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## Optimizing Industrial Systems with Hybrid Information Quality

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Industry 4.0 contexts generate large amounts of data holding potential value for advancing product quality and process performance. Current research already uses data-driven models to refine theoretical models, but integrating mechanistic understanding into data-driven models is still overlooked. This represents an opportunity to harness extensive data alongside fundamental principles.

We propose a framework for hybrid modeling solutions in industry, by combining Information Quality (InfoQ) principles with hybrid modeling insights. Such Hybrid Information Quality approach (H-InfoQ) aims to enhance industrial problem-solving, to improve process modeling and understanding of non-stationary systems.

The H-InfoQ framework evaluates a given hybrid model,  $f_H$ , the available process information,  $X_H$ , the specific analysis goal,  $g$ , and the adequate utility measure,  $U$ . Despite its thoroughness, the framework's reproducibility and practical application remain challenging for practitioners to navigate autonomously. The main goal is to optimize the utility derived from applying  $f_H$  to  $X_H$ , in the scope of the goal  $g$ :  $Max\ H-InfoQ = U\{f_H(X_H)|g\}$ . To improve its practicality, an eight-dimensional strategy is proposed, focusing on data granularity, structure, integration, temporal relevance, data and goal chronology, generalizability, operationalization, and communication (see also Kenett & Shmueli, 2014).

To illustrate the practical application and effectiveness of the H-InfoQ framework, two industrial case studies are analyzed and explored through the lens of this methodological construct. These instances were selected to showcase the tangible benefits and real-world applicability of the framework in industrial contexts.

### References

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Talk

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