opening hours or what they have to bring with them to apply for an ID card. Most of that can now be found on the internet. These days it's usually about help with filling in forms. Because more and more areas of administration are putting their technical applications online and we have access to more and more knowledge through the knowledge database and the questions we receive are more varied than before. That makes us happier, too.

Many believe that older people prefer to use the telephone and cannot cope so well with new technology. But that is not our experience. Instead it depends on how open-minded someone is or whether they are averse to trying new things. And of course there are people who just don't trust online applications. For that reason we also offer the option of helping people over the telephone to fill in forms on the computer, which they can then print out and send to us. Or we simply put them in an envelope in the old-fashioned way and post them. But that is now the exception. What is completely new is that we can chat with citizens as an alternative to telephoning or e-mails.

Networking within the administration is increasing significantly. The city administration is setting up a document management system so that all operations are digitally recorded. Everyone works in the same system, but of course access rights vary. All this makes work easier – as long as the system is working. When it comes to new features and updates I always have the feeling that at first there are technical difficulties, until eventually everything works properly again. But it can be annoying.

My department is in a bit of a special position because we provide internal services as well as public services. In my experience the fewest calls come in October, November and December. During these months we invite colleagues from the town hall to update us on certain topics. In that way we also find out what the general mood is among the citizens who the people in the various departments have dealings with.

Once a year there is a management curriculum on current issues and there are monthly events for all employees. The topic is announced on our portal and you can register by e-mail. At these three-hour events colleagues from different specialist areas report on what is new with them. I like going to these events, meeting colleagues and exchanging views and experiences. Now I know what a chatbot is, for example. There is going to be one at the entrance to the town hall to give citizens directions or specific information. But I don't like this term any more than I like ›smart city‹ – it's hard to grasp what's behind it all.«

Jutta Schulz (56) heads the Service Centre in Wolfsburg. She was born in Wolfsburg and loves her home city very much. Soon she and her husband hope to move to one of the new districts to live in a housing project with likeminded people.

»I'm afraid that many people are being left behind«

»For me ›smart city‹ is an abstract slogan. Do people really know what it is? Volkswagen is building an enormous smart-city complex. What is going on there? At the moment, in Wolfsburg for the time being smart city means that all the streets are being dug up and glass fibre cables are being laid. I have wifi at home. Everyone's always telling me that everything is going to be much faster. But I'm satisfied with what I already have.

We now have a department for digital affairs in Wolfsburg. The city entered a competition, but it didn't win. That means that we haven't really got that far. It says in the newspapers, too, that digitalisation is going to make life easier. You can rent a room in the city on your computer; you download the application form on the internet, fill it in and send it back. I've done that myself – it was quite complicated and it was a while before I understood how it works. You can also apply for a travel pass in this way. But I only need one once every ten years and the next time I need one I've already forgotten what to do. With that kind of thing I much prefer personal contact in an office.

For me as an older woman all this can be difficult to get my head round – also the interaction between the different areas. But I have nice people who I can call when I have problems with the computer or smartphone. It is not always easy but I manage it somehow. For many people of my generation all this is a mystery, however. And my neighbours are much younger than me, but even they can't cope with the new technology and don't even know how to do something about it. That's also a problem of education. I'm afraid that many people are being left behind.

But I have to confess that I don't really see how digitalisation can really contribute to quality of life – apart from self-driving cars, perhaps. It's a good idea, just call up a car from home and then be picked up by it. That would mean,

>

for example, that you wouldn't need to own your own car any more. I like that idea. On the other hand, I know a lot of people who really like driving, including my husband.

When I think about a good future for the city, I imagine that not so much space would be allocated to cars. The streets would be much more habitable and better for cyclists and pedestrians; kids would be able to play in the street again. In education, too, I think it's very important that analogue capabilities are promoted, for example, that children have a chance to cultivate small gardens and learn that carrots come out of the ground. They ought to understand what conditions are needed for life on earth and what we need to maintain them. Obviously children also need to master the new technology, no question. They should learn how to handle it – but some of their time should be spent without their smartphone. Unfortunately, however, I don't see much potential for politicians here in Wolfsburg to be able to shape the future in the right way, or that people are even interested in it. Generally speaking, the attitude is, let's keep things as they are and that also means: whatever VW does affect the city, come what may.«

Elke Braun (72) is a qualified nurse, now retired. She has lived in Wolfsburg for forty years, was the mayor for one term of office and now volunteers at the local branch of the automobile association Verkehrsclub Deutschland (VCD).

Data protection rules are needed

Data are collected automatically in the various processes that make up digitalisation. That means that clear regulations are needed at state, federal and EU level to lay down what is permitted and what is not, says Weilmann.

Wolfsburg collects and stores data locally. There is a statistical department in compliance with the Data Protection Act, to which only authorised persons have access in justified cases. At present, discussions are ongoing concerning the use of depersonalised data collected by the city of Wolfsburg.

The European Commission's geodata initiative »Inspire« ensures that certain data has to be made available and can be used by anyone. In this context the question arises of why commercial companies are able to develop a business model on this basis and not the municipalities themselves – after all, the data were collected with taxpayers' money.

»Smart City should make life easier for people«

»I associate networking with the Smart City – not necessarily digital, but something that takes people into account, looks to the future and makes life easier for people. For example, people shouldn't have to make an application every time they take part in a music competition; on the contrary, schools should just be informed which of their students is taking part in the state competition. Or in winter when there's snow on all the roads, you shouldn't have to get into arguments with the school about why you're late – the school should be provided with traffic information.

Technology should facilitate social change. When I imagine the city of the future the communication network should be much denser. What I would also like to see is public transport being more developed, more flexible and perhaps free for students. I'm a youth leader in the scouts and it's often quite hard to arrange things at short notice because many kids come from places where there's only a bus once every hour.

Getting through traffic is pretty tough. I often ride past endless traffic jams on my bike. If cars knew more about the overall traffic situation and traffic flows were better managed, there might be fewer jams: that would be ›smart‹. And with autonomous vehicles fewer bus drivers would be needed and public transport could be more efficient. It would also be good to press ahead with electro-mobility; so far, there are only a few e-service stations in Wolfsburg and there are virtually no bus lanes. For that reason air quality is not too good.

I also think that nature is very important for the future of the city. I'm really happy that we still have urban woodland here in Wolfsburg, where children can go out and play. And there should be enough recreation areas and playgrounds.

I think that Wolfsburg is making reasonable progress with making people's lives better. But the city is still very focussed on VW and everything possible is done for the firm. Building work for VW takes precedence over other things. There have been budget cuts because tax revenues have declined due to the diesel scandal. Investment in relation to VW has not been cut, but the education centre has been put on hold. The city library is supposed to be relocated there and a media centre was planned where technology was to be available for rental. There were also going to be internet connections for people who don't have it at home, as well as open group rooms.

I think that public participation is very important and I also get involved in things myself. I represent our scout group at the Stadtjugendring (umbrella organisation for city youth groups), where all youth organisations work together and have their interests represented. We get some funding from the city each year, which is distributed there. We want children and young people to have better opportunities for leisure activities and measures to make it easier

for volunteers, so that more people help out. I'm also involved in the city school students' council.

How will Wolfsburg develop? A lot depends on the future of VW. If there are more e-cars fewer workers will be needed. I can imagine that in ten years' time there will be massive layoffs – and in that case, the city will be too big; but at the moment there's actually a construction boom.«

Moritz Dybowski (17) is a student, a youth leader with the scouts, is involved with the Catholic Church and helps out at school events as an event technician. After leaving school he plans to take a gap year in Asia and then study chemistry.

4.4 MUNICH

With 1.55 million inhabitants Munich is the third largest city in Germany and the largest single municipality run without the district structures characteristic of Berlin and Hamburg. Up until 2014 Munich had been run by the SPD/Greens for 20 years. The council's social services and housing innovations during this period continue to shape its structures today. There is considerable need for action in a number of areas, however.

Public and private transport operates close to capacity. Around 400,000 people commute into the city each day. The suburban railway (S-Bahn) system constructed for the 1972 Olympics was intended for 250,000 passengers but today it is used by 850,000 people every day. On top of that, the automobile companies would like to – or have to – establish themselves as mobility service providers. The importance of digitalisation is also increasing significantly in relation to the environment, energy, public participation and a number of other areas.

Economically, Munich is prospering; in no other major city is local government debt as low as it is here, at around 200 euros per capita. But this very success puts enormous pressure on housing and is leading to rapid changes in IT, while at the same time many decision-makers still belong to a generation for whom the digital domain is foreign and to whom a big car is still very important.

Local government needs should be central

»The Smart City is here – and it is not going away. For that reason the municipality needs to adopt clear positions and strategies on the issue«, says Klaus Illigmann, head of the office for population, housing and future prospects, housed in Munich's department of urban planning and building regulation. It is also very important to get people involved early on and intensively. Illigmann also considers positive examples to be very important. For many years Barcelona led the way in Europe, but a number of other cities have now come to be regarded as pioneers. A lot is going on in Scandinavia and Amsterdam. Munich now uses a number of crowd management approaches developed for the London Olympic Games, for example, for the Oktoberfest.

Municipalities should put their own needs first and not be pressurised into accepting new offerings. Munich has worked to establish a framework for the Smart City and digital public services. Social and ecological sustainability, as well as digital participation are very high on the list of priorities here.

It should not be too difficult to come up with a digital master plan, according to Illigmann. This entails drawing up a list of areas of activity and their central problems. Then potential solutions need to be identified. The participation of both, citizens and specialists, as well as public expertise should play a central role in all this.

Joined-up thinking is crucial and the consequences for other areas need to be taken on board. Between 50 and 60 experts from different administrative units were invited to Munich for the spatial updating of the urban development concept through the so-called »area action« approach. In the course of an afternoon they reported on what is going on in the city in their respective areas. All the participants found this process extremely helpful and a first draft emerged, which was later enriched and deepened through the involvement of the relevant specialists in different areas. In this way an extremely clear overview was produced of the needs in all important areas and principles and targets were established for solutions.

The housing shortage is Munich's most urgent problem

A social city means, above all, that all inhabitants are able to find affordable accommodation. Munich is probably the German city experiencing transformation pressure most acutely. Growth is enormous and it has been estimated that by 2035 the population will have increased by another 19.3 per cent, which means another 250,000 to 300,000 inhabitants. Around 8,000 new homes are built in Munich each year – the city has the biggest housing programme in Germany with funding of 850 million euros over five years. It will be used to fund social housing, subsidise building land and renovate existing housing.

At the same time, Munich has the smallest area of any major German city and with around 4,700 inhabitants per square kilometre the highest population density. Nowhere else in Germany is the housing market so tight. Owner-occupied properties cost, on average, 7,000 euros per square metre and anyone wanting to rent a newly built dwelling has to find 17 to 18 euros per square metre in rent (not including utilities). Uses that do not yield high profits are often forced out.

The building demolition rate is four times as high as the national average because it is much more lucrative to build a new high-density property and then sell it or rent it out than to modernise an older building and operate it over the long term. Although the city has made a number of attempts to safeguard particular locations and to freeze land prices and rents, in many places there is considerable, sometimes bitter

opposition to the establishment of pre-emptive purchase rights for the city.

In 1994 Munich decided to make the beneficiaries of municipal land use planning share the costs and burdens. Since this decision »socially just land use« (Sozialgerechte Bodennutzung – SoBoN) has been implemented consistently in all of the city's development plans. This includes builders sharing the development costs and assigning land for services, for public amenities (such as nurseries and primary schools), as well as for green space and ecological compensation measures. Furthermore, a fixed percentage (30 per cent + x) of new residential building permits are earmarked for social housing. In this way socially just land use makes a substantial contribution to social and sustainable urban development. Sales of public land now involve smaller plots – also in order to counteract architectural monotony. It was also decided, by a resolution of the city council, that 30 to 40 per cent of parcels sold should go to cooperatives and *Baugruppen* (see Section 4.1). Auctions have been terminated and now concept tenders are standard. Some private investors are trying to foster the establishment of small businesses and art, not least because they consider such mixed urban use to be attractive to affluent renters and firms.

In recent years Munich has transformed many disused industrial areas into residential neighbourhoods. In the north, Domagkpark has emerged as an area with a diverse mixture of cooperatives and *Baugruppen*, as well as municipal and private developers.

Real-world laboratory for Smart City elements

Munich has more real-world laboratories for Smart City applications than any other German city. Often the aim is to create more space in public streets. The motto here is try it out and test it, achieve acceptance for well-functioning solutions and increase their visibility.

The project City2Share is financed by the Federal Ministry for the Environment and involves logistics and sharing aspects. A parcels service no longer enters the city centre with a delivery van; instead all the goods arrive in a big container and the packages are then delivered by handcart. Mobility stations integrating trams, underground, buses and bike and car sharing systems – sometimes linked to e-mobility – make up a further element. Autonomous driving and parking sensor technology have also been tried out.

The mobility of the future is central to the EU-funded CIVITAS-Eccentric project in the Domagkpark development. As well as car sharing and mobility stations, an extensive mobility management system has been set up here to reconcile the needs of residents, firms and workers. Concrete examples of Smart City are multiple use of parking places and the organisation of car pooling opportunities.

The European project Smarter Together concerns western Munich from the city hall to the outskirts 12 kilometres away, an area of 350 hectares with 25,000 inhabitants. Under the Horizon 2020 Smart Cities and Communities research framework, the three major areas of mobility, energy and integrated infrastructure are being investigated here, and in Vienna and Lyon. Two Munich universities are also participating. The aim is to find intelligent and sustainable solutions for better quality of living in urban neighbourhoods. At the same time, this is an urban development area and the largest energy-related urban renewal area in Germany.

Besides conventional renovation of existing buildings, this project is also about connecting the city's last major expansion, where 12,000 homes are to be built for 25,000 people. Here public areas are to be equipped with smart lamp posts with various sensors. Here, too, mobility stations are part of the concept. There are also so-called »district sharing boxes«, similar to the package lockers used by postal services. Residents can have their groceries delivered here and neighbourhood joint use devices can be kept here.

As one of the partners, the Munich public utilities will supply district heating, using low-temperature geothermal system. A virtual power station will link many small plants together. A district laboratory invites people to look at the planned technologies and innovations and to give their opinions on them. There are also numerous information and education events. After a three-year implementation phase the task since February 2019 has been to evaluate and draw conclusions.

In Munich around 100 lamp posts suitable for sensors have already been erected. They are an initiative of the civil engineering office, which makes the construction plans available on request to other municipalities. Although the unit costs are a little higher than for standard masts, they can be serviced with standard tools.

Around 2,000 of Munich's 85,000 street lamps are replaced every year. In the coming years there will be a systematic examination of the problems that arise in the new development and how they can be solved, before more masts are erected. The employees involved have found the project highly motivating.

Learning from experience

Topically integrated working groups between the projects meet for regular coordination rounds and in order to collate experiences from the different projects. Some of this has already been rolled out throughout Munich so that the first scaling effects are discernible. That includes, for example, the traffic app (MVG More), which displays all the mobility offerings combined with real-time data on the current traffic situation. Uniform mobility stations are also now appearing all over the city.

The city administration's IT is currently undergoing restructuring, after choosing to use open source and Linux rather than Microsoft products for nearly ten years. This led to many unexpected problems because of the rapidity and thrust of general technological developments. Apart from that, the assumption that all the major software providers would offer Linux-based solutions proved too optimistic.

In 2017, therefore, the city council decided to return to the Microsoft fold. At the same time, it established its own IT department, thereby creating a golden opportunity to foster coordinated city-wide development.

In future, platform technology will be the hub and pivot of many applications and data provision.

Handling data

One challenge facing all municipalities is how they are supposed to handle the increasing volume of data that they themselves are generating. On one hand, of course, the issue of data protection arises and questions concerning how open it should be (open data) or who should have access to it and under what conditions. Big data is a concern – but also an opportunity to develop applications that benefit the public.

With regard to data in general, clear regulations are needed on who can obtain what and for what purposes, as well as what will be deleted (data gatekeeper approach). It must certainly not become a one-way street in which dependencies on the major data companies only increase and independent solutions become very difficult to implement. Municipalities must remain in the game as players themselves, according to Illigmann.

Obtaining independent advice

Large companies are only too ready to muscle in. What is needed, however, are disinterested advisory services, in particular for smaller municipalities. They are hard to find. In response, Illigmann has set up the informal Smart-City-Interest-Group München, which meets every six months. At this meeting participants are kept up to date on the progress of projects in Munich and in return community knowledge is tapped. In this way the city, too, is kept up to date concerning the latest trends and the state of technological development.

Cities should make their own decisions about Smart City applications

Development partnerships are needed, not off-the-peg solutions. Companies must be prepared to enter into genuine dialogue with municipalities and to seek appropriate solutions jointly. In Illigmann's experience, many companies are now interested in the kind of exchange that the German Association of Cities and Towns (Deutsche Städtetag) engages in at the DIN Smart City Standard Forum. If one talks to German representatives of international IT firms they often maintain a constructive but critical distance from their US parent companies. All major firms have now leased server capacities in Europe and often even in Germany. On the other hand, German firms, too, are oriented much more towards Asia than they were in the past. In any case, one should pursue dialogue, keep informed and not be afraid to clearly formulate one's own ideas and demands, says Illigmann.

The difficulties involved in integrated urban planning

The staff of the Munich administration have a wide range of views about their city. »At the strategic level we have had integrated interdisciplinary working since the 1990s. That is where the objectives for the city are worked out – and it works«, says Andreas Peter, 42 year-old deputy unit head in the population and housing department in urban development planning. There are also the operational departments, which are involved with planning permission, scrutinising building plans or approving bylaws. There the predominant logic is that of the respective area of expertise.

What should the last unused site in a densely-built neighbourhood be used for? A school, commercial premises, a cultural institution or rather another three residential blocks? »For me, it is part and parcel of integrated urban planning that we always look closely at the specific space, how it has been structured so far and what needs arise from that. And then we have to discuss what should have priority, when and where«, says Werner Nüßle. The 57 year-old heads the social planning section in the social services department and is responsible, for example, for ensuring that there are sufficient care homes and facilities for children and young people.

In the north of Munich, where BMW has its headquarters, and where for that reason other suppliers would like to be located, many new homes have been built in recent years. »We argue, of course, that the people who move there also need day care centres, schools and sports grounds and they may also have parents in need of care, who they would prefer to be housed in the vicinity«, says Nüßle. His department is urgently seeking a site there to build a care home – but the competition between departments is considerable. Many people in the department of labour and economic development think that far too many commercial premises have already been converted into residential space over the past few years and thus that no more sites should be made available for other uses.

New planning approaches to the area around the Ostbahnhof

New approaches are being tried in the area around Munich's Ostbahnhof. Here for the first time an integrated area action concept was developed in a cross-regional and interdisciplinary joint deliberation process. »The idea is to examine this space in its full context and to bring everyone to the same table. That was something completely new«, Andreas Peter said.

Everyone expects the area to develop dynamically over the coming decades. For a time the brownfield site of the Pfanni works was Europe's biggest nightlife centre, where 20,000 people gathered every weekend to enjoy themselves. Now a whole series of residential buildings have been built and a new concert hall is planned, which is intended to attract an international audience, too. Another task is to integrate neighbouring residential blocks, some of whose residents are socially disadvantaged. And all of that in an area where railway tracks create significant barriers.

All those involved in the process see that solving the problem the rail tracks pose for getting around is a joint task and not merely a question of traffic management. Two underpasses have already been redesigned, to allow both pedestrians and cyclists to use them. The exchange of views also led to a common recognition that it is not only

>

financially more beneficial to locate social and cultural establishments in one building, but also animates the whole streetscape at different hours of the day, which in turn creates new opportunities for gastronomy in the area. Peter hopes that the dissemination of such insights among many colleagues in the city administration will frame the new planning instruments as an opportunity that could also benefit their particular areas.

Besides a variety of representatives of various technical agencies, others have also participated in the new area action concept. Primary school principals and even the proprietor of a culture café have been involved. In the meantime the city council has decided to introduce this kind of cooperative and networked planning of urban spaces as a new level between the strategic and the operational levels. Andreas Peter's department is the lead body for the urban development concept »Perspektive München« (Outlook Munich), in which all departments are to cooperate. Gradually, corresponding organisational structures are to be established in the Munich administration. There will be a platform to facilitate interaction at the political level – city council and districts – and with the various actors on the ground. The area action approach is new to Germany, although this form of planning commenced in Vienna ten years ago.

This process of reconstruction and rethinking is here to stay, however. Hitherto, everyday activities in many administrations have been defined by tasks, responsibilities and boundaries. However, not every employee feels that the new approach is beneficial for them and their department. They fear that freedoms they have enjoyed are being restricted, reaching agreement with other technical agencies takes up valuable time and the interdisciplinary approach ties them to a rigid schedule.

»Nevertheless I regard it as essential because myopic planning has been deleterious to the development of the city as a whole«, says Nüßle. As an example he cites cycle lanes and local mobility, for which he would like to see binding guidelines for the whole city. If a new development is planned, for example, connections to the surrounding area must be taken into consideration as a matter of course, he believes. »Instead, I often hear that people are in principle on board with land-use plans – but that their responsibility ends at the boundary of the new development.« For these reasons Peter considers that policymakers need to lay down binding regulations.

Clear policy objectives are essential

To date, however, the political inputs have been vague – and sometimes even regressive. For example, the city council now makes many decisions on the basis of individual resolutions. Nüßle would like policymakers to lay down objectives and the administration should be responsible for ensuring that these objectives are achieved on a joint basis, including time limits. »At present we have to put up with too much red tape. Every little thing always has to go through the city council.« Furthermore, the administration lacks the staff to carry out its own investigations. As a result, tasks have to be put out to tender and the findings of the external contractors have to be signed off at the political level before the administration can move forward. From the standpoints of Nüßle and Peter, taking this approach in such a rapidly changing city as Munich is just too slow, in the face of continuing developments in the neigbhourhoods. Peter summarises the situation as follows: »In these conditions strategic planning tends to lag behind operations.«

On top of all this, some legal regulations for new developments are extremely strict, although the problems in existing neighbourhoods represent a much more substantial obstacle, according to Nüßle. He cites noise prevention as one example. »Many people would be happy if the maximum values for development areas where they live were only complied with about halfway.« In his experience, there is often a lack of proportion. Technical provisions and bureaucracy have now become so manifold and complex that things simply proceed too slowly. »What would have happened to the preparations for the Olympics in 1972?« he asks rhetorically. New underground and suburban railway lines were developed within a mere six years, along with the central ringroad (mittlere Ring), the Olympic Park and the Olympic Stadium. It's true that building density was less of a problem in those days, but clear policy guidelines would be helpful in that connection. »It would give people a much stronger sense of direction if it was clear which open and green spaces were off limits as air corridors for each development«, says Nüßle.

What does »Smart City« mean from this perspective?

»Under the term ›Smart City‹ I would like to see a more analogue approach, for example, in the form of joint walking tours or cycle tours of the city, in which people could really see for themselves what it's like for a pedestrian or a cyclist in a particular location« is Nüßle's answer. It makes a lot of sense to do this with people from different agencies in the administration. It does not mean that we shouldn't also make use of computer simulations later on. His conviction is that even the best simulations cannot substitute for actual experience of city spaces.

»Many people associate Smart City first and foremost with technological innovations: e-mobility, intelligent lamp posts and so on« says Peter. But he would like to see the focus put on the city's future viability – and for that purpose, the different aspects have to be bound together in a harmonious accord: first, urban society and solidarity; second, the spatial level, with green areas, transport links, commerce and housing; third, the city's economic base and attractiveness; and finally, strategic urban planning, which includes an administration that is constantly learning. Digitalisation and technological innovations can contribute a lot in individual domains and in combination. But Peter is also convinced that »technology must play a supportive role and not take first place«.

5

SINGAPORE – A MODEL SMART CITY?

Singapore is known throughout the world as a major smart city and it is very proud of this image. But how is this Southeast Asian state organised, which manages to accommodate 5.6 million people in a smaller area than Hamburg? What are the pros and cons of the Smart City approach for the citizens? Does technology provide the population with positive developments or does the city-state use digitalisation of urban space as a means of control? Can anything be learned from experiences there for the situation in Germany? With these questions in mind the project participants visited Singapore on a research trip in December 2018.

Long-term urban planning

Singapore plans the development of the city systematically and very much on a long-term basis. Land is an extremely scarce resource: already 7,800 people live in each square kilometre – and the city wants to grow further. By comparison, in Munich the figure is 4,700 people per square kilometre, in Berlin 4,000 and in Hamburg around 2,400.

Because 80 per cent of Singapore's land belongs to the state, policymakers and the administration can make and implement concrete plans. Industry and commercial land is privatised for 30 years at most and residential buildings for a maximum 99 years. For this reason the state is able to change its plans as new needs arise. Supervision of plan implementation by private firms is also in public hands – and state offices are staffed by well-educated and well paid personnel. Some have called Singapore's economic model a »capitalist planned economy«, which in many respects contradicts conventional economic doctrines.

Urban planning comprises three levels. The conceptual plan has a time horizon of 40 to 50 years, the master plan is oriented towards the future 10 to 15 years hence and short-term planning towards the implementation phase.

Taking a long-term perspective an agency of the Ministry for National Development organises a two-year planning process and invites representatives of all ministries and technical agencies to take part.

The citizens are also asked about their priorities: do they want more residential or green areas, more room for cars or pedestrians? The various interests are aggregated and reconciled as far as possible.

Civil servants model the desired future in a cooperative process with a number of feedback loops. In the master plan, which is revised every five years, they focus on the concrete implementation of planning decisions and change direction if new developments require. Plans are publically accessible, citizens can make comments and proposals within the established framework. School competitions and other opportunities are arranged to motivate as many Singaporeans as possible to participate. The ultimate decisions belong to the responsible ministers, of course.

In the implementation phase Singapore places considerable importance on punctual completion. If need be, commissioned firms can take on additional staff and work round the clock. Foreign companies praise the planning certainty and, for example, fully expect that the complete relocation of the second biggest port in the world will take place on schedule. It will be fully automated and have over 40 per cent more capacity than the existing location near the centre, handling 150 ships a day.

A common platform was established for planning processes as early as the 1980s and since the mid-1990s the city administration has had an integrated software system. This enables it to simulate the effects that particular decisions may have in other domains. For example, what would the building of a new residential quarter, a commercial area or a park have on air circulation in this area and the island as a whole? How would a large building alter the temperatures in the surrounding districts, both during the day and at night? What traffic flows are to be expected and what does that mean for public transport needs?

At the same time, city spaces are increasingly being fitted out with more and more diverse sensors and new applications are constantly being tested. In the new Punggol district air quality, wind speeds, the movements and volumes of pedestrians and cars and much more can be measured in real time. Lamp and wi-fi posts also serve as mobile phone charging points. Facial recognition is important – although not discussed – in Singapore. What is found to work in Punggol is later rolled out over the whole city.

Big Brother is watching you

Gradually, Singapore is introducing a digital identification system for its citizens, to be completed by 2022. By this means citizens are able to communicate with the administration with as little bureaucracy as possible on all matters, whether it be a birth certificate, a day care place or a loan for a state-subsidised flat. How the state collects and uses such sensitive data remains a black box for Singaporeans. On top of that, cameras are installed at every corner. The feeling that you can be out and about at all hours without danger goes hand in hand with the suspicion that the state can see everywhere and takes note of all activities.

The state in Singapore is de facto the People's Action Party (PAP), which has ruled uninterruptedly since the parliamentary elections of 1959, when it was still under British occupation. Initially, the PAP consolidated its power with waves of arrests targeting left-wing opposition politicians, who often remained in prison for years without due process. In the meantime the government party has apportioned election constituencies to its own advantage. If the opposition should happen to be doing well in a particular district, the inhabitants soon know about it: renovations and other improvements are carried out only after some delay, without any reason being given.

Politics in Singapore is usually passed over in silence. Older people in particular are loyal to the government and take it for granted that a strong PAP will safeguard prosperity and solve any problems that might arise. Unemployment stands at 2.1 per cent. There is a general expectation that things will continue to get better. Shopping and eating are Singaporeans' favourite leisure activities.

The founding fathers of the PAP studied at elite British universities and even today the civil service is composed of people who, besides their experience in administration, trade unions, parliament and the military, have a Harvard degree or something similar. They act like managers and are paid accordingly.

In exchange, the population expects that infrastructure to always be in perfect condition, the trains to always run on time and the state to make it possible for them to buy an affordable and high quality flat. Ministers who do not achieve the requisite results are soon replaced.

Housing policy as the cement of society

Trust in the regime is high. This situation needs to be understood against the background of the changes that Singapore has undergone since the 1960s. In the early days, most people lived in slums, unemployment was high and sanitary conditions were disastrous. Floods repeatedly led to outbreaks of cholera and other illnesses.

After Singapore obtained the right to govern itself (while still a British colony), the PAP, under Lee Kuan Yew established the Housing Development Board (HDB) programme, which has overseen the construction of a million homes since then. Today around 90 per cent of citizens are owner-occupiers: anyone earning above 1,500 Singaporean dollars (just under 1,000 euros) a month can afford their own home, thanks to favourable conditions and high state subsidies. Although they are rather small by central European standards they are fitted out to a high standard and the often gigantic residential blocks are regularly renovated.

In recent times architects and landscape planners have worked closely together, creating more and more park landscapes that are somehow intertwined with the buildings, with trees on the roofs of skyscrapers, green mezzanines and facades. These are intended not only to cool the buildings, but also to make the neighbourhoods attractive meeting places. There have also been experiments with bamboo and substitutes for concrete. Because buildings are often torn down to make way for higher ones, recycling of building materials is an important issue in Singapore.

Housing allocation is connected to the traditional family model. Anyone who moves close to their parents can count on a bonus. On top of that, there is a quota system to ensure that the composition of housing matches that of the population, with 75 per cent Chinese, 14 per cent Malay and 8 per cent Indian. State planning also ensures that there are temples, mosques, churches and other places of worship of all the represented religions and that the schools are similarly ethnically mixed. While other countries in the region suffer from religious conflicts and repeated terrorist attacks Singapore remains calm. »We build not only homes, but communities« is the motto of the responsible authorities.

Owning a Singapore passport is undoubtedly a privilege because it not only provides access to a cheap apartment, but also permits the holder to travel freely almost anywhere in the world. In fact, many young people leave the country to study. Singapore's GDP per capita is much higher than Germany's. There are also crass inequalities of wealth and income. Several hundred thousand people possess wealth exceeding 10 million euros.

Divided workforce

Prosperity is based, however, on the fact that poorly paid people, largely without rights, from India, Malaysia, Indonesia and other countries of the region, work in construction, private households, factories and the extensive green areas. They often earn only around 320 euros a month and live in very basic dormitories. The Malays who commute into Singapore each day are a little better off. The trade union, which is close to the state, is not responsible for this 10 per cent or so of employees – and when a construction worker is injured or a household worker becomes pregnant they are at risk of immediate deportation. Those, on the other hand, who possess Singaporean citizenship and are in work receive regular training offers from the trade union – but have to pay around half themselves. Workers also bear most of the responsibility for retirement provision.

Until 2011 it was relatively easy for well qualified workers from abroad to obtain permanent residence and later a passport. In that year, however, the PAP only received 60 per cent of the votes, which it took as a wake-up call. One cause the party identified was the liberal immigration policy for well qualified workers, which many residents regarded as threatening their own opportunities.

The PAP has the ear of the people and tends to act paternalistically. In particular, MPs are very much a presence in their constituencies and tuned in to their constituents' needs.

Whoever has a problem can turn to them in full confidence. For example, one hears stories of families that were unable to pay for an expensive operation and the state stepped in to help, even through the pension and health insurance scheme normally does not provide for such things. And in Punggol, when dissatisfaction became evident among young families a PAP MP organised a social innovation park with community garden and self-organised bars. Disabled people are also involved and there are special offerings for children, young people, single parents and older people. There are also measures to integrate former prisoners. The idea is that no-one should feel marginalised: everyone belongs. In appearance, this park is reminiscent of civil society initiatives in Europe that have embraced co-creativity. The social innovation park is an example of how the party tries to prevent society from fraying at the margins.

The fact that the situation of potential highly qualified immigrants has deteriorated under popular pressure in recent years is definitely a problem from the standpoint of state planning offices. Singapore's population is ageing significantly; by 2030 the number of pensioners will have tripled. The birth rate is only 1.4 children per woman. Automation in Singapore is also seen as an opportunity to save on labour and thus to cope with a shrinking working-age population. Those most likely to be affected are workers in the port, in construction and in low skilled services.

Magnet for high-tech firms from all over the world

The state leadership considers it essential that Singapore continue to be a magnet for innovative companies and scientists from all over the world. In 2017 the country was ranked first in the Global Innovation Index and invests around 10 per cent of its public spending in research. Out of that, around every fifth Singapore dollar flows into the development of armaments and military research.

Singapore has two well-funded universities, in which, for example, ETH Zürich, Yale University and MIT have a presence. International scientific institutions and universities have established affiliates in the city-state, including TU München and the Fraunhofer Society. Researchers from all over the world conduct research on crypto-currencies in a so-called »real-world laboratory« organised jointly by the Singapore National Bank. Companies are also involved in many projects. The linkages between science, state and the economy are very close in Singapore; cooperation is highly valued.

The state makes a lot of data available to companies for Smart City applications. Thus, there is an integrated platform for various payment systems so that customers can pay with their credit card even in small shops. A parking app has also been developed. At present, there are trials with telemedicine and the monitoring of older people in their own homes.

Singapore has 23 overseas representations worldwide, aimed at attracting interesting firms to the city state. The criteria include innovative high-tech, lean production and high potential for international markets. For example, TÜV-Süd in Singapore has developed an evaluation system for companies, with which people can assess their digital fitness in relation to Industry 4.0. Singapore has now bought into the project and has arranged for it to be tested by 300 firms.

There are 40,000 start-ups in this small country, one in eight of which is a technology company. Any firm that trains local staff in Singapore receives tax concessions. Furthermore, 800 German companies have set up affiliates in Singapore. Besides the high subsidies they also enjoy freedoms that are not available anywhere else. For example, in Singapore medical products can be developed using embryonic stem cells.

Laboratory for Mobility 4.0

The streets of Singapore are wide and in many places access to the roadway is fenced off. Pedestrians are compelled to use overpasses to get to the other side. At first sight, Singapore is very car-friendly, but public transport already plays a prominent role; it is very reliable and affordable and now accounts for 67 per cent of all traffic. The government wants to increase this proportion substantially. By 2030 they would like to extend the underground network by 160 kilometres, so that 80 per cent of the population is at most 10 minutes' walk from the nearest station. Forty additional bus routes are also planned. Planners locate interchanges near shopping centres, if possible. If buildings stand in the way, demolition can be ordered; the owners are notified well in advance and subsequently compensated.

Singapore is now fully committed to public transport as the most efficient traffic system to ensure urban mobility. The country has a clear plan for the future: public transport will be convenient and constructed to the highest standards and there will be autonomous vehicles acting as shuttles between stops and the passenger's destination. Private cars will be largely superfluous. Thanks to digital technology it will be easy for users to determine the best transport connections, but also to report disruptions or pollution.

To coordinate passengers and offerings optimally the state bundles commuters' smartphone data, information from buses and taxis, and video recordings, combines them using software and disseminates the resulting information. Primarily outside peak times needs-based services are available: for example, if a stop registers that no one is waiting a bus can take a short cut. Conversely, minibuses can collect passengers according to demand. Algorithms help to determine the optimal route.

Cameras and probability calculations also help to identify and repair wear and tear in tracks or vehicles before they fail. Situations causing overcrowding and delays can be detected so quickly that replacement vehicles can sometimes be provided before customers are even aware of any problem. For this purpose Singapore has been building up a stand-by fleet since 2015. Buses and infrastructure are publically owned, while a number of private companies are responsible for operations.

All data collected in public areas has to be shared with the state. Thus the administration obtains, for example, all information collected by cycle hire companies about their customers. The state retains personalised data for itself and no-one is permitted to know what happens to it.

Anonymised data, by contrast, are made available to private firms so that they can develop innovative offerings. The state initially lets experiments unfold, before stepping in to regulate as soon as any unwanted side-effects appear. This concerns not only regulation of the number and deployment

locations of vehicles, such as rental bikes or e-scooters, or for which traffic lanes are available to them, but also, for example, the working conditions of Uber drivers. Also because drivers were supposed to become members of the quasi-state trade union Uber pulled out of the Singapore market, leaving the field open to its Asian competitor Grab.

Many companies are experimenting with innovative services. DHL is testing autonomous drones in Singapore to make deliveries to less accessible addresses. On a trial basis Audi is offering a car rental service with the option of ordering the car to a particular location. A car decorated with red roses or fitted out for a party can also be ordered by smartphone.

The so-called »Car Light« strategy is an important element of transport development. This is less about industrial policy than an attempt to get to grips with urban problems. Anyone wanting a car needs a licence; the price is set by auction and can go up to several tens of thousands of euros.

On top of that, the licence lapses after 10 years. At present there are 612,256 cars, according to official figures. The government has decided that there should be no more than this. This cap has been in place since February 2018. For the future the plan is gradually to reduce the number of licences. In any case, cars are extremely expensive: the purchase price is more than two or three times the price of a similar vehicle in Europe due to the extremely high tax. The enormous cost of car ownership – to which road pricing and comprehensive parking management in the inner city also contribute – is already responsible for the almost total absence of congestion. Transport is supposed to be efficient, which is why public transport works well, and the state provides for cheap taxis and car and bike sharing and strictly regulates individual motorised transport.

As things stand, around 11 per cent of the island state's land is used for streets and vehicle parking. The government would gradually like to reduce this. In the Bencoolen district an asphalted area has already been greened, while in the new areas of the city roadways will increasingly be underground. At the moment, however, it is the other way around: pedestrians have to go under or over vehicular traffic.

Because of the tropical temperatures and high humidity cycling is a sweaty business in Singapore. Nevertheless there is a network of cycle paths that is set to be expanded.

Self-driving cars are a key element

Singapore's government views self-driving vehicles as an important element of »Car Light« and Nanyang Technological University (NTU) is now involved in research and development. Already many underground trains are driverless and in future, to a considerable extent, cars will be too. A test site has already been established.

The focus of development in Singapore is an infrastructure that controls vehicles externally. The key software is thus not installed in the cars themselves, and to that extent the term »autonomous« is totally misleading. The vehicles have electric motors under the bonnet. In 2018 there were already 100 e-taxis. The number is supposed to rise to 800 in 2020, with the first driverless e-taxis entering operation shortly afterwards. Singapore also envisages e-vehicles the size of minibuses, which are more flexible than regular buses and can bundle spontaneous demand better than taxis. The inclusion of carsharing vehicles is also being considered.

The administration understands that self-driving vehicles will move around more slowly than cars today. And although there are no immediate plans to decommission the wide, well constructed streets, posters already depict how the administration envisages the new residential district: between the buildings there are no roadways any more, but green areas where children play and only pedestrians and cyclists are on the move. The driverless electric vehicles that shuttle people to the nearest metro station travel underground and surface only to collect or drop off passengers. Autonomous driving has been included in the planning of the three new city districts from the outset. In any case, autonomous driving is not intended to replace public transport, just complement it. The deployment of autonomous vehicles is rather aimed at further reducing individual motorised traffic.

SUMMARY

Singapore is often held up as a Smart-City metropolis par excellence, but this image is justified in only certain respects. The government uses big data both for systematic and long-term planning and for surveillance of the citizenry. Furthermore, a lot continues to be done on an analogue basis and is set to remain so. The purpose is always primary, not the technological possibilities.

In Singapore the state enjoys sovereignty not only over most land, but also over all data collected in public space. The technical infrastructure ensures that both citizens and firms provide everything that is generated here. The state makes anonymised data available to companies to enable them to develop innovative applications.

The government acts pragmatically. What works for Singapore economically is good, whereas what proves to be a flop is binned. Experiments based on the trial-and-error principle are welcome for learning purposes.

The aim is to foster prosperity for the population and thus to ensure peace and security. To this end the state pays the high tech companies it needs a lot of money and workers regularly receive training offers from the state-supported trade union. No one is supposed to be left behind. If unexpected developments occur, however, or unwanted side-effects, the state sometimes responds with strict regulations. Furthermore, workers have to contribute their own time and money to participate in training programmes. The social security system is weak and any redistribution is carried out through housing policy. The family is pivotal in times of crisis.

The economic system could not be transposed to the surrounding countries, as many in Southeast Asia would like. Singapore depends massively not only on cheap labour from other countries, but also resources such as water, energy, food and raw materials. A substantial portion of Singapore's waste is exported to poorer areas in Malaysia. On top of that, energy use is extremely high, in particular due to cooling needs. Air conditioning operates unceasingly in buildings to keep out the humid air and avoid mould. Around 60 per cent of the server farms in Southeast Asia are in Singapore and have to be constantly cooled. Solar and wind energy are not viable and hence large quantities of gas are imported for Singapore's

power stations. Per capita, Singaporeans have among the highest environmental impacts in the world.

One of Singapore's greatest advantages is that English is the first official language. This has made it easy to open up internationally and attracts, along with the high quality of life and a virtually unmatched level of personal safety, many highly qualified people from all over the world.

Many of these initiatives are not applicable to Germany: we are able to take free elections, a strong civil society and freedom of expression for granted, fortunately. Nevertheless, Singapore can provide impetus for discussion of the Smart City. On one hand, digitalisation of the state administration is not an end in itself, rather technology serves goals that have already been laid down. The abundant resources and high qualifications of civil servants make it possible for the state to provide the private sector with guidelines and monitor their compliance. When it comes to the deployment of digital tools, too, providers are confronted by competent interlocutors, who are able to formulate and implement their own criteria.

An intensive, well structured and long-term process integrates multiple aspects of city planning at an early stage. The simulation of different solutions is conducive to the optimisation of the overall plan and does not improve individual aspects at the expense of others.

In Singapore the state enables experiments with innovative applications to go ahead initially, but if negative consequences ensue it steps in to regulate expeditiously.

Singapore can also provide fresh impetus in relation to transport policy. Private cars are being pushed out of public spaces in favour of pedestrians and green areas.

»Autonomous vehicles« are constructed in such a way that the infrastructure controls them and pedestrian-friendly speed limits can be implemented simply. Public transport in Singapore already works extremely well, is affordable and is being expanded on a massive scale. Furthermore, Singapore is committed to optimal linking of different modes of transport.

6

CONCLUSIONS AND RECOMMENDED ACTIONS

Increasing digitalisation harbours both risks and opportunities. Time is short: big companies are trying to use their offerings to push development in a direction that secures their business over the long term. But that is not in the interest of society. Policymakers at all levels must therefore address the issue and work towards developing and deploying digital instruments that benefit everyone. The Smart City should become synonymous with a city that is worth living in for all inhabitants. Technology can help with this but it is not an end in itself, merely a tool to be made use of in case of need.

The following criteria characterise a social Smart City:

- People are what really counts. Citizens have the opportunity for real participation when it comes to developments in their city. They find support for their various needs and can rely on their data being protected.
- Local and regional value creation is strengthened through structures that create jobs locally and ensure that a considerable portion of profits remain in the region.
- The use of new technologies should aim at improving working conditions. That includes not only alleviating heavy physical work, but also improving the work/life balance.
- The social Smart City should boost the quality of life of all residents and not focus on selected groups, such as the young and tech savvy.

Using these criteria as a compass, the opportunities of digitalisation can be seizeed and risks limited. Policymakers should orient themselves towards this at federal, state and municipal level.

6.1 OPPORTUNITIES AND RISKS DUE TO DIGITALISATION

… FOR THE LOCAL ECONOMY

Opportunities: Digital tools can …

- facilitate online access to services and goods in a particular district;
- strengthen and stabilise local supply through new distribution channels for local and regional products so that new jobs are created;
- promote decent work by decentralising economic structures, self-determination and self-organisation;
- create new open, participatory exchange platforms for public information and services, based on clearly defined regulations;
- make decisions more transparent and faster, facilitate approval, reflection and decision-making processes in order to strengthen representative democracy over the long term;
- create new occupations for all qualification levels;
- involve people with sought-after qualifications, such as software specialists, robot technicians and engineers, as well as the so-called creative economy in their own Smart City processes early and sustainably and boost the city's attractiveness and economic strength;
- help people to cope with new challenges in an ageing and increasingly diverse society. In future, there will be much greater demand for digitalisation skills in schools and colleges, and among older people and immigrants;
- publicise the attractiveness of cities and municipalities in new ways.

Risks: Digital tools can …

- overstrain local suppliers because of a lack of know-how and the higher costs of new distribution channels;
- exclude people where distribution channels are not barrier-free;

- weaken local supply through new forms of distribution;
- increase delivery traffic and weaken regional purchasing power;
- lead to job losses due to automation;
- lead to poor working conditions for more people because the platform economy puts all risks on the employees and workforce organisation is not possible.

… FOR SOCIAL INFRASTRUCTURE

Opportunities: Digital tools can …

- open up new access and communication possibilities for public and social offerings;
- organise offerings more simply;
- bring together different generations and target groups.

Risks: Digital tools can …

- reinforce the digital divide in society;
- exclude and neglect individual groups of people;
- shift real life encounters to online;
- diminish person-related offerings instead of complementing them.

… FOR MOBILITY AND TRANSPORT

Opportunities: Digital tools can …

- create more mobility with less traffic;
- link different means of transport for the transport of people and goods;
- facilitate multiple mobility offerings;
- make remote locations and regions more accessible;
- improve accessibility through a variety of mobility offerings;
- facilitate more affordable mobility and thereby improve participation;
- improve the quality of public space by means of traffic prevention;
- facilitate doing without a car in rural regions.

Risks: Digital tools can ...

- cause more traffic with less mobility;
- weaken public transport and impair participation;
- reinforce the withdrawal of supply infrastructure from the area;
- reinforce the trend towards monopolies in the economy.

… FOR HOUSING

Opportunities: Digital tools can …

- save energy;
- help older people to live independently for longer;
- simplify the organisation of everyday life;
- lead to new encounters in the neighbourhood, for example, through platforms or the sharing of everyday objects;
- contribute to more cost-efficient home building.

Risks: Digital tools can ...

- make housing more expensive because of their cost;
- lead to increasing isolation;
- facilitate the abuse of personal data through hacking;
- cause higher energy use because of a lack of expertise in planning, installation or use;
- lead to higher maintenance costs, above all in the absence of standards;
- increase dependence on technology and the internet.

6.2 RECOMMENDED ACTIONS

6.2.1 FOR FEDERAL AND *LAND* POLICYMAKERS

Qualitative objectives, not technological possibilities, must be at the centre of federal and state (Land) policy strategies concerning digitalisation.

- Objectives must be worked out on a participatory basis. In addition to the appropriate digital tools other participation formats must also be used that ensure direct dialogue between the various interests.

People belong at the heart of Smart City strategies. They must be enabled to act in a self-determined and responsible way in digital and analogue space. Laws and infrastructure should be developed in a way that guarantees informational self-determination and access. Those who are less tech savvy must not be left behind.

- Digital infrastructure is a public service. A legal framework must be established for digital infrastructure and resources made available for investment.
- Federal and state governments must commit themselves to fostering equal living conditions across the country and support cities and municipalities to enable them to create, foster and work with needs-based digital infrastructures. The legal framework must motivate municipalities to try out their own approaches while ensuring that certain standards are adhered to.
- Integrated planning processes and concepts are a fundamental precondition for future-oriented urban development. They need to be strengthened and oriented towards the Social City. Digitalisation provides new options for a collaborative, cross-departmental and cooperative way of working, both within the administration (with its various departments) and also in »the outside world«.
- Along with a digitalisation strategy for integrated urban development and housing concepts, experimental spaces have to be created for all socially relevant issues. Furthermore, pilot projects need to be initiated, supported and evaluated transparently and the results applied to everyday life. A programme for an »integrated, digital and

social district« supports 100 experiments in four years, undertakes research on them and derives recommendations as appropriate. Important components here include energy/resource consumption, mobility, nutrition/exercise/health, education, housing, and the local economy.
– The urban development programme, especially the lead programme »Social City« is being expanded to include digitalisation. In this process the risks and opportunities of digitalisation for urban and regional development processes should be clearly identified. Besides construction investments, support can also be given for local digital and social networking and cooperation. Social neighbourhood initiatives should be strengthened and projects can be implemented with the assistance of the urban development programme.
– There should be regular exchanges of experience at all policy levels on the issue of the Smart City and information should be provided on best practices. It is also important that failures should be recognised as such and lessons learned.

6.2.2 RECOMMENDED ACTIONS FOR CITIES AND MUNICIPALITIES

– Municipalities must gain and maintain the initiative over analogue and digital space. The administration should be revamped so that it can manage digital projects itself or at least oversee them properly.
– Standardised digital structures should be provided and used to enable developments independent of specific manufacturers or providers. Contracts should be drafted to allow innovations and adaptations as conditions change.
– Municipalities should develop a cross-departmental Smart City strategy that addresses the social as well as economic dimension. The public and experts from other areas of the administration should be kept involved.
– Each municipality should develop a system for collecting data and making it available, including standardised interfaces to enable the simplified exchange of documents and data.
– Municipalities should set up digital, process-oriented and participatory planning processes that permit dynamic adjustments and provide for the necessary transparency. The administration should be put in a position to drive and guide processes in a target-oriented manner.
– Citizens should have access to the necessary information and plans and be able to enter into dialogue with the administration straightforwardly, by both digital and analogue means. The administration should be set up in such a way that it is open to ideas and proposals and cultivates an understanding of itself as a facilitator.
– Municipalities should establish frameworks and timeframes for non-technology-centred Smart City experiments. They should initiate and support the relevant processes, discuss experiences and document results so that other municipalities can learn from them, too.

There should be a consistent approach to the risks and opportunities that arise from digitalisation at municipal level.

– In order to strengthen the local economy regional economic cycles should be stabilised or initiated, targeted action strategies should be developed and driven jointly with economic and societal actors.
– Municipalities should support regional providers in networking and bundling what they have to offer. This can be applied to very different areas: food, energy, eldercare, to mention only three.
– Cities and municipalities should also get involved in delivery logistics. For example, they can set up distribution points and stipulate that all package deliveries are made from there on a pooled basis.
– Local supply structures should be designed and maintained with an eye to the future. This requires, besides support based on digital tools, active management of commercial premises, a proper social mix at district level and public welfare–oriented design of public space.
– In order to strengthen digital networking and exchange at district level, targeted support is needed for non-commercial offerings, such as neighbourhood platforms. Hand in hand with that, encounters and cooperation in real space should be promoted by means of district businesses, places for civic involvement and so on.

References

Feierabend, Sabine; Plankenhorn, Theresa; Rathgeb, Thomas 2016: JIM 2016: Jugend, Information, (Multi-)Media: Basisstudie zum Medienumgang 12- bis 19-Jähriger in Deutschland [Young people, information, (multi) media. Baseline study on the media habits of 12 to 19 year-olds], Medienpädagogischer Forschungsverbund Südwest, https://www.mpfs.de/fileadmin/files/Studien/ JIM/2016/JIM_Studie_2016.pdf (9.8.2019).

Giersberg, Georg 2013: 3400 Sextillionen, in: Frankfurter Allgemeine Zeitung, 13.4.2013, Frankfurt am Main.

Internet & Gesellschaft Collaboratory e.V. No date: Digitale Regionen: Aus dem Land, für das Land [Digital regions: from rural areas, for rural areas], https://paderta.com/wp-content/ uploads/2016/12/Digitale-Region_Hintergrundbericht.pdf (9.8.2019).

Krinninger, Theresa 2018: Das soziale Netzwerk pflegt mit [The social network plays its part in care provision], in: Zeit Online, 19.7.2018, https://www.zeit.de/wirtschaft/2018-06/ambulante-pflege- dienste-soziale-netzwerke-personal-mangel-niederlande-zeitdruck (9.8.2019).

Wohnbau Salzgitter. No date: Im Alter möglichst lange selbstständig bleiben [Remaining independent in old age as long as possible], http://www.wohnbau-salzgitter.de/de/wohnen-im-alter/ (9.8.2019).

Zika, Gerd; Helmrich, Robert; Maier, Tobias; Weber, Enzo; Wolter, Marc I. 2018: Regionale Branchenstruktur spielt eine wichtige Rolle [Regional branch structures play an important role], in: IAB-Kurz- berichte 9 (2018), http://doku.iab.de/kurzber/2018/kb0918.pdf (9.8.2019).

Zukunftsinstitut. No date: Die Megatrend-Map, https://www.zukunftsinstitut.de/ artikel/die-megatrend-map/ (9.8.2019).

Friedrich-Ebert-Stiftung
Publisher: Division for Economic and Social Policy,
Godesberger Allee 149, D-53175 Bonn
Fax 0228 883 9202, 030 26935 9229, www.fes.de/wiso

Orders / contact: wiso-news@fes.de

ISBN: 978-3-96250-796-1

Title image: © pyty / depositphotos.com
Design concept: www.stetzer.net

DIVISION FOR ECONOMIC AND SOCIAL POLICY
OTHER PUBLICATIONS ON RELATED TOPICS

Shaping Urban Change and Promoting Sustainable Mobility
WISO DIREKT – 27/**2017**

Building Culture: Key to Better Urban and Rural Quality of Life
WISO DIREKT – 26/**2017**

FRIEDRICH EBERT STIFTUNG

Volltexte dieser Veröffentlichungen finden
Sie bei uns im Internet unter

www.fes.de/wiso