Virtual Reality (VR) simulations have long been proposed to allow users to explore both yet-to-built buildings in architectural design, and ancient, remote or disappeared buildings in cultural heritage. In this paper we describe an on-going VR project on an UNESCO World Heritage Site that simultaneously addresses both scenarios: supporting architects in the task of designing the remaining parts of a large unfinished building, and simulating existing parts that define the environment that new designs must conform to. The main challenge for the team of architects is to advance towards the project completion being faithful to the original Gaudí’s project, since many plans, drawings and plaster models were lost. We analyze the main requirements for collaborative architectural design in such a unique scenario, describe the main technical challenges, and discuss the lessons learned after one year of use of the system.