Geophysical Research Abstracts
Vol. 12, EGU2010-6258, 2010
EGU General Assembly 2010

Concept-referenced spaces in Computer-supported Collaborative Work

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Modern epistemology and sociology of Science tell us that any concept may exist only in some context or paradigm in which it is termed or just named, and should not be abducted from it. Contexts are created by communities or even by an individual researcher. Different contexts intersect by a set of repeating terms or names with no guarantee that for the same term people really mean the same. For instance, speaking about "layers", "stratification", "basement", "structures" and "anomalies", a geophysicist and a sedimentologist may mean completely different things. Thus, in any research field, but particularly in the geosciences we stand before a colorful mosaic of coexisting different and concurrent visions of similar subject. Correspondingly, the environment of any concept teems with discrepancies and contradictions in its meanings. Ironically, this refers not only to general and abstract theoretical knowledge, but also to raw unprocessed data, because the latter reflects, along with the properties of sampled/described object, the properties of sampling technique and, most important, the presuppositions of the underlying theory including quite general expectations like what kind of data can ever be obtained and what these data can ever mean.

As every context is created by a scientist's unique vision (a side product of which is bias), these conceptual factions, however annoying, actually fuel the evolution of Science, so that the "biodiversity" of meaning (and hence, of visions) should be preserved to avoid a dull, grey winter for the narrow mind.

Nevertheless, this becomes truly annoying when scientists need to share a common space to communicate and collaborate, which means that all useful information, once collected, should be easily accessible by all the members of a working group, even if coming form different contexts. Whether this space is viewed as a void barrel engulfing everything, or a tidy multi-drawer wardrobe, meaning is needed anyway – in the former case, to select an item from a dump, and in the latter, to decide what to put where, and why.

How to balance, then, in one collaborative tool, the need to apply a fixed meaning and the claim to preserve different and concurrent meanings?

Among possible paths that can be followed, we will here focus on two views that acknowledge formalism but at the same time avoid strict definitions: (I) task mapping and (II) the event bush method (Pshenichny et al., 2009). Both rely on a formalized graphic representation made of nodes (denoting abstractions or concepts) and edges, but relax on the meaning of nodes themselves, which are descriptive but not explanatory, connotative but not denotative.

The former path (I) is more oriented toward human activities, e.g., a workflow of data processing. The latter (II) formalizes a domain of knowledge through relations of cause and effect as in describing geohazards. Importantly, these cause-effect relations are just postulated as observed or imagined facts, but not elucidated – e.g., "if something explodes, it falls into fragments", without an explanation. The one who denies this relation is free to build another event bush without it, and compare the structure of the two bushes to find out what else has changed with negation of this link.

In both cases reasoning is projected over the graph while information (as a file resulting from an intermediate processing step, or the observations regarding the presence of water during a volcanic eruption) can be organized across the nodes of the graph. This adds to the bi-dimensional surface of the task-map or of the event bush, a third dimension creating a "concept-referenced" space (some kind of geo-referencing applied to reasoning) where collaborators can easily find the information they are looking for