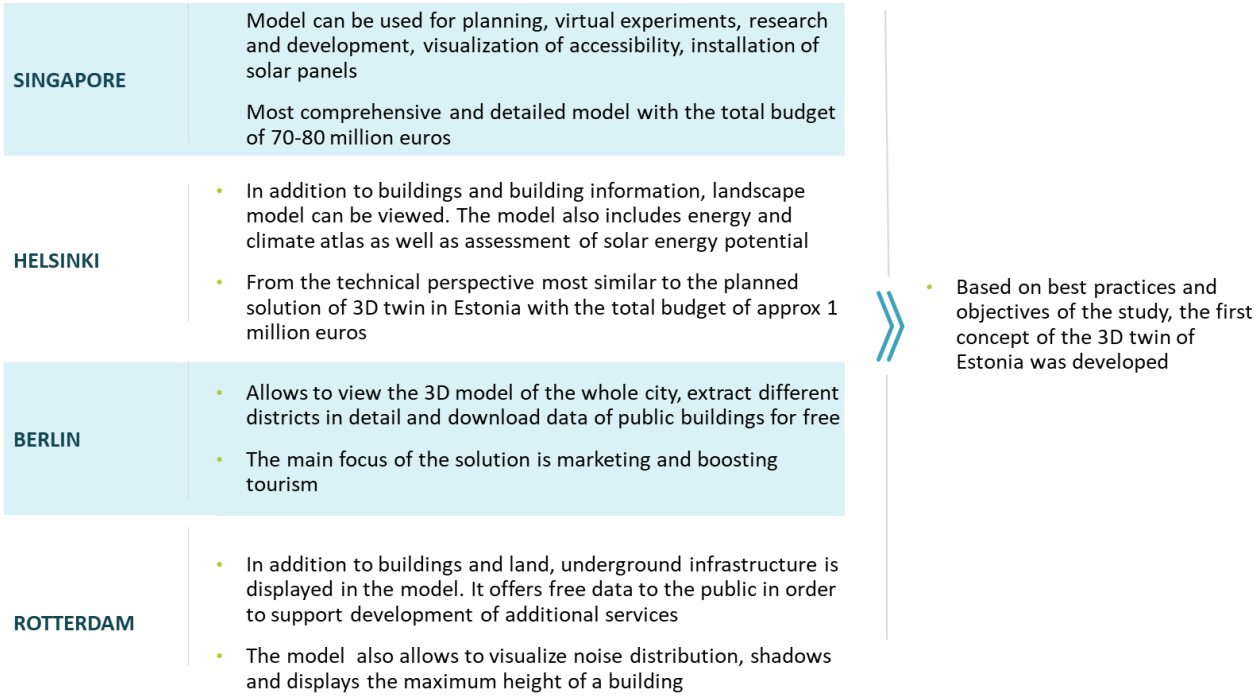
Study of 3D visualization component of digital twin of Estonian built environment

The aim of the current study is to analyse the technical and commercial aspects of the visualization components, in order to develop a functional solution. As the first step of the study, benchmark analysis of similar solutions in other cities was conducted. Altogether seven cities were analysed, out of which four most distinct solutions are represented on the figure below.

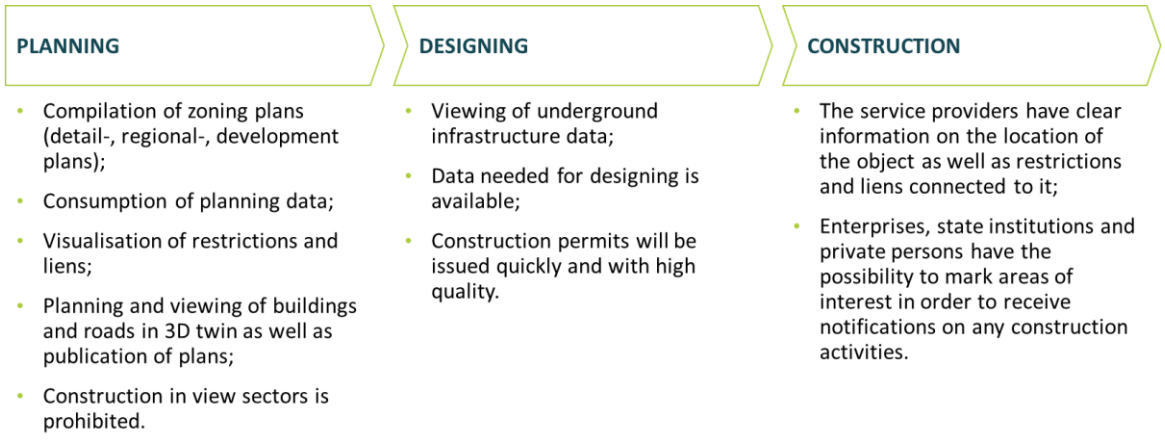
Figure 1. Results of benchmarking



The analysis pointed out that it is reasonable to use similar technologies than already used in other solutions also during the development of the Estonian 3D twin.

The concept of the model was built on main use cases, that were collected and analysed together with the representatives of the interest groups. The most important use cases were tightly connected to the first three stages of the building life cycle.

Figure 2. Main use cases



Based on the selected use cases, the prototype of the 3D twin was developed. Analysis showed that the nation-wide 3D twin should be developed as a **re-usable component**: in addition to the e-construction platform, it should allow integration with various other infosystems (Figure 3).

The prototype was built based on databases of various organisations, whereas the databases were mainly in one of the two categories: 1) databases that are obligatory to be included in the development of 3D twin or realizing use cases from the main scope; 2) databases that are needed for the realization of certain use cases that may not be in the main scope. The used databases are presented in the following figure together with their sources, whereas the databases that are included in the main scope are in bold.

Figure 1. 3D twin and other systems

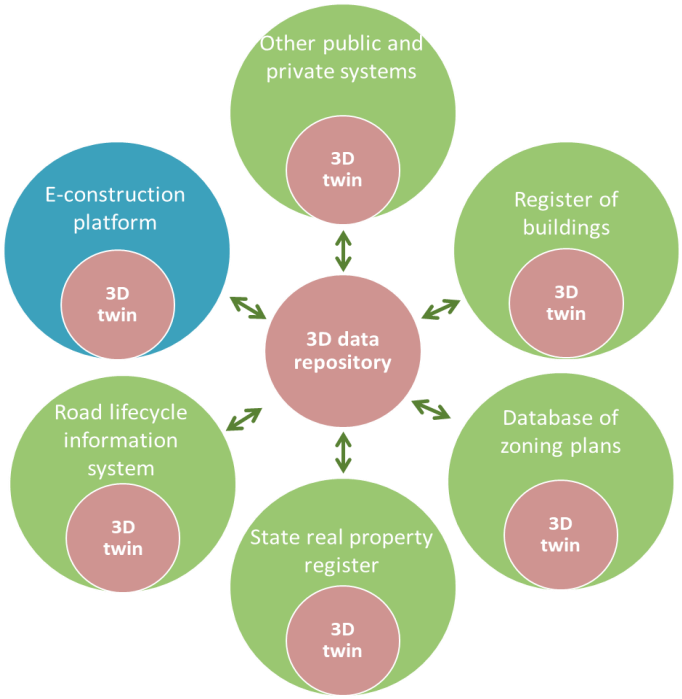
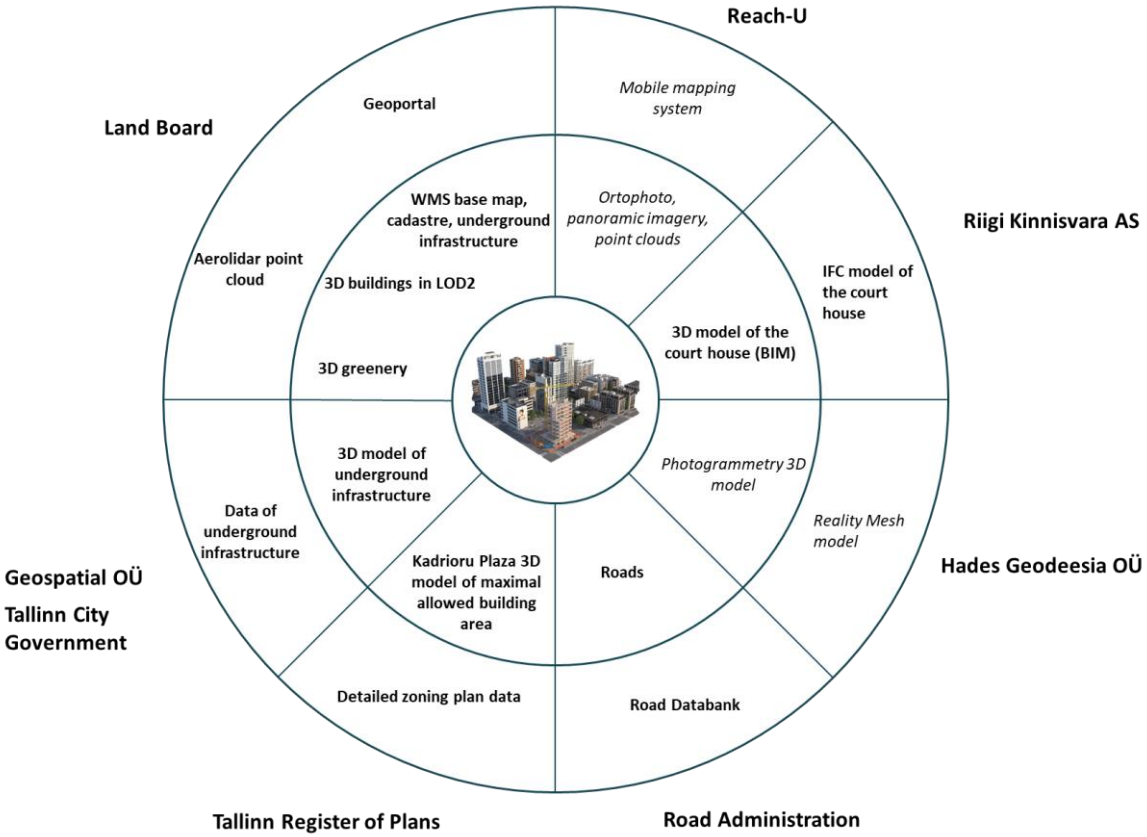


Figure 2. Used databases together with their sources



The cost for developing the main scope of the 3D twin is EUR 391 000-889 000 as a single investment and EUR 44 000-175 000 as annual cost. The exact budget for the development and maintenance of the 3D twin depends on the exact functionality of the solution.