European smart cities – New scientific ranking instrument for European middle-sized cities

Scientists from the Technical University (TU) of Vienna in cooperation with the University of Ljubljana and the TU of Delft developed a new ranking instrument to have a good look at European "middle-sized cities" with populations under 500,000. The result is an interactive tool which shows the potentials of currently 70 *smart cities* and makes them comparable for the first time. The outcome: the smartest middle-sized cities are located in Finland, Denmark, Austria, Germany and Benelux. The study shows which wheels politicians, administrative authorities and inhabitants have to turn to increase the smartness of their cities and to improve their positioning.

"Middle-sized cities are a fascinating focus group", says *smart cities* project manager Univ.Prof. Dr. Rudolf Giffinger from the TU of Vienna. "120 million people, i.e. not quite 40 percent of all of Europe's city dwellers live in about 600 cities of that size. They have an enormous potential but are often in the shade of the big metropolises. It is difficult for them to position themselves, sometimes they have to fight image problems, and they are overlooked by investors. But they have a major advantage: Due to their size they are flexible and can pick up points with smartness".

Smart means high performance in six characteristics
To heighten the awareness of middle-sized cities such as Regensburg, Dijon, Maastricht, Cardiff or Innsbruck and offer them an instrument for positioning themselves, Giffinger and his team of scientists at the TU of Vienna in cooperation with researchers from the TU of Delft and the University of Ljubljana developed a scientifically sound ranking instrument. They examined 70 European middle-sized cities and studied what makes these cities *smart* as lebensraum and economic locations on the basis of the six characteristics economy, people, governance, mobility, environment and living. Giffinger defines: "A middle-sized city is considered to be a *smart city* if it demonstrates forward-looking development in the six characteristics on the basis of a combination of local circumstances and activities carried out by politics, business, and the inhabitants."

256 potential candidates

"To be able to compare cities in a way that makes sense they have to be of a similar size and dispose of relevant, sufficient and accessible data material", says Giffinger. The prerequisites for inclusion in the ranking were defined by the scientists: 100,000 to 500,000 inhabitants, a commuter belt under 1.5 million people, at least one university – which applies to 256 European cities. "To ensure that the data is comparable we used data material from Urban Audit, a European comparison of cities carried out by the Statistical Office of the EU (Eurostat), which covers 94 of the eligible 256 cities. In addition to that we collected data ourselves". For the first edition of their ranking the scientists finally chose 70 middle-sized European cities.

Scientifically sound, dynamic and universally applicable

"Our study is scientifically sound, transparent and verifiable. The special benefit of this tool is that it is universally applicable because on the one hand additionally to the status quo we show how the positioning in the ranking shifts if individual factors are changed. On the other hand the ranking allows comparisons in the event of future surveys, and the increasing number of participants and increasing quantity of data increase the validity", says Evert Meijers from the TU of Delft.

The ranking was structured in three levels: for h six characteristics – economy, people, governance, mobility, environment, living – the team of researchers defined 31 factors which are determined by 74 indicators. "For the smart economy characteristic, for example, the factor innovative spirit is of importance, which in turn is determined by the three indicators 'research and development expenditure', 'rate of employment in knowledge-intensive areas', and 'relative number of patent applications' ", explains Meijers. "Thus a number of comparable factors are assigned to every city which are allocated to the individual characteristics and thus determine the position in the ranking".

Denmark and Finland dominate the leading group

Luxemburg as number one in the overall ranking is followed by the Danish and Finnish cities in the leading group, followed by Eindhoven (NL), Linz ynd Salzburg. The Top Five: Luxemburg, Aarhus (Denmark), Turku (Finland), Aalburg and Odense (Denmark). At the lower end mainly cities from the new Member States of the EU are found.

Decisive for the quality of the ranking: Focus not only on economy

In the ranking based on individual smart characteristics the positions differ considerably from the overall ranking in some cases. Maastricht (overall ranking: 18th),

for example, is at the top as to the characteristic smart mobility; Tampere (overall ranking: 6th) comes first when it comes to smart government, and Montpellier (overall ranking: 11th) is the number one when it comes to smart environment. "Twenty years ago only economic aspects would have been considered in a ranking. What is decisive for the quality of our ranking is the selection of factors which reflect not only an economy-based point of view but also governance, participation, culture and quality of life", says Meijers, demonstrating the step-by-step change up to the last place on the example of Göttingen and Graz: "What speaks for Göttingen is above all the factor innovative environment in the "smart economy" characteristic, but the city shows weaknesses in the areas flexibility and cosmopolitanism in the "smart people" characteristic. Graz, by contrast, is strong in the factor culture and society in the "smart living" characteristic but needs to catch up in the factor air quality of the "smart environment" characteristic".

Placement is important, potential for improvement is even more important
"The overall ranking in the placement is of great interest for a city, of course, but it is even more important to identify strengths and weaknesses in certain key areas and to develop strategies to improve the performance and become more attractive for investors. Our study shows on the basis of which indicators this can be done", says Natasa Pichler-Milanovic from the University of Ljubljana. "We developed a scientifically sound tool for decision-makers – an ideal instrument which shows where something has to be done."

Middle-sized cities form a separate, strong league. New round of evaluations scheduled in three years.
The ranking is to be continued. "Presented to the public for the first time at the Expo Real the ranking result is a first intermediate status in the evaluation process of the *smart cities* so to speak, which is to serve as basis for discussion", says Meijers. In three years a second round of evaluations is to be started. The team of scientists hopes that it will have more comprehensive data at its disposal then to be able to include more cities in the ranking. "Not providing any data does not really indicate that a city is smart", emphasizes Meijers. He appeals to those responsible in the cities which are not included in the ranking to provide data of their own accord. "The European middle-sized cities form a separate, strong league. Any city should be interested in a good positioning in that ranking. If the inhabitants and their local governments are smart, it is up to them to increase their quality of life".

Homepage: mouse click provides access to the data of all cities

The study is also accessible on the Internet: In addition to a brief explanation of the methodology the detailed results can be found on the English-language Homepage *www.smart-cities.eu*. For each of the *smart cities* a detailed profile based on the characteristics and indicators can be requested. Also, information on the project and the research team and press material are provided for downloading.

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