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## **A Databank on Perspective: the Concept of Knowledge Packages**

*Metodologia della ricerca: orientamenti attuali. Congresso internazionale in onore di Eugenio Battisti*, Milan, 1991, *Arte Lombarda*, Milan, 1994, n. 3-4, parte secunda, pp. 166-170.

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### **Abstract**

An electronic database (© 1988) is described as an example of a new approach to knowledge. This grew out of nearly two decades' work on a standard bibliography on perspective and, beyond its content, is of interest because it can potentially be applied to any topic. Ten levels of knowledge are identified: classifications, definitions (as in dictionaries), explanations (as in encyclopaedias), titles (as in bibliographies), partial contents (as in abstracts), full contents (as in facsimiles), and four levels of interpretation: internal analyses (when a text or picture is looked at in its own terms), external analyses (when comparisons with other works are made), restorations (which have built into them the interpretations of the restorer) and reconstructions (which contain the interpretations of the individual doing the reconstruction). Plans to apply methods of Geographical Information Systems (GIS) to cultural domains are outlined. Since the conference, the bibliography has become part of a larger project, a System for Universal Media Searching (SUMS, © 1992).

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### **1. Introduction**

Perspective has been described (Edgerton 1975) as the most important discovery of the West. In the fifteenth and sixteenth centuries it involved many of the key individuals in Renaissance art and architecture, notably Brunelleschi, Alberti, and Piero della Francesca. The projection methods of perspective were linked with astronomy (astrolabes and sundials), cartography, stonecutting, and surveying. Leonardo da Vinci linked perspective with physics and made it one of the cornerstones in his new approach to science through his pyramidal law, a principle that also inspired the first universal analogue reckoning instruments: the sector and proportional compass. Since the seventeenth century, the development of perspective has entailed some of the leading mathematicians: Desargues, Pascal, Euler, Monge, Poncelet. In its metaphorical sense, perspective has been explored by philosophers such as Leibniz and Nietzsche; played a fundamental role in the work of Schutz, one of the founding fathers of modern sociology and has affected profoundly most major disciplines, including anthropology, ethnography, literature, psychology and even theology.

To date material on perspective has usually been studied in terms of a given discipline. Art historians study its use in paintings; geographers study cartographical projection, but ignore projections in stage scenery, stonecutting or sundials. Moreover, levels of knowledge are traditionally treated separately. Classifications are found in one kind of book; definitions in dictionaries; explanations in encyclopedias; references to literature in bibliographies; lists of contents in synopses; actual texts are scattered in various libraries; while analyses are found in scholarly studies. The idea of creating a databank which will integrate these disparate levels into a coherent knowledge package arose from a desire to study the interrelationships among these elements; to study perspective as a universal problem rather than its narrow application in a single discipline. This is a quest to extend earlier ideas of the encyclopaedia using the potentials of electronic media (computers, graphics systems, CD-ROMs).

The project began while preparing a bibliography commissioned by the organizers (Marisa Dalai Emiliani at the suggestion of Eugenio Battisti) of the first world conference on perspective (Milan, 1977). Work continued on this while in Germany from 1977 to 1984, with the support of the Volkswagen, Humboldt, Thyssen and Henkel Foundations. In 1986-1987, the titles of 8,000 primary and 7,000 secondary sources were entered into a computer (IBM compatible AT, with DBASEIII PLUS) with the support of the Getty Center for the History of Art in Santa Monica<sup>1</sup>. Since then, with support from the Social Sciences and Humanities Research Council of Canada, the bibliography has expanded into a computerized data bank or knowledge package (of 1 gigabyte) with ten levels, which include the following: 1. Classifications; 2. Definitions; 3. Explanations; 4. Bibliographies; 5. Partial Contents; 6. Full Contents; 7. Internal Analyses; 8. External Analyses; 9. Restorations and 10. Reconstructions. There are also indexes. The scope and function of each of these will be considered in turn.

### **Level One. Classifications**

Classification systems reveal the different cubbyholes in which knowledge is arranged. At present, level one of the databank contains relevant sections from eight major systems: (Getty) Art and Architectural Thesaurus, Bliss, Dewey, Göttingen, Iconclass, Library of Congress, Ranganathan and Riders. One can choose a term such as inverted perspective or conic sections and see in how many systems it is classed and where it is classed in any particular system. Alternatively one can go to an alphabetical list of terms from all eight classifications combined, which introduces one to related terms. Either approach can serve as a point of departure to other levels.

### **Level Two. Definitions (Dictionaries)**

This contains definitions of 747 basic terms relating to perspective. Translations for terms are being prepared in Dutch, Italian, French, German and Latin, and are planned for other languages. Terms can be accessed using variant names, including those in the basic languages. A person who types in *prospettiva tolemaica* learns that this is a variant Italian name for *inverted perspective*. A person who types in *prospettiva rovesciata* learns that this is a regular Italian name for *inverted perspective*. In both cases a definition of inverted perspective appears on the screen along with a numbered series of related terms, definitions of which are obtained by pressing the number. To obtain an illustration of a term, one can press a button for an Example (which gives a colour picture), Diagram (which shows a diagram drawn in Auto-CAD) or Animation.

### **Level Three. Explanations (Encyclopaedias)**

If more information is required one enters Explanations, which takes one down to level three and provides an animated version of the principles involved. This is extremely helpful didactically because it helps the viewer to relate frontal and lateral views of a spatial situation and also traces the sequence of steps taken in arriving at a complex result. (All too often in the past textbooks have given the end product of some construction with little hint of the intermediate steps). The drawings for the definitions and explanations have been created by Mr. Eric Dobbs. If bibliographical information is required concerning either the definition or the explanation one enters Bibliographies; one is given the choice of primary or secondary literature and is then taken down to level four.

### **Level Four. Titles (Bibliographies)**

Persons not concerned with classifications, definitions (the level traditionally found in dictionaries), or explanations (the level traditionally found in encyclopaedias), can enter the databank directly at level four. Unlike traditional bibliographies this level contains a series of access points in terms of either names or subjects. In terms of names there are several options. If one knows the function of the individual in question one can search for it directly in the lists of authors, editors, illustrators, translators, (persons) printed for, publishers and sellers. If a person's function is not known one can check the name in a master list of names and variants. If a variant spelling is entered one is taken to the corresponding standard name. For example, if one enters Viator one is given a screen

with the name of Jean Pélerin, his dates (1435?-1524), his role (as a theorist he was an author), plus a list of all his variant names: Péregrin, Peregrinus, Viateur, Viator, Gast, Gastius etc. From this screen one can choose to explore Pélerin's books, which presents one with a screen with seven choices in terms of texts (standard titles, variant titles, languages, editions, manuscripts, locations, other subjects) plus further choices in terms of secondary literature, notably general articles (about Pélerin's work on perspective), articles on specific editions, manuscripts, bibliographies, and biographies.

#### **Level Four.1. Standard Titles**

If standard titles are chosen, one is given a list of titles on perspective. In the case of Pélerin there is only one work: *De artificiali perspectiva*. To learn more the user can choose Editions. This provides a numbered chronological list of dates and cities of publication for all known editions, in this case 27. By entering the number alongside, say, the 1521 Toul edition, the screen provides a regular bibliographical record of the book including its format and, where possible, two locations, one in North America, usually National Union Catalogue volume and page number, and one in Europe. If one wishes further historical information, one enters History which, in turn, permits one to check which of the 36 earlier bibliographies cited the text. In this case six bibliographies cite the 1521 Toul edition: namely, Scheibel (1778), Murhard (1805), Cicognara (1821), Poudra (1864), Schüling (1973) and Vagnetti (1979). This feature amounts to an historical citation index. In future the historical option will be expanded to include references to secondary literature on a specific edition, attributions, owners and restorations. If instead of history, the user is concerned with contents of the book, then Partial or Full Contents is entered. This will take one down to level five or six which are discussed below.

#### **Level Four.2. Variant Titles**

Variant titles provides a list of all the alternative names under which a treatise has been catalogued. In the case of Alberti's *Della pittura*, for instance, this includes *De pictura*, *On Painting*, *O Malarstwie*, *Traktat von der Malerei*, *Trattato della pittura*. Each of these variants is numbered, and if they are chosen one is taken back to the standard title. Hence, a person confronted by a title in an unfamiliar language can use this to confirm its standard title.

#### **Level Four.3. Languages**

This provides a list of all languages into which works on perspective by a given author have been translated, which is of interest because it gives some sense of how influential a work has been beyond the local context.

#### **Level Four.4. Editions**

This is a list of all editions of works concerning perspective by a given author. In the case of Alberti, this includes editions of *Della pittura*, *Elementa picturae*, and the *Ludi Matematici*. This list provides another indication of how influential an author has been. By contrast, if one is concerned strictly with the editions of a given text such as *Della pittura*, this is accessed through the standard titles list described above.

#### **Level Four.5. Manuscripts**

Similarly, this gives one a list of all manuscripts pertaining to perspective produced by a given author. If one wishes only the manuscripts of *Della pittura* these are again found under that title through the standard titles route.

#### **Level Four.6. Locations**

This function is designed to link the databank with catalogues in local libraries, indicating what subset of the corpus is available in these local libraries. It is foreseen that it will eventually link with national and international library catalogues in order that one can determine the number of known copies of a given text as well as their precise locations and call numbers.

#### **Level Four.7. Subjects**

To understand an author requires an awareness of all their writings. Frequently an author who writes on perspective will also write on mathematics, astronomy, surveying, geography and related subjects. Understanding this nexus of interests helps one to assess their activities in perspective. Hence it is foreseen that the databank on perspective will eventually also become a databank of the complete works of all the authors on perspective, thus providing a conceptual map of how perspective relates to a nexus of other topics.

Meanwhile, the user wishing to explore level four may wish to do so in terms of subjects rather than names. One is then presented with seven other options: bibliographies, chronological lists, key words, languages, multiple search, places and titles. If bibliographies are chosen the screen provides a numbered chronological list of authors, plus the number of texts recorded by each author: e.g. 1791 Comolli 78. This permits a survey of how the field has grown from seven titles of primary literature in Lomazzo (1590) to 1283 in Vagnetti (1979). If one enters the number alongside Comolli, the screen gives a regular bibliographical reference to Comolli, followed by a numbered list by year and author of all works found in Comolli's bibliography. A print function allows one to acquire a printed copy of Comolli's or any of the other bibliographies. Choice of the accompanying number in turn gives one a regular bibliographical reference to the work listed by Comolli, usually including two modern locations of the book.

If one chooses chronological lists, one decides whether one wishes primary or secondary titles. A time span from year  $a$  to year  $b$  is then entered. All works within that time span are again displayed in a numbered chronological list by date and author. Entering the

number alongside any of these again provides a regular bibliographic reference. If one chooses keywords as a point of access one begins with 38 disciplines as headings. Two options are then open. One is to proceed hierarchically. If, for instance, one chooses mathematics, there is a choice between geometry and measurement. Geometry in turn is subdivided into analytic geometry, conic sections, descriptive geometry, projective geometry, proportion and quadrature, each of which will provide one with lists of pertinent titles. Alternatively one can abandon the hierarchical search by simply choosing Index which presents an alphabetical list of all keywords.

If one chooses languages the screen presents a numbered alphabetical list of 29 languages along with the number of books which have been published in that language. For instance, Italian books are 854. If Italian is chosen, works are displayed in a numbered chronological list by date and author and entering the number alongside any of these again provides a regular bibliographic reference. Multiple search, as it suggests, allows one to specify more than one criterion in a search: e.g. editions of Alberti published in London between 1700 and 1800. Choice of places takes one to a screen with 59 countries listed alphabetically with the number of books published in each country alongside. France, for instance has 1185. If one chooses France, one receives a list of French cities connected with publications on perspective again with the number of works produced there: e. g. Angers 6, Annecy 2, Arras 1 or Paris 1050. If one chooses Paris one again specifies a time span from year *a* to year *b*. All books published in Paris within that time span are then displayed in a numbered chronological list by date and author. Entering the number alongside any of these provides a regular bibliographic reference as usual. The final option in the subject approach is by title. This is simply a numbered list with year of publication with short titles in alphabetical order. Entering the number alongside, provides the usual bibliographic entry. This option includes a find function which permits one to type in a title, a first word or merely a first letter.

### **Level Five. Partial Contents**

Levels five to ten are being developed using Leonardo da Vinci as an example. At level four (the bibliographical level) one can choose a list of Leonardo's manuscripts. These are presented in a numbered series, alphabetically on the screen. When a number is entered, a description of the corresponding manuscript appears. In the case of *Manuscript A*, for instance, one is told that it is in Paris at the Institut de France, that it is unsigned etc. One is given a choice to learn more about this text in terms of bibliography, contents or history. Choice of contents first presents one with the following options: Abstract, Description, Note, and Pages. These are variations on the theme of a summary. An abstract summarizes an entire manuscript or book. Abstracts are subdivided into three categories: a) less than 200 words; b) 200-500 words; c) over 500 words. Longer treatments are also searched under reviews. Description refers to a non-published outline of contents usually by a scholar in the field. Notes refer to non-published comments about a specific page.

The fourth choice, gives a page by page, or in this case a folio by folio, survey of contents using key words. One can scroll through a book or manuscript page by page, and

then choose a given page or folio. Alternatively, there are four other options at this point: Chronology, Index, Details, Text. Chronology provides a record of different claims about the dating of a given folio. Index gives access to the key word descriptors for each page through an alphabetical list. Details provide a corresponding survey of contents at the level of individual paragraphs and drawings. Text allows one to call up a specific page or folio. If this is chosen one is taken down to level six.

### **Level Six. Full Contents (Texts)**

Choice of texts gives one a standard transcription of the text in its original language. Three further options are available at this point: Original will present a digital image of the original manuscript folio on the screen. Translation will give an English translation of the folio in question. Interpretations takes one to levels seven to ten.

### **Level Seven. Internal Analyses**

The level of internal analysis is used when one studies a text or picture in its own right as in the case of close reading in English.

### **Level Eight. External Analyses**

External analysis is used when one compares a text or picture with other texts or pictures.

### **Level Nine. Restorations**

Books or pictures which have been restored contain the interpretations of the restorer and are therefore at a separate level.

### **Level 10. Reconstructions**

Level ten records different interpretations and/or reconstructions given to a text or diagram. For instance, a two-dimensional drawing by Leonardo of a perspectival situation will be reconstructed three-dimensionally. An animated version will retrace the steps he took in reaching this diagram. If there is controversy about a diagram and there is more than one reconstruction, as in the case of Alberti's *costruzione legittima*, the alternative interpretations will also be available. This does not mean that every page of every text will be interpreted and reconstructed. History has decided which pages receive more interpretations than others: the Bible, Aristotle and Leonardo are in a different category than minor authors.

### **Indexes**

Indexes provide addresses of institutions and scholars and offer further access points to the knowledge in the above levels.

## **Future Plans**

The system described above exists. What follows is a description of future plans. It is foreseen that original texts will eventually be stored on a CD-ROM and available directly on the Internet. The latest technology permits storage of 350,000 pages on a single disc. The full texts of all primary sources on perspective could be stored on two discs, while all secondary literature on the subject could be stored on another two discs. Hence the idea of a knowledge package which will collect all that is known in a given field on four or five discs, which can be accessed in series using the juke box principle. Given developments in miniaturization, specifically in terms of new holographic methods, it is likely that one will be able to store all this material on a single disc in the near future. Hence the knowledge package on perspective can serve as a model for other disciplines.

Thus far the databank has emphasized concepts and texts rather than their locations. It has focussed on verbal means of access particularly with respect to written documents on perspective: i.e. theory. The challenge remains of how to link theory and practice: how to relate discussions in books with actual examples in paintings and drawings. A recent contract (December 1990) with the Generation 5 Cartotechnical Corporation, which includes a link with Autodesk, and makes the perspective databank at the McLuhan Centre a research station for their software, has opened new possibilities for solving these problems. An access or entry level to the databank is planned. This will have names, objects, subjects, titles, chronology, geography language and multiple search access points, reminiscent of what already exists at the bibliographical level, but differing in two respects. First, these categories will apply to the entire databank: i.e. art and instruments as well as books. Second and more importantly, the concept of geographical access will be greatly developed.

If this geographical access is chosen one will be given a list of all countries involved. If one chooses a country, say, Italy, one is asked to decide between maps and cities. If one chooses maps, a world map appears with Italy framed and highlighted, with an alternative to see contemporary maps or historical maps. If one decides on contemporary maps one is offered a series of scales, chooses one and obtains the corresponding map of Italy. (Or one might window a part of the map and let the computer determine the relative scale). If one decides on historical maps, one is given a chronological list of dates when Italian maps were produced, chooses one and again obtains the corresponding map. From the world map with Italy highlighted, with either the contemporary or the historical map of Italy one can go to a list of Italian cities used in the knowledge package.

If one chooses a city such as Florence from either a national map or from a list of cities, one has an alternative between city maps of Florence and its institutions. If one chooses institutions, one must decide whether one wishes art galleries, churches, libraries, museums or a combined list. Alternatively, if one chooses maps, the screen presents a standard map of Florence with each of the major institutions numbered, plus choices to see further contemporary or historical maps or a list of Florentine institutions. If one wishes to go directly to a given institution one simply enters the number on the map corresponding to this institution. If, for instance, the Uffizi is chosen, one can again



decide whether one wants to see maps or learn about art, books or instruments contained in that institution.

The maps option introduces a choice between exterior views and interiors, the latter of which offers a choice between ground plans and rooms. Ground plans of the Uffizi are coded with numbers for each room, and entering that number takes one to the corresponding room which can be viewed in terms of elevations of the four walls and ground plans of the floor and ceiling. Choice of say the North wall in a room will give one a modern photograph of that wall on which all the paintings are numbered as are the sculptures, vases and other works of art along the walls of this room. In cases such as the Uffizi there is also a historical dimension to the disposition of these rooms. Hence the enterprising student can call up a list of earlier engravings and drawings showing what the room looked like in earlier centuries and which again have corresponding numbers for the works of art on and along each wall. Choice of a number from either a modern photograph or an historical engraving takes one to information about that painter. The more thorough student will be able to go to a screen about the the artist in question, giving his dates, variant names and indicating whether the individual produced only art (e.g. Botticelli), or was active on several fronts, producing art, books and instruments (e.g. Leonardo da Vinci).

Let us say we are in the room of the Uffizi with Botticelli's *Adoration of the Magi*. We enter the appropriate number, and get Botticelli's dates, then a numbered list of all his paintings which again has the option of maps. If we choose maps we are asked to decide between (original place of) production and (present) location. Production gives us a map with places where the paintings were produced accompanied by dates. In the case of Botticelli, who spent most of his time in Florence, there would be an additional map indicating when he worked in Santa Croce, Ognissanti, the Duomo etc. Precisely when an artist executed a painting, or even which paintings he produced is not always clearly documented and hence there is frequently considerable debate amongst scholars on these questions.

Accordingly the databank will indicate that there are different lists of complete works and alternative chronologies for these works, and will note which of these is the currently accepted standard. For some purposes the standard list will suffice. A serious scholar in the field will wish to study the various alternatives, weigh their merits and possibly add his own version. If, on the other hand, one chooses locations one obtains a map of those museums where paintings by Botticelli are now stored. Since there is an historical dimension to these locations, one will also be able to see where works were in an earlier period. In the case of famous paintings one will have an animated map which allows one to trace their movement from the time of their production in Italy to their present location, say, in Washington or elsewhere in America.

Instead of choosing maps, one can choose a particular painting by entering the number accompanying it on the list. Say one chooses *The Adoration of the Magi*. The menu now allows one to choose subjects, elements or techniques. Subjects gives one a chronological list of all treatments of *The Adoration of the Magi* as a painting, fresco, drawing,

sculpture etc., which can be studied in its entirety or in subsets, e.g. Italian examples from 1450-1500, either in list form or with the aid of maps. Elements identifies stock motifs in the painting. The knowledge package on perspective will focus on spatial elements, which will be a collection of basic forms, hierarchically arranged such that one begins with general shapes such as building which are then subdivided: triangular building, square building, pentagonal, hexagonal, heptagonal, octagonal etc.; or vaults which are then subdivided into barrel vaults, cross vaults and so on.

An extension of the principles used in the AUTOCAD camera function<sup>2</sup> should allow the creation of an historical repertoire of representations of basic architectural elements, such that one can trace how spatial forms such as a vault or a niche were gradually mastered, and who copied directly from whom. Indeed if a series of tolerances are defined for variations on a basic form, this will introduce a quantitative approach to traditional discussions of influence. Moreover, the representations in drawings and paintings of a vault can be compared with corresponding representations in treatises on perspective and architecture. This will transform the age old abstract discussions concerning interplay of theory and practice to a quantitative realm of study. Most of the basic architectural forms are constructed in real architecture and not just outlined in treatises or painted on canvases. So there are further dimensions to this interplay, namely, how real and fictive architecture interact, how the exploration of possible worlds plays its part in transforming the physical world. Where once there were maps of Europe with locations of major Romanesque or Gothic churches, there will now be maps which allow one to follow the tradition of an architectural element, be it a portal, a niche or a vault; to witness its interplay with corresponding forms as spatial motifs in paintings and treatises; and in some cases how this interplay leads to an evolution in the complexity of a form.

This will lead eventually to an understanding of the history of art and architecture that is profoundly different from that which has traditionally been possible. At an intuitive level it has long been apparent that theory follows practice, that motifs are mastered by an architect in a building or by an artist in a painting long before there is a theoretical discussion of that form in a treatise on architecture, art or perspective. But how long? And what stages occur between a mere collecting of isolated examples in the catalogue style of mediaeval sketchbooks and Renaissance how-to-do-it books, to the development of an integrated theory concerning the cumulative meaning of these isolated elements? How many elements are needed before their integration can be considered a theory? Indeed what is the history of the concept of theory in these terms?

In a related way the knowledge package will allow one to trace the history of perspectival methods and techniques, such that one could follow, either with lists or with the help of a map, chronologically, examples of one-point perspective, spherical perspective or applications of various projection methods in cartography, sundials etc.; how these methods evolve from simple rules of thumb to clearly stated examples, to principles which have quantitative parameters. Animations would be used to recreate the steps that are required in the execution of any particular method. The role of such techniques and principles in the history of theory could also be explored. The number of paintings which use a method such as one point perspective completely accurately are remarkably few. So

there is another story to be told: how artists deliberately used the rules imprecisely as the rules became more precise; i.e. the paradoxical interplay between rules and licence with the rules. The use of maps in tracing developments in both motifs and techniques will also permit one to see which of these are strictly or mainly local phenomena and which of them become of national or international significance.

The detailed paths described above are intended to give readers a clear view of possibilities. It would be idle to pretend that these are the only paths or even that these are the best paths. Some individuals will be more visually oriented and prefer iconic markers and maps. Others will be more verbal and prefer lists. Traditional forms such as books required that a library be organized using one method to the exclusion of others. The revolutionary potential of computers lies therein that the same machine can have many paths to the same set of facts. These paths can entail different media and various levels of complexity. Thus knowledge packages involve two distinct tasks. First there is the challenge of collecting all the knowledge pertaining to a field or discipline, which will lead to collecting materials in closely related fields. Second, there is a challenge of creating ever more access points to this corpus of knowledge. As these access points become more complex it will be useful to add conceptual maps of the paths such that a person can at any stage step back as it were by pressing a button and having a "You are here" sign to indicate where they are, and allow them to move elsewhere in the system. Getting there is proverbially half the fun, but great care must be taken lest the new paths for access become labyrinths which prevent users from getting to knowledge.

It is possible to foresee a series of software tools that will aid greatly in the use of these knowledge packages. These would be in the form of scaled levers. One is an animation speedometer which allows one to speed up or slow down an animation used to demonstrate the steps entailed in a given perspectival technique, or even aspects of building practice. Another is a chronologometer which permits one to identify the year or span of years of interest in the query. Similarly a scaleometer will allow one to choose which scale of map or drawing interests one; while a microscaleometer will do the same for microscopic levels. A dimensionometer will permit one to define relative scales of height, width and depth in representations of a building. The advantages brought by such and similar technological aids are obviously exciting, so much so that a certain number of persons refer to these as if they were all that mattered. To do so is misleading because the deeper value of these developments lies elsewhere.

In the past scholars inevitably tended to base their claims on the materials available in their local libraries and museums. The Italians, who are famous for this tendency, even have a word for it: *cameralismo*, which is more neutral than the English term provincialism. Scholars who chose to go beyond this usually spent most of their lives collecting materials from disparate places, only then to be dismissed as compilers. Serious scholars have been heard to say that it took 90% of one's time to acquire documents, 5% of one's time to read it, which left 5% of their time for original work. A systematic collection of materials in a field as knowledge packages will remove the need for unwanted provincialism. Local history will of course always have its value. But claims for universality based on a single region will no longer be tenable. By increasing

enormously the size of the sample on which claims are based it will change the writing of history in a basic way.

Larger patterns of artistic, scientific and cultural development will become visible. It will be possible to explore a series of new questions. The interplay of theory and practice has already been mentioned. Related to this is the paradoxical way in which the rise of systematic rules and laws goes hand in hand a) with the use of instruments, tools, and machines; and b) with the spread of a man-made, built environment, an artificial landscape in which geometrical regularity threatens and often replaces organic complexities of Nature. Is each step towards scientific mastery therefore a step towards being surrounded by mechanical devices, towards greater isolation and alienation from Nature? Are these or are they not irreversible trends? The knowledge package will give no simple answers to these or any other complex questions. It will not be a package in the simple sense. Rather it will be a tool to reflect upon our activities as human beings and the meaning of that to which we devote our lives. Indeed if the approach to perspective here outlined is extended to all realms of knowledge, then perhaps there will be less parcelled knowledge, more synthesis, a greater sense of interrelatedness, more awareness of the vast domains of matter and spirit which await exploration.

Since giving this lecture in 1991 the project has received further support from the Canadian Heritage Information (CHIN) and the Dutch software firm BSO/Origin. The principles used in the perspective project are being developed into a System for Universal Media Searching (SUMS), which has since been described in a series of articles<sup>3</sup>. At present SUMS is being designed as an electronic bucket which can be used for producing knowledge packages on any subject. This will be expanded into an authoring system for CD-ROMs. With the aid of Hyper Text Markup Language (HTML) and Standard Generalized Markup Language (SGML) connections with the Internet will be established to allow on-line conceptual navigation of databases in libraries, museums and other institutions at a distance. It seems fitting that the visionary suggestions of Eugenio Battisti should have led to so international a vision.

### **Postscript 2004**

A newer version is now available at [mmilinux.unimaas.nl](http://mmilinux.unimaas.nl) under username sums and password summa.

### **Acknowledgments**

I am grateful for a Canada Research Fellowship from the Social Sciences and Humanities Research Council of Canada which has allowed me to focus on this project for the past four years. I thank Generation 5 Cartotechnical for providing me with their software, and giving us access to Traline Conversion software. I am grateful to Autodesk for being a test site for their products. I thank my colleague, Mr. Eric Dobbs for reading the paper and offering advice.

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## Notes

<sup>1</sup> Initial programming was done by Dr. Richard Dolen (1986-1987), then continued by Mr. Alan Brolley (1987-1989), and Mr. Paul Chvostek (April-August 1990) and is now being developed by Mr. Jonathan Shekter, David Pritchard and Jordan Christensen. Their help has made this project possible and I am grateful for their patient contribution.

<sup>2</sup> Cf. John Walker, *The Autodesk File*, Thousand Oaks: New Riders Publishing, 1989, p.251-2.

<sup>3</sup> Cf. the following articles in books: "The Electronic Highway and Education: New Doors to keep Open", *Proceedings of Learntec '93*, Karlsruhe (1994, in press); "New Media and New Knowledge", *Proceedings of the Third Canadian Conference on Foundations and Applications of General Science Theory: Universal Knowledge Tools and their Applications*, Ryerson, June 1993 (in press); "Can Museum Computer Networks Change Our Views of Knowledge?", *Museums and Information. New Technological Horizons. Proceedings*, Ottawa: Canadian Heritage Information Network, (1992), pp. 101-108; "Databanks in Education", *The 12th E.C.O.O. and the 8th I.C.T.E. Joint Conference*, Toronto, (May 1991), pp.412-418; "Knowledge Packages", *The 12th E.C.O.O. and the 8th I.C.T.E. Joint Conference*, Toronto, (May 1991), pp.757-759; "Multidimensional Bibliography and Classification, Eröffnungsvortrag": *Anwendungen in der Klassifikation. Proceedings 8 Jahrestagung der Gesellschaft für Klassifikation eV*, ed. Rolf G. Hensler (Teil I), (Hof Geismar, 1984), (Frankfurt, Indeks Verlag, 1984), pp.57-75. (*Studien zur Klassifikation*, Bd. 14 SK 14).

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