

Visualising Corporate Memory

A Future for Online Computing

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ABSTRACT:

Established for some time in scientific circles, visualisation refers to the technique of portraying data in graphical terms. As a research tool, visualisation is particularly useful for making sense of large and complex data sets and for exploring the multitude of relationships within those data sets.

Current developments, such as Virtual Reality Modelling Language (VRML) will enable data to be modelled in 3-D. Java, on the other hand, will enable developers to attribute behaviours to data objects thereby providing the basis for complex forms of interaction. As these developments and other possibilities converge with the further integration of distributed heterogeneous networks, be it the internet or intranets, the potential for visualising information will be enormous.

Likely to have consequences in all aspects of life, the visualisation of legal information may well alter our very perception of law itself. Legal systems are after all a kind of cultural corporate memory whose evolution is intimately linked to the history of the print medium. Reflected in idioms such as „the letter of the law“, the written word is the means through which law is expressed and exposed. In legal terms altering the medium for expressing legal relationships implies altering the nature of those relationships.

However, to date most legal information systems are electronic versions of printed products. That is, they have carried into an electronic format or new media, the structure and information processing habits of the old media. In order to take full advantage of the next generation of visualisation tools for fleshing out corporate legal memory, it is necessary to move legal information systems out of the post-print pre-digital twilight into a situation where the digital medium is the primary format for publishing legal documents.

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1. Introduction

Ranking high amongst a firm's many assets is its *know-how*. Preserved in a variety of *knowledge carriers* be they people, procedures and PCs to name only a few, this pool of knowledge is however most likely to be distributed, diverse, fragmented, elusive and above all perishable. This complex body of knowledge can be described as constituting the organisation's institutional or corporate memory.

1.1 Corporate memory

Research from the natural sciences supports the view that „memory is not a single entity but is composed of several separate systems“ (Ref 1). That in effect, what we recognise and describe as memory results from the accumulative and combined effect of a multitude of processes. Central however, to any discussion involving memory, is information processing. This holds true irrespective of the context, be it memory in biological terms or, as in this case, with respect to a firm's knowledge pool.

It is important at the outset, however to be clear that corporate memory is much more than an information system. Despite their rapid growth, corporate intranets are still a long way off the complexity, depth and plasticity associated with corporate memory. That said, information systems are the vital link between that which is real and familiar and this essentially abstract and ethereal thing we call memory. Distributed information systems like the World Wide Web provide the basic elements upon which to construct the architecture of the infrastructure required to be able to eventually visualise corporate memory. Thus, it follows that corporate information systems and intranets should also be looked upon as paving the road to the eventual visualisation of corporate memory.

This article will look at some of the issues involved in visualising corporate memory for a specific subject, namely law. The reasons for selecting law are outlined briefly in the next section. Nevertheless the issues, problems and solutions discussed here are transferable to other subjects and disciplines. The article begins with a short discussion of visualisation and proceeds to answer the basic question that for any given subject, in this particular case, law, what concretely should be visualised? Here it will be demonstrated that online computing techniques have already begun to visualise legal information. The article then concludes by arguing that in order for a subject like law to truly benefit from the developments in online computing, we need to challenge and where necessary, reappraise our basic understanding of what constitutes legal documents.

1.2 The case for law.

The subject of law and legal information processing in general lend themselves well to a discussion on visualising corporate memory. Consider the following:

Legal documentation has reached a high degree of formalisation

For the purposes of discussion legal documents referred to here are what are known as „primary sources“, that is legislation and case law. From a legal publishing point of view we can also refer to them as „raw law“ in the sense of being the naked legal text.

Legislation and case law have reached a high degree of formalisation in both content and form of the document. Even between jurisdictions there are both similarities and clear differences that make the subsequent manipulation of the document using software-based techniques that bit easier.

Legal documents are products of past events with an influence on the future

The memory metaphor for law as a complex adaptive system is both appropriate and very exploitable as the law can be said to exhibit memory type behaviour. For example, under the doctrine of binding precedent, a backbone principle of the common law jurisdictions, a point of law can be traced to a string of decisions. As subsequent decisions confirm the case law pathway so the point of law gains in authority. This is analogous to reinforcement in biological and artificial neural nets. Conversely the old adage in memory training „use it or lose it“ finds a legal equivalent in the principle of desuetude observed by some civil law jurisdictions. This principle holds where a law is not regularly applied it will gradually lose its legal forcefulness.

„Raw law“ documentation is generally considered as public domain

Certainly as regards legislation and case law, legal documents are seen as public property and as such have appeared on the World Wide Web. To what extent this will continue remains to be seen. It does mean however that there is a vast, rich bed of structured content upon which to explore the visualisation of corporate memory and in time to grow product ranges based on distributed artificial intelligence applications.

In contrast, a firm's know how, being such a valuable asset will comprise sensitive and confidential information and as such will most likely remain shielded from public eyes secure behind corporate firewalls.

Law provides a rich source of historical perspectives

The transition into the digital era is one of profound change. Product timescales have been reduced to months. Investment is fast and furious. The stakes are very high. Yet the induced collective impatience is absolutely deadly to the kind of discussion and reflection needed to prepare us for the digital age. The rapid pace of change is the common enemy of author, publisher and consumer alike. Ideas must be given room to breath. New and alternative perspectives must be explored. Legal history is rich in useful and instructive perspectives. Consider the following: visualisation tends to be associated primarily with pictures. Yet legal history suggests we see the term in a wider sense. The codification of law in France (Ref 2) and Germany (Ref 3) during the last century ordered a very complex state of affairs. These codes expressed legal relations and also provided a means with which to communicate them. In doing so, the codes arguably visualised the codification process.

2. Visualisation

Although it is quite natural to associate visualisation with pictures and techniques of graphical representation, this as we shall see does the term something of an injustice. Visualisation is a very fundamental skill and is the primary process with which we try to make sense of our world.

2.1 Thinking in pictures...stories and objects.

We are confronted by examples of visualisation virtually every day. A particularly good example and one that you may well have used this morning is the London Underground map. By keeping the map simple, i.e. by only referring to the links between stations as opposed to geographical details, and through the effective use of colour, the map makes sense of and communicates information about the vast labyrinth that comprises the „Tube“.

Pictures are also a very effective way of expressing a set of relationships and of conveying knowledge. The caveman's drawings for example, were early attempts to make sense of the world. Not only was a set of circumstances conveyed to fellow dwellers but also to us some thousands of years later. Also the process of producing the picture acts as a confirmation of understanding. A child's drawing depicting mum, dad and baby brother expresses and by doing so, confirms an understanding of the family hierarchy.

The London Underground map, the caveman's drawing and the child's painting, like many visualisation tools, draw upon the wisdom expressed in the idiom that a picture paints a thousand words. Although having obvious merit, this view fails to do justice to the full scope of the term. As any poet will tell you, or for that matter a lawyer, a few words can just as easily evoke a hundred images. A well formulated legal rule, for instance, can also cover a multitude of possible circumstances or relationships.

The telling of stories and the reciting of verse may also be looked upon as means of visualisation. Think of the biblical parables. At one time, stories were the only way of preserving any sort of corporate legal memory.

Th(e) pre-literate Irish legal tradition was presumably passed on by lawyers from generation to generation in the form of alliterative verse and legal maxims. The *introduction of Latin letters revolutionised the transmission of legal material. Legal topics could now be treated at length and in detail, whereas previously only the salient points could be passed on by word of mouth* (Ref 4). [Emphasis added.]

The impact of writing upon this oral tradition was in its time a kind of visualisation process which in turn led to the greater sophistication of legal knowledge. The jump then between oral and scribal traditions of legal information processing mirrors today's lurch from print to digital based media.

In application development terms, object-oriented programming has visualised the creation of software and in doing so has brought programming to a wider audience and paved the way for application inter-operability.

2.2 Scientific visualisation

Whereas up until now we have referred to visualisation in general terms, the phrase *scientific visualisation* tends to be used to describe the specific application of computer graphics technology to displaying scientific data.

Although much work was done in the 1940's and 1950's on computer graphics, in particular with respect to the development of radar, the significant milestone in the evolution of scientific visualisation remains the invention of Sketchpad by Ivan Sutherland in the 1960's, a development described by Nicholas Negroponte as „the big bang of computer graphics“ (Ref 5).

Up until Sketchpad, computers had been seen mainly as data processors. Sutherland's programme, written as part of his Ph.D. thesis, enabled a computer operator to draw a picture upon a computer screen with a pen device and then to be able to manipulate the picture. The significance of Sutherland's invention lay not so much in the operator's ability to draw pictures as..

...Sketchpad was much more than a tool for creating visual displays. It was a kind of simulation language that *enabled computers to translate abstractions into perceptually concrete forms* (Ref 6). [Emphasis added.]

Sutherland's invention opened up the window for a complete industry, namely computer aided design (CAD) and can also be looked upon as a seminal event in the evolution of virtual reality.

Scientific visualisation as a more formal discipline began to emerge in the late 1980's. The report, *Visualisation in Scientific Computing* published by the National Science Foundation in 1987 outlined the need for visualisation tools „to steer and visually analyze scientific data“ (Ref 7). As computing power increased and prices came down, the techniques and approaches used in scientific visualisation migrated out of the laboratory to a wider audience. In addition to CAD applications, visualisation techniques have become commonplace in medicine, business and - albeit slowly - in the practice of law.

Given that each subject discipline and application area now makes its own demands upon visualisation techniques, it is nevertheless possible to crystallise out of the above diversity the essential aspects of the visualisation process, namely,

to order and make sense of complex data,

to gain valuable insights into the data,

to be able to communicate those insights to others.

3. Legal corporate memory

We have established that the process of visualisation helps us order a complex world, in doing so provides insights into that world and enables us to communicate these insights to others. Scientific visualisation has produced numerous tools. Given that we have the means to link concrete data and abstractions, the question then arises what concrete data must we use to visualise legal corporate memory?

3.1 Legal documents

An obvious answer is to visualise the law itself. The issue then becomes one of where do we find the law? This question is best left to the legal philosophers. For our purposes we shall remain with the legal publishers' more pragmatic response, that the law is to be found in legal documents. By legal documents we mean for example legislation passed by the legislature, for instance Parliament or case law by which we mean the decisions of a judicial tribunal. Clearly these documents as physical objects are not themselves the law. If we destroyed the Companies Act 1985 the Act itself still remains in force. Nevertheless if enough copies were destroyed the Act's enforcement would become something of a problem. The point here is that while the physical document is not the law itself, the physical document giving expression to the law, is nonetheless essential to the law's existence.

One way of looking at a legal document is to think of it as a snap-shot of a legal information process analogous to a snap-shot photograph of say, the firm Christmas party. If we imagine a group of revellers at the party complete with funny hats and red noses, a snap-shot of the group captures an event at a particular point in time. Independently of the photograph, the event arose, occurred and continued. All the photograph did was freeze the event in time. Similarly, an Act of Parliament as a physical document is a snap-shot or rather, the product of a legal information process. In the way that the snap-shot of the party conveys little direct information about the events that led up to the constellation of circumstances represented in the photograph, similarly the physical document of the statute holds no information about what led to its origin. Also the party snap-shot gives no indication as to how the captured scene subsequently developed. Likewise the statute document gives no indication as to how it has been subsequently interpreted or even if all of its provisions are still in force.

It should be stressed here that the analogy is being used to demonstrate the limited information provided by legal documents as snap-shots of legal information processes. The role of preparatory materials in the interpretation of legislation certainly varies between jurisdictions. That being the case, it could be argued that the constrained information content is deliberate, being based upon sound legal principles. This view is, however, likely to be tested as some online versions of legal documents contain document related information not normally found in the printed version. An instance here concerns the German legal information system, juris. Although there is no formal doctrine of binding precedent in German law, cases on juris now contain a list of citations to other cases in which they are subsequently cited. Thus, the online system will enable users to trace precedent pathways through German case law.

3.2 Collections and clusters of legal documents

Legal documents are sociable creatures living as they do in clusters rather than glorious isolation. Yet, legal publishing, generally speaking, has tended to disrupt the clusters by forcing documents into compilations and collections. Undoubtedly useful and convenient, such compilations and collections run counter to „natural“ legal document clustering and arguably, conflict with the way in which legal information is used. Online databases, on the other hand, have already begun to portray, if not visualise „natural“ legal document clustering. Thanks to hypertext linking this development is on the increase.

Let us return to the snap-shot analogy. If at the party we were able to take a series of photographs and then arrange them in a meaningful order, in this case chronologically, we would then be able to make more sense of the scene in the original snap-shot. The circumstances that led up to the scene would become more apparent as would the subsequent actions of the scene's participants. With an increase in the frequency of the snapshots the information capturing possibilities, namely video, improve significantly. The technological leap has brought with it greater visualisation possibilities. Using rewind and forward wind functions, the original scene, and for that matter any scene, can be examined in greater detail over and over again.

In terms of legal information, the series of legal document snap-shots could be arranged according to other criteria based on content for example, and not just on their chronological order. What the video recorder did for the Christmas party, online databases have done for legal documentation only that rewinding and forward winding means following a series of hypertext links through document clusters.

3.3 Legal information product versus legal information process

Whereas in the snap-shot analogy the photograph froze a dynamic event in time, a legal document captures a process or, put another way around, is produced by a process. This is preferable to saying that the document is a product, as the connotation of being final is just not appropriate. Legal information processing is complex, dynamic and above all inter-related. Although an Act of Parliament is the end product of a legislation generating process, the Act, upon promulgation, begins on an interpretation process. A decision of a lower court is the end product of a judicial process but the beginning of an appeal process.

The inter-relation of legal information processing can be captured by online databases. In this way online computing visualises the processes behind the law rather than the products of law which up until now has been the main task of conventional print based legal publishing. Further visualisation of the processes of law will however depend upon the digitalisation of legal information..

3.4 Visualising legal corporate memory

If we understand visualisation in its wider sense, online databases have already begun to visualise legal information. As supplements to products whose origin lie in print, online databases have at least demonstrated that it is also possible to capture in an electronic format, the process behind the product. This being the case, we are on the road to sophisticated, distributed information systems which will provide the building blocks for the eventual visualisation of legal corporate memory. Yet, in this promising formulation lies the very problem that will retard the long awaited jump out of the post-print pre-digital twilight. The current spate of electronic legal information products have been built upon the structure and information processing habits of the old media. In order to really be able to visualise corporate memory we need to stop forcing square print pegs into round digital holes.

4. Paving the path to the future of online computing

The following describes, albeit briefly, an approach to the digitalisation of legal information processing. It will be seen that the root of the problem lies not so much in technology but more so in the need for alternative perspectives.

4.1 Deconstructing the legal information process

The first step is to be able to deconstruct legal information processing. Whether they are in print or in an electronic format, legal documents remain points of orientation in the complex world of legal information. Then starting with a legal document we need to be able to trace and identify the processes that produced it. In software development terminology, the task before us is to reverse engineer legal documents.

Perhaps, at first sight a strange idea for legal information, the approach has many precedents elsewhere. If you have built a database in your firm or organisation you probably carried out a similar data analysis or information process deconstruction type of exercise. Implementing procedures based upon the SGML or Standard General Mark-up Language presupposes a thorough analysis of document generating information processes (Ref 8). In a lighter vein an instructive alternative is to simply sketch a document generating process in terms of atoms and bits as described by Nicholas

Negroponte in his book, *Being Digital*. The following passage describes for newspapers what needs to be similarly overcome with respect to legal documents:

Consider a modern newspaper. The text is prepared on a computer; stories are often shipped in by reporters as e-mail. The pictures are digitized and frequently transmitted by wire as well. And the page layout of a modern newspaper is done with computer-aided design systems, which prepare the data for transfer to film or direct engraving onto plates. This is to say that the entire conception and construction of the newspaper is digital, from beginning to end, until the very last step, when ink is squeezed onto dead trees. This is the step where bits becomes atoms (Ref 9).

4.2 Reconstructing the legal information process

The second step is to reconstruct the document in digital terms. It is really during this process of document reconstruction that we can begin to explore and challenge the notions and formats dictated largely by the print age. For instance, should a document be real in the sense that it resides on a computer somewhere or virtual in the sense that it only appears as a document when its constituent parts are pulled together in cyberspace? Where does a document begin and end, etc.?

During the reconstruction process certain emerging technologies ought to be borne in mind.

Graphical Representation.

One of the benefits of the deconstruction/reconstruction model of legal information processing is that it circumvents the text/graphic division which is largely a technical distinction (Ref 10). When everything is in bits, the final representation be it text, speech or graphics will depend largely upon the user. Legal documents, in clusters or families would indeed profit from representation as 3 dimensional objects. It is not unusual to discuss documents and legal concepts using spatial terms. In EU law for example it is common to talk of the „vertical“ or „horizontal“ effect of directives (Ref 11).

The relationships between documents, clusters and families of documents and their properties whether individual or collective could be represented better by shapes or colours. For example, under Rule 979 of the California Court Rules, the Supreme Court of California has the unusual power to be able to depublish decisions. In contrast to the example with Celex below, the relevant information on LEXIS is at least added to the title display (Ref 12). As depublished documents these cases have lost the attribute of being „in force“ but nevertheless remain on LEXIS for reference purposes.. Granted that the title of the case explicitly states that the decision has been depublished, the use of colour would be useful to distinguish these documents from those that are still „in force“.

Contrast this with a search on Celex for the Commission Regulation (EEC) No. 9/86 of 3 January 1986 amending regulation (EEC) No. 1633/84 laying down detailed rules for applying the variable slaughter premium for sheep. The information in the document's title suffices to formulate the Celex specific document number. Alternatively, you could search using specific words in the title. Either way the Celex information system yields the document. A successful search? The document's appearance at first sight does nothing to indicate that this document was declared invalid by a preliminary ruling, C-Case 86/162. This information can be found buried within the document in a field called COURTDEC.

All too often the role of the 4th dimension, i.e. time tends to be forgotten. An interesting exception to this is Juris. Searching specifically for a single paragraph of the German Criminal Code, for example

§129a StGB which makes it an offence to found a terrorist organisation, Juris yields 4 hits. These correspond to four versions of the same paragraph that date back to 1980. To obtain the currently valid version of the provision, the user must specifically request this. Again colours could be used to distinguish versions and shapes to distinguish a constellation of documents at any given time. If we now refer back to the snap-shot analogy, the sequence of changing shapes or constellations will yield information about the process.

The use of VRML or Virtual Reality Modelling Language coupled with the increasing power of computers and spread of broadband communications will make these possibilities realisable.

Behaviours

Compared to the drama often encapsulated in them, legal documents are themselves rather inert. Leaving the document's content aside for the moment, there are properties of the document which could be enlivened using current technology and that in a more sophisticated way when Sun's JavaScript and Java and Microsoft's ActiveX gain wider acceptance. For instance the Commission Regulation (EEC) No. 9/86 of 3 January 1986 mentioned above could announce, as you load it into your browser, that it has been overturned by a preliminary ruling. Scripting languages like JavaScript have already made it possible to construct documents as interactive knowledge carriers. The IRS 1040 tax form demonstrated by Home Pages, Inc. is such an example (Ref 13). Simple but instructive, the tax form fills itself in based on the data given to it by the user.

A further development in this respect might be that the document upon being summoned asks you about the sort of information you would like to know, i.e. am I still in force. who proposed me, where else have I been cited. how long am I scheduled to remain in force ? In other words, the documents themselves can be accorded a specific, in this instance, presentation behaviour.

Agents

An emerging technology of immense interest here involves the application of intelligent software agents. Precise definitions in this turbulent field are best avoided for the time being save to say that generally speaking an intelligent agent may be looked upon as software, that acting on instructions, works to achieve a particular end. Agents will be instrumental in managing the vast information resources like the World Wide Web and are likely to feature very prominently in interface design. Seen also as distributed artificial intelligence applications they will also lead to a considerable personalisation of the information process.

A list of World Wide Web sites with relevant background information and a discussion in the form of Frequently Asked Questions is given at the end of this article. At first sight some of the above suggestions might sound a touch bizarre. Yet the examples all involve current documents and existing technology. What is different is the perspective.

5. The individualisation of legal information processing

The digitalisation of information is upon us. Change however, is a double-edged sword, exciting on the one hand, frightening on the other. Quite legitimately legal publishers are concerned that electronic versions of their products will erode established revenues instead of generating them. There is still much uncertainty bound to the digitalisation of information. However it is important not to see

all these developments as a battle between print and digital media. This would be far too simplistic and restrictive. Some commentators prefer to describe the transition from print to digital products as a displacement rather than replacement of traditional product ranges. As much of this article has drawn upon legal history to help mould alternative perspectives, it would be fitting to conclude by delving once more into the past to express the future.

It is more instructive to think of the future of legal publishing in terms of the individualisation of legal information processing. To understand what is meant by the term *individualisation* requires a short excursion into legal history.

Known mostly by its common name, (Ref 14) The Waltham Black Act came into force during the reign of George I to deal with an essentially local problem. The forests of Waltham in Hampshire had been rendered unsafe due to the criminal activities of bands who operated in disguise or with their faces blackened.. Introduced originally as emergency legislation, renewable every three years, the Act was made permanent in 1758 and remained on the Statute books until its effective repeal in 1823.

The Waltham Black Act is notorious in English criminal legal history as it provided the death penalty for some 200 offences which ranged from murder to breaking the mound of any fishpond or destroying trees. No consideration was given to the personality of the offender or to the individual circumstances of each offence.

The passing of the Black Act coincided with the ascendancy of the doctrine of undifferentiated and crude retribution; its abrogation was the sign of a new approach to the problems of crime and punishment (Ref 15).

Repeal when it came owed much to the spirit of reform sweeping through Europe at the time and in the particular case of criminal justice was heavily influenced by the writings of Montesquieu and Beccaria. By evolving a scale of punishment to fit the crime, the reformers managed to stretch out, expand and develop the ground between the debate's two extremes which were represented by the abolition of the death penalty on the one hand and the doctrine of maximum severity , i.e. the particularly unpleasant application of the death penalty, on the other. Legal historians have referred to this process of expansion of possibilities as the individualisation of law.

The future of online computing lies in enabling the digitalisation of the information process which will lead, by analogy, to an individualisation of information processing. This in turn will generate new products and procedures and lead eventually to the visualisation of corporate memory.

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2. See David and Brierley, (1985) pages 63-71.
3. See Markesinis, (1990) pages 18-19.
4. See Kelly, (1988), page 232.
5. See Negroponete, (1995), page 103.
6. See Rheingold, (1991), page 90.
7. See Brown et al. (1995), page 7.
8. See generally Travis and Waldt, (1995).
9. See Negroponete, (1995), page 56.
10. See Katsh, (1995), pages 147-152.
11. For a recent example of the use of the words „vertical“ and „horizontal“ in a discussion referring to the direct effect of directives see the Opinion of Mr Advocate General Jacobs delivered on 27 January 1994. *Nicole Vaneetveld v SA le Foyer and SA le Foyer v Federation des Mutualites Socialistes et Syndicales de la Province de Liege*. Reference for a preliminary ruling: tribunal de commerce de Huy - Belgium. Insurance - directive - time-limit for transposition - direct effect. Case C-316/93.
12. See *Kaukauna Crenshaw v. The State of California*, 1992 Cal. App. LEXIS 46; 3 Cal. Rptr. 2d 405; 92 Cal. Daily Op. Service 443; 92 Daily Journal DAR 606. Filed 13 January 1992. Depublished 11 February 1992.
13. See the World Wide Web site of Home Pages, Inc. at <<http://www.homepages.com>>.
14. The Act (9 Geo. 1, c. 22) has as its full title: „An Act for the more effectual punishing wicked and evil disposed persons going armed in Disguise, and doing Injuries and Violences to the Persons and Properties of His Majesty’s Subjects, and for the more speedy bringing the Offenders to Justice“. See Radzinowicz, (1948), page 49.
15. See Radzinowicz, (1948), page 79.

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World Wide Web SitesIntelligent Agents - Background Information and Resource Guide

<http://munkora.cs.mu.oz.au/~leon/agentlinks.html>

Intelligent Agents - Frequently Asked Questions

http://www.ee.mcgill.ca/~belmarc/agent_faq.html

Java - Background Information and Resource Guide

<http://www.javasoft.com>

Java - Frequently Asked Questions

<http://sunsite.unc.edu/javafaq/javafaq.html>

JavaScript Demonstration - IRS 1040 Tax Form

<http://www.homepages.com>

Juris, the German Legal Information System

<http://www.juris-sb.de>

LEXIS

<http://www.lexis-nexis.com>

Virtual Reality Modelling Language - Background Information and Resource Guide

<http://www.sdsc.edu/vrml>

Virtual Reality Modelling Language - Frequently Asked Questions

http://vag.vrml.org/VRML_FAQ.html

World Wide Web - Background Information and Resource Guide

<http://www.w3.org>