THE FUTURE OF 2D AND 3D INFORMATON VISUALIZATION IN INFORMATION ORGANIZATIONS

The fields of data, software, and scientific visualization are well on their way to becoming a part of normal life and are already well-established fields in their perspective arenas of influence.

Information visualization itself is just at the end of its first exploratory stage. Many librarians say the next-generation Web (often called the Semantic Web) will be rich both visually and semantically.

XML technologies, SVG, and especially the X3D open markup language standard for 3D visualization supported by the World Wide Web (W3) Consortium are just beginning to explore how information and metadata can be presented to Web users in a desirable and efficient manner (for instance, through manipulation, navigation, transformation, zooming, filtering, and so on).

Here are some interesting futures for information visualization, some of which are already available commercially in the marketplace and in open-source software products:

- Visual data mining
- Collaborative visualization
- Visualization on the Web
- Real-time visualization of large datasets
- Virtual reality navigation using virtual user interface technology
- 2D and 3D visualization on the PC desktop, including:
    - Desktop 3D for 3D worlds, with 3D objects on a 2D display, and handheld 3D navigation device (for use in architecture, manufacturing design, and medical fields)
    - Desktop 3D for novel information spaces (applied to various landscapes like cities, themes, walls, rooms, hard disk files) using various techniques
    - Desktop 3D for artificial worlds, to represent information content in file cabinets, shopping malls, library shelves and catalogs, Web spaces, etc.
    - Chartjunk 3D applied to various charts such as histograms, financial data, bar charts, pie charts, icons, etc.
- Immersive virtual environments (with head-mounted gear)
- Semi-immersive environments (with special glasses and/or large projection screens)

In addition, some future trends are readily apparent for 2D and 3D information visualization:[1]

- Information visualization will enter the mainstream. High-end PCs continue to come down in price and become more available to most users. More companies are focusing research and development dollars and staff into this

area, and they are producing and marketing 2D and 3D information visualization software products (as can be seen in Chapter 3).

- More applications are appearing all the time, using existing technologies and creating new techniques.
- More information visualization software products are being marketed as integrated packages to assist users, companies, and researchers to employ the full potentials of information visualization in their current environments and problem-solving duties.
- More information visualization can now be done across networks, not just on one PC or by one group, so that collaborative research and sharing of information means faster results and more interactive production.
- Information visualization, both in theory and in practice, is now being taught in many different disciplines as a course of study. Computer science, library and information science, graphic designers, software engineering, architecture, business, Internet2, supercomputer research: all of these disciplines are moving toward integrating information visualization into their curricula, intern programs, and consulting services.

In addition, some key issues and unsolved problems will involve future research in 2D and 3D information visualization:[2]

- There need to be new metaphors and new visualizations.
- Both science and practice need to merge and interact with each other.
- Cyberspace and its visualization will probably be the largest, most complex, and crucial information space for this new field.
- 3D collaborative visualizations will become increasingly important and exciting (the interactive gaming community already plays a critical role in this area).
- Moving from raw data to a modular view of data and information.
- More research needs to be done on understanding and designing interactive and dynamic information displays.
- More research needs to be done in the area of spatial cognition.
- A theory of knowledge crystallization needs to be developed.

Ultimately, 2D and 3D information visualization has extensive promise because of the following:[3]

- It is manipulable and interactive.
- It enables perceptual inference and perceptual monitoring.
- It enhances the recognition of patterns.
- It reduces the time element in searching for information.
- It brings numerous resources to the user of expanded memory and perceptual processing.

Overall, each information organization must determine the level and intensity with which it examines, experiments with, and explores the technologies described in this report.

Without a doubt, interactive 2D and 3D platforms are on the verge of exploding into the marketplace. The Web already enables 3D interactive collaborative

gaming and virtual environments, and 2D and 3D gaming systems have been in the marketplace for many years.

Library users are probably more familiar and comfortable with interacting in 2D and 3D than librarians are. Offering up information, whether text or data, into this 2D and 3D technological environment would significantly alter the public's perception of the role that information organizations play in the presentation and manipulation of information into new environments. It might open new avenues and enhancements for information organizations themselves.

Some librarians will take the lead, others will follow, and still others will either wait or not be involved at all. This report is specifically geared toward the first group, those who wish to take the lead and become involved right now.

As Chapter 3 illustrates, librarians can easily become familiar with and indeed begin the process of offering these 2D and 3D technologies not only to their organizational staff, but to their users as well.

Notes

[1]Card et al., p. 639-640.

[2]Card et al., p. 640.

[3]Card et al., p. 637.