



# Management of metrological examination processes based on a risk-oriented approach

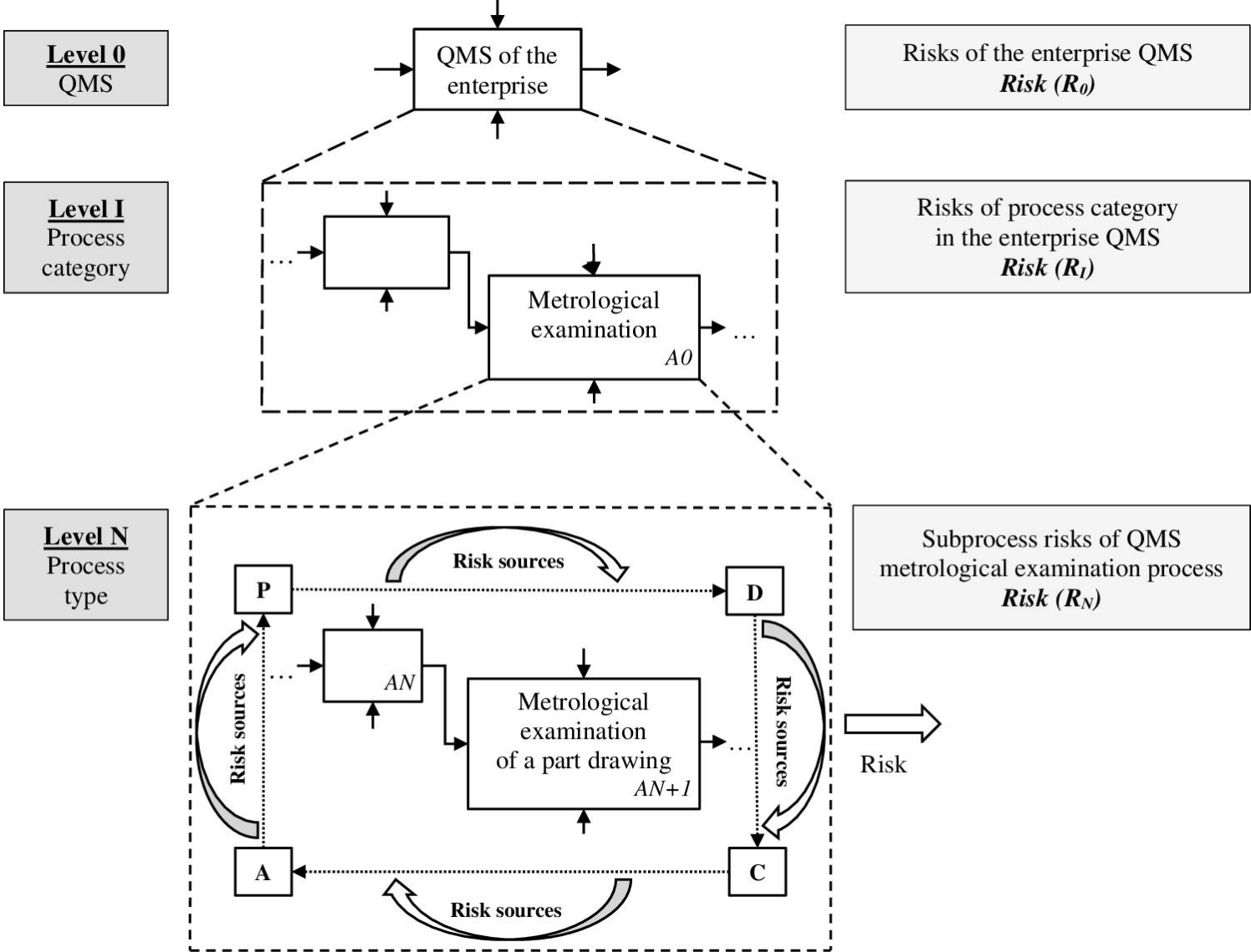
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# Abstract

The paper describes the basics of managing metrological examination processes in the quality management system of an enterprise based on a risk-oriented approach in the interpretation of international standards ISO 9000:2015. Scientific publications in the field of risk management of metrological examination processes are analysed, the problems associated with the integration of a risk-oriented approach into managing this type of activity are investigated. A procedure for identifying and structuring the risks of metrological examination processes is proposed based on the modular-hierarchical model of the enterprise quality management system, which is connected with defining the category of the process under study and correlating its parameters with the risk characteristics. The expediency of developing documentation support for the procedure under consideration is justified by the example of documenting information on risk management of the metrological examination for a part drawing. The arguments are given to prove the advantages of using the procedure for managing the metrological examination processes in the quality management system of an enterprise based on a risk-oriented approach.

# Risk structuring model of the metrological examination process in the enterprise QMS



# Risks of subprocess "Metrological examination of a part drawing" (document fragment)

**Subprocess purpose:** analysis and evaluation of correct formulation and meeting metrological requirements in relation to a part drawing.

**Subprocess result:** confirmation of the availability of necessary and sufficient dimensions, limit deviations and other parameters and requirements for control, as well as an assessment of their controllability.

**Risks:** 1) inability to control the part due to design features, incorrect indication of tolerances; 2) the wrong choice of measuring bases; 3) incorrect correlation between the tolerances of size, shape, location of surfaces and the requirements for surface roughness; 4) use of complex and expensive measuring instruments; 5) need to develop new control and measuring devices and/or measuring instruments.

**Types of activities**

***1. Checking the correctness of formulating technical requirements***

***2. Establishing the necessity and possibility to control the dimensions limited by tolerances***

**Purpose of subprocess activity:** confirmation of correct formulation of requirements for the accuracy of part dimensions, as well as their controllability

**Risk sources (subprocess parameters that determine risk emergence)**

**Subprocess parameters**

**Input:** Part drawing

**Risk sources**

1. Absence of the part drawing considered in the schedule of metrological examination of the enterprise.

2. Absence of coordinating and approving signatures on the drawing.

**Output:** 1) list of comments and proposals; 2) part drawing

Incorrect information about the result of the metrological examination

**Control action:** 1) RMG 63-2003; 2) a document defining the specific procedure for conducting metrological examination at the enterprise; 3) a set of documents and reference materials required for conducting metrological examination; 4) a schedule for conducting metrological examination at the enterprise

1. The company does not have a local document regulating the specific procedure for conducting metrological examination.

2. Absence of regulatory and reference documents necessary for conducting metrological examination at the enterprise.

**Resource provision:** 1) expert; 2) metrological service of the enterprise

1. Low level of the expert's qualification.

2. Insufficient material, technical and information equipment of the metrological service of the enterprise.

**Subprocess risk (deviation in achieving the process result):** incomplete list of comments, incorrectly formulated proposals on the results of the metrological examination

**Preventive actions**

1) regular professional development training of experts;

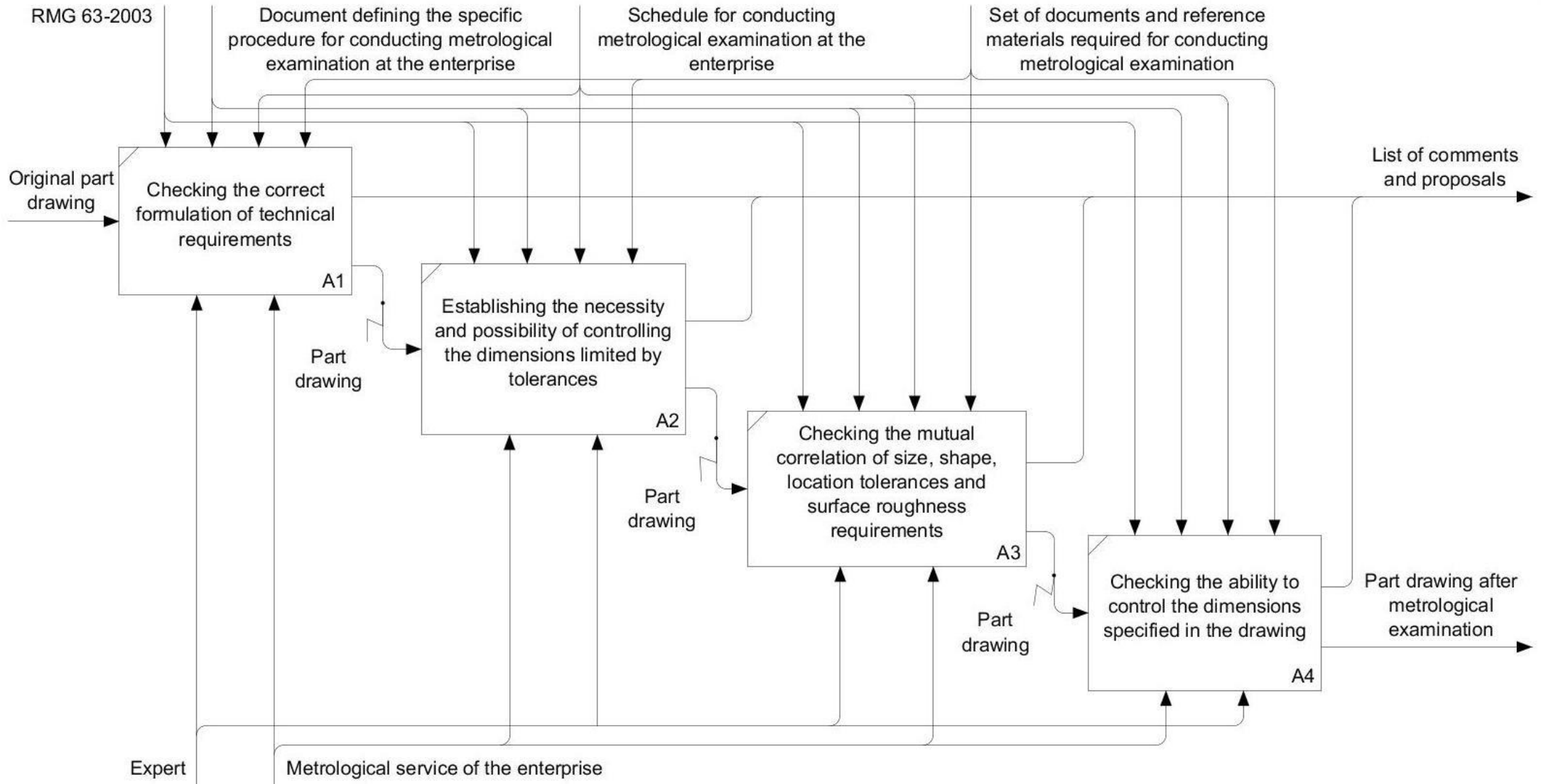
2) updating of schedules for conducting metrological examination;

3) improvement of regulatory and reference base for conducting metrological examination

***3. Checking the mutual correlation of size, shape, location tolerances and surface roughness requirements***

***4. Checking the ability to control the dimensions specified in the drawing***

# Functional model of subprocess "Metrological examination of a part drawing"



# Conclusion

The research conducted shows that there is no unity in the views of the scientific community on integrating risk-oriented thinking into the management of the metrological examination processes of the enterprise QMS. Scientific discussions in the field of risk management of metrological examination processes, caused by the complexity in identifying and structuring risks, the limited methodological documentation in this subject area, can be solved within the framework of applying a risk-oriented approach to the object of research.

The proposed procedure for identifying and structuring the risks of metrological examination based on the modular-hierarchical model of the enterprise QMS, which takes into account the variety of processes under study and characterizes their parameters, allows to integrate risk management into all processes included in the register. The practical application of the approach to risk management of metrological examination considered in this paper will undoubtedly contribute to ensuring the quality of the process under study and the products as a whole.