

# Shared visualisation and virtual environments for co-operative learning

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## **Introduction**

The author's PhD at Lancaster University Computing Department is based on the need of better tools to deal with information in an way which does not depend on current database systems or distributed information systems. The proposed system was designed to allow user collaboration based on the direct manipulation of a visualisation that represents a particular information space based on an agreed abstraction.

Information Visualisation designs offer opportunities for enhancing user interaction. The PhD focus on a proposed system with two main characteristics: 1) uses a top-down principle for information visualisation where different users share a common collection of agreed concepts (rely into abstraction as a common ground to get real data), and 2) uses a two part information visualisation design, one dealing with context and other with focus. From this common information space each user can integrate the system with locally available databases and World Wide Web resources.

## **Main research problem**

When dealing with representations it's rather obvious that different representations can enhance the understanding level of a particular problem. The form of representation makes a dramatic difference in the ease of the task and their proper choice depends upon the knowledge, system, and method being applied to the problem (Norman, 1993). The main PhD research question is: *Can computer mediated 3D visual representations be useful in helping the understanding and communication between individuals?*

Why consider information visualisation as the main research topic? We need better tools to deal with complex data sets, ill-structure and dynamic information settings that characterise actual systems to deal with communication needs, understand and learning problems, info-glut, and information overload (Forrester, 1987). Visual representations are more natural for humans and can be used to improve their perception to learn and as an aid for search and computation.

Norman proposes that external representations, especially ones that can be part of a workspace shared with others, require some sort of constructed device to support them: an artefact (Norman, 1993). He also adds that the representations of the representations of thoughts and concepts is the essence of reflection and of higher-order thought. It is through *metarepresentations* that new knowledge is generated, finding consistencies and patterns in the representations that could not readily be noticed in the world (Norman, 1993).

For our purposes, the generation of cognitive map visualisations can be of interest. The conceptual space as referred by (Hutchins, 1995) will be the focus for the present work. The research can be now stated as *the use of 3D facilities to improve information visualisation providing a useful way of sharing workable knowledge representations as a collective*

*reflective artefact*. In particular the work to be undertaken focus on Shared visualisation and virtual environments for co-operative learning.

The main research for the PhD are:

- model a workable set of parameters to represent useful knowledge representations, for an information visualisation design that use 3D facilities;
- develop an usable set of 3D symbols to serve as demonstrators for supporting the 3D information space as an information visualisation design;
- select an application where the system can be tested. The particular model will set-up a learning environment to support and generate workable knowledge representations as information visualisations;
- use an enabling set of technologies to prototype the 3D information space for (i) individual control and (ii) for sharing by several users.

In his paper *The Eyes Have It*, Ben Shneiderman proposes a Visual Information-Seeking Mantra: *Overview first, zoom and filter, then details-on-demand* (Shneiderman, 1996). The PhD takes its foundations and considers the collaborative functionality of rating the information visualised.

### **Current status**

The PhD is now in its second year and is taken in studying away Lancaster University. The conceptual model for the system as been already developed and the functional model is under development. The key concepts related with how to use an workable set of parameters and their 3D symbols have already devised. The selected application for testing the CELTIC system will be an educational setting for support undergraduate students. Current work is now focused on an prototype version, developed in Java to test the model and refine it.

### **References**

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### **Biographical note**

Luís Gouveia's first degree is in Applied Maths/Computer Science from UPIH, Porto. He spend five years in industry working at a IBM VAR, where he participated as a project manager in several projects implementing Videotex systems. He took his Master degree in electrical Engineering, joining Fernando Pessoa University as Research Assistant in the CEREM group. Since then, he has participated in several projects related to technology innovation applied to education. He is currently carrying out his PhD studies, in Computing Science, at Lancaster University. His main interests are Collaborative Virtual Environments, Information Visualisation and Educational Applications.