Seeing the Past: Digital History as New Model Scholarship

Crandall Shifflett
Department of History
Virginia Tech
Blacksburg, Virginia, USA
shifflet@vt.edu

Abstract

Digital scholarship will develop discrete research techniques, theoretical models, and vocabularies. Visual techniques and methodologies provide historians with break-through technologies for producing scholarship in new forms. Visual history has the potential to expose new interpretive relationships, provide historians with new tools to reimagine the past, and deliver the results of recent research in a timely manner and efficacious format.

Keywords: visual history, new model scholarship, breakthrough technology, electronic publication, visualization, collaboration teams

Digital scholarship will develop discrete research techniques, theoretical models, and vocabularies. The natural attributes of technology, where the work flow and exchange of information, knowledge, and ideas is limitless, nearly instantaneous, and when delivered in electronic format, naturally image-driven, challenge us to discover ways of scholarly communication that take advantage of electronic and visual environments. This essay uses Virtual Jamestown and collaborations made possible by an Andrew W. Mellon planning grant to explore how visualization techniques can enhance the research, production, and dissemination of historical scholarship in new forms.

First, what is visual history and how could visualization be a breakthrough technology in digital history? Some have called the push to make historical data more visual "history's next frontier" (Young, 2006). Second, why is visual history especially suited to seeding and developing electronic scholarship?

To begin, the issue might be cast "What does the past look like?" A mental picture with text could be drawn of an Indian settlement, for example, from the accounts of those travelers who left written descriptions. To someone who has never seen one, without an image, it would be difficult to analyze the settlement. Since Virginia's Indians left no known written accounts of their history, historians have relied upon English travelers and their written accounts. More recently, archaeological evidence has added to the visual record. Perhaps the most significant contribution to our recent understanding has come from the use of John White's sixteenth-century watercolors and the corresponding Theodor DeBry engravings. White came to the Outer Banks of North Carolina in 1585 and left over 70 watercolor sketches, many of the Algonquian-speaking Indians of the area. Karen Kupperman made clever use of the White watercolors for "reading Indian bodies" to pose questions about English and Indian understandings of the "other" (Kupperman, 2000, chap. 2). In other words, Kupperman focused upon self-presentation, as

exhibited in clothing, posture, body markings, and other visible evidence, .to make images the objects of research and analysis.

On the Virtual Jamestown Web site (http://www.virtualjamestown.org/paspahegh/paspaheghHome.html) archaeological, textual, and imaginary records have been combined to recreate visually the Paspahegh Indian settlement. The Paspahegh were one of the earliest English contact groups in Powhatan's paramount chieftancy. In a horrific incident, the English invaded their settlement, just 9 miles north of James Fort, sacked the village, and shot women and children to death as prisoners. Since the Paspahegh were a small group, the attack virtually destroyed them and they were wiped from the pages of history. Except a recent development of the Paspahegh area as a golf course produced archaeological evidence of their settlement and led to a survey. Drawings, sketches, artifacts, maps, and first-hand accounts can now recreate the Paspahegh settlement. This is an example how images integrated with textual, cartographical, and archaeological data can broaden our understanding of the Chesapeake Algonquians through multiple perspectives, English and Indian.

Visual history becomes even more intriguing perhaps once historians move beyond a specific case to something broad and abstract, such as colonization, and ask the question, "What does colonization look like?" When visual history is employed to address abstract questions, the results would be delivered much more effectively electronically, because visual history, as it has come to be defined here, now represents a core activity of the research and analysis. Visual history is not "history without words." Historians will always need text. Ideally, visualization will develop as a fusion technology, melding together text, artifacts, maps, and other hypermedia material with appropriate vocabularies and theoretical models.

Technology provides new eyes for resurrecting the past and unlocking its secrets. Images and computers, maps and historians, and special history all go together like bread and butter.. In fact, it is unlikely that text alone would even elicit the questions that images sometimes raise. To return to the previous example, the use of the White watercolors raised questions of self-representation and its meaning that English printed texts did not evoke with such clarity and effectiveness. Where reality and imagination combine to produce the likeliest visualization of something never before seen, except by dead contemporaries, researchers chance to see a new past.

Visual images have enhanced the work of historians for generations, especially in the form of illustrations and maps. Notable examples include John Smith being "saved" by Pocahontas, Matthew Brady photographs of Civil War soldiers, Walker Evan's poignant images of families in the Great Depression, or the raising of flag at Iwo Jima. Using the lens of these examples, recorders of the past capture a defining moment, pivotal period, or symbolic gesture that somehow reveals the birth, struggle, and valor of people and history intersecting.

But let's be clear that visualization as advocated here goes beyond mere illustration. Many authors use images to illustrate their work. But it is when researchers use a variety of visualization, animation, and auditory tools and techniques as the *primary means of analyses and presentation* that will make visualization history's new frontier. Through simulations, three-or four-dimensional renderings of objects—used broadly here to refer not only to artifacts, for example, but to more complex landscapes, such as an African slave fort, a Caribbean port, a French settlement, an Algonquian village, or the Jamestown statehouse—historians have the tools to open new vistas on past worlds and also pave the way to study history comparatively. Visualizations such as these expose interpretive relationships and possibilities to provide historians with an effective means to imagine the past, even when visual data is sparse, as it was in seventeenth-century Virginia.

Ironically, the power and utility of visualization increases inversely with the absence of historical images. Virtual reality recreations have enormous potential to permit historians to recapture and reconceive lost worlds of the more distant, visually anemic past. In modeling landscapes,

researchers see more clearly what they know and do not know. From both pedagogical and research perspectives, immersive environments invite participatory observation that leads to further discovery, new interpretations, and integration of alternative points of view. When harnessed to the classroom, 3D and 4D modeling has tremendous potential, both pedagogically and cognitively, to engage students in the enterprise of doing history (Bonnett, 2004). For most historians, the efficacy of visual models as cognitive tools designed to assist student learning and as platforms to display research findings is *terra incognita*. This situation is likely to change as the technology and appreciation for its potential becomes more widely shared. The student population, much more conversant with advanced technology than earlier generations, is already pushing teachers towards the visual medium. Increasingly cognitive studies have shown these visual renderings to be efficacious in recent educational studies at all student levels (Young, 2006; Wineburg, 1991).

An example of how visualization can fill gaps left by the printed text is the Jamestown statehouse. It has only one known visual representation and that is a conjectural drawing. Here is the earliest, most well-known symbol of representative government in Colonial America and historians have had to rely largely upon textual descriptions of the structure. It would be nice to know what government looked like in its physical form as the House of Burgesses. As it turns out, documents reveal that the statehouse was built in five stages and destroyed several times by fire, before the capitol of government moved to Williamsburg in 1699. In collaboration with the Association for the Preservation of Virginia Antiquities Jamestown Rediscovery archaeologists, Professor Earl Mark at the University of Virginia, and Virtual Jamestown, the statehouse as it emerged in its various forms has been recreated from its foundations to its final structure. (http://www.vcdh.virginia.edu/jita/renderings.php). In addition, a historical specialist on early Virginia government wrote an interpretive essay to provide the latest understanding of its development. Archaeologists have drawn a floor plan of the building developed from post hole molds. Artifacts are still being excavated that will eventually supply more detail to add to the floor plan and our understanding of how over time this structure reflected the growing complexity and changing functionality of state government in seventeenth-century Virginia.

Visualization techniques need not necessarily employ the robust technologies of virtual reality. Historians have long recognized that maps represent power. History without maps is like driving blind through the past. Satellite imagery provides new tools to study the past via maps. According to one historian, “as the technology advance[s] perhaps it will be appropriate for history doctoral students to go across campus and take courses in such mapmaking techniques.” (http://mcel.pacificu.edu/JAHC/JAHCVIII2/benchmarks.htm) Or they might just come to the University of Virginia’s Center for Digital History and spend some time with graduate students who work on the Valley of the Shadow (http://valley.vcdh.virginia.edu/) or Virtual Jamestown projects.

J.B. Harley, the Atlantic World historian and specialist on mapping, wrote persuasively on the importance of reading maps in the early modern world as texts (Harley, 1988, 1989). John Smith’s 1612 Map of Virginia is a perfect example of map-making as a display of “knowledge and power.” Maps as visualizations of space created by explorers allow us to read space as history, as Carter has brillantly shown in *The Road to Botany Bay*, the history of Australia’s creation. Discoverers, explorers, and settlers were making spatial history: “choosing directions, applying names, imagining goals, inhabiting the country (Carter, 1987, p. xvi).” And a visual record of these processes exists in the form of maps which reveal, when read closely, what the participants *thought* they were doing.

Indeed, the ontologies of mapmakers, palpably reflected as footprints on a historical map, ought to give historians the same rush as a detective would get at a clue-strewn crime scene. A clever historian, coming upon the visualized world of mind and matter in the form of a map full of images, cartouches, sketches of native people, objects of interest, and other renderings, most unrelated to scientific cartography, such as the John Smith 1612 Map of Virginia, would recognize the chance to get inside the head of the map maker to learn what Smith and his cultural world

understood, believed, did not know, or misunderstood about the world they were entering (Bach, 2001). Some have called this "spatial history," and it not only opens up new possibilities for the study of the past but instantiates essential features of historical interpretation that are often overwhelmed by presentism.

Spatial history priviledges contingency and in turn endows history with the voice of irony, when it visualizes space to reveal the imperfect knowledge of those making history. Carter calls this "intentional" history," i.e., what participants thought they were doing (Carter, 1987, p. xxiii). As historians, we often interpret only what they did, and easily slip into the trap of judging them by present day ontologies. Spatial history, unlike written documents which may or may not reflect presuppositions, like a candid camera, can capture historical individuals making history as a process in which they may be unconscious of how their actions betray their intentions. Captain Cook's map of Australia and John Smith's map of Virginia are examples of images that expose the cultural understandings and misunderstandings of early explorers. For Carter, the practice of spatial history moves us away from the pitfall of reducing space to a stage upon which events unfold in time alone and get selected by historians based upon their relevance to European developments.

Some examples of spatialized renderings of John Smith's famous 1612 Map of Virginia on Virtual Jamestown include the original 1612 map (http://www.virtualjamestown.org/jsmap_large.html); the Haile map (http://www.virtualjamestown.org/hailmap_zoom.html); a transposition of Smith's version onto a modern Virginia landscape without geographical coordinates; a version with Smith's two trips up the rivers of the Chesapeake in 1608, based upon his log of daily stops (http://www.virtualjamestown.org/smith_voyages/introduction.html); and most recently a version with modern geographic coordinates and the comparison between Smith's 1612 map and coastlines today (http://www.virtualjamestown.org/johnsmithsmap.html).

Why so much emphasis upon a single map? Smith created a map that lasted over half a century as *the* map of Virginia from its earliest beginnings. It is an extraordinary product because of its ethnographic content – naming and locating Indian settlements, rivers, inlets, and other designations – that still provide archaeologists and historians with clues to Indian history and Indian-English relations. And it can be read as a document on Powhatan's paramount chieftancy, its dimensions, tribal groupings, locations of major and minor Indian villages, trade centers, and rival groups. Equally important, it reflects English imperial designs and understandings and misunderstandings of the environment and Indian culture.

Clearly, as these examples show, visualization techniques provide opportunities to study the past in new ways with new tools. Just like documents, images can also be *read* and they present multiple perspectives on the past. They allow us to see and experience what the creators saw and experienced. But just like the textual record, the visual record may also be misread.

Experiential history needs to be kept separate from models or categories of analyses, otherwise historians compromise the heuristic process and discover what they set out to find rather than let the evidence lead them to conclusions. Better to discern the motivations, understandings, ignorance, belief systems, and political economy that have conditioned responses than impose a priori categories. Visual history pictures historical experience first and challenges us to explain what the image reveals in terms of how the subjects understood their world.

Contingency exists on two levels: participant and observer, as Isaac has demonstrated (Isaac, 1982). On the observer level, as historians, uncertainty is viewed as something to be eliminated from interpretation. It is easy to find a quotation or anecdote to "prove" or at least buttress a point. Once historical positivists squeeze from history the last ounce of uncertainty, they feel more confident in the validity of their interpretation. The problem with this approach to history is it creates artificial pasts, closes off debate, and turns out the lights on contingency and uncertainty. Because unknowns always exist for those who are actually experiencing history, meaning, the very object of this approach to history, becomes the first casualty of historical positivism.

As individual participants caught up in the day by day unfolding of history, uncertainty is as natural as the air they breathe. Each person acts on the bases of current knowledge and understanding, although certainly not free from emotion, irrationality, and memory.

To find meaning in history, observers may translate culture in more than just words. Dress, architecture, posture, bearing, artifacts, and "all the [other] codes by which those who share in the culture convery meanings and significance to each other" give outward appearances to unspoken understandings (Isaac, 1982, p. 325). Insofar as advanced technologies provide tools to visualize the "production of culture" (White, 2000, p.x) as a process whose footprints have been left on the landscape or historical record in the forms of building foundations, engravings of past encounters, archaeological finds, mappings of decisions, to that extent researchers may use visual means to discover meaning and intentions, discern ignorance, and assay uncertainty of outcome among participants.

To summarize, detailed visualization techniques possess four qualities that aid in the practice of history:

1. Visualizations provide visual models to see, imagine, get a mental picture of, and analyze what would not otherwise be imagined or even considered, similar to the role visualization plays in medical science.
2. Advanced technology provides new analytical tools for data manipulation.
3. Visual history brings together different datasets (visual/graphical, cartographical, archaeological, and textual) to produce multiple perspectives on the same phenomena in a comparative historical context.
4. Digital history restores the natural contingency, indeterminacy, and unpredictability to historical narratives.

A few historians have already mapped out some routes to the new frontier. The first generation represents ideosyncratic forays into digital history by highly talented scholars, who, using heroic measures, have become experts, despite a reward structure in many venues still tied to the printed word. They exploit advanced technologies' capacities to archive, search, and query datasets and present the results in digitally enhanced formats. Especially noteworthy, the authors promote experimentation in the form of "open narratives;" muted voices of authority; hyperlinked vaults of information; recombinant texts; disaggregation of history into bins of historiography, evidence, and interpretation; or visualized networks of communication and knowledge diffusion. Scholars like Cohen and Rosenzweig (2006), Ayers and Thomas (2003), Darnton (1999), Ethington (2000), and Censer and Hunt (2005), for example, have led the way in digital history and their work has inspired others and given professional credibility to its practice. Now it is time to take greater advantage of what the technology offers and move beyond just another Web site or digital archive. The next step, mainstreaming digital scholarship, will likely proceed apace, if all humanists move toward greater collaboration and towards exploitation of those techniques that enhance analysis of data and privilege fully integrated, visually-rich, multimedia, para-sourced interpretations.

The pathbreaking and innovative pathways mentioned above lack a clear process and infrastructure for creating and sustaining electronic scholarship. A vacuum exists in the humanities for the publication and dissemination of research results, especially in digital history. Print-on-demand publishers, electronic text centers, and books online fill important niches in electronic dissemination. Over the past five years, the American Council of Learned Societies has collaborated with learned societies and a select group of university presses to assist scholars in electronic publishing of high-quality works in history. The project has resulted in digitizing approximately 500 full-text books (http://www.historyebook.org/heb-whitepaper-1.html). But presenting printed work in a digital environment, however valuable in widely distributing scholarship, is a limiting and limited definition of digital history. This approach does not meet the

needs of researchers and scholars who seek to explore and use technologies to exploit their data sources and present the results outside the boundaries of print format.

The Mellon planning grant for the Virtual Jamestown project opened new vistas on the limitations and opportunities for producing and disseminating scholarship. Each year at dozens of conferences, scores of scholarly essays circulate largely in small specialized groups of select audiences. Much of this research may never get wide distribution or publication. Scholars in archaeology, history, American studies, Atlantic studies, English literature, and foreign languages in America hold their own separate conferences. Specialty seminars, such as Bernard Bailyn's seminar on the Atlantic World at Harvard University each fall invite half a dozen or more scholars to make presentations. European scholars have their own thematic conferences where papers are presented that touch on the Early Modern Atlantic World. During the period of the Mellon planning grant, European scholars were invited to serve on the board. Nicholas Canny, Chair, Department of History, University of Ireland at Galway, and David Peacock, Director, *Virtual Norfolk*, the University of East Anglia were associated with the project briefly but long enough to show the value of international collaboration in the forms of contact with the work of foreign graduate students and scholars researching a variety of topics of comparative and relevant importance to digital history in the Atlantic World. Increasingly, much of this work is spatial and visual.

Digital history needs more outlets to circulate the results of the latest research. Presently, except for a few scholar-authored web sites, little of the vast outpouring of Atlantic Studies research and scholarship has an outlet and an immense amount of it will never even see the light of day. Some would argue that this "survival of the fittest" situation means we are guaranteed that the best scholarship will find its way into circulation. What this condition really guarantees is planned obsolescence, elite access, unnecessary and duplicatory research, and interrupted careers of promising scholars. Full access to timely research has always been one of the crown jewels in the realm of academe. But high-priced journal subscriptions, parsimonious state education budgets, and professional snobbery that assigns high prestige to only a very small number of publishers who take years to put research in print (at some top scholarly journals, only ten percent of the submissions make it into print, in some cases up to 18 months after first submission) has high-jacked open access to timely research findings. Although peer pressure and the Web have already begun to alter these conditions (Wysocki, 2005), it is remarkable that such a situation has persisted in an age where advanced technology offers solutions. The failure of humanists' to collaborate, bring together the rich resources and talents of institutions and individuals, and create a new model for how scholarship is produced has been a problem. Advanced technology may have rendered anachronistic the model of the lone scholar working in splendid isolation.

How can scholars take advantage of new means of scholarly communication to produce and disseminate knowledge in an effective and timely fashion and in formats that will enhance their effectiveness?

In order to exploit the potential of visualization to produce history, we will need to shift the way we produce scholarship to a more collaborative, federated, multi-institutional approach. Faculty and students, for example, will need to work, not only as individuals, but as teams to become experts in using new tools, such as geographic information systems, 3-D design, temporal modeling, and spatial analysis on various kinds of scholarly resources.

One limitation or – depending upon one's point of view – opportunity for seeding digital scholarship is that various venues comprise expert domains for specific techniques. Rarely can every need be satisfied in a single location. Hence, collaboration on all levels will be essential to the growth and development of digital history. Scholars will need to identify the expert domains within their own institutions and even outside for training themselves and their graduate students in the use of the tools they need for their work In other words humanities will need to use the laboratory model of engineering and the sciences to work together in research and dissemination

of the results. Technology makes collective scholarship much easier to achieve because researchers can work in a virtual laboratory environment.

How might we harvest new model scholarship from the vast outpouring of research and writing on Jamestown, Atlantic Virginia, or Colonial America and related themes of colonization? Interactive maps, GIS databases, 3D modeling techniques, text databases, and other technologies, when applied to this kind of research and delivered on the Internet, can transform historical work into a dynamic, intuitive, and pedagogically-useful scholarship, more effective in its presentation, widespread in its distribution, and immediate in its impact, "at a scale and level of generality that will attract a broad audience of users and have such an impact on scholarship that their disappearance is not an option." Lessig has noted the potential for technology to lead us out of the copyright quagmire which can smother creativity as well as protect it (Lessig, 2001, 2004). Waters adds a prohibitive note on institutional obstacles: "… the huge economies of scale that are possible with digital databases are difficult to manage over current institutional boundaries. Much as they might like in principle to do so, few academic institutions, large or small, are actually endowed with the mission, leadership, accountability, support structures, and other organizational apparatus to serve up collections to scholars worldwide" (Waters, 2004).

Somehow we must get beyond the "so what" question. So what if one can digitize huge databases and map the results in color? So what if one can apply robust search engines to vaults of historical data? So what if one can display John Smith's voyages on a modern map of Virginia? Audiences might be impressed but beyond that, so what?

Despite its pedagogical and cognitive potential, only if visualization leads to new model scholarship perhaps will this approach likely have broad impact in the profession. If visualization techniques merely facilitate effective teaching and learning, however desireable this might be, the approach will never mainstream digital history in the profession. It should accomplish both the ends of teaching and scholarship. Although it may be easier to grasp visual history as a tool for teaching than research and scholarship, time, resources, training, and collaboration will eventually cause visual history to "prove itself" as a methodology for scholarship. This does not mean merely converting a Microsoft Word dissertation to a computer language. For a product to be considered digital scholarship, it needs to have elements that make publication more efficacious in a digital medium. Perhaps it's the incorporation of an interactive GIS component, or the use of a searchable relational database. It may be scholarship that has a multi-media or hypermedia component with technology at its foundation.

Again, what does the past look like? As more historians apply visual techniques to their research and scholarship, break the bonds that bind them to print, and move beyond the walls of the text archive and institutional barriers, new experimental forms of research analysis, narration, and scholarship will likely emerge.

Acknowledgments

The author wishes to acknowledge Edward L. Ayers, Andrew Torget, William G. Thomas, III, anonymous readers for JOLT, the Andrew W. Mellon Foundation, and the National Endowment for the Humanities for the critiques and support in the preparation of this essay.

References

Anderson, Deborah Lines. (2005, September). Benchmarks: Maps of the World, *Journal of the Association for History and Computing*. Retrieved February 28, 2007, from http://mcel.pacificu.edu/JAHC/JAHCVIII2/benchmarks.htm.

Bach, Rebecca Ann. (2001). Naming Territory and Negotiating Power, *Texts of Imagination and Empire*. Retrieved February 28, 2007, from *http://www.folger.edu/html/folger_institute/jamestown/c_bach.htm*.

Bonnett, John. (2004). New Technologies, New Formalisms for Historians: The 3D Virtual Buildings Project, Literarcy and Linguistic Computing, *19,* 273-287.

Carter, Paul. (1988). T*he Road to Botany Bay: An Essay in Spatial History*. New York: Knopf.

Censer, Jack and Lynn Hunt. (2005). Imagining the French Revolution: Depictions of the French Revolutionary Crowd, *American Historical Review*, 110. Retrieved February 28, 2007, from http://www.historycooperative.org/journals/ahr/110.1/censer.html.

Cohen, Daniel J. and Roy Rosenzweig. (2006). *Digital History: A Guide to Gathering, Preserving, and Presenting the Past on the Web*. Philadelphia: University of Pennsylvania Press.

Darnton, Robert. (2000). An Early Information Society: News and Media in Eighteenth-Century Paris. *American Historical Review*, 105. Retrieved February 28, 2007, from http://www.historycooperative.org/journals/ahr/105.1/ah000001.html.

Ethington, Philip J. (2000, December). "Los Angeles and the Problem of Urban Historical Knowledge," Retrieved February 28, 2007, from http://www.usc.edu/dept/LAS/historylab/LAPUHK/.

Harley, J.B. (1989, Summer). Deconstructing the Map, *Cartographica.* 26, 1-19.

Harley, J.B. (1988). Maps, Knowledge, and Power. In Denis Cosgrove and Stephen Daniels (Eds.), *The Iconography of Landscape* (pp. 277-312). Cambridge: Cambridge University Press.

Isaac, Rhys. (1982). *The Transformation of Virginia 1740-1790*. Chapel Hill: University of North Carolina Press.

Lessig, Lawrence. (2001). *The Future of ideas: The fate of the commons in a connected world*. Nesw York: Random House.

Lessig, Lawrence. (2004). *Free culture: How big media uses technology and the law to lock down culture and control creativity.* New York: Penguin Press.

Thomas, William G. III. (2004, March). "Is the Future of Digital History Spatial History," Newberry Library Historical GIS Conference. Retrieved February 28, 2007, from http://www.vcdh.virginia.edu/thomas.spatial.pdf.

Thomas, William G. III and Edward Ayers. (2003, December). The Difference Slavery Made: A Close Analysis of Two American Communities. *American Historical Review*, 108. Retrieved February 28, 2007, from *http://www.historycooperative.org/journals/ahr/108.5/thomas.html*.

Waters, Donald J. (2004, May). "Building on Success, Forging New Ground: The Question of Sustainability, *First Monday*, 9. Retrieved February 28, 2007, from http://www.firstmonday.org/issues/issue9_5/waters/.

Wineburg, Samuel S. (1991, March). Historical Problem Solving: A Study of Cognitive Processes Used in the Evaluation of Documentary and Pictorial Evidence. *Journal of Educational Psychology*, 83, 73-87.

Wysocki, Bernard Jr. (2005, May). "Peer Pressure: Scholarly Journals' Premier Status is Diluted by Web – More Research is Free Online Amid Spurt of Start-Ups: Publishers' Profits at Risk – A Revolt on UC's Campuses," *Wall Street Journal.*

Young, Jeffrey R. (2006, November). "With Digital Maps Historians Chart a New Way into the Past: A Push to Make Historical Data More Visual Could Yield a Better Understanding of Events,

Chronicle of Higher Education, 53. Retrieved February 28, 2007, from http://chronicle.com/weekly/v53/i12/12a03301.htm.

Manuscript received 30 Nov 2006; revision received 1 Mar 2007.

This work is licensed under a

Creative Commons Attribution-NonCommercial-ShareAlike 2.5 License