



HONORARY PATRONAGE
OF THE MAYOR OF WARSAW

WARSAW

- towards
a Smart City

2018

Dynamic urbanisation together with globalisation processes, the free movement of people, and the flow of capital and information, mean cities face unique challenges, requiring new development strategies. It is extremely important to provide cities with innovative solutions to meet their inhabitants' needs and, at the same time, enable rational government driven by the idea of sustainable growth. Thus, the term Smart City is increasingly being applied to the growth of urban areas.

What is a Smart City?

A Smart City is an urban area which makes intelligent use of information and communication technologies (ICT) and other innovative tools in order to raise the quality of life of its inhabitants, whilst engaging them in decision-making processes. A Smart City is characterised by sustainable growth, care for social, economic and environmental

values, and the use of cross-referencing and integrated solutions to achieve its aims. Such a city also focuses on the needs of present and future generations. It also requires that the public authorities make good use of new technologies within the framework of the city's strategic management. The foundation pillars of the Smart City are environmental care,

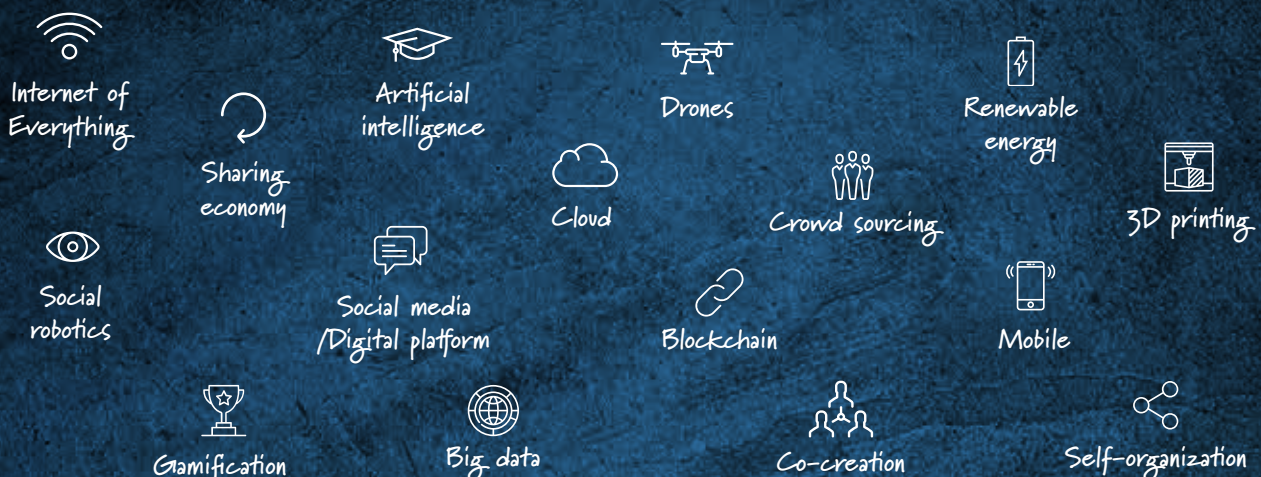
intelligent city management, the development of human capital, a raised quality of the lives of the inhabitants, intelligent construction, sustainable economic growth, infrastructure and public transport.

Smart City = a good city to live in

Goals:



Influenced by technologies and social changes:



Thus, the idea of the Smart City is based on creating and using a network comprising human capital and information and communication technologies in order to generate the sustainable economic growth of the city, whilst improving the quality of life of its inhabitants. The key areas are:



1. smart
mobility



2.

smart
economy



3.

smart
environment



5.

smart
society



smart
living

4.



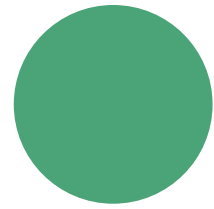
5.

smart
society



6.

smart
government



Smart mobility means mobile solutions which allow synergies in different areas of the functioning of the city. Many factors combine in an effective and balanced manner, helping to automate the processes of daily life. In a Smart City, mobile solutions based on new technologies are often implemented in infrastructure and transport, allowing inhabitants quick data access and time-efficiency. First of all, they are intended to serve the inhabitants, ease travel around the city, help in finding parking spaces and, as a result, reduce air pollution.

Key indicators include:

- wide access to public transport,
- effective public transport,
- sustainable solutions using new technologies.

A Smart City also supports economic development, entrepreneurship, the employment market and tourism, and encourages a pro-investment policy.

A smart economy uses innovative business models and is highly efficient and technologically advanced, whilst encouraging and supporting local initiatives. It stimulates the creative sector, actively educates, and creates growth opportunities for inhabitants.

Key indicators include:

- pro-investment policy,
- creative sector support (increasing number of start-ups),
- expenditure on the R&D sector,
- flexible labour market.



A major idea behind the Smart City is the **smart environment**, or how we manage electricity, water and waste, and how we protect the environment, air quality and green areas. An efficient urban economy, using green energy and promoting sustainable growth, has become one of the most popular challenges of modern urbanism. Currently, CO₂ reduction systems are just as important as the development of new technologies, since they influence the quality of city life and, in the longer term, lead to major savings at a citywide level.

Key indicators include:

- environment protection,
- smart buildings,
- air pollution reduction activities,
- sustainable management of natural resources.





One of the foundations of the Smart City is **investment in human capital (smart society)**, which has many growth paths in terms of social diversity, tolerance and creativity. The authorities should educate and bring about change to influence society to constantly strive to improve qualifications and skills, as well as boost its creativity and collaboration, all with the support of modern technologies.

Key indicators include:

- education support,
- possibility of improving qualifications,
- citizens involvement in social life.



The main assumption behind the idea of the Smart City is **smart living** i.e. raising the quality of life of the citizens of the Smart City; something which goes beyond the effective implementation of new technologies. In this case, smart solutions concentrate on the needs of present and future generations, with regard to their health and safety. A better quality of life also means living in a city with a rich variety of culture, housing and entertainment, whilst providing wide access to educational, communication and service infrastructure.

Key indicators include:

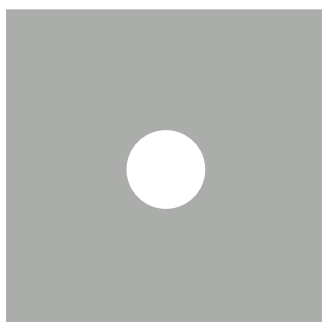
- wide access to public, cultural and entertainment services,
- concern for inhabitants' safety and health,
- numerous investments to increase the attraction of city living.



The Smart City requires **smart government**, in which a key role is played by the city authorities who facilitate the organisation and integration of the remaining elements of a Smart City. The possibility for society to participate in decision making is crucial, along with transparency, and access to high-quality public services. Such an approach is linked to effective collaboration between the public and private sectors, along with the participation of an integrated city management system, underpinned by a new technology infrastructure.

Key indicators include:

- pro-citizen policy,
- use of innovative technologies and e-services,
- collaboration of public and private sectors in city management,
- open access to data for inhabitants,
- local development strategies.





Heading towards sustainable and intelligent development, Warsaw mirrors trends observed in many European cities. A number of initiatives aimed at improving the quality of daily life and the functioning of the city are already in place and operating in Warsaw. These initiatives are primarily investments for developing infrastructure and the digital sphere, which results in an increase in quality of functioning city services, including e-services. At the same time, traditional investments are accompanied by a series of actions focused on building human and social capital and engaging citizens in co-governance of the city. Using innovative tools, these actions improve the quality of life of the inhabitants, thus bringing the city closer to its goal of intelligent development.

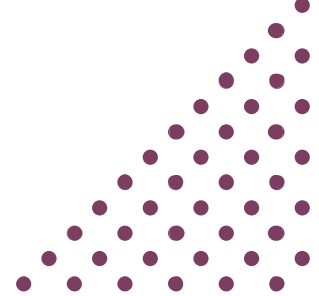
Warsaw – towards a Smart City

Authors: Knight Frank in cooperation with the Digitization Department and the Economic Development Department of the City of Warsaw

MICHAŁ OLSZEWSKI, Deputy Mayor of Warsaw
- When is the development of a city smart?

” The inhabitants come first in Warsaw, and each technical advancement is aimed at improving the quality and convenience of their lives. We are using technology to cooperate with inhabitants who might have an influence on such important issues as public transport, air quality, green spaces or the city budget. The city develops in a smart way when its residents are well-informed and can contribute to the city’s management, where they can live and have the opportunity to explore their ideas. In the last couple of years, Warsaw has been developing dynamically and a number of initiatives have been implemented in cooperation with the city’s residents. These include the participation budget and local projects to improve the quality of local infrastructure and respond to specific needs. It is also important to build trust between local government and residents, who feel like hosts for the place in which they live. The Smart City is not just a well-designed urban system; it is primarily about satisfied city inhabitants. ”

Sample projects which are bringing Warsaw closer to becoming a Smart City whose growth is sustainable.



Smart mobility

Veturilo

– one of the largest urban bike systems in Europe, constituting an important element of Warsaw's transportation ecosystem. Thanks to expansion in the number of bike lanes, the Warsaw network is now 500 km long. The system reaches many different parts of the city and is a credible alternative to public transport.

355 bike docking stations

5m bike rentals

610,000 users in 2017

introduction of electric bikes



Mobile apps

– a number of mobile apps for public transport passengers are live in Warsaw and enable them to, for example, buy tickets, pay for parking, check timetables, plan routes, and estimate the actual arrival time of a bus or tram based on the vehicle's location in the network.



Car-sharing

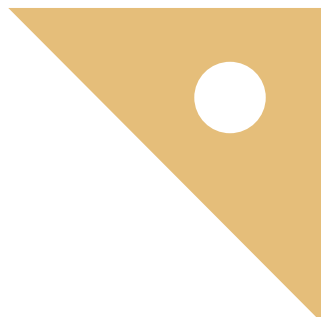
– renting a car by the minute is becoming increasingly popular all over the world. Warsaw introduced this service in 2017, with many companies soon offering short-term rentals.



Planned or under development:

Electromobility

– a few dozen electric buses are already present on Warsaw roads, with 140 more coming in the near future. Within the next few years, the capital city will fully update its entire transport fleet to electric and gas vehicles, and install public charging stations for individual drivers.



VaVeL

– a pilot project using big data conducted in, for example, Warsaw and Dublin. A platform is being set up to integrate and analyse data from public transport and the Veturilo bike system. It will enable the creation of an intelligent journey planner. The app will suggest an optimum route based on real time transport data.

Smart economy

With its numerous business incubators and multiple strands of support, Warsaw is becoming a major hub for developing entrepreneurship, innovation and start-ups. Many initiatives undertaken by the public, private and scientific sectors exert an influence on it. Activities in the dedicated, contemporary spaces of the **The Centre of Entrepreneurship Smolna** and **The Centre of Creativity Targowa**, bring together the growing ranks of start-ups and emerging companies. They also host events

promoting business and new technologies. Autumn 2018 will see the opening of **The Centre of Economic Promotion ZODIAK** in central Warsaw: an interactive showroom, the face of modern Warsaw, and also a place to support investors, and hold meetings. As well as the city's activities, other business initiatives are taking place. In 2015, Google opened an up to the minute business incubator in the Praga district. The location became so popular that the company

decided to expand its operation. A second American giant, Microsoft, along with Senfino and EY, opened Startberry, a young business and start-up accelerator. Warsaw is also home to many centres and support initiatives for entrepreneurs and their ideas, providing opportunities for development and cooperation with investors and business – The Heart Warsaw, Reaktor and Akademickie Inkubatory Przedsiębiorczości.



The Centre of Economic Promotion ZODIAK
Source: Kalata Architekci

The Centre of Creativity Targowa



Planned or under development:



Urban Living Lab, Kampus Nowych Technologii,
Pro Development, The Warsaw University of
Technology

The Warsaw University of Technology and Pro Development will create Europe's largest urban living lab. **The Kampus Nowych Technologii**, whose construction got under way at the start of 2018, will be a place for testing intelligent technologies designed for urban spaces, and will be operating within two years. The village will have residential buildings, office and service properties, along with public spaces where smart technological solutions will be implemented. Warsaw citizens will be the testers.



Smart environment

The Smart Heating Network – is a joint investment between the city of Warsaw and Veolia Energia Warszawa S.A. completed in autumn 2017. By modernising the existing network, installing appropriate equipment, and implementing apps to manage the system, the optimisation of consumed resources and a 14.5 tonne lowering of Warsaw's annual CO₂ emissions was achieved. This equates to the planting of 1m trees.

Warsaw heating network:

- largest network in the EU
- includes **1,800 km of network and 19,000 installations**
- covers **80% of the capital's need**

A million trees – the urban app enables citizens to designate a location where a tree will be planted. The app was introduced in spring 2017. Warsaw citizens have been quick to participate in the initiative and, so far, have designated 8,500 tree planting locations. This can also be done via the 19115 application.

Step by Step – is a pilot project aimed at changing energy-consumption behaviour of citizens. The project includes 3,113 households in the Goclaw district. The results showed that using LED bulbs, as well as turning all lights off while leaving the room, or switching off devices from standby mode, 397 MWh of energy was saved. (Step by step is an international project financed by Horizon 2020 program).

Under development:

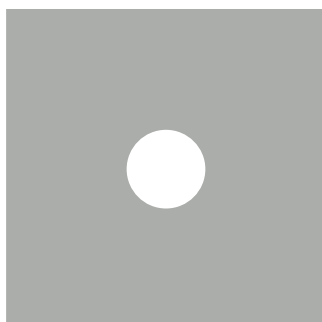
The Warsaw Air Index – an official urban system allowing the checking of air quality in the capital and the obtaining of the forecasted change in the concentration of harmful particles in the atmosphere. Its key components are recommendations related to the outdoor activity of inhabitants, along with pollution alerts for the current or following day. In the coming years, another 100 air monitoring devices will be installed to support the Warsaw Internet of Things platform.



Smart society

As the country's largest academic centre, Warsaw offers a wide range of **open universities and third age universities**. Open lectures are held at institutions such as the University of Warsaw, the Cardinal Wyszyński University and the Warsaw School of Life Sciences. The third age university is dedicated to pensioners who want to pursue their passions and interests. Approximately 40 third age universities now operate in Warsaw.

Warsaw Volunteers – an urban portal promoting voluntary service. It helps volunteers to find initiatives they would like participate in.



The Copernicus Science Centre – opened in 2010. A science centre, museum and planetarium. A unique conference and exhibition centre in both Poland and the surrounding part of Europe. It helps to deepen the knowledge of biology, physics, chemistry and mathematics by conducting experiments. The centre's rooftop garden is open to visitors. It's a flagship example of Warsaw's growing green building stock.



Dzielnica Wisła – an initiative of the city encouraging the spending of leisure time on the banks of the Vistula and, at the same time, a campaign promoting the maintenance of a clean, riverside environment. Promotion and education is accompanied by investments to make this part of the city more attractive. In 2017 a further stretch of the Vistula boulevards was opened, and Warsaw received a location with a sports hub, outdoor gyms, bike lanes and restaurants and cafes. In the summer, the boulevards teem with life and rank high among the city's favourite places.



19115 Warsaw City Contact Centre

– a modern multi-channel contact centre which enables people to contact the city 24/7 via phone, e-mail, chat or mobile app. The latter is a useful tool to draw attention to vandalism and urban decay, designate places for tree planting, or browse projects under the umbrella of the participation budget. In 2017, 19115 was recognized by Germany's CRN magazine as one of the five most innovative projects in digital transformation in Europe.

Planned or under development:

Warsaw Virtual Functional

Area – a project in which Warsaw and 25 neighbouring communities included in the Warsaw Virtual Functional Area will design and implement mobile apps in public cyberspace access, tourism, transport, parking and environmental protection in the coming years.

Smart government

The Warsaw participation

budget – a mechanism which has been developed over the past few years to engage local communities in shaping the city's development. It allows the inclusion of citizens' voices in the decision-making processes regarding the city's expenditures. Since 2015, the Warsaw participation budget has been based on a mobile app, which enables citizens to register initiatives and desired activities.

The „Otwarte dane po warszawsku”

– since 2015, Warsaw has shared more than 200 data collections via a dedicated web platform. As a result, anyone can easily gain access to data from official sources on subjects such as transport, education, history, culture, entertainment, real estate, and social projects. Data availability feeds the creativity

of programmers. In effect, Warsaw supports hackathons, or programming marathons, which aim to create author apps dedicated to urban space users.

Planned or under development:

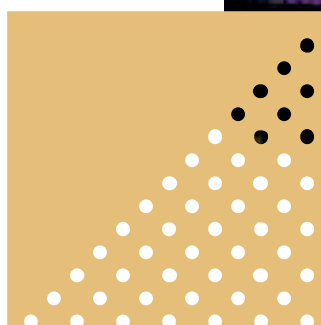
Data availability is perceived as one of the conditions necessary for building a truly Smart City. For 2018, Warsaw has planned a key update of the city data platform **‘Otwarte dane po warszawsku’**. The new version of the platform will be an attractive place to gather verified data. It will also offer analyses for users on various digital competency levels and different needs.

#Warsaw2030 development

strategy – Warsaw has created a new development strategy based on a months-long social consultation process. The new strategy focuses on the key aspects of a Smart City – the role of social participation, co-decision making about the city, the growing of creative potential, the creation of innovation, and a creative response to challenges.

” If you want to make life better for people,
make the cities better ”

Jamie Lerner, town mayor of Curitiba in Brazil
(one of the greenest cities in the world,
famous for its ultra-efficient public transport)





Warsaw

The significance of modern cities as centres that concentrate an increasing part of society is ever-growing. According to the UN projections, global population will increase by 30% by 2050 and nearly 70% of society will live within cities. Thus, it means a significant increase in demand for utilities (such as energy, water and gas), transport services, and the number of investments in the field of environmental protection. Warsaw also faces these challenges - the city's population is growing year by year and, according to PWC forecasts, the number of Warsaw inhabitants will increase by 10% by 2035. Consequently, the Smart City idea is the future for the majority of agglomerations. The key question is how quickly cities are able to meet the requirements of the concept of sustainability. Warsaw has already taken its first steps towards becoming an intelligent city but there are still some areas which need investment and change. Certainly, these areas concern technology, but first of all they require changes in the mentalities of Warsaw's citizens and visitors, along with thinking in both local government authorities and business.



- smart city?

Prof. MIECZYSLAW MURASZKIEWICZ, The Warsaw University of Technology

” Warsaw has already begun its work on constructing a common ICT platform, integrating scattered and unconnected information and IT systems with opening data resources. Integration relates not only to data and ICT systems, but also to organisational and infrastructural improvements. The concept of the Smart City is open by nature, especially when we consider the pace of ongoing technological change. The work being carried out in Warsaw takes that into account, and its overseers are constantly ready to modify and enhance their Smart City vision for the capital of Poland. In practice, this approach is implemented, for example, by using agile methods of management and design. ”

MARCIN WOJDAT, Secretary of the City of Warsaw

- What are the priorities for the smart development of Warsaw?

” We need to look at the Smart City from different angles: socially, economically, technologically and environmentally. Each of these perspectives focuses on creating better living conditions for people in cities. The Smart City is a concept which, so it seems, best answers the question: how do we get to that point? It highlights the fact that intelligent urban growth is made possible by the use of information and communication technologies. On top of investing in infrastructure and social capital, we want to invest in digital growth in an integrated and consistent manner. That is why we are planning to focus on expanding multichannel communication, open data, and mature e-services. ”



Smart buildings in Warsaw

Author: Knight Frank Poland

The concept of a Smart City cannot be advanced without developers and owners of commercial real estate. The key question is whether they are willing to take up the challenge of creating their buildings as multi-functional elements of an intelligent urban infrastructure, that responds to the continually changing needs and demands of the contemporary working environment, and the wider outdoor climate.

SMART TECHNOLOGY

The equipment of smart buildings consists of numerous technological solutions which enable the control of and response to environmental changes, both inside and outside the system:

- Commercial properties are usually equipped with Building Management Systems, which are extensive and connected, and may integrate many interdisciplinary elements for the collection, exchange and analysis of system data. Based on accumulated information, it is possible to react to and resolve issues which arise.
- The active use of such platforms enables precise monitoring and management of individual parameters, along with their optimisation, made possible by the Internet of Things. With a network connecting multiple sensors, the exchange of data is possible in real time between devices communicating independently. For this purpose, beacons are used which, through Bluetooth

technology, are able to send information to mobile devices located within their range.

- Heat-insulating facades contain photovoltaic cell systems which supply power to the devices inside, and thanks to built-in ventilation and heat recovery installations, it is possible to reduce the energy footprint of a building's heating and cooling systems.

- External blinds equipped with sensors react to changes in external conditions, notably the degree of incoming solar radiation and the seasonal climate, preventing overheating or excessive cooling of the building. Appropriate systems adjust the amount of light in rooms to the amount coming in from outside.

- Smart buildings are usually equipped with modern LED light fittings, motion sensors which enable the control of lighting, and mobile applications which allow the effective management of light intensity and colour. After connection to a wireless network, the user can manage the system from any place. Innovations in intelligent buildings allow users to take full advantage of a building's capabilities with minimum disturbance to the environment.



Eurocentrum, Capital Park

SMART ECO (SUSTAINABILITY)

Nowadays, when people care more about the environment and a healthy lifestyle, smart buildings have to adjust to more demanding times. Each building, in order to qualify as intelligent, should have specific features. Green certificates have already become standard in buildings under the control of property managers and property owners, whether at the construction stage or after delivery to the market. New investments take full account of considerations related to sustainability, in terms of safe and ecological construction materials, energy saving systems, and grey-water recovery systems. Water efficient bathrooms, along with rainwater harvesting and green area irrigation are becoming more and more common practice in smart buildings.

**Beehives on the myhive Nimbus rooftop,
Immofinanz**

Buildings are also noteworthy for the larger green areas in and around them. There are green walls, meeting points and chill-out rooms surrounded by plants in lobbies and on reception desks. Outside buildings, the green areas are accompanied by benches, tables, outdoor gyms, and even vegetable and fruit gardens. Facilities for birds, animals and insects are another common feature; many buildings offer beehives, green roofs, feeders for birds, and boxes for insects and bats. The owners, as well as the tenants, concentrate more on waste segregation. Consequently smart buildings play host to electrical waste collection campaigns and educational events to draw attention to the need for proper waste segregation. Office organisation facilitates waste segregation even at the level of individual tenants.

SMART ENVIRONMENT FOR TENANTS

Smart is not only about respecting the environment. This term also encompasses all of the amenities for tenants that significantly simplify their functioning and involvement in common initiatives and activities. Most of them have the opportunity to use additional facilities at their workplace, which include services like parcel lockers, laundry machines, ATMs, mobile seasonal services (e.g. car

tire services), canteens, cafes and slow food points.

The concierge service has also become popular, giving support in organising everyday matters such as airport pickups for guests, the making of non-work reservations, or the organising of child-minding services. Being green also means promoting ecological transport (charging points for electric cars), facilities for cyclists (bike racks, changing rooms, showers, repair stations), along with

creating a large biologically active area inside and outside the building. Smart buildings also give their tenants opportunities to have an impact on their work environment by such initiatives as participation budgets. Stakeholders may contribute to, and decide on, what kind of improvements the landlord should allocate funds to in the upcoming year. We can observe a growing trend towards employee involvement in the building's life, through the organising of various events.



Yoga in Empark, Immofinanz

Open-air cinema in Empark, Immofinanz

Not only is it very important to enjoy work time, but people want to spend time meaningfully in the pursuit of a healthy and sustainable lifestyle, a good work-life balance, an ongoing education, coupled with support for charitable initiatives. A perfect example is the yoga workshops organized as part of the International Day of Yoga, whose aim is to instil peace and harmony in practitioners.

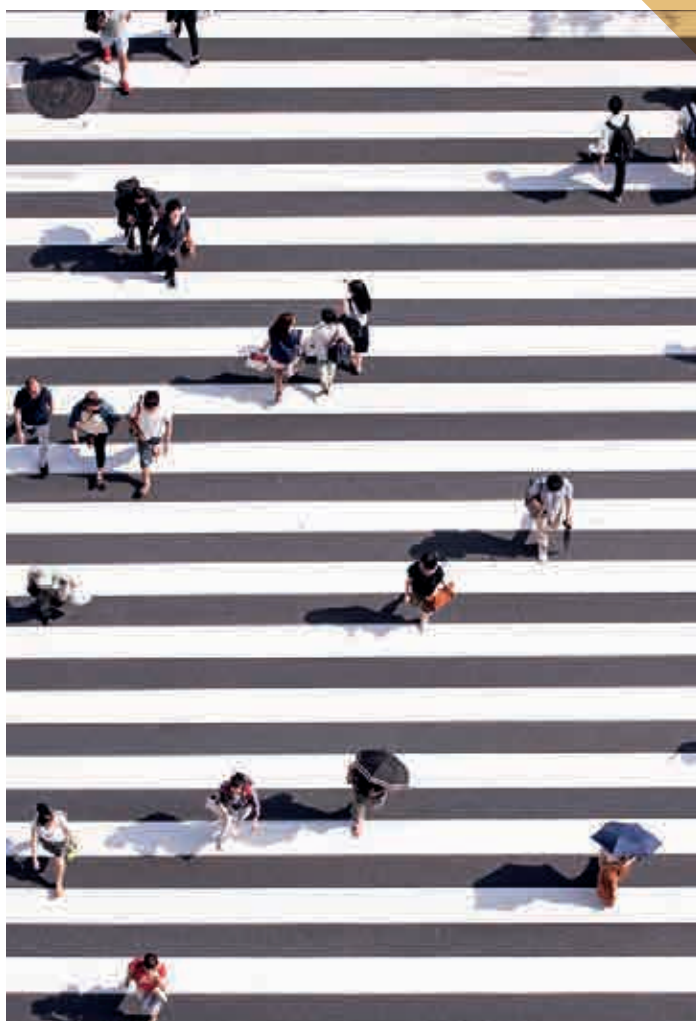
THE SMART OFFICE

An intelligent building is more than a modern office space coupled with a number of mobile and technological features. The office meets 100% of its function only when it is filled with users. With the current demographic and social changes, „smart“ suggests a friendly

workplace atmosphere. Employees are more and more demanding, and expect a comfortable workplace in which to spend quality time in the office. Modern offices offer relaxation zones, rest areas, game and play rooms, as well as places for physical activity. Companies identify the needs and expectations of their employees and respond appropriately. Wellness trends in the workplace are a feature of the smart building strategy and, additionally, contribute to an increase in employee effectiveness. Flexibility is a key word in the smart building philosophy. Employees can do their job from anywhere thanks to broadband access. For the majority, mobility is the key factor when choosing an employer. Office equipment should also meet ecological criteria including furniture made from recycled materials or constructed of wood from certified sustainable sources. Desks with adjustable height coupled with cycling machines instead of traditional chairs allow employees to adapt their work space to their current needs, giving the added bonus of an invigorating workout to boot. Smart may also mean floor-coverings made from recycled materials, and acoustic panels in which foliage is a key element.



Google Campus Warsaw



The idea of Sick Building Syndrome is more and more noted. Bad air quality and incorrectly-regulated temperature in the office may cause health problems. Such issues are absent in building which are smart and intelligent. The challenge for smart offices is to find a balance between technologies and the needs of employees, and to provide them with appropriate working conditions.

SMART FUTURE

What will smart buildings of the future offer? Inevitably, they will be zero-energy buildings, with zero net energy consumption, and zero net annual CO₂ emissions.

According to the EU directive (EPBD 2010/31/UE), from 1st January 2019 all new buildings owned or occupied by public authorities will have to be buildings with near zero energy consumption. Two years hence the law will come into force for all new buildings in Poland. In model examples around the world, there is already such an idea that each employee can personalise their own workplace. It is likely that in future everyone will be able to control their work conditions from their smartphone - where they will be sitting, what the office temperature, humidity or lighting quality will be. Intelligent jobs of the future are those that will offer a seamless connection and interaction between the building and its users from any point on Earth or, perhaps, beyond.



Smart cities - going global

Author:
James Roberts, Chief Economist,
Knight Frank London

” A Smart City uses new technology to the maximum to advance the goals of the community, either by promoting social cohesion, delivering efficient services, or meeting sustainability targets. In the long-term, I believe the various Smart City initiatives being launched today will allow the ‘live’ management of cities, so they will adapt to changing requirements for public services on a day-to-day basis. ”

Technology and data will make ‘live’ management of cities a reality.

Smart cities use the growing possibilities of Information and Communications Technology (ICT) to achieve a series of goals. This allows policymakers to deliver bespoke solutions to the challenges of managing modern cities. Smart cities aim, via ICT and data analysis, to advance:

- Social cohesion
- Sustainability
- Efficiency

Achieving these three goals occurs through greater interaction between the city’s government and its citizens, and analysing data from sensors installed in city infrastructure – like traffic lights or bus stops – or the signals coming from smartphones. In the long-term, this will allow city governments to achieve ‘live’ management of their cities.

Social cohesion

Seoul, South Korea, is a good example of smart city technology being used to advance social cohesion. The city authorities have used the Internet and smartphones to interact with the public, and share more information. This helps to keep the government better informed of the public’s views, while people can find out what services are available to them. An m-voting app lets Seoul’s citizens’ vote on local issues via smartphones, so the city can measure public opinion.

The city government’s web portal has been transformed to allow officials to establish their own web pages and blogs, encouraging them to interact with the public. Most non-confidential data is available on the Internet, so citizens can conduct their own analysis of the government’s efficiency. Accessing interactive maps via their smartphones allows citizens to find information on what services are available nearby, or whether new buildings are planned.



Efficiency

Filling a street with sensors can advance other community goals, thus enhancing the overall efficiency of a city. One of the lamps being tested in Copenhagen's Albertslund will contact the police if there is a sudden flurry of human movement nearby at a time when one would expect the street to be very quiet. This shows how in a Smart City, technology intended to achieve one goal can address other issues.

In Italy, the SmartMe app covers various cities and towns in Sicily, creating many efficiency benefits from one technology. The app allows motorists to identify and reserve parking spaces, and a new function being developed will use the motorist's phone to detect when the car hits a pothole. This will be plotted on a map to warn other drivers, which can also be seen by road repair workers.

SmartMe also shows pedestrians where to find available taxis, and feeds data on bus locations to smart bus stops, which have solar-powered screens for people to access the app. Sensors warn SmartMe users if there are long queues at the airport, so travellers know to arrive early for their flights.

As more people use SmartMe, the amount of data it collects will increase – on where people go, at what times, and which mode of transport they use. This could be used to plan a range of public services.

Sustainability

Many cities are committed to sustainability targets, and in Denmark we see Smart City technology helping a city government achieve its goals. Copenhagen's smart traffic lights system gives buses and cyclists priority over cars. This encourages sustainable commuting in a city that wants to become carbon neutral. Large trucks create more pollution than most other vehicles, so the traffic lights arrange green light routes to minimise the time they spend in the city. Barcelona uses a similar system to hurry emergency vehicles through traffic when responding to incidents.

According to Cisco, power for streetlights can account for nearly 38% of a city's utilities expenditure. In a suburb of Copenhagen, Albertslund, the city is experimenting with different types of smart street lamps that are equipped with sensors. Some dim if no one is around, others call an engineer when they need repairing, or monitor air pollution. Sensors in the street lamps gather data that the city can use to measure whether carbon emission targets are being achieved.

Live management

The data gathered via various Smart City initiatives will in the long-term allow 'live' management of cities. Traffic could be managed in a highly responsive manner, and evolve on a day-to-day basis as the city's transport system adapts to circumstances. A city's resources could be deployed according to the demands of the moment, not based on the experience of previous years.

The result will be cities that can adapt their services as the population changes its behaviour. If a road is getting congested regularly, traffic light data will inform the transport authorities. If a new location becomes fashionable with late night drinkers, smartphone signals will highlight this, and more night buses can be scheduled. Smartphones, sensors in street lamps and bus stops, and apps, will provide authorities with the data that identifies new trends.



As one of the largest and most experienced research teams operating across Polish commercial real estate markets, Knight Frank Poland provides strategic advice, forecasting and consultancy services to a wide range of commercial clients including developers, investment funds, financial and corporate institutions as well as private individuals.

We offer:

- strategic consulting, independent forecasts and analysis adapted to clients' specific requirements,
- market reports and analysis available to the public,
- tailored presentations and market reports for clients.

Reports are produced on a quarterly basis and cover all sectors of commercial market (office, retail, industrial, hotel) in major Polish cities and regions (Warsaw, Kraków, Łódź, Poznań, Silesia, Tricity, Wrocław). Long-term presence in local markets has allowed our research team to build in-depth expertise of socio-economic factors affecting commercial and residential real estate in Poland.



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