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## **Risk Management as an executive task in the construction of Wendelstein 7-X**

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Wendelstein 7-X, the first numerically optimized stellarator, is presently under construction at the Max-Planck-Institut für Plasmaphysik (IPP) in Greifswald (Germany). Construction, commissioning, and later operation of such an experiment represent unquestionably a very complex challenge in solving scientific, technical and organizational tasks. Furthermore, all these activities bear many risks, process or management risks as well as technical risks. Process risks result from budgets, schedule, due dates, requirements in the specifications, fluctuation of specialized manpower, etc. Technical risks are given in all steps of the process from specification, design, material selection, manufacturing, assembly, testing up to the operation of the experiment. It is necessary to manage these risks in a forward looking and aggressive manner to be successful with such a project. In the Wendelstein 7-X project these requirements have been recognized early on and therefore priorities have been set and several measures have been introduced to assess and minimize the risks. Very good experiences have been made with the introduction of a uniform quality management system which takes into account both the process and the technical side. Beside a continuous reporting and decision process on a weekly basis some special procedures support the managing processes. A very effective system has been introduced for the integrated budget and schedule planning and controlling of each sub-project. Extended planning and controlling of work packages on basis of detailed and linked work breakdown structures of all departments gives the chance to synchronize all due dates and to react early and efficiently to deviations and turbulences. The measures for the reduction of the technical risks cover the complete process, beginning with the specification and the design- and development process, suitable work and test instructions, Quality Assurance and Assembly Plans, use of certified material, incoming inspections, etc. up to the management of changes and non conformities. In all these processes potential risks are identified and assessed. E.g. all modifications of technical specifications and all quality deviations during the manufacturing or the assembly process are subjected to a formal assessment process reevaluating possible effects on the later operation of W7-X. The paper will describe the essential measures and their efficiency with emphasis on those topics which may require special attention to ensure that Wendelstein 7-X will be finished in time and that later it will work properly and without major interruptions of the plasma operation.