

# **The Holistic World of NDE 4.0 – Machine Perception**

**Johannes Vrana<sup>1</sup>, Ripi Singh<sup>2</sup>**

<sup>1</sup>CEO, Vrana GmbH, Germany, <sup>1</sup>Innovation Coach, InspiringNext, USA

The term NDE 4.0 was first introduced in 2017 to represent the cyber-physical confluence of the various physical nondestructive evaluation methods with the digital technologies associated with Industry 4.0. Its value is either generated by improving nondestructive evaluation with those technologies (digitalization) or by implementing nondestructive evaluation as one of the most valuable data sources for Industry 4.0 applications (digital transformation). Quickly, NDE 4.0 became all around the globe a rapidly growing new field with multiple special issues in scientific journals, an extensive handbook, its own conference series, and a topic with one of the highest numbers of papers submitted at every NDT conference. Unfortunately, the term NDE 4.0 and most of the terms associated with NDE 4.0 (e.g., digitization, digitalization, and digital transformation) are not well understood and are often used as sales buzzwords. In this paper, authors build a unified model of the industrialized society covering value creation and consumption and work through the digital penetration of the ecosystem in the context of NDE, providing clear definitions and understanding of many of the frequently used terms. This clarifies the main role of NDT&E, Structural Health, Condition, and Production Monitoring as well as Metrology in times of digital transformation: Machine Perception. The paper also shares a few success stories as discrete pieces of the mega puzzle, we are all engaged in building. Small successful steps help overcome people's concerns and attitudes and motivate us to create roadmaps for personal and company growth, leading to a bright future.