When ergonomic considerations are integrated into the design of work systems, both overall system performance and employee well-being improve. A central part of integrating ergonomics in work system design is to benefit from employees' knowledge of existing work systems. Participatory simulation (PS) is a method to access employee knowledge; namely, employees are involved in the simulation and design of their own future work systems through the exploration of models representing work system designs. However, only a few studies have investigated PS and the elements of the method. Yet understanding the elements is essential when analyzing and planning PS in research and practice. This PhD study investigates PS and the method elements in the context of the Danish hospital sector, where PS is applied in the renewal and design of public hospitals and the work systems within the hospitals. The investigation was guided by three research questions focusing on: 1) the influence of simulation media on ergonomic evaluation in PS, 2) the creation of ergonomic knowledge in PS, and 3) the transfer and integration of the ergonomic knowledge into work system design. The investigation was based on three PS cases in the Danish hospital sector. The cases were analyzed from an ergonomics system perspective combined with theories on knowledge creation, transfer, and integration. The results are presented in six scientific papers from which three core findings are extracted: 1) simulation media attributes influence the type of ergonomic conditions that can be evaluated in PS, 2) sequences and overlaps of knowledge creation activities are sources of ergonomic knowledge creation in PS, and 3) intermediaries are means of knowledge transfer, and interpretation and transformation are means of knowledge integration.