Smart Cities

Brave new urban world

Although current forecasts of urban living conditions might not be taking it into account yet, it is possible to ensure a healthier, more comfortable and more relaxing life style in urban centers the world over. They only need to get smarter in order to achieve this goal. Can cities turn into open-air computers?

In only 15 more years about 60 percent of the human race will be living in urban areas. And, if current forecasts are right, it'll be as much as 70 percent by 2050 – that's as many people as are living on the Earth today. The unsettling thing about this is that up to 70 percent of the global greenhouse gas emissions already come from cities today. Therefore, almost 90 percent of the world's urban population is breathing air with pollution levels that clearly exceed the recommended limits. On top of that, many cities are struggling to deal with housing shortages, overloaded infrastructures, and vulnerable water and power supplies. Some also are increasingly threatened by natural disasters caused by the climate change, in which the emissions from the urban centers play a decisive role.

Clean air instead of smog, clean drinking water for everyone

The thought that these trends will continue to develop that way – some of them even potentially – is both frightening and alarming. However, there is good reason to hope not least because these trends can be reversed: clean air instead of smog; smooth mobility instead congested transport routes from A to B; abundant, clean drinking water instead of water sources that contain bacteria; where necessary, available and affordable power from regenerative sources instead of expensive or dirty energy generated from fossil fuels.

The way to reach those goals does not lead backward into a preindustrial age but forward into an age of digitalization, in which cities function like huge computers. Many metropolitan centers – at least some parts of them – are already heading in that direction. They are on the way to becoming smart – in the most modern sense of the word – based on the use of data and aided by a number of sophisticated technologies.

Smart forecasts for smart cities thanks to smart software

As a first step, it is necessary to expand the level of knowledge about a city. In every metropolitan area uncounted sensors and meters are already collecting all kinds of data today. All these bits and bytes are acquired and often even stored, but, comparatively speaking, evaluated only to a limited degree and

put to sensible use. How useable smart data can be obtained from that huge pile of big data is the question that has to be answered and the challenge to be met by the cities of the future.

The answers to this are provided by smart software, the most diverse forms of which are already being used today. Sometimes it's a question of coordinating algorithms, as in the case of the "Green Mobility App" developed in the EU project "Streetlife" and offering the "greenest" routes to drivers in the cities of Rovereto, Italy, Tampere, Finland and Berlin, Germany. Not infrequently, it's also a question of more complex systems known as neural networks. These are computer models that function much like the human brain: for example, through training they learn how to recognize interrelationships and make forecasts.

One example of the fascinating results obtainable with neural networks is the Siemens software developed by Ralph Grothmann at Corporate Technology (CT), the corporate research unit at Siemens. It can predict the degree of air pollution in major cities not only precisely, but also many days in advance.

Accurate forecasts based on precisely acquired data are at the core of almost every area of a smart city. For example, intelligent power networks are able to counteract current fluctuations caused by changing weather patterns. Also, it is already possible to obtain information on how integrate a fleet of e-cars into building management and serve there as power storage units.

New markets created by the Internet of Things and smart data

The Internet of Things as networking technology and smart data as forecast technology will distinguish the future of smart cities. For example, they will enable: more accurate coordination of generation and consumption than ever before; control of the increasing decentralization; merging of the heating and electricity markets; integration of industrial plants, buildings and transportation systems as energy service providers.

Consequently, this creates completely new markets for technologies and services. For instance, Siemens is currently participating in an approximately 100-million-pound project aimed at noticeably relieving the load on London's rapid transit system as of 2018. As the task of the century, the Crossrail Tunnel is the presently biggest infrastructure project in Europe and will increase the capacity of the London commuter rail network by around 10 percent.

The possibilities for networking the city and its agencies are fascinating. In the end, however, they also call for the total acquisition of data, which prompts concerns about the establishment of a police state. Will the city of the future be an environment like that described in Orwell's "1984"? Not at all, says Bernd Wachmann, head of the technology field Sustainable Cities at Siemens' Corporate Technology and representative of the City Intelligence Platform. This is a central information and data analysis platform developed for research purposes to gather and evaluate all the data of a city and issue instructions on how to cut cost and reduce emissions. "We use only anonymized information," reassures Wachmann. "Moreover, we collect our data directly from the cities in question."

Radically changed working world: new sense of community

The increasing networking of cities has already resulted in a cultural transformation. The world is moving closer and closer together. By the year 2020, the Internet will presumably have connected five billion people. It is a development that will permanently change many aspects of our present-day life, above all our working world. Instead of working in a separate office within a department, the working day of the future will be characterized by decentralized worldwide cooperation ventures, as well as by global competition and life-long learning processes. A radical change, but one that can also have a positive effect: a new sense of community. In smart cities and an increasingly networked world, knowledge workers will operate in virtual teams and open office landscapes and coworking centers together. As the barriers between generations, time zones and cultures disappear, the exchange of ideas will increase.

"Over the past decade digital technologies have begun to blanket our cities... [---] Cities are quickly becoming like 'computers in open air'." Carlo Ratti, architect, engineer and researcher at MIT's Department of Urban Studies and Planning.

But just how radical would the structural change have to be to make our cities become smarter and more livable? First of all, not all that radical, argues Carlo Ratti, architect, engineer and professor at MIT's Department of Urban Studies and Planning. "I would say that it's not about systemic solutions – it is more like an incremental process," says Ratti in an interview. "From an architectural point of view, the city of tomorrow will not compulsory look dramatically different from the city of today - much in the same way that the Roman urbs were not all that different than the city as we know it today. [---] What will change," according to Ratti, "will be the way we live in cities." He attributes this to the pervasive use of digital technologies. "Over the past decade digital technologies have begun to blanket our cities, forming the backbone of a large, intelligent infrastructure. Cities are quickly becoming like 'computers in open air'."

So, what will life be like in future? At the moment, there is strong evidence that the current trends can be reversed and that in many respects a better life is possible in cities.

Further information at:

http://www.siemens.de/pof/smart-cities