

Chapter 8

The Reflexive Practitioner: Knowledge Discovery through Action Research

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ABSTRACT

This chapter aims to set out relevant discourse and approaches to consider when planning strategies for acquiring and building knowledge for formal ontology construction. Action Research (AR) is offered as a key means to help structure the necessary reflexivity required to enrich the researcher's understanding of how they know what they know, particularly within a collaborative research setting. This is especially necessary when revealing tacit domain knowledge through participation with actors and stakeholders: "In this kind of research it is permissible to be openly normative and to strive for change, but not to neglect critical reflection" (Elfors & Svane 2008, 1).

INTRODUCTION

Ontologies are becoming increasingly valued in research and practice; both to help organise information within a domain and to facilitate it being shared between domains.

"Ontologies encode knowledge in a domain and also knowledge that spans domains...Ontologies include computer-useable definitions of basic concepts in the domain and the relationships among

them and are increasingly valued because of the ever-increasing need for knowledge interchange." (Mounce et al 2010, 40)

Whilst much discussion concerning formal domain ontologies has focussed on the technical issues or semantic structures of the conceptualisation - perhaps less focus has been placed on epistemology in this setting. Semantic relationships or 'links' between concepts are a critical part of the formal ontology. However, the means for unpacking the assumptions which ultimately inform these links are not always fully surfaced.

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BACKGROUND

In discussing the process of formal ontology construction Roussey (2005) refers to both Gruber (1993) and Studer *et al* (1998) in outlining that ontologies are explicitly defined and shared specifications of concepts. The formal ontology may be considered as a framework of understanding about the world enabling more effective data sharing, retrieval, reuse and ultimately leading to increased communication between domains. It is therefore seen as: “a unifying framework to solve problems...an ontology necessarily entails or embodies some sort of world view with respect to a given domain” (Uschold and Gruninger 1996, 5).

The “reach” of this formalised view of the world is often defined by its intended application and/or by the concerns of a particular subject domain (e.g. the Art and Architecture Thesaurus¹). In practice these ‘worlds views’, as expressed by those in a given domain, may often be tacit prior to formal specification. Teller underlines the role of the formal ontology as helping to clarify the semantic structures which reside in tacit understanding:

“Ontologies have also an important role to play in revealing the logical structure of existing conceptualizations. Conceptualizations are often tacit. They are often not thematized in a systematic way. But tools can be developed to specify and to clarify the concepts involved and to establish their logical structure, and thus to render explicit the underlying taxonomy” (Teller 2007, 2)

Depending upon the intended nature of communication (from natural dialogue to machine-understandable code) four classifications of ontology are offered by Uschold and Gruninger (1996) based on levels of required formality. These range from, the highly informal and expressed loosely in natural language; the semi-informal which may

result in restricted use of terms to aid communication; the semi-formal involving “artificial formally defined language”; and rigorously-formal, employing “meticulously defined terms with formal semantics” (Uschold and Gruninger 1996, 6). However, regardless of the level of formality of the ontology, a key concern underpinning the process of construction is the means by which knowledge is acquired and the epistemological basis relating to this. How do we know what we know? Uschold and Gruninger refer to the explicit ontology as being “an agreement about shared conceptualizations” and so the means by which this agreement is formed is obviously an area of key importance.

Guarino (1995) outlines key debates concerning epistemology and *formal* ontology in knowledge representation and relates to Nutter (1987) in defining Epistemology as being; “the field of philosophy which deals with the nature and sources of knowledge” (Guarino 1995, 628). Whilst Guarino describes ontology as being the nature of the world - independent of our knowledge about it, the definition of a *formal* ontology is acknowledged as still a matter for debate. Here, Guarino asserts that, potentially, the act of formalising knowledge for domain or local application may conflate philosophical approaches of analytical ‘descriptive metaphysics’ (Strawson 1959) and phenomenology (summarised in Burkhardt and Smith 1991). In, for example, the following passage from *Ontology Development 101: A guide to creating your first ontology* we can see the philosophical status of the formal ontology is, as Guarino suggests, ‘still a matter for debate’:

“...one of the most important things to remember is the following: there is no single correct ontology for any domain. Ontology design is a creative process and no two ontologies designed by different people would be the same. The potential applications of the ontology and the designer’s

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