chapter 4

Mapping conversation and community
In this chapter we turn our attention away from examining attempts to spatialize information and network spaces and instead consider attempts to spatialize modes of online communication and interaction between people. As such, this chapter is concerned with what might be termed “people-centered” information visualization.

Cyberspace is composed of a variety of social media – email, mailing lists, listservers, bulletin boards, chat rooms, multi-user domains (MUDs), virtual worlds, game spaces – that support social interaction between people who are geographically dislocated. Many commentators now view the fostering of social interaction as the most significant aspect of cyberspace. Indeed, there is no denying that these social media are used every day and inhabited by millions of people talking, discussing, arguing, flirting, playing, and chatting with one another. As a consequence, the social uses and consequences of cyberspace have received significant academic and public attention, including attempts to spatialize these interactions in attempts to either engender more effective communication or to aid the comprehension of how these media function and the social relations they support. Before examining the wide range of ways to spatialize these media, we outline in brief some of the debates concerning the meaning and value of social media of cyberspace in order to illustrate its social significance and demonstrate the value of the spatializations we detail.

In general, analysts argue that the social media of cyberspace provide (1) new conditions under which individuals can explore and manipulate their identity; (2) new spaces in which communities – with very different characteristics to those in geographic space – can be developed and sustained.

In the first instance, analysts suggest that cyberspace allows individuals to explore their identity by changing the conditions under which identity is constructed and expressed. Cyberspace achieves this by providing a space of disembodiment and dislocation, because interaction is conducted through a medium that strips away body codings (e.g. age, gender, race) and geographic place and community. In other words, in cyberspace a person’s identity is defined by words and actions, not body and place. In cyberspace, some commentators contend, your body is irrelevant and invisible and nobody need know your race, disability, gender, sexuality, material wealth, or geographic location unless you choose to reveal it. This stripping away, it is hypothesized, allows individuals to experiment with aspects of their identity that they would otherwise conceal. Although some question the degree to which cyberspace provides a space of meaningful social interaction, we believe that the influence of identity experimentation in cyberspace should not be dismissed lightly. The evidence gathered so far indicates that the social interactions that take place there clearly have a significant influence on some people, changing their outlook and values.

In the second instance, it is contended that individuals are exploiting the flexibility and fluidity of cyberspace to forge new communities – new social networks that are centered upon what they think, say, believe and are interested in. As such, some suggest that one of the principal effects of cyberspace is the formation of communities that are free of the constraints of place and are based upon new modes of interaction and new forms of social relationships. Instead of being founded on geographic propinquity, these communities are grounded in communicative practice. Here, individual participants can circumvent the geographical constraints of the material world and take a more proactive role in shaping their own community and their position within it, although (just like geographic communities) such online communities have behavioral norms, differing personalities, shared significance, and allegiances. Often, these communities are promoted as an antidote to, or as a supplementary means of belonging to or creating a sense of place for, traditional communities that are perceived to be disappearing in the geographic world due to processes of cultural and economic globalization, which are leading to a condition of placelessness.
In order to structure our discussion of the spatializations, we have divided the chapter into sections defined by the mode of social interaction (e.g., email, mailing lists, chat, MUDs, virtual worlds, games). These sections have been ordered in relation to whether they are asynchronous or synchronous modes of communication, and also taking into account their relative sophistication. Asynchronous media are domains in which interaction does not occur in real time (e.g., email, mailing lists, bulletin boards, Usenet news), and synchronous are the converse (e.g., chat rooms, MUDs, virtual worlds, multiplayer games). Outside cyberspace, letter writing is the archetypal asynchronous mode of social interaction and face-to-face communication is the archetypal synchronous mode. Many of the asynchronous media provide “persistent conversations” that continue to exist beyond their immediate posting.

Mapping email

Email was the first social medium of cyberspace, developed by Ray Tomlinson at BBN in 1971. It allowed users to post mail messages across a network to individual accounts. The supporting software was quickly circulated between all ARPANET sites and by 1972 it was one of the two most widely used applications on the network (the other being remote log-in services). Since then, email has remained the most popular, well-used and powerful of all social media.

A report by Peter Lyman and Hal Varian, both of the University of California at Berkeley, stated that over 610 billion emails were sent in 1999. Email can be read and sent from a networked computer, even over the slowest modem links. Its standing is such that, for most Internet users, the first thing they do when they log on is to check their email, and it has been credited in part with fueling the surge in Internet user growth as many people seek out an Internet account because of the lure of email communication with friends, family and colleagues. A recent survey from the University of California, Los Angeles found that 82 percent of Internet users use email. Of those, 76 percent check their email at least once a day.

Despite email’s enduring popularity as a medium, there have been few attempts to spatialize the structure and content of email. Interfaces for email clients are still pretty much the same as a decade ago. As befits a predominately text-based form of communication, messages are stored in sorted lists and arranged in folders. And yet there is increasing need for better tools to manage the inexorable growth in the volume and importance of the email that many people receive on a daily basis. Two interesting prototype email clients that take a much more visual approach to reading, composing and managing messages are Parasite and ContactMap, described next.

One interesting experiment in designing a visual email application was Parasite. The visual metaphor used to map out the storage of messages in mailboxes is an adaptation of the Feynman diagrams normally used in the field of particle...
The interface looks complex, with a multilayered display, and it focuses on revealing the connections between messages and the people who sent them. Cannon and Szeto explain:

As each participant contributes to a given topic over time, links thread an email “conversation” together. By emphasizing these links, Parasite preserves the relational quality of each bit of text so, as an online correspondence builds up, the interface gradually maps out a “community memory” of the discussion.

Unfortunately, development of Parasite ceased before a finished version of the software was released, and so it will remain an interesting but untested approach.

ContactMap is development software that allows users to manage and examine their communication. It extends beyond an email client to allow click-to-dial instant-messaging video and fax. It also facilitates finding documents by contacts, taking memos, and monitoring the availability of contacts.

The software can also be used to examine the interactions between people, using the information to construct a map of contacts, and to perform an analysis of the contacts and their importance. In order to create an “importance rank” it weights factors such as “number of replies”, “number of sent messages”, “who replies to your email”, “who sends you messages”, “who is often mentioned”.

The spatialization opposite shows the social network of Bonnie Nardi, one of the software’s developers, with her contacts grouped by location. It is essentially a visual address book.

4.1: Parasite

chief cartographers: Steve Cannon and Gong Szeto (whilst at i/o360).

aim: to provide a visual email client.

form: a complex, multilayered graph where blue dots represent individual messages and wavy lines show connections.

technique: adaptation of Feynman diagrams.

date: 1998.

further information: see <http://www.ure.org/>
4.2: ContactMap

chief cartographers: Bonnie Nardi, Steve Whittaker and Ellen Isaacs (AT&T Research Labs).

aim: to create a social desktop that integrates a person’s information and communication interactions.

form: a kind of simulated desktop where different people are shown by small iconic business cards.

technique: custom-written browser and contact-manager software.

date: 2000.

further information: see <http://www.research.att.com/~stevew/>
Mapping mailing lists and bulletin boards

The power of email for one-to-one communication can easily be used for one-to-many interactions and many-to-many discussions. This is achieved through the use of mailing lists, listservers and bulletin boards. A mailing list is a one-to-many communication medium where the list owner can send messages to all members of a list. A single message can therefore be delivered to hundreds of subscribers with no extra effort or costs. Examples include commercial daily news bulletins (e.g. Wired News at <http://www.wired.com>) or weekly sarcastic Net gossip (e.g. Need to Know! at <http://www.ntk.net>). A listserv extends this idea to allow many-to-many discussions by permitting all subscribers to post messages to the list. This opens the way for ongoing conversations involving many participants. Bulletin boards, similarly, allow many-to-many communication between individuals. However, unlike mailing lists, messages are not redistributed to subscribers; instead, messages are posted to a central site, now usually Web-based, which users have to log on to in order to check messages.

Many tens of thousands of different mailing lists, listservers and bulletin boards exist, covering almost every imaginable topic. As with email, there have been relatively few attempts to spatialize them, but we detail next three interesting examples: Visual Who, PeopleGarden and WebFan.

The mailing lists that people subscribe to can reveal much about their interests and the form of the wider online social communities in which they participate. Visual Who is an interactive mapping tool designed to dynamically spatialize the social patterns (based on affinities) of a large online community, as measured in mailing-list usage.

The pictures opposite show screenshots of the Visual Who mapping system displaying the affinity of a large number of people to different mailing lists, such as softball, agents and holography. The lists are positioned as anchor points around the edge of the spatialization window, and the people are represented by their names. The position of people’s names is relative to the strength of their affinity to each of the anchor mailing lists: people with a strong affinity to a certain list will be drawn close to it on the spatialization, whereas someone with approximately equal affinity to two lists would be drawn to a midway point between each. As a case study, Judith Donath used the 700 or so people affiliated to the MIT Media Lab. The color-coding of people’s names is based on their work status (faculty are yellow, staff are purple, graduate students are red, and undergraduates are green). Visual Who is also an interactive spatialization in that the user of the system can move anchors, delete and add new lists, with the mapping being rearranged dynamically to take account of the new forces. The system can also show presence by only mapping the people who are actively logged on to the computer system at any one time. In this way, a user can explore quantitatively the social patterns and uses of list space.

We look at more of the visualization work of Donath’s research students over the next few pages (PeopleGarden, WebFan, Loom, and Chat Circles).

4.3: Visual Who

chief cartographers: Judith Donath, with Dana Spiegel, Danah Boyd and Jonathan Goler (Sociable Media Group, Media Lab, MIT).

aim: to show the complex patterns of social connections between large numbers of people, based on their mailing list affiliations.

form: people are represented by their names, which float in a black 2-D space.

technique: spatial position of people’s names is determined by their attraction to the mailing-list anchors, based on the strength of their affinities.

date: original version 1995.

further information: see <http://smg.media.mit.edu/projects/VisualWho/>

Rebecca Xiong has developed a number of innovative interactive visualizations of social interactions in cyberspace (including Netscan cross-visualization). The problem of how to gain a sense of the social nature of discussion spaces is difficult, particularly with conventional interfaces that just present a hierarchical listing of text messages. Xiong has sought to tackle this problem by spatializing the patterns of postings. This, she suggests, would enable users to answer basic questions such as “How much interaction is there?”, “Who are the ‘experts’ and ‘old-timers’?” “Is the space friendly for newcomers?” and “What is the style of conversation?”

At the heart of Xiong’s spatialization work is the use of what she terms “data portraits” to represent people in the discussion space. She explains: “Unlike photo-realistic portraits, which show physical features such as gender, age or race, data portraits are abstract representations of users’ interaction history.” They are not fixed but change over time as the person’s social relations evolve. By displaying individual data portraits of discussion members on a single screen, it is possible to make quick visual comparisons of people and, most importantly, gain a sense of the overall “shape” of the community at a particular snapshot in time. PeopleGarden and WebFan both display Xiong’s data portraits.

In PeopleGarden (opposite), the data portraits of individual discussion participants are called PeopleFlowers. Each petal in a flower represents a single message. Xiong says that she chose the flower metaphor because she liked “the organic nature of a flower, and the suggestion that it changes over time, as users do”. Indeed, it provides a simple, yet attractive, visual metaphor. The form and color of the flower encode data on the number of messages posted, their temporal sequence, whether they were initial conversations or replies, and also the number of replies garnered in return from other participants.

As messages are posted, more petals appear and the flower blooms into life. The more active a user is, the more significant is the flower that is “grown”. The petals are positioned clockwise with age and the color of each petal fades with time, so that the newer postings are indicated by brighter petals. Also, a distinct change in the color saturation of the petals indicates a significant time gap between postings. To show the number of replies a message receives, small yellow dots are added to the tip of the petal. Finally, strong color-coding can be enabled to distinguish petals that represent initial postings and those that are replies. In the images opposite, the magenta-colored petals are new initial messages, while the blue ones are replies.

Displaying all the individual PeopleFlowers of a discussion space creates what Xiong calls a PeopleGarden. She argues: “We have used the garden metaphor because a healthy garden has certain properties that we can use to represent a healthy discussion group.” For example, if a PeopleGarden contains only a few small flowers, with sparse and faded petals, one could conclude that the discussion space is relatively lifeless. The height of each flower in the PeopleGarden represents the length of time that a particular user has been involved (since a first posting). Thus, the tallest flowers are the oldest, fitting well with the overall organic metaphor. The patterning of flowers at different heights indicates how well the space is attracting new users. The horizontal arrangement of flowers is random.

One can also easily compare flowers, and thereby people’s interactions – seeing who is most active, who replies a lot, and who receives most replies to their messages. This comparison
can be facilitated by choosing the option to lay out flowers according to the total number of postings. There are also several other useful options – for example, one can toggle the display of user names below the flowers, the display of the yellow reply markers, and choose between different layouts.

An earlier, somewhat simpler, visualization developed by Xiong is called WebFan, where a semicircular fan of small lines represents messages posted on a Web-based discussion board (below and opposite). One of the principal aims of WebFan is to show the dynamic nature of discussion over time, by representing the detail of posting and (especially) reading messages. Animation is used to show the reading of messages by different users throughout the day, on top of the fan structure. The initial message in a thread is the line segment at the very center of the semicircle; subsequent replies are added as branches to the end of the line; new messages are added at the top of the semicircle. The fan of message segments is interactive, so that moving the mouse cursor over a line causes the area immediately around it to expand, ensuring greater visibility, with the title, author and date of the message simultaneously displayed in a pop-up box. Right-clicking on the message segment causes the actual text of the message to be displayed in another frame of the browser.

Enabling the animation of WebFan shows social activity by color-coding the line segments based on who has read them. (Each participant has a unique color.) If a message is read by several people, it becomes multicolored. As time progresses it is possible to see individuals move through the fan (represented by a small circle symbol) and the line segments change color as they are read. Also, on the right-hand side of the fan a simple activity chart can be scrolled down. The differently colored bars represent people, and the length of the bar is the amount of time that a particular person has spent reading/posting messages.
Mapping Usenet

Usenet is the most popular discussion space on the Internet. It was developed in 1979 by Jim Ellis and Tom Truscott at Duke University and Steve Bellovin at the University of North Carolina. It is a vast, distributed bulletin board running on top of the Internet, and it provides a complex mesh of interrelated spaces known as newsgroups. (See page 53 for old maps of Usenet traffic flows.)

There are many thousands of different newsgroups, covering a huge range of topics. Newsgroups are arranged in a number of large hierarchies based on very broad classifications. The seven of the oldest hierarchies are comp, sci, soc, talk, news, misc, rec, later joined by the largest and most contentious of all – the alt (alternative) hierarchy. The comp hierarchy contains the newsgroups for computer-related discussion, rec is for hobbies and recreational activities, while alt holds a miscellaneous bunch of groups (including what some see as the controversial groups like alt.drugs and alt.sex). There are also hierarchies for major organizations, commercial software vendors, countries, and local site-specific groupings. Each newsgroup holds many separate, ongoing conversations – usually with multiple participants.

We look at two prototype newsreaders, Loom and Conversation Map, which try to spatialize messages to enhance users’ understanding of the wider social context of a newsgroup. We then examine Netscan, an ambitious five-year project led by sociologist Marc Smith to provide a comprehensive array of Web-based tools to analyze the social geography of Usenet.

Loom aims to visualize the patterns of article posting within individual newsgroups over time, with a focus on individual participants and the article threads. A variety of spatializations, all using a simple two-dimensional grid structure, can be produced to show the different social structures underlying posting interaction in the newsgroup, as displayed opposite. Within each image shown, the horizontal axis represents time and the vertical axis is divided into individual columns, each representing a single group participant.

Top-right, each message is represented by a single colored symbol in the spatialization – the color can be used to represent an important characteristic of the article, such as subject, or the domain of the poster. The lines connect messages of a single thread. At first glance, the spatialization is difficult to read; however, according to the developers of Loom, there are three key patterns to look for that aid interpretation: first, a strong vertical patterning of symbols represents an intensity of activity at a particular time; second, prominent horizontal rows of symbols show the most active participants; third, the structure of connecting lines between articles is an indication of the conversational atmosphere of the group, for where there are long, complex and overlapping lines one can infer a group of intense discussions involving many participants with many replies and long threads, and where the lines are much shorter and form a more disconnected mesh, this indicates a more “question and answer” style of interaction.

The second image (bottom-right) shows the Loom spatialization concentrating on the temporal patterns revealed by Loom. The solid vertical lines are user-specified time units (such as days or weeks) and the dots at different heights are the articles posted by different people.

The last image (left) is an attempt to classify and spatialize the actual content of the articles rather than just the structure of the group. Automatic content classification is a major challenge facing those wishing to map social cyberspace. Loom uses a heuristic device to classify articles into four categories: angry, which is mapped as red, peaceful (green), news-based (yellow), and all others (blue). The spatialization is divided into a cellular structure based on the boxes of a calendar. Each day’s articles are represented by appropriately colored disks in the cell. Clicking on a particular disk will cause the text of an article to be displayed in a pop-up window. The spatialization displays a whole month’s worth of newsgroup posting and it is possible to see the daily intensity and tone of conversations from the density and color of the disks. In this way, this particular type of Loom spatialization acts as a kind of visual overview, and also generates a unique signature of the group.
4.5: **Loom**

**chief cartographers:** Karrie Karahalios, Judith Donath and Todd Kamin (Sociable Media Group, Media Lab, MIT).

**aim:** to provide a newsreader that is able to visualize the patterns of postings in a newsgroup.

**form:** structured 2-D information maps, where one dimension is people or messages and the other dimension is time.

**technique:** custom-written software to analyze messages by poster and time. Spatializes with interactive graphics using Java.

**date:** 1998.

**further information:** Sociable Media Group homepage at <http://smg.media.mit.edu>

Atlas of cyberspace

Courtesy of Warren Sack
Conversation Map is a visual browser for large online
discussion, such as Usenet. It is a prototype being developed by
Warren Sack, initially as a doctoral research project at the MIT
Media Lab. Sack is interested in analyzing and mapping the
structure of the actual messages in what he terms “very large-
scale conversations” (VLSC), where hundreds of participants
may exchange thousands of message over a short time period.
He says the spatialization provided by Conversation Map
enables a user to “browse a set of Usenet articles according to
who is ‘talking’ to whom, what they are ‘talking’ about, and the
central terms and possible emergent metaphors of the
conversation”. It is therefore a browser of content that harnesses
the analytical power of computational linguistic and interactive
graphics to try to provide users with a richer and deeper view of
social interaction than conventional Usenet interfaces.

The screenshots of Conversation Map spatialize the
sci.environment and alt.politics.elections newsgroups. Initially,
each interface looks somewhat complex, comprising four
separate panels. These panels show different views of the same
newsgroup, with the top half comprising graphical interfaces to
the three key analytical tools – the social network, the
discussion themes, and the semantic network. The bottom half
of the screen shows all the message threads as small graphs. It
is important to note that these four panels are interactive and
fully interlinked, and so selecting a data element of interest in
one panel will also highlight the same feature in the
complementary views.

Conversation Map automatically calculates the social network of
people in the newsgroup by analyzing the reciprocal exchanges
of messages. This is visualized as an interactive spider graph,
where individual participants are the nodes and their reciprocal
connections are the lines. The participant’s name can be toggled
on and off for clarity. A user can explore the graph by clicking
and dragging nodes with the mouse. The middle panel in each
image gives a list of the key themes of the newsgroup, in
descending order according to how often they occur in message
threads. Again, this metric is generated automatically using
standard linguistic techniques. The right-hand panel is the
semantic network showing which significant terms are being
used in the messages and how these are connected.

Message threads for the given time period are displayed in the
bottom half of the interface. They are represented by small spider
graphs, which are arranged in chronological order from the
upper-left corner of the panel. The complexity of the spider
graphs indicates visually the number of messages in that thread.
Moving the mouse over a graph displays the date and subject in a
pop-up panel, while clicking on a thread graph will highlight the
participants in the social network panel and the terms used in the
semantic network. Double-clicking causes a new window to pop
up displaying the thread in greater detail, enabling one to explore
further and actually read messages. In the example screenshot
from sci.environment shown top-right, the user has clicked on the
thread entitled “Global Warming or Arctic Freeze?”.

Conversation Map is a powerful prototype tool, although it
is perhaps too complex at present for average Usenet
participants. As such, it may be more useful as an exploratory
tool for sociologists and anthropologists who are analyzing
online discourse.

4.6: Conversation Map

chief cartographer: Warren Sack (whilst a graduate student at the Media Lab, MIT).
aim: to provide a visual Usenet browser that offers analysis of the social and linguistic
structure of a newsgroup.
form: Simple spider graphs represent the social network of posters and the semantic
network of the message for a given newsgroup. Four interlinked panels show different views
of the social content of the newsgroup.
technique: applies linguistic analysis to derive social and semantic networks. Visualization
interface uses Java.
further information: see <http://www.sims.berkeley.edu/~sack/>
further reading: “Conversation Map: A Content-Based Usenet Newsgroup Browser”, by
Warren Sack, in Proceedings of the International Conference on Intelligent User Interfaces,
One of the leading researchers analyzing and visualizing social interaction in cyberspace is Marc Smith, a research sociologist at Microsoft Research. His ongoing project is called Netscan, and it involves measuring and mapping the social structures of Usenet, at various scales ranging from individual message threads, to newsgroups’ interconnections, to maps of whole sections of Usenet space. The project began as part of Smith’s doctoral research at University of California Los Angeles in 1994. This ambitious project monitors “every message from every newsgroup every day”, equivalent to some 27,000 newsgroups carrying around 675,000 messages per day. Netscan therefore represents one of the most comprehensive projects analyzing and mapping social cyberspace.

At a basic level, Netscan data-mines daily Usenet traffic to produce a wealth of descriptive statistics on newsgroups and postings. This data is freely available on the Netscan website in summary tables and newsgroup scorecards (as shown bottom-opposite). Netscan also provides three more advanced analysis and visualization tools, these being Dashboard, the Cross Post network visualization, and treemaps of Usenet space.

Netscan Dashboard was released as a prototype application in Fall 2000 to provide users with a detailed and interactive analysis tool for examining the social communication that takes place in message threads of selected newsgroups. It was developed by Marc Smith and Andrew Fiore (a student intern). Dashboard is composed of several distinct visual interfaces, as can be seen in the screenshot top-opposite. The image shows the whole interface, comprising a selection panel, a tree visualization, a so-called “piano-roll” display, and an interpersonal connection graph. In this case the user is analysing a large thread from the newsgroup microsoft.public.win96.gen_discussion. The thread subject is “Bill Gates” and it comprises some 74 messages, posted over a four-day period by 26 different people.

One starts using Dashboard from the selection panel to isolate a particular message thread one wishes to examine. Different views of this thread are then displayed in the three panels. The main view is a tree visualization of the temporal sequence of the thread; each box represents an individual message and a line between boxes represents that it was a reply to a previous one. The start of the message thread is the first box at the top of the tree, time moving forward as a user descends the tree. The gray banding represents separate days, and the width of the band is proportional to the number of messages posted on that day. Half-shaded boxes indicate that the message was from the most prolific contributors. Passing the mouse over a message box highlights the author in the other two panels. Clicking on a box causes the actual message to be displayed in a window at the bottom of the screen.

The piano-roll panel shows author activity over time. Each column shows a histogram of the number of messages that each author has contributed to the thread on each day. Again, the piano roll is interactive and interlinked to the other two panels. Clicking on an author provides access to an email facility enabling the user to contact that author directly. The final panel is a graph of interpersonal connections, where authors are represented as circles. The position of an author in the two-dimensional graph is based on the measure of the number of replies sent by the author and the number of replies received from other list members. Clicking on an author in the graph highlights, in the tree visualization, the messages sent.

4.7: Netscan Dashboard

chief cartographers: Marc A. Smith and Andrew T. Fiore (Collaboration and Multimedia Group, Microsoft Research).

aim: to visualize the social structures of message threads in a newsgroup. Part of the whole Netscan project for measuring and mapping the social geography of Usenet.

form: a three-panel presentation of different dimensions of the data.

technique: analysis of message threads over time, and the social network of posters. Spatialization by a Web-based interface using Java.


further information: see <http://netscan.research.microsoft.com/>


Another part of the Netscan project is Cross Post, a network visualization that enables users to explore the connections between Usenet newsgroups. The system enables a user to view a cross-post graph for any of the thousands of newsgroups covered by the Netscan system, quickly revealing hidden clusters of related newsgroups. The visualization is also interactive, enabling a user to explore the graph and alter various settings.

The size and color of the boxes in the graphical representation (see maps on page 170 and below) represent the newsgroup’s characteristics, with the size of the box proportional to the number of posts and the color showing the posts-to-poster ratio. The graph is also fluid, so that the user can move and position the boxes as desired. The graph layout is created using a simple “spring-based” algorithm, where boxes repel each other with the cross-post links acting as attractors and so working to counteract this. The lines between boxes show the ties between groups and can be labeled to indicate the strength of the relationship in terms of the number of cross-posted articles. The visualization of cross-posting is important because this is a key structural component of Usenet, which (Smith argues) forges small neighborhoods of interconnected groups. He found that only 6 percent of groups analyzed by Netscan stood completely alone, with no cross-posting at all. On average a newsgroup has some measure of connectivity to 50 other groups.

The image top-left shows the cross-post graphs for two potentially related groups: *alt.culture.vampires* and *alt.tv.buffy-v-slayer*. While both newsgroups have lots of connected groups, there appear to be few direct cross-post links. The map top-right shows two closely interlinked groups, namely *alt.buffy.europe* and *alt.tv.buffy-v-slayer*, which have many groups in common. Also shown on this image is the control panel that users can manipulate and tune the display. The groups connected to the newsgroup *alt.fan.jesus-christ* are shown middle-right, while the image in bottom-left shows the same group compared with *alt.homosexual*. The image bottom-right shows *comp.infosystems.gis*, a technical Q&A-orientated group for discussing geographical information systems (GISs). It has connection to 11 others, with the majority located in the *sci* hierarchy and concerned with physical environment applications of GISs.

The final example, below left, shows how the Cross Post visualization tool can be used to get a wider overview of a larger part of Usenet space by focussing purely on the patterns produced by the cross-postings of several large newsgroups. By turning off the display of names, one can reveal the structure of spaces around the group – what Marc Smith has tentatively termed the “electron shells”. This scale of visualization, where one can see a large portion of Usenet, has been further explored using treemaps, described next.

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4.8: *Netscan Cross Post network visualization*

**Chief cartographers:** Marc A. Smith and Rebecca Xiong (Collaboration and Multimedia Group, Microsoft Research).

**Aim:** To provide an interactive tool that allows users to explore how newsgroups are connected by cross-posts. Part of the whole Netscan project for measuring and mapping the social geography of Usenet.

**Form:** Graph with colored, labeled boxes, each representing a single newsgroup. The lines show the cross-post links.

**Technique:** Interactive graphics using spring-based layout algorithms.

**Date:** 1998. Screenshots taken November 2000.

**Further information:** See [http://netscan.research.microsoft.com/](http://netscan.research.microsoft.com/)

The final visualization from the Netscan project is a set of treemaps of relative volumes of postings/posters for large chunks of Usenet space. This element of the project is at a very early stage of development, and the examples shown here are some of the first attempts to map the whole of Usenet space.

Treemapping is an information visualization technique that can show a large hierarchical structure of data as a two-dimensional “space-filling” map. The technique was conceived in 1990 by Ben Shneiderman, a leading expert in human–computer interfaces and information visualization. In the treemap application, nodes (in this case, individual newsgroups) in the hierarchy are represented by rectangles sized proportionally to the number of messages each group receives and nested according to the lexical hierarchy of newsgroup names. A modified version of the treemaps approach was used in the Map of the Market. The example treemap opposite shows the whole of the Usenet space for the month of March 2000, and it represents 35,657 newsgroups with over 17 million messages. The examples below show significant portions of it in more detail: the alt.tv.* and comp.* hierarchies.

In the whole Usenet treemap the alt hierarchy is dominant, making up some 36 percent of all newsgroups and some 43 percent of all messages. Within the alt hierarchy itself, the alt.binaries.* newsgroups are the most popular. The large undivided rectangles represent the huge super-newsgroups that receive tens of thousands of messages per month. The color-coding of the rectangles indicates the relative growth or decline of a newsgroup over the prior month, with dark-red coloring representing a steep fall in posting traffic, white being no change, and dark green indicating growth. In general, much of Usenet space is growing or stable, with only the odd smattering of red rectangles. Smith argues that the treemaps “resemble a land use map, with some areas seemingly more rural than others”. Development of treemaps of Usenet is ongoing, and more revealing results are sure to emerge.
4.9: Netscan treemaps of Usenet space

chief cartographers: Marc A. Smith and Andrew T. Fiore (Collaboration and Multimedia Group, Microsoft Research).

aim: to show the relative volumes of postings/posters for large numbers of Usenet newsgroups. Part of the whole Netscan project for measuring and mapping the social geography of Usenet.

form: recursively nested rectangles representing a hierarchy of newsgroups, where the size of the area of the box shows the number of postings/posters.

technique: the treemap algorithm developed by Ben Shneiderman is a planar space-filling map, representing data hierarchically.

date: prototype images from November 2000.

further information: see <http://netscan.research.microsoft.com/>
further reading: for background information on treemaps, see “Treemaps for space-constrained visualization of hierarchies”, by Ben Shneiderman, November 2000, Human–Computer Interaction Lab, University of Maryland, at <http://www.cs.umd.edu/hcil/treemaps/>
Mapping chat

The social media so far examined are asynchronous in nature. In this and the following sections, we turn our attention to synchronous media where interactions – although geographically dislocated – take place in real time in the same virtual space.

The first of these media we discuss is chat. Chat is an increasingly popular virtual medium through which individuals communicate by rapidly exchanging a series of short text messages, which form an ongoing conversation. Chat discussions are conducted within channels, meaning self-contained spaces that users can utilize to hold conversations. Many of these channels are themed, with users expected to conduct conversations on particular topics. One method adopted recently to try to explore the social relations and interactions between participants has been the spatialization of chat.

In conventional chat clients, the conversations are a multi-user experience where other people’s dialog appears in the chat window, intermingling with that of each participant. Each sentence usually takes up one entry in the chat window, and the text can quickly scroll upward and off the screen as the conversation progresses. As such, chat is a very dynamic medium, comprising continuously flowing text that can be difficult to follow. Many first-time users can become easily confused, for it is difficult to follow multiple conversations that overlap and interweave, with sentences appearing out of sequence as people “talk” over the top of each other.

Chat Circles, developed by Judith Donath and her students, seeks to spatialize the scrolling reams of text, creating a graphical interface able to convey important structural information concerning the conversations as well as some of the unspoken nuances of face-to-face communication. The system comprises two distinct components, the first being the dynamic spatialization of Chat Circles and the second being an archival spatialization that enables a user to see and browse through an overview of conversations over time. Chat Circles employs simple, abstract two-dimensional graphics, encoding the key chat characteristics of participant identity and conversational activity with the fundamental properties of shape, size and color for the representative elements.

The images display a range of example screenshots of the Chat Circles interface in action. The participants of chat rooms are represented as differently colored circles. All participants are represented, regardless of how much or how little they speak, enabling a user to see at a glance all those in the chat room. A major problem with conventional chat interfaces is that one is often only aware of the active speakers, as the text acts as a central indicator of presence. This makes people feel they must continually “speak” to maintain their presence, otherwise people will forget they are present. It also means one is not aware of “lurkers”, who may be monitoring the conversation. Chat Circles aims to overcome this problem by its different format.

4.10: Chat Circles

chief cartographers: Fernanda Viégas and Judith Donath, assisted by Joey Rozier, Rodrigo Leroux and Matt Lee (Sociable Media Group, Media Lab, MIT).

aim: to provide an enhanced chat client where it is easier to see the nature of the conversation(s) in the channel. Also, to provide a history of conversation.

form: bubbles of different colors represent chat-room participants, with the text appearing in the bubble. Bubbles can move to form distinct conversation clusters. The history of conversations is presented as vertically scrolling bars, somewhat like a seismograph trace.

technique: custom-written client software.


further information: see <http://chatcircles.media.mit.edu/>

Another problem experienced by chat users is that chat space can become divided into a number of separate rooms or channels, each with small groups that are unaware of each other. Chat Circles overcomes this problem by displaying all the different rooms on a chat server on a single screen, dividing the chats into distinct conversational groups based on the spatial clustering of circles. However, it is only possible to “hear” the conversation in the limited geographic proximity of one’s circle, so that no one is overwhelmed by a cacophony of chatter. Yet, crucially, it is possible to see the number and strength of the other conversations, indicated by the number and size of the circles. It also enables a user to move easily to another conversation by moving the appropriate circle to that cluster. Chat Circles thus employs spatial location in the interface as a tool for a kind of “geographic” (chat room) filtering. For example, you can clearly see conversational groupings in different areas of the screen, but a user should only be able to “hear” one set of conversations – that in the bottom left – and hence the text of the conversation is displayed in these circles.

The size and brightness of the circles is dependent on how much and how often people talk. A person’s circle grows to accommodate the text of their speech. The circle then shrinks back and fades away, after each sentence, so the most active participants in the conversation are visually prominent on the spatialization, with large bright circles, while the lurkers are represented by small faded dots. The circle is also labeled with the person’s name for easy identification and an individual’s own circle is drawn with a white outline for enhanced distinctiveness. Over time, the dynamic of the conversation can be seen as the circles grow and shrink, and drift to different groups.

Unlike email messages or news articles, conversations in chat mode are rarely archived, and so once the conversation has disappeared from the window, it is lost. As such, the interactions in chat are highly ephemeral, and like the conversations at a party, unknown to those not intimately involved and often quickly forgotten. To accompany Chat Circles, therefore, a unique history function is also being developed, employing a timeline graphical metaphor somewhat reminiscent of a seismogram trace (opposite).

The spatialization produces what the creators call a “conversational landscape” tool, which enables the user to get an instant overview of the pulse conversation and easily browse individual chat contributions. Each participant is represented as a vertical line of the same color as the circles, with the $x$-dimension of the screen showing time. The horizontal bars are individual sentences, the width of the bars indicating the length of the sentence. The combination of all the lines shows the threads of the conversation. Browsing the threads is possible, with one simply pointing the mouse over a bar leading to the display of the actual dialog. For conversations that take place outside the “hearing” range of the particular participant, the sentences are shown by hollow horizontal bars. As with the main Chat Circles interface, it is a simple, minimalist approach to cyberspace spatialization, but it is potentially a powerful mapping of chat-space history – as its creators Viégas and Donath say, it “allows for a visualization of both group and individual patterns at the same time as it creates, by its mere shape and colors, a snapshot of an entire conversation in one image”.
Paul Adams takes a different approach to spatializing chat, extending his work beyond chat rooms to include other modes of communication. His work is primarily interested in examining how transportation and communications technologies can “extend” the scope of the human body to reach out and interact across geographic space. In order to examine this, Adams has sought to model people’s connections through time and space during the course of an ordinary day using three-dimensional time–space models created using the Vellum computer-aided design (CAD) application. The images opposite show one of these models, for one day in the lives of five interconnected people. Furthermore, the image below shows an illustration of the variety of means of communication.

The data for the model were gathered through detailed time diaries and interviews, recording the daily activities and social interactions (face-to-face, phone, letters, TV, radio, email) of a small group of connected people, who live in the Albany metropolitan area of New York. For each person, a separate 3-D model of his or her daily routine was built in the CAD package. The vertical axis represents time through the day and horizontal bars project out along the x-axis for different communications activities (such as making a phone call, watching television, talking face-to-face or sending an email). The horizontal length of the bar from the vertical axis shows the geographic distance of the activity, ranging from proximate face-to-face conversations to an international phone call. The x-y dimensions of the bars thus represent the scale of the activity in time–space, with the length of the bar being distance and the width of the bar being temporal. These individual time–space activity “bar charts” are combined into one model by arranging them evenly on the circumference of a circle. This enables a viewer to compare the shape and structure of the activities of the different people’s daily lives as well as showing the communications links between them. So the curving between the different individuals represents interactions between them. For example, at the front of the model opposite, a link is drawn between Diann and Thomas that represents a face-to-face meeting between the two.

Adams argues that the 3-D models “reveal the existence of a kind of ‘commuting’ between physical and virtual places, an oscillation that occurs much faster than the older form of home–work commuting: every time one picks up a phone receiver, opens a book, or turns on the radio”.

4.11: Models of human extensibility

chief cartographer: Paul Adams (Department of Geography, Texas A&M University).
aim: to model the communications between people.
form: 3-D time–space models.
technique: models are created in a computer-aided design (CAD) package.
date: 1999.
further information: see <http://geog.tamu.edu/faculty/adams/>
further reading: “Application of a CAD-Based Accessibility Model” by Paul Adams, in Accessibility in the Information Age, edited by Donald Janelle and David Hodge (Springer Verlag, 1999), pp. 217–239.
Mapping conversation and community

Courtesy of Paul Adams, Texas A&M University
Mapping MUDs

Multi-user dungeons (or domains), or MUDs for short, are a unique and often strange part of the Net. MUDs are virtual spaces created solely by written words; their space unfolds on the computer screen as scrolling text. MUDs are also social spaces shared by many players who are able to interact with each other and with the environment around them. The experience of MUDding (playing a MUD) is often described as like being inside a literary novel, but not merely as a reader. The MUD is a living novel, being written in real time by its players. (We are using MUD to refer also to MOOs (MUD object-oriented elements). MUD environments tend to be hard-coded, whereas players can change the environments of MOOs.)

A simple way in which to think about MUDs is to envisage them as chat rooms with an explicit geography. MUDs employ explicit spatial metaphors to create stages or scenes in which interactions are situated. So, instead of a conversation within a “spaceless” chat channel, interactions occur within a place, such as a living room, a bar, by the swimming pool or in a dungeon. Each room is known to its occupants by its textual description, and it can contain any number of objects (such as furniture). Rooms are linked by exits that enable MUD participants (generally known as players) to traverse from room to room. Some of the largest MUDs have many hundreds of rooms linked to form complex topologies. The topologies are often changing, with continual additions and subtractions of rooms. Much of this change is unplanned, the creative outcome of individual actions resulting in an evolving, organic structure. Such change can also lead to anomalies in the topological structures, the most obvious being “black hole” rooms that are only linked to the main MUD structure in one direction. So you can enter the room, but then have no means of exiting (except by direction teleportation to another location, if allowed, or by quitting and restarting). Some of these topological black holes are designed as deliberate pranks to trap unwary players, while other anomalies are simply mistakes in construction.

The linkages of the rooms into larger topologies of space, and the ability of players to move purposefully through them, travelling in distinct directions, all serve to create an approximate sense of spatiality. Given the explicit spatial topography of MUDs, one logical and analytical approach is to map its spatial form and extent. In this section we detail a number of attempts to do just that.
The history of MUDs, like much of cyberspace, can be traced to the experimental hacking of university students. The first MUD was created by two students, Roy Trubshaw and Richard Bartle, studying at Essex University in the United Kingdom at the end of the 1970s. Their first MUD, known as MUD1 or the Essex MUD, was written on the university mainframe in 1978 and it became available for networked users outside the university in the spring of 1980. Many of the concepts that lay behind Bartle and Trubshaw’s first MUD had a much longer genealogy, owing a great deal to the dungeons-and-dragons computer games “Zork” and “Adventure” of the mid-1970s (although these were single-user games). These in turn were inspired by the “Dungeons and Dragons” board game created by Gary Gygax and Dave Arneson in the early 1970s – a complex role-playing game set in a Tolkienesque landscape of myth and fantasy, inhabited by warriors, elves, dragons and wizards.

The map over the page was drawn by Richard Bartle in 1983 and shows the layout of the approximately 420 rooms of MUD1. It is a simple black-and-white hand-drawn sketch map, but it is an important historical record of this part of cyberspace. The map comprises one large central section, with three smaller subsidiary maps that show details of clusters of rooms from the center of the MUD. Rooms are represented on the map by their name (or abbreviation) and the various connections between them are shown by the lines. Straight lines are simple “walkable” connections and are orientated according to the cardinal compass directions; stepped lines represent stairs; and curved lines are jumps. Each of the rooms shown on the map was envisioned for the players by a short textual description. To give a sense of what these were like, three descriptions — the Badger’s Sett, the Crow’s Nest and the Shed — are reproduced in the inset boxes shown.

The map was drawn several years after MUD1 was created and opened to players. The layout of rooms was transposed from the original “travel table”, part of the MUD’s core software code. Bartle made the map for the “wizzes” (Wizards). It shows the whole of the MUD’s geography except for a few disconnected special rooms that were not accessible to normal players. MUD1 has had an extremely long life, in cyberspace terms, and it is still active after nearly 20 years. It ran at Essex University until September 1987 and then was licensed and operated by CompuServe. It was retired by CompuServe as part of its millennium-bug measures, and it now operates under the name British Legends (<http://www.british-legends.com/>). Bartle and Trubshaw are still actively designing and creating further MUDs with their company MUSE (standing for multi-user entertainment).

### 4.12: Sketch map of MUD1

**chief cartographer:** Richard Bartle (Muse Ltd, UK).

**aim:** to show the logical structure of the MUD by mapping the rooms and their interconnections. For use by MUD “wizards”.

**form:** black-and-white sketch with names representing rooms and different line styles for the different types of connection. Linked to subsidiary maps that show complex areas of the MUD in detail.

**technique:** link-node topological map, hand-drawn with pencil and paper. Map derived from the “travel table”.

**date:** 1983.

**further information:** see <http://www.mud.co.uk>; available nowadays to play as British Legends at <http://www.british-legends.com/>.

You are perched in the crow's nest, high above the sea where it juts out from the deck below. Far, far to the north-west can be glimpsed a mysterious island, and to the east over the sea are cliffs.
This is a decrepit but nevertheless rather sturdy shed, used by the tin miners in the old days to store their equipment. The way out is to the south, onto a platform at the top of a staircase.

Badger’s Sett

You are inside a small sett belonging to a badger. It looks as though the badger is hidden in a smaller hole above the entrance, but there is no conceivable way you can reach him. The room looks the ideal place to store objects, since the badger acts as guard. The only way out is up.
A common way to create a simple map of a MUD is to use keyboard characters such as dashes and equals signs to draw cartographic features. The resultant maps are often called “ASCII text maps”. Perhaps the fact that they are just text, like the MUD itself, appeals to many of their cartographers. They can also be created in a basic text editor or word processor without any graphics software. Moreover, they can be viewed on any computer (as long as they are displayed with a fixed-width font), again without any special software. Countering this is the fact that ASCII maps can be extremely time-consuming to create, requiring a particular degree of patience for large ones; furthermore, there is a limit to the type and scale of graphical forms that can be created just with keyboard characters.

The example opposite is from PhoenixMUD (a combat-orientated MUD started in March 1995, with over 8,000 rooms). The map was created to provide an overview of the geography of the continent of Caledon, one of three continents that make up the world of PhoenixMUD. (Maps of the other two continents and cities are available.) The map is at the regional scale, showing general areas such as cities, forests, deserts, and their relative geographic positions. It does not show detailed room topologies (unlike Bartle’s MUD1 map). Caledon contains the major city of PhoenixMUD, namely Heliopolis, which is where players begin their adventures. According to the description accompanying the map, “the area is ancient, as evidenced by the many ruins of long-forgotten civilizations, including Old Thalos and Rhyodin. Numerous castles, towers, and natural attractions await the eager explorer”.

4.13: ASCII-style map of part of PhoenixMUD

- **chief cartographer:** not known.
- **aim:** to show the geography of the continent of Caledon, the main area of PhoenixMUD.
- **form:** created with ASCII characters such as dashes and equals signs.
- **technique:** manual ASCII plotting.
- **date:** 1998.
- **further information:** see <http://www.phoenixmud.org/>
LEGEND:
= = river
# = gate or entrance to a city or area
| | | | | | | +++++
THIS IS NOT A COMPLETE MAP!!
Explore to find new or hidden areas
Mages
Forest
Tower
of
Rhowyn
+++
+
-----

Dwarven
Village
+++++

Earth
Temple
Shire
Chess
Board
New
Zone
Caverns
+++++

Forest
Arachnos
---------

Heliopolis
= +++

Haon-dor

River
Great
Eastern
Desert

==
===
==
==
==
==
==

Isengard = Is = ++++++

Mordilnia = Cathedral

Mahn_Tor's Keep

= +++

---------Eastern-Trail------

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==
==
==
==

Old
Marsh
Mage's
Valley
(Mountains)

Trog
R "d
Rhyo-
din

Ocean

Courtest of Phooze
130
Discworld MUD is based on the hugely popular fantasy world of Terry Pratchett’s novels. The MUD is long-running, large and popular, with between 150 and 200 players logged in at any one time. The geography of the Discworld MUD has also been well mapped by various players. The most comprehensive set of maps was produced by player “Choppy”, and they are currently maintained by “Morgoth” (Daniel Staniforth). These form the atlas of Discworld, showing the complex room topologies from regions and cities down to individual streets and building layouts. The maps are high-quality in terms of cartographic design, and they represent many hours of dedicated volunteer work. They are perhaps the most complete mapping of any MUD.

Opposite are three examples from the Discworld Atlas. The maps use a familiar link–node graphical style to portray detailed room topologies. Individual rooms are represented by small boxes, with significant ones colored by function and often labeled. Black lines between the squares indicate possible pathways. The large map shows the geography of Ankh Morpork, “contayning withyn all thye streets of thye Great Citye of thye Dysc”. The city is large, with many rooms organized into a complex pattern of interconnecting streets. There are a large number of shops, houses, temples and so on. The blue line across the top is the River Ankh. A number of small inset maps show the detailed room layouts inside important player guild buildings. More detailed maps of all the streets and key buildings in the city of Ankh Morpork are also available. An example of Heroes Street is shown bottom-left. This street is in the center of the main Ankh Morpork map. The small brown boxes are houses and the green ones are shops. The diagram shown bottom-right plots the outlying town of Lancre and Mad Stoat Village, which are in the Circle Sea region, close to the Ramtop Mountains.

4.14: Maps from the Discworld Atlas

chief cartographers: original map research and drawings by player “Choppy”, now maintained by player “Morgoth” (Daniel Staniforth).

aim: to show the geography of the Discworld MUD by mapping room topologies at different scales, from regional to local streets and building layouts.

form: well-designed map with squares representing rooms. Clear color-coding and labeling to identify significant locations (temples, guilds, shops, etc.).

technique: hand-drawn sketches made on graph paper whilst exploring the MUD. These have then been used to create finished maps using standard graphics software.

date: 1998.

further information: browse the Discworld Atlas at <http://discworld.imaginary.com>
FurryMUCK is based around the role-playing theme of anthropomorphics, where players role-play as human-like but animal (furry) characters. Like the Discworld MUD, FurryMUCK regularly has over 150 players online, and the maps of the domain serve as a useful tool for newcomers and regulars alike. The example shown below is one of a series of ten maps maintained by player “Quill” (Graham J. Clarke), based on original research and mapping by Tom Turrittin in 1994. The maps only show a small portion of FurryMUCK—the central areas that can be reached on foot. The example chosen, Map 5, shows the Far North of the world, including Eagle Mountains and the Arctic. The graphical style of the map is somewhat like a circuit diagram, with circular nodes and straight lines showing the room topologies. The rooms are laid out on a grid to give a regular structure.

Abandon All Hope MUD is a multiclass role-playing MUD where players progress through a series of roles and levels. As their rating improves, the classes (e.g., thief, magus, cleric, warrior, etc.), skills and areas available to them increase.

This MUD was mapped by Arkady in March 1999 using a stylized dot map somewhat reminiscent of a star chart. Rooms are represented by small dots, many of which are labeled to indicate interesting locations. Clusters of rooms are coded using the same color scheme. The rooms are arranged spatially to show the relative locations of rooms but, unlike the previous MUD maps we have looked at, Arkady’s map does not show how the rooms are linked. The map is partially interactive, in that you can zoom into particular areas of interest, but no further detail is revealed.

Many more maps of Abandon All Hope MUD are available as ASCII-style sketch maps.
abandon all hope MUD
These two example MUD maps are somewhat different from the others we have examined thus far. They were in fact physical models of MUD room topologies rather than two-dimensional sketches or diagrams, created by Peter Anders and his students in the fall of 1995. Working in pairs, students conducted a detailed field survey of specific MUDs, noting and sketching the geography in a notebook as they explored. Next, they constructed what Anders terms “logical adjacency models” – physical three-dimensional models built with Plexiglass cubes (represents rooms) and rods (connections) that visually graph the MUD structure, looking like a molecular model commonly used in chemistry or biology. As far as possible, the arrangement of cubes and rods is positioned spatially congruent to the MUD structure. Rooms that are connected – but not connected by Euclidean geometry (e.g., they are accessed by teleporting) – are represented by spheres positioned arbitrarily. Only the publicly accessible geography of the MUD has been mapped, and so private spaces have been omitted. In all, ten MUDs have been modeled, and the images opposite show two examples: the logical adjacency model of BayMOO produced by Thomas Vollaro and Susan Sealer (top) and the model of MediaMOO created by George Paschalis and Michael Lisowski (bottom).

The BayMOO model has three distinct zones joined by a central node known as the Aquatic Dome. These clusters of rooms in the map are the three major areas of BayMOO, all with distinctive characteristics, known as “The Bay Area”, “Netspace” and “Other Worlds”. Anders says the stick-and-ball LAMs (logical adjacency models) developed by his students reveal the distinct structure of a MUD from the topology of its rooms, much like a fingerprint provides unique identification of a person. The fingerprint of a particular MUD is determined to a large degree by the political structure of the MUD, and Anders says:

MUDs whose maps resemble an orthogonal grid of cubic rooms reflect a strong administration of wizards – a top-down control of construction in the domain. On the other hand, in democratic, bottom-up managed MUDs, users are free to build spaces without constraint. LAMs of these MUDs tend to be shaggy clusters of spheres, as the directional grid is not followed rigorously.

Anders continues to explore the spatial structures of cyberspace. He has published a book entitled *Envisioning Cyberspace* (McGraw-Hill, 1998), in which he delves deeper into this fascinating topic. In his current doctoral research he is developing “cybrid space, which combines attributes of physical and electronic spaces.”

4.17: Physical 3-D models of (a) BayMOO and (b) MediaMOO

chief cartographers: under supervision of Peter Anders, the BayMOO model was created by Thomas Vollaro and Susan Sealer; the MediaMOO model was created by George Paschalis and Michael Lisowski (School of Architecture, New Jersey Institute of Technology).

aim: to show room topology of large MUDs.

form: models in three dimensions using spheres and cubes to represent rooms. Has the appearance of a molecular model.

technique: physical, Plexiglass model.

date: Fall 1995.

further information: Peter Anders’ homepage is at <http://www.mindspace.net/> try also BayMOO at <http://baymoo.org:4242/> and more information on MediaMOO is available at: <http://www.cc.gatech.edu/~asb/MediaMOO/>

All the maps of MUDs that we have looked at so far chart the “physical” topologies of the virtual environment. This example, however, takes a different approach, mapping the complex topologies of the social connections between players. The huge and dense mesh of connections shows the social geography of LambdaMOO by mapping how over half of the 4,800 or so players relate to each other. LambdaMOO is a well-established and well-known virtual environment. It was created at Xerox PARC by Pavel Curtis in 1990.

The map was created using social statistics gathered by Cobot, a software agent that has “lived” in LambdaMOO since June 1999. It sits in the “living room” and observes the social interactions of players. Cobot was created by Michael Kearns and Charles Lee Isbell Jr and colleagues as an AI research project at AT&T Labs. They state that Cobot’s “goal is to interact with other members of the community and to become a vital, useful and accepted part of its social fabric”. Cobot is a kind of software sociologist, building detailed statistical profiles of everyone’s social interaction in terms of verbal communication and also the rich MOO vocabulary of non-verbal emoters such as hugs, smiles and shrugs. In one year, Cobot has recorded over 2.5 million events. Importantly, players can also talk to Cobot, and in particular they can ask questions about their sociability. For example, Cobot uses its database of social statistics to give an empirical answer to questions such as “Who are my playmates?”, “Who acts like me?” and “Who loves me?” As a result, Cobot has become a very popular fixture in LambdaMOO.

The maps were produced in an effort to visualize and begin to understand the complexity of social relations in a large, vibrant social cyberspace and to see whether cliques and small-world social networks came to exist. The graphs are created by Christian Shelton using “dot”, an application capable of handling large graphing tasks (developed by researchers Eleftherios Koutsofios and Stephen North, also of AT&T Labs). The maps were originally designed for plotting as large wall-sized 6 ft by 4 ft posters, and so those on the next two pages have had to be shrunk greatly to fit the pages of this book.

In the graphs, each player is represented as a small elliptical node. The graph is anonymized, so that the node contains a code number rather than an actual player’s name. The nodes are color-coded according to the kinds of communications player exhibit, measured in two dimensions: amount of interaction and the amount of emoting. Red–purple colors tend to be players with an average degree of interaction through “speaking”; yellow, normal through emoting; blue, heavy interactors through speaking; green, heavy interactors through emoting. There are some 2,784 players shown in the full map, as well as many thousands of connections gathered over 14½ months by Cobot. On average, a player is connected to 1.3 other players. The graph opposite shows the out and in connections for each player, with an arrow from each player to all his or her playmates. The most connected player is 4841, a hacker who has inflated his position by writing code that can generate messages to all other users online. This is followed by Cobot itself, which has 288 connections. Another highly connected player is HFh – Charles Lee Isbell, one of Cobot’s creators – with 151, but soon below this the number of out-connections drops off rapidly.

**4.18: Cobot map of the social structure of LambdaMOO**

*chief cartographers:* Charles Lee Isbell Jr, Michael Kearns, Christian Shelton and colleagues (AT&T Research, Shannon Labs).

*aim:* to show the complex social connections between all LambdaMOO players, based on their verbal and non-verbal interactions.

*form:* a massive and complex graph, where players are represented by small colored ellipses. Originally designed as a large wall-sized plot.

*technique:* graph based on social statistics gathered by the Cobot software agent, which “lives” in LambdaMOO. Graphs drawn using the “dot” application.

*date:* November 2000.

*Further information:* see <http://cobot.research.att.com>

Clearly, it is difficult to read and study the whole graph of LambdaMOO’s social geography (especially given the reduction to fit the page). As a consequence, the first graph should be viewed as an overview, displaying global patterns of complexity. To explore the social geography further, a number of interesting subgraphs have been created, and two are shown here. The first (bottom-left) shows the 368 players who are directly connected with Cobot or HFh. Interestingly, not everyone is clustered close to these two players and there are other distinct social cliques evident. The second example shows the 11 most connected (and thus “popular”) people.

The development of Cobot continues, including making it/him proactive so that it/he can initiate interactions with other players rather than just respond to direct questions. Cobot’s creators say that “the hope is to build an agent that will eventually take unprompted actions that are meaningful, useful or amusing to users”. 
Mapping virtual worlds

Virtual worlds are very much like MUDs; but rather than interaction being mediated solely by text, a graphical interface exists that reveals visually the physical landscape and the representations of the participants. A number of such worlds now exist and include AlphaWorld, V-Chat, InterSpace, Worlds Chat, WorldsAway, The Palace, Deuxième Monde, CyberGate and Online Traveller. Each system aims to provide a visual, spatial domain (using 2-D, 2.5-D or fully 3-D graphics) that can be shared by many people socializing in real time. At present, they are perhaps the closest form of online interaction to the shared, immersive, VR worlds envisaged by cyberpunk writers (see chapter 5). Because they are quite clearly spatial in nature, a number of attempts have been made to map their geographic extent. Here, we detail a number of different attempts to map the spatial extent of AlphaWorld – probably the most popular virtual world and certainly the most studied and mapped since it went online in 1995.

The original geography of AlphaWorld was a flat, featureless plain, with no natural features, that stretched for hundreds of virtual kilometres in every direction. This plain was colored a uniform shade of green to signify that it was virgin territory waiting to be claimed. The total area of the flat plain is exactly 429,025 square kilometres, which is 43 percent larger than the United Kingdom or 4.4 percent larger than California. Unlike the UK, the borders of AlphaWorld are straight, forming an exact square of land 655 kilometres across. A Cartesian coordinate system is used to delineate this space, with an origin point (0,0) located at the dead center of the world. This center point is known as Ground Zero (GZ) and acts as a focal point – the point at which most people enter AlphaWorld. As a result, the area around Ground Zero has the greatest density of development, containing the oldest structures in AlphaWorld; it is also the most densely populated location. The coordinate system is important because it divides the plain into a series of 10 × 10 meter cells and allows people to navigate, by means of teleportation, to any point in AlphaWorld using an (x,y) coordinate address. For example, coordinates (67N, 42W) translate to 670 meters north and 420 metres west of GZ.

Since AlphaWorld came into existence, inhabitants have been busy claiming land and building all manner of structures, from modest suburban-style homes to grand castles. As of November 2000, 67.7 million objects had been placed by the inhabitants. All the objects used in construction, such as windows, doors, stairs and furniture, are appropriately scaled in relation to representational size, which is limited and constant. The maps of AlphaWorld are interesting because they can be used as a kind of proxy for analyzing the underlying processes of urban and social development. In some senses, we can infer a lot of the nature of the virtual community by studying what is built and where building takes place.

We start our discussion by examining how land is claimed and structures are built. Further information on AlphaWorld can be found at <http://www.activeworlds.com>. For a general overview of virtual worlds on the Internet, see Bruce Damer’s book *Avatars! Exploring and Building Virtual Worlds on the Internet* (Peachpit Press, 1997).
AlphaWorld enables users to “own” land and design and build homesteads, thereby constructing their own places for social interaction. This “homesteading” facility was a conscious aspect of software design and is unique amongst competing commercial Internet virtual worlds. It has been enthusiastically grasped by many thousands of people since AlphaWorld was opened.

The first step in building is to locate a plot of empty land that is not owned by anyone else. This can be difficult near GZ because of the density of existing urban development; however, there is still plenty of virgin land further from the center. Claiming land consists simply of building in situ, and there is no limit as to how much land can be claimed. It is important to claim all necessary land, however, as others can build on virgin territory and thus in the middle of a development. This in fact gives rise to one of the major sources of conflict in AlphaWorld: building disputes.

Building is undertaken with predefined objects, much like virtual Lego bricks, such as road sections, wall panels, doors, windows, flowers and furniture. In total there are over 1,000 different objects available and they can be put together piece by piece to create larger structures. The Active Worlds browser provides rudimentary tools to select and manipulate the objects so as to put them in a desired position. Construction of large buildings, using hundreds of individual objects, requires a considerable amount of skill, effort and – above all – patience.

As with a Lego set, buildings can only be built with the pieces provided, and it is not possible to create your own objects in AlphaWorld. This means that the built environment of AlphaWorld can have a somewhat homogenous appearance. Despite this limitation, the individual creativity of the citizens has flowered, with all manner of interesting structures having been constructed. Some are well designed and aesthetically pleasing, but there are also equal measures of ugly and half-finished structures. Here, we present a range of architecture to give a flavour of some of the structures built. The buildings are located in relation to maps of AlphaWorld.
a Colosseo [location 224 S, 104 W]

The “colosseo” is a large Romanesque monument built by a tourist in October 1996.

b Greatlight Keep [location 202 S, 105 W]

Greatlight Keep is a large stone tower at the heart of a huge circular sundial-type structure. It was built by user “LittleBull”, a prominent early builder in Active Worlds, in August 1996.

c and d Mock Tudor House [location 1635 N, 2397 W]

Two views of a well-designed British mock-Tudor suburban detached house at “77 Rockinghorse Way”. It was built by user “Tranthum” in December 1996. The interior, however, is empty. This house is part of the planned development, started in 1995, called “Suburbia”, with a grid of roads and large detached houses.
The Great Forest was built between November 1995 and spring 1996, also by “LittleBull”. It is one of the largest, most impressive building projects in AlphaWorld, containing tens of thousands of trees. A river and tributaries flow through the heart of the forest, crossed by a footbridge [location 598 S, 565 E]. There is also a small ornamental garden on the edge of the forest, with a large chess set, also built by “LittleBull” in March 1996 [location 635 S, 566 E].
To the west of the Great Forest is Pimlico Palace, a large, modern-style country house built by user “KomodoDragon” in March 1997. It has a minimalist interior décor and nice gardens, with a pool. It is set in substantial grounds, including a lake, and is approached from the main road via a sweeping driveway.
Douggie’s House [location 446 S, 482 E]

A compact and futurist-looking house built by user “Douggie” in November 1996.

Monorail System

The monorail system built by user “Ko Toff” in February 1998 is an immense project, spanning an area of the order of 27 square kilometres. It includes more than 40 stations and 8 distinct loops of track. The image shows one of the stations.

Titanic [location 2349 N, 1917 W]

A vast and very well-designed model of Titanic in a dry dock in the middle of AlphaWorld. It was built by user “Omega” in July 1999.

Pieter’s Dutch Castle [location 52 S, 109 W]

A grand stone castle built by Pieter van der Meulen in April 1998. The castle is surrounded by a deep moat and a working drawbridge.
These striking black-and-white maps show the density of urban development for the whole 429,025 square kilometres of AlphaWorld’s virtual land at specific times over recent years. The maps have been created by Greg Roelofs and Pieter van der Meulen as part of their comprehensive AlphaWorld mapping project. In the maps, the density of building is indicated by the brightness of the pixels. Bright white blobs are therefore congruous with towns, areas speckled with white dots are largely “rural” with scattered homesteads, while solid black areas remain undeveloped “wilderness”. The maps look like satellite maps of the Earth taken at night when major cities are visible because of the light they are emitting.

The main image (opposite, top) is the latest map at the time of writing, showing the world as at 12 June 2000. It is clear from this image that the most developed area of AlphaWorld is the densely built city around Ground Zero (GZ). Given its importance as the entry point into AlphaWorld, the area around GZ has become heavily urbanized, with roads and buildings of all shapes and sizes sprawling out in many directions for many kilometres. (More detailed maps of GZ city are given on pages 205–7).

The most obvious feature of the urban geography revealed by this map are the straight ribbons of development that project out from GZ along the eight principal compass axes. Together, these ribbons form a distinctive star shape. Towns and other small settlements lie along these axes, looking like bright beads strung along a necklace. The directional structure of urban development is largely the result of the single entry point and coordinate system, with people choosing regular and memorable coordinates, such as [50 N, 50 W] or [1555 E, 1555 S] as the location for their homestead. Once a pioneer has started building, other citizens will build alongside, either by invitation or just to be close to another settlement.

The smaller images show density maps from three earlier phases of development, taken in 1997, 1998 and 1999 respectively. Looking at this sequence of maps, one can clearly see the rate of urban development in AlphaWorld. Over time the city at GZ has sprawled further from GZ, filling in spaces and extending along the principal coordinate axes. The star pattern is clearly evident, even in the earliest map from July 1997, and this has become stronger over time. One of the reasons for the sprawl effect is the fact that land cannot be redeveloped even if redundant – only the builder of a property can alter that property. New developers are thus forced to build on virgin land.

4.20: Density of urban development in AlphaWorld

**Chief cartographers:** Greg Roelofs and Pieter van der Meulen (Philips Silicon Valley Center, Sunnyvale, California). Part of the Vevo mapping project that produces very detailed maps of the urban geography of AlphaWorld on a quarterly basis.

**Aim:** to show the urban density for the whole of AlphaWorld at a snapshot in time.

**Form:** 2-D black-and-white map, looking like a satellite image of the Earth taken at night, where the cities stand out because of their lights.

**Technique:** the brighter the pixel in the image, the more buildings at that location. Generated from the AlphaWorld building database using custom software.

**Dates:** main image shows AlphaWorld, 12 June 2000. Smaller side images are from 31 July 1997, 3 June 1998, and 16 August 1999.

**Further information:** see <http://awmap.vevo.com>
What would the urban morphology of a virtual city be like? This sequence of “satellite” maps of AlphaWorld’s GZ City provides us with a relatively good idea. The maps show the growth of buildings, streets, parks and gardens, as designed and constructed by the citizens of AlphaWorld over the past five years. The cartographer responsible is Roland Vilett, the lead programmer on the virtual world system at Activeworlds.com, which includes AlphaWorld. These maps are at a much more detailed scale than the density maps examined in Map 4.20, only covering the GZ City area which amounts to some 400 square kilometres. (This is just 0.3 percent of the total expanse of AlphaWorld.)

The maps on the next three pages reveal several interesting features of the AlphaWorld’s urban geography. The first, and most obvious, impression is just how much the map looks like a map of a city in the real world. Each has the seemingly organic complexity and disorderliness of real cities, which grow over time through many thousands of individually planned actions. This likeness is clearly apparent if Vilett’s maps of AlphaWorld’s city are compared with remotely sensed images at a similar scale to real-world cities.

The extent of urban growth, spreading out from GZ, is clearly apparent when the maps are compared. The familiar star-shaped urban structure is most evident in the first map, created at the end of 1996. From then onward, this star pattern gradually dissolves as fill-in development occupies desirable land around GZ. The result is that, in the final map, unclaimed land, shown as dark green, has largely vanished.

Studying the maps in detail reveals many other interesting features. For example, a complex lattice of roads, represented by the fine black lines, criss-crosses the plain. Areas of light blue, denoting rivers, ponds and lakes, also stand out. Another notable phenomenon is “sky writing”, an artefact of the mapping process itself. Here, AlphaWorld citizens have deliberately claimed land in patterns that, when mapped, reveal words on the ground. Noticeable examples include the words “PLATTER” and “RAGU”, visible in the map on page 207.

Perhaps the most striking single feature on the three maps is the large black area at the top-middle of each map. This is the result of an extremely large “land claiming” project that dates back to the earliest days of AlphaWorld, according to Vilett. Whilst the land is claimed, very few structures actually exist at this location, and yet it cannot be redeveloped for the reason explained above.

One must also be aware there is much that is not revealed in the maps. For example, because of the scale of the map, each pixel in the image has to represent a 10 × 10 meter plot on the ground; as a consequence, many small features are not shown. In addition, AlphaWorld is a three-dimensional environment, with buildings of different heights and some features located underground; these differentials are not captured by the two-dimensional maps (but see the 3-D map of a virtual world by Andy Hudson-Smith on page 210). The map also does not reveal how active and well-used different parts of the city are. Unfortunately, many areas of AlphaWorld are “virtual ghost towns”, where land and buildings have been abandoned by their original homesteaders, but which cannot be reoccupied. And, because this is cyberspace, the buildings forever remain pristine clean, never decaying; the gardens never become overgrown; and no one ever visits!
Vilett’s cartography provides us with city-wide “satellite” maps, but if we want to see more of the local detail and texture – what the buildings, trees and structures are really like – we need more detailed scale mapping. Such sophisticated mapping for AlphaWorld has been provided by Greg Roelofs and Pieter van der Meulen. Their system maps AlphaWorld at 12 different scales, and the images (clockwise from top left) show a zoom through ten of these. These scales are organized according to a pyramidal structure, with each layer being double the size and double the resolution of the one above. At the apex of the pyramid is the largest scale map, where the whole of AlphaWorld fits on a single screen image. Moving down through 12 layers of the pyramid, the base layer is a vast map where each screen image represents an area of 540 × 540 meters on the ground. The transition of scale from base to tip represents a zoom of over 2,000 percent. The maps can be browsed interactively, panning in all directions as well as moving through the different scales. Currently, all maps are updated every three months.

At the largest scale the map is mainly a green featureless expanse because urban development does not show up well, unlike in the density maps. As the scale increases, the urban detail becomes more visible. The most detailed scales are essentially equivalent to aerial photos, with each pixel in the large image representing one meter on the ground. This reveals the fine detail of roads, ponds, trees and buildings, along with localized “sky writing”. The highest resolution map can actually be used as a powerful teleportation tool, placing the user in the landscape mapped.

4.22: Vevo multiscale mapping system

chief cartographers: Greg Roelofs and Pieter van der Meulen (Philips Silicon Valley Center, Sunnyvale, California).

aim: to map the whole of AlphaWorld at 12 different scales (from 20,000 to 500 feet).

form: color raster maps, where at the most detailed scale the maps appear aerial-photo-like, revealing individual buildings and roads.

technique: generated from the AlphaWorld building database using custom software.

date: images show the urban development of AlphaWorld, 5 November 2000. The system has been operational since July 1997.

further information: see <http://awmap.vevo.com>
Using the same 3-D Active Worlds software platform as AlphaWorld, Andy Hudson-Smith has undertaken an interesting experiment in online community development. The experiment ran for 30 days initially, starting on 30 November 1998, and was a key element of his doctoral research concerning online planning. Hudson-Smith was particularly interested in the ability of inhabitants to design and build virtual architecture and communities. He therefore examined empirically the processes through which virtual place-making occurs. He created a new world called “30 Days” in which users were free to build a new community. The land extent of this world was 2 million square metres, and was capable of supporting 32 simultaneous users. Both registered and tourist users were able to enter the world and build structures, and no specific guidelines were provided as to where to build or what to build. A small prize was offered for the best structure built during the first 30 days of the project.

Hudson-Smith monitored in detail the building of urban structures and the social interaction of inhabitants. Maps of each day’s urban development were produced and posted on the project’s website. Most of these maps were two-dimensional, similar to those of Roland Vilett and the Vevo project which we have just examined. However, Hudson-Smith also created some innovative three-dimensional maps.

The example opposite shows the full extent of urban development in the “30 Days” world as of 4 January 1999. The map was produced from the building database for the virtual world using the Awmap mapping utility developed by user “Foxy”. The map is displayed using an isometric projection, looking from the north-west corner of the world. Major structures projecting upward can clearly be discerned, the most noticeable being the purple tower in the middle – a kind of skyscraper building created by an unknown tourist – and two blue pyramids at the south-west corner of the world, created by user “Tom Hoxton”. The structures are colored according to their owner. The map shows the building work of 89 different registered users, as well as an unknown number of tourists, who altogether placed nearly 29,000 objects. Interestingly, the map reveals several key geographic features of “30 Days” that are similar to AlphaWorld – for example, the regular grids formed by road builders (the yellow lines) and the sky writing.

4.23: 3-D isometric map of the urban environment of “30 Days"

Chief cartographer: Andy Hudson-Smith (Centre for Advanced Spatial Analysis, University College London, UK).

Aim: to visualize the urban environment developed in an online community experiment hosted by an Active Worlds virtual world.

Form: 3-D isometric map showing built structures. Land-use colored by owner.

Technique: map generated automatically from the building database of the virtual world, using the Awmap utility developed by user “Foxy”.

Date: 1999.

Further information: see <http://www.onlineplanning.org>
In virtual worlds, the ability to teleport to distant locations is a vital form of movement. Andy Hudson-Smith produced an experimental 3-D model showing the location of fixed teleports that users had created in the “30 Days” world. Any object can be made into a teleport by giving it that “action” with specified destination coordinates. People then just touch the object with their avatar (representation) and they are transported to that location. There are two types of teleports, in-world and out-world. The in-world teleports are between two locations within the “30 Days” world, while out-world teleports link to locations into other virtual worlds in the Active Worlds universe.

Right are two rendered images of the model from different views. The “30 Days” world is shown in a transparent bubble, with the blue band representing the horizon. The teleports are shown by differently colored elliptical ribbons that pass through the origin and destination point. The flat plane in the middle of the bubble represents the extent of the land, and it has a 2-D map on it to provide context. In total, 65 teleports are shown, where 27 are in-world and the rest (38) are out-world. The teleport ellipses that touch the outer sphere are out-world teleports to other worlds. It should be noted that there may well be teleports in these other Active Worlds into the “30 Days” world, but these could not be determined from the data available to Hudson-Smith.

Analysis and mapping of the “30 Days” experiment is ongoing.

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4.24: Teleports in “30 Days”

chief cartographer: Andy Hudson-Smith (Centre for Advanced Spatial Analysis, University College London, UK).

aim: to show the location and destination of teleports in the “30 Days” virtual world.

form: 3-D model with teleports shown as ellipses projecting through a 2-D map on the ground plane.

technique: locations of teleports and their destinations have been determined from the building database and then manually modeled in a CAD package.

date: 1999.

further information: see <http://www.onlineplanning.org>
Mapping game space

Computer games have been at the forefront of the development of virtual space. Since the release of pioneering games such as “Pong”, “Pac-man” and “Donkey Kong” over two decades ago, the fierce pace of technical development has pushed games to offer ever more exciting and more immersive virtual experiences. Given the profitability of the computer games industry, recent trends have included using cyberspace as a distributed medium to increase market share. As such, the mass-market sales of powerful home PCs with 3-D graphics potential, coupled with the Internet, have given rise to networked games played by many thousands of players simultaneously.

The best of these games offer perhaps the most dynamic and interactive realms of cyberspace, although it is a realm often focussed on killing your opponent. But even in this, there is considerable social interaction despite it ending with a blast from a shotgun! The two major genres that work best as networked games are the first-person “shoot 'em ups”, such as “Doom”, and the so-called MMORPGs (Massively Multiplayer Online Role-playing Game), of which “EverQuest” and “Ultima Online” are the leading examples. These games are very popular – tens of thousands of people are immersed in cyberspace playing against one another. And this is their real power: the knowledge that the opponents are other people and are not computer simulated. The overall objective of many of the games may be to kill your opponent (often as quickly as possible) and yet it is still a vibrant form of social cyberspace, with communications and communities evolving. For example, teams are often forged in the guise of clans and guilds, and there is a rich fan culture associated with the games.

Before we start to review some of the maps of EverQuest, we detail in brief some of the characteristics of the game. The designers state:

Welcome to the world of EverQuest, a real 3-D massively multiplayer fantasy role-playing game. Prepare to enter an enormous virtual environment – an entire world with its own diverse species, economic systems, alliances, and politics. Choose from a variety of races and classes, and begin your quest in any number of cities or villages throughout several continents. From there, equip yourself for adventure, seek allies and knowledge, and head out into a rich world of dungeons, towers, crypts, evil abbeys – anything conceivable – even planes and realities beyond your imagination. Learn skills, earn experience, acquire treasure and equipment, meet friends and encounter enemies. A multitude of quests and adventures await, but you choose your role, you define your destiny. But whether you make yourself a noble human knight, a vicious dark elf thief, a greedy dwarven merchant, or whatever suits your desire, remember one thing: You're in our world now.

EverQuest is probably the leading massively multiplayer role-playing game on the Internet at present. As the designers note, it is a large three-dimensional virtual world in which tens of thousands of players can interact, go on adventures, and fight each other. The setting of the virtual world, the lands of Norrath, are very much the stuff of conventional role-playing games, consisting of a very Tolkienesque landscape. Unlike some of these games, EverQuest also includes money and a dynamic economy controlled by player actions. Individual adventuring is supported, but the game encourages the formation of parties to complete quests. Its environment is rendered in realistic three-dimensional graphics, from a first-person perspective. It has a large and varied geography, with many towns, villages, castles and ruins spread across several continents.

This playing environment is created by the game designers and remains fixed. This contrasts with more mutable virtual environments such as AlphaWorld or MOOs. The top map opposite is the stylized official game map. The screenshots below show various scenes and some of the characters that live there. There have been a number of notable efforts to map parts of the EverQuest game world. These are mainly hand-crafted maps created by the players themselves to help guide each other.
4.25: EverQuest

*Chief designers:* developed by 989 Studios / Verant Interactive, released by Sony Online Entertainment.

*Date:* March 1999.

*Further information:* see <http://www.everquest.com>

*Further reading:* These EverQuest community websites contain a huge wealth of information: <http://eqvault.ign.com> and <http://www.eqcorner.com>
The Map Shop of Norrath provides a comprehensive selection of more than 50 maps of the lands within EverQuest. The maps are created by player “Chizuya”, based in Japan. They are high-quality hand-drawn maps, richly colored using a watercolor effect, containing detailed information on key points of interest. There are maps for major cities, wilderness areas – swamps, forests and mountains – as well as detailed layouts for castles and dungeons. They represent many hours of work researching and drawing.

We have chosen two examples that illustrate the quality of the maps available from Chizuya’s Map Shop. The first (top-left) shows the Rathe Mountains, which lie in the east of the main continent of Antonica. The map shows grey and rocky mountain peaks, surrounded by lush green valleys, as well as significant locations such as camps, shops and inns. It is drawn on a regular coordinate grid so that a user can pinpoint locations and calculate approximate distances; it also shows connections to maps of adjoining areas. The second example (bottom-left) is a detailed layout of the rooms of the City of Mist, a small village in the Emerald Forest within the Kunark region. It shows individual rooms and whether their doors are locked or open. Again, the map is drawn on a regular grid.

Cartographer and member of the guild of the Outriders of Karana, “Gesler”, produced a series of 12 maps showing in detail the geography of the Kunark region of EverQuest. (Kunark is an expansion of the original EverQuest world released in 1999.) The Field of Bones map delineates clearly the key features of the area with labeling and coordinates. The area is at the heart of the Kunark region and was once the site of a reservoir for the nearby city of Cabilis, which was the site of a great battle in the distant past. The area is largely desert and notable for the monsters (such as various types of skeletons, scorpions and scaled wolves) that the adventurer is likely to encounter. On 15 June 2000, the guild decided to disband.

4.26: The Map Shop of the Norrath

Chief Cartographer: player “Chizuya” (from Japan).

Aim: to map portions of EverQuest.

Form: colorful, watercolor-look map on a base grid. Many significant places are marked. Examples show the Rathe Mountains and the City of Mist.

Technique: hand-created. More than 50 detailed maps of regions, cities and dungeons from the lands of Norrath.

Date: 2000.

Further information: see <http://www.nx.sakura.ne.jp/~chizuya/index2e.html>

4.27: The Kunark Mapping Project

Chief Cartographer: player “Gesler” (guild of Outriders of Karana).

Aim: to produce a range of high-quality maps of Kunark region.

Form: high-quality, two-dimensional schematic map.

Technique: hand-created digital map.

Date: May 2000.

Further information: see <http://www.tapr.org/~OutridersKarana/index.html>
The EQ Atlas is the definitive source of maps and information on the geography of EverQuest. It was created and is maintained by player “Muse” (Michael A. Swiernik). The site is continually updated and represents a valuable community resource. More than 100 separate areas are covered by the EQ Atlas, with large areas covered by several maps. The maps themselves are well-designed and well-drawn sketch maps, shaded with a light pencil effect.

The example displayed opposite is an image of Ak’Anon, a city on the continent of Faydwer. The map is drawn with a coordinate grid and significant locations are numbered. (Detailed descriptions of the locations are listed on the map’s accompanying Web page.) For example, location 5 is the “Abbey of Deep Musing – Cleric Trainers and Merchants selling Blunt Weapons, through secret door lies stairs down to Rogue Guild with Merchants selling Rogue Weapons”. A large system of water channels and lakes flows throughout the city.

Ak’Anon has numerous guilds for clerics, necromancers, warriors and wizards. Two inset maps provide layouts of building complexes: the bottom one is a major shopping district and connects to the main map at point A; the top one is a maze of old caverns to the north of Ak’Anon that, according to the EQ Atlas, “have been taken over by the less desirable elements of the gnome society, where the necromancers and the other evil gnomes have taken up residence, as well as the undead that they have summoned to protect their home”.

EQ Atlas provides valuable information and descriptions that accompany the map, giving details on the area’s local character and its neighboring regions. The description for Ak’Anon begins: “An ancient city, built into the edge of the mountains long ago by the gnomes who call it home. Half fortress and half laboratory, the gnomes have been developing their clockwork machines and defenses here for generations, and show no signs of stopping.”

4.28: The EQ Atlas

chief cartographer: player “Muse” (Michael A. Swiernik).
aim: to provide the most comprehensive atlas of EverQuest so far, with detailed maps of all areas of EverQuest along with useful descriptions of dangers and travel tips.
form: 2-D sketch map showing EverQuest environment.
technique: hand-constructed map.
date: September 2000. Atlas is continuously updated.
further information: <http://www.eqatlas.com>
Ultima Online (UO) is another notable massively multiplayer online role-playing game. It has much in common with EverQuest, although it pre-dates it by a couple of years and consequently has less sophisticated graphics. Instead of a first-person perspective on the world, Ultima Online’s interface is a third-person overhead isometric view. The screenshots (opposite-bottom) show the gaming environment. The current version of UO is based on a successful series of single-player role-playing games known as Ultima.

The geography of the UO virtual environment is the world of Britannia, consisting of nearly 200 million square feet, accompanied by subsequent expansions of The Second Age. Maps of every city can be used to guide the players. Like EverQuest, the land of Britannia has its own economic flux, political turmoil, battles and wars, and even a simple model ecosystem. Similarly, like EverQuest, actions have a real and lasting impact on the world of UO, and users run businesses and wage wars, although the terrain is fixed.

“Gram” has produced the best overview map (above right) of the Ultima Online world of Britannia so far. It took many hours of volunteer labor to create. It is a well-designed map, drawn on a regular grid, with stylistic elements to suggest the mythical realm of the game, such as a parchment effect and the style of lettering. Towns, dungeons and shrines are identified. The top corners of the map sheet are filled with supplementary information.

Another popular way to map the landscape of Britannia is to take multiple screen captures from within the game. Setting the viewpoint high above the terrain, a user can get a kind of aerial photograph view of the world. Moving across the world taking screen captures provides tiles that can be carefully stitched together to give a seamless map. The example shown top-opposite is the town of Yew (known as the City of Justice). Merchants and other points of interest are indicated, such as the Bloody Thumb Woodwork and the Court of Truth.

4.29: Ultima Online
date: September 1997.
further information: see <http://www.uo.com>
further reading: these leading Ultima Online community websites contain a huge wealth of information: <http://uovault.ign.com/> and <http://uo.stratics.com>
“Killers have more fun”, by Amy Jo Kim, Wired magazine, May 1998.
<http://www.wired.com/wired/archive/6.05/ultima.html>

4.30: Map of Britannia
chief cartographer: “Gram” (Graham P. Colwell).
aim: to provide a map of Britannia.
form: 2-D sketch map.
technique: hand-constructed map.
date: 1998.
further information: see <http://uo.stratics.com/homes/gramatls.shtml>

4.31: The Grand Atlas of Britannia
chief cartographer: Ba’alzamon of Trinsic (David G. Perkins).
aim: to produce maps of the major towns and dungeons.
form: somewhat like an aerial photograph, where one can discern roads and individual buildings.
technique: mosaic of multiple screen captures from the game.
date: 1999.
further information: see <http://uo.stratics.com/atlas/>
The computer game Doom, released by id Software at the end of 1993, pioneered a whole new genre of fast-action, violent “shoot 'em up” games. The key technical developments of Doom were its graphical rendering of the game world and its game play. In terms of graphics, Doom used a 3-D first-person perspective, where the game environment was viewed from a player’s perspective, as can be seen in the screenshots opposite. This gives a very immersive feel to the gameplay, placing the player at the heart of the action. Doom, however, was not the first game to use first-person perspective; that honor probably belongs to the tank game Battlezone, released by Atari in 1980. Also, the immediate forerunner of Doom, Wolfenstein 3-D by id Software, developed many of the techniques used in Doom. Doom, though, became a smash hit – and the introduction to this view of virtual space for many millions of players.

The other major advance of Doom was its ability to have multiplayer games over local area networks and modems. In this violent realm of cyberspace, players had the thrill of knowing they were fighting against and killing human opponents, not just sterile computer-controlled “baddies”. In multiplayer DOOM, the so-called DeathMatch mode, where every player is out for himself and himself (or herself!) alone, was particularly popular. So, even in this action-game space, it was still about interaction but mediated through gameplay (with rocket launchers!).

Doom also made extensive use of the Internet as an important channel to distribute the shareware version of the game to millions of players at very low cost. The actual software code of the game also had an open architecture that allowed players to modify, and experiment with, game design. Players could design new levels, new weapons and enemies. This greatly encouraged the development of a vibrant fan culture and enabled creative players to extend both the game environment and their enjoyment of it.

Opposite we present a number of screenshots of the first-person action from the Doom shareware game and two plan views of the level layouts. The shareware release had eight levels, starting with The Hanger (top-right). The plan views were created using a level editor called WadAuthor by John B. Williston. The red symbols in the map are different baddies, the blue are survival objects and the green ones are weapons and armour. The individual level environments are relatively small and compact, particularly compared with, say, AlphaWorld or EverQuest. This ensures that the action is fast and furious, for there is never long before there is another opponent to fight.

The creative company id Software developed the game further, releasing Doom II in October 1994. Then after two years’ development the next generation of multiplayer 3-D first-person “shoot 'em up” was released by id Software, named Quake.
Quake developed from the gameplay of Doom, providing greatly enhanced graphical realism. The 3-D environment was richer in texture and dank dungeon menace, and the kinetic violence was rendered so fast that one could become dangerously immersed in it. The environments had a genuine three-dimensional feel to them. The multiplayer capabilities in Quake were also greatly enhanced, enabling many players to “frag” (i.e. fragment) each other in death matches over the Internet. Once again, an open software architecture facilitated great creativity and effort from the user community in producing “mods” for Quake – such as new maps, weapons and skins. This has greatly extended and enhanced the Quake world – all through volunteer activity.

Some scenes of violent struggles against “fearsome” baddies from a single-player game of Quake are shown opposite. The baddies include zombies who throw nasty lumps of flesh, chainsaw wielding ogres who throw devastating pipe bombs when within range, and other aggressive and unearthly fiends. The fights are fast and bloody. The actual 3-D environments are not much larger than in Doom, but they are much more three-dimensional, with bridges, holes, lifts and walkways (Doom tended to all be on one level). A 3-D wireframe view and a plan view of one of the early levels – The Necropolis – are shown below. These images are complex and were created using Qwdquake, a simple tool created by Gunnar Dahlström for viewing Quake maps.

4.33: Quake

chief designer: John Carmack (id Software).
aim: The son of Doom. A hugely successful first-person-perspective “shoot ‘em up”.
form: great 3-D graphics with murky dungeon-like levels and considerable violence and gore.
date: released 1996.
further information: <http://www.idsoftware.com>
further reading: <http://www.planetquake.com>