Knowledge lost in information, meanings lost in semantics?
In complex realities and information systems, e.g. (on) cultural landscapes

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1. Introduction

Where is the wisdom we have lost in knowledge?
Where is the knowledge we have lost in information?

These lines from the English poet Eliot (1934) have become well known in IS disciplines because of the implied relations between the concepts of wisdom, knowledge and information. As they are not unproblematic, debates are common.
The concept of ‘meaning’ emerged foremost in ‘conceptual modeling’ (of a reality domain) as well as in ‘semantics’ in Artificial Intelligence. In the latter, the origin is in philosophical-linguistics. In the present Semantic Web era, semantics means adding annotations (language-based) to all informational objects, and structuring and connecting these by ‘ontologies’ (categorizations), thesauri, and smart programming. In this regard, an ontology is merely a technical term, although derived from the metaphysical philosophical notion of Ontology (‘what exists’).

This raises questions like
(1) Are meanings ‘in reality’ identical to semantics as in information systems?
(2) Can/is all (potential) semantics (be) implemented in information systems?
(3) What is the situation in complex realities like cultural landscapes?

2. Knowledge, meanings and complex realities

Needs for information and knowledge as in information systems arise from needs in reality from people who are thinking, acting, etc.
Meanings are a factor in this, because:
➢ people perceive and process data/information because it is meaningful to them
➢ only then will data => information, and information => knowledge
➢ meanings are decisive in people acting upon information and knowledge

Information systems are meant to capture and handle knowledge from contexts – in real, actual, imagined or virtual realities - and from people as adequately as possible in a computerized and
therefore formalized way. In **system design contexts** these realities are confronted with those of the system developers and users. Many realities – e.g. cultural landscapes - are **complex realities**, meaning **reality domains with many aspects and elements, in contexts with different people, who all may think and act differently according to their own opinions, perceptions, meanings, emotions, etc., effectively leading to different realities.**

3. **Knowledge and information**

Knowledge and ‘in-formation’ both date from the Antiquities, but have been changing in time. E.g. the concept of information in the 20th century became connected to data (as building blocks provided by perception of realities) and **explicit** knowledge. In computers all of this is ultimately implemented as formalized, ‘hard-coded’ representations (bits, etc.) . Explicit knowledge indicates a narrowing down of knowledge into information ('knowledge lost in information’), conforming knowledge typologies or modes like:

- tacit (unarticulated) and explicit (codified) knowledge
- embodied, narrative and abstract-symbolic knowledge
- factual, procedural, interpretative and meta (background) knowledge
- human, documented, mechanized and computerized knowledge

But in personal communication (through technology or direct), information is also derived from gestures, behavior, voices, etc. => ‘information lost in knowledge’?

For cultural landscapes, interpretive and narrative knowledge are especially important, essentially related to knowledge systems and semantic techniques.

4. **(De)personalization of communication and meanings**

In **modeling** realities, designers are used to depersonalize (or de-group) the knowledge/information. Personal meanings are then sorted out or generalized, leading to standard definitions and categorizations. Later on, personalization and customization do take place, but mostly just in the user-interface, while ‘personal annotation’ of users to the **content** may be seen as problematic or is not thought of. However, in cultural landscapes, different meanings **do** matter.

5. **... So what is meaning (1)**

Meaning is a concept that is often used but less often defined, explained or discussed. Definitions or explications can be found in a number of disciplinary fields, though, like:

*Meanings as in philosophical-linguistics, e.g. as in concepts:
“Meaning is the customary significance attached to the use of a word, phrase or sentence, including both its literal sense and its emotive associations.”

‘Concepts’ – an essential base in information systems – are defined by means of their intension (properties) or the extension (the set of individuals).

As definitions are related to explanations (“a structure, act, or process that provides understanding”), meanings can also be expressed in acts, structures, emotions, ...

*Meanings as in (cognitive) representations in Cognitive Science:

Human mental representations, especially linguistic ones, are said to be semantic, which is to say, they have meaning. But: how about images?!

Although much debated, meaning may be derived from the relationship with what it is about (in reality or otherwise), called the intentionality.

*Meanings as in Semiotics

Semiotics is about communication as the production and exchange of meanings as in signs. There is a ‘sender’, of course, who puts his/her interpretation on the reality into the ‘message’ (called the sign) about something (the referent). But the reader and his/her interpretations are seen as more important. It leads to a ‘meaning triangle’ (figure ..), related to practices, cultures, norms and deviations.

*Meanings as in Hermeneutics

Interpretation as in hermeneutics is essentially concerned with meanings, including the meanings in their everyday contexts and their fuzziness, changeability, etc. Meaning is about signification or ‘giving sense’ by a person or group to an utterance or event, both intended and unintended.

6. Meanings and semantics in (web) information systems

As it appears, Semantic Web models and techniques are primarily about knowledge, by means of ontologies and their interconnections. Meaning often seems to be kind of ‘axioma’ : hardly explained or proven.

The machine-processibility is crucial: “ontologies define real-world semantics, which makes it possible to link machine processable content with meaning for humans based on consensual terminologies”. Ontologies then aim at “a shared and common understanding of a domain”, as in ‘communities of practice’. As this requires a convergence of meanings, the degree of convergence should be a main discussion point: whose meanings, who decides, what about other and new ones?

7. Semantics between meanings and formalization
To be machine processable, ontologies must be formalized: “ontologies define formal semantics for information, [ ...] allowing information processing by a computer”. This two-sided ‘Janus head’ emerges from the table of Knowledge Representations formalisms classes (below). Supposedly this formalization aspect puts constraints on what can be done concerning realizing meanings and semantics into systems.

<table>
<thead>
<tr>
<th>Level</th>
<th>Primitives</th>
<th>Interpretation</th>
<th>Main feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logical</td>
<td>Predicates, functions</td>
<td>Arbitrary</td>
<td>Formalization</td>
</tr>
<tr>
<td>Epistemological</td>
<td>Structuring relations</td>
<td>Arbitrary</td>
<td>Structure</td>
</tr>
<tr>
<td><strong>Ontological</strong></td>
<td><strong>Ontological relations</strong></td>
<td><strong>Constrained</strong></td>
<td><strong>Meaning</strong></td>
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<tr>
<td>Conceptual</td>
<td>Conceptual relations</td>
<td>Subjective</td>
<td>Conceptualization</td>
</tr>
<tr>
<td>Linguistic</td>
<td>Linguistic terms</td>
<td>Subjective</td>
<td>Language dependency</td>
</tr>
</tbody>
</table>

8. The Semantic Web: adding or reducing meanings?

The Semantic Web aims at making the WWW content more meaningful by adding semantics. As has been argued, however, the content of the WWW is already seen as meaningful by users; the added meaning, therefore, is to make the Web more ‘meaningful’ to machines. As an ontology is a selection of the potential interpretations, it leads to a decrease of the amount of meanings in the WWW. The Semantic Web, therefore, comprises an unusual notion of meaning and a rather restricted view on semantics. And users have to use these pre-selected meanings, not their own.

Conclusions

Complex realities may become quite reduced in both knowledge, information and meanings, not just in traditional information systems, but also in semantic systems. The main reasons are (1) in semantics, meanings are restricted to what is and can be put into language, (2) the requirements of machine processability and its inherent formalization, and (3) the often ‘unproblematic’ use of annotations, concepts and their definitions and ontologies, and the (un)consciously restrictions of these to meaning(s) of the information systems makers. Or put into Eliot’s poem lines:

*Where are the meanings we have lost in semantics? Where is the Ontology we have lost in ontologies?*
Complex realities: Cultural landscapes

Layers of interactions man - landscape:
- The layer of intervention: ‘what you make’
- The layer of knowledge: ‘what you know’
- The layer of perception: ‘what you see’
- The layer of interpretation: ‘what you believe/feel’

Views on the landscape:
- Artificial, idyllic, authentic, mythical, natural
- Historical, living, aesthetic, Genius Loci
- From truth, use, power, participation, sustainability, etc.
- Different philosophical and scientific approaches

Meanings, semantics and information systems
Information systems on cultural landscapes are typically Geographic Information System (GIS) with information presented on maps. Meanings are an important issue in discourses on cultural landscapes, but in practice those information systems usually are just about knowledge and values, and GIS is mostly taken for granted. ‘Semantic’ ideas are hardly an issue either. A very recent project on a renewed national web ‘portal’ for cultural heritage KICH may be a start, though. But at present, KICH also acts as a selective content filter, as a reflection of selective views in both the systems design and in the cultural landscape meanings.

As KICH is more the norm than the exception, it leads to many different systems about (the same) cultural landscapes. The few exceptions are mainly web systems without a GIS. This may be done deliberately, e.g. because of the rather ‘hard’ data GIS requires. Some are made by local history clubs, others in regional or local landscape history research projects. Examples are Zandstad (www.Zandstad.nl), and the Utrecht University (Dept. ICS) research project Venster op de Vecht (www.vensteropdevecht.nl).

Therefore, both the taken-for-granted use of GIS and a lack of consideration of meanings in relation to information systems may be main factors in realizing (explicit) meanings in systems.
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