ContSys under Ontological Scrutiny

Catalina MARTÍNEZ-COSTA[a], Stephen KAY[b], Nicholas OUGHTIBRIDGE[c], Stefan SCHULZ[a]

[a]Medical University of Graz, Austria, [b]Health Informatics Standards Consultancy Ltd, UK
[c]Health and Social Care Information Centre, UK

BACKGROUND

EN ISO 13940 (ContSys)[1] provides a system of concepts to support continuity of care and semantic interoperability of information systems. ContSys provides domain-specific terms, definitions and relations. Although it was originally not devised as an ontology, ContSys might benefit from the use of more formal, ontological principles. Besides facilitating ContSys' adoption, supporting its further evolution, and assist its maintenance, this would improve the interoperability of ContSys with domain ontologies like SNOMED CT.

METHODS

We tested this hypothesis by placing ContSys concepts under the top-level ontology BioTopLite2 (BTL2)[2], which standardizes the modelling task by establishing a reference framework; one that restricts it by means of logical axioms grounded on formal-ontological principles.
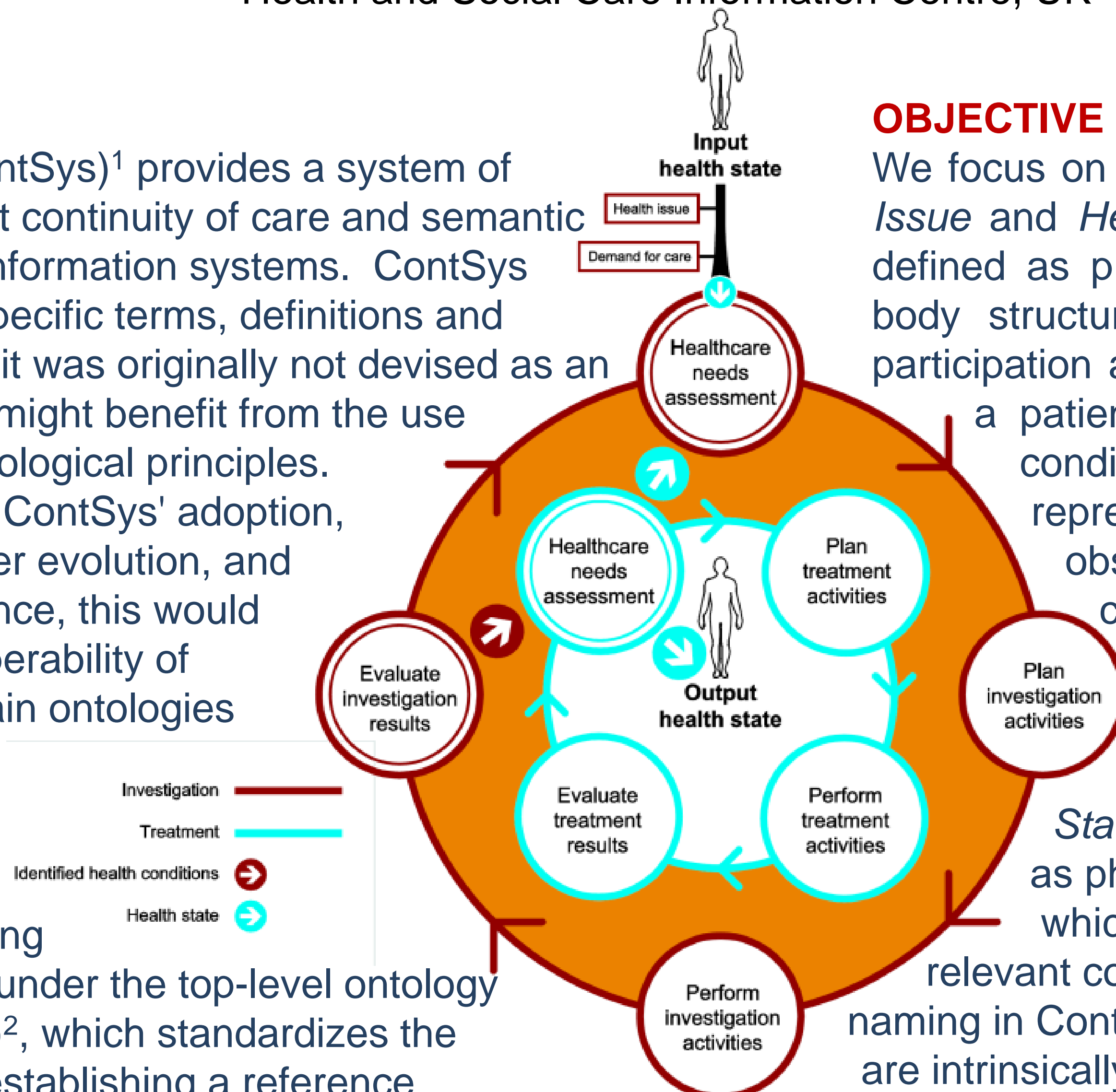
OBJECTIVE

We focus on the ContSys branches *Health Issue* and *Health State*. Health states are defined as physical and mental functions, body structure, personal factors, activity, participation and environmental aspects as a patient's composite health. Health conditions are Health issues that represent existing or potential observations of a subject of care's *Health State*.

RESULTS

In BTL2, the closest concept for ContSys' notion of *Health State* is *Clinical Situation*, defined as phases of a patient's life, during which he/she is bearer of clinically relevant conditions. This contradicts with naming in ContSys, where *Health Conditions* are intrinsically epistemic entities, best to be regarded as clinical statements about a *Health state*, aligned with the class *Information Object* in BTL2.
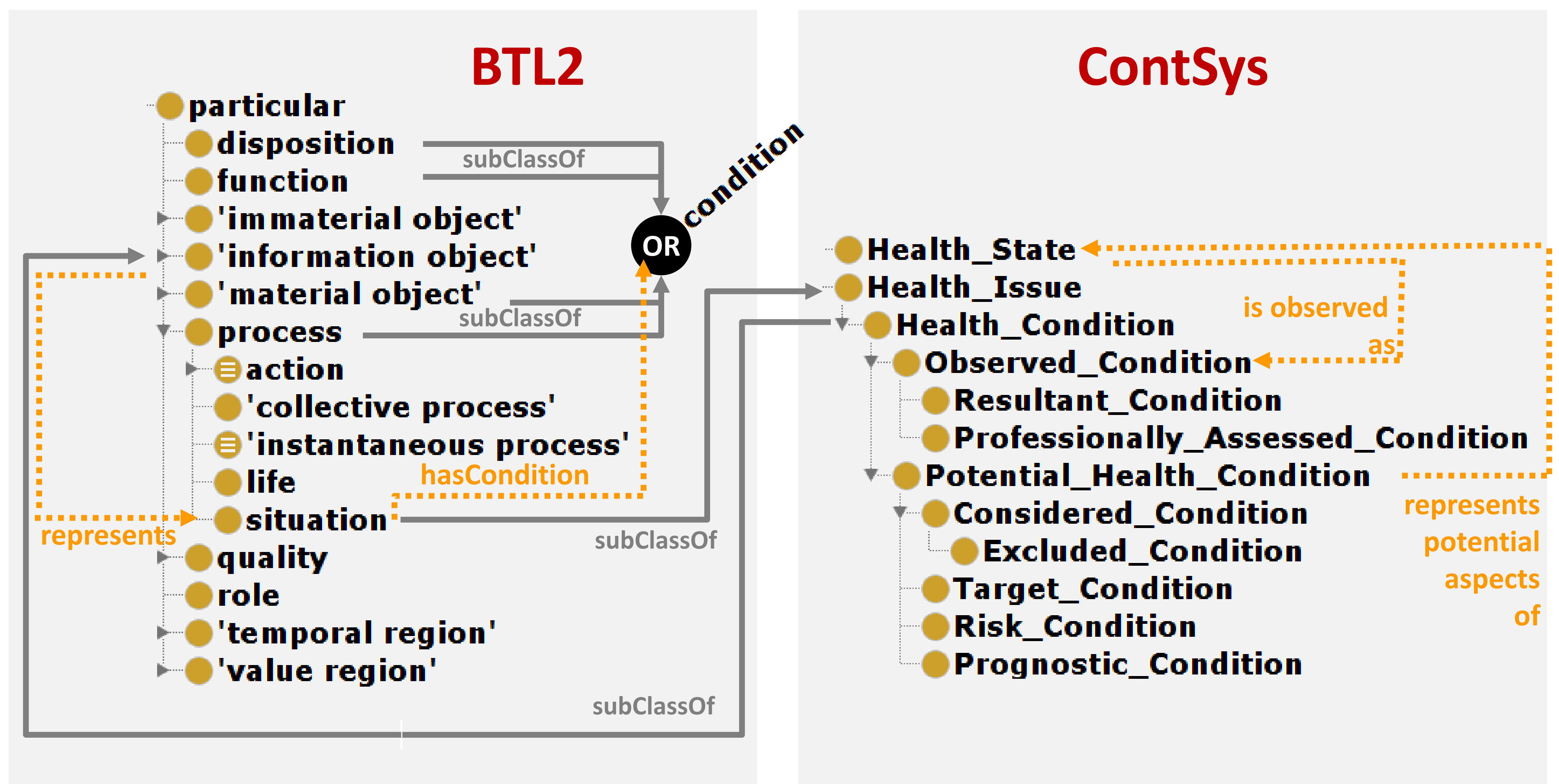
DISCUSSION

The strong axiomatic grounding of BTL2 immediately detects alignment errors by satisfiability checking using a description logics reasoner, such as when aligning (i) *Health Condition* in ContSys with *Condition* in BTL2 together with (ii) the relation '**represents potential aspects of**' in ContSys with '**represents**' in BTL2. It is desirable that semantic artefacts that represent the clinical domain avoid ambiguous terms or at least provide clear-cut text definitions such as it is the case with ContSys.

CONCLUSIONS

This pilot study suggests that the rooting of ContSys in an ontological framework makes sense not only for adjusting terms and definitions, but also because it has the potential to detect logical contradictions. It also shows naming problems, where one key term like "Clinical condition" has opposing definitions between two semantic artefacts.

We expect that the use of a top-level ontology that is shared with other semantic artefacts will help tighten the relationship of ContSys with information models and medical terminologies.

1. EN ISO 13940 Health Informatics - System of Concepts to Support Continuity of Care. CEN, the European Committee for Standardization, ISO TC 215/WG 3, prEN/ISO/DIS, CONTSYS, 08/2014
2. Schulz S, Boeker M. BioTopLite: An Upper Level Ontology for the Life Sciences. Evolution, Design and Application. *Informatik 2013*. U. Furbach, S. Staab; editors(s). IOS Press; 2013