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SOFTWARE Grokking the infoviz

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Information visualisation is about to go mainstream. While it may not be the killer application some expect, "infoviz" is going to help users to manipulate data in wholly new ways

SOFTWARE firms still have the irritating habit of marketing new products as "killer applications". Yet almost none of the products they trumpet has a chance of measuring up to the program for which the term was invented 25 years ago: the spreadsheet. That was the reason why many people bought their first PC. It allowed them to build models and play with their data. With spreadsheets, "what if" scenarios could be calculated and recalculated easily. If the value in one cell was changed, the data in related cells were automatically adjusted. Users can, in the words of Clay Shirky, an American software expert, "converse with the data".

Now, another kind of software that lets users converse with the data is going mainstream. It consists of programs that help you to visualise large amounts of information. They have made their way into the enterprise software used by large corporations. Interactive charts are showing up on websites. And earlier this year, Groxis, a start-up based in Sausalito, California, released Grokker, an innovative graphical tool that it also sells to consumers for $99. Will "infoviz", as geeks call the technology, become a killer application, rather as spreadsheets did?

As the term implies, information visualisation is all about making data visible—or, more precisely, the patterns that are hidden in the data. Graphic aids such as charts have done this for ages, says Ben Shneiderman of the Human-Computer Interaction Laboratory at the University of Maryland (and co-editor of "Readings in Information Visualisation", the sacred text of the field). What is new, he and his colleagues explain in the book, "is that the evolution of computers is making possible a medium for graphics with dramatically improved rendering, real-time interactivity and cost."

The goal of information visualisation is not to analyse data gathered from, say, tornadoes or nuclear explosions (that is called scientific visualisation). Instead, it aims to create a computer "user-interface" that is better than today's "desktop" metaphor—so that people can get their arms (or, rather, their eyes) around the ever-increasing amount of information stored in corporate computer systems, available on the internet, or kept on PCs.

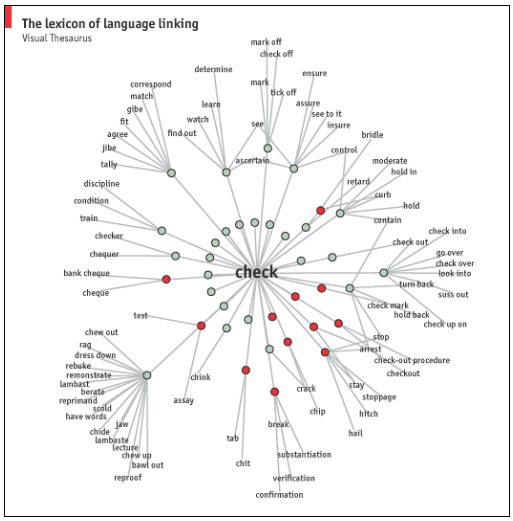
This concept, of course, is not new. It had its debut about 15 years ago. In 1987, the National Science Foundation in Washington, DC,

published a report entitled "Visualisation in Scientific Computing". Later, in the early 1990s, Xerox PARC, a legendary Silicon Valley research laboratory, published its work on the next-generation user-interface that pioneered many of the approaches still used today.

Yet, despite its obvious potential, information visualisation never really took off commercially. The main reasons for the slow coming are that the PC's present interface is so well entrenched, and that its evolution is controlled by a few companies such as Microsoft, argues Ramana Rao, one of the researchers at PARC and now chief technology officer at Inxight, a firm spun out from the lab in 1997.

Recently, however, things have begun to change. Information visualisation is becoming more widespread—particularly in corporations, as part of enterprise-software packages. For one thing, the digital plumbing is now in place. More and more data are kept in a "structured" way (ie, in a format that can easily be digested by visualisation programs) or can be converted into such a format by special software tools. The spread of XML (short for the eXtensible Markup Language) also makes it much easier to "tag" data and integrate information from different sources.

Most important, the search for further cost reductions is driving firms to use visualisation tools. Having automated many of their business processes, companies now collect huge amounts of data that they want to analyse to gain a competitive edge. After rounds of lay-offs, companies have fewer people to take complex decisions—a shortage that better software tools can help to alleviate.



Such corporate applications are the main source of business for Antarctica Systems, a company founded in 1999 by Tim Bray, one of the creators of XML. The firm is best known for using cartographic maps to visualise "shared information spaces" such as catalogues, inventories and guides—because people are familiar with maps, which can pack a lot of information in a limited space such as a computer screen.

Antarctica's Visual Net lets customers turn their data into a geographical map. The categories of an online directory, for instance, appear as countries. Their surface indicates how many websites can be found under each heading. And there are "cities"—virtual landmarks, in this case the main websites. Users can also zoom in, to get a closer look at the lay of the information land.

One of Antarctica's customers is Which? Online, a website of the Consumers Association, a consumer-research organisation

based in Britain. The group's numerous guides are displayed as a map of the United Kingdom. Subscribers can click through from country to county to city to neighbourhood, to find a good hotel or restaurant.

Other start-ups are offering not cartographic but heat maps, where "heat" is represented by those parts of the map that change colour—say, from hot red to cool blue—when the underlying value (eg, share price or interest rate) changes. Panopticon, a Swedish firm, has specialised in building such heat maps for financial institutions. The European arm of J.P. Morgan Chase, an investment bank, will use them to monitor credit markets.

The most famous and instructive heat map is the MarketMap on the website of Smart Money, a personal-finance magazine. The map lets users keep track of more than 500 shares at the same time. It is a collection of coloured rectangles, each representing a company. A rectangle's size reflects the market capitalisation of the firm it represents. Its colour shows the performance of the firm's share price. Green means that the shares are up. Red means they are down. Black means they are unchanged.

When a user moves his cursor over one of the rectangles, a small panel containing more detailed information pops up. Users can also drill down by clicking on a rectangle that will bring up a menu offering links to such elements as news about a company, charts and earnings data. A separate control panel allows users to select time periods or colours.

From maps to trees

Yet surface maps are not the only model of information visualisation that has gained support of late.

Another approach focuses less on displaying information and more on making navigation easier using trees or webs. Mr Rao calls them "widgets"—the basic building-blocks of graphical user-interfaces, such as buttons, toolbars and menus.

Users often react enthusiastically when they first see new visualisation tools, but then turn wary.

A classic in this category is the Visual Thesaurus created by Plumb Design, a start-up based in New York. Related words are linked with "virtual springs" that pull them together into a cluster. To navigate through the Visual Thesaurus, a user types in a word which pulls up a tree-like shape with the word in question at the centre, and related terms clustered around it (see diagram). Definitions appear when the cursor is moved over dots next to the words. To find out more about a synonym, a user can click on it, which makes it move to the centre of a new cluster of words.

Clicking on a node, to move it into the centre, is also a feature of Inxight's interface. Called Star Tree, it is a virtual magnifying-glass that highlights part of a hierarchy—say, an employee's name. Linked data—in this case, other employees—are concentrated at the edges, so users can see the

forest as well as the trees. More than 50 information-technology firms, including Tivoli, Hewlett-Packard and Computer Associates, have included Inxight's Star Tree in their offerings.

Most visualisation products focus on surface maps, webs or trees. Grokker, by contrast, is something of a novelty. Instead of showing search results as, say, a list, the program can display them as a collection of circles within circles. A big circle represents all the results. Smaller orbs within it are sub-categories. Clicking on one will expand it and reveal yet more circles. Drilling down further in this way will eventually get a user to a single document.

What also differentiates Grokker (derived from the word "to grok", or to understand something completely, which was coined by Robert Heinlein, a science-fiction writer) is that it comes as a program to be installed on a PC. Just as with a spreadsheet program, users can therefore have a dialogue with the data by looking at them from different angles—for instance, by having the size of a circle represent the amount of data it contains, or using colour to express relevance. And just as with spreadsheet files, users of Grokker can share their data views with others, allowing them to collaborate.

But do all these new offerings mean that Grokker and other information-visualisation tools will become a killer application? One problem, for consumers at least, is that many of the data they access are still unstructured. Search engines, for instance, still do not produce their results in a format that can be fed into these tools. And rare are the PC users who systematically classify their files.

More important, however, users have proved slow to adopt new computer interfaces. They often react enthusiastically when they first see new visualisation tools, but turn wary when it comes to using them—because that means relearning how to do things.

Instead of succeeding as a stand-alone application, information visualisation is more likely to show up on web pages. Consider the cases of Which? Online, MarketMap and InterfaceFLOR, a carpet manufacturer that uses the enterprise version of Grokker to let customers design their own floor coverings. Integrating new interfaces into websites helps overcome both adoption barriers: data integration is much easier and the interface can be optimised to the task at hand.

This approach also allows experimentation about which new interface users like best. Only when users have made their pick, predicts Mr Rao, will new widgets have a chance to make their way into popular PC applications, such as spreadsheet programs. In a way, such an outcome would replicate what has occurred in the offline world. Many print publications (including The Economist) use charts as illustrations. Most of these are line or bar charts. But most of what is printed is still text.