Smart Cities

How will we live in the cities of tomorrow

Current forecasts regarding living conditions in cities don't yet take it for granted, but it's possible that in the future people will live healthier, more pleasant, and more relaxed lives in the major cities than they do today. But that will require cities to become smart, and even downright crafty. Various exciting technologies are steadily helping to transform cities into open-air computers.
In only 15 years, almost 60 percent of humanity will live in urban centers. And by 2050 that figure

will be 70 percent, according to current forecasts — almost as many people as the total population of the earth today. The disturbing thing about this is that cities already account for up to 70 percent of global greenhouse gas emissions.

Almost 90 percent of the world's urban residents breathe air that contains more pollutant emissions than the recommended thresholds. And many cities are already struggling with a shortage of

living space, overburdened infrastructure, and vulnerable water and energy supplies. There is also an increasing risk of natural disasters caused by climate change — which is made significantly worse by the emissions of large cities.

Paths to a Better Future
Things could be very different. Urban residents could enjoy clean air instead of smog, stress-free mobility instead of congested roads, clean drinking

water instead of water sources that carry pathogens, and affordable electricity from renewable sources that is available on demand instead of expensive or dirty energy obtained from fossil fuels.

The path to that future does not lead back into a pre-industrial age. Instead, it leads forward to an age of digital technologies in which cities operate like large computers. Many major cities are already on the way to that future — at least in some areas. They are becoming smart in the modern sense: on the basis of data. And they are being helped by many sophisticated technologies.

From Software to Smart Cities

In every major city, there are already untold numbers of sensors and meters collecting data of all kinds. But very few cities have made a meaningful attempt to transform this data into actionable knowledge. How can that be accomplished? That is the question, and the challenge, for the city of the future.

Answers are being supplied by algorithms that are coordinated with one another, as in the case of the Green Mobility app that was developed in the EU project "Streetlife." In this case, software identifies the "greenest" transit routes for the cities of Rovereto, Italy; Tampere, Finland; and Berlin, Germany. In many other cases, the software in question consists of more complex systems, such as artificial neural networks. These are computer models whose operation is similar to that of the human brain. Through training, they learn to recognize interrelationships so that they can make forecasts. One example of the fascinating results of neural networks is a software developed by Ralph Grothmann from the Siemens Corporate Technology (CT). It accurately predicts the degree of air pollution in major cities several days in advance.

Precise forecasts based on precisely recorded data are the foundation for optimized use of urban infrastructures. They make it possible for smart grids to manage tasks such as balancing fluctuations in the power supply that result from changing weather conditions. Forecasts of this kind can already be used to indicate how a fleet of electric cars can be integrated into a building management system and be used there as an energy-storage mechanism.

From Information to Enhanced Services

The future of smart cities will be shaped by the Internet of Things as a networking technology and by smart data as a forecasting technology. For example, power generation and consumption can be coordinated more precisely when consumers such as air conditioning systems can be automatically dialed down during periods of peak demand; increasing decentralization of power generation can be managed efficiently through implementation of smart grid technologies; and industrial facilities, buildings, and transportation systems can be integrated as energy service providers.

Already at an earlier stage, this opens up completely new markets for technologies and services. At the moment, for instance, Siemens is filling about 100 million pounds' worth of orders for a project that will significantly relieve strain on London's rail transit system beginning in 2018. The Crossrail Tunnel is the sort of project that occurs once every century — and it is currently the largest infrastructure project in Europe. Crossrail will increase the capacity of London's local public transit system by approximately ten percent

Cities and their residents can be linked together in networks that have the potential for optimizing not only energy use, but transportation, logistics, medical information, entertainment, and much more. Ultimately, however, all of these services are based on data — and that raises concerns about a "big brother" state. Will tomorrow#s cities be the world of George Orwell's 1984? Not at all, says Bernd Wachmann, who heads the Sustainable Cities technology area at Siemens Corporate Technology and is the spokesman for the company's City Intelligence Platform. The latter is a central platform for the analysis of information and data that was developed for research purposes. Its goal is to bring together all of a city's data, evaluate it, and issue commands to implement measures that reduce costs and emissions. "We need only anonymized information," says Wachmann reassuringly.

Transformed Workplace

The increasing interconnectedness of cities has already led to many cultural changes. By 2020 about five billion people will be connected via to the Internet. This is a development that will cause lasting changes in many facets of our lives - particularly in the workplace. The typical workday of the future will no longer be spent in an individual office; instead, it will be characterized by decentralized, global cooperation, global competition, and lifelong learning. This may have both positive and negative effects: a new feeling of community or a growing sense of alienation. In smart cities, and in an increasingly interconnected world, knowledge workers collaborate in virtual teams, open-plan offices, and coworking centers.

The barriers between generations, time zones, and cultures may be disappearing. But job insecurity and lack of identity may also be aon the rise. One thing is certain: as the capabilities of the internet expand, we will continue to share ideas ever more rapidly and intensely, spinning them into ever more information-based services and new ways of living in cities.

How radical are the structural changes that cities will have to implement in order to become smarter and more livable? In one sense, not especially radical, argues Carlo Ratti, an architect, engineer, and professor at the MIT Department of Urban Studies and Planning. "I would say that it's not about systematic solutions. It is more like an incremental process," he says in an interview. From an architectural point of view, the city of tomorrow won't look fundamentally different from the city of today, he says — just as ancient Rome doesn't differ all that much from the cities we're familiar with today. "What will change, however," says Ratti, "is the way we experience the city." He attributes this to the comprehensive use of digital technologies. "Over the past decade digital technologies have begun to blanket our cities, forming the backbone of a large, intelligent infrastructure. Our cities are rapidly becoming open-air computers."

So how will we live in the cities of tomorrow? At the moment, there are many indications that it is possible to reverse current trends, and that life in cities can in many respects be better than it is today. **Author: Sandra Zistl**