

**FinEst Centre**  
for Smart Cities

## SMART CITY CHALLENGE 2023

### City Challenge

Max 3 pages

send to [smartcity@taltech.ee](mailto:smartcity@taltech.ee) by Sept 30, 2023

**Challenge Title** – A road map to the city's underground digital twin.

**City/county and country** – Rīga, Latvia

**Main contact from your city / county** – Diāna Korbe, Rīga City, City Development Department, Head of Board of Geomatics, [diana.korbe@riga.lv](mailto:diana.korbe@riga.lv), +371 67012882.

#### 1. What is the future urban challenge that would need a solution to?

- *Please describe the challenge of your city / county neighboring a city?*

Rīga Municipality maintains a large scale (1:500) topographic information database, which includes information on underground infrastructure, i.e., power grid, sewerage, rainwater drainage system, gas pipelines etc. The data is maintained in vector data formats consisting of 600+ data levels/objects and split in 1000+ and more maps/planchets. To maintain and update data a proprietary software is used. In order to promote data exchange with other potential data users, it is important to ensure data exchange and compatibility with other data systems/ data users and the possibility to add additional data to the municipal database. Existing data structure and software does not allow to execute data exchange and updates effectively as data transformation processes must be involved. However, this data is very valuable, it is hardly used in building and urban modeling as 3D models.

The challenge is to find a solution how to transform historical large scale topographic data from proprietary data formats to database formats, to ensure the regular update of the data set in the most effective way and – finally – to identify further process and next steps to the 3D underground model that can be matched with the 3D surface model.

- *Why is it important for your city to solve it? How big priority it is for you and why?*

Large scale underground information plays a crucial role in the urban planning and construction planning and execution processes, as well as in the maintenance and safety of underground infrastructure, along with greening the city. 3D data would allow for more efficient planning as the infrastructure is in different depths and distances and cannot be clearly visualized in 2D, especially in areas with high density. Accurate data would reduce risks of unnecessary costs and damage to road infrastructure (since infrastructure is most often located under roads, pathways etc.), buildings, and human health and life. The data would provide very useful information on the urban infrastructure capacity for greening purposes – would allow to find the most suitable places in streets, squares, parks, and small yards for trees and shrubs and analyze alternate ways of the maintenance of the green infrastructure, for example watering from rainwater. Thus, underground infrastructure information is widely used in many processes.



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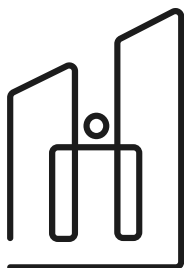


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- *Is this a unique challenge/problem of your city, why or is this by your knowledge a challenge/problem that many cities have – which kind of other cities?*

In our opinion, this is a problem in all big cities, especially those with historical heritage – buildings, infrastructure, and historical underground utilities – an infrastructure that has formed over long years. Densely built-up cities struggle with the challenges of greening city centers, especially those parts with narrow streets and dense buildings, as street space is limited both for building infrastructure and planting trees. To make cities more livable, it is crucial to green the cities, as people tend to move outside city centers in search for more attractive and safe environment, green parks and well-designed public spaces. Furthermore, it is essential not to damage existing infrastructure during construction and greening activities, especially the critical infrastructure, and ensure its safety, as utility networks are located very close to each other in densely built-up areas. In addition, an erroneous and incomplete information may cause additional costs – direct and indirect costs, for example, may paralyze functioning of the city for longer than necessary.

## 2. Innovation

- *How have you solved that issue so far? Why aren't the present solutions good enough? Are there legal obstacles, which ones?*

Riga City specialists carried out a feasibility study on transforming the existing data set to the data base formats, updating it, and tried to evaluate the potential of the data set to be maintained in the 3D. There is a limited range of specialists who would be willing to work with the data base elaboration, as we must ensure not only data transition, but also data updates, issuance, elaborate services for data exchange with other users/ systems and perform data exchange with the state. We assume that changes in the regulations might be necessary in respect to large scale data maintenance and address integration issues, for example, with Building information system, Planning information system and others.

- *What should be the main features, characteristics of the future solution to be potentially best for that challenge or problem?*

Maintaining data in the data base formats and the 3D would allow adding additional attributes to the object from other sources and evaluating the entire structure of the utility, including its depth, dimensions, distance to the other objects and surface. Data base formats would allow to distribute, exchange, analyze information easily and use it in designing urban environment more efficiently.

## 3. Expected impact of your pilot solution

- *What is the expected impact to your city environment you expect to see if the challenge gets solved?*

Availability of high-quality data to be used in urban planning, construction and design, and for other purposes, would allow decision-makers to make decisions quickly and effectively. Moreover, access to high quality data, including 3D data, would allow to minimize costs of emergency works, reduce downtime risks and damage to other nearby infrastructure; works could be done faster and with less expenses and harm to the environment.



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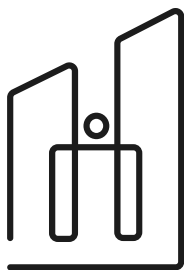
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- *What is the expected impact to your citizens you expect to see if the challenge gets solved?*

We believe that there will be less disruption to city everyday life, and more effective planning of urban environment will be ensured.

- *What is the expected impact to your city governance you expect to see if the challenge gets solved?*

It is expected that availability of high-quality data will ensure faster execution of works and implementation of projects with lower costs, as the city is responsible for the street infrastructure, the green infrastructure and providing of the public services, for example, sewerage, water supply. The data will also be used for further maintenance of the mentioned objects and infrastructures, financial evaluation, and as well for civil security purposes.

#### 4. Piloting

- *Would you be interested to become a piloting partner of a proposed solution? Why? Describe shortly your capability to participate.*

We are interested in the piloting, as we have well structured data set with large scale topographic information, which is updated regularly. Riga City City Development Department is responsible for the maintenance of the mentioned data set. Furthermore, we have already done some reserach in respect to transition to the data base formats and the 3D. We have experienced specialists who have been in the industry for a long time, have knowledge of different aspects of data maintenance, and are capable of piloting new and innovative solutions.



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