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Modelling of the complex societal problem of establishing a national energy sufficiency competence

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Abstract

Complex societal problems require a multidisciplinary and multi-method approach to develop models that can support the development of solutions. General morphological analysis is a qualitative method to extract information from experts through facilitation and the use of customized software. Ontologies provide semantic representation of knowledge bases together with automated reasoning capabilities. These two approaches, combined with the use of concept maps, provide an integrated approach which can be used to understand complex and ill-structured problem domains and to aid in business modelling, strategy and scenario development and finally, decision-making. The resulting models are subjective constructs reflecting the knowledge and understanding of the analysts. Subsequent synthesis of new understanding and decisions rely on the robust validation and verification of the underlying logic and assumptions of the conceptual models. Morphological Analysis and ontological constructs are applied in terms of an integrated Morphological Ontology Design Engineering methodology (MODE), which is based on Design Science. The paper is developed around the opportunity of scoping the applied research competence required to support a nation's progress toward energy sufficiency. This paper presents a complex fused model for national energy sufficiency in New Zealand. The approach can be used to address other ill-structured complex societal problems.