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An Ontology-based approach to enable data-driven research in the field of NDT in Civil Engineering

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Non-destructive testing (NDT) data in civil engineering is regularly used for scientific analysis. However, there is no uniform representation of the data yet. An analysis of distributed data sets across different test objects is therefore too difficult in most cases.

To overcome this, we present an approach for an integrated data management of distributed data sets based on Semantic Web technologies. The cornerstone of this approach is an ontology, a semantic knowledge representation of our domain. This NDT-CE ontology is later populated with the data sources. Using the properties and the relationships between concepts that the ontology contains, we make these data sets meaningful also for machines. Furthermore, the ontology can be used as a central interface for database access. Non-domain data sources can be integrated by linking them with the NDT ontology, making them directly available for generic use in terms of digitization. Based on an extensive literature research, we outline the possibilities that result for NDT in civil engineering, such as computer-aided sorting and analysis of measurement data, and the recognition and explanation of correlations.

A common knowledge representation and data access allows the scientific exploitation of existing data sources with data-based methods (such as image recognition, measurement uncertainty calculations, factor analysis or material characterization) and simplifies bidirectional knowledge and data transfer between engineers and NDT specialists.