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Method for Requirements Analysis and Decision Making for Restructuring Projects in Factories

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Abstract : The requirements for the factory planning and the building concerned have changed in the last years. Factory planning has the task of designing products, plants, processes, organization, areas, and the building of a factory. Regular restructuring gains more importance in order to maintain the competitiveness of a factory. Restrictions regarding new areas, shorter life cycles of product and production technology as well as a VUCA (volatility, uncertainty, complexity and ambiguity) world cause more frequently occurring rebuilding measures within a factory. Restructuring of factories is the most common planning case today. Restructuring is more common than new construction, revitalization and dismantling of factories. The increasing importance of restructuring processes shows that the ability to change was and is a promising concept for the reaction of companies to permanently changing conditions. The factory building is the basis for most changes within a factory. If an adaptation of a construction project (factory) is necessary, the inventory documents must be checked and often time-consuming planning of the adaptation must take place to define the relevant components to be adapted, in order to be able to finally evaluate them. The different requirements of the planning participants from the disciplines of factory planning (production planner, logistics planner, automation planner) and industrial construction planning (architect, civil engineer) come together during reconstruction and must be structured. This raises the research question: Which requirements do the disciplines involved in the reconstruction planning place on a digital factory model? A subordinate research question is: How can model-based decision support be provided for a more efficient design of the conversion within a factory? Because of the high adaptation rate of factories and its building described above, a methodology for rescheduling factories based on the requirements engineering method from software development is conceived and designed for practical application in factory restructuring projects. The explorative research procedure according to Kubicek is applied. Explorative research is suitable if the practical usability of the research results has priority. Furthermore, it will be shown how to best use a digital factory model in practice. The focus will be on mobile applications to meet the needs of factory planners on site. An augmented reality (AR) application will be designed and created to provide decision support for planning variants. The aim is to contribute to a shortening of the planning process and model-based decision support for more efficient change management. This requires the application of a methodology that reduces the deficits of the existing approaches. The time and cost expenditure are represented in the AR tablet solution based on a building information model (BIM). Overall, the requirements of those involved in the planning process for a digital factory model in the case of restructuring within a factory are thus first determined in a structured manner. The results are then applied and transferred to a construction site solution based on augmented reality.

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