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■ Age of Overload

Though many of us in today's high-tech culture, are living in the "Age of Information," it at times seems like the "Age of Overload." Not only does print material continue to flood our desks, offices, and homes, we now also have to respond to the digital world of text, images, animations, and sound. We are bombarded with information and faced with constant decisions about how to manage and use all this input.

That's the stress side of information overload. The positive side is that we have the potential to educate ourselves by accessing information with new learning tools that are conceptually different than anything that has previously existed. Multimedia (or hypermedia) is a new technology that can enhance the process of learning and discovery. Its metaphor is navigation as the user moves through electronically created and designed information. Its promise is that it can empower the individual in ways that are very different from conventional learning.

The information explosion has shrunk our planet into the "global village" that Marshall McLuhan predicted in the 1960s. And as we watch our planet compress, we also realize that our impact on it can create imbalances that have potentially enormous environmental, social, and economic consequences. All this information has made us realize how interconnected we are and how our actions can cause reactions that surge with the speed of a planetary tsunami—witness increasing ozone depletion, deforestation, and global warming.

■ Pyramid of Wisdom

It is important to realize that more information is not necessarily better and that there is a hierarchy to the value and utility of all this material. At the bottom of the pyramid is the vast base of *raw data* from all sources. It is processed, critiqued, evaluated, and filtered into the next level: *information*. In its purest form, if it is objective and not statistically manipulated, information is neutral: just the facts. How we deal with all the information begins to add another processing level that expresses our mind's power to observe, look for patterns, add value (from economic to ethical), synthesize, and create. These are the steps up to the next level on the pyramid: that of *knowledge*, defined as understanding by experience with the clear perception of truth. Finally the knowledge leads to more rarefied heights, to *wisdom*: the accumulation of philosophical and scientific learning which empowers us with the faculty of making the best use of

knowledge. In managing information our highest goal should be to further optimum levels of knowledge for as many people as possible. Wisdom must blossom and grow so that decisions and solutions can be found for the enormous personal and planetary challenges we face.

■ Interface of Science, Art and Technology

InterNetwork, Inc. (INI) is a small design studio, which I founded with the goal of working "at the interface of science, art and technology." We strive to create an open space (both physically and psychically) where working with clients, we can develop novel solutions to science communications.

INI has been involved with electronic design publishing in both print and CD working with major United States science agencies such as NASA or the US Geological Survey (USGS) and other academic institutions. For the last five years a major focus has been computer multimedia/hypermedia for scientific, educational, and "edutainment."

■ Multimedia—Environment and Earth Science

Multimedia or hypermedia computer technology is an emerging paradigm for navigating through multiple layers of information in all subject areas. It offers exciting new possibilities for communicating complex scientific processes and real data for user manipulation. INI is currently working on a number of multimedia projects. Some are internal R&D projects and others are client-based. We see the use of computers as production and publishing platforms for text, graphics, satellite imagery, and animation to enhance analysis of earth science information for the professional, semiprofessional and education audience to increase awareness of critical environmental issues.

Multimedia allows easy access to information through the use of a graphical user interface or GUI. This is both a conceptual and graphic "map" which links deepening of graphic icons representing different system functions, allows the user to browse through this information by exploring links between bibliographies, numeric data, textual information, imagery and sound. By pointing and clicking with the computer mouse, a user moves through the information and images at his or her own pace. The user has the option to explore and navigate through a wide variety of deepening levels of information. In contrast to printed or sequential film/video material, the user can explore in a non-linear

fashion and see relationships between different types of visual and textual information wherever they choose. These links are self-created and directed—ultimately they are a function of the depth of information and the intelligence of the GUI. Hypermedia technology represents a revolution in the communication of information. The user now has the ability to select their own curriculum and become an active participant on the teaching as well as learning process. Ultimately data becomes information and then information becomes knowledge.

Over the last decade we have accumulated a large visual database of satellite and ground-based images of our planet. With the increasing ability to store and manipulate visual material we started in 1987-88 to develop in-house multimedia prototypes exploring the navigation paradigm drawing on this rich resource. As animation, sound and photomanipulation software become more user-friendly (with products such as MacroMind Director, PhotoShop, DigiDesign AudioMedia) we will see an explosion of electronically generated documents for all audiences. We have developed a few R&D multimedia prototypes for these different audiences including *Earth: Vital Signs*, and *Polar Sea Ice*. These have helped educate and stimulate our clients on the potential of this new media as they are often unfamiliar with the exciting and creative applications of the technology. When USGS saw *Polar Sea Ice* they contacted us to help them develop a new concept in science communication.

ADI: Multimedia Science Journal

In 1990, USGS and other US Federal agencies agreed to use multimedia technology to promote access to data and information on global environmental change. Effective data management and dissemination is one of the goals of the global change research community, especially with the project exponential growth in data expected in the coming years. The objective of the project, known as the Arctic Data *InterActive* (ADI), was to integrate a variety of scientific information sources, including complete text of scientific papers, numeric and spatial data sets, and software for data analysis. ADI's goal was to create, design and implement a prototype of the first multimedia, electronic science journal with a Global Change theme and will soon be published on CD ROM. The design of ADI is based on hypermedia technology allowing user-directed navigation of multiple layers of information in different media. The Arctic was selected as the

theme of this data management study because it is one of the first geographic regions to respond to changing climate (e.g. global warming will cause ice to melt). ADI is being distributed to researchers and policymakers throughout the United States and other countries.

Bridging the Linear and Non-Linear Way

The ability to combine multimedia experiences adds to the conceptual depth of the navigation experience. The design of these links which access text, sound, animations, and software applications all need to be seen in relationship to each other. There are even an element of unexpected surprises as information is organized and even organizes itself beyond our own intellectual structures as designers. I think this is one of the exciting aspects of multimedia—it pushes you into seeing new ways that things relate to each other in new ways. Hopefully that will ultimately stimulate those who use the technology to find solutions to many issues we face. It is very exciting from a creative perspective on two levels. First, it pushes the designer beyond the conventions of own training and perception. There are no teachers or guidebooks for most people working at the edge of this technology, so we are charting new ground, ways of seeing relationships between all the elements in a particular piece that goes beyond the GUI's design. The educational process now has the possibility of expanding beyond our contemporary linear way of thinking. Multimedia linking may help to accelerate the next of generation to see and more readily accept things in both a linear and non-linear fashion. Though non-linearity is accepted in the Orient, it is not a particularly Western cultural concept, as most of science see things in causal relationships. Yet the mystery of understanding how things work and how they "are" has many non-causal components. Multimedia may help bridge these two intellectual and ultimately "spiritual" ways of seeing the world—it may even provide the "techno-spiritual" meeting of East and West.

It is clear that the merging of many disciplines with the accelerating communication technologies offers great promise for creative endeavours which have social and economic benefits. We are in a phase of our evolution as a species where we need to really look at how we live on this planet. The Earth from space is a metaphor of both our home and the need to step back and collectively view our situation.



Scenes from the presentation *Global Change*