A visualisation proposal to assist knowledge sharing

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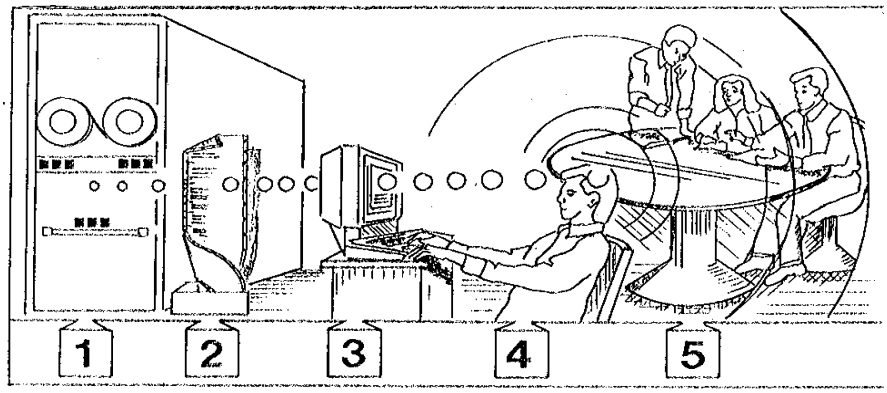
Presentation abstract

- discuss the design and use of interactive visualisations
- presents a system that allows the creation of a virtual world representing a concept space to assist knowledge sharing.
- argue how visualisation, in particular 3D interactive visualisation, can be used for knowledge sharing support and group interaction.
- applications include information retrieval and indexing, and group knowledge sharing such as in educational settings.

Presentation abstract

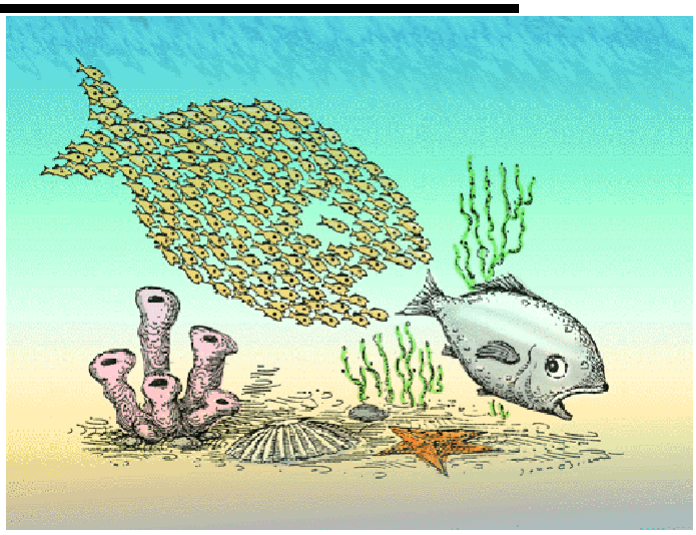
- *knowledge sharing* is supported by a concept space structure, which can be individually or collaboratively built and refined.
- the proposed system uses a 3D interactive visualisation interface to support user exploration and enhancement of the concept space.
- the concept space is somewhat a 3D semantic map, allowing users to define concepts by listing associated keywords.

CSCW systems emerging

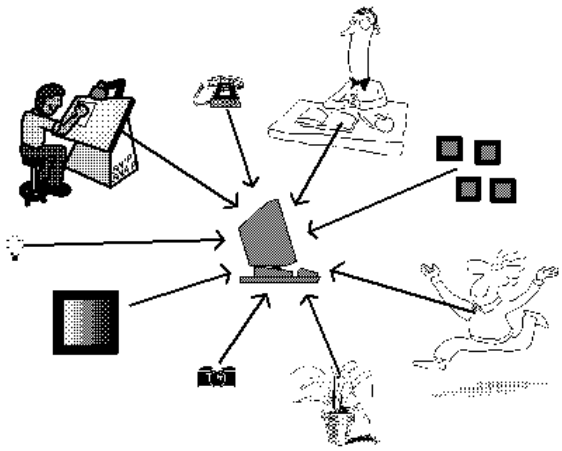


The machine (1) **Data output (2)** **The terminal (3)** **The user (4)** **The group (5)**

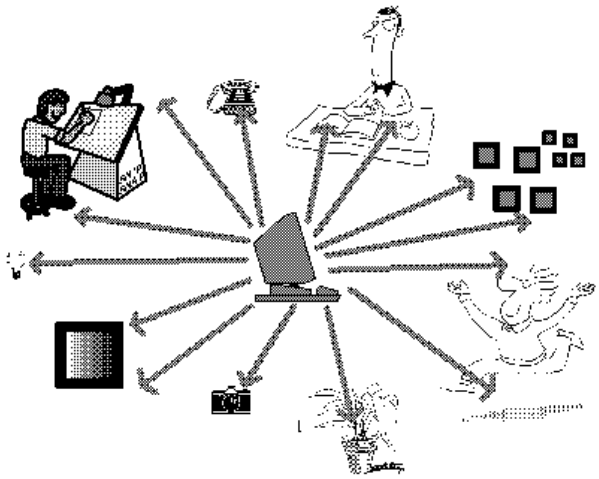
Collaboration allows better performance



Way One: virtual reality

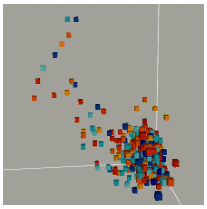
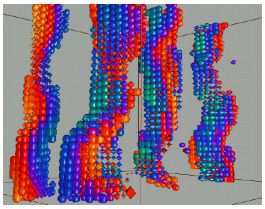
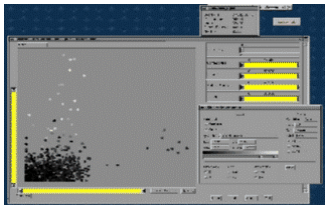


Way two: ubiquitous computing



“Two way” integration: visualisation

- definition: use of images and animations to convey information
- goal :effectively convey information to the user
  - transforms the abstract and symbolic into the geometric
  - harnesses the human perception system (visual?)

Motivation

- different representations can enhance the understanding level of a particular problem [Tufte].
- the form of representation makes a dramatic difference in the ease of the task [Norman].
- Norman proposes that external representations, that can be part of a workspace shared with others, require some sort of constructed device to support them: an artefact.
- the system proposes an interface that tries to remove the computer as an object of perception, allowing the user to interact directly with the generated environment as discussed by [Hubbold et al].

Semantic Maps

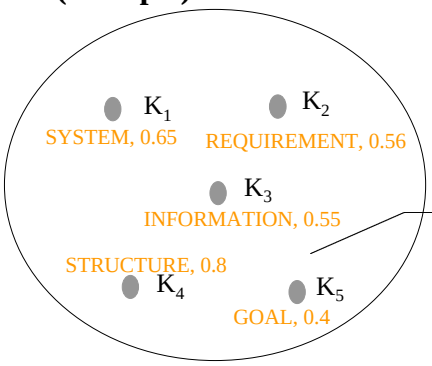
- strategy for graphically representing concepts, portraying the schematic relations that compose a concept
- assumes that there are multiple relations between a concept and the knowledge that is associated with the concept
- for any concept there are at least these types of associations:
    - class: the order of things the concept falls into;
    - property: the attributes that define the concept;
    - example: exemplars of the concept.

Semantic Maps

- a general procedure to develop a Semantic Map is by having a group discussion where the three types of concept associations emerge.
- its major purpose is to allow students organise their prior knowledge into formal relations and thus provide a basis for understanding what they are about to read and study.
- comprehension can be thought of as the elaboration and refinement of prior knowledge.
- provide a graphic structure of knowledge to be used as the basis for organising new ideas as they are understood.

Concept definition and structure

Concept
(example) ENTERPRISE



K_i - keywords

Rating [0 , 1]
amount of relation with the concept

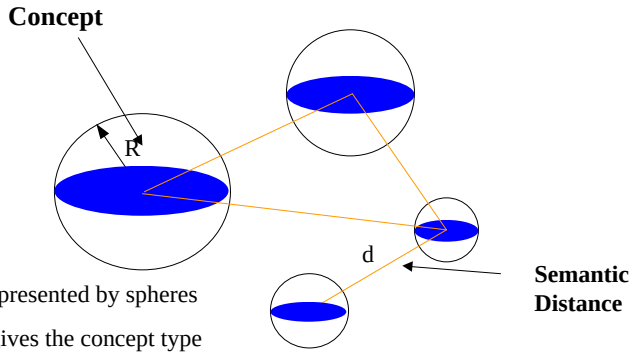
< name > < value >

Enterprise	
system	0,65
structure	0,8
goal	0,4
information	0,55
requirement	0,56

A partial concept space structure example

Computer	Interface
Order, 0.67	order, 0.34
Technology, 0.7	operation, 0.76
Automatic, 0.67	human, 0.8
Processing, 0.8	computer, 0.56
Structure, 0.7	

Concept space



Concepts are represented by spheres

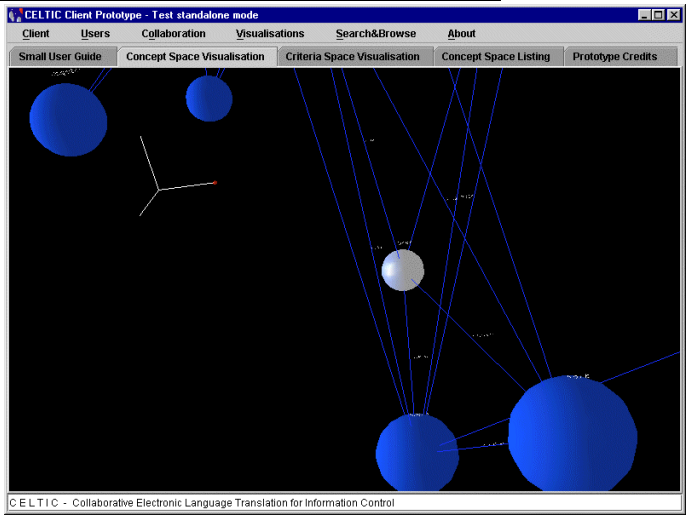
Sphere colour gives the concept type

Sphere size gives the concept description rate

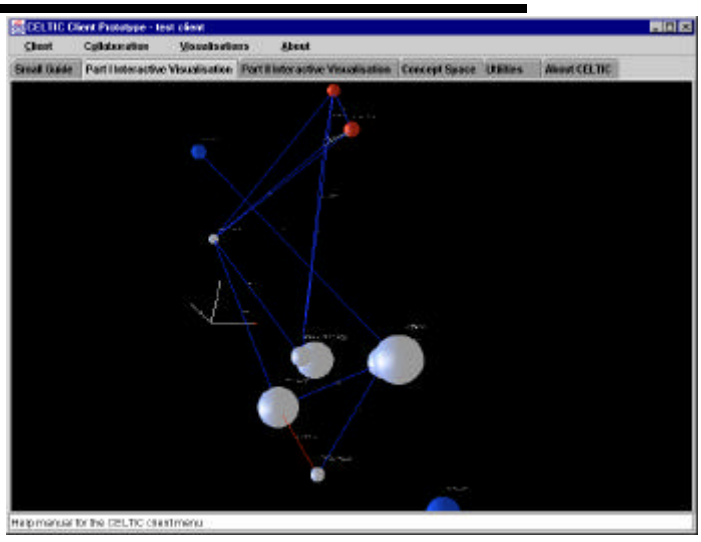
Semantic Distance is represented by lines between spheres

Spatial position is used with no other meaning than to place concepts for increase readability

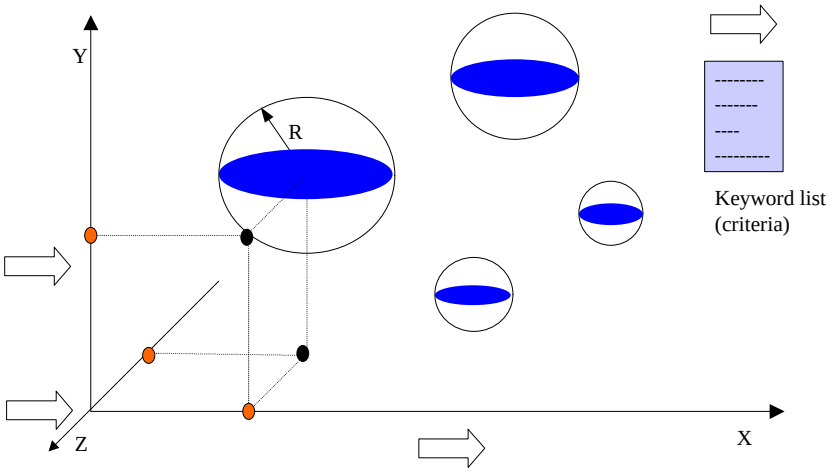
Concept space visualisation



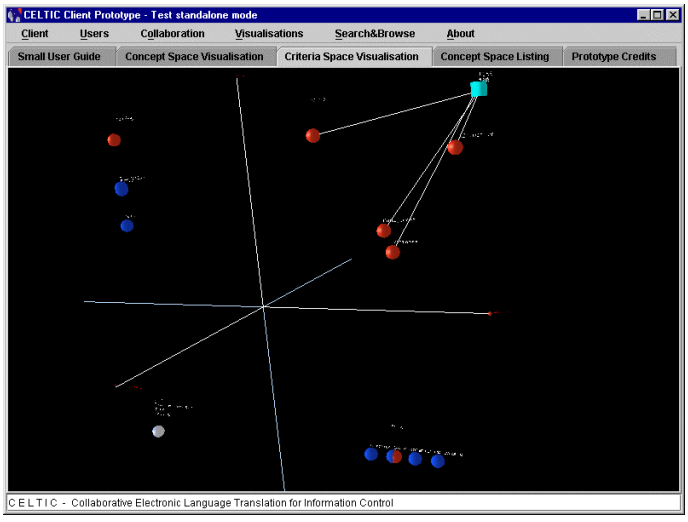
Concept space visualisation



Criteria space



Criteria space Visualisation



Concluding remarks

- evaluation is being conducted by groups of people sharing their concepts and keywords about a given domain providing information on three main topics:
  - how experts can built a common knowledge structure;
  - how each user will be able to take advantage of both concept and criteria visualisations;
  - how can a group of users enhance and share a given knowledge structure.
- in ill-structured or complex domains, the visualisation offers the possibility of discovering relations between given concepts, defining an information context.

Concluding remarks

- the proposed 3D interactive visualisation provides the means for integration between the services needed to allow collaboration for enhancing the structure, and allows for group interaction.
- provides a visual interface for semantic access to information as an independent layer regarding a data source.
- the criteria space visualisation allow users' exploration of the shared concept space by rearranging its concepts based on given criteria.