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# **DIGITAL AGENDA VIENNA 2025**

**Vienna to become capital of  
digitalisation**

**[www.DigitaleAgenda.Wien](http://www.DigitaleAgenda.Wien)**

Vienna, September 2019

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# EXECUTIVE SUMMARY

## **Digital to-do list for the city**

The digitalisation of all areas of life is a comprehensive challenge for society as a whole. Vienna's Digital Agenda 2025 is both a strategic paper and an ongoing working document with which the City of Vienna faces this transformation process.

The digitalisation of the City of Vienna is a primary strategic concern with great relevance for society and its institutions, for living together, business and politics. Today, the city's municipal cleaning services, power supply, schools, traffic, health facilities, food supplies and Vienna's general administration can no longer get by without information and communication technologies (ICT). Not only do they ensure the city's proper functioning, they also offer the golden opportunity to supply citizens with truly smart and innovative city services, making the city still more immediately tangible to its residents.

## **Objectives of Vienna's Digital Agenda**

- Long-term strategic control of the transformation process, culminating in the City of Vienna's establishment as "capital of digitalisation"
- Making best use of new technologies to achieve the goals of the Smart City Vienna Framework Strategy 2050
- Strengthening the fast-growing ICT sector while at the same time ensuring social fairness
- Participation and involvement of the citizens of Vienna in the advancing digitalisation of city services
- Harnessing the enormous opportunities for digital city administration
- Building and developing cutting-edge infrastructure while ensuring security, confidence and protection

## **Participatory working paper**

Vienna's Digital Agenda represents a contribution to achieving the Smart City Goals by presenting an action catalogue as a "to-do list" for the digitalisation process that is regularly evaluated, renewed and extended. This will allow the new technologies to be put to use in the best possible way. The Agenda is not a hard and fast set of rules, but a working document or an overview of current projects and future priorities that continues to evolve. Vienna's Digital Agenda was first created in 2014 as part of a participatory process.

The third revised edition now available offers an overview of everything achieved so far and establishes the strategic principles, projects and action steps until 2025. The Digital Agenda identifies relevant action fields related to the digitalisation of the City of Vienna, namely:

security, service, knowledge, working world 4.0, business, infrastructure and control. Each action field defines a series of projects. The key projects will be implemented in the next few years. In addition, there are a number of short- and medium-term priorities that are to be further explored and substantiated in collaboration with Vienna's relevant municipal institutions.

The City of Vienna is well aware of the sweeping socio-political and democratic dimensions of the digital transformation process. "Technology follows people, not the other way around." In its Vienna Digital Principles, the City of Vienna has established a number of guiding principles as a basis, in order to do justice to this principle and to put people's needs first

## **The seven action fields of Vienna's Digital Agenda**

### Security

The trust citizens place in the City of Vienna's services and ICT systems is of prime importance; data protection being priority number one. The City of Vienna ensures provision of a reliable and secure ICT infrastructure and assures that the trust of its citizens and of the business community in data security is strengthened. It aspires to offer secure, trouble-free and powerful services and to take appropriate measures to defend against and prevent IT risks in accordance with the risks identified and taking economic considerations into account. Already established offices such as WienCERT (Computer Emergency Response Team) are responsible for comprehensive IT security.

#### *Key security projects*

Sustainable overall conditions that facilitate the training and support of highly qualified IT security staff and the establishment of a sustainable network are to be created with the help of Security Hub Wien.

The key project "information security for the citizens of Vienna" will strengthen personal IT security skills through e-learning. To this end, the city is working on priorities in the areas of blockchain, data protection, encryption.

### Service

The city acts as a digital service provider and offers comprehensive digital services to its citizens. "Smart City Vienna" is a city of short distances; accordingly, all its processes are being redesigned using new methods and digital tools. The "city as a service" principle (the city as a digital platform) continually supplies the citizens of Vienna with an improved quality of life through digitalisation. In this context, the experiences and feedback of the citizens are to be integrated as an "outside view" in a participatory approach. As a sponsor and interface between service-oriented authorities and innovative startups, the City of Vienna develops

cutting edge GovTech solutions for all errands to public offices.

#### *Key service projects*

Key projects are the development of the digital "mein.wien" city service as a central hub for all electronic errands to public offices and the establishment of the "GrätzlMap" as a local information service. The "online procedure status check" will also help to simplify official administrative procedures in future. For instance, it will soon be possible for the inspection of sidewalk seating areas to be taken care of via digital site inspection, without city employees having to leave their desks.

In addition, digitalisation in the service action field includes numerous other priority projects related to participation, smart living, "digital health", culture and recreation, as well as networked and autonomous mobility.

#### Knowledge

A high level of education is a basic prerequisite for citizens to be able to lead a self-determined, inclusive life together and is also crucial to the city as a business hub. A strong university location and internationally competitive research are equally at the centre of Vienna's Digital Agenda as are the appropriate teaching of skills and basic rules for a digitalised world from earliest childhood. This requires continuous modernisation of educational institutions for all age and societal groups and furnishing them with the best of equipment as well as supporting all teaching school professionals. Digital priorities in education, training and professional development should be just as much a matter of course as the support of junior ICT staff, low-threshold access to knowledge, databases and digital contents or creativity and the freedom to experiment with using new technologies. As a science hub, a high level of networking between general universities, universities of applied sciences and other science and research institutions is critical.

#### *Key knowledge projects*

One of the key projects in the knowledge action field is "digital school" in the context of which educational institutions and teachers receive regular proactive digital support. As part of the educational initiative "DigitalCity.Wien", experts bring basic IT skills from the real world to schools. Comprehensively providing educational institutions with powerful Wi-Fi is the basis for the "digital classroom" in which mobile devices are integrated into classroom work with the best possible pedagogical support using modern educational concepts. The City of Vienna funds research for the "digital hotspot Vienna" and relies on various infrastructure programmes for universities, on research funding and on networking among the players for this purpose.

#### Working world 4.0

The digitalisation of the working world offers opportunities and presents challenges for which

Vienna's Digital Agenda sets clear rules. Some 60,000 people in the metropolitan area of Vienna work in IT companies. While digitalisation is predicted to create new jobs for highly qualified people, the loss of a number of jobs is likewise to be expected. As a result, the City of Vienna is committed to continuing training and education in the field of digitalisation as well as to technologies that make it easier to balance work and family life. Moreover, the working world 4.0 requires the achievement of legal certainty in the sharing economy while at the same time promoting innovative developments. The businesspeople of Vienna, in particular brick-and-mortar retail should also be strengthened in the digital world.

#### *Key working world 4.0 projects*

Priority is given to the "sharing economy strategy", promotion of digital brick-and-mortar retail, a digitalisation pact of the City of Vienna with the social partners and the professional development programme "Digi Winner" by the WAFF – Vienna Employment Promotion Fund.

#### Business

Already, some 6,000 companies generate 8 percent of total sales – and this number continues to grow. As a result, the ICT industry has become not only the most promising and innovative pillar of Vienna's economy, it also has at its command the key and interdisciplinary technologies for all other sectors and areas of life. Vienna's Digital Agenda aspires to create the right overall conditions for innovative and successful businesses and to establish itself as an attractive location for international IT companies and startups. The aim is to establish and develop DigitalCity.Wien as a network for innovation drivers. Efforts are being undertaken to better position Vienna as a hub in the international gaming industry.

Scientific data must be provided to the administration and the citizens.

#### *Key business projects*

One of the key projects in the business action field is the development of "DigitalCity.Wien" as a networking platform for innovation drivers. With ventures such as the research project "WAALTeR" related to new, digitally supported forms of housing, the innovations are also to benefit citizens aged 65 and over. The ICT hub is to be further strengthened by continuing to expand the digital trade exhibition of ICT companies during the "Digital Days", promoting GAME CITY and generally supporting and encouraging networking between developers. Collaboration with innovative companies is to turn the City of Vienna into a hub of innovation and promote the startup ecosystem.

#### Infrastructure

An excellent digital infrastructure is a smart city's "nervous system". This essential building block of digitalisation is the prerequisite that ensures sustainable interconnection of the many data points with, however, the various requirements for bandwidth, response time, scalability,

availability, security and energy supply having to be adequately taken into account.

Digital infrastructure includes basic services such as broadband internet connection and powerful Wi-Fi as well as standardised and open interfaces and the development of the "internet of things" (IoT), that is to say, of networked objects and applications. The Digital Agenda Vienna accelerates effective and secure use of natural, technical and human resources, the improvement of city service offers, barrier-free access to services and information as well as the participation of citizens in relevant decisions.

#### *Key infrastructure projects*

Key projects include the intelligent interconnection of the city by implementing the "Vienna IoT Strategy" and launching various pilot projects in the area of connectivity, such as the development of IoT networks. Additionally, the City of Vienna is stepping up intelligent traffic control via sensors and video analyses, equipping the traffic lights with weather and environment sensors and establishing the City of Vienna as a European 5G pioneer.

#### Control

In the field of IT governance, structures are being created that permit the best possible planning, implementation and guidance of the digitalisation process. On behalf of the Executive City Councillor of Digital Innovation and the Chief Executive Director, modern IT governance is implemented by the Process Management and ICT Strategy Group of the Chief Executive Office. Appropriate strategy and communication bodies should be created and established to this end, while further establishing the CIO Department of the City of Vienna as a think tank and innovation driver. The newly created "Municipal Department 01 (MA 01 – Wien Digital)" will be developed as a central hub for digitalisation players. Every department of the City of Vienna will be assigned a Digital Officer and supplied with modern ICT equipment.

#### *Key control projects*

A key project in the control action field includes establishment of a "Digitalisation Control Group" that drives digitalisation forward with an integrated approach and the assistance of external experts. In addition, the newly established Digital Officers ensure an integrated approach to digitalisation in all municipal departments.

## **DIGITAL AGENDA VIENNA IN A NUTSHELL**

The word "agenda" is of Latin origin and essentially means "things to be done" or "what has to be done". With this in mind, Vienna's Digital Agenda can be seen as a "to-do list" for the city. It summarises what projects and activities in the area of or related to information and communication technology (ICT) are on the city administration's agenda. Several action fields of Vienna's Digital Agenda have been defined in a participatory process with the involvement

of the citizenry, within the limits of which the City of Vienna will be prioritising the implementation of a number of very diverse individual projects in the coming years. These actions fields are security, service, knowledge, working world 4.0., business, infrastructure and control.

The citizens of the city are at the heart of Vienna's Digital Agenda. Their concerns, needs and interests always serve as the guideline for identifying priorities, implementing projects and designing new services. Therefore, the proactive involvement of all the people living in this city is a key element in all the related processes.

This is how the present Digital Agenda Vienna came into being. The priorities and projects of Vienna's Digital Agenda were mapped out with the involvement of hundreds of interested people. And it goes without saying that the evolution of Vienna's Digital Agenda will continue along these transparent and open lines.

The Digital Agenda Vienna is consistent with the Vienna Digital Principles. These are principles that guide the city's development of new technological opportunities. In addition to openness, transparency and participation, they also include trust and security, age appropriateness, accessibility and digital equality, gender equality, independence, autonomy, citizens' orientation, strengthening of the business hub, conservation of resources, consolidation and innovation, as well as flexibility and learning.

These principles are what render the Vienna Digital Agenda unique and ensure that the opportunities and potentials of digital development benefit everyone in this city. However, it is also necessary to bring these principles to life. Therefore, we extend a warm invitation to anyone who lives in this city to participate in this process and dialogue.

Vienna's Digital Agenda is not a hard and fast set of rules, instead it is a working document or an overview of current projects and future priorities that continues to be developed. Accordingly, this Digital Agenda Vienna includes an assessment of already ongoing projects. Approaching the Agenda as an "open working document" makes sense, especially considering that both citizens' demands and technical possibilities keep evolving. Ultimately, Vienna's Digital Agenda seeks to answer the question of how the City of Vienna should deal with these challenges and opportunities. How can the potentials of the new technologies be put to the service of all the citizens of Vienna? How can the related opportunities be taken advantage of, while at the same time avoiding risks?

As a result of dealing with these questions, Vienna's Digital Agenda represents a logical addition to the existing strategy documents in the context of Vienna's research, technology and location policy. In the end, however, it encompasses far more, because digital technologies are beginning to play a decisive role in ever more areas of city life.

# I. SMART CITY VIENNA: DIGITAL AGENDA VIENNA AS AN ONGOING TO-DO LIST

## The smart city's "nervous system"

We live in an age where all areas of life are subject to digitalisation. The City of Vienna has accepted this challenge by presenting Vienna's Digital Agenda as a strategy with which to handle this special transition process successfully.

Based on the motto "best quality of life for all residents of Vienna combined with the greatest possible conservation of resources", the "Smart City Framework Strategy 2050" is a set of new guidelines that the City of Vienna has imposed on itself, establishing how the challenges of the future are to be met. Apart from goals such as the reduction of CO2 emissions, the development of renewable energy sources, the modernisation of buildings, the guarantee of highest-level medical care, this umbrella strategy also includes the digitalisation of infrastructures, organisations and lifeworlds (for instance education or healthcare) as one of the city's central strategic tasks. The strategy's main areas of focus are the population's high quality of life, the conservation of resources and the added value of innovations. Achieving these goals will require the deployment of modern technologies and processes. Information and communications technologies (ICT) have become the "smart" city's nervous system.

Vienna has formulated the goals it hopes to reach by 2050 in the "Smart City Framework Strategy": According to it, Smart City Vienna refers to the evolution of a city in which issues like energy, mobility, buildings, infrastructure and technologies as well as health, education, social affairs and equal opportunities are considered in their entirety and continue to be developed in innovative ways. The basis for this is digital education and qualification as well as the targeted education and professional development of people of all age groups. The aspect of inclusion is given particular consideration in this context.

This "Digital Agenda Vienna" represents a contribution to achieving the Smart City Goals by presenting an action catalogue as a "to-do list" that is regularly evaluated, renewed and extended and with the help of which best use of the new technologies can be made. In this way, technologically driven innovations are linked to socially driven innovations in order to centre attention on the needs of the people. Vienna considers itself a smart city mainly because it centres attention on people and their needs.

Naturally, the principles and overall conditions related to sustainability, the conservation of resources and circular economy defined in the Smart City Vienna Framework Strategy (SCWR) also apply to the Digital Agenda.

As a result, the SCWR already establishes that the City of Vienna and its companies are to make targeted use of digital data, tools and artificial intelligence for the conservation of resources and the preservation of a high quality of life.

Moreover, the city's digital infrastructure should be run in the most energy- and resource-saving manner possible. Renewable energy sources will supply 75 percent of the energy demand for digitalisation and the provision of digital services by 2030 and will cover 100 percent of these needs by 2050. This also includes the power supply for data centres, workstations etc. Infrastructure development should also take health aspects (such as exposure to radiation) into account.

Technology follows people, not the other way around: This basic mindset is a central feature of the Smart City Vienna, thus distinguishing it from other smart city initiatives. Therefore, Vienna's Digital Agenda also centres its strategy on the users of information and communication technologies. The city's services should continue to be equally available to everyone without excluding anyone. The technical divide between the citizens, also referred to as the "digital divide", must be prevented, while developing digital skills in all age groups continues to be a key goal of Vienna's Digital Agenda at the same time.

The enormous innovative power of information and communication technologies has doubtlessly contributed to many positive developments, which is why it has a significance for overall society that is difficult to grasp. New business models, the changing worlds of work and qualification needs, a rebalancing of centralised and decentralised production methods, as well as the acceleration and individualisation of numerous processes are leading to rifts in what has been the social order so far. It is not without reason that some authors are referring to the third or fourth industrial revolution and are predicting the disruption of entire business sectors. Some of the challenges that have already become evident are those related to current technological developments, such as artificial intelligence, machine learning and augmented reality, to name just a few trend examples. Such radical changes offer tremendous opportunities for innovative city administrations, yet they also give rise to uncertainty among the population.

The City of Vienna has always taken the challenges related to public services of general interest very seriously and has found solutions to increase the quality of people's lives. It is for good reason that Vienna is regarded as a liveable city – Vienna as a "digital hotspot". Today, the city's cleaning services, energy supply, schools, traffic, health facilities, food supply and Vienna's general administration can no longer get by without ICT. Information and communication technologies ensure not only the city's proper functioning, but also offer the golden opportunity to supply citizens with truly smart and innovative services, in line with the smart city spirit.

In addition, the ICT industry has become a very important economic factor for Vienna. More than 54,000 employees in roughly 6,000 companies have generated sales in the amount of EUR 18.8 billion (study: "ICT location Vienna in comparison II", 2017). These numbers speak a clear language.

The City of Vienna takes a holistic view of its location policy planning. In addition to the "City of Vienna's research and technology strategy" and the already planned goals and measures of the Vienna Business Agency, the Digital Agenda constitutes a supplement that centres special attention on the involvement of the citizens when it comes to establishing its actions.

### *Participation and cooperation*

Active participation and the opportunity to collaborate and contribute are becoming increasingly important to the citizens of Vienna and there is also a need for a range of services that takes its cue from individual use behaviour and a person's respective personal life situation. In the spirit of digital democracy, social co-determination and transparency, the City of Vienna enters into active dialogue with its citizens, thus actively advancing the democratisation of knowledge and information. In this context, Vienna will also support the establishment of network neutrality or web freedom as a basic value on a national and international level.

The currently ongoing transition process related to digitalisation is not a short-term trend nor is it exclusively an issue for the ICT Department. The digitalisation of the City of Vienna is a primary strategic concern of the utmost relevance to society and its institutions, for life together, business and politics. In the decades to come, the City of Vienna will continue to be intensely occupied with how to best put new technologies to use. This requires both the questioning of previously valid ways of thinking and the learning of new technological skills and management approaches.

This "Digital Agenda Vienna" intends to identify areas of action for the City of Vienna, for its citizens and its guests, in order to specifically shape and advance these developments together. For the City of Vienna, information and communication technologies have been evolving more and more from a supporting role to a strategic task.

### **Objectives of the DIGITAL AGENDA VIENNA**

- Long-term strategic control of the transformation process, culminating in the City of Vienna's establishment as "capital of digitalisation"
- Making best use of new technologies to reach the "Smart City Goals 2050"
- Strengthening the fast-growing ICT sector while at the same time ensuring social fairness

- Participation and involvement of the citizens of Vienna in the advancing digitalisation of city services
- Harnessing the enormous opportunities for digital city administration
- The creation and development of cutting-edge infrastructure, operated in the most energy- and resource-saving manner possible, while at the same time preserving security, trust and protection.

### *Ongoing development of the Digital Agenda Vienna*

Vienna's Digital Agenda is the result of a new way of thinking that is to find its way into the city's work. It was not hatched behind closed doors, but is the result of a participatory working process, based on the Vienna Digital Principles.

Vienna's Digital Agenda was established in cooperation with citizens, business and research as well as the employees of the City of Vienna as part of a participatory process in 2014. It was published in 2015 and a second edition appeared in 2016. At its inception, it was established that the Digital Agenda would continue to be constantly evolved and adapted to new (technological) developments.

Over the course of several months, hundreds of interested employees of the City of Vienna, enterprises closely associated with the city and citizens participated in the development of many suggestions and ideas for the shaping of the digital transformation process. In the phase that followed, these ideas were then sifted and discussed in five working groups. Thereafter, work on the final text took place, again inviting public participation.

This collaboration became conceivable and possible only as a result of innovative technologies. Above all, it required a break from the city's traditional, rather hierarchical working methods. Because the extraordinary becomes possible only where new technologies and new thinking meet. The new manner of cooperation, enabled by new, innovative technologies, that led to creation of the Digital Agenda Vienna, demonstrates this too.

Aside from describing what has been achieved and what key projects were implemented, the third edition now available also identifies new initiatives and impulses. Again, the community was invited to engage on the City of Vienna's participation platform ([partizipation.wien.gv.at](http://partizipation.wien.gv.at)) and contributed many ideas. The previous action fields were adapted in accordance with recent developments. Finally, the Digital Agenda Vienna is a dynamic strategy that continues to evolve regularly and addresses new challenges and goals. Likewise, it also examines the various dimensions of digitalisation in greater detail.

The following chapters identify the relevant action fields of digitalisation as well as the possibility spaces that open up as a result of increasing transformation processes. "Key

projects" are determined as central elements for each individual action field. The key projects will be launched as pioneering projects in the next few years. Some of the key projects have already entered the implementation stage. In addition, short- and medium-term priorities will be defined that are to be explored in greater depth and fleshed out in cooperation with the respective competent authorities of the City of Vienna.

Vienna's Digital Agenda is an ongoing process that thrives on participation and collaboration between all the parties involved. It should not be thought of as set in stone, on the contrary, it is meant to be a living, functional text that inspires reflection, sets guidelines, identifies key projects, suggests ideas and defines responsibilities. The Digital Agenda is a process of strategic planning, the value of which evolves through collaboration and will continue to develop dynamically over the coming years.

Therefore, in future, the City of Vienna will continue to reflect on the implementation of the priorities, measures and projects planned online on [www.digitaleagenda.wien](http://www.digitaleagenda.wien) as well as personally in working groups and at events with citizens and Vienna's ICT sector. Moreover, the online platform will regularly offer the opportunity to suggest projects and ideas for the further development of Vienna's Digital Agenda.

## **Political dimensions of digitalisation**

While it is beyond doubt that the digital transformation process offers many advantages and an increase in the quality of life, it also involves risks for society. Internet speeds going through the roof, the internet's new power, hitherto unseen data volumes and computing capacities are just a few of the developments to be taken seriously and for which new solutions need to be discussed with the involvement of large population groups. The following will expound on various dimensions of digitalisation and the Vienna Digital Principles as guides for the thoughts and actions of all the parties concerned with digital change.

### *The socio-political and democratic dimension*

Digitalisation constitutes the most significant factor of omnipresent structural change in our society and city. People and their social and societal needs should be at the centre of attention of every change. All areas of life are impacted: how we do business, how we work, how we live together and, most of all, how we exercise our democratic rights. Participation, elections, involvement in political life, information acquisition – all this is influenced by the opportunity for sharing in our digitally transformed world. The City of Vienna is committed to not "losing" anyone along the way. Therefore, it is necessary to identify and appropriately counteract developments such as the "digital divide".

Digitalisation offers countless new opportunities for citizen participation, and in this context, the

City of Vienna relies primarily on the empowerment of the people. This begins as early as in kindergarten, at school and during education, where, for example, adolescents are invited to discuss the workings of the digital world. The focus is on questions regarding digital or media literacy, mobbing prevention and generally the safe and competent use of social networks.

Social inclusion means creating the opportunity for everyone to participate in the benefits of digitalisation, regardless of age, education, etc. Digital applications must either be programmed in a manner ensuring their easy use by all, or people must be provided adequate training in their use. At the same time, however, other alternatives need to be provided in addition to the digital services, ensuring, for instance, that traditional communication channels and their points of contact remain open and available.

### *Socio-political dimensions*

The City of Vienna will actively participate in the socio-political debate in order to ensure the equitability of digital change. For instance, the City of Vienna provides regular discussion groups on changes for employees that provide a space in which to explore current issues together: What trends in the working world are going to have an impact on the future development of employment and work life? What challenges will working people face given the technological advances and greater demands for flexibility?

Research will also be involved, for example to analyse changes in Vienna's labour market in view of digitalisation and then to derive recommendations for the political agenda early on.

Digitalisation can open up new opportunities for participation in the labour market, particularly for people with special needs. Smart support, for instance with smart glasses or prostheses is to make inclusion easier to achieve and allow everyone to participate in social life.

### *"Digital humanism"*

Under the heading "digital humanism", Vienna is to become an extensive open lab for alternatives to existing paradigms and market models in the internet and social media. The digital world opens up many options. At the same time, however, it has also been subject to a sharp narrowing as the result of increasing market monopolisation. There is a need for making the basic mechanisms and algorithms of digital solutions socially more acceptable. The City of Vienna aims to share in the development of alternatives that put a humanistic world view first, instead of primarily economic or other commercial interests. This includes new, interdisciplinary forms of development as well as a range of social or profit-oriented activities and is to take place at all levels of teaching and learning. Negative developments, as seen in other cities in the past, are to be countered early on or, ideally, avoided altogether from the outset.

Coping with this digital transformation calls for a stronger interconnection of academic disciplines. The aims thereby pursued include gaining a better understanding of and facilitating interaction between the technical sciences (MINT subjects) and the humanities, social and cultural sciences.

### *Ethical dimensions*

The myriads of possibilities that the Internet of Things, data analyses and algorithmic decisions provide today as a result of artificial intelligence must not be viewed purely through a technological lens. On the contrary, ethical considerations are de rigueur when it comes to designing digitalisation processes, in order to provide a solution that takes into account ethical standards.

### *Dimension of women's policy*

Women will be particularly hard hit by digitalisation, above all owing to the automation of "typically" female sectors, such as office administration. In areas where job losses as a result of automation are to be feared, the City of Vienna takes early pre-emptive action, for example with upskilling initiatives.

Automation and the use of artificial intelligence, such as for voice assistants, have sparked the return of discriminatory tendencies, partly due to self-taught inappropriate conduct and partly due to the under-representation of women in developer teams.

When developing and using algorithms, the City of Vienna will work toward a balanced gender ratio in order to ensure the consideration of all life realities and perspectives.

### *Technology assessment*

Policy decisions in connection with ICT and digitalisation must always be downstream of thorough technology assessment. The use of technologies is not just a question of technical implementation, but often has an impact on society as a whole. Technology assessment observes the related societal developments and the potential consequences of new technologies, notably repercussions on the natural and social environment. A thorough analysis prior to implementation can contribute to avoiding undesirable effects. The focus is on exploring and assessing the use of new technologies and the subsequent identification of potential conflicts that could emerge as a result of the technology use. At the same time, technology assessment aims to present possibilities for action to improve the technologies under scrutiny.

### *Promoting political discourse – basic digital rights*

Nowadays, our fundamental rights are constitutionally enshrined in the European Human

Rights Convention and guarantee essential, basic rights to individuals. In the digital age, the demand for basic digital rights is growing louder. The City of Vienna is following the debate closely and would like to step up its involvement in the debate proactively.

### *Digital Rights Coalition*

Vienna as capital of digitalisation also means helping to design a European coalition of digitally advanced cities whose agenda it is to centre attention on the citizens and their digital participation and quality of life in cooperation with other European cities under the aspect of technological sovereignty and transparency. Therefore, Vienna has been a part of the "Cities Coalition for Digital Rights" since 2019, together with many other major cities like Barcelona and New York.

### **The "Vienna Digital Principles" as guides**

Guiding principles for the thoughts and actions of all those involved crystallised early on when Vienna's Digital Agenda was being charted. They are to serve as a foundation upon which to explore the many dimensions of digitalisation. The City of Vienna enshrines these in the Vienna Digital Principles for the action steps ahead, from the creation of Vienna's Agenda to its implementation.

These principles provide guidance and ensure that everything that, over the course of more than a century, has made Vienna into what it is today will continue to apply to the City of Vienna, also in the age of digitalisation. In the context of these principles, digitalisation should be seized as an opportunity for a mutually supportive society as embodied in Vienna.

Age appropriateness, accessibility and digital equality: Digital change processes present a major challenge for politics, administration, business and the population as a whole. The City of Vienna ensures that no one is left behind and that all services remain accessible to everyone in the city – regardless of education, background and income. Therefore, the principle of inclusion and the provision of equal opportunities for all is a key concern in the development and provision of the city's information services. Notably, this includes all of the city's digital services giving special consideration to the needs of people with disabilities.

Citizen orientation: Administration is a service for the citizens. When it comes to the digitalisation of processes and services, the City of Vienna is guided primarily by the perspectives and circumstances of its citizens. The city is available online to handle their requests seven days a week, 24 hours a day.

Autonomy: Developing information services for the city with the highest level of independence possible – provided this is practicable from a technical and organisational point of view –

ensures a high degree of individualisation and service orientation for business, citizens and employees.

Flexibility and learning: A learning organisation with a high level of agility and flexibility and a no-blame culture that embraces change is needed to be able to successfully rise to the challenges of digital transformation. This in turn entails the use of new management methods that support the City of Vienna's innovation culture, the modification of processes and the use of innovative technologies of the digital age.

Gender equality: The City of Vienna's digital services are developed and provided taking consideration of gender-neutral or gender-specific needs. In addition, there is a special focus on women and girls in digital professions and in digitalised lifestyles in general.

The establishment of gender equality in this significant social and business area provides the City of Vienna with relevant direction. The City of Vienna proactively promotes women in IT and women in digitalisation in order to achieve gender-equitable participation in the digitalisation process. The aim is to generate enthusiasm among young women for technical professions. The City of Vienna aspires to raise awareness for this topic and to send a positive message.

Innovation: In times of extremely dynamic change, characterised by new ideas and multidisciplinary approaches, information and communication technologies have an even greater strategic significance and must always be kept in mind. The City of Vienna is rising to this challenge, not only by providing additional terms of reference for innovative projects but also by actively promoting a culture of innovation in its own ranks.

Consolidation: In a citizen-oriented view, the city's administration and its companies are perceived as an entire whole. A coordinated and consolidated approach is a basic prerequisite for the efficient and effective advancement of the City of Vienna's information and communication technologies.

Sustainability: The City of Vienna is committed to a sustainable digital future. Digitalisation is to serve as a leverage factor to boost ecologisation. This is relevant for instance for information services that facilitate ecologically responsible behaviour, sustainable procurement, the environmentally friendly use of resources, the resource-saving operation of ICT systems or a sound approach to sharing services.

Openness, transparency and participation: More than ever, the City of Vienna is evolving from a closed bureaucracy model to an open and participatory city. Transparency and openness guide its administrative attitudes and practice. For instance, the population's free access to

administrative information, numbers and data is considered an important basic principle. Moreover, the age of artificial intelligence must continue to uphold transparency. Therefore, the City of Vienna is strictly committed to the disclosure of algorithms used by the city's information services.

The active involvement of citizens with the help of intelligent ICT platforms is becoming the standard in the City of Vienna, allowing creative and innovative solutions to emerge on a cooperative basis.

Strengthening the business hub: In recent years, the ICT industry has evolved into one of the City of Vienna's most important economic factors. Continuing to expand this hub jointly is an important task for all the parties involved.

Independence: Operating the city's information services with the highest level of independence possible – provided this is practicable from a technical and organisational point of view – is to ensure a high degree of independence, individuality and flexibility.

Trust and security: The citizens' trust in the data and information processed by the City of Vienna is critical for every aspect of the city's activities in the age of digitalisation and is the basis of a modern city. The security of infrastructure, data and communication is a top priority and must be taken into account in all processes.

## **II. LOOKING BACK: DIGITALISATION SUCCESSES**

Since 2014, Vienna's Digital Agenda has been an ongoing participatory process, jointly implemented by citizens, business and research as well as the employees of the City of Vienna. The further development and constant adjustment to new technological advances are a cornerstone, and the action fields are continually expanded where necessary. But at the same time, it is also important for the present third edition of Vienna's Digital Agenda to showcase the key projects already accomplished.

These key projects have already demonstrated the many opportunities related to the digitalisation of the City of Vienna and are examples of the immediate benefits that technology brings to people. Therefore, the following overview spotlights a selection of completed or currently ongoing projects.

### *Digital participation culture*

In recent years, a number of participation processes have been carried out using the newly created online participation platform. [www.partizipation.wien.at](http://www.partizipation.wien.at) For instance, ideas and opinions regarding the IoT (Internet of Things), the potentials of artificial intelligence (AI) as

well as proposals regarding the budget of several municipal districts of Vienna were discussed. Similarly, proposals and ideas put forward by citizens with regard to the Smart City Framework Strategy and the Digital Agenda Vienna were collected, discussed, commented and assessed, ultimately giving rise to the present collaborative work or text.

### *Social Media Strategy*

The City of Vienna's social media strategy is a step toward repositioning the city's social media activities. It applies to the Vienna City Administration. Based on the analysis of previous social media activities and the recommendations contained in the report of the City of Vienna Court of Audit, goals have been defined and measures derived to ensure that these goals are achieved.

### *Sag's Wien app*

Using the Sag's Wien app, citizens can report a concern, a hazard or a malfunction anytime via their smartphones while on the road. Optionally, they can also attach photos, for instance to report a discovered grievance. Reports can be sent to the city's administration quickly, intuitively and without mandatory registration in just five clicks and within 30 seconds. Before a report is created, the "Sag's Wien – smart check" function verifies whether the city's administration has already been informed of the matter.

### *WienBot – the City of Vienna's digital assistant*

No matter whether their questions concern district offices, residence registration forms, parking or events: The citizens of Vienna can find the wanted information faster and more easily using the "WienBot" smart app. WienBot can supply answers to questions about more than 350 topics related to the city's administration, for example regarding opening hours, admissions, parking fees, drinking fountains or waste collection points. The smart WienBot keeps learning from every question. Requests are analysed and the range of information services offered is continuously adjusted.

### *MA 01 – IT from a single source*

A central contact point for questions related to digitalisation has been available since July 2018: Municipal Department 01 (MA 01) "Wien Digital". The ICT areas were consolidated for this purpose and conflating the IT departments of the Vienna City Administration, the General Hospital (AKH) and the Vienna Hospital Association opened a new chapter for the City of Vienna's IT services: Henceforth, all IT services are to come from a single source: MA 01. Additionally, synergies will be leveraged by close collaboration with Wiener Stadtwerke (Wiener Linien, Wien Energie, Wiener Netze etc.).

### *Digitalisation events: DigitalDays*

The DigitalDays event has been taking place annually since 2014, serving as a stage for the IT industry and the city's administration to make visible and tangible what the digital hotspot Vienna already offers people of all age groups today. Thousands of visitors seek information about the potentials of digitalisation at the DigitalDays event. During the DigitalDays, everything focuses on the latest trends and the most pressing questions related to future tech and digitalisation as well as the connected challenges and opportunities for users and knowledge holders who, being the driving forces behind innovation, clearly take centre stage.

### *Pilot projects with blockchain technology*

Blockchain offers technological opportunities to create more transparency, efficiency and confidence in administrative processes. The City of Vienna would like to gain expertise in applying blockchain technology and to develop know-how of its own. The first pilot project centred on ensuring the integrity of Open Government Data (OGD). The blockchain pilot "OGD protocol of amendment and notarization" published in December 2017 permits verification of whether datasets of the City of Vienna existed at a specific point in time. The Open Data checksums are stored in public blockchains for this purpose. In this way, users can check the authenticity and history of data themselves, without the interposition of an intermediate institution. In the second pilot project, "Digital Meal Ticket", the entire process – from the distribution of meal tickets to city staff to their redemption at partner venues and their billing – was converted to digital technology.

Additionally, the City of Vienna ensures the networking of the blockchain community in Vienna and international stakeholders in a joint effort with DigitalCity.Wien and the Vienna Business Agency. The regular community meetings have proven highly popular. Workshops on specific topics, such as "identity", are to promote the joint development of prototypes and sandboxes. The City of Vienna hosted the first stakeholder workshop of the "EU Blockchain Observatory & Forum" in Europe in May 2018.

### *Open Government Data*

The range of the City of Vienna's openly accessible data was one of the community's special concerns, particularly the release of the Wiener Linien timetable data. This data was made publicly accessible in the spirit of open government data – as a result, third-party providers can now develop apps for mapping routes through the city on public transport and are able to offer additional applications. The quarterly data releases will be continued, and communication with and contact to the community will continue to be cultivated. So far, more than 250 applications using open data provided by the City of Vienna have been reported.

### *Stadt Wien Live app*

All the services available online are compact and available 24/7: The freely available app "Stadt Wien Live" allows use of the City of Vienna's services on mobile devices as well – even

in multiple languages.

The Stadt Wien Live app is designed as what is referred to as an umbrella app in which current and seasonal services can be summarised and that users can individually configure. It also provides international guests with useful information to their mobile devices, in several languages of course, to make their stay in Vienna more enjoyable (e.g. city map, opening hours, events, etc.). Easy customisation allows users to receive automatic notifications about favoured services and special interests. This makes the Stadt Wien Live app a mobile assistant for everyone in the city. Additionally, it offers a request and complaint function as well as participatory elements, encouraging citizens to participate in shaping the city.

During civil defence siren testing, the Stadt Wien Live app now also features a civil protection function directly on the smartphone. This service can be subscribed to in the app (under the heading "real-time news") and provides users with up-to-date information and instructions on what to do in the event of emergencies in Vienna. It also includes civil defence alerts and civil defence test alerts. The messages are sent to the device using what are called push notifications.

#### *Vienna's IoT strategy*

"Internet of Things (IoT)" refers to an infrastructure of commodity items that are interconnected by information and communication technologies. The increased interconnection of commodity items aims to facilitate citizens' everyday lives and the services of the city administration through added efficiency. In order to ensure this efficiency, the City of Vienna has developed the "Vienna IoT Strategy" in collaboration with many stakeholders in municipal departments, business, universities, and last but not least the citizens of Vienna. The City of Vienna's participation platform was also put to use for the development of the IoT strategy.

#### *AAL project "WAALTeR"*

"AAL" is the acronym for "Ambient Assisted Living". Based on this, "WAALTeR" stands for the "Viennese AAL Test Region". It refers to a research project on technological support provided to Vienna's senior citizens in everyday life. For instance, the "WAALTeR" project is currently testing indoor fall detection as well as blood pressure and blood sugar measurement. Technology is to improve activity and mobility, social interaction, safety and health. In this way, "WAALTeR" contributes significantly to enhancing quality of life for senior citizens in Vienna.

### **III. THE ROAD TO BECOMING A CAPITAL OF DIGITALISATION: THE ACTION FIELDS**

The following pages illustrate the relevant action fields of digitalisation and the possibility spaces that emerge as a result of the growing processes of change. Essentially, the action

fields are based on ideas from the general public and on discussions in the working groups or are the result of research by experts of the City of Vienna.

"Key projects" are determined as central elements for each individual action field. The key projects will be launched as pioneering projects in the next few years. They already demonstrate the many possibilities related to the digitalisation of the City of Vienna and are examples of the immediate benefit that technology brings to people.

While some of the projects mentioned in the action fields are already in the implementation phase, some should be considered more of an initial impulse. The related implementation concepts are still emerging.

In addition, short- and medium-term priorities will be defined that are to be explored in greater depth and fleshed out in cooperation with the City of Vienna's respective competent authorities.

## **1. SECURITY action field: RELIABLE CITY**

### **Ensuring protection and trust**

The increasing digitalisation of all of the city's services and processes makes it essential to ensure the citizens' trust in the security of our ICT systems, data and services. The City of Vienna's ICT systems and the related infrastructure have become the foundation for the city's capacity to act and contract. Accordingly, information security has been a very high priority in the City of Vienna for many years.

The following basic rule applies: Digitalisation makes our world – and our city – safer. Anyone can see this for themselves when they cross a traffic-light controlled intersection or an uncontrolled (railway) crossing. The added security is warranted if what is done by whom with what data becomes traceable. The protection of data – belonging to the citizens or to anyone else whose data is available to the city – is essential for establishing trust in the digital world. That means this data may under no circumstances be permitted to fall into the hands of unauthorised third parties or be manipulated by them. The City of Vienna gives data protection top priority.

Likewise, guaranteeing reliable and secure infrastructure (for example health and social services, education, energy, water, sewage, waste disposal, transport, ...) based on available and secure information and communication technologies is of central concern to the City of Vienna. Appropriate information security precautions ensure that citizens are provided with secure, trouble-free and high-performing city services. The measures adopted by the City of Vienna to defend against and prevent dangers are all taken in accordance with identified risk

and economic aspects, aiming to protect the citizens' data in the best way possible and to safeguard the City of Vienna against damage caused by threats to information security.

The citizens and the economy must be able to trust that the City of Vienna will take due and diligent care of the data entrusted to it and handle it in accordance with its intended use. Therefore, the security action field receives a high level of attention and is the foundation of our actions in the context of Vienna's Digital Agenda.

### **Objectives SECURITY action field**

- Ensuring reliable and secure ICT infrastructure
- Strengthening the faith of citizens and business in the city's secure handling of personal data
- Ensuring secure, trouble-free and high-performing services provided by the City of Vienna
- Taking defensive and preventive measures in accordance with risk identification and taking economic considerations into account
- Having highly qualified ICT security experts at the City of Vienna's disposal

### **Key projects SECURITY action field**

#### *Security Hub Wien*

What it takes most of all, to safely navigate the challenges of digitalisation is sufficiently qualified staff and a widespread social consensus on the enormous significance of IT security.

The security hub aims to develop sustainable structures to establish Vienna's top rank in the IT security environment. The city's expertise in the field of IT security is to be expanded with the help of programmes of excellence. In addition, the intention is to develop a greater awareness for the issue among the population.

The objectives of Security Hub Wien include:

- The funding and development of overall conditions ensuring excellence in the IT security sector for local school students, university students, startups and established companies.
- Structured search for and promotion of talent.
- Positioning, making visible and developing IT security in all educational fields and institutes in cooperation with business.
- Strengthening the local ICT security trade and ICT security research through networking, information and cooperation.
- Awareness for the issue among the general public (for instance through awareness training like business competitions, gamified awareness training, etc.).

### *E-learning "information security for the citizens of Vienna"*

Be it a question of the protection of passwords, important personal data or ICT infrastructure in general: Knowledge of adequate preventive security measures is a prerequisite for genuine protection and genuine security. Accordingly, the City of Vienna is developing its own e-learning course on "information security for the citizens of Vienna" which is to explain the day-to-day handling of information security in a clear and comprehensible manner.

## **Digitalisation projects of Vienna's Digital Agenda – SECURITY action field**

Some of the following projects are already being implemented or are now in the design stage:

### *Excellent IT security in the city - WienCERT*

The City of Vienna has already taken a number of steps in the past to ensure the highest level of ICT security for city administration. For instance, an ICT security organisation was launched based on the main pillars of organisation-law-related security as well as technical ICT security. A computer emergency response team (WienCERT) was established for the city's services and processes which takes both preventive and reactive action against ICT threats and participates in regular ICT safety drills. In order to minimise possible damage, the ICT threat level is evaluated on an ongoing basis and appropriate action for risk reduction and risk prevention is regularly taken. The ongoing training and education of employees and the building of close ties with science, business and administration will be continued and extended to develop the city's IT security know-how.

### *Cyber crisis management in a smart city*

In the age of digitalisation, major cities also face new challenges in crisis management. Aside from internal measures, this includes integrated crisis communication as well. The City of Vienna has also introduced crisis management concepts in the IT field and regularly evaluates them.

### *Proof of safe and transparent data handling*

The City of Vienna ensures that the collection, processing, transmission and storage of data is in compliance with data protection laws and is handled with the highest level of data security. In so doing, it guarantees information about the traceability of the data's use. To ensure confidence in the safety and protection of the data, the City of Vienna takes not only organisational and legal as well as technical action, it also raises awareness for the safe handling of data.

### *Blockchain – ensuring confidence through decentralised technology*

Blockchain offers technological options to create greater transparency, efficiency and confidence in administrative processes. The City of Vienna is eager to expand its know-how through pilot applications by collecting more experience in the application of blockchain

technology for the authentication of data and documents and for identity management. It is specifically interested in blockchain types based on mechanisms that are different from those of the first blockchain generation that were employed primarily for cryptocurrencies (for instance, bitcoins). Energy consumption for the blockchains used by the City of Vienna is no higher than that for classical databases.

### *Promoting encryption*

The City of Vienna will step up use of cryptographic measures (encryption) to protect personal and sensitive data and will provide the citizens secure, cryptographically protected channels for their communication with the City of Vienna.

### *Data protection at all levels*

The European General Data Protection Regulation (GDPR) has been in effect since 25 May 2018. It standardises the rules on the processing of personal data. An electronic directory of all data applications (DAVID) has been developed in the City of Vienna, listing all operations with personal data and documenting them in accordance with the Regulation. This corresponds to the goals of the GDPR, specifically of strengthening data subject rights through more transparency, establishing the right "to be forgotten" and focusing on data security with the help of appropriate mandatory precautions such as reporting data misuse and security breaches to the supervisory authorities as well as appointing the City's Data Protection Officer.

## **2. SERVICE action field: THE CITY AS A DIGITAL SERVICE PROVIDER**

### **Digital authorities for citizens**

Digital transformation is a far-reaching process of change and a momentous structural transition, involving all of the city's processes. Citizens are at the centre of any smart city. Their view of the City of Vienna and their feedback from daily experiences is to contribute substantially to improving the City of Vienna's range of services. The City of Vienna's services are to be redesigned step by step with the help of new methods and digital tools. In the spirit of the path adopted by the City of Vienna, people and their needs take centre stage, meaning that involving the citizens of Vienna is held to be an essential organisation principle.

Smart City Vienna is a city of short distances. The digital services offered are intended to contribute substantially to a higher quality of life. The entire population as well as entrepreneurs or tourists are to save time with the help of these digital services provided by the City of Vienna.

Accordingly, the "city as a service" principle is enshrined in the city administration's mindset.

The e-government services provided by the City of Vienna already deliver to a high standard today and serve as a model in Europe. These services are continually expanded and improved using the new opportunities provided by growing digitalisation. The range of digital services thus emerging is to make it easier to find one's way around in the City of Vienna's administration.

Participation likewise plays a central role in terms of the population's active engagement. Regardless of citizenship. Everyone in Vienna can participate and have a say. Cooperation with the citizens, their feedback and their "inside view" are to continue guiding the future development of digital services. Digital and analogous participatory processes are thus established as standard practice and generate considerable added value for society. In this way, digital democracy becomes useful and perceptible.

GovTech is experiencing an enormous upturn. The City of Vienna is participating in the new creative approaches, collaborating with startups and contributing as a pro-active partner to the exchange at national and international conferences.

### **Objectives of the SERVICE action field**

- The "city as a service" principle enhances quality of life for the citizens of Vienna by digitalisation.
- An optimisation analysis for all of the city's processes results in the "city of short distances".
- The experience and feedback provided by citizens is taken into account actively and participatorily as an "outside view".
- As a sponsor and interface between service-oriented authorities and innovative startups, the City of Vienna develops cutting edge GovTech solutions for all errands to public offices.

### **Key projects SERVICE action field**

#### *Mein.Wien – digital city service*

The mein.wien website is regarded as the new digital pivotal and focal point for location-operated, customised information and applications. The portal offers the citizens and entrepreneurs of Vienna both comfort and speed when it comes to running errands to public offices. With the "GrätzlMap", the web application doubles as a cutting-edge guide for the respective neighbourhood that provides information about recreational activities and events and communicates important news items in an individualised manner. WienBot is integrated into mein.wien and allows questions about authorities to be answered interactively and errands to public offices, such as applying for a resident parking permit or a sidewalk seating area, to be taken care of using game-style forms.

### *Central hub for electronic errands to public offices*

One by one, digital options for running errands to public offices of the City of Vienna are being unlocked on the "mein.wien" web application, thus arriving at a new evolutionary level of e-government. All of the services offered there are conceived and designed from the user's perspective. An individualised area will be created for every citizen of Vienna that can optionally be used to store all of their personal administrative data safely in one place. As a result, data already filed with the administration does not need to be entered again – all of which saves time and money.

### *Online procedure status check*

This service allows citizens to follow the progress of their procedures with the Vienna City authorities online. Notifications on status changes or already completed processes will be provided directly in the digital city service. Secure authentication (for instance via eID) enables simple login. Data protection has top priority in this environment: Personal data is protected from unauthorised access by the high security standards observed in the municipality's data centre.

### *GrätzlMap - the city close up*

Always keeping up with what's going on in the neighbourhood: the "location-based service" of GrätzlMap offers just that. This app allows the citizens of Vienna to access key up-to-date information and news about their neighbourhoods anytime and from anywhere. Perhaps there is a new construction site, a street festival happening or a new dog zone available right at one's doorstep? The city provides timely and proactive information.

### *3D city surveying and digital site inspection*

In the future, the "mein.wien" portal will allow many errands to public offices that used to require having an appointment and involved an on-site inspection by experts to be taken care of straight from the office desk. The City of Vienna has captured the entire cityscape on high-resolution film as a basis for many use cases. Unlike city images that are already available, this material is to enable 3-dimensional measurement in the image down to a detail of +/- 5cm. This makes administration more efficient and also saves entrepreneurs time and money. The first use case of this technology is the fully digital application process for sidewalk seating areas embedded in the "mein.wien" portal.

### *WienBot – the digital civil servant*

The WienBot is a smart digital assistant for the people of Vienna. The digital civil servant answers questions about some 350 topic areas related to life in the City of Vienna, around the clock and wherever you are. The WienBot keeps on learning all the time and is therefore continuously developed as a first service point of contact. For instance, the WienBot recently

acquired the ABCs of Waste published by Municipal Department 48 and can now also be of assistance when it comes to questions related to the environment and waste separation.

Where running errands to public offices still requires personal presence, the WienBot provides appointment-making assistance by automatically synchronising calendars and suggesting the nearest district office. In this way, the citizens of Vienna can make and confirm appointments with the authorities in just three clicks.

The City of Vienna plans to continue developing options for running errands to public offices digitally via WienBot, such as applying and paying for resident parking permits. This makes the digital assistant "WienBot" a true trailblazer in the German-speaking world. Many other cities have already expressed interest in the technology behind the WienBot. The City of Vienna will be happy to share this knowledge.

#### *Digital building permit application*

This innovative research and development project will allow building permit applications to be processed digitally. Revolutionary foundations for the entire construction process, from planning to filing to the on-site construction site check and final approval, can be provided with the help of augmented reality and with the use of modern planning tools, artificial intelligence and a (highly) automated administrative process.

### **Digitalisation projects of Vienna's Digital Agenda – SERVICE action field**

Other considerations from the "SERVICE" area that are currently under review or design:

#### *Traffic simulations*

The capture and visualisation of Vienna's traffic and the ability to conduct traffic simulations provide another database contributing to the digitalisation of errands to public offices. It should be determined whether construction site set-up, advertising signs etc. could be handled without requiring face-to-face on-site negotiations and whether they could be authorised more efficiently with, for instance, the help of traffic simulations. This could be made possible by analysing motion data. In combination with the image data service "Kappazunder", this information represents yet another building block for "Vienna's digital twin". Kappazunder allows employees of the City of Vienna to inspect public areas and perform measurements from their desks, to save the time and money otherwise spent for on-site inspections.

#### *Smart City Dashboard – always keeping tabs on the city*

In future, the "Smart City Dashboard" is to present current data of the City of Vienna in real time. This is where information comes together from various sources that supply the citizens of Vienna with different information about their city and illustrate how the city works. Real-time

environmental data, the current parking situation on site or "citizen-generated data" converge in the Smart City Dashboard. In order to ensure the low-threshold accessibility of this wealth of data, the information and data should be converted into engaging and comprehensible visualisations.

#### *"Zahl's Wien" – Digital payment transactions with the city*

Tax and fee notices and any invoices from the city offices: With "Zahl's Wien", the citizens of Vienna are to be able to view a summary of their obligations as well as to settle them anytime. Various payment methods that are up to par with the high standards of the private sector are available for use at the touch of a button. The same rules apply here: complete transparency, an easy overview and secure payment.

#### *Digital payment – settling fines*

When a traffic ticket, so, for instance a parking ticket, is issued, it should be delivered directly to the mobile phone or the digital city service. If no objection is made, the ticket can be paid immediately, straightforwardly and on time, at the touch of a button and using digital payment methods.

#### *Digital counter – errands to public offices via video*

In future, the "digital counter" is to provide best possible and personal advice, including via digitally available channels, for instance as video errand to a public office via webcam or screensharing or as a digital consultation via personal chat. This will make it possible for the citizens of Vienna to run errands to public offices from anywhere and more comfortably, thus helping to cut down on unnecessary travel and waiting time. Trust and protection are also of the highest priority in this regard, which is why "digital counters" require a unique identification of citizens via an eID. If such identification is not yet available, a digital ID can also be provided using a video identification process, making it possible to attend to all errands to public offices via PC, tablet, mobile phone or webcam. In this case, an automatically generated eID is sent directly.

#### *Errand to a public office without requiring physical travel – the proactive city*

In future, the city will take care of many services of its own accord and fully automatically in the background as a "no-stop shop". Many public office services, such as giving due notice of the expiry of a passport as well as its reissue and payment processing in a matter of seconds, are to be taken care of directly and proactively by the digital city service in the future. With the help of this and other applications, such as addresses being changed automatically in all public administrative offices after a relocation, the smart system is to make life more convenient for the citizens of Vienna by providing forward-looking service.

## **Digital community: participation on all channels**

### *Open innovation and digital participation culture*

The Smart City Vienna attaches particular importance to integrating its citizens, as a digital community, into the city's development. This can be understood as a call for "crowdsourcing": The residents' knowledge is regarded as the basis for the city's further development from a bureaucratic to a participatory administration.

The information necessary for the involvement of citizens must be transparent and centrally available. Establishing and actively supporting dependable and easy-to-use digital platforms are a means to this end. They constitute the basis for the development and maintenance of a digital community that can continually exchange views on the city's current projects. The citizens of Vienna should be able to share their opinions and experiences. This is how a particularly low-threshold access to participatory services is to be created. However, analogous channels will also continue to remain open to honour the principle of inclusion. The combined offer of online and offline platforms ensures that no one is excluded from participation and that the knowledge of all 1.9 million residents is used.

The innovative power of new technologies is to be put to use in the process. For instance, in the future it will be easier to communicate urban development projects using AR/VR visualisation or 3D print. From now on, the people of Vienna will thus be able to share their views on the design of squares and neighbourhoods aided by illustrative and tangible examples.

The following other priorities in the area of "participation" are still currently under review:

### *The city barometer – participating digitally*

Getting important information easily, expressing one's concerns or voicing one's opinions on specific projects: With the city barometer, the City of Vienna aims to develop a channel for continuous communication between citizens, administration and politics. In the spirit of direct democracy, residents can also be specifically asked to provide their feedback on this platform. Hence, the city barometer represents a useful addition to already existing processes related to petitions and civic participation.

### *Open creation – developing and testing digital products together*

The City of Vienna is planning to build and develop its own tester community and to involve it in the development of preferably all the City's new digital services from the outset. An example for this is the development of the "Sag's Wien app" during which feedback from citizens and entrepreneurs was embraced at a very early stage.

## **Smart living in a digital city**

Housing is one of the most important basic needs and one of the crucially determining factors for general quality of life. Digital technologies and communication platforms are to continue to improve housing and life together in the Smart City Vienna.

For instance, the City of Vienna has been working on improving the range of online services consistently for several years. The primary aim in this context is not only the use of new technologies but their best use in conjunction with social innovations that centre attention on people's needs.

The following related ideas are currently under review or design:

### *Digital noticeboard*

In future, a digital noticeboard could simplify communication between tenants and their facility management, allowing near real-time information about measures in the building, repairs or refurbishments. However, the digital noticeboard is more than just the digital version of a once-popular medium: Instead it is to be a personalised service that can be procured via the internet, via an app or a home TV channel.

### *Digital neighbourhood development*

A wealth of research findings as well as, above all, experience and practice all reveal that communication is a mainspring for living a good life together when it comes to settling new neighbourhoods. The quality of communication in the neighbourhood is a central, even crucial, element in ensuring the success of a pleasant residential social climate. Therefore, hereafter, the City of Vienna will rely even more heavily on the use of new technologies and communication platforms when planning new projects. This is to pave the way for target-oriented cooperation across construction sites between developers and other relevant protagonists in neighbourhood development and to ensure the best possible and structured support of exchanges of communication.

## **Digital Health City Vienna**

Vienna is working on a strategy for the digital health area. Highly innovative startups, the DigitalCity.Wien network, renowned health experts and the city's powerful ICT Department are all pulling together to place Vienna in a leading role in this field as well.

Innovative technologies are opening up new possibility spaces for the health and social area. The City of Vienna intends to make use of them by establishing a smart health initiative and to push them forward as part of Smart City Vienna.

The aim is to make Vienna one of the leading "digital health" cities in Europe. Plans are to put new technologies to use in this context with a view to continuously and comprehensively improving the City of Vienna's health and care system. To this end, mobile solutions for the promotion of health prevention are to be deployed and the expansion of telemedicine services, specific information services on digital channels as well as greater digital support for older people and people with disabilities is to be pursued. In this context, information and communication technologies should be easily accessible and tools should be easy to operate and handle. At the same time, fears and concerns are to be addressed, advantages pointed out and the operating principles explained at special events related to use of smartphones or tablets.

Health data is in particular need of high protection, which is why data protection and information security must be of the highest priority when developing such services. Special attention should be paid to self-determination regarding the disclosure of information and the principle of data minimisation.

#### *Telemedicine – digital health services*

In order to achieve the goal of "improving quality of life", the City of Vienna will, where reasonable, focus on the further development and expansion of telemedical services in the coming years. Digital communication with experts, the use of artificial intelligence and telemonitoring are to allow a healthy life, without having to travel to or wait in a doctor's office. In Vienna, a telephone health advice service is available on "1450". Around-the-clock assistance and answers to all health-related issues are provided on this number. The future use of chatbots in this respect is under review.

#### *Digital health prevention*

In the area of health prevention, the City of Vienna will focus more strongly on digital communication channels and smart service systems. For instance, there are plans to establish a digital appointment service that will remind of upcoming examinations and vaccinations automatically. A healthy diet, sufficient exercise and other advice and health services can also be provided via mHealth programmes, for instance via apps. In the process, the city can strategically opt for a gamification approach which involves increasing the population's health compliance using a playful approach. Playful elements, such as high scores and collecting points can increase the motivation to embrace a healthier lifestyle, particularly among children and adolescents but among many adults as well. Digital games can also help older people strengthen their sense of balance, agility and reactivity.

#### *Digitally assisted living – AAL projects*

Living at home independently: The development of ever-better digital assistance systems is

allowing older people to meet this basic need. For instance, special sensor systems can detect a fall in the home environment by picking up vibrations and specific sounds. As a result, relatives or the emergency services can be notified directly.

This and other technologies to improve quality of life, security and autonomy are being put to the test in many households as part of the City of Vienna's "WAALTeR" research project. In order to allow older people a self-determined life in their familiar environment, "WAALTeR" is developing service packages customised to the users' needs, based on current Viennese concepts and the results of (inter)national AAL projects.

The use of these technologies is to be integrated into everyday life in a helpful and meaningful manner, contribute to a higher quality of life and address various aspects such as security and health. Above all, however, they are to enable senior citizens to maintain their social contacts and participate in city life.

#### *ELGA – the electronic health file*

The Vienna Hospital Association was the first Austrian hospital association to comprehensively deploy electronic health files (ELGA) in its hospitals, taking on a pioneering role in many areas of implementation. The City of Vienna has, for instance, created a separate ELGA zone for Vienna, to which many private hospitals have already been connected. The City of Vienna has taken on a leading role in the further development of ELGA in terms of additional diagnosis types and functionalities. To the Vienna City Administration, ELGA is the basic infrastructure for any new developments related to the digitalisation of health services.

#### *Electronic vaccination card*

The digital vaccination card is to increase vaccination coverage in Austria and help prevent double vaccinations, because the electronic vaccination card will allow one-click access to current vaccination status and supply reminders about any vaccinations due. Electronic vaccination cards will replace paper ones that no longer comply with the requirements of a modern health care tool. The City of Vienna will be a pioneer of this initiative during implementation planned for 2020 and will launch initially with children aged 0 to 6.

#### *Driverless transport systems in the clinic*

In the health area, the City of Vienna plans to make increasing use of automated systems for (internal hospital) support services. For instance, there are largely out-of-sight, subterranean, fully automated, driverless transport systems that operate in the Floridsdorf Clinic and supply the hospital wards with laundry, meals and medication. Several robotic vehicles perform hundreds of Wi-Fi-controlled trips daily at this location.

Other ideas from the "digital health" area that are currently under review or design :

### *Digital resource planning*

Long waiting times are unpleasant for all parties involved. Therefore, in the future, physicians, nurses, patients and relatives are to benefit from care optimised by digital technologies. For instance, smart waiting time management in the clinic can reduce waiting time on site and sufficient information about waiting periods can help increase patient satisfaction. The development of first concepts and pilot testing has already been completed.

The City of Vienna is also evaluating the establishment of a med community where physicians and medical staff can register and receive digital notifications in case of an emergency. As a result, it will be possible to administer first aid even faster in future. In addition, the City of Vienna will rely more strongly on the digital support of family and relatives with the aid of a digital care planner.

### *AI and modern technology in therapy and rehabilitation*

The use of exoskeletons can substantially improve the quality of life and general condition of people with limited mobility. Aside from the positive mental effect on patients, the muscle system is trained by the supported movements, thus strengthening and providing relief to the circulatory system and organs.

### *Intelligent visual aids for blind people or people with vision impairments*

In everyday life or in situations involving others, blind people or people with vision impairments do not have the sensory capacity to perceive moods easily. During conversational situations in which, for instance, intelligent eyeglasses perceive the counterpart's level of alertness or enable identification, the wearer can be provided a description of the overall situation.

Reading signs and texts or warning against dangers would be conceivable and a significant contribution to additional self-determination and equality – both in everyday and in professional life.

## **Culture and recreational opportunities at a click**

Vienna is characterised by a wide range of cultural and recreational opportunities, both for the population and for the many tourists, congress participants and people working in Vienna. The extensive and wide range of concerts, exhibitions, theatre shows, museums and sports events is one of the reasons for Vienna's high quality of life. Additionally, Vienna has superb gastronomy to offer, excellent restaurants and inns, bars, clubs and a hotel industry that offers services in all price categories.

The aim is to pool together the wide range of cultural and recreational opportunities and treasures that the City of Vienna has to offer and to present them in a clear manner with the

help of easily accessible technology.

#### *Vienna Token – blockchain bonus system*

This service can be extended with the Vienna City Token which represents an incentive system for the city's citizens. Participants can generate Vienna Tokens for instance if they travel in a climate-friendly manner. This digital credit voucher can then be redeemed at cultural institutions, such as museums and events. The Culture Token will be scientifically supported and evaluated as a pilot application. Technically speaking, the token will be based on blockchain technology, which focuses on egalitarian data administration, while at the same time ensuring a high measure of data security and privacy.

Other ideas from the "leisure" area that are currently under review or design:

#### *Smart culture and leisure guide*

Savvy digital solutions will ensure the mobile availability of the City of Vienna's cultural and recreational opportunities anywhere and in a clearly organised, regularly updated manner. Thus, it will be possible for culture enthusiasts to have event recommendations sent to them directly and personally by push function. Numerous other options may be contemplated beyond that – from interactive exchanges related to individual events, for instance in chats or witnessing events via live stream to "digital signage", meaning intelligent references on monuments and buildings. As a result, online content is available always and anywhere and helps find information precisely at the time and in the place it is needed.

To reflect Vienna's internationality, the content provided by the smart cultural and recreational guide is to be available in multiple languages.

#### *mein.wien Key – the key to the city*

In the future, access to many of the City of Vienna's services, attractions and recreational activities may be provided to all of the citizens of Vienna conveniently collected into a single portal. With mein.wien Key, the citizens of Vienna have a key to the city and the opportunities it has to offer, such as swimming pools, museums, theatres, and much more. Booking and payment happens online from home or directly in the app. Payment is per service via any of multiple payment options.

## **On the road in the capital of digitalisation**

#### *Networked and sustainable mobility*

The aim is to promote switching to public means of transport, to make the remaining car traffic more environmentally friendly and to allow citizens to participate in sustainable and individual energy management with the help of all the technological possibilities available.

The well-developed public transport system, with Wiener Linien as its foundation and mobility backbone, is interconnected with publicly available services and complemented by additional services, such as taxis, carsharing, car rentals, bicycles and walking. Urban mobility provider information offers a standardised, interlinked and openly organised interface to all mobility services that is freely available to individuals and businesses. In other words: The aim is to expand the radius of classical Wiener Linien public transport by the ever growing group of publicly accessible means of transport (carsharing, bike sharing, e-scooters, free-floating system, taxis, etc.).

These services occupy a key role in the integration of digital environmentally-friendly services as alternatives to owning a private car. In addition, digital infrastructures will support no-barrier access to all publicly accessible means of transport. Consequently, modern opportunities arise for the citizens of Vienna to shape their personal mobility in a more needs-oriented manner while at the same time contributing to environmental protection.

#### *Automated and autonomous mobility*

In the future, automated driving is expected to play a gradually more significant role for the mobility of the citizens of Vienna. The City of Vienna and Wiener Linien will establish know-how in the area of automated mobility and ensure a strategic approach with the help of research projects, the exchange of experience as well as an array of different pilot projects. In particular, this will drive facilitation and support of additional test areas.

#### *Driverless bus line in Vienna*

The future of mobility was tested with the pilot run of the first fully automatic bus line as part of the project "auto.Bus – Seestadt". Two minibuses with a capacity of eleven passengers each operated under real conditions on a test circuit on closed grounds with stops, a schedule and real passengers. The maximum speed in automated operation is 20km/h. The goal of such pilot operations is to increase efficiency and security. Autonomous buses thus perform valuable shuttle services to trams and subways on the city's outskirts.

#### *Fully automatic subway*

When it begins operation, the U5 line will be the first subway in Vienna to operate fully automatically. Improved disruption management, better customer service, easier compliance with timetables during normal operation and, above all, in case of disruptions, as well as more security through platform screen doors are only a few of the advantages of fully automatic operation. The U5 platforms will be fitted with platform screen doors that will also contribute to security. The fully automatic trains will communicate with headquarters in Erdberg via wireless connections.

Other considerations from the mobility area that are currently under review or design:

### *Autonomous individual transport*

Attention is focused on the security aspect as a new opportunity, since automated driving may contribute significantly to accident reduction. The development of automated mobility can contribute significantly to making our transport system safer and more efficient. In combination with car sharing, the expansion of automated mobility could result in a perceptibly lower number of cars in the streets of future Vienna. But at the same time, autonomous driving is also a substantial economic factor, because large numbers of highly qualified employees work in the mobility sector.

The combination of zero-emission and automated mobility is to contribute to CO2 reduction, thus adding another aspect to the enhancement of our quality of life. As part of a pilot project, an attempt could be made to put silent, automated and zero-emission delivery traffic on the road with a focus on off-peak periods.

## **1. KNOWLEDGE action field: FIT FOR DIGITAL SOCIETY**

### **City of digital literacy**

Education and research are central elements of a society of knowledge. As a result, high digital literacy is particularly crucial for Vienna as a vibrant, inclusive city and not least also as a business hub. A strong university location and internationally competitive research are the basis for innovation, thus not only providing a location advantage, but also an improvement in quality of life for all the citizens of Vienna. Aside from personal development and participation in the information society, digital literacy is a necessary prerequisite for success on the labour market.

When information and communication technologies, or generally speaking, digitalisation are put into the service of education and research, this yields enormous potential. The City of Vienna is aware of this and is intensifying these measures to establish digital literacy as a fourth cultural skill. For instance, the City of Vienna has launched many initiatives in recent years in collaboration with its educational establishments, with the Vienna Business Agency and WAFF, to respond to the challenges of ICT education and research.

The constant exchange between science, business, civil society and administration is a central factor for the City of Vienna. When research results are merged and educational and research institutions collaborate with all social groups, the outcome is better products and more innovative services for all citizens. Additionally, answers are found to the pressing questions of the future and, consequently, better digital solutions are identified for all of the relevant issues of our times. The City of Vienna collaborates with all players in society to network knowledge, enhance the public good as well as to give citizens the opportunity to shape the digital world they live in capably themselves. As a result, the networking of players constitutes a central

element of the City of Vienna's FTI strategy.

In line with the vision of digital literacy, the aim is to get even the youngest members of our society into shape for the digital world. No child is made to cross a street without prior preparation. With this in mind, the appropriate teaching of skills and general rules for the digital world is at the heart of Vienna's Digital Agenda. Particularly, awareness for one's own privacy and security must be taught as early as in kindergarten and in primary school. The teaching of digital skills and contents from an early age onwards also promotes equal opportunities and social equality, because not all children have equal access to modern IT equipment at home.

An age-appropriate and playful approach to the digital world is particularly important for children. Hence, the City of Vienna promotes the use of digital educational games and programmes. They can be used in small increments to complement existing practices as early as in kindergarten. Therefore, the foundation for digital literacy in all subsequent paths of education should be laid at an early age, since these skills will be broadened in all school types, in apprenticeships, in higher schools, universities of applied sciences, general universities as well as in adult education.

In addition, Vienna's Digital Agenda focuses on new perspectives for later occupations to provide junior employees of the future sufficient information and assistance services today. A wide catalogue of measures, such as field trips, visits to companies and workshops is to kindle enthusiasm for IT occupations in the IT sector. Better forecasts can be made based on the analysis of interlinked labour market data and the labour needs communicated by business. As a consequence, concrete management in terms of a content-related focusing on disciplines can counteract a looming skills shortage.

The measures listed as examples correspond to the zeitgeist, according to which enhanced cooperation is necessary to succeed in the digital age.

### **Objectives KNOWLEDGE action field**

- Continuous modernisation and best equipment of educational institutions for all age and social groups as well as support for all teachers.
- Promoting digital priorities in education and training as well as support for young potentials in the ICT field
- Creation of the most open possible access to knowledge, databases and digital contents, in line with open source thinking
- Promotion of creativity and freedom for experiments in dealing with new technologies
- Integration and support of universities, universities of applied sciences and other institutions in science and research in Vienna as a science hub.

## **Key projects KNOWLEDGE action field**

### *Digital school*

The foundation for teaching digital literacy is the best-possible support of teachers in Vienna, on the one hand, and modern class venues on the other. To that effect, the City of Vienna promotes the development of appropriate educational concepts and superbly equipped educational institutions. Aside from a high-performance internet connection, this also includes digital teaching materials, such as interactive blackboards, various terminal devices and e-books.

Teachers are informed and trained proactively in order to optimally integrate digitalisation potentials into class and to be able to develop appropriate pedagogical approaches. This will require the provision of appropriate training to optimally prepare teachers in Vienna for working with digital media in class, thus serving as an incentive to take increased advantage of digital educational approaches.

### *DigitalCity.Wien educational initiative*

The digital skills of school students at Vienna's schools are being enhanced as part of the "DigitalCity.Wien" educational initiative. In the process, experts in the field, for instance employees of Vienna's IT companies and city administration, teach basic programming skills, an understanding of data as well as general digital skills.

School students should develop digital skills as early as possible, through an age-appropriate and, most of all, playful approach. In this way, they are introduced to the exciting opportunities offered by the information and communication technologies, prepared for their use and supported in the process. The initiative targets school students from primary school to graduation.

As part of this project, partner companies volunteer their services and supply interested schools with lecturers free of charge who pass on their know-how, for instance in programming.

Additionally, the education initiative DigitalCity.Wien treats the promotion of women in IT with priority, since women and girls in IT are underrepresented. This is done by offering special technology workshops for girls and young women in schools and with the help of presentations given by successful, IT experts acting as role models. As a consequence, choosing a MINT subject later on at general university and the universities of applied sciences is to become easier. The aim is to kindle enthusiasm for technological areas of expertise among girls at a young age, encouraging them to consider an education in the IT field and to pursue a career in this sector.

There are also other successful initiatives in Vienna, aside from the DigitalCity.Wien educational initiative. In order to guarantee high quality and a concerted approach, coordination between the various projects should be intensified. The long-term goal must be to integrate the teaching contents or methods from educational initiatives that have proven successful into standard teaching. *Wi-Fi – the basis for digital classrooms*

Many buildings in the City of Vienna and many highly frequented public areas are already equipped with free Wi-Fi that is made available to everyone in the city in equal measure and is also highly appreciated, not least, by tourists.

Accordingly, Vienna's compulsory schools are being modernised into a digital classroom and plans are to equip them with comprehensive Wi-Fi. A wireless network will be part of the basic infrastructure of all schools to be newly built. At a later stage, all vocational and lower secondary schools will be equipped with superfast, wireless internet.

In accordance with the digital educational concepts, the new infrastructure will also deliver many new opportunities with regard to lesson plans. Digital skills are already taught at an early age through internet research, e-learning, digital learning forums and much more. Providing teachers with the ideal equipment also enables them to deliver modern teaching.

During the comprehensive rollout, the City of Vienna will focus specifically on high security standards and fast transmission rates.

### *The end of the chalk age*

Whether in a private or professional context, we can no longer imagine life without mobile devices such as smartphones and tablets. Therefore, the City of Vienna is committed to ensuring that digital teaching and learning methods become standard in compulsory schools, to equip school students with relevant skills in preparation for a digitalised (working) world. In accordance with a "BYOD – Bring Your Own Device" policy, school students have the opportunity to seamlessly integrate their own devices into class and learn how to work with digital contents and applications while being provided the best possible educational support.

Within pre-defined limits, school students should be given the autonomy to decide for themselves whether they want to repeat classroom material already covered during classroom learning, deepen their understanding of or even skip certain items. For a better understanding, educational content can be illustrated with numerous examples in an IT-supported environment. This warrants better individual learner progress and reduces the need for private tutoring. School students are also given the opportunity to support each other through virtual platforms ("cloud"). This also develops the school students' social skills, beyond the mere transfer of knowledge. The following point illustrates the possibilities of these virtual

communication platforms in more detail.

## **Digitalisation projects of Vienna's Digital Agenda – KNOWLEDGE action field**

### *Digital kiosk of the Vienna Public Libraries*

Via the Virtual Library, the Vienna Public Libraries offer access to more than 40,000 e-media or digital media services. The Austria kiosk at [www.kiosk.at](http://www.kiosk.at) is available free of charge on all PCs of the Vienna Public Libraries equipped with internet access. The Austria kiosk refers to the digital newsstand of the Austrian Press Agency in which a total of 190 Austrian and international daily newspapers, numerous periodicals, magazines and specialised media can be read digitally as electronic papers.

In addition, the online newspaper portal "Library Press Display" offers all customers of the Vienna Public Libraries access to the latest e-paper editions of more than 3,000 international, national and regional daily newspapers and to magazines from 100 countries in 60 languages. Schools of the City of Vienna can, among other things, download digital educational media for teaching via Media Wien's media rentals.

The digital services offered by Vienna's libraries are to be further expanded in the future and advertised more strongly for the relevant target groups and all citizens of Vienna.

### *Technology in youth work*

Extracurricular youth services, in particular, face major challenges due to growing social change, such as the rising share of juveniles who are dropping out of the educational system. A project is currently under review in collaboration with Vienna's youth services or youth centres, which intends to offer tailor-made workshops for extracurricular children's and youth work in cooperation with the creative technology scene. This is to help tap into the potential of using technologies in youth work to a much greater extent than before. In this context, the "digital natives" are to learn not only about the opportunities, but also about the potential risks involved. The workshops range from the analysis of the many potentials and risks of the digital world to e-sports, youth work in the web and workshops for the artistic design of mobile phone videos.

Vienna's child and youth work offers internet access and infrastructure at over 100 locations throughout the city and supports young people through low-threshold, informal education programmes. The gender- and diversity-oriented approach adopted is to reduce the "digital gap" and promote digital literacy.

### *Promoting girls and women*

The City of Vienna takes active measures to educate the skilled workers needed for successful digitalisation in Vienna. Particular emphasis is placed on supporting enthusiasm among children and young people for paths of education and professions with a focus on digitalisation. Special attention should be paid to the promotion of girls and young women in the technical sciences. Teachers are supported in building their knowledge of digital areas of expertise and parents are made aware of the significance of professional training in the field of digitalisation.

### *Supporting senior citizens*

Senior citizens are one of the population groups who stand to benefit the most from the opportunities digitalisation provides, for instance when travelling can be avoided as mobility declines. At the same time, they must be taught basic user skills as well as data privacy and security aspects for the sake of their peace of mind and in order to feel safe. Therefore, a focus will be on basic training for senior citizens on smartphones, tablets or PCs.

In this context, the City of Vienna is aware of its special responsibility to an important and large population group whose quality of life can be significantly improved by the targeted use of technologies.

### *Priorities of digitalisation at Vienna's educational institutions*

To effectively counteract the skills shortage in the ICT sector, the City of Vienna has placed special emphasis on attractive digital education.

Digital initiatives are being established at Vienna's educational institutions with the lowest threshold possible and adapted to different levels and varying degrees of prior knowledge. This concerns both digital educational content and knowledge transfer on digital channels.

As one of many priority measures, future course participants will be able to attend classes in virtual reality (VR) at adult education centres. This technology will allow participants to be at the centre of the learning action by means of wearing VR glasses, to ask questions and to experience a 360-degree learning environment. In the future, this will allow the people of Vienna to take engaging classes without having to leave the comfort of their homes.

The Vienna Employment Promotion Fund (WAFF) also offers a wide range of initiatives to enhance digital literacy among employees. For instance, the "Digi Winner" initiative is a support service that helps employees expand their knowledge and their skills – from basic IT skills to social media affinity.

Other ideas from the "knowledge" area that are currently under review or design:

### *Digital literacy in all forms of education*

It is the stated goal of the city government and social partners to continue developing professional training with digital elements. This applies to all areas of education, such as vocational schools and businesses as well as general universities, universities of applied sciences and higher schools, but also includes primary schools and kindergartens.

Digital adult education and the continuous education and professional development of employees are essential measures to avoid a digital divide in society. This includes the learning of important basic skills, the obtainment of qualifications by adults later in life, the promotion of digital-oriented opportunities for professional development also for older employees and constant learning in already existing programmes.

### *Network of exchange*

The City of Vienna promotes the mutual exchange of information and experience among teachers, school students and parents in the context of a virtual communication platform. The regular exchange concerning school matters is to make life more pleasant for teachers, parents and not least school students and improve efficiency in planning. Beyond this, additional applications can be contemplated for the future, such as the secured filing of certificates.

New technologies can benefit parents of kindergarten children, as well: In the future, parents will also be able to receive important messages directly via virtual communication platforms or apps. Thus, parents can keep up-to-date without having to depend on notifications that are often only posted in kindergarten entrance halls and corridors. The continuous exchange of information between parents and kindergarten teachers is to be encouraged in this way, in addition to personal conversations.

### *Promoting lifelong learning*

Learning does not stop when you graduate from school: The concept of "lifelong learning" is to enable people to acquire knowledge and skills throughout their entire lives. The City of Vienna is committed to ensuring that all citizens have the opportunity to participate in digital cultural skills, regardless of educational attainment, age and origin. Educational content determined by the individual needs of the citizens can be provided by means of digital communication platforms and digital spaces. Particularly citizens with very little IT knowledge are to be introduced to the new technologies via target-group-specific services offered by the City of Vienna: For instance, special courses are offered to older citizens who are as yet inexperienced with the possibilities and dangers of the internet or the latest devices such as smartphones or tablets.

### *Open and freely usable contents*

In keeping with the basic idea of inclusion and the open-source philosophy, the City of Vienna

offers open educational content that can be freely used and modified by learners, teachers and organisations. This benefits schools, research institutions, educational establishments, business, and above all citizens. In accordance with the OER model (Open Educational Resources) of what are known as the "Creative Commons", this is primarily to allow free and unlimited use and amendment by all users.

#### *Scope for creativity*

The City of Vienna also creates spaces for mutual creative exchange beyond the virtual world: Places of encounter are developing in neighbourhoods where people can expand their horizons through personal contact and knowledge sharing.

Involvement of the local "maker" scene, where creatives develop new things with the help of the latest technologies, is to inspire creative processes and foster innovation. In addition, citizens are to be given the opportunity to be actively involved in research projects of Vienna's research institutions as part of the "Citizen Science" initiative or also to be supported in their own amateur research in these places of encounters. This environment can also support the democratisation of technology by using and thereby raising the visibility of startups and the "maker" scene in ground floor zones.

### **High-performance research for the "Digital Hotspot Vienna"**

Digitalisation concerns all areas of life, thus making it one of the decisive social transformation processes of the 21st century – also and more particularly for a major city like Vienna. Therefore, strong research in the digitalisation area is necessary to further establish the City of Vienna as "Digital Hotspot Vienna".

Excellence in relevant research on information and communication technologies, the appeal of Vienna for talents as well as brand development of the City of Vienna as a capital of digitalisation play a central role in this process.

#### *Infrastructure programme for universities (UIP)*

Over the next few years, substantial investments at universities can be expected, particularly in the field of digitalisation. State-of-the-art infrastructure, such as high-quality Wi-Fi or secure and powerful server infrastructure, are to help ensure that Vienna's universities remain internationally attractive to students and researchers. Additionally, new demand for infrastructure is emerging in application fields where work and research have only recently begun to go digital. In this context it is also essential for the universities of Vienna to be given opportunity to meet their needs in order to be able to compete internationally. The universities are to be provided with additional incentive to increase digital investments.

#### *Centres of competence and projects for the digital area*

With the COMET programme, the City of Vienna funds strategic research cooperation projects between science and industry in collaboration with the federal government. The Vienna Business Agency also promotes the cooperation of science and business and is committed to the development of joint funding programmes.

Vienna promotes the following competence centres and projects that deal with digitalisation issues:

- The international strength in the blockchain area has already been proven in the past through many initiatives in business, science and administration. The new ABC competence centre (Austrian Research Centre for Blockchain) is the Austrian one-stop shop for industrial blockchain applications in the areas of Industry 4.0, financial industry, energy, logistics and administration.
- The CDP (Austrian Center of Digital Production) serves the research and advancement of digital, intelligent or "smart" product development processes nowadays referred to as "Industry 4.0".
- SBA Research deals with software security and applied discrete mathematics for information security.
- VRVis is Austria's leading and internationally renowned institution for applied research in the field of visual computing. Solutions and prototypes are developed in accordance with customer-specific requirements.
- KNOW Center: Central skills for information technologies for knowledge management are united here.
- The COMET project D4Dairy deals with the digitalisation of the dairy industry.
- The CHASE Competence Center makes use of digital technologies to establish a new knowledge platform for the high-energy, resource-intensive and cost-intensive procedures in the process industry.

#### *Vienna Cybersecurity and Privacy Research Center*

The "Vienna Cybersecurity and Privacy Research Center" will be supported by the Vienna University of Technology (as lead partner), the University of Vienna and the Institute of Science and Technology Austria (IST Austria). The three institutions bundle the skills already developed in this area and use them to promote internationally visible research activity.

### *Promoting exchange between research, ICT industry and the City of Vienna*

The exchange between the City of Vienna, the ICT industry and institutions in ICT research in the field of application-oriented research will be intensified. Common forums serve to identify and present topics of interest for practical applications for third-party funded projects, joint EU projects as well as bachelor and master theses.

### *Promoting Vienna's universities of applied sciences: an ICT skills training hotspot*

Vienna's universities of applied sciences are highly significant for the training of ICT skilled workers and engineers. For instance, more than 40 percent of all recent computer science university graduates completed their studies at a university of applied sciences in Vienna. As part of Vienna's funding of universities of applied sciences, the City of Vienna supports the universities of applied sciences through annual calls, including in the fields of teaching and didactics or internationalisation.

### *Security & Safety Initiative*

With more than fifteen strong research groups, Vienna has a powerful international position in the area of security, privacy and safety. This expertise is to become significantly more visible and forceful by means of a planned concentration.

A high degree of security while simultaneously preserving privacy are central prerequisites for successful cooperation in the digital world. The creation of a common identity can be based thereon and Vienna presented as a model city internationally as well. This also includes initiatives like post-doc programmes, scholarships, guest professorships, but also a management that holds this important initiative together and helps it become socially effective. Not least, this treasure trove of resources also intends to greatly facilitate the relocation of relevant international companies to Austria.

### *"Digital humanism" as a principle of research*

Vienna needs to become a place where the kind of top people want to work that think in alternatives and want to participate in the shaping of a more socially designed digital world. To this end, there are to be career positions, guest professorships and scholarships for interdisciplinary research projects, also conferences, workshops and forums as well as places of encounter and lab situations. At the core of this are strong, interlinked circles of research groups and innovative players from fields like computer science and mathematics as well as from the humanities and social sciences.

### *Promoting enthusiasm for technology and innovation*

The openness of civil society for new technologies is essential for an innovation hub. Only if enthusiasm can be generated for natural sciences and technology and if curiosity can be

cultivated for training opportunities and studies in these subjects will it be possible to ensure that sufficiently qualified personnel is available for technology developers and drivers of innovation in Vienna. A population that is enthusiastic about innovation ensures that pilot users are found for new products and services.

That is why the Vienna Business Agency will promote private initiatives on behalf of the City of Vienna that aim to reduce technology scepticism and increase enthusiasm for research and technology. Ideally, social and ecological risks that often go hand in hand with technological developments just as the economic potential of the emergence of new markets should equally be addressed.

## **2. WORKING WORLD 4.0 action field: FAIR RULES FOR NEW WORK**

### **Solidarity in a digital world**

In Vienna as a capital of digitalisation, steps are taken to ensure that the digitalisation of the quality of life benefits the citizens, contributes to cohesion among the citizens of Vienna and promotes the careful treatment of resources. More than 60,000 people work for IT companies in the metropolitan area of Vienna. If this count is adjusted to include the sectors considered heavy on ICT, some 200,000 employees can be assumed for this area.

This is why it is important to actively participate in the design of digitalisation and to place people with their social and societal needs in the centre of this development. The opportunities presented by digitalisation must be made use of while minimising the risks for people at the same time.

Information technology opens up a great variety of new opportunities for active citizen participation. In this context, the city keeps an eye on the digital rights of all the citizens of Vienna as well as on low-threshold access to digital information and no-barrier participation in order to minimise what is known as the "digital divide" to the extent possible. In Vienna, smart digital solutions are characterized by easy access to information and services, such as in the field of urban mobility or by simplifying errands to public offices.

With the advancement of digitalisation, the domestic labour market will continue to change increasingly. The labour supply in several sectors will adjust – for instance in the retail sector and in the sale of products, but also in personal mobility. In most branches, new jobs will emerge for highly qualified people, while jobs will be lost where tasks become automated. Nowadays, complex tasks are already being broken down into ever smaller subtasks and outsourced to precariously employed people via digital platforms as very small orders. This development will have to be strengthened in the future. Digitalisation will not only change the worlds we work and live in, but also influence requirements. As a result, new regulations may

become necessary to control these developments.

### **Objectives WORKING WORLD 4.0 action field**

- Drive forward education and professional development in the field of digitalisation for all citizens of Vienna
- Use new technologies to reconcile work and family
- Create legal certainty for the sharing economy while at the same time promoting innovative developments
- Strengthen brick-and-mortar retail and the entrepreneurs of Vienna in the digital world

### **Key projects WORKING WORLD 4.0 action field**

#### *Digital professional development: "Digi Winner"*

With "Digi Winner", prospects in the digital working world are improved, new IT skills for employees are gained and jobs secured. The aim is to teach digital literacy, take anxieties related to digital change seriously and to stimulate interest in digital transformation. Qualifications and professional development are of particularly high relevance in the quickly changing digital working world. The Vienna Chamber of Labour and the Vienna Employment Promotion Fund (WAFF) support Vienna's employees financially in the establishment and further development of their digital skills with this qualification programme.

#### *Online childcare atlas*

Sufficiently qualified education and care places are essential for parents to be able to juggle family and career. Finding an appropriate place can represent a challenge for families. In order to ensure that they get a good overview of the existing services rapidly, the provision of an "online childcare atlas" is currently under evaluation. This atlas will make the services offered at public and private elementary education institutions more transparent. Parents can compare necessary information online, such as opening hours and the various services offered. In addition, the intention is to provide a digital map of childcare opportunities (for instance Summer City Camps).

#### *Sharing economy strategy*

"Sharing economy" is a collective term that describes the sharing of resources and products in society. It requires clear overall rules and a level playing field – for employees and suppliers alike. The City of Vienna has developed a sharing economy strategy for this purpose. Generally speaking, platforms that provide, for instance, transfer services or overnight accommodation should be treated like agents who organise transfer services or guest room accommodation rather than IT companies, unless the opposite is found to be true in individual areas. In order to obtain certainty of law for all parties involved, a distinction must be made between what should be regulated locally and what does not fall within the city's remit.

Transparency and fairness should be the foundation for the activities of sharing economy platforms. In order for them to be achieved, Vienna seeks collaborations and certainty of law, such as the prosecutability of the platform or the referred providers. Simple, clear and transparent rules as well as processes provide the citizens with security, transparency and fairness, regardless of whether in the role of suppliers or consumers. With this in mind, Vienna promotes control options and regulations on both the technical and regulatory levels – for instance related to transparent rules for data transfer – both within the city's administration and in external communication with the citizens and platforms.

## **Digital transformation projects of Vienna's Digital Agenda – WORKING WORLD 4.0**

### *Digitalisation pact of the City of Vienna with the social partners*

In order to ensure the supply of skilled manpower, particularly in ICT, the City of Vienna's existing strategies are being reviewed for synergies and pooled. (e.g. by DigitalCity.Wien, the City of Vienna's funding of universities of applied sciences, the Vienna Employment Promotion Fund WAFF, initiatives of the Vienna Business Agency, the Vienna Education Directorate). The further development of professional education and training must be incorporate digital elements. Digital skills should become an even more substantial part of education in vocational schools, secondary schools of engineering (HTL), universities of applied sciences and general universities.

### *Professional development in city administration*

Additionally, appropriate measures have also been initiated in Vienna's City Administration, such as trainee programmes, job rotations and an education and professional development programme intending to further strengthen the employees' digital know-how. In this context, it is necessary to emphasize that digital change alters the "inner workings of organisations", thus also necessitating adjustments to processes as well as to management and organisational models.

### *Digital brick-and-mortar retail*

As online trade continues to grow, initiatives to help Vienna's smaller brick-and-mortar retailers launch online business activities should be encouraged. Many businesses are called upon to adjust their internal professional development programme to the new challenges and to step it up. This applies mainly to employees. Therefore, the existing collective bargaining agreement provisions related to working from home and to remote work need to be adjusted and judicious rules found for people in atypical employment. A level playing field must be ensured for competition between brick-and-mortar and online retail: this being one of the reasons why profits should be taxed where they are generated. Based on the "Shöpping Wien" initiative, conclusions will be drawn about other possibilities to support brick-and-mortar compared to online retail.

### **3. BUSINESS action field: STRONG ICT LOCATION VIENNA**

#### **The networked capital city**

The ICT sector in the City of Vienna comprises almost 6,000 companies with roughly 54,000 employees. These companies already generate 8 percent of the sales achieved by all the companies located in the capital city. As a result, the ICT industry has become not only the most promising and innovative pillar of Vienna's economy, it also has at its command the key and interdisciplinary technologies for all other sectors and areas of life. This strong ICT sector is the driving force behind Smart City Vienna, providing a modern and value-creating ICT infrastructure for its citizens – for example in the areas of energy, mobility, health or transport.

Today, above all through the Business Agency, the City of Vienna already generates powerful momentum for the strengthening of the business hub. The Business Agency operates a technology platform for Vienna's drivers of innovation. The Business Agency's websites present current projects, finished prototypes and development skills "Made in Vienna". Moreover, the platform provides assistance in the search for project partners and pilot customers. Additionally, the Business Agency is a strong service provider in advising IT companies. ICT experts inform about suitable funding programmes and financing opportunities. Another area of focus is the networking of Vienna's technology developers with innovative companies as well as potential pilot customers, such as by means of the regular "Business Treff" event.

In the future, the City of Vienna will create the right overall conditions for innovative and successful companies in especially close cooperation with the Vienna Business Agency, Urban Innovation Vienna as smart city agency, the local IT industry and research institutions. This is to ensure that Vienna remains successful as an ICT business hub and is made even more attractive in the future.

#### **Objectives BUSINESS action field**

- Continue expanding DigitalCity.Wien as a network for innovation drivers
- Attracting international IT companies and startups
- Providing scientific data for administration and for citizens
- Strengthening Vienna's position as an attractive venue for specific sectors, such as the international gaming industry

#### **Key projects BUSINESS action field**

##### *DigitalCity.Wien*

DigitalCity.Wien is a city initiative, supported by dedicated companies, interested parties from the fields of education and research as well as the city's administration that all seek innovative

avenues of cooperation and the exchange of ideas on new paths and on an equal footing. This initiative has embraced the goal of transforming Vienna into one of Europe's leading digital hotspots and to position and market it as such both internally and externally. The foundation is provided by the continuous exchange between various stakeholders. This initiative evolved from a broadly based discussion of potential solutions to the current IT skills shortage in Vienna as a business hub.

The aim is to take action against the skills shortage, promote digital expertise and excellence, and especially to promote girls and women and to spark their interest in IT professions. Digital experts visit schools, creating an appetite for digital issues and professions among young people. Visits to schools aim to teach IT security issues through digital and playful knowledge transfer. Moreover, an Austrian IT security hub is being established, with the objective of promoting talents and cooperation initiatives between state, business, schools and research. In this way, the City of Vienna is to be converted into an IT security hub.

### *Digital Days*

The digital trade exhibition "Digital Days" hosted by ICT companies and the City of Vienna takes place once a year. An event with a focus on "digital education" is planned. Throughout the year, there are additional network meetings that centre on key areas of DigitalCity.Wien, for instance community meetings on trend and technology topics such as e-health, artificial intelligence or blockchain technology.

### *Startup City Vienna*

With the Startup City Vienna initiative, the Business Agency compiles all relevant information for startups interested in launching a new business in Vienna. The initiative provides information about, for instance, Vienna's ecosystem, that is to say, about incubation and accelerator programmes, financing and investment opportunities, startup events as well as funding calls and competitions.

## **Other digitalisation projects of the City of Vienna – BUSINESS action field**

### *New funding programme: Wien Digital*

The Wien Digital funding programme helps Viennese companies implement digitalisation projects or ideas for optimising operational processes. The programme promotes SMEs that have been operating in Vienna for at least one year.

### *Content Vienna*

With Content Vienna, the Vienna Business Agency supports media and creative professionals in the design of digital worlds for projects and prototypes of everything from games and virtual

reality to artificial intelligence and creative web and mobile applications.

### *Co-Creation Lab*

In the Vienna Business Agency's Co-Creation Lab, established companies and organisations can address more than 1,800 Viennese companies, startups and research institutions to find innovative solutions. The aim is to find partners and to launch cooperative projects together.

### *Industry Meets Makers*

This open innovation format supported by DigitalCity.Wien aims to encourage new collaboration models between the industry and the creative, young maker scene with a view to leveraging the resulting innovation and business potential to the advantage of both sides. The concept consists of industrial companies advertising briefs in technological fields of the future, such as robotics, AI, 3D printing, Industry 4.0, IoT, big data or blockchain technology, and inviting innovative startups to solve these issues jointly in ways that ideally permit the subsequent launching of a follow-up project based on the results.

### *Digital business strategies*

The approach to the "sharing economy", the clickworker economy and the platform economy should be targeted, strategic and fair. The City of Vienna endorses innovative ideas – particularly when they benefit people. Vienna wants courageous entrepreneurs to be able to act as freely as possible. However, the limits of this freedom begin where the interests of citizens, consumers and fair competition are affected. The city will not stand in the way of innovative business models, but it will ensure a strategic approach.

### *City as innovation partner – collaboration with startups*

The city's administration relies increasingly on collaboration with startups. Plans are to set priorities for challenges faced by the city in coordination with the Business Agency. There should be additional potential for cooperation with the city at the end of a funding process. In many cases, having the City of Vienna as a reference customer or pilot partner gives companies a decisive boost.

The City of Vienna opens itself up to this, subject to the public procurement provisions for innovative procurement. In doing so, it contributes essentially to strengthening the IT location and to preserving value creation in the ICT sector. Beyond this, Vienna espouses procurement law reforms both in European and in national organisations with a view to opportunities for innovative procurement. The targeted promotion of Vienna's startup scene plays an essential role in this context.

### *The digital city of the future*

Vienna is home to an impressive number of national and international ICT companies. The aim is to hold and grow this position. Vienna competes with other major international cities, such as London, Seoul or Berlin. Targeted and renewed efforts are being made to address the international ICT industry. The aim is to attract the added value and know-how of internationally operating digital companies to Vienna. The planned measures include strengthening Vienna's image as a digital hub while also providing assistance with regard to and facilitating work permit acquisition.

### *Founders Lab*

At Founders Lab – Creative Industries, a new part-time learning and workshop format, founders are provided professional support by the Vienna Business Agency, coached individually by top-level experts and trainers from the creative industry and rooted in Vienna's creative industry network.

### *Product developments and prototypes*

The technology platform on the Business Agency's website offers an up-to-date overview of product developments and prototypes in Vienna. The list includes exclusively innovative solutions whose innovative character has been confirmed by independent experts. Additionally, the Vienna Business Agency supports the municipal departments and companies of the City of Vienna in their search for appropriate technological solutions for the current challenges and "use cases", that is to say, application possibilities in the city's administration.

### *Data excellence, smart data and analytics excellence*

Vienna's vision of a data excellence strategy is of a city that provides reliable information and data as the central value of an open administration of the future. The data is available to the city's data users, that is to say, the population, business and science, in a form that can be understood and used by the respective target group, either as smart data, open data or linked data.

The architecture needed to process poly-structured data and to provide data for analyses and machine learning is being built. The promotion of the efficiency and effectiveness of data analyses in the city is achieved by fostering analytics excellence. The parties who actually analyse the data locally are promoted and find assistance from statistics experts. On the one hand, this is achieved by the appropriate infrastructure, the establishment and promotion of analysis architecture and the relevant software. On the other hand, the training of the analysts and the exchange of experience and knowledge between them on the ground, where the need for analysis arises, and of statistic experts are fostered.

## **Innovation capital Vienna**

By implementing the Smart City Framework Strategy, Vienna is to become one of the five largest European research and innovation hubs, on the one hand, while continuing to grow its position as a preferred choice of headquarters on the other hand, for instance for ICT companies in Central and South Eastern Europe. Eruptive trends, such as 3D print, robotics, cyber-physical systems, the Internet of Things (IoT) or innovative functional materials should be swiftly incorporated into location-compatible implementation concepts.

### *Further development of the startup ecosystem in Vienna*

Vienna has exhibited a gratifying momentum with regard to startups of growth-oriented companies that develop innovative products and services and bring them to market. The Vienna Business Agency supports startups with many activities such as offers of individual coaching and support programmes and runs the business incubator INITS in cooperation with the Vienna University of Technology and the University of Vienna. Almost 1/3 of the 250 startups that INITS has assisted in developing their business models, entering the market and finding sponsors, bring digital solutions to the market. The aim is to create a close relationship with the existing funding landscape and to place an even greater focus on simplifying incorporation procedures. Priorities in this context are activities related to financing and funding opportunities as well as education. Vienna is to be converted into a European startup centre. The city pursues three specific related goals in this context:

### *Establishment of research centres*

Vienna will actively engage in ensuring that research centres of internationally renowned IT companies establish operations in Vienna. This will place an emphasis on innovative strength, expertise, internationality and a high quality of life.

### *Involvement of expatriates*

By providing intensive support to "expatriates", so internationally deployed professionals, who live and work in Vienna at least temporarily, Vienna is positioning itself as an attractive location and hub in the heart of Europe. At the same time, this allows Vienna to win a multitude of "ambassadors", who spread the word all over the world about the city's high quality of life and Vienna's appeal as a research and innovation location for information and communication technologies.

### *Startup package*

With the startup package, the Business Agency extends invitations to 20 international startups annually to come to Vienna for two months to develop their business idea and explore the Austrian and European market. The Business Agency funds travel costs, accommodation, co-working space and individual business coaching. The focus is on companies in the digital

field.

The following additional priorities in the field of business based on ideas originating from the community and research work are currently still under review:

#### *Gaming industry as driver of innovation*

The gaming industry has grown significantly in recent years, with the result that one fifth of the world's population plays regularly today. In the USA, games studios revenue is no longer below that generated by the film industry. The sector already generates sizable revenues in Vienna, as well.

"Game City", Austria's largest gaming event, has been taking place in Vienna since 2007. Aside from the further development and internationalisation of the event, the supporting programme is to be made more attractive as well, in order to strengthen Vienna as a gaming location, since visitors to "Game City" and other e-sports events already constitute a significant factor for Vienna as a business hub.

Moreover, digital games are an important innovation driver for other industries. Both the technologies used in games, such as game engines, the digital design possibilities as well as the lifeworlds and game reward mechanisms created, are frequently put to use. Gamification is also used in therapies, in training courses or in communication. Immersive technologies such as virtual reality (VR) and augmented reality (AR) are another example for innovations whose development is further advanced by the games industry.

The City of Vienna is evaluating how these potentials found in the gaming sector can be exploited. This applies, for instance, to the high qualifications of the employees, the vigorous growth and internationality. Therefore, intentions are to more strongly promote public perception of this emerging sector.

#### *Focus on serious games*

The focus of "playful learning" is on the playful transfer of knowledge and further training – combined with elements of entertainment. The City of Vienna is currently testing the use of such educationally valuable gaming concepts (for instance for schools or employees). Possible areas of application would be all areas of learning such as boosting media literacy (playfully) or proactively combating mobbing.

#### *Networking and promotion*

In order for developers of digital games to be able to benefit from the growth potential across industry boundaries, they need opportunities for interdisciplinary networking and international

exchange to inspire their work, acquire know-how and also to meet potential customers. The strengths of Vienna as an international ICT hub lie in, among other things, the interdisciplinary connection of creative industries and technology. Talents and innovations at this interface should be promoted with targeted measures.

### *Digital City Lab Vienna*

The City of Vienna is evaluating the establishment of a (physical) space in which to work on projects of the future in association with school students, university students and other interested parties as well as with business, startups and research institutions.

The hub – where the digital meets the analogue world – is to help strengthen confidence and digital know-how. The lab could include the following priorities:

- *Testing lab*

In the Digital City Lab, innovative companies connect with the know-how of administration and of infrastructure providers, energy suppliers and mobility providers, receive resources such as computing power and anonymised real data (for research and tests) and a network via which to contribute their expertise to administration. Innovative solutions are to emerge that offer added value to both sides.

- *Showroom digitalisation*

These solutions as well as other modern technological applications are presented to the general public, city employees and all interested parties in what is referred to as showrooms, where they can be tested and studied. On top of that, this space could also be a maker space, equipped with traditional and digital production tools (3D printers, laser cutters, CNC milling tools, etc.). This would allow even children, but also adults to be introduced to the many possibilities emerging from the digital revolution.

### *Open (government) data unplugged*

Not everyone has the skills it takes to process the data made available by the City of Vienna. In order to rise to the challenge of closing the "digital divide" and to facilitate low-threshold access for as many citizens as possible, the data is visualised and made openly available. In the project "Smarter Together", this has already been implemented with "neighbourhood-relevant" information.

### *Using open source software as a driver of innovation*

Open Source Software (OSS) is the innovation driver behind many current technology trends (blockchain, deep learning, artificial intelligence etc.) with which the digital transformation is taking place. Cooperation activities across organisational borders are only possible with open

standards and algorithms that are publicised mainly by the dissemination of OSS. Thus, the strategic use of OSS is also relevant for the City of Vienna to create transparency, increase security and to promote young talent through cooperation with open source communities, but also to avoid vendor lock-in situations. The City of Vienna adopts open-source platforms if appropriate products are available and also make this openly visible.

#### *Co-working in Vienna*

Vienna offers a diverse landscape of co-working spaces. In order to achieve a distribution across all the districts of Vienna that is as needs-oriented as possible, the City of Vienna will open talks with (future) co-working space operators. The aim is to achieve a reasonable distribution and market-aligned specialisation. The city administration's innovation teams that have high requirements with respect to the technical equipment of their workplaces can gain access to temporary or permanent office workspace here and encourage innovations by means of experimental approaches. Vacant business premises could also be made available for such interim use.

## **4. INFRASTRUCTURE action field: INTELLIGENT TECHNOLOGY FOR THE CITY'S FUTURE**

### **The smart city for all**

"Smart City Vienna" stands for the "intelligent" city Vienna aspires to be. Innovative solutions serve the protection, development and use of natural and technical resources and of our city's areas of life. This is only possible with the intensive use of information technology and applies specifically to the interrelated fields of energy, buildings, mobility and infrastructure. Hence, a substantial contribution to the Smart City Vienna is an excellent digital infrastructure functioning as the city's intelligent "nervous system". This key component of digitalisation is a prerequisite for ensuring that the interconnection of the many data points can be achieved sustainably, with the different requirements for bandwidth, response time, scalability, availability, security and energy supply needing to be given due consideration. The City of Vienna has a large number of buildings at its disposal that can serve as the foundation for an excellent digital infrastructure.

New technologies offer a wide range of possibilities. The principle that technology must adapt or be adapted to people and not the other way around must always be given priority. Not people should adapt to technology. Usability and intuitive use by people are at the forefront of attention when it comes to new innovative solutions.

Apparent elements of the city's basic supply of information and communication technological services, such as broadband internet access or Wi-Fi, represent a foundation of digital infrastructure. In addition, current technologies or IT technology solutions, such as cloud

computing, data analyses, social media technologies and procedures as well as the internet of things (IoT) are increasingly becoming the foundations or building blocks of innovative solutions. Standardisation and "interoperability", meaning standardised and open interfaces, are prerequisites for efficient ICT operation in an interconnected world.

Only on the basis of a well-oiled digital infrastructure is it possible to develop service offers that take on an "infrastructural function" for citizens and business alike.

### **Objectives INFRASTRUCTURE action field**

- Continuing development of a powerful digital infrastructure
- Expanding the digital life and working world in the interest and for the benefit of citizens and business
- Effective and safe use of natural, technical and human resources
- Improving the services offered by the city
- Increasing the city's appeal as a business and science hub
- Strengthening the participation of citizens
- Ensuring no-barrier access to the services and information offered by the city
- It is indispensable for a modern administration to be able to test new technologies itself, define specific use cases and to be familiar with the strengths and weaknesses of the technologies.

### **Key projects INFRASTRUCTURE action field**

#### *AI (artificial intelligence) strategy for Vienna*

In order to fully tap into the potential of using artificial intelligence, the City of Vienna developed a strategy seeking to identify AI use cases to enhance the efficiency of existing workflows and to identify new services in order to advance another step forward on the road to becoming a digital capital. In this context, the City of Vienna believes it essential to always take ethical and moral principles and the greatest possible safety and efficiency into account when employing artificial intelligence.

As one of the main drivers of digitalisation, artificial intelligence has a tangible impact on the City of Vienna, including in the areas of public transport, health & health care, education and public security. In accordance with this, the applications that provide people with the greatest efficiency are virtual assistants, like smart home, deep learning, machine learning and autonomous driving.

The City of Vienna pilots use cases of artificial intelligence in the following areas: image recognition (e.g. video analytics), intelligent text analyses (e.g. natural language processing), smart chatbots, identification of anomalies in audio and video recordings (e.g. predictive

maintenance) and time series analyses for forecasting by means of AI.

### *Vienna as a European 5G pioneer*

The demand for mobile data has skyrocketed in recent years and will continue to rise. Technical innovations require larger data volumes and higher data speeds. Data transmission speed is not only important for private smartphone use. It is also becoming an increasingly important deciding factor for companies in terms of location decisions. In the future, fast data transmission will make or break a business hub's global success.

The City of Vienna has already commissioned a feasibility study that will examine what is needed technically, legally, structurally and financially to be among the first cities in Europe to provide comprehensive 5G coverage.

Consequently, the city is developing a 5G strategy to be able to meet the challenges of Vienna as a capital of digitalisation. International best-practice examples, the involvement of the people and many expert discussions serve as a hotbed for new trends in Smart City Vienna.

The integration of 5G is an opportunity to continue improving the digital infrastructure and is the foundation for applications that benefit citizens. Pilot projects provide significant insights during the testing of new technologies. The City of Vienna is testing pre-5G technologies in Seestadt Aspern to this end. Additionally, there is a 5G pilot project at Vienna's Rathausplatz. The highly frequented Rathausplatz, with its events like the Christmas market, was chosen for the new technology's first trial run. Test operations will be performed in collaboration with the mobile phone operators A1 Telekom Austria, Magenta Telekom and Hutchison Drei. The town hall square is particularly well suited as a test area because many people who use a lot of data spend time there.

### *The networked city – Internet of Things (IoT)*

The "Internet of Things" refers to the flow of data between physical and virtual objects over the internet. These objects send data into a network and supply information about conditions that can subsequently be put to use. In just a few years, billions of devices will likely be interconnected in this way. Intelligent networking is a great opportunity for business, population and city administration alike. A Viennese IoT strategy has been developed in order to harness this technology for the Vienna City Administration.

The shared use of a physical infrastructure also calls for a fair data return on a digital infrastructure level.

The following example illustrates the many applications of IoT: Smart Data allows the city's

data-driven control, the improvement and more efficient processing of citizen services and provides the content of a Smart City Dashboard – the "control panel" for the citizens of Vienna with which to maintain a data-based overview of the city at all times.

In accordance with the city's IoT strategy, the focus in all IoT projects is an integrated approach and a particularly high measure of data security and informational autonomy. This aspect is also essential with regard to cooperation and procurement.

### *Connectivity and IoT platform*

Different use cases need different

transmission options. The City of Vienna is working on pilot projects related to connectivity. It is involved in the development of IoT networks (radio standards like LoRa), the establishment of a safe IoT platform to manage sensors securely and intelligently and to analyse and further process the collected data centrally. This platform is expected to support technological standards and various use cases with the highest possible security. Intentions are to cooperate with Wiener Stadtwerke in terms of the procurement and operation of an IoT platform.

FIWARE is an open source standards & components framework in the cloud for the smart digital future. FIWARE standards and APIs help to develop intelligent applications in smart cities and in the smart industry, agriculture and energy sectors. FIWARE is regarded as a benchmark for interoperability in context- and data-driven platforms everywhere in the world. Fast and flexible solutions can be developed with the FIWARE framework. To accelerate the development of smart solutions, FIWARE can be used together with other platform components from third-party providers. The City of Vienna and the Vienna Business Agency are gold members of the FIWARE Foundation. FIWARE has already been deployed and experience has already been accumulated in the context of the "Smarter Together" project. The organisation and attendance of community meetings as well as involvement in the technological evolution of this platform in cooperation with other organisations is intended.

### *Intelligent traffic control*

A traffic light system developed by the City of Vienna and the Technical University of Graz not only detects people, it can also tell whether they actually want to cross the street. The new traffic lights are to prevent unnecessary waiting times, thereby improving pedestrian comfort.

Additionally, the traffic light system is to be made more intelligent and flexible. By interconnecting the traffic lights they will be able to react to the current traffic situation and optimise traffic flow. This way, congested traffic is resolved faster and emissions are reduced. By passing on information to navigation systems, speed recommendations can be adjusted

and green waves taken advantage of. In cooperation with the Central Institute for Meteorology and Geodynamics (ZAMG), Vienna's traffic lights will also be equipped with weather and environmental sensors, for instance to call attention to heat islands. The sensors are to measure temperature, air humidity and nitrogen oxide, sulphur oxide as well as noise pollution.

#### *Environmental sensors on traffic lights*

The City of Vienna and the Central Institute for Meteorology and Geodynamics (ZAMG) are to equip the 1,300 traffic lights with some 10,000 weather and environmental sensors. This will allow a multitude of applications with the help of "big data analytics". For instance, heat islands can be detected or the quality of air improved with the help of intelligent traffic flow control, since considerably more pollutants are released during braking and accelerating than in flowing traffic. Making this data openly available as part of the OGD initiative is under review.

#### *Smart support for senior citizens*

New technologies also support the elderly. For example, they can detect irregularities in the home of the person cared for, because, for instance, the electricity or water consumption is unusually high or low. Remote-controlled camera robots help relatives check on their family members regularly or a robot enables a bedridden person to make a video call.

#### *Open Government Data (OGD)*

"Open by default", the guiding principle of the City of Vienna's data excellence strategy, stands for access to public data. The city's administration provides access to classified data, documents and services in machine-readable form, free and at no charge.

A proactive, open data publication is to allow availability and reuse of the City of Vienna's data for private or commercial purposes – but only subject to legal, technical or financial conditions. Aims are to establish an open data culture as well as to expand digital participation and use opportunities. Because data is the foundation for development and application of new technologies.

Active cooperation with the public is maintained (for instance open government platforms, DigitalCity.Wien) to be able to use creative and innovative ideas as the foundation for the city administration's work.

#### *Blockchain technology*

Blockchain infrastructure in the City of Vienna's computing centre allows the testing and application of blockchain technology in projects. The City of Vienna is a reliable cooperation and consortium partner in blockchain projects of business, science and research and provides the basis for potential additional use cases.

## **Digitalisation projects of Vienna's Digital Agenda – INFRASTRUCTURE action field**

In addition to the key projects, there are other priorities in the infrastructure action field that are also currently under review:

### *Smart parking*

A modern sensor system helps the city manage parking spaces efficiently and supports car drivers looking for a place to park. Strategies and solutions for an integrated model are being developed and tested.

### *Trend radar for the city*

The timely recognition and the proper pigeonholing of trends for the future is of central relevance to a city aspiring to become a capital of digitalisation. Technology trends are to be analysed and strategic conclusions drawn therefrom. Hence, the City of Vienna wants to develop interdisciplinary trend monitoring that aims at observing future trends, their relevance analysis as well as the subsequent sharing of knowledge to all areas in the City of Vienna.

### *Vienna from above*

Drones are used for inspection flights over forests and facilities as well as for surveying flights. For instance, Wiener Stadtwerke already use "flying cameras" to inspect power plants. With the help of an image diagnosis tool, reliable information about the condition of buildings and bridges can be collected within a few hours.

The City of Vienna dedicates extensive attention to this issue, establishing infrastructure, regulations and know-how in order to be able to test applications in pilot projects later on. Again, the City intends to engage the citizens and business in a participatory process to assess meaningful use cases and to counteract potential concerns related to security or noise development early on.

### *Use of virtual reality (VR) and augmented reality (AR)*

Virtual or augmented realities help to simulate situations and impart knowledge. As a result of the City of Vienna's wide remit, myriads of use cases of VR and AR are possible. Today, these technologies are already in use for training purposes at Wiener Stadtwerke or for therapy purposes at the Central Hospital (AKH). The City of Vienna will review additional use cases and implement new projects.

### *Digital building permit application with augmented reality*

Digital building permit applications are the basis for new approaches to local construction

supervision and control. Already, there are isolated cases where construction sites today are being planned and implemented using augmented reality. This gives the involvement of stakeholders and future users a whole new dimension. People have the opportunity to experience their future home, their rental flat or their future workplace virtually and can participate in its design.

In the future, virtual site inspection via AR or VR is expected to simplify planning in the building application process and convert the hearing of the parties in the public office into a high-tech experience. Both the impact on neighbouring properties as well as a glimpse of the building's interior will support an acceptance-encouraging approach.

Apart from this, it permits both the authority and the builders to subject both plan and reality to rigorous scrutiny.

#### *Bringing historical images to life digitally*

Citizens and interested guests are to be given the opportunity to immerse themselves in the Vienna of the past. A digital journey through historical Vienna becomes possible by superimposing historical images using a smartphone. The application is started at the "point of interest" and the historical images are superimposed at the respective location. In this way, historical and present-day Vienna can be discovered and compared at the same time.

#### *APIs – harnessing interfaces*

To facilitate access to the City of Vienna's data and to facilitate its further processing, well-designed application programming interfaces (APIs) are needed for both internal and external use. The reuse and shared use of data via the appropriate application of APIs is of general interest, since developers and startups can create new services and products in this way. That is why the creation of valuable ecosystems around often unused data repositories, is encouraged.

## **5. CONTROL action field: IT-GOVERNANCE & INTERNAL PROCESSES**

### **Controlling Vienna, the capital of digitalisation**

Implementation of Vienna's Digital Agenda takes place via modern IT governance, that is to say by means of management and organisation structures. The organisation and establishment of this IT governance is carried out by the Process Management and ICT Strategy Group in the Executive Group for Organisation and Security of the Chief Executive Office on behalf of the Executive City Councillor of Digital Innovation and the Chief Executive Director.

In these times of growing digitalisation, IT business alignment, so the cooperation of areas of expertise (business) and IT, is an indispensable part of the city's ICT. This includes the continuous mutual coordination of areas of expertise and IT on the strategic level for the definition of necessary goals, strategies, plans, portfolios and infrastructure as well as a regular exchange on the operational level, where projects, routine operation and all business processes are managed. What is important at all levels is social alignment, that is to say communication quality, mutual trust and cross-departmental knowledge.

The key to the successful implementation of Vienna's Digital Agenda is good coordination between all parties. These currently include the people responsible for content in the municipal ICT department (MA 01), the City of Vienna's enterprises (Vienna Hospital Association, Housing in Vienna and Vienna Waste Water Management), all facilities and companies closely related to the city (for instance Wiener Stadtwerke) as well as the IT industry and particularly interested citizens.

### **Objectives CONTROL action field**

- Digitalisation Control Group and Executive Board – establishing digitalisation as strategy and communication bodies
- Continuing development of the City of Vienna's CIO department as think tank and innovation driver
- Continuing to build up Municipal Department 01 (MA 01) "Wien Digital" as a partner for operational implementation
- Nominating a Digital Officer for every department
- Establishing a dynamic ICT strategy instead of rigid structures for more innovative power
- Employing modern ICT equipment in every department

### **Key projects CONTROL action field**

#### *Digitalisation Control Group – designing Vienna as a capital of digitalisation*

Vienna is to become Europe's capital of digitalisation and defining clear goals and projects is necessary to achieve this. This is done in the Digitalisation Control Group under the leadership of the City Councillor of Digital Innovation as well as with the assistance of internal and external experts.

The role of the Digitalisation Executive Board is to achieve, control and design the concerted alignment of all municipal areas. This Board is comprised of representatives of the chief executive level and representatives of the executive and management board levels in the City of Vienna's central holdings.

#### *Digital Officers – shaping digital change together*

"Digital Officers" responsible for all departments are established and trained in accordance with the "digitalisation strategy for the Vienna City Administration" to drive forward the speed of the city administration's digitalisation. They are to advance digitalisation initiatives in cooperation with the ICT Department. For digitalisation is by no means purely an IT issue but requires interdisciplinary cooperation instead.

#### *Chief Information Officer (CIO) – planning ICT and digitalisation*

Ensuring implementation of the objectives pursued by the Digitalisation Control Group and the Executive Board is the responsibility of the City of Vienna's Chief Information Officer (CIO). The CIO's office is the strategic planning and control unit in all areas of the City of Vienna's forward-looking information and communication technology and efficiency-promoting process management. The CIO department is both a think tank and a driver of innovation, as social and technological trends are observed there and the development of innovative ICT and digitalisation solutions is kicked off there. ICT consolidation and increased cooperation between the City of Vienna and its enterprises and companies is likewise promoted by this department.

#### *Secure ICT: MA 01 – Wien Digital*

In addition to the strategic course pursued by the Chief Executive Office, the city's operational ICT must align itself with the principles of the Digital Agenda. In doing so, it ensures that the added value contributed by ICT increases for the entire city. As the City's provider of solutions, it has a special responsibility.

The City of Vienna's operational ICT will change dramatically in the coming years to meet the requirements of the age of digitalisation. As a result, a focus must be placed on its service portfolio and an appropriate organisational structure applied. The diversification of employees will be another priority in this context, both in terms of the ratio of women and men as well as in terms of age structure. Operational ICT will use industry role models (industry best practices) and continuously obtain certifications in accordance with relevant norms, thus delivering a stable performance as a trustworthy and reliable ICT service provider in a rapidly changing environment.

The consolidation of the municipal ICT departments is a major step towards "Vienna as a capital of digitalisation". Nowadays, these departments use a strong single brand (MA 01 Wien Digital). As a result, cross-departmental solutions are now developed just once. Many synergies can be harnessed in the areas of maintenance and operation. Henceforth, the focus will be on deeper technical consolidation, for instance of the city's data centres.

## **Digitalisation projects of Vienna's Digital Agenda – CONTROL action field**

### *Strategic digitalisation*

Nowadays, rigid IT strategies are no longer conducive to ensuring the best possible integrated approach. Instead, a future-oriented and also dynamically expandable ICT corporate strategy should be developed and established as a default.

This new ICT strategy describes the strategic goals as well as the related actions and processes to achieve the objectives of the City of Vienna's corporate strategy. It provides the terms of reference and consists of several "partial ICT strategies" for the following areas: ICT applications, ICT architecture, ICT innovations, ICT staff, information security, digitalisation in the municipal department and in the health area, data excellence as well as sourcing and vendor management.

### *Modern working worlds for Vienna – collaborative, flexible, mobile*

Modern ICT terminal devices and current software technologies (cooperation platforms etc.) increase work efficiency, offer higher availability for customers, raise flexibility and enhance cooperation among members of the staff. In addition, the ongoing development and adjustment of technical equipment for the workplace helps increase the City of Vienna's appeal as an employer.

The systematic implementation of pilot projects and the testing of new technologies and devices is to help identify technical developments early on and make plans for their use in the city. Aside from the technological challenge of integrating these developments into the City of Vienna's ICT systems, questions regarding hierarchical structures and staff management as well as organisational issues will need to be clarified (working time models, learning models, models of cooperation etc.).

## **GLOSSARY**

**API** is the abbreviation for the term "application programming interface" and refers to the interface via which other programmes can access an application or be connected to it. For instance, APIs facilitate the exchange of data between websites and programmes.

**Augmented Reality (AR)** refers to the computer-assisted enhancement of perceived reality. It involves additional information or virtual objects being superimposed into a person's field of vision, for instance using smart glasses. AR systems will be put to use more frequently in a wide range of areas, for instance architecture and medicine.

**Blockchain:** A blockchain is a list of records, also referred to as "blocks", that are linked to each other using an encryption process. Since the records are linked to each other, older "blocks" continue to exist and cannot be modified when new ones are added. This technology is applied for transactions (for instance of crypto currencies). If there is a transaction between the sender and the recipient, another entry is added to the blockchain. This procedure is considered very secure because manipulations to such a chain would be traceable and are not considered feasible.

**Citizen generated data:** Data collected by citizens (individuals, companies etc.) that convey their perspective and can thus constitute an alternative or addition to the data of institutions or governments.

**Clickworker economy:** The term clickworker refers to users that work for companies via the internet without employment on a permanent basis. Usually they take on tasks that can be outsourced to third parties relatively easily, such as information research or the creating and correcting of texts.

**Co-Working** is a new organisational form of work and denotes freelancers or startups that communicate with one another and collaborate continuously or on a project-related basis.

**Creative Commons** is an organisation devoted to making the works of authors available to the public online for free and without restrictions.

**Data excellence strategy** refers to the City of Vienna's commitment to working towards an open administration dedicated to making reliable information and data available to the population, business and science.

**Digital divide** refers to the differences between various population groups in terms of their access to new information and communication technologies and their use. This digital gap

leads to new or perpetuates existing inequalities in people's social and economic development opportunities.

**Digital Officers** are on duty in the municipal departments of the City of Vienna. Their task is to drive digitalisation initiatives forward in collaboration with the IT department.

**Digital signage** refers to digital displays. It can be used, for instance, to provide information about monuments or in advertisement.

**DigitalCity.Wien** is a city initiative driven by committed companies, interested parties from the educational and research sector and the city's administration. This initiative has set itself the goal to convert Vienna into one of Europe's leading digital hotspots and to position it as such both internally and externally.

**Digital democracy** refers to the population's involvement in digital and analogue participation processes. Such cooperation is to create considerable added value for society. For instance, the feedback provided by citizens can inform the development of digital services that become significantly better as a result.

**Digital humanism:** This term refers to the City of Vienna's commitment to ensuring that the development of digital services centres on a humanist world view rather than on economic-commercial interests. The digital world opens up many options, but also causes the growing monopolisation of markets. There is a need to make basic mechanisms and algorithms more socially compatible, particularly in social media.

**GDPR:** The European General Data Protection Regulation (GDPR) has been applicable since 25 May 2018. It harmonises the rules for the processing and protection of personal data.

**eID** is an electronic proof of identity. Digital errands to public offices, for instance via video or chat, require such a digital ID.

**FIWARE** is an open source platform for the smart digital future. FIWARE standards and -APIs help develop and connect intelligent applications for smart cities and in the smart industry, agriculture and energy sectors. FIWARE is considered the global benchmark for seamless cooperation between context- and data-driven platforms.

**Gamification** refers to the use of playful elements in areas such as medicine, communication or education. For instance, high scores can help complete activities faster or computer games can contribute to knowledge transfer.

**GovTech** stands for "governmental technologies" and refers to products and procedures that improve processes in the public sector.

**ICT** is the abbreviation for information and communication technology, including, for instance, TV, radio, computer and mobile telephony.

**Industry 4.0** stands for the fourth industrial revolution and refers to the comprehensive digitalisation of industry. The first industrial revolution was triggered by machines powered by water and steam. The second industrial revolution brought electrification and mass production with the help of assembly lines. Electronics and IT then triggered the third industrial revolution that is heading progressively toward the automation of production. The term "Industry 4.0" is intended to highlight the profound changes yet in store for industrial production as a result of digitalisation.

**INiTS** is a hightech business incubator. The university startup service is operated jointly by the Business Agency, the Technical University of Vienna and the University of Vienna.

**Incubator** is a facility or organisation that supports companies or startups in the formation stage with consulting or infrastructure.

**Internet of Things (IoT)** is a collective term for the interconnection of devices, machines and other objects that can interact by sharing data with each other. For instance, the amount of energy needed to heat and cool buildings can be reduced by the interaction between environment sensors and devices.

**Linked Open Data (LOD)** is freely available data on the web that is accessible to all in the interest of society.

**MA 01 – Wien Digital** is the City of Vienna's ICT service provider. A major step forward on the road to "Vienna as a capital of digitalisation" is the merging of the three ICT departments. Today, these three departments appear jointly as MA 01 – Wien Digital.

**Maker scene** stands for the independent development and production of technical solutions by "do-it-yourselfers". Members of the movement handcraft low-cost products for IT problems, for instance using 3D printers.

**mein.wien** is the new digital city service for citizens and entrepreneurs. The portal offers both comfort and speed for errands to public offices. One by one, options for running errands to public offices of the City of Vienna digitally are being unlocked on the "mein.wien" web application. All the services offered there are conceived and designed from the user's

perspective (for instance GrätzlMap, WienBot etc.).

**Open Data** is data that can be used and disseminated by everyone for every purpose.

**Open Educational Resources (OER)** are free learning and teaching resources with an open license, such as Creative Commons or GNU General Public License, inspired by the English term open content.

**Open Government Data** stands for access to public data. In Vienna, the city's administration makes classified data, figures, documents and services available in formats that are machine-readable, open and free of charge (for instance the Wiener Linien timetable data).

**Open Source Software (OSS)** describes software for which the source code is freely available. OSS may be copied, distributed and used, modified and transmitted including the source text. Open source software is defined in numerous licences.

**Sandboxes** – are testing environments in computer science. A sandbox is used, for instance, to test programmes without affecting the environment.

**Science Slams** are talks where scientists or students present their work or their scientific subject within a short time frame and in an easily understandable way. The lecture is then rated by the audience.

**Sharing economy** is a collective term describing the sharing of resources and products. Popular applications are, for instance, shared offices or the shared use of cars ("car sharing").

**Smart City Dashboard** is the "control panel" via which the citizens of Vienna can get a data-based overview of the city anytime. It presents current data related to the City of Vienna in real-time. Here, information comes together from multiple sources that supply the citizens of Vienna with different data – for instance real-time environmental data or the current parking situation – thus making tangible how Vienna works.

**Smart City Vienna Strategy** summarises the goals that Vienna wants to achieve by 2050 in order to become "Smart City Vienna". This describes the conversion into a city in which the issues of energy, mobility, buildings, infrastructure and technologies as well as health, education, social affairs and equal opportunities are considered in their entirety and innovatively developed. The foundations for this are digital education and qualification as well as the targeted education and professional development of people of all age groups.

**Smart Data** is the basis for the city's data-driven control as well as the more efficient

processing and improvement of citizen services. Smart data also provides the content of the Smart City Dashboard.

**Use case** describes the behaviour of the IT system from a user's perspective.

**Virtual Reality (VR)** is the representation of an artificial, interactive, computer-generated world. Video and audio are combined in a way that creates the impression of a new reality to human senses. Today, people can enter such artificial worlds, for example by means of VR glasses.

**WAFF:** The Vienna Employment Promotion Fund is one of the city's labour market policy institutions that helps employees in Vienna get ahead in their jobs. This is done primarily with the help of information, consulting and financial support for education and professional development in a wide range of different sectors.

**WienBot** is the digital assistant of the City of Vienna. No matter whether questions concern district offices, residence registration forms, parking or events – the citizens of Vienna can access the information required even faster and more easily with the help of this app. The WienBot can supply answers to questions about more than 350 topics related to the city's administration and is continuously expanded. It is part of mein.wien, the digital city service.

**Vienna Education Directorate:** The Vienna Education Directorate, formerly known as City School Council, is responsible for all matters concerning public schools. It is a partner of the digitalisation pact of the City of Vienna in order to continue expanding education and professional development in the ICT field.

**Vienna Business Agency** is a central interface between the city and companies. It supports companies in the startup phase, in their search for funding or for appropriate infrastructure and helps them network with other companies or expats. In addition, the City of Vienna generates powerful momentum for the establishment of international companies through the Business Agency.

***Credits and disclaimer***

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