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A Multimedia Information Exchange of the Industrial Heritage of the Lower Lee Valley

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the degree of Doctor of Philosophy

By

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ABSTRACT

The Lee Valley Industrial Heritage Electronic Archive (LVIHEA) is a model record of industrial buildings composed as a composite of multimedia data files relevant to the interpretation of the region's dynamic industrial environment. The design criteria concerning natural, human and artificial resources are applicable to education and heritage management strategies.

The prototype model was evaluated in terms of its efficacy and effectiveness with designated user groups. The developed model will enable qualitative and quantitative analyses concerning the economic, social and industrial history of the region. It can be used as a pedagogic tool for instruction in the principles of structured data design, construction, storage and retrieval, and for techniques of data collection. Furthermore the data sets can be closely analysed and manipulated for interpretative purposes.

Chapter one attempts to define the Lee Valley in terms of its geographic, historical, economic and societal context. The aims and resources of the project are outlined and the study is placed in the bibliographic context of similar studies.

Thereafter it addresses the processes leading to and a description of the structure of the prototype model. A paper model is presented and the data structures conforming to or compatible with established planning, archiving and management protocols and strategies are described and evaluated.

Chapter two is a detailed description and rationale of the archive's data files and teaching and learning package. It outlines procedures of multimedia data collection and digitisation and provides an evaluative analysis.

Chapter three looks at the completed prototype and reviews the soft systems methodology approach to problem analysis used throughout the project. Sections

examining the LVIHEA in use and the practical issues of disseminating it follow. The chapter concludes by reviewing the significance of the research and indicates possible directions for further research.

The survey is artifact rather than document led and begins with the contemporary landscape before “excavating” to reveal first the recent and then the more distant past. However, many choices for inclusion are necessarily reactive rather than proactive in response to the regular "crises" where conservation is just one consideration in a complex development. Progressive strategies are sometimes sacrificed for the immediate opportunity to record information concerning an artifact under imminent threat of destruction. It is acknowledge that the artifact (building) would usually disappear before its associated documentation and that therefore it was imperative to obtain as much basic detail as possible about as many sites as possible. It is hoped that greater depth can be achieved by tracking down the documentation to its repositories when time permits. Amenity groups had already focussed their attention on many of the more "interesting" sites and every opportunity was taken to incorporate their findings into the LVIHEA. This study provides an insight into the cycle of development and decline of an internationally important industrial landscape. It does so in a structured environment incorporating modern digital technology while providing a framework for continuing study.

Abbreviations

AHC	Association For History And Computing
AIA	Association For Industrial Archaeology
BPS	Bits Per Second
BBS	Bulletin Board Service
CD	Compact Disk
CD-ROM	Compact Disk - Read Only Memory
DBMS	Database Management System
DOS	Disk Operating System
EBC	Enfield Borough Council
FTP	File Transfer Protocol
FMPRO	FileMaker Pro
GIS	Geographical Information System
GB	Gigabyte
GUI	Graphical User Interface
GLIAS	Greater London Industrial Archaeology Society
HMSO	Her Majesty's Stationery Office
HM	Hierarchical Model
HCI	Human Computer Interface
HTML	Hypertext Mark-Up Language
IAP	Independent Access Provider
IRIS	Index Record For Industrial Sites
IT	Information Technology
ISDN	Integrated Switched Digital Network

XCMD(S)	Inter - Application Features
ISP	Internet Service Provider
JANET	Joint Academic Network
KB	Kilobyte
LVIHEA	Lee Valley Industrial Heritage Electronic Archive
LAN	Local Area Network
MB	Megabyte
MAN	Metropolitan Area Network
MULVI	Middlesex University Lee Valley Index (Number)
MUOHR	Middlesex University Oral History Register
NTSC	National Television Standards Committee
NM	Network Model
NRAG	New River Action Group
OCR	Optical Character Recognition
PAL	Phase Alternate Line
PSTN	Public Switched Telephone Network
RM	Relational Model
RCHME	Royal Commission For Historic Monuments In England
RCHMS	Royal Commission For Historic Monuments In Scotland
RSAF	Royal Small Arms Factory
SRC	Science Research Council
SLIP/PPP	Serial Line Internet Protocol / Point To Point Protocol
SMR	Sites & Monuments Record

SCSI	Small Computer Standard Interface
SSM	Soft Systems Methodology
SGML	Standardised General Mark-Up Language
SQL	Structured Query Language
TA	Terminal Adaptor
URL	Unique Resource Location
ULCC	University Of London Computer Centre
WAN	Wide Area Network
WWW	World Wide Web

Bibliographic Background

Introduction

Diverse disciplines are reflected in the project bibliography including studies by historians, archaeologists, geographers, architectural historians, surveyors and information technologists. Some of these studies provided instruction in the acquisition of skills and techniques necessary for the compilation of this project, while others provided a more philosophical background. Two of the LVIHEA commissioners were geographers but the project was based in a school of History and Politics and supervised by a historian specialising in the history of material culture.

The artifact led approach of the project to survey and record industrial buildings had its roots in archaeology. The recording utilised modern digital technology enabling the incorporation of multimedia displays. It addressed a wide constituency of interest groups, some unfamiliar with academic paradigms. As a heritage management tool, it had implications for a variety of users from amenity groups to planners and politicians. This disparate environment militated against the specialisation usually associated with a doctoral thesis. It is more usual to concentrate on a narrower field of expertise and to refine the pool of knowledge so that the distillation adds to the sum or enables a fresh understanding through an altered perspective. This project is not a section of a partially completed jigsaw. It is not an enhanced view of the minutiae of an established subject. It is a new recipe exploring the possibilities of combining familiar ingredients in an innovative way. As such, it does not re-examine issues at

an atomic level to reveal hitherto concealed truths but tests combinations of elements to see if a worthwhile compound is produced.

This approach requires a wide trawl of the academic ocean but, to extend the metaphor, the catch must be edible and more importantly, digestible. It attempts to balance the blunt with the pointed. Sampling should be efficient but must be effective. A skilled angler also needs to be lucky especially when inspiration lead to the reverse of traditional practice. However, it should be beneficial to deconstruct the study and analyse its constituents to justify the approach taken.

Data Gathering Techniques.

Existing surveys by Local Authorities (LAs) and Training Enterprise Councils (TECs) provided the backbone of the data. Most were recent and essentially unpublished. The data existed in digital form but locally produced printouts were available, as it had been compiled for the business community. It was structured but consisted only of basic legal details such as name and address, though sometimes the physical area of the enterprise was recorded. In theory, all the enterprises in the LVIHEA study area (and beyond) were included. In practice, regular updates were required to ensure that the information was current. Information on service and retail enterprises was included but these were of no interest to the LVIHEA. The compilers had not attempted to summarise or synthesis the information.

Historians and archaeologists also compile and use survey data but this tends to be more narrowly concerned with a particular study or excavation. Estates yield records and registers of births, deaths and

marriages have recently been digitised. Prominent in this area is the ESRC at the University of Essex¹ established in 1969. It contains no data on industrial buildings or manufacturing but of possible interest for later study is its data on Employment & Labour, Industrial Relations, Land Use & Town Planning. In archaeology, records of site artifacts are increasingly digitised. For example, details of every timber of the Mary Rose and over 4000 bricks were entered into a database². Such databases are of assistance for manipulating the data into chunks of information for analysis. Museums are more concerned with the cataloguing of diverse artifacts and make use of visual data because of the more unique; or at least distinguishable, nature of the data. The Museum of London produces project histories from their wider collections on interactive CDs. The LVIHEA has more in common with this type of dataset. Like the Museum, it has produced Photo CDs. The LVIHEA is not expected to include much data from these sources but is interested in the way they structure information.

Of more concern is the nature of the on site surveys and here the LVIHEA is well served with publications. Most prominent are those by the RCHME. Much useful information on the conduct of surveys is covered, none more so than the detailed methodology of survey levels³. This methodology covers measuring, photographing, drawing and recording. The LVIHEA is innovative in at least one major respect of technique, that of video survey. Of especial interest to this project was the survey of the Textile Mills of the North of England⁴. This was a comparable project, differing only in its restriction to one type of industry. Had the LVIHEA

concentrated on (say) the electronic industry to the exclusion of others the similarities would have been more marked. Interestingly; as a codicil to the LVIHEA, some of the extractive and primary industries in the Yorkshire area were incorporated into the digital record for the benefit of the South Yorkshire Industrial History Society. In addition, this tested the flexibility of the LVIHEA and the ease with which it could be disseminated. The LVIHEA suffered in comparison with the scale of resources at the disposal of the RCHME. It therefore was unable to synthesise the data to anything like the degree managed by the RCHME.

History

Standard history texts have influenced this project at a basic level. For example E P Thompson's "The Making of the English Working Class" and his edition of Mayhew's "portraits" of Victorian London artisans⁵ was a constant reminder of the social conditions and outlooks of the people who, (otherwise unremembered) contributed to the formation of the industrial environment. Their descendents in all probability still populate its contemporary locale. If one were looking for a tangible metaphor, the imposing gothic structure of the Bryant & May matchmaking factory is testimony to the impact made by Annie Bessant⁶ on the exploited matchgirls whose resistance she helped to organise and articulate. The factory system had made it easier for the owners to exercise closer control over the workers, but it also allowed the workers the opportunity to organise more effectively. The union she was instrumental in creating was the forerunner of the low skilled workers like the TGWU.

Blake's vision of "dark satanic mills" was expressed a full century before Thompson's birth and a good fifty years before the plentiful gothic structures that became such a feature of the Lee Valley industrial landscape. Many have since disappeared but those that remain, particularly the pumping stations are now viewed much more sentimentally. The Abbey Mills complex is commonly described as cathedral like. This is not to say that they could not seem miserable places. The now semi-derelict Stonehills furniture works is decidedly gloomy and bears more resemblance to that other Victorian archetype – the prison. Thompson quite rightly draws our attention to the depressing side of factory life and though initially criticised his views now represent an orthodoxy few contradict. Yet, we also accept that the Victorians were excellent civil engineers and their factories like their factory acts were improvements on the miserable fire hazards that previously passed for workshops. It is inevitable that the historian will project the brutal perception of factory life onto the structure itself so that the building becomes the embodiment of the misery. The LVIHEA by contrast, emphasises the building while making provision for others to measure the human cost.

Colin Platt has straddled the disciplines of archaeology and history to the enrichment of both. He brought history and archaeology together to study the values that mirror contemporary values. He investigated the buildings for what they tell us of their period:

Antiquities: "The remnants of history which have casually escaped the shipwreck of time" (Francis Bacon)- are the honest face of the past. There has been no deliberate dissembling in chance survivals of this kind; no subsequent 'weeding' of the evidence has taken

place. Ruins, unlike most archives, are naked truth... In working with buildings, there is no substitute for images⁷.

Similarly, the LVIHEA is not an architectural history but explores buildings to elucidate aspects of industrialised society. There are probably more industrial buildings in the Lee Valley than there are medieval buildings in the whole of Britain. They require closer study before they can be treated to a similar magisterial account. However, the principals outlined above are as relevant to a modern industrial setting as they are to the medieval world.

Local Studies

Local bibliographic resources were invaluable in priming the author for communications with the local community as well as providing information on where to look and what sources to consult. David Pam⁸ described the effects on the Lee Valley of the great events of the first half of the twentieth century. The extension of the munitions industry throughout the region in 1914 and its contraction after 1918, the mass unemployment that followed before the transformation to its golden age of the 1920's & 30's. He placed industrial events into the wider context of a house and road building programme. These related events are not overtly included in the LVIHEA (though the workers' cottages at the RSAF are documented and the roads are present in the form of the industrial estates that bear their name). The perspective of a professional archivist and experienced active amenity group member was most important for an outsider keen to appreciate local priorities and anxieties. This was a reminder if one were necessary that the LVIHEA project was a 'child' of the Centre for *Applied* (my emphasis) Historical Studies.

Few studies of the Industries of the Lee Valley exist. An exceptional work by the geographer P G Hall dates from 1961 when the Lee Valley Industries had reached the limit of their expansion. It summarises the industrial development of the previous 100 years. Above all, it emphasises the importance of London as an industrial centre recalling that up to 1951 one in six of industrial workers in England and Wales worked there. After 1951, it was one in five. It draws attention to the nature of industries located in London (Manufacturing, Clothing and Electrical Engineering. Distinguishing high relative concentrations of Printing, Furniture, Precision Instruments and Paint while emphasising that London has no staple industry). When structuring the LVIHEA thirty years later, particular attention was paid to Hall's criteria so that future studies could compare the state of the region's industries following another of the historic watersheds: the decline that commenced in the late 1960's and accelerated in the 1980's. Hall recorded the "when" and the "why" of industrial development, the LVIHEA is more ambitious. It seeks to influence development by providing easily accessible information. The LVIHEA also tries to remain philosophically neutral, taking no position on whether industrial decline or growth is a good or bad thing, but allows for user interpretation so introducing elements of conflict between (say) businessmen and heritage managers.

The LVIHEA is closer in technique to Smith's⁹ 1970 study that incorporated: land surveying; measured drawings of buildings and machinery; still and cine photography, tape recordings of machinery at work and personal interviews. The media used by Smith have changed in

respect of the technological advances during the intervening twenty-five years. Data contained on punched cards in a central index, with files containing copies of engineering drawings, photos, colour transparencies, company correspondence, maps and catalogues in the LVIHEA are all stored digitally. A noticeable difference is the present exclusion of the former heavy industries like foundries, ship and bridge building.

Heritage Management

I have arbitrarily defined “heritage” as the *materialisation* of indicators illustrating perceived trends and transitions in history and as importantly, realising which contemporary artifacts and edifices represent significant episodes when viewed from the perspective of an indeterminate future. The LVIHEA has incorporated some key heritage issues defined by Alfrey & Putnam¹⁰. For example, the adoption of new forms of motive power or structural technology and the effect this would have on building layout. However, the LVIHEA recognises that priorities and fashions change and is structured so that its search routines allow equal priority to any factor. The LVIHEA was considerably influenced by their methodology, which can be deconstructed to include text and illustrative components, and can be summarised as follows:

- 1) describe the site,
- 2) detail its history,
- 3) provide photographs,
- 4) include measured drawings.

Alfrey & Clark¹¹ developed an integrated approach to landscape study by bringing together the different classes of evidence in the analysis of a

particular region as it changes through space and time. One of their stated aims was to provide a database for the Ironbridge Gorge. They achieved this but their database was manual rather than digital. The LVIHEA is comparable to the electronic database that *might have been* for their study. Providing the survey data in an easily accessible form opens the path to a wider readership from diverse constituencies.

Information Technology

The Association for History and Computing produce a regular journal, “History and Computing” from which many articles are included in the bibliography at the end of this project. In addition, their annual conference provides a stimulating forum for the exchange of ideas and the presentation of research. Since 1987, they have produced edited versions of conference papers in a series of books: History and Computing I, II &c. There has perhaps been an over emphasis on the use of relational databases and the concomitant reliance on coded data that tends to restrict accessibility. This is not a criticism as the utmost rigour is necessary in research methodologies whatever the discipline. Furthermore, the genesis of the Association for History and Computing lies in the early adoption of quantitative methods so suitable to early computers that could not support a complex graphics environment. However, the LVIHEA has accessibility as part of its mandate to enable it to communicate with a constituency beyond historians. Neither is it easy to divide the LVIHEA into exhaustive chunks that reveal some truth or insight into an aspect of past. As the archive grows so does its interpretive scope. All information derived is by definition provisional.

Underlining both the LVIHEA and the generality of the Association for History and Computing is the larger pool of specific Information Technology literature. This is a vast and still growing field. It would be impossible to acknowledge more than a fraction of the output.

Nevertheless some reference is justified and this falls into particular areas of analysis and design. From the abundance of titles on Systems Analysis, a purely arbitrary selection has been made. There was no attempt to evaluate the relative merits of (say) SSADM or Yourdon. Both and others would have been effective. Where a structured method was thought necessary Yourdon's¹² was used quite simply because it was written in a clear, logical and understandable prose. It was not slavishly followed but most of the symbolism and modeling protocols employed in the LVIHEA are derived from Yourdon. However, Yourdon's methods were elicited for the business community where most of the project parameters are known in advance. The LVIHEA did not have this advantage and because of this vagueness Checkland's¹³ Soft Systems Methodology played an equally important part. For Database design, McFadden & Hoffer¹⁴ proved invaluable because of its great clarity over the esoteric subject of normalisation¹⁵. The datasets of the LVIHEA were not formally normalised but redundant information for example had to be addressed and frequently practical models were compared and tested against orthodox "McFadden & Hoffer" paradigms.

Conclusion

This brief contextual survey of the main bibliographic sources excludes the majority. The others are acknowledged at the end of this thesis. In

keeping with the philosophy of the archive to present the data “without interpretation” the FileMaker Pro file: “Bibliography” contains summaries of each particular source’s contents.

NOTES

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CHAPTER 1- THE DESIGN OF THE PROTOTYPE

AIMS AND OBJECTIVES

Introduction

The cardinal aim of the project was to design a database prototype for a draft industrial heritage inventory of the Lower Lee Valley while identifying key constituencies and issues for an industrial heritage strategy. The function of the model Electronic Archive system is to provide that inventory and a cross-reference of (and for) participating bodies through a network of inter-related files. A 'soft systems' approach¹ was used for the initial design of the prototype model of the system. This involved selecting and arranging various types of data to linked software applications, in consultation with user groups. Consultations took place internally with university staff and students² and externally on matters of software choice and the evaluation of design alternatives. The supervisors provided guidance on the heritage policy; where consideration was given to issues such as regeneration, conservation, education, research and communication, each of whom have major publications in this area.

It is sensible to define the Lee Valley in terms of its geography, its social, economic and historic context and question what determines it as an entity for individual study. Although such a definition of the region may not yet be apparent two conjectures are appropriate. Firstly that the industrial growth and decline of the area were a response to a conscious policy underpinned by a coherent view of the region as an entity. Secondly that the cycle was the result of a more haphazard process, indicating that the concept of the Lee Valley Industries may be a creation of recent thinking. Accordingly, the factors delimiting the scope of the survey while ensuring that neither

conjecture was prejudiced were significant in determining a data gathering strategy. Whatever its genesis a much-changed pattern of industrial activity has accrued and it is this accretion that provided a suitable starting point for the project. The specification outlined by the project commissioners was fundamental to the construction of a practical model recording sufficient of the industrial activity to describe the current situation and form a basis for comparison with previous activity (and future) in the region. During the course of the project, issues of information acquisition, presentation, interpretation and usage were the subject of regular appraisal during the survey and some revisions were incorporated in the light of practical experience.

The supervisors' document instigating the project contained the following statement:

“The immediate aim of the industrial heritage inventory is to establish a centre through which knowledge of the industrial heritage of the region can be efficiently accessed and assessed, while identifying partners with which it can be developed and constituencies such developments will benefit. The valley of the River Lee between Waltham Abbey and the River Thames is one of the oldest and most diverse industrial landscapes in Northern Europe. The significance of this heritage has been somewhat obscured by its situation on the margins of the metropolis and the complexity and continuing transformation of the industrial landscape. However, the re-structuring of contemporary industry has focused attention on the vital characteristics of regions that have not been dominated by one industry or firm...*(and)* **To survey the industrial heritage resources relating to the Lee watershed between Waltham Abbey and the Thames. This includes the surviving physical remains and textual and visual documentation of surviving and previous industry, and a register of related oral testimony...***(and)* **To cross reference the results of this survey in a multi-media database.** We will not normally hold original archival resources, but facilitate access to materials held elsewhere, supplemented by electronic copies of those materials where this is important for research or curricular use. Access will be available to collaborating institutions in the first instance and subsequently extended to the general public through local authority libraries and archives. To identify the key constituencies who will

support and can benefit from the more effective utilisation of these resources. The inventory and the oral history survey in particular, will help profile the extent and character of awareness of industrial heritage. The evaluation of such a profile is essential in identifying viable heritage projects and project partners.”

The most feasible way to carry out the project was with the active involvement of as many of the community groups as possible. Official bodies had custody of records; amenity groups had a unique and deep understanding of the resources, while only limited information about the industries would be obtained without the cooperation of those working within them. Where possible the project was harnessed to the interests and aspirations of these groups to gain momentum for the achievement of its goals.

Resources

The Lee Valley Industrial Heritage Electronic Archive (LVIHEA) is an information system designed to model and interpret data for the use of diverse groups interested in heritage resource management. The project is the result of an initiative by the School of History and Politics to develop a local connection for its work in industrial and social history. Others involved included a part-time community liaison worker and members of History staff and undergraduates enrolled on the History in the Community internship module at Middlesex University. The LVIHEA is part of a continuing programme of local historical studies that included the compilation of a site history for the Royal Small Arms Factory (RSAF), studies of the renowned art deco designers The Silver Studios and the local relevance of a nationwide network like the Co-op. Archive work and oral history programmes conducted in partnership with museums and local amenity groups both helped to raise the profile of university researchers in

the community and provided a reservoir of skills and resources. Academics, students, and a wider constituency including local authorities, amenity groups, developers, heritage management organisations and the public can tap these. Mature, often part-time students particularly on the MA "Industrial and Social History" course brought an appreciation of the local industrial and commercial environment to their studies of local history and with it an awareness that that environment had changed dramatically during their working lives. There was concern that should those changes continue much of the familiar industrial landscape was in danger of surviving only in their memories. It seemed that characterless pressed steel boxes, industrial barns employing few people, were replacing the older industrial buildings with their comfortable familiarity and their cast of thousands. The Mills and brickworks that constituted much of the industrial activity of the area throughout the nineteenth century had passed long before the personal experience of most of those now living. Furniture makers who traditionally sited their works close to the River Lee to take advantage of its transportation facilities had seen their flagship, the internationally successful Lebus Company, sink in the late 1960's. But the giant of Lee Valley enterprise, the electrical engineering industry must have seemed sound and solid enough, yet even it could not survive the recessions of the 1980's, with perhaps one of the grandest, Thorn, withdrawing completely with the leveling of its Southbury Road, Enfield tower building in 1993.

Antecedents

When considering a profile of the Lee Valley it is worth reflecting on the reasons given for locating in the area by heads of firms during a period of

great expansion; in this case c.1930, as well as taking into account demographic and natural features. A cheap housing programme in Edmonton & Tottenham during the last twenty years of the nineteenth century ensured the availability of a local and variously skilled labour force many of whom were female and also including some foreigners arriving from London's East End. Population in the area increased at a faster rate than factories up to 1911 but subsequently the trend was reversed. It rose in Tottenham during the period 1911-21 despite 8,633 individuals migrating to other districts. Environmentally, "it is probably true to say that the influence of geographical environment over industrial growth is not commensurate with, or materially responsible for, the growth of factories during the past quarter of a century."³ A notable earlier exception was the brick industry that by the 1930's had disappeared since fully exploiting the valley's brickearth sediments. Later the flat rather swampy land adjacent to the river attracted manufacturing industries partly because of the unsuitability of the land for residential purposes. The greatest increase in the number of factories was after 1918. "Owing to the even more swampy nature of the left bank, east-west roads are few, with the result that factories have tended to grow up on the right bank."⁴ Local Authority Rates increased in the 1920's as available land decreased; many firms re-located out of the region but some returned as a consequence of the De-Rating Act c.1930. Space and cheap land were the most important reason given by factory owners for re-location and development in the region c.1930. Between 1900 and 1933 more than half the firms situated in the Lee Valley had re-located from inner London. Particularly from the East End, indicating that the Lee Valley was

the “natural line of expansion for firms in the Victorian manufacturing belt of London”⁵, most typically the clothing and furniture factories. The “New Industries” (e.g. electronics) in the Lee Valley tended to be completely new firms. There seemed little tendency for Northern or Midland firms to relocate in the area. The Great War had seen the establishment of munitions buildings in many areas of the valley apart from the RSAF at Enfield Lock. The large female population employed there during the war and redundant after, by virtue of forming a pool of available unskilled and semi-skilled labour were a contributing factor in the stated reasons for 15 firms that relocated in the Lee Valley. The rail link between Liverpool St, Tottenham and Edmonton was considered by industrialists to be satisfactory, but that north of Enfield to be inadequate. The important link with the Midlands from whence came many of the essential raw materials was less adequate. The generally good transport facilities attracted many industries to the area and perhaps stimulated firms to develop an export market.

STRATEGY & ROLES FOR THE PROJECT

A buildings record

The threat of destruction to industrial buildings has in part been due to changes in working methods and the perceived or actual unsuitability of the buildings to accommodate new uses and practices. Large numbers of vacant premises are considered to have a deflating effect on the local economy⁶. A preliminary study might indicate if this was the case in the Lee Valley and test its general effectiveness⁷. It would concentrate on a small geographical area offering a variety of industrial premises. The buildings record attributes were not previously specified but discussions established certain desirable features. Broadly the criteria applied by the RCHME when considering whether or not to list a building; i.e. age, architectural or aesthetic value, historic associations, unique or group value, were incorporated when designing the database.

Education

"Preparing curricular materials for students in heritage policy and industrial history. Students will also be involved in gathering and analysing source materials. Aspects of the database will be developed in depth for use on these courses and in schools"⁸. Undergraduate students assisted with the survey by studying particular industrial estates carrying out surveys of different levels and enriching the inventory with the data collected. Their evaluation and criticisms of the system in practical use and their class presentations provided valuable responses and added to the iterative design process.

WHO WAS CONSULTED

Introduction

An informal programme of associated study exploited university and external contacts; relevant research seminars were held both in the School of History and Politics and with students and staff engaged on related projects in CASCAAD. Other specialisms involved to a greater or lesser degree included archaeology, computing and IT, geography, social sciences, architecture, building, engineering, local knowledge, design, photography, drawing and surveying. National conferences and seminars proved productive for the exchange of ideas and reduced the risk of duplication while keeping in touch with topical developments.

Internal design methods

Situated in the Art & history school CASCAAD is the principal centre within the university for graphic and multimedia projects, notably the Virtual Museum Project. They developed a considerable and widely recognised expertise and experience particularly in the use of Apple Macintosh™'s (Macs), and the multimedia development application Macromind Director™. They hosted regular formal and informal meetings and seminars to exchange ideas and discuss problems that were both stimulating and productive. Their equipment resources were been built up over a number of years and included the only colour laser printer in the University as well as specialised multimedia tools.

External

The Annual National Conference of the Association for History and Computing provided for the presentation of substantial papers on themes covering for example the analysis of history from large data sets, IT

methodologies and aspects of the use of IT use in teaching, learning and research. Displays and practical demonstrations of many different projects, some not included in the formal proceedings provided fringe support and were a natural forum for comparing notes, obtaining advice and evaluating the relevance, performance and scope of the projects in an informed environment. Issues covered the use of databases, statistics packages and Geographic Information Systems (GIS). IT facilities, project lists, electronic bulletin boards and general contacts are published tri-annually to ensure that members are appraised of current issues.

The Summerlee Industrial Museum at Glasgow hosted a seminar attended by national and international experts and heritage managers where consideration was given to prospects and priorities of industrial heritage focussing on such issues as industry as heritage, building the heritage resource and strengthening the industrial heritage movement.

RCHME are the most prominent experts in the discipline of historic and architectural survey. They have produced seminal papers on methodology⁹ for individual buildings and complexes and published books on the results and techniques of regional industrial surveys¹⁰. Valuable survey detail of the Listed (Industrial) Buildings has been freely supplied by RCHME¹¹, digitised and incorporated into the Electronic Archive.

The Association for Industrial Archaeology (AIA) who have produced an Index Record for Industrial Sites (IRIS) as part of the Sites and Monuments Initiative for England (SMI) was established in 1973 to “Promote the study of industrial archaeology and encourage improved standards of recording, research, conservation and publication.¹²” They publish the journal

“Industrial Archaeology Review”, produce their own forms, and are confronting the problem of designing new systems of data gathering to digitise their records. The dialogue with these two organisations has been most instructive. Variations can be examined and in some cases standardised, the solutions adopted by them can act as a checklist to compare with the resolutions conceptualised for this project.

Local Authority

Enfield Borough produced a document outlining its resources and potential aimed at prospective industrial investors. The document stated that its corporate objective is “To support local industry and commerce and discourage outward migration and re-location in order to retain existing employment, retard manufacturing decline and reduce the burden on skills re-training.¹³” The Borough contains 370 hectares of employment and commercial centres and a skilled workforce of over 90,000. They have expressed concern over the effects of the mid 1980’s property boom; that enhanced land values resulting in some local firms leaving the area, and the latest recession that has brought further closures and “permanently”(sic) reduced employment. Against this background, the main attractions of Enfield are perceived as the M25, Green Belt, Stansted Corridor, costs which are lower than the ten-mile distant Inner London to encourage re-location, and “Brownfield” sites. The Council it states is committed to “... the enhancement and improvement of the environment of its major employment areas and town centres in order to increase the borough’s attractiveness”. The Council acknowledges that the development of IT can assist in the “...Restructuring of employment and assessment of the

locational (*sic*) needs of business.” They recognise that there is some “sectorial (*sic*) growth in the leisure and tourism industry.” and realise that “Greater environmental awareness has brought with it ... an increased sense of dissatisfaction with outdated industrial and commercial environments.” This may or may not be good news for Industrial Heritage Management, which may be forced to provide self-financing conservation programmes most probably through tourism. The Council has been generous in providing access to information and a dialogue with the University is developing largely through the efforts of the University Community Liaison Officer. The Council can be considered as most unlikely to offer funding for University projects but have commissioned a site history of the RSAF as an investment in the marketing of the future development of the site. Similar commissions are expected to follow. These developments are very recent and if they are to blossom into a mutually beneficial partnership it would seem to be in the University’s interest if the Business School could suggest suitable areas of contact and advice over matters of tendering and presentation. With such advice, the School of History and Politics (and others) could structure internship modules in such a way that they produce financial as well as educational benefits.

Amenity Groups

At least fifteen local amenity groups were consulted, ranging from historical societies, preservation societies, and environmental protection groups to organisations concerned only with one industry or enterprise like the Markfield Beam Engine Society and Gunpowder Mills Study Group. These groups are composed of people with a wide range of experience, some

are recognised experts with a publication record, and others are simply enthusiasts. All the groups have members skilled in data collection techniques and have collections of archive material and knowledge of the location of other records. They are oases of information having extensive contacts among experts, local politicians and administrators, retired workers with vivid memories and redundant skills that can enlighten others through oral history. They are often the first to hear of proposed changes affecting the community. Some like the New River Action Group conduct their own surveys, the latest using customised survey forms from this project. The Greater London Industrial Archaeology Society (GLIAS) agreed to contribute manual records to the Information Exchange that after incorporation into the LVIHEA will be formatted and digitised to comply with the AIA Index Record of Industrial Sites (IRIS) standard, for transmission to the Sites and Monuments Record (SMR). The University hosts a regular forum with a steadily increasing number of these groups and is currently co-ordinating action on heritage management. Between meetings I maintained these links by publishing a newsletter: "Catalyst"

Summation

The Electronic Archive is conceived as more than a "computerised" manual inventory of industrial buildings which enables the fast retrieval of material in a convenient and compact environment. It will have applications for research and teaching and learning systems that can extend beyond formal education into the wider community. The multi-media display is an effective means of communicating the ideas of the various groups within the community. It can widen appreciation of the

region's industrial heritage on the assumption that communication is a prelude to greater democratic participation initially in a heritage management policy but with far reaching implications for the way in which decisions are made concerning local issues.

DESIGN CRITERIA IN RELATION TO RESOURCE DEFINED ROLES

Introduction

The Electronic Archive System will be interactive, open to user input and will be designed for ease of use both within and outside the University. Files, forms, stacks and the interactive interface all present varying design problems because of the flexibility required to make the system accessible to a wide variety of end users with differing degrees of IT competence. The project stretches this flexibility to cope with a blend of practical uses including on site surveys, oral histories and data handling of records in different media. The system aims to be congenial, easy to learn and use, and allow for fast and efficient task performance. The Human - Computer Interface (HCI) should be welcoming and interesting. Cognitive, behavioral and affective aspects of the interface govern the choice, appearance and functionality of menus, icons, error messages, help facilities, consistency of layout, input and output of data mechanisms and the suitability of response times. Links within and between applications should be obvious and the user should not be disorientated at any stage. Multimedia special effects should not be gratuitous but take advantage of the most effective way of delivering particular types of information. Different media and combinations of media impact with variable degrees of effectiveness in terms of the time and effort expended to comprehend an idea or message. Sound with moving pictures optimises memory recall. Charts enable the quick assimilation of large data volumes. Images illustrate engineering, architectural or other detail ("A picture tells a thousand words"). Animations elucidate processes and have the ability to exclude extraneous detail, highlight essential action and vary

speeds to compensate for human perceptual limitations. Text is traditionally used to communicate ideas, instructions and explanations.

RCHME has recognised the importance of buildings at some seventeen industrial sites in the Valley by listing them as protected buildings. Currently this includes two grade one buildings at the Three Mills site, Bromley-by-Bow, two grade two star at the Coppermills, Walthamstowe and the Castle, Stoke Newington, with the remainder classified at the lowest grade, two. The recent RCHME survey at the Royal Gunpowder Works at Waltham Abbey has added a number of buildings to the list. Few of these listed buildings date from the twentieth century, which was a great period of industrial growth and construction in the Lee Valley, particularly between the two World Wars. It is salutary to realise that buildings sometimes more than seventy years old and covering a range of styles including Art Deco appear to merit no official recognition of their architectural worth or their impact on the lives of thousands of people living and working in the region. It is appropriate that an inventory be compiled as a matter of urgency so that a realistic picture of existing resources in their local, national and international context can be obtained. The builders, the workers, the machinery and wider social and economic issues, would populate the picture obtained. The inventory is necessarily compiled on a spatial basis but has made provision for temporal data. It is a project that will take many years to complete; the first phase is to provide a solid foundation and an encompassing structure for future efforts.

Multi-media

Multimedia is a much used term, for the purposes of this thesis it is taken to mean the use many different communication formats within a single computer application. This will include text, illustrations, animations, still and moving video images and sound. In real life we are used to receiving information in a variety of formats and appreciate that first hand involvement in a situation renders it more real and memorable than it would seem to the recipient of a spoken or written report of the same situation. We have a variety of highly developed senses, the more of them that are utilised in appraising a situation, the more likely a fuller understanding of that situation will result. Computer technology cannot (yet) present the smells of a factory or the taste of prepared food or the pain of an accident, but with developments in virtual reality a large consumer of research spending that day may not be too far off. This project will confine itself to communication through the visual and aural senses.

Uniformity of working environments

An end user will typically employ the Electronic Archive in either its Database mode or its Hypercard™ Stack mode. Several other applications are used to collate and manipulate the information but these will normally be invisible to the user. Similarities between the main applications are utilised wherever possible. The most apparent is the way navigation through either can be achieved by the means of clicking on-screen buttons. Where possible and appropriate these buttons incorporate uniform icons for the sake of consistency. Within Hypercard™ the buttons and fields of the various stacks will be in the same position and in the same text or icon format. Until the recent introduction of version 2.2, Hypercard™ did not make use of colour¹⁴

thereby initially reducing areas of potential conformity. The advent of colour facilities has led to systematic revisions of the prototype stacks. For reasons of access time, storage considerations and development time much remains in the original black and white. The possibilities are demonstrated for prototyping purposes in the understanding that a later full working edition will be able to take advantage of technological advances to overcome these drawbacks

DEVELOPMENT OF THE PROTOTYPE

Several important decisions were made concerning equipment. The approach was to consider the nature of the final presentation (Multimedia) and to choose the hardware and software capable of delivering it. It is accepted that different combinations could deliver similar results and that decisions taken at the time might not necessarily be the same if taken today because of the rapidly changing computing market. The commercial acceptance of technological innovations can bring applications previously dismissed on the grounds of cost or reliability into contention a few months later. For example, the purchase cost of equipment to write Compact Disks (CD-ROMs) has plummeted in the last twelve months. Opportunities to evaluate equipment varied from comparisons of technical specifications and features to operational demonstrations. Price constraints inevitably dictated certain choices but where this did occur, the ease with which subsequent upgrading could be made and its compatibility with other formats was taken into account. Arguably the most important decision concerned which DataBase Management System (DBMS) to use. The principal applications used for the first phase prototype were: Hypercard 2.1™¹⁵, (currently involving 28 Hypercard stacks), FileMaker Pro 2.0™ for data volumes and Macromind Director 3.1™ for presentation, with Adobe Premiere 2LE™, Ofoto 2.0™, Omnipage Direct 3.0™ and Superpaint 3.0™. to assist input and editing.

Evaluation And Justification Of Equipment Choices

Hardware - PC v. MAC Architecture and Cost factors

Cost, speed, available applications, market share and ease of use are all factors to be considered when specifying IT equipment. PC's are the market leaders with particular dominance in the business community and though Apple does have a lead in the educational market, it is probably the more competitive business market that has resulted in the prices for PC's being lower than equivalent Macs. Since 1994 prices of Macs have fallen and there is a greater degree of routine interaction between the two architectures. Interchange of data is often easier between Mac and PC versions of a particular application than between different brand applications on the same architecture. For example it can be easier to import a PC document written in MS Word™ into Mac Word 5.1™ than it is to transfer the same document to a MS WordPerfect™ format. However in January 1993 when the equipment choices were made a basic PC compared more favourably than a Mac regarding processor speed and cost. Even so the choice was made to go for a Mac. Why?

Macs had long enjoyed a reputation for having the sort of Human Computer Interface (HCI) that made them very popular and easy to use. What distinguished them from PC's was their Graphical User Interface (GUI). A GUI uses icons and a visual representation of a desktop/office set-up in contrast to the PC's Disk Operating System (DOS) which was a command driven system showing on screen as a pulsing dot at the bottom left hand corner of the monitor screen. Although not a difficult system to learn¹⁶, it did have the power to traumatise computer-phobic potential users

into abandoning any attempt to use the machine without a modicum of training. A Mac on the other hand boasted that it could be used immediately by someone with no IT experience because its point and click graphical environment was so intuitive.

The appearance of Windows 3.0™ and 3.1 was a major breakthrough for PC's because it reproduced a graphical working environment very similar to the Macs'. It is a popular system enabling existing PCs to be updated simply by adding the software. Windows is a very memory hungry system and is slower than DOS. It took time for the software applications that could take advantage of it to reach the market and when they did they were often more expensive than the related DOS programs and the established Mac equivalents. Windows may have forced Apple to cut prices in order to compete but at the same time virtually cancelled the PC's lead on price and speed. It seemed as though PC's were admitting that the Apple system was superior by producing what many believed was little more than a Mac emulator. Windows could reproduce a user-friendly environment for the basic functions of word processing, spreadsheet calculation, database management and graphics presentation which satisfied most existing customers. It had a lot of ground to catch up at the specialised multi-media end of the market, a regime pioneered and populated by Apple applications. Microsoft (the producers of Windows) acknowledged in their own multi-media publications¹⁷ that in order to carry out certain tasks use would have to be made of Macs running Macromind Director™ multi-media software. The problem of adapting this essential software or something very like it to the PC had not been solved.

With price and speed differences narrowing and in some cases disappearing in the important area of multimedia and the lead that Macs had developed through longer experience in that field, the balance in favour of Macs was more apparent. The release of the Mac Duo-Dock™ system which consisted of a laptop portable that could be incorporated into a desktop system allowing the easy interchange between gathering site data and desktop processing with its better facilities and peripherals had no serious PC rival.

University wide facilities

The university has a mainframe computer on the Bounds Green campus that is networked to the other campuses' Local Area Networks (LANs) and from there to individual workstations in various offices. The LANs consist of Apple and PC networks. Most of the work on this project was centred at the Tottenham Campus where Macs now outnumber the PCs in the Learning Resources Centre. This is also the case at the Cat Hill Campus where related multimedia research is carried out. At Enfield Campus PC's predominate. No multi-media research and development using PC's was in evidence. Taught modules involving computing in the departments of History and of Philosophy employed the Mac software: Hypercard™. Because Macs were easier to use and quicker to learn they have an advantage over PC's in that the novice user can get into the subject matter with less IT expertise, hence more time can be spent on the actual project, less on acquiring the skills to handle the tools. Overall there are more PC based educational applications than Mac, but more and more of these are now being produced in Mac formats.

Community uses

The user friendliness of the Mac was the over-riding consideration for community use. Typically the amenity groups consist of people with few IT skills. It is therefore essential that potential users are not frightened off using the system because it appears hostile, particularly if public opinion is to be polled. Ideally a touch screen environment could be used but development costs mitigate against this because the University currently has no hardware or software to develop such a system. However should circumstances change during the course of the project this option may be considered because it offers the current state of the art in a user-friendly interface. Some museums do have information kiosks operating on a touch screen system and where they are interested in displaying the Electronic Archive an alternative touch screen version of the application may be viable.

Peripherals

Storage

The 120-megabyte (MB) hard disk built into the Duo Dock™ laptop computer was never going to be sufficient to store all the data accumulated during the project. The issue was not just what alternative storage devices could complement it but also how to allocate the data among them. The first consideration concerned the attributes of the stored data and the way that data could be accessed. It was recognised that hard disk drives can read and write data quicker than any other permanent storage system available to a microcomputer. One solution available on the desktop dock was the facility to incorporate an additional hard drive of up to a gigabyte (1,000 megabytes) capacity at a cost of approximately £1000 (and declining). An alternative

was to use a SyQuest™ Cartridge Drive costing about £400 with additional 88MB cartridges costing under £80. A gigabyte of storage with performance and cost about the same as above but with the advantage that the cost can be phased with less chance of wasted capacity and the disadvantage that many multimedia presentations will easily exceed 88 MB.

Compact Disks (CDs) are characterised by their high storage capacity, typically about 650 Megabytes¹⁸. Video images are massive consumers of storage space, "...One second of digital television needs over 22 MB of storage...", a 650 MB CD-ROM could provide "...less than thirty seconds of TV quality pictures"¹⁹. Compression and decompression of files, currently a 650 MB CD-ROM have now alleviated this problem could provide over an hour of full screen/full motion video. " A CD-ROM could (*for example*) contain 20 minutes of full screen/full motion video, 5,000 high resolution still frames, more than 6 hours of voice over commentary on the stills – and still find room for 15,000 pages of text."²⁰. Graphics can consume an enormous amount of disk space and though ultimately this problem may be overcome on the project by producing a CD-ROM, the complications of writing details to CD on a piecemeal basis and the expense of acquiring the equipment to do the task, required an interim solution.

The agreed solution was to use a combination of the 120-MB hard drive, SyQuest with 88-MB removable cartridges and a CD-ROM drive. Photo-CD™ will be used to store survey photographs because of the high image quality and the convenience of storage. The distributed version of the project could be delivered on CD, the transfer of the data might be accomplished using an outside bureau in the event of the University not having the

available technology at the time. The hard disk in the laptop would be used to store applications and files directly related to the survey data gathering, in particular the database material but extending to the material that was considered to be most likely to be useful at remote locations. Most of the image processing applications and files are stored on a SyQuest 88 MB cartridge. Image processing requires large amounts of storage capacity. A scanned document may for example take up to a megabyte of storage space, but this is only part of the story. Several temporary files are opened automatically by the software to create the stored file during image processing. These files may be four or five times the size of the finished file so it is essential to ensure that there is always sufficient reserved disc space for them.

Back-up facilities for ensuring that a recovery can be accomplished should the working data be lost, damaged or corrupted are essential. Storage space was available on the local network hard disk, currently of unlimited size. This is an "expensive" solution and inappropriate but effective only because there is little pressure by others to use the facility. This situation was not expected to last indefinitely, but contingency plans, most notably a tape back up system offering cheap but slow facilities were feasible if the need arose. Floppy disks were used for backing up material from the start of the project but because each disk can only store about 1 MB they are an ungainly and ultimately bulky medium. Even as a short-term solution, they were barely adequate.

Output

In addition to digitised output to various type of disk, networked printers were available on the Tottenham Campus network. These included black and white laser and 24 pin dot-matrix machines. By the conclusion of the project a colour ink jet printer had been added. A colour laser printer was located at the Cat Hill campus. A fourteen-inch colour monitor displaying millions of colours through an additional 32 bit addressing VRAM card was provided solely for use on this project.

Input

Most of the textural data is inputted via the computer keyboard but this is an inappropriate method for entering image data. Original artwork can be created within the computer using a combination of the keyboard and the mouse. Entering data from other media into the computer required specialised equipment.

Video Capture and Editing

Video capture cards perform the compression, decompression and managing of the video images that allow reasonable libraries to be stored and imported fast enough to make the image as smooth as on a TV. The capture card used for this project is VideoSpigot priced at under £400 whose specification is only exceeded by utilities costing three times as much.

VideoSpigot cannot capture full screen/full motion video but provides an acceptable standard in a reduced size window for prototype purposes. It has no sound editing facilities nor can it be used to transfer data to videotape.

VideoSpigot is supplied with Adobe Premiere 2.0 LE™, a cut down version

of the full video editing package which can be upgraded for about £150 when the need arises to use a more professional video capture card.

Portability

Since data would come from a variety of locations, it makes sense to be able to import it directly to the computer rather than record it on some other media for later transfer to the computer. There are many portable computers on the market in both PC and Apple Macintosh formats. Only the Mac Duo-Dock can be used both as a portable and a desktop computer. The only realistic alternative to the Duo-Dock would have been to have a portable and a desktop, which would have been more expensive and involved time consuming data transfers.

Software

Scanning

Scanners are invaluable as an alternative to typing using for example Omnipage Direct™ Optical Character Recognition (OCR) software. They are essential for digitising colour, grey scale and black and white graphics, which can be edited and enhanced using bespoke software such as Ofoto 2.0™ and other proprietary packages such as Superpaint 3.0™. Colour scanning inevitably consumes a vast amount of disk space, a final A4 colour image scanned at a high resolution of 300 dpi may consume up to 36 MB and use about 200 MB for its production²¹. Scanning at a lower resolution (say 200 dpi) would reduce the finished file size to something like 16 MB²². Omnipage Direct™ OCR software claims to be usually more than 90% accurate, but put in perspective this may mean between fifty and one hundred errors when scanning a typical page of an academic journal. Even at

98-99% accuracy, which I have found to be general when scanning good quality typesetting some ten to twenty corrections still, have to be made. The best typists may find it more efficient to re-type a document of less than 500 words, for those of lesser ability progressively less. For large scale copying of several pages it is invaluable. The quality of the print in the document to be copied is crucial when considering whether or not to use OCR software. In one experiment scanning approximately seventy-five ten-field records from a dot matrix produced listing into the Electronic Archive database took over five and a half hours. The problem was that the recognition software was next to useless where lots of proper nouns and abbreviations were included in the original document. A word processor was used for further editing which included adding the tab delimitation to enable the edited document to be exported to the database.

Flat-file v. Relational database

A relational database is one where you can link or *relate* common information held in more than one file, so that each file can access data from any of the others. This enables the setting up of as many separate files as required without duplication of information. They are expensive (4th Dimension™ £816). A flat-file database is organised like a simple card index with a sequence of similar records. FileMaker Pro 2.0™ is a flat-file DBMS but does have some relational traits. Specifically it can look up information in other files provided there is only a single matching record. It also has a range of auto-entry procedures that can save time and reduce data entry errors, thus helping to maintain the integrity of the file. Apple Events™ capability allows data to be read or written directly to say a

spreadsheet for data manipulation and charting. FileMaker Pro2.0™ costs about £225.

The choice is how much use could be made of relational file facilities in this project and could the answer justify the extra £500 expenditure. The principal use to be made of a DBMS in the early stages of the project was in conjunction with the Building Resources Survey, which is organised by site and by building: one site may have many buildings but a building can not have many sites. It would therefore be easy to “lookup” data from the one site record and incorporate it into the many building records related to that particular site. I have serious doubts whether this system will be suitable when the inventory expands to incorporate site historic detail where data may range through sales, purchasing, personnel and audits etc., producing many to many potential linkages. This stage will not be reached until quite late in the project, by which time several options may be available. One is the rumour that Claris the makers of FileMaker Pro™ are working on a relational version which even if not available as an add-on to the existing version might at least be able to import the already gathered data quickly and efficiently. Another option might be connected with the use of a Geographic Information System (GIS), if such a purchase is justified to solve the problem of producing accurate maps. It is usual for GIS's to come complete with a relational database to facilitate the input of data.

PAPER MODEL OF THE SYSTEM

Introduction

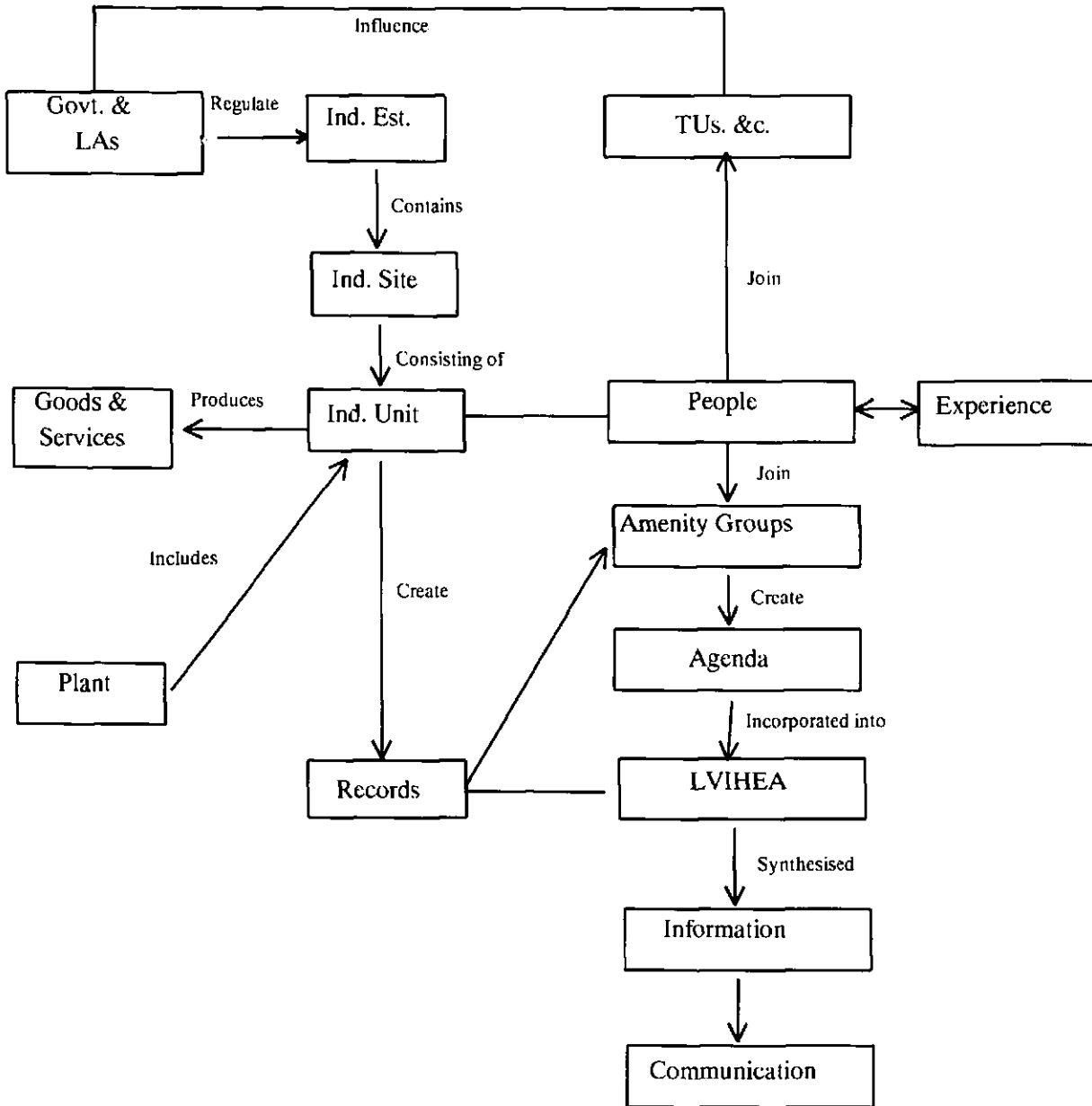
Paper models are useful because they allow a concept to be realised in a graphic form which can be easily assimilated, evaluated and revised, ensuring that when the model is practically applied it is likely to require less fundamental revision. The model starts at a high level or overall system view and its components are subsequently broken down to expound their own systems. This goes some way to ensuring that gaps in the system do not appear nor are redundant systems perpetrated. A structural map shows the relationship between systems or entities and may be hierarchical. Structural maps and paper models are useful for the developer analysing the system and for the user navigating through that system. High-level system drawings are included with this text. Specifically: the system drawing of industry in the Lee Valley, the Information Exchange, the entity relationships of the IT equipment to the media resources, the working arrangement of the system hardware in the form of a “circuit drawing” and the site and building survey models.

The working environment

The system drawing of industry in the Lee Valley (fig.1) shows the manufacturing industrial units within the scheme of buildings, site, estate and associated with the other factors of the industrial landscape. The environment is inhabited by people who have either a direct relationship with industry or are secondarily associated with it through institutions like the University and the local authority, which may in turn have direct links with each other, and with industry.

Fig.1

System Drawing of the Industry of the Lee Valley



The Information Exchange drawing (fig.2) is a dynamic drawing showing the interaction and flow of resources and information. Resources are created by what for brevity has been termed “Streams of History”. These resources provide data that is channeled through the Electronic Archive and made available to activists including academics, planners, politicians, pressure or amenity groups. Activists can be loosely or closely classified as heritage

managers whose activities have an effect upon the original resources. Moreover their activities swell the “streams of history” creating new resources.

The equipment to media resources drawing (fig.3) shows the “Outside World” at the centre, generating documents, images and other data and receiving reports and presentations. This data is channeled through a scanner or some other input device such as a keyboard to the project computer. Others will process some data to CD-ROM (Photo CD) before being assimilated into the system. The project computer is linked to other IT systems principally to output data into storage but also to use some licensed programming held on the LAN and to communicate with other academic institutions via the Joint Academic Network (JANET). Generally most of the applications used for processing the project data are contained in the project computer and these are shown by generic type.

The system hardware environment consists of the project’s own hardware. An Ethernet card to the LAN, which is controlled and located at the Learning Resources Centre Tottenham campus, connects this. The same network links the project hardware to a laser printer owned by the Department of History and situated a few yards from the project office. The final link is to the University mainframe computers at Bounds Green that allows the project use of extensive software, the University library catalogue and the JANET mailing facility.

fig. 2

Information Exchange Model Level 0

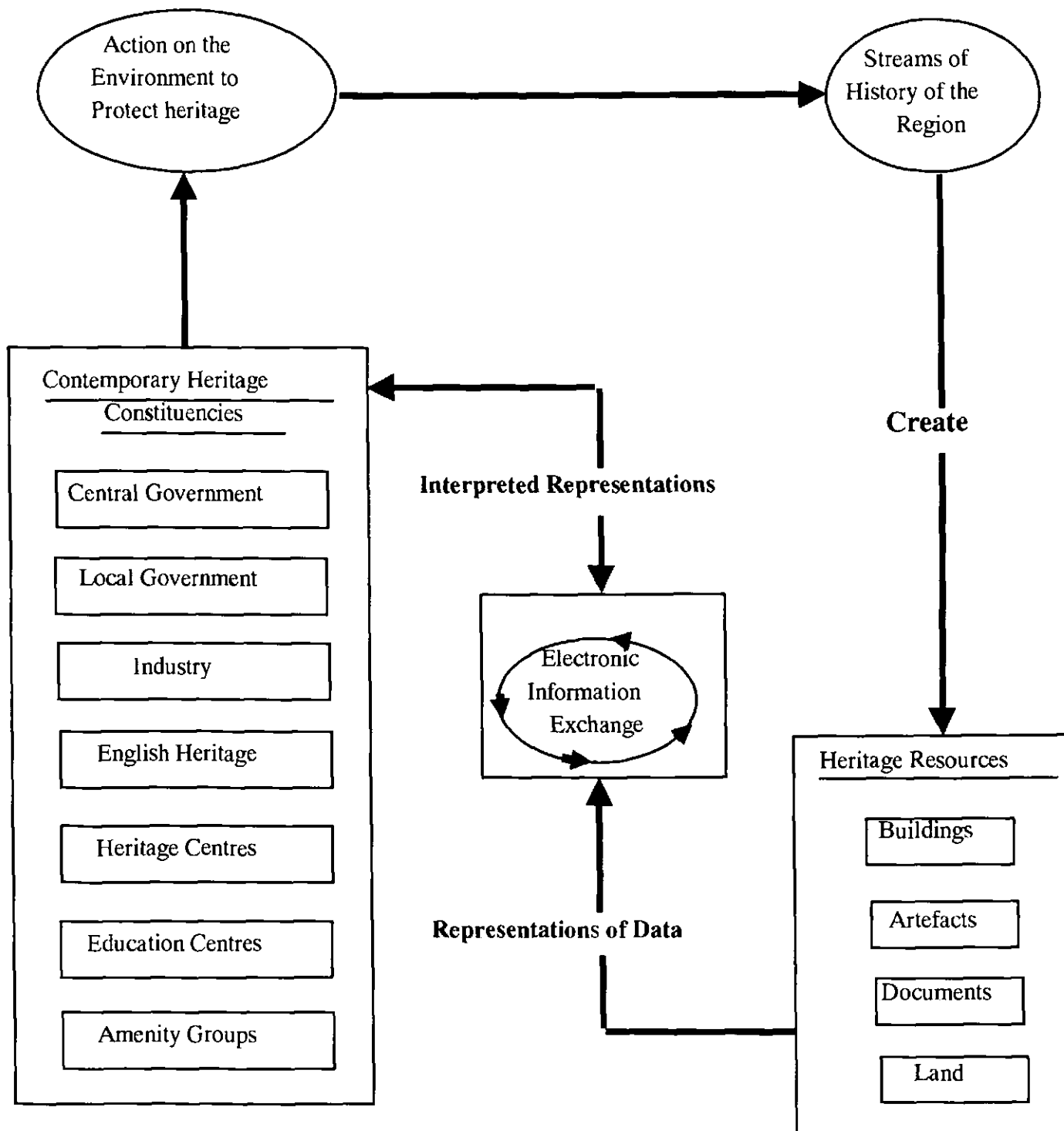
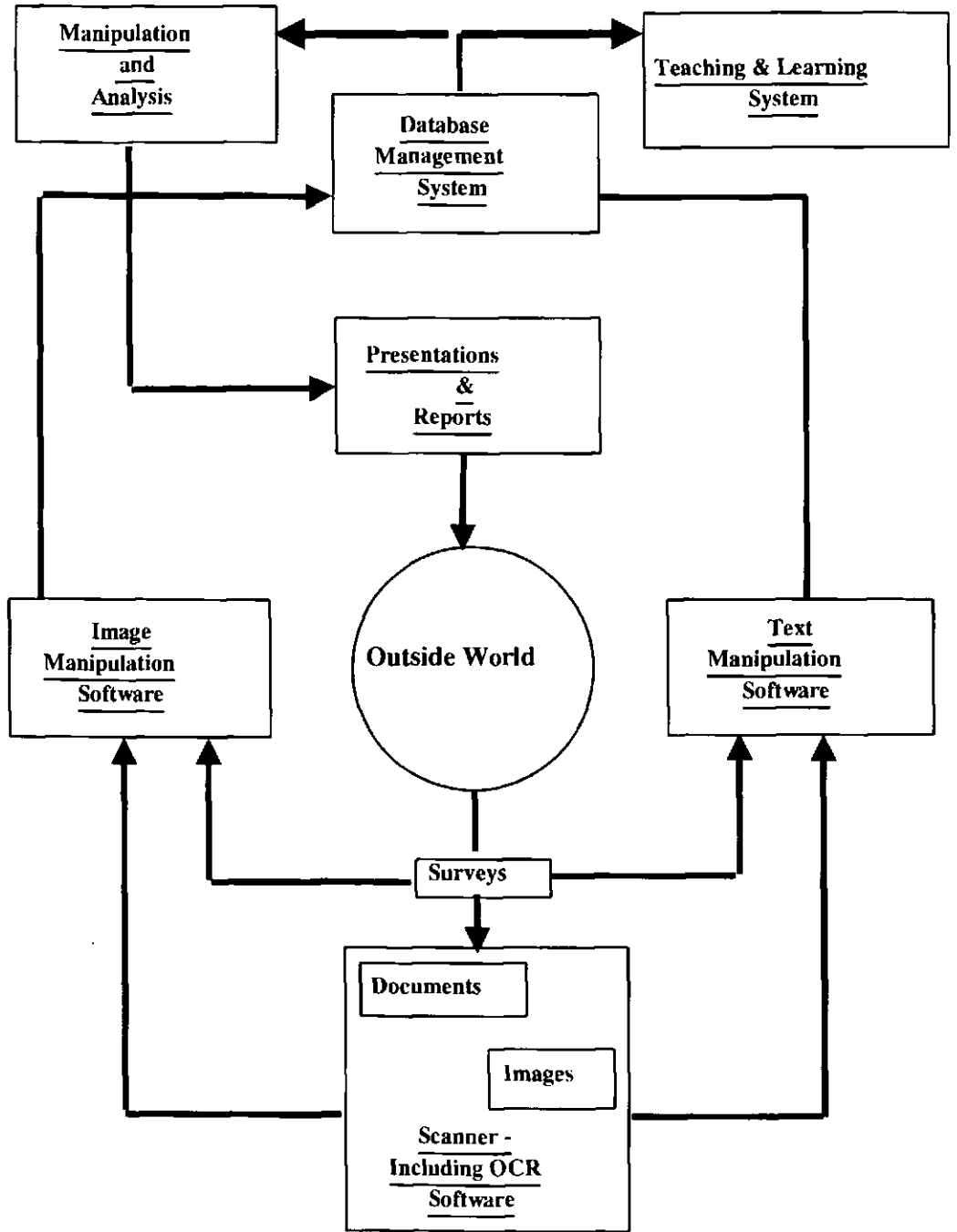


Fig. 3

Media Resources: IT Equipment



DEVELOPMENT OF FORMS AND TEMPLATE DESIGN

Introduction

Standardised survey forms contribute toward the fulfillment the project's primary function by providing a means to record the industrial sites and buildings of the Lee Valley. The success of the system depends on a clear analysis of the problem area or in other words what do we want to record, why do we want to record it and how is the information interrogated and presented. These issues were resolved through examination of the data gathering techniques with reference to the available technology and the time available to individuals who will conduct the survey. Qualitative judgements concerning the historical, architectural or other significance of a site or building were inappropriate at the commencement of the survey because such judgements ignore the regional context that should first be established by a general survey. The data formats employed by the RCHME and the Index Record of Industrial Sites (IRIS)²³ exerted some influence on the design of the survey forms (fig.5) and the database software provided opportunities to present records in a number of different layouts²⁴. The creation of a new file in the system database defaults to a simple field and field-name list layout. The fields and field names can be moved, omitted, re-sized or grouped as desired. Buttons can be added for an input and edit working layout that simplifies the use of common routines or inter-record and inter-file linkages. The manual survey form layouts appear similar to the input working layouts except for the omission of the redundant buttons and the field characteristic options which include the look-up, pop-up, picture/video/sound, scrolling, summary and calculation fields. The designs

of the site survey & building survey record layout patterns are as similar as possible to avoid disorientating the user.

Fig.5

SITE SURVEY FORM

Date Recorder Map Refs Listed? Other Status

MULVI Number Site Name

Company Address

IRIS Class District

Condition Post Code Tel

At Risk? Land Use SIC EmpCode

Prev Loctn Area Code

Key Loctn Factor(s) Site Area Mtr Sq

Site frdn Date

IRIS Site Term

Site Compts

Site Detail

Site Summary

Assoc Persons/COs

Sources

Middlesex University Center for Applied Historical Studies

Two glossaries are provided, namely the Survey Form Glossary and the Technical Glossary, the former consists of a "name" field and a

“description” field, while the latter has both of these plus an additional “picture” field. The files are “intelligently” linked to each other in an object sensitive environment to speed up search and query routines.

The traditional solution to problems of navigation through a complex system of related information is to train users in its application. The provision a system map and regular use will progressively lead to operational expertise. However this option is not practical where a variety of casual and infrequent users are expected to operate the system. A solution lies in thoughtful screen layout design. A topic index can be discretely available on screen displays, through which the user can be made aware of perhaps previously unconsidered options and by defining these options as buttons enable transfer to them with the minimum of effort.

In principal the most generalised information should be displayed initially. The presentation would be such that a user can readily access the more specific information (s)he may require. To accommodate this the design should pay particular attention to any identifiable hierarchical structure of the data. For example an initial entry-level display might include a field named “Recorder” into which the name of the individual responsible for presenting the data is written. It would not be necessary at this stage to include further detail on the subject, but someone browsing or editing the record at a later stage may wish to know further details of the recorder, perhaps to discuss a related issue. In this event the system should allow the user to access more specific information about the recorder by simply highlighting to the field and triggering a pre-set instruction that generates a Level 2 display consisting of attributes associated with the recorder, e.g.,

Name, Address, Phone Number, E-Mail Address, Qualification, etc.

Querying say the “Qualification” field could produce a transfer to a Level 3 display that may include a list of Publications, Professional Status, Certificates. Through the list of “Publications”, Level 4 might provide a more extensive subject bibliography.

Filemaker Pro

Design factors

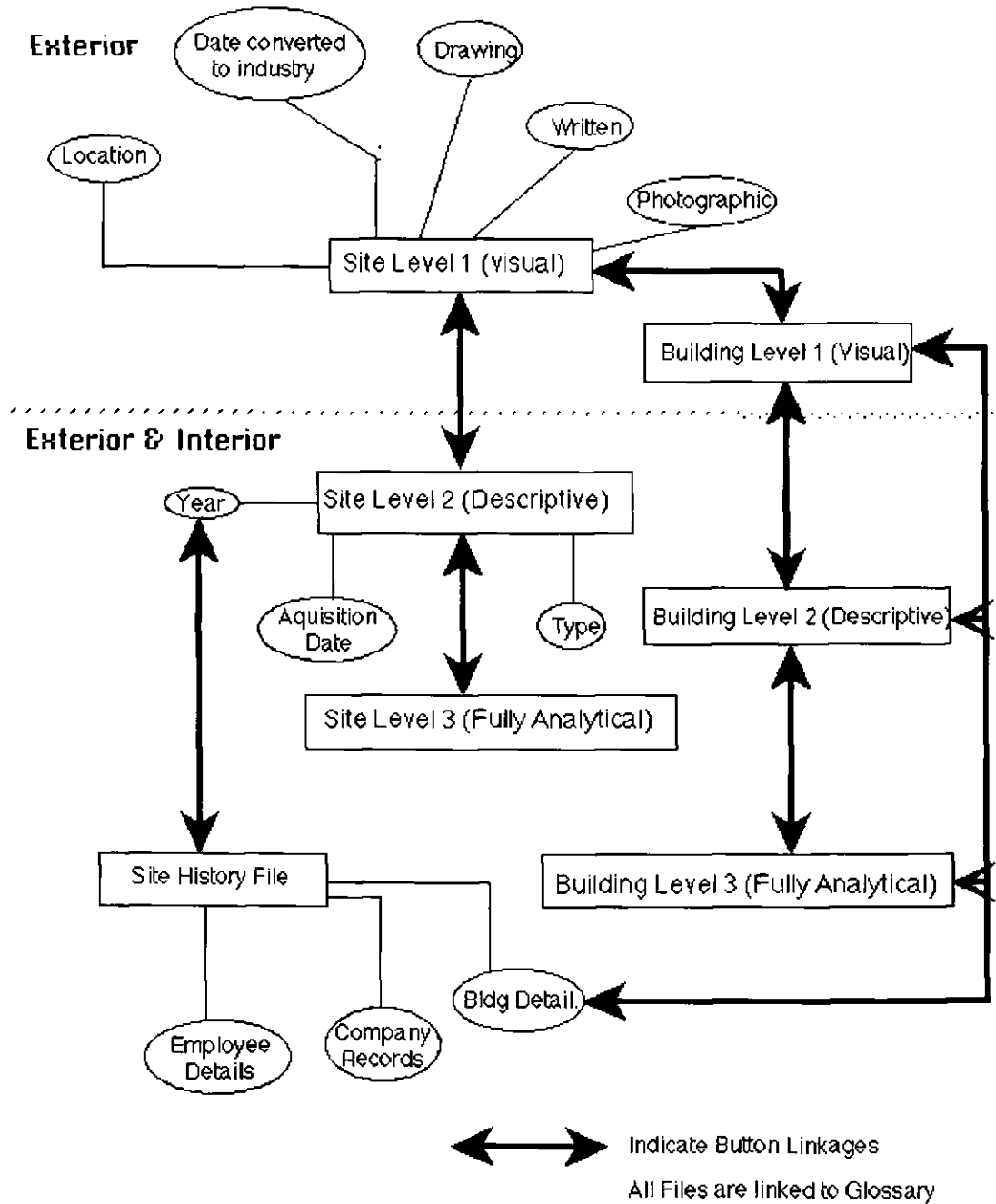
The survey files have two structural levels: site/enterprise and buildings (see Inventory Database Model fig.6), and are connected by button links to each other and to the Survey Form Glossary and the Technical Glossary files (see figs. 7 & 8). Currently the system holds 800 records of companies and sites. To include all the potential data types on one comprehensive survey form would require more space than would be available on one A4 size form or single computer screen. To extend the space by including multiple pages and scrolling screen images would make them uninvitingly complex. A solution is to group common themes and/or types into smaller presentation units capable of hiding information until requested. Though such a system would ease the problems of complexity it would generate its own problems of navigating through the various files to obtain related information.

Another problem, scarcely less significant is the difference between the entry and retrieval attributes of a manual and an electronic system. A manual record system might consist of a cardboard folder bulging with documents. Related material might be found in other storage devices such as books, journals, pamphlets, maps, code books, minutes, accounts, reports, photographic collections, film or video and sound archives often located in

different centres. It is widely acknowledged that the use of computers can overcome many of the problems that a manual storage system presents. In particular those of storage space, easing accessibility, speed of retrieval, report generation and provision for multiple rather than individual access, i.e. it is possible for several people to append to and read from ²⁵ records in a single file.

Fig 6

Inventory Database Model (Level Zero)

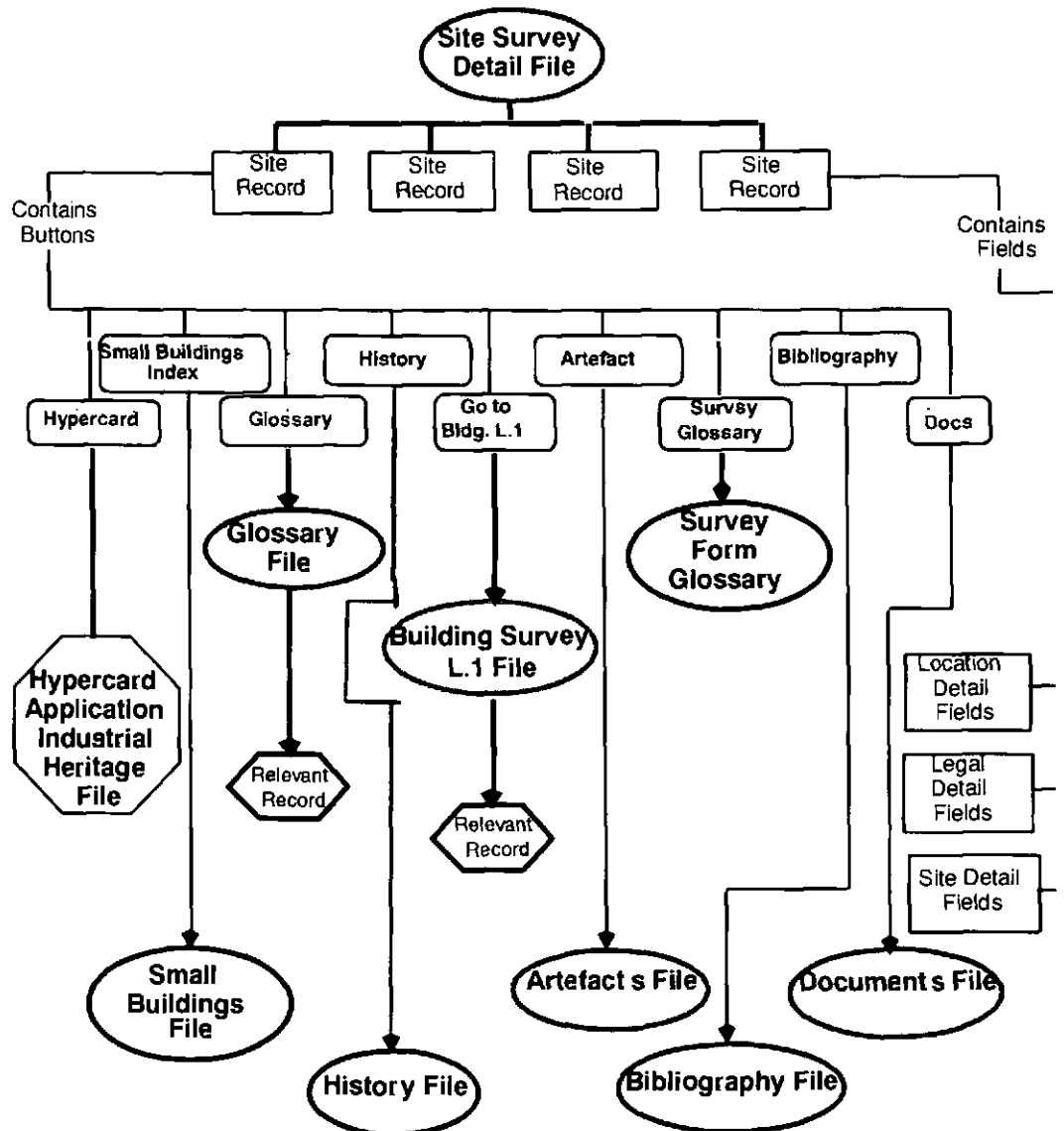


The Phrase “computerising the records” is familiar and encapsulates the constraints placed upon the electronic media by traditional thinking and practice. The existing system is re-constructed to take advantage of available technology while its conceptual model remains essentially unchanged, rather

as the first automobiles were genuinely and accurately “horse-less carriages”.

Fig. 7

Site Survey Detail File Contents & Relationships

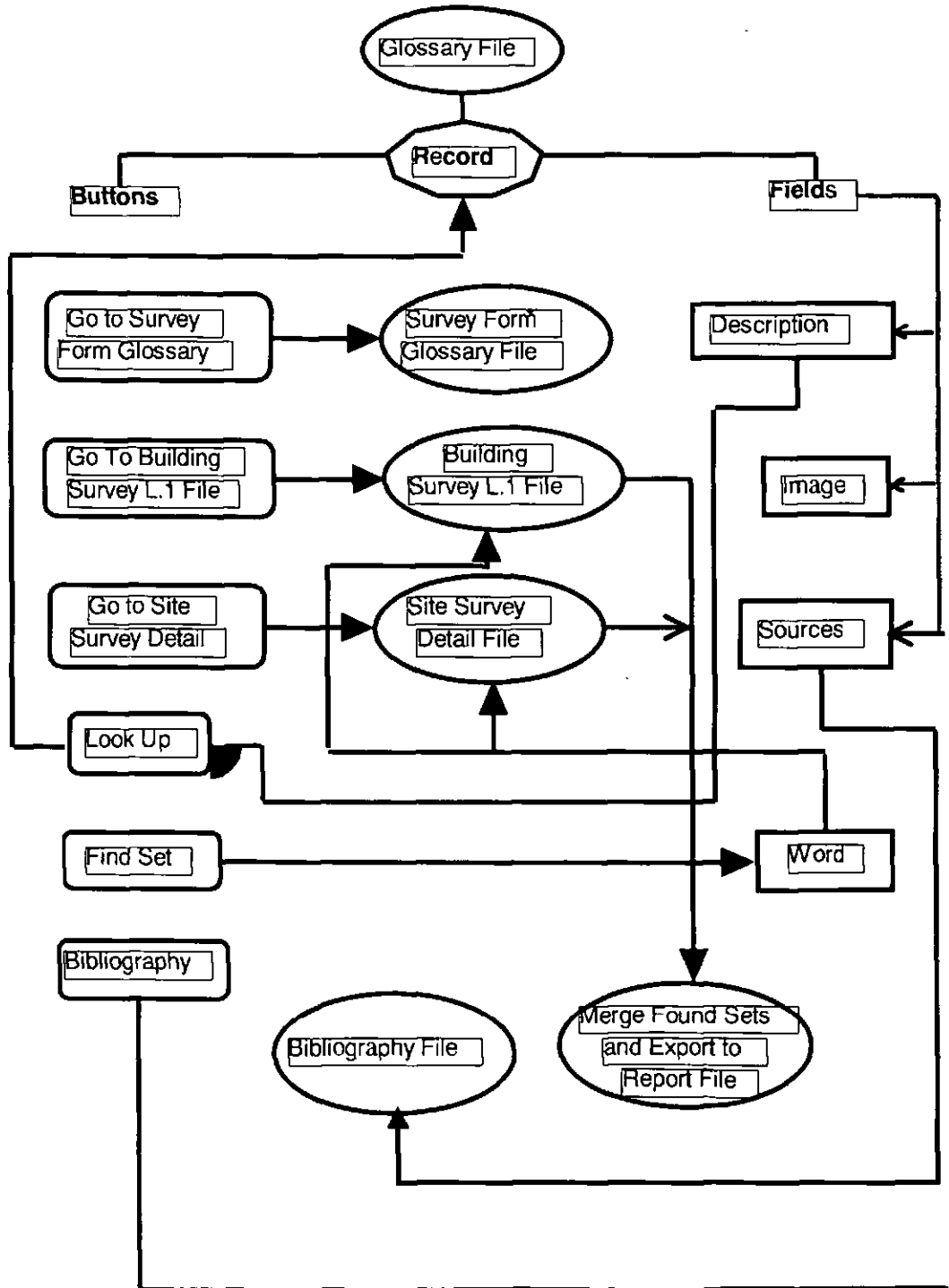


Development has come through experience but is of an uneven nature and responsive to fashions. Those generic systems created in earlier phases of development; of which archiving is a typical example, can easily stagnate as innovations are stimulated by and subsequently applied to current applications. Expert systems, artificial intelligence and interactive multimedia are examples of innovations since the conception of traditional electronic archiving techniques. To return to the analogy of the “horse-less

carriage”, innovations have lead to the family car, the articulated lorry and the formula one racer in response to the problems of different consumer groups.

Fig.8

Glossary File Contents and Relationships



These groups have not absorbed every innovation because it is inappropriate to have a racing car with a 200 cubic metre storage capacity or a juggernaut that can travel at 200 miles per hour. There is also the phenomenon of fitting the innovation to the problem. While historians are generally united in the canon that computers are simply “powerful tools” to be used for testing hypotheses and saving labour, using something just because it is there can give fresh insights on a problem so long as a rational basis exists for the attempt. The available technology can stimulate alternative solutions to existing practice rather than only providing an exclusively electronic format to perpetrate a perhaps-redundant problem defined and solved by a manual process.

Layouts

An inherent problem in the design of survey forms for an electronic archive is that while simply translating the existing manual archive tidies up the storage facility and can speed the delivery of information it is heavily dependent on the skills of the individual operator. An individual interrogating the electronic system would need a conceptual and system map to navigate to the diverse chunks of information. The problem is compounded by the tendency to over-use areas of the record typically designated “Description”, “Notes”, “Comments”. Computers are at their most efficient when the data they process is broken down into standard, exclusive categories. The creation of precise fields to store concisely described detail depends on accurate data input to ensure that sorting routines function correctly. Furthermore the information recorder has less

opportunity to qualify the description in such fields except by recourse to a separate “Comments” type field.

Reserved word lists

An established technique designed to ensure the accuracy and uniformity of the data is to provide a system generated multiple choice input option. For example, a data field labeled “Power Source” might allow the operator the choice of entering only the value list alternatives:

“Muscle, Water, Steam, Wind, Gas and Electricity”.

by for example clicking the option shown in a field including “Check Boxes”. There is no allowance for any other entry into that field except by re-configuring the field to (say) a simple value list which allows user edited as well as pre-defined value list entry options. The absence of errors allows the system to function efficiently because mis-spellings cannot be entered and therefore all search routines should find all the requested information and not omit a record because an input error entered say “Warter” instead of “Water”. Moreover confining data entry choices to pre-selected subject specific words or organised phrases enables the use of an structured “shorthand” for even faster data input and searches. Where more than one descriptive term is acceptable in a given field, that field can be formatted as a “repeating” field. For example a field labeled “Building Materials” can allow “brick” and/or “concrete” and/or “stone” and/or “timber” etc.. The more concise the data in such fields, the more efficient the data management routines and the less the necessity for large “description” fields. If this seems a little Orwellian the purpose is not to use the specialised vocabulary to

eliminate thought crime, but ensure that all users can use data that is as free of ambiguity and as concise as possible.

Look-up routines

A site may contain many buildings and the database should reflect this relationship by allowing efficient transfers between the record in the "Site Survey" file and the related records in the "Building Survey" file. To accomplish this a button was placed in the layout with a script that searches for the site serial number, copies it and then searches for all records in the building file containing that serial number and then displays only those records²⁶. To accommodate all levels of operator and user expertise a glossary of terms is included in the archive. The glossary can be produced in notebook form for site use and as a related data set on the computer. Clicking the mouse pointer on the appropriate word activates a small program that copies the highlighted word, opens the glossary file, enters "find" mode, pastes the word, locates the reference and displays it on screen. Multimedia facilities allow the glossary description to be augmented by a drawing, animation or film for even greater clarity.

Hypercard

Design Factors

Information should be displayed in a clear, uncluttered, logical, consistent and pleasing manner. Seven plus or minus two items per screen or sheet of paper is the usual criterion. A card size of 640 X 480 pixels was selected to effectively fill the screen of a fourteen inch monitor. Smaller sized cards have the disadvantage of showing the outer sections of the computer desktop and larger cards have to be scrolled to display all their

information. Many older Apple Macintoshes and Powerbooks²⁷ have a nine-inch screen but the card size can easily be re-set to accommodate them.

Hypercard 2.1™ could display colours²⁸ thus imposing severe constraints on the subtlety and consistency of design. However it does have an External Command “Picture XCMD” that allows colour PICT and other files to be opened in a separate window by writing an appropriate script to a button. It is not possible to step through a stack of cards using this function but it is useful for calling up individual illustrations.

Layouts

For consistency all stacks use the same background²⁹ art, it is simple enough not to dominate, but appropriate enough to fill the spaces between the other features. Further experiments with different designs for different stacks have been undertaken to make the background reflect the stack content but a final decision will be made later after some evaluative opinion. Each card in the prototype “London Industries” stack has 23 background buttons sitting on top of the background art. These provide links to specified industries in other stacks, navigation buttons for moving within the stack and buttons to access information or presentations in other software applications like Filemaker Pro™ and Macromind Director™ and XCMD extensions including “Picture” and Macromind Player™ that allow colour pictures and multimedia colour and black and white presentations to be included within the stack. Each card has a major field for displaying text information and three minor fields. One minor field displays an index that is itself a series of buttons. The index field is an index of cards within the stack, those without an individual name carry a simple ID number that is

meaningless to a casual browser. Ideally, all cards should be named for the production version though this will be a time consuming task. Another minor field is for footnotes. The third minor field is a “card of cards” number automatically updated whenever a new card is created. Adding extra fields and buttons as appropriate may customise individual cards within the stack. Each card therefore displays a minimum of twenty-seven entities quite apart from any text or illustration entered into the major field, a lot more than the “Seven plus or minus two” ideal. A solution was to gather the entities into logical groups and to present those groups as though they were single items.

EVALUATION OF HOW THE PROTOTYPE MODEL MEETS THE ORIGINAL CRITERIA AND ITS EXPERIMENTAL USE

Introduction

The first phase of the project research has involved both intensive and extensive dimensions. *A Short History of the Royal Small Arms Factory Enfield*, produced by Tim Putnam and Dan Weinbren with the assistance of a dozen students, for clients Royal Ordnance plc. represents the intensive dimension. It provides a model enterprise history for the project as a good example of the kinds of multimedia data involved. Development of the extensive dimension involves consultation with public authorities, companies and local amenity groups who are the custodians of extant data series relating to employment, land use, and conservation. Links with the community established by the History Department's Community Liaison Officer have established good relations with the various constituencies of the region, obtaining access to their expertise and information resources and in return providing a forum for co-ordinated activity. There were regular individual and collective meetings to exchange information and focus issues of common concern with organisations interested in historical, archaeological, amenity and environmental issues. The project has received an enthusiastic welcome by all heritage-related constituencies in the area between Waltham Abbey and Tottenham and attracted a great deal of interest from organisations in Hackney, Tower Hamlets and Newham.

Expertise in hierarchical survey techniques for example provided by RCHME serve as a basic model for the project survey. Where the site survey

produces detail considered to be commensurate with (at present unpublished) RCHME criteria for awarding protected status listing that detail is forwarded to RCHME and their subsequent deliberations will be of evaluative moment to the future conduct of the project. The prototype model should be evaluated for its ability to meet the project specification and perform its tasks quickly and economically through the efficient use of the computer processor capabilities and data storage facilities to process survey input, manipulate data and present information. In practice, does it enable the facile input, manipulation and display of data within a congenial environment? The project surveyors can contribute their evaluation of the survey system, concerning the gathering and input of data. A version of the survey system forms was developed to allow input from the New River Action Group's (NRAG) resource survey, and a healthy evaluation of its performance is anticipated. Colleagues can assess the quality of the data obtained by interrogating and manipulating it. Students can use it as part of their programme of IT acquisition skills. Demonstrations of the prototype model were arranged at academic seminars and amenity group meetings. There will be however insufficient data in the prototype model in the early stages to consider evaluating it in heritage centres. Much of the evaluation will be qualitative and observational but, where practicable, repertory grid questionnaires will ^{be} considered to induce quantifiable responses to a structured enquiry. Qualitative response has been a continual though informal facet of the prototype models development involving friends and colleagues.

A strategy of holistic evaluation necessarily concentrates on the qualitative than quantitative aspect of the project and includes seminars among colleagues with research interests or expertise in related disciplines including historians, geographers, information technologists and designers. It is useful because other disciplines have different traditions and approach problem solving from different perspectives. Difficulties recently encountered in one discipline may have been routinely solved in another and a geographer for example may see an application of the project to their discipline not previously envisaged for the Electronic Archive but one that can in turn be applied to this project. Students participating in the project survey are suitably placed to evaluate its functionality by attempting to use the system in the real world. Friends who know little or nothing about the River Lee and its industrial environs were set down in front of the computer screen presenting the first card of the "London Industries" stack displaying the navigation instructions and left to get on with it. This is at the same time a rewarding and distressing process. Few bother to read the instructions fully, once they understand how to start they are off and only pause baffled when confronted by a routine explained but not absorbed from the first card. The elements of the presentation that do not perform in the expected manner are soon exposed.

Comparison with Other Multimedia presentations

There is an increasing number of Hypercard applications on the open or academic market, often with multimedia facilities. BBC education programmes while using a similar structure take advantage of the latest generation multimedia technology to present subjects as virtual reality

presentations. The production and direction of this project is indebted to such applications for an example of high standard design. Inevitably, budgetary constraints will militate against attempts to recreate some types of display in anything like as polished a performance as that produced by a team of media communication experts. Nevertheless, the project endeavours to remain aware of the expectations of potential users even where the polish of the finished product will not stand comparison with those produced using more sophisticated hardware.

Students on HS3860

Flexible survey structures are fundamental because of the constraints imposed by the inexperience of the surveyors, the need for the survey to be incorporated as part of a learning module and, more positively, to facilitate the generation of fresh ideas. Survey strategies can be spatially, typologically or temporally orientated depending on the direction of the surveyors' own project criteria. For example, a surveyor selecting a particular industrial estate from a starting point of the skeletal details gathered from the business listings, will check the accuracy of those details, add details of unrecorded structures, carry out level 1 and 2 surveys before selecting a sample to investigate in greater depth. Alternatively, a specific type of industry, building style or technique could be surveyed across a wider range of locations. Or the surveyor could concentrate on examples drawn from enterprises with a broadly common date of origin to obtain a "snapshot" of a particular period in the region's industrial development.

Amenity Groups

Amenity groups can consider individual aspects of the prototype model more closely because of their specific expertise and their honest self-interest

in applying it to parochial tasks. They can help in the iterative design process and they can assess the relevance of the type of information presented by the Electronic Archive to their specialism. This may lead to an increase in data input from the group and refinement of the importation mechanisms.

Tutors and students

Several tutors in history and other disciplines within the University are highly qualified to assess the Electronic Archive having developed Hypercard stacks for teaching their own subject and would be able to offer critical and practical advice on aspects of its design and performance. The Middlesex University Graduate Centre encourages post-graduate students to deliver workshops that "... are an opportunity to present and discuss ideas in the process of development; ... they are intended to help unfinished work develop"³⁰. Colleagues can evaluate the database content and the opportunities it offers for manipulating the data including its export to statistical software packages and spreadsheets.

REVIEW OF PROTOTYPE DESIGN

Introduction

It is important to ensure that the project organiser's role is neither too small nor too large to maintain a balanced conclusion. The collection of data to demonstrate the range of the Electronic Archive's capabilities is sufficient rather than comprehensive. Typically, this will involve a large amount of superficial data concerning many sites and a small amount of abstruse data from a few sites. It is only possible to undertake the most cursory of historical analysis on the expected amount of information processed. Meaningful appraisal must be preceded by a period of evaluative use and where appropriate, alternatives sought. Few aspects are fully resolved but provisional solutions were found that enable the prototype model to function. Some solutions are unsatisfactory because they consume an inordinate amount of time, memory and disk space, particularly the incorporation of maps and data from draft quality computer listings. File structures suitable for the storage and referencing of company records (invariably facsimiles) and oral testimony can only be considered once a degree of survey material has been accessed. As any degree of uniformity among company records is moot, so the resolution certain file formats is in abeyance pending the receipt of actual data. When such data is obtained and its generality established, more standardised input modes where practicable may be implemented. For example a high degree of document clarity and uniformity might allow for scanning and direct importation to the database, whereas a lower degree would require increasing flexibility and customising down to a level where there is virtually no uniformity and the data would

have to be manually entered. The distinction between documents containing data for incorporation into the Electronic Archive file formats, and documents that are merely illustrative needs to be emphasised. The former depend on the computer's literal interpretation constraints whereas the latter require no great flexibility from the computer at all, relying for interpretation on the more sophisticated human perceptions employed by users viewing the display.

File formats

The flatfile DBMS is effective for the direct entry of survey data. Any bias concerning the file formats in the database inclines toward recording of *surviving* details of the industrial fabric, with particular attention paid to studies using an artifact led rather than a document led approach to data gathering³¹. Clones of the survey files were installed in the Learning Resources Centre for the undergraduate surveyors, enabling them to input their survey material without recourse to the main project computer. Initially because of local licensing and financial factors, the DBMS used by the undergraduate surveyors was Claris Works™. This lacks many of routines available to FileMaker Pro™ and only new and updated data was exported to the main database through the LAN where it was easily re-incorporated into, for example repeating fields. It also provided an early examination of data format compatibility and transfer protocols. However, copies of Filemaker Pro™ were made available later in the project for all surveyors. Organisations using PCs to store data will not experience insuperable problems when importing LVIHEA files. Neither will PC formatted input data prove an obstacle. Data from the PC formatted Enfield Borough

Council Business Listing for example was imported into the project quickly, easily and efficiently. Other tests will follow when data in a variety of formats is imported from groups like GLIAS. This data will test the flexibility and adaptability of the LVIHEA input/output system because the manipulated information will become available for export in formats usable by IRIS. Exporting some data from the Electronic Archive to PC DBMSs is a major concern. Most do not have the advanced multimedia capabilities of Filemaker Pro™. The import facilities of Microsoft Access™; the most widely used PC DBMS, can cope with standard text, numeric and date fields but not multimedia images or repeating fields. One expects that DBMS for PC architectures will catch up with these facilities and that Internet transfer protocols will become sophisticated enough to handle it.

Historical Depth

Consideration was given to the storage and presentation of summarised historical information such as employment numbers, wages, capital investment, annual profit and loss, annual turnover, raw material costs, transport detail, number of buildings/machines and power sources. Various solutions were examined including entering the data in the form of tables in a relational database. This solution would take account of the size and complexity of the data and treat it in the same way as a current information system for an active enterprise. It could provide information accessible in different combinations for a number of users concerned with different aspects of an enterprise's function. It is a complex task to project this modern system of information management onto the historical data recovered. A more modest possibility is to create a "History" file containing

information relating to particular years. A spreadsheet format can be used to generate graphs of summarised DBMS detail. Some caution is warranted, as it is easy to get lost in large spreadsheet files. However if the file size is manageable a 3D spreadsheet (the third dimension here being time) is a feasible solution

Interactivity Polls

A good example is a prior requirement before an interactive polling system could be created and evaluated. Video interviews require recording, digitising, editing, and incorporating into a presentation. The user could be presented with an online multiple choice questionnaire to register their reaction at the conclusion of each interview. Pointing and clicking one of the response options would activate a program to open a spreadsheet file, locate a specified cell and increment its value by one before returning to the next subject and repeating the procedure until the presentation is complete or the user decides to quit.

Mapping and GIS

The electronic archive can assimilate maps by scanning and editing to highlight existing detail, add and subtract features. Grouping different editions produces an image of a landscape through time. Unfortunately this process can consume a vast amount of time and storage space. The quality of the image can be extremely variable and orientation problems arise if higher resolution scans are used to overcome this. As the map extends beyond the monitor screen highlight and zoom routines are required to view precise locations. Commercially available GIS applications have largely solved these problems. Maps are created within the GIS by inputting vector data, also a time consuming process. However GISs are packaged with a

relational database for storing the vector data and once input this data can be used or omitted to produce an unlimited range of customised maps. The relational database would be useful for other aspects of the Electronic Archive for example the putative historic and employee detail files. Much research work is continuing and development of a comprehensive GIS for the Lee Valley Industrial Heritage is beyond the scope of this project. This is not to say that the project would not benefit enormously by utilising such a system. My feeling is that the Electronic Archive should have the facilities available to display GISs compiled for example in the Department of Geography³².

CRUCIAL CHOICES

Introduction

A practical survey is important for assessing the efficacy of a system because the LVIHEA is dependent on information gathered (rubbish in, rubbish out). The quality of the information is considered with the quantity of sites surveyed. The adoption of a suitable selection of survey levels is the result of logistical choices dictated by time, available personnel and the ability to demonstrate the scope of the prototype model. The application of the hardware and software to deliver the appropriate archival, presentation and analytical support are assessed. Discrepancies are countered by adjustments within the existing system, or by more fundamental changes involving re-specifying certain elements. Methods to ensure that the information gathered from other organisations is up to date have to be addressed

Breadth of survey/Depth of survey

Attempts to define the conduct of the survey too closely are inappropriate because of the conflicts involved in attempting to satisfy several aims: (**Record** the building details, produce **multimedia** presentations, "... **establish a centre** through which knowledge of the industrial heritage of the region can be efficiently accessed and assessed, **identify partners** with which it can be developed and **constituencies such developments will benefit**"). Ideally skeletal records of each enterprise and its principal buildings within the specified area might be obtained and a judgement made concerning those that merit closer scrutiny. Because of the numbers involved this fundamental level will not be completed during the

lifetime of this phase of the project. As the surveyors were undergraduates it was essential to widen the scope of the survey beyond this level in order to ensure that they acquire a broad range of techniques and experience commensurate with the standards expected for the successful completion of their individual studies.

Development and Archive Performance

For the compilation of the survey the flatfile is ideal, it is easy to use, presented in a logical format oriented towards on-site survey and is excellent for the production of forms but may be found wanting when large quantities of information are to be manipulated and reports generated. A relational database has the very useful feature of being able to display selected (related) **data** whereas a flatfile system can only display selected **records** where much of the information in the complete record is superfluous to the particular enquiry. For example if the user wishes to know only the names, addresses and dates of buildings within a single postal area (s)he can more easily browse a list of those relevant fields (typically twenty per screen), than browse the entire found set of records where each record occupies more than a single screen display. It is only possible for the flatfile database to produce a listed layout of particular fields by creating a new layout for each query format that would hide all unnecessary fields, shrink the report size to one line and add column headers. This is not a great problem for the system developer though not all query formats can be anticipated, but it will not be satisfactory for secondary uses that wish to interrogate the system quickly and economically. The system would benefit from having a relational database **and** a flatfile system so that the strengths of each system are used.

Coupling a relational database with a GIS could go a long way towards resolving both advanced query routines and map production.

Upgrading VideoSpigot™ to VideoFusion™ with Premiere 3.0 was expected to provide improvements including full screen/full motion video capture facilities, an integral soundboard and computer to videotape download facility. Professional video decks and cameras were available from the University's Learning Resources Centre. The increasing use of graphics; particularly video, on the project may justify the acquisition of Graphics Accelerators to speed up screen re-draws and SCSI Accelerators³³) to speed up the information flow between the Mac and its hard drive. There is always a requirement for more long-term (random access) storage; a gigabyte might be appropriate as a thirty-minute full screen/full motion video clip may consume approximately 800MB.

Updating

Keeping the Archive current is dependent on the receipt of information from bodies such as the Local Authority, RCHME, SMR and more particularly on the vigilance of the project staff. Though outside organisations have agreed that such an archive is desirable and that updated information is essential to its currency, it is perhaps inevitable that they will not allocate the necessary resources for implementing an updating system until it is demonstrated that the LVIHEA is of practical (economic) benefit to them. This state will not exist during the development phase. Many of the sites will be bought and sold and their function change without being brought to the attention of the project staff.

Conclusion

So what is the LVIHEA? Firstly it is a data resource for the historic industrial development of the Lee Valley. Secondly it is a research tool that incorporates and evaluates modern information technology. Thirdly it is a catalyst for community action on heritage conservation issues. It operates on a small research budget in a rapidly changing information technology environment, where no sooner is one solution strategy adopted than another cheaper alternative seems to appear because of technological developments. However most of these developments are aimed at the world business community and their implications are often unrevealed in many areas of the academic community. In this environment there is still room for the "garden shed" approach to perform useful work. Broadly the objectives of this phase of the project have been met with the completion of a design prototype, the establishment of community links and the production of a substantial amount of historical research.

NOTES

¹ P. Checkland, Systems Thinking, Systems Practice, (New York, Wiley 1981).

& P. Checkland & J Scholes, Soft Systems Methodology in Practice, (Chichester, UK, Wiley 1981).

² Especially the virtual museum project at CASCAAD, and Geographical Information Systems (GIS) work at Enfield

³ D.H Smith The Industries of Greater London (London, P S King & Sons 1933) p.8

⁴ *Ibid.* (p.16)

⁵ *Ibid.* (p.16)

⁶ Giles, C & Goodall, I.H. Yorkshire Textile Mills - The Buildings of the Yorkshire Textile Industry 1770-1939. (London, HMSO 1992)

⁷ A simple query of the AT RISK field in both SITE & BUILDINGS files to find "disused", "demolished" or "unknown" quickly revealed 89 instances out of 892 records (9.98%)

⁸ The Project Specification

⁹ RCHME Recording Historic Buildings. (London, HMSO 2nd ed. 1991)

¹⁰ *op cit*, Giles, C & Goodall, I.H. (1992).

¹¹ From its Fortress House offices in Saville Row, West Central London,

¹² Index Record for Industrial Sites (Recording the Industrial Heritage) A Handbook. (Leicester, Association for Industrial Archaeology, 1993)

¹³ London Borough of Enfield. Economic Development Strategy, Financial Year 1992/1993 (Consultation Draft D3, December 1991) *et seq*

¹⁴ Except in XCMD mode which enables colour images to be imported into special fields

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- ¹⁵ But see above Version 2.2 colour facilities since incorporated
- ¹⁶ (and in fact little in evidence because of specialised utility programs like Norton Commander™ and PC Works™ which became popular as more user friendly replacements to DOS)
- ¹⁷ Multimedia Authoring and Tools Guide (Redmond, WA, Microsoft, 1991)
- ¹⁸ see Panko, R, End User Computing (New York, Wiley 1988) p.255 : "... a 550 MB CD-ROM can store ... about the same as 1500 typical floppy disks or a quarter of a million pages of text."
- ¹⁹ see G. Jacobs "The Future Unfolds" .Personal Computing vol. 4 no.1 May 1990.
- ²⁰ *op. Cit*, Panko (1988)
- ²¹ S. Caplin "Design Matters Colour Scanning" MacUser Vol 9 No. 20 (October 1993)
- ²² *Ibid.*
- ²³ A database file based on the IRIS format has been included in the options for the LVIHEA so that records collected by local amenity groups in this format can be easily imported.
- ²⁴ See Appendix 1 for database field definitions and file comparisons
- ²⁵ if not then edit, to ensure the integrity of the file is maintained
- ²⁶ Where there are several buildings recorded from the same site their records are given the same serial number as the site and then given a unique suffix which for the purpose of this routine is in fact ignored
- ²⁷ This can be a particular nuisance with the Duo-Dock Powerbooks as the card size has to be toggled whenever the desktop or powerbook mode is switched
- ²⁸ Hypercard version 2.2 which incorporates full colour is due for release early 1994 for an upgrade price of approx. £50 (now incorporated)
- ²⁹ see chapter 2 for detail on "background" and "card" buttons and fields
- ³⁰ C. Pehrson. Graduate Centre News Letter No.1 (London, Middlesex University, December 1993)
- ³¹ Giles, C & Goodall, I.H. (1992) pp. 1 – 2, *op cit*; and Giles, C & Goodall, I.H. (1986-7), pp.71 – 81,; and Alfrey, J & Clark, C The Industrial Landscape - Patterns of Change in the Ironbridge Gorge (London, Routledge 1993), pp. 3 – 6.
- ³² This would involve the purchase of a Mac GIS system with capability to import data in a PC format. Later, time allowing it would be possible to create specific Electronic Archive GIS examples. Closer collaboration on student projects between the History and Geography departments may be a desirable outcome.
- ³³ On 1993 prices respectively £1500 - £2900 & £249 approx.

CHAPTER II - THE ELECTRONIC ARCHIVE

INTRODUCTION

The previous section outlined and developed the conceptual basis of the project and as such was its starting point. External contacts had to be established early in order that their diverse *modus operandi* could be incorporated and adapted to interface with the LVIHEA. The concepts required feasibility testing and consequently several changes were assimilated. Often these were as rudimentary as the organisation of layout designs but field formats also underwent changes as more information was added and the testable sample grew. Generally the full details of this evolutionary process and the intermediate solutions were not described but inevitably there is a chronological development order and this section could not exist without the preliminary processes described in section one.

This second section describes the implementation of those concepts to produce models and subsequently the component parts of the LVIHEA. It re-iterates the intentions of the project before outlining the structural organisation of the IT system. This consists of the Database Management System (DBMS), the heart of the system, the Hypercard™ teaching and learning stack, and finally the more peripheral aspects, covering technicalities of multimedia operations including video and photographic capture.

Outline of intent for IT system

The objective of the project is to produce a multimedia inventory of the industrial heritage of the Lower Lee Valley. This will spawn a teaching and

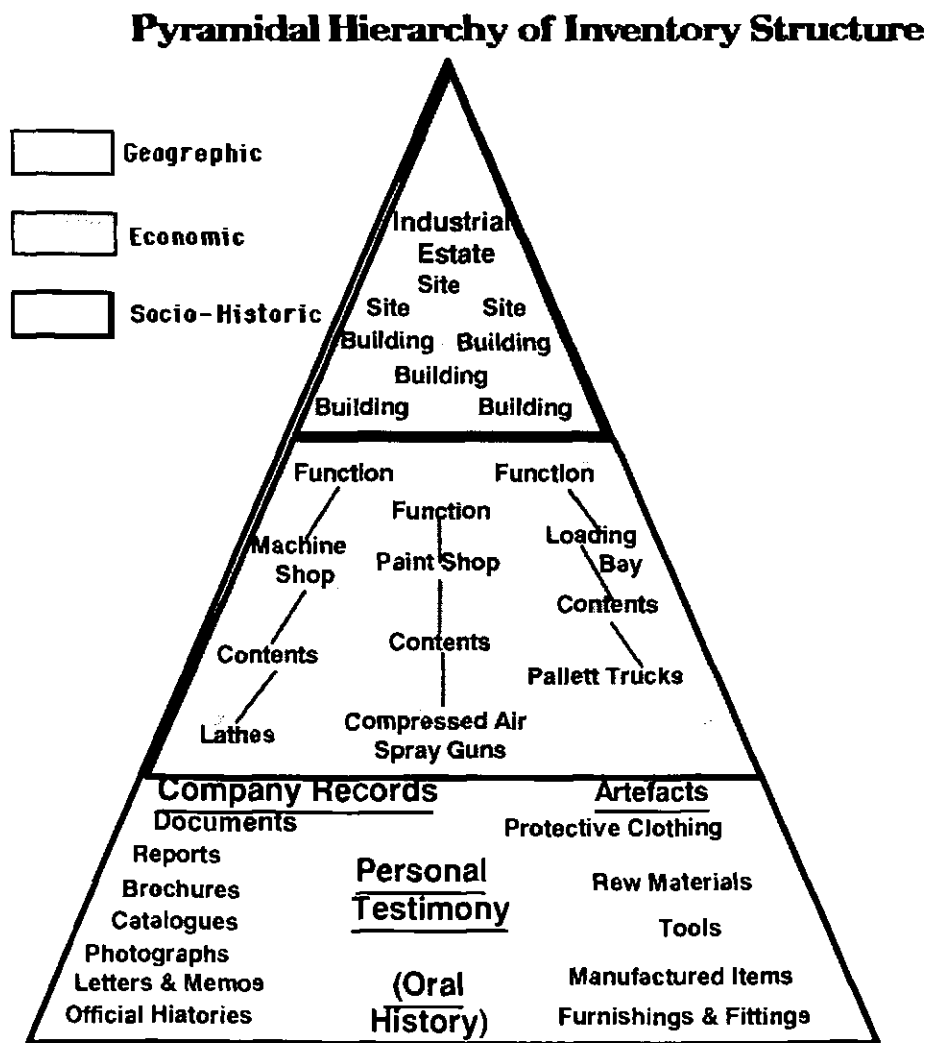
learning shell flexible enough to be modified for wider use. Users of the system will be encouraged to supplement the base resource with additional data and/or analysis, subject only to safeguards designed to protect the integrity of the system and the accuracy of the data. The system therefore will be interactive in the same manner that the historian's other "tools" (documentary and Artifactual sources) are interactive; that is, constrained only by the availability of the resources rather than a pre-arranged suite reflecting the weltanschauung of the resources' editor(s). A wider public should have access to it

Producing a multimedia archive of Industrial Heritage

The inventory is categorised by spatial (where is it?), legal (who owns it?) and descriptive (what is it?) material. The spatial parameters defining the location of the edifice or artifact are fixed although it may have moved or been destroyed, whereas legal and descriptive details are expected to be more mutable. The files are organised in a pyramidal hierarchy with spatial details of which the Industrial Estate is the point of departure at the highest level, widening to include the Site and the Buildings¹, and deepening to include economic factors taking account of function(s), contents and socio-historic elements (see fig.9). This organisation is based on an archaeological metaphor: start excavating at the contemporary surface and slice away to reveal a fuller picture of the function and conditions of an enterprise both current and historic. When accessing the inventory at a high level; (say) with the Hastingwood Estate record of the Industrial Estate File, quantitative details of the enterprises, their categorisation, buildings, locational and legal details can be established. A found set of records based on (say) the

industrial category could be accessed through a button link to the Site Survey Detail level. Selecting a particular enterprise will enable a further found set of on-site buildings to be located within the Building Survey L.1 file. Both the Site and Building levels are access points for detailed information on company documents, Artifacts and historic building sequence files.

Fig. 9



To Produce A Teaching And Learning Prototype Shell Using Data From The Archive And Historic Sources

The database files provide the primary level of a teaching and learning system through which students can proceed by a number of differing approaches. They can browse the existing records to produce a set on which various analytical techniques can be practiced. The same set could be used as the basis for further investigation and the results may be incorporated into the lower hierarchical levels of the archive. Summaries in presentational form could be produced in Hypercard™. Alternatively they could conduct their own surveys based on the established inventory parameters to broaden the archive. The IT skills acquired would be incidental to the accumulation of historiographic research techniques but invaluable in the context of wider vocational accomplishments.

System Constraints

Must Be “Exploratory”

Where am I? Where did I come from and where am I going? These are the cardinal points, without which the system user may be disorientated, his/her search at one extreme haphazard and at the opposite too inured by the system author. Researching a subject by traditional methods in a library involves locating the sources and gathering them to a suitable work area. The investigative starting point is established fairly arbitrarily but from thence footnotes, index references, tables, charts, illustrations are accessed among the range of sources as seems fit and copious use is made of scrap paper, bookmarks and rough notes. The important point is that the researcher

is in control of the “programme”, amenable of course to prompting by the source authors but free to progress tangentially and always aware of where they are and how to get to where they want to be or where they were. Many IT applications provide button links which are fast and efficient but few leave a re-traceable audit path. Furthermore there is a tendency to use the buttons because they are there giving them an authority that is often distracting and sometimes spurious. It is better if the links are subtle only becoming obvious when they are actively sought.

Entry Level Welcoming

It is important that the point of entry to the system is communicative, but the material should be generalised thoughtfully to a few inaugural options to avoid a cluttered screen display. Clutter on the one hand, might tempt the user into a spree of gratuitous button clicking resulting in an unstructured traipse along the backstreets and cul-de-sacs rather than the main highway of the system or on the other hand, inhibit him/her with an overwhelming but uninformed choice. Entry to the Lee Valley Archive can be effected through either the DBMS (FileMaker Pro™) or Hypercard™, with the latter method being the recommended approach for novitiates because circumstantial information is synthesized to allow a better contextual appreciation of the Lec Valley industries.

In summary the LVIHEA is conceived as a communication device to empower communities through information gathered, stored and retrieved through a multimedia IT environment. Its elements will be described in turn starting with the DBMS because that is the foundation on which the rest stands.

THE DATABASE MANAGEMENT SYSTEM

Introduction

“What motivates an organisation to consider the database approach?”

Database Management Systems (DBMS) basic objectives are sharability, availability, evolvability and integrity. It is no good at all if only

“programmers” can use the DBMS²

DBMSs were developed in response to a demand by commercial users for an integrated automated system to store and maintain records. “The traditional computer program needed to define the files which it required and *could only access whole records*” (my italics)³. They were *duta dependent* and programme maintenance could take 75% of operating time⁴. An initiative to separate the data definition from the process specification (programme) resulted in the “Relational”⁵ DBMS: a “...system that manages data as a collection of tables in which all data relationships are represented by common values in related tables”⁶. Thus data could be made available for a whole enterprise but individual processes could be restricted to a sub-set. The implications for commerce were that the accounts, personnel and stores departments etc. could use sub-sets of a master file thus ensuring that confidentiality was restricted to those with a need to know. For Education, a system where the *sine qua non* is the need to disseminate information⁷ and where the use of computers for any purpose was modest before the mid 1980’s, these restrictions are less appropriate. However, the notion of sub-sets is still appropriate in respect of managing the data into orderly chunks. When Historians began using DBMSs the market was stocked with

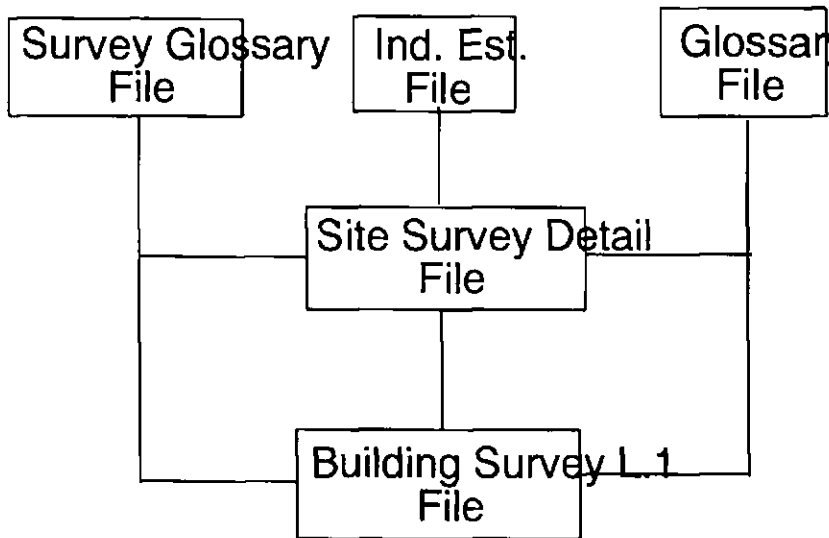
numerous applications designed and refined for commercial users and the majority of these DBMSs were relational. Any historian considering using a DBMS would probably be advised by expert opinion to use a relational DBMS and it would do the job, but when a historian designed a DBMS (s)he started from a consideration of the sources and tailored the DBMS to satisfy historiographical criteria rather than customising an off the shelf system designed initially for some other purpose. This is not to say that historians should eschew off the shelf packages; no one needs to re-invent the wheel, resources for historians to specialise in this area are not abundant and the development time is, if not on a geological scale, at least on a historical one.

A strength of a relational database is its ability to combine information from different file⁸ sources into a display table. Therefore a relational database has the ability to retrieve, combine and display data from many files. It does this by generating a query in a Structured Query Language (SQL), hence users of the system are required to have at the very least a basic knowledge of the particular programming language. Such restrictions place limitations on the use of data sets structured in this way because the high learning curve for SQL has to be balanced against other subjects on an agenda. This should not be insurmountable as SQL skills are highly transferable and thus desirable, but the paranoia effect on non-computer literate undergraduates, particularly mature students is a formidable barrier that discourages many from considering such an option. An alternative system is for the designer of the DBMS to anticipate the working procedures of the users based on common historiographic practices and techniques and

provide for them by constructing initial display environments that re-create familiar research domains such as are commonly encountered in libraries, museums and archives.

Major alternatives to the relational model (RM) are the hierarchical model (HM) and the network model (NM). Benyon concluded that a HM with its structure of “parent” and “children” sets “... is not flexible enough to deal with the huge number of database applications” citing its propensity to encourage redundancy, asymmetry and complexity. He considered the extended hierarchy of the NM overcame many of the problems of the HM but at the expense of even greater complexity. The “parents” and “children” of the HM become the “owners” and “members” of the NM where the owner in one set (or link) can be a member of another. Different types of record he cautioned, required different types of operators to manipulate them, but he conceded however that “...it may be a perfectly good method of implementation and may give a very good physical performance.”⁹ The LVIHEA files are structured as a network precisely because of their explicit and different record types and operators.

LVIHEA FILE STRUCTURE NE (Level 1)



It is a significant concern that the ensuing LVIHEA data set is accessible to potential users with varying degrees of DBMS expertise. A non-relational DBMS: Filemaker Pro™ (FMPRO) was chosen for two persuasive reasons; first, decidedly diverse record categories and the associated difficulties of fully modeling them before data collection commenced were anticipated and secondly, the IT skills required to create, maintain, update, consult, sort and query it are rudimentary. The expected diversity in record categories was due to several factors: the predictable variation in document format amongst the enterprises, local and national government and trades union sources, and the very limited amount of published synthesized material that might elucidate some provisional parameters. Since the project is artifact led, the DBMS ought to be intrinsically source (data) oriented because, although a reasonably clear idea of the sort of data available was perceived, the survey would as is the nature of archaeological programmes, yield unexpected finds. Ensuring that relationships between entities were fully normalised¹⁰ in

advance did not seem so high a priority because of the large scale of the project, the knowledge that its scope was well beyond the resources of this phase of the programme and its remit to produce a prototype. This project is in effect a preliminary survey with breadth of detail initially more valued than depth of detail. Relational strategies; regarded as so important when a fuller picture is developed, could realistically only be considered when a clearer perspective of the various enterprises together with some degree of rationality was established. Meanwhile the information gathered from the survey was to be used as a resource for a "Computing for Historians" course and in the future to form the basis of a teaching and learning system for the study of industrial heritage and its management. It had therefore to present a welcoming and congenial environment to its potential users especially those with little IT experience.

The nature of the information that can be displayed, and how comprehensively and speedily the data set may be interrogated is of more concern here than a comparison and evaluation of the relative merits and demerits of relational and other databases. History is made up of the experience and imagination of active individuals operating in our past. The history of today's Britain is that of over 55 million people multiplied by each instant of their existence. When this history is recorded inevitably much will be discarded by design and by accident and will continue to be lost as the sum of the data grows and the information is condensed. All historical sources (with the exception perhaps of real time "events" recorded on film or video, though even in this case a decision about where to point the camera is a political one) are editions of a subjective perception. It is in

short, impossible for the historian to be in full possession of all the different versions of past reality. (S)he exercises a judgement based on the possession of information filtered through an individual *weltanschauung* and collated with notes, charts, calculations, sketches and scribbings to produce a coherent account, that even if “perfect” will be re-assessed within a generation or less. IT can provide for future historians by allowing data collection to be contained in a format that can be more easily re-examined not least because it can be updated *without compromising the integrity of the original data*. What would the classical historian be prepared to give for access to Thucydides’ sources or the medievalist for Froissart’s? Consequently a priority should be the consideration of effective ways of storing information so that future historians will not have to duplicate research, but appraise it in relation to further detail, contemporary attitudes and new metaphors.

FMPRO does not have the ability to create and combine tables¹¹ of information in the manner of a relational DBMS. Such two-dimensional tables enable selected information containing specified (related) criteria to be organised and displayed. In other words at the discretion of the operator, some information in the file(s) is hidden and some is displayed without undue repetition. FMPRO unlike the two dimensionally tabled relational database is “three dimensional” in the respect that whereas the relational database can only store atomic detail at each intersection of column and row¹², FMPRO can include repeating fields at such a *virtual* position. Through the provision of customisable *Layouts* FMPRO can effectively anticipate and mimic the “relationals” by placing on display, information

that in a relational DBMS would customarily be generated by carefully structured query. As the screen display is to all intents and purposes *wysiwig*, these layouts can also be forms and can include background art, field borders, colouring and shading in addition to multimedia fields. The files may contain some fifty fields but; with a little thought about design, *layouts* can be devised which use only some of the information and can be classified under headings that prompt their use in specific circumstances. Data can be appended, amended and deleted in any layout and those changes are effective for all layouts of the file. The LVIHEA has several layouts labeled for example: "Research" which consist of unique identifiers plus summary and calculation fields; "Legal Details", a sort of number, rank, name of the enterprise; in addition to the comprehensive main "working" layout for entering data. Layouts can be arranged as though they were pages: Page 1 = Legal Detail, Page 2 = Locational Detail, Page 3 = Architectural Detail, Page 4 = Historical Detail, Page 5 = Research summary etc., so that the user can step through the system armed with a "book" metaphor.

The LVIHEA database fields have been arranged to contain text, images or sound and contain a variety of features such as auto-entry, look-up fields, pop-up value lists and repeating fields. "Look-up" fields offer a relational aspect to the LVIHEA and have been incorporated for reasons of ease and the maintenance of file integrity. The "owner" is consulted when certain parameters are met, in the case of the "Building Survey L.1" ("member") file it is when the record number matches one in the "Site Survey Detail" ("owner") file. Each field designated as a "look-up" is programmed to receive information from the specified fields of the "owner". Thus the

system enters the data instead of the human operator saving time, effort and maintaining data integrity by negating any possibility of input error that would adversely affect future sorting, searching and querying routines. Look-up fields do not come without problems - modifying the "member" file leaves the "owner" file unaltered - a solution is to restrict access to certain qualified individuals and lock the "look-up" fields. Amendments to these fields can then only be made in the "owner" file and then a "re-lookup" feature is activated to update the "member" file. A restricted user cannot append data to these fields even when raising a new record. This is a double safeguard for the LVIHEA because "look-up" fields are used for the "Building Survey L.1" file which is a "sub-file" of the "Site Survey Detail" file and all buildings' records must have a parent record in the "Site Survey Detail" file. Where a site consists only of a single building it is usually possible to incorporate all detail into the "Site Survey Detail" file, if this is insufficient then a related record can be added to the "Building Survey L.1" file.

The use of a multimedia DBMS presents problems and opportunities for historians. A tabulated list is just one method of presenting related data, but a tabulated list display is not necessarily the most suitable format for non-expert users. It's all very well asking a database to tabulate the name, address, owner, floorspace etc. of (say) *all* electrical enterprises *in* London N18 and receiving an on screen list of perhaps 20 enterprises. Generating a photograph of each site alongside its details is impracticable. For the field to accept a picture of workable size, the tabulated listing would be reduced to two or three items per screen display. The more variables specified for a

tabulated list the more complex and unwieldy it becomes, eventually becoming an inappropriate way to retrieve and display information. Multimedia fields can be incompatible with a tabulated format simply because of the variation in the size of fields. A text field might measure (say) 20 X 100 pixels whereas 200 X 125 pixels would be a more appropriate size for photographs and video clips. Then there is the nature of the enquiry to consider. In many instances a tabulated list as described above is most useful for the summary information it can infer (number, average etc.), or as a preliminary to further action. For example: visiting the site(s) or selecting subjects from the list for fuller investigation quite possibly of information already contained within the file. This is an over-simplification, but illustrates the different approaches an expert and a novice might follow when consulting a dataset. I contend that an expert can quickly create their own recipes to generate information in an acceptable format (perhaps as a preliminary to some quantitative analysis), while a novice is helped if his/her servings are presented *à la carte*.

Theoreticians of the commercial DBMS world have argued that data should be modeled and the processes of retrieving information derived from that data should be subservient to that data model. Thaller and computer literate historians seem to support this assertion though they use the term “source” rather than “data” driven with reference to historical DBMSs. Is there a significant difference between sources and data? The data driven approach focuses on the entities, which in the case of the LVIHEA would include buildings, people and machinery, working practices (originally processes but entities to the historian). The process driven approach involves

working backwards from the required outputs to determine the required inputs for the system (typically using flow charts) and subsequently data files are finally designed as a “...by-product of process design”¹³. The danger in following the process driven model is that existing work practices may be incorporated into the new system although they may be redundant, inefficient or counter-productive.

Sources for Historians	Processes for Historians:
Documentary (including text, illustration, photo, film & video)	Data Gathering
Artifacts	Evaluation (of source integrity and data)
Oral Testimony	Quantification
	Comparison
	Analysis
	Interpretation
	Reporting

Commercial design processes attempt to ensure some balance between the data and process driven models but in reality are heavily biased towards the data driven model. Business records tend to use standardised data sets and are nominally complete. This is not the case with historical data, therefore the historian using DBMS applications designed for business clients would, to use a well worn example, be rather like doing a jigsaw puzzle with many missing pieces and no illustration. The source driven approach takes into account the fact that the originator has already processed the data within a

source and as even like sources are not standardised to a degree acceptable for database modeling, the processed data has to be further processed for incorporation into a database. In historical studies however the processes (or methodologies) can be as important as the data so it is incumbent on historians to invest more thought in the process approach. The data should be viewed on its merits but some established processes are likely to be pertinent and therefore should form an integral part of the system planning. For example, data gathering is a subjective act requiring observation and interpretation. It is however susceptible to oversight, inaccuracy and misinterpretation. The survey files are constructed to take account of entities of interest to the historian in respect of (say) date, style, associated persons, continuity, historic processes and methods. Further, it should provide for quick and easy consultation, summarising, quantification and analysis as required, but it must be tolerant of a valued judgements, assumptions and a certain vagueness because ultimately history is an art not a science.

History students have often been provided with little opportunity to consult or construct a DBMS. Their studies would normally have led them to an array of mostly documentary primary and secondary sources. Increasingly however there is a trend towards providing electronic data sets for historians. Early historical data sets typically consisted of tabulated data in the form of e.g. censuses, estate records, inventories and registers etc., which reflected the capabilities of the available IT equipment and more crucially the sort of use made of it as much as the research interests of the historian. Improvements in DBMS technology have enabled the incorporation of multimedia data with stunning consequences. Now a

DBMS can for example include facsimiles of original documents.

Consequently historians are not obliged to use exact techniques when confronting inexact data, in other words the evidence can be presented and a thesis postulated on the basis of that stored information. Nodes of history do not necessarily fit into a logical pattern, relationships between events may be coincidental; it can therefore be inappropriate to relate some entities. History is not an exact science: opinions, prejudice, stupidity and greed have as equal a role to play as fact, tolerance, sagacity and altruism. The historian selects from the incomplete, rationalises, and keeps his fingers crossed. In the circumstances using the IT tools and criteria of the business world; with its quest for absolutes preparatory to logical economic decision making, for historical purposes is like using a hammer to tighten a screw, it works after a fashion but can you release the screw with a hammer? The point here is about absolutes: if you have the correct data, and all of it, you may still have more or less data than the historic actors possessed. Therefore, the logical decision a historian might reach will probably be different from the logical decision the participants reached. Even if the conclusions do turn out to be congruent, there is no telling whether they were reached for the same reasons or even whether the same conclusion was reached logically in one case and illogically in the other. For the very reason that history is inexact there will always be the tendency to give great credence to research that uses “scientific” methodologies. Certain bravery is required when challenging summaries produced using quantitative techniques on computers capable of performing millions of calculations per second.

Importantly editions¹⁴ of original sources can be made and incorporated into a DBMS. Editions are important and valid historical tools and should not be seen as bowdlerised versions, at their most basic the first edition of a first generation facsimile (say Domesday Book) might be a translation from the Medieval Latin to Modern English. Subsequent editions might reflect a compromise between two or more authentic but differing contemporary manuscripts. Other editions might involve the correction of acknowledged errors in the original. Later editions might include the editor's interpretation of controversial issues. All are historiographically valid. Datasets are under-used resources despite being conveniently arranged and easily manipulated. This may be because they utilise modern (in comparison to handwritten or printed records) technology that is either unavailable in universities or available but underused because many historians have not acquired the appropriate IT skills. The situation could be improved by providing a curriculum covering ways in which historical material and the analysis of that material may be made more central to the process of learning about computing. The process of discovery should be led by historical interests which should not exclude but encourage use of a substantial library. The teaching of computing to history students should more closely replicate the experience of discovery undergone by most computer literate historians; that historical issues drive the learning process. Based on the Lee Valley Archive material drawn from the database, students could acquire or enhance skills in gathering historiographic material through on-site survey, public and business archives, self - test exercises and by providing précied anthologies.

PROJECT DATA FILES: FIELD DESCRIPTIONS & DATA MANAGEMENT

Introduction

The LVIHEA contains three main survey files, the Ind. Est. Survey file, the Site Survey Detail file and the Building Survey L.1¹⁵ file comprising data from over 1000 sites. Data has been obtained from independent data sets and from personal on site surveys supported by photographs and/or video recordings. Facilities to record data at levels 2, 3, & 4¹⁶ have been created in a series of sub-files but currently contain only minimal data. The other survey file described is the AIA file, an external system devised by the Association of Industrial Archaeology (AIA) for the use of local industrial archaeological societies to standardise their survey data for incorporation into the Sites and Monuments Record (SMR) computer. It is included so that Lee Valley Archive material of historical, archaeological and architectural interest can be exported to it where it is considered appropriate to forward such information to the SMR. These main files are supported by two glossaries one for historical, archaeological and architectural detail and the other containing information on the system and including reserved word lists for the value fields. Reserved word lists are used where possible to preserve the integrity of the data entry process and ensure that future searches are more likely to find complete sets of information. All the files are linked by buttons containing scripts of commonly used routines such as for finding sets of data, summarising information, calculating events etc. The data files consist of fields formatted for text, numbers, dates, time, picture/sound,

calculation and summary. Within these broad categories (excepting picture/sound, and summary fields) are facilities for simplifying data entry and retrieval display. These comprise of value lists, repeating, and auto input fields. The fields to which these features apply are described in tabulated form in Appendix 1.

Field Descriptions

Value List fields

Fields which when created (or subsequently modified) have a list of standardised values attached to them. This makes data entry easier than a succession of keystrokes because a simple mouse click on a value in the field pop-up menu¹⁷ inserts it into the field, and more efficient because it prevents typological errors thus ensuring that subsequent searches on the field are not compromised. It is possible to override selection from the value list and type in a non-standard value as required.

Repeating Fields

The repeating fields option is available where there is the possibility of more than one value being legitimately entered into a field. For example the field "Sources" could reasonably be expected to include details gleaned from physical surveys by project operatives as well as surveyors from the RCHME, plans, documents, photographs etc., the originals often remote from the Lee Valley Archive. In these circumstances, the number of repeats within a field is determined when the field is created but can be amended at any time. When laying out (and modifying the layout) the display of the number of the repeats within a field can be specified as well as whether any repeats are presented vertically or horizontally.

Auto Input Fields

To save data entry time and to preserve the integrity of the file certain fields can be filled with data generated by the computer itself thus reducing the incidence of human error. Serial numbers, file creation/modification dates and calculation fields are all examples where simple processes can be confidently handed over to the computer.

“Look Up” Fields

These fields obtain their values by importing them from other files. This is a relational effect saving time, effort and preserving the record’s integrity by consulting specifically designated fields in a separate file. It mimics the effect of “tabling” in a relational database, thus certain identifiers essential to all of the main survey files in the Lee Valley Archive such as “Name”, “Address” etc., can be entered once and copied. The function can be used when and wherever additional records are needed, typically as more buildings are surveyed and details appended to an existing site record. When values are changed the “Re-lookup” feature can be used to update the data of all “look-up” fields of the file or a number of selected fields. They have limited use for displaying derived data from query routines where it is safer to use customised scripts because all records in the set will be revised when the intention would usually be to update a single record.

Summary Fields

At the simplest level any specified field in a found set of records can be counted and the result of the count placed automatically in the assigned summary field. Other functions like “maximum”, “minimum”, “Standard

deviation” and “average” can only be used when summarising fields of type “number”.

Calculation Fields

A set of mathematical/statistical functions is available to operate in conjunction with many of the fields within a database file. Fields of type “number” are the most conducive because their values are susceptible to a full range of quantitative algorithms found within the DBMS. Summary fields cannot be used as a formulaic component for a calculation field.

Other Fields

Text, number, date and picture/sound fields are more or less self explanatory in describing the type of data they can contain. Text fields can accept numerical data but it will be stored as an alphanumeric value and cannot be used in calculations. Number fields will accept alphanumeric data but only after a dialogue box has been displayed asking for confirmation of the user’s intent to input such data. For calculations and searches, alphanumeric components of a number field are ignored. Date fields will only accept correctly formatted dates while allowing certain conventions to be followed by previously setting the “preferences”. September 30 1994, 30 September 1994, 30/9/94, 9/30/94 are all acceptable formats once specified in “preferences”. Picture/sound fields can accept most images from line art to scanned photographs and video clips. When used as a sound field an icon in the form of a loudspeaker is displayed within the field and double clicking the mouse while the pointer is within the field will playback the sound data. Where a video clip is included, a mouse activated control panel

appears when the field is selected (this is more fully described in the section:
“Capturing Video Images”)

Importing Data

Where one individual is in total control of data input following an on site survey or other data gathering exercise it can safely be entered into the survey files directly via the keyboard. Where several people are expected to enter data, some elementary precautions have to be taken to ensure the integrity of the survey files. Principal among these is that one individual (supervisor) is responsible for verifying the new data before it is placed in the archive. Where information is gathered by a team of surveyors whose sole responsibility is to the LVIHEA the system adopted is as follows. A clone of the original (master) survey file (a clone is a copy of the file structure but excluding data) is created and the new data entered into it. At an appropriate time, the supervisor can utilise the master file's "Import" command to **Add** these new records to the archive. Many of the records in the master survey files were supplied by outside organisations such as Local Authorities and TECs and contain little more than legal and locational details. As these records are systematically checked and embellished with descriptive detail by on-site survey, the original record needs to be updated. If this process is accomplished by someone other than the supervisor the procedure outlined above should be followed but with one major difference: those original records have to be replaced by the new and verified records. When importing records to **Replace** existing records it is essential to ensure that both import records and target records are in an identical order otherwise the wrong records will be updated. This is achieved by selecting the master survey file records to be updated using the "Find" and the "Omit" commands and then sorting them into the same order as the new data

records. It is vital to make a back-up copy of the master survey file before using the **Replace** option because once effected it cannot be undone. Where records compiled by outside organisations (e.g. local authorities, TECs etc.) are imported care must be taken to ensure that the fields are aligned with the appropriate fields in the LVIHEA before they are **added**. Where records for import have not been presented in a digitised format and the resolution of the type is of a sufficiently high quality, it may be possible to scan the data into a digital format using Optical Character Recognition (OCR) software. Scanned data is best edited in a wordprocessor and then saved using Tab-Separated Text format to prepare data for import to the survey file. Poor quality resolution of the characters in the scanned document will result in less efficient scanning and consequently more time will be needed for editing. Eventually a stage will be reached where it is more efficient to copy the document by keying the data directly into the survey file.

ATTRIBUTES, FEATURES AND PURPOSE OF THE SURVEY FILES

The Industrial Estate Database File

This is a high-level survey file. It reflects that aspect of industrial organisation where a number of enterprises are gathered together into a definite space reserved almost exclusively for industrial activity (there may be some commercial and retail presence but here “industry” is connotated as “busy-ness”). When fully developed it will assist in the generalisation of environmental features, give clues to the use and re-use of buildings, note creation factors such as whether it was a planned development or more the result of organic growth and whether this growth is continuing. The file

summarises information about its constituent enterprise sites and buildings. Scripts (listed in appendix II) are provided enabling this data to be obtained automatically from the site survey and building survey files. For example, the number of enterprises on an estate is obtained by triggering a routine that consults the “Area Code” field of the “Site Survey Detail” and generates a found set containing the total number of enterprises in the inventory with that area code. To obtain the total number of buildings on the estate the “Area Code” field of both the “Site Survey Detail” and the “Building Survey L.1” files are similarly consulted to generate the found sets. Other commonly anticipated searches and queries to summarise the types of buildings, the industrial classification and the age of the building are also provided. The functionality of the file can be extended to display any of the “Site Survey Detail” file’s principal search fields (and their sum) and group them in a layout displaying a quantitative summary of all the estate's constituent enterprises.

The Site Survey Detail Database File

This is a high-level survey file. It contains records detailing the legal, locational and descriptive features of an individual enterprise at a particular site, which may or may not be a component of an industrial estate. It includes summary details of its constituent buildings. Scripts (listed in appendix II) are provided enabling this data to be obtained automatically from the building survey files. The functionality of the file can be extended to display any of the “Building Survey L.1” file’s principal search fields (and their sum) and group them in a layout displaying a quantitative

summary of all the site's constituent buildings. Further details and an example of a record from this file are given in the section RSAF Dataset.

The Building Survey L.1 Database File

This is a high-level survey file. It contains details of the individual site buildings and is related to the "Site Survey Detail" file by virtue of using the same serial number plus a unique suffix and a number of "look-up" fields. Scripts (listed in appendix II) are provided enabling summary data to be obtained automatically for the "Site Survey Detail" file. Further details and an example of a record from this file are given in the section RSAF Dataset.

QUERYING THE SURVEY FILES

Introduction

The LVIHEA files can be interrogated to give up their information by entering values into selected fields while in the DBMS "Find" mode, this is known as querying the file. At its simplest all occurrences of (say) the enterprise "M K Elect." would be displayed as a found set if "M K Elect" was entered into the field "Site Name" while in the "Find" mode. The query can be narrowed by entering conditional values into several fields before performing the find; this is known as the "logical AND condition". Similarly it can be broadened by using the "New Request" (or "Duplicate Request"), this is known as the "logical OR condition". Querying the database is more efficient if there is a high degree of standardisation within particular fields. Care must be taken to ensure that the values entered into the file are accurate, thus if some M K Elect. sites were entered into the file as "MK Elect" (note the missing space between M and K) then the query would not find all of the records relating to that enterprise (unless the logical

OR condition was invoked). For this reason value lists have been applied to fields wherever practical so that input errors are reduced and file integrity maintained. For the same reason all subsequent query criteria should also be input from the value list. Where the input value is usually a proper noun, it is impractical to apply a value list, but where a finite accumulation of values is expected value lists are a considerable asset. There is however virtually no limit to the theoretical size of a value list, where they contain a few values as for example for the field "Recorder" their major advantage is most likely to be their ease of input. However value lists can be more sophisticated, they can be arranged to reflect a hierarchy of values which can be advantageous when the nature of the query is to systematically narrow down the criteria to home in on particular attributes. One such field is the "IRIS CLASS" field and a description of the field and its use is the subject of this section.

Description

"IRIS CLASS" is a scrolling text field containing an extensive "pop-up" value list. The contents of the value list are organised into three primary categories which are **INDUSTRY**, **SETTLEMENT**, and **INFRASTRUCTURE**. Nested within these primary categories are secondary categories such as **FUEL & POWER PRODUCTION**, **ENGINEERING** etc. The tertiary level is more enterprise specific enabling the primary function of a site to be described. The components of the value list are based on the IRIS Class List¹⁸ with my own discretionary additions.

Contents

<u>Industrial Classifications</u>
Hierarchy
<u>INDUSTRY [IND]</u> (Primary Level)

FUEL & POWER PRODUCTION [FUEL] (Secondary Level)

MINERAL EXTRACTION [MNRLEXT]

ENGINEERING [ENGI] Etc. etc.

*AgrEng Agricultural Machine Manufacture
(Tertiary Level)*

*AircraftEng Aircraft Engineering
Etc. etc.*

INFRASTRUCTURE [INF]

TRANSPORT [TRANSPORT]

COMMUNICATIONS [COMMUNIC] Etc. etc.

Post Postal Service

Radio Radio & Television

Tele Telegraph & Telephone

OthComm Other Communications

Etc. etc.

SETTLEMENT [SET]

CIVIL-ADMINISTRATION [ADMIN]

COMMERCIAL [COMMERCIAL] Etc.etc.

Accom Accommodation

Bank Banks & Money Markets

Office Commercial Offices

Retail Retail & Wholesale Distribution

Etc. etc.

The value list is structured to take account of a deepening knowledge of the enterprise. If details are scarce it may only be possible to classify it as either INDUSTRY [IND], INFRASTRUCTURE [INF] or SETTLEMENT [SET]. For example, a site may be owned by say British Gas but the function of the site may not be known, therefore the broad classification INDUSTRY [IND] should be used. Further investigation may show that the site is/was used for the production of coal gas, in which case the more narrow classification: CoalGas [FUEL] [IND] should be chosen. Again the site might be used for the production of chemical by-products so the

classification: CoalBy [CHEM] [IND] would be appropriate. If the site is a regional depot storing coal for use at local gasworks then: Storage [COMMERCIAL] [SET] (though in this case it would be useful to manually enter “Coal” as an addition).

When querying at the highest two levels of the hierarchy only the characters inside the square brackets should be entered. It is however unnecessary to enter these major classification as well as the minor when querying at the lower levels, because each classification includes all its associated higher level classifications. This can be simplified by giving an example. If a query is launched to find all records with a value in the IRIS Class field of “[IND]” then a found set of 456 records will be obtained. If the secondary level classification “[FUEL]” is used then 9 records will be obtained. If “CoalGas” is used then 2 records will be obtained.

Querying is a major consultative function of a DBMS, the more speedily and efficiently it can be performed the better. The most efficient queries operate by using number formatted fields. Many organisations create elaborate numeric and alphanumeric codes for the input of values. There is though a price to pay for this efficiency and that is loss of clarity. As the LVIHEA is targeted at both expert and non expert users it tries (and probably fails as is the way of these things) to make the best of both worlds by making increasing use of structured language for the routines considered most likely to be used by experts.

FILE LINKAGES AND RELATIONSHIPS

Introduction

The survey files of the LVIHEA are linked to each other through a network of relationships. For example the “Ind. Est. Survey File” is associated with the “Site Survey Detail” file through their “Area Code” fields and the “Site Survey Detail” file with the “Building Survey L.1” file via the “MULVI Number” fields. Where practical it is permissible and desirable to use identical field names in different files for those fields whose function is the same or similar to each other, for no better reason than to assist the human memory to cope with the already large data dictionary. The links take various forms, some fields automatically look-up values from another file when new data is entered into a specified field. On other occasions the values in fields are consulted through programmed scripts which can be activated via buttons, from a drop-down menu, or in some cases just by entering the field with a mouse click. Ancillary files like the “Glossaries” can be opened and the required record accessed automatically by highlighting a reference in a survey file and activating a button. These references are colour coded such that any word coloured red indicates a glossary entry is available, while green indicates an entry in the “Artifacts” file and magenta: the “Bibliography” file etc

The structural heart of the LVIHEA is the site detail because a site may or may not be part of an industrial estate and may or may not contain many buildings. Therefore the first direct relationship is between the Site and the “Site Survey Detail” File, details of site buildings are accessed via the “Site Survey Detail” file link with the “Building Survey L.1” file.

This path is desirable to differentiate between buildings on different sites of the same enterprise (company). The “Ind. Est. file” though containing original and site and building independent data, draws much of its information from the “Site Survey Detail” and “Building Survey L.1” files but does not include information from independent sites. The “Documents”, “Artifacts”, “Building Index”, “History”, “Bibliography” and “Biography” files are sub-files of the “Site Survey Detail” and the “Building Survey L.1” files and contain information derived from higher level surveys¹⁹. These sub-files have no direct link to the “Ind. Est. File”. The glossary files are linked to the “Ind.Est. File”, the “Site Survey Detail” and the “Building Survey L.1” files but not to the sub-files at this stage of development, however as more information is derived from higher level surveys such links can easily be established if required.

Site Survey Detail

The “Site Survey Detail” file contains records that consist of fields and buttons. The fields contain legal, locational and descriptive information in text, number, date, graphical and sound format. The Buttons activate links to external applications programmes and other database files either direct to the relevant record or to the last record browsed.

Bulding Survey L.1

In all structural essentials, this file is the same as the “Site Survey Detail” file.

Glossary File

Structurally the “Glossary file is similar to the “Site Survey Detail” and “Building Survey L.1” files. The “Find Set” button contains instructions to look up both of these files preliminary to producing a merged report.

DATABASE SCRIPTS - Functions

The following section nominates and describes the scripts (programs) which give extra functionality to the files. A full listing of the scripts can be found in Appendix 2

IND EST FILE

Enterprise Total

Function

To keep the “No. of Enterprises” field updated with data from the “Site Survey Detail” File. Data from the field: “Area Code” is copied to the clipboard and after opening the “Site Survey Detail” file, the external script “Number of Enterprises” from the “Site Survey Detail” file is performed (see below). The resulting data is then pasted into the “No. of Enterprises” field.

Building Totals

Function

To keep the “No. of Additional Buildings Surveyed” field updated with data from the “Building Survey L.1” file. Data from the field: “Area Code” is copied to the clipboard and after opening the “Building Survey L.1” file the external script “Find All Buildings for Ind Est” from the “Building Survey L.1” file is performed (see below) including the sub-script “Get Number of Site Buildings” (see below). The resulting data is then pasted into the “No. of Additional Buildings Surveyed” field of the “Ind. Est Survey” file.

Site Classification

Function

Displays the sum total of a particular class of industry within an estate, after a value has been entered into the “IRIS Class” field. The routine is paused in the Find Mode of the “Site Survey Detail File” to verify the area code (which distinguishes the estate), plus any other (optional) values required by the search criteria, (this is necessary because only one clipboard is available to store the copied data). Upon resumption the search is performed, browse mode is re-entered and the value in the field “Total Number of Enterprises” is copied and then pasted into the field “IRIS Class Total” of the “Ind. Est. File”. The display will then show the “IRIS Class” value and below it the sum total of enterprises corresponding to that value on that particular industrial estate.

SITE SURVEY DETAIL

Go To Building Survey

Function

Opens the file “Building Survey L.1”, locates the entire individual building records on the specified site and displays them as a found set.

Survey Form Glossary

Function

Opens the “Survey Form Glossary” file, selects the “find” mode and pastes the field name (stored in the clipboard) into the field: “Word”, finds and displays the relevant record.

Glossary

Function

Allows expressions displayed in red in the “Site Summary” field to be looked up in the glossary file after they have first been highlighted.

Find Corresponding Record

Function

Designed to be used as a Sub-Script enabling related records in the “Site Survey Detail” file to be found from a script originating in another file.

Find Set

Function

Designed to be used as a Sub-Script enabling a set of records including a word selected from the glossary file to be found and displayed. The “Site Summary” field is the major descriptive field of each record.

Re-serialise MULVI No.

Function

Allows the serial number(s) of the found set (MULVI Number) to be permanently replaced (with specified increments).

Copy Map Ref

Function

To amend the map references of a suite of records. Required because initially unverified data from independent sources has since been checked or because of the subsequent availability of large-scale maps allowing for greater accuracy etc.

Go Hypercard™

Function

Opens and displays the Hypercard™ stack “Map” which displays the structural organisation of the folder “Industrial Heritage” that contains stacks relating to various aspects of the Lee Valley Industrial Heritage. Each expression within “Map” is a hotkey button with a script that allows the user to navigate directly to the chosen stack.

Number of Enterprises

Function

Primarily used as a sub-script of the “Enterprise Total” script in the “Ind. Est. Survey File”. It identifies the number of enterprises recorded on an industrial estate by using the “Area Code” field data as the find criterion. Initially finds all records and opens the “Research” layout that contains summary and Calculation fields. Performs a find of records that match the search criteria pasted into the “Area Code” field, on completion of which it copies the data displayed in the “Total Enterprises This Set” field to the clipboard.

Bibliography

Function

Opens the RSAF Bibliography file, (will later extend functionality of this file to all enterprises with a bibliography by linking a key field to obtain a found set).

Go Help

Function

Opens the Help file.

Site Only

Function

An authoring script designed to save keystrokes when amending a sole “Site Survey Detail” file record that has since had related “Building Survey L.1” file building record(s) appended.

Get No of Buildings on Site

Function

To display the total number of buildings related to a particular site by counting the related building records in the “Building Survey L.1” file. Used with the Layout: “Research”.

Note: Where no found set of buildings exists for a site (either because it is a one building site or the on-site buildings have not been physically surveyed), the total number of records in the Building Survey L.1 file is automatically entered into the “No. of Buildings This Set” field and subsequently pasted into the “No. of Site Buildings” field (if the “Continue” option is clicked).

Cummulate Building Totals

Function

Searches the “Building Survey L.1” file for all buildings having the same “Area Code” (i.e. on the same industrial estate) as the record being browsed in the “Site Survey Detail” file, and records the total in the field: “Additional Buildings Surveyed on Estate”.

Listed

Function

Finds all sites that include listed buildings, <“YES”>, (plus buildings that in the opinion of the recorder, should be listed, <“? YES”>) and displays the records as a found set.

Search on IRIS Class

Function

Finds a set of records according to a value pasted into the field “IRIS Class” and enters the sum of that found set into the field “Total Enterprises This Set”.

BUILDING SURVEY L.1

Go To Site Level 1

Function

Opens the file “Site Survey Detail”, locates the specific site; of which the building in the Building Survey L.1 record is a part, through the MULVI Number and displays it.

Survey Form Glossary

Function

Opens the “Survey Form Glossary” file, selects the “find” mode and pastes the field name (stored in the clipboard) into the field: “Word”, finds and displays the relevant record.

Glossary

Function

Allows expressions displayed in red in the “Bldg Summary” field to be looked up in the glossary file after they have first been highlighted.

Find Corresponding Record (Sub-script)

Function

Designed to be used as a Sub-Script enabling related records in the “Building Survey L.1” file to be found from a script instruction in another file.

Find Set

Function

Designed to be used as a Sub-Script enabling a set of records including a word selected from the glossary file to be found and displayed.

Go to RSAF Building Index

Function

Opens and displays the file “RSAF Bldg Detail” at the first record. This is an index file compiled from documentary sources rather than a physical site survey.

Go to Artifacts

Function

After expressions displayed in green are highlighted, opens “RSAF Artifact 1988” file and locates the appropriate record by performing the sub-script “Find Artifact”.

Docs

Function

After expressions displayed in Pink are highlighted, opens “RSAF Docs” file and locates the appropriate reference by performing the sub-script “Find”.

Go To History File

Function

Selects a building number and looks up its incidence in the History file. Presents a found set of year records containing that building number by performing the sub-script “Find”.

Go Hypercard™

Function

Opens and displays the Hypercard™ stack “Map” which displays the structural organisation of the folder “Industrial Heritage” that contains stacks relating to various aspects of the Lee Valley Industrial Heritage. Each

expression within “Map” is a hotkey button with a script that allows the user to navigate directly to the chosen stack.

Find Corresponding Record Area Code

Function

Enables a set of records to be found based on a common Area Code.

Find All Buildings for Ind Est

Function

Enables a set of records to be found based on a common Area Code.

Particularly used as a sub-script for the Ind. Est. Survey File script “Building Totals”.

Find all Buildings for Site Survey

Function

Used primarily as a sub-script to the “Site Survey Detail” file script: “Get Number of Buildings on Site”. Finds a set of records and copies the value in the field “Number of Buildings on Site” to the clipboard.

Get Number of Site Buildings

Function

Copies the value held in the summary field that is a count of the records in a set found using “Area Code” as the search criterion. Particularly used as a sub-script for the “Find all Buildings for Site Survey” & “Find all Buildings for Ind Est” scripts of the “Building Survey L.1” file that are themselves sub scripts for the “Site Survey Detail” file script “Get Number of Buildings on Site” and the “Ind. Est. Survey File” script “Building Totals” where the “Clear[]” code is to ensure that the “MULVI Number”/“Area Code” copied earlier in the script and no longer required is deleted.

GLOSSARY

Go to Site Survey

Function

Opens, or if already open, returns the user to the “Site Survey Detail” file.

Does not perform a find function.

Survey Form Glossary

Function

Opens, or if already open, returns the user to the “Survey Form Glossary”

file. Does not perform a find function.

Go to Building Survey

Function

Opens, or if already open, returns the user to the “Building Survey L.1” file.

Does not perform a find function.

Find Word

Function

Used as a sub-script to find a record based on data from another file e.g.

“Site Survey Detail”, or “Building Survey L.1”.

Find Set

Function

After manual selection of a Word Field entry, searches for incidental records in the Site Survey Detail and Building Survey L.1 files. Displays both found sets.

Look Up

Function

After manual selection of a (red) highlighted word in the Description Field, searches the Word Field of the file for the corresponding record.

SITE SURVEY GLOSSARY

Go to Site Survey Form

Function

Opens, or if already open, returns the user to the “Site Survey Detail” file.

Does not perform a find function.

Go to Building Survey Form

Function

Opens, or if already open, returns the user to the “Building Survey L.1” file.

Does not perform a find function.

Glossary

Function

Opens, or if already open, returns the user to the “Glossary” file. Does not perform a find function.

Find Word

Function

Used as a sub-script to find a record based on data from another file e.g “Site Survey Detail”, or “Building Survey L.1”.

HISTORY RECORD NO. 1

Get Building Numbers

Function

Opens a dialogue box that specifies fields for export, where the field “Bldg Num.” is pre-selected. Clicking “o.k.” exports the records to a specified file.

ARTIFACTS

Sub-script “Find Artifact” only - see above .

DOCS

Sub-script “Find” only - see above

RSAF BLDG DETAIL

Sub-script “Expt Bldg Numbers” only - see above .

THE RSAF DATABASE SET

Introduction

The RSAF record set is a comprehensive example illustrating the subject material contained in the LVIHEA. The general site and building descriptions are included but otherwise no other field contents are displayed.

Files

Data concerning the RSAF occurs in several files:

Site Survey Detail

Contains 1 record for the RSAF that is the entire site at Enfield Lock and has a general description as follows:

Workers cottages listed. Several plans in the PRO dating from 1812 showing the intended arrangement of buildings comprising the new factory, with the main mill at the southern end of the long thin site with cottages for the workforce fronting on to the canal. This layout was used almost unaltered and can be seen on the plan of the factory dated 1827. Andrew Saint a historian from Enfield suggests in A historians report (EN27) that none of the buildings from this date survive, but Neil Burton, former historian suggests that the worker's cottages No.'s 4-14 Government Row are of a mixed build dating from 1816 (The first date of occupation) with additions and alterations c. 1857. (See EN 8). The poor performance of the British in the early years of the Crimean War led to an expansion of the factory 1854-8 which included the building of the Machine Shop, more workers' housing, a School and Church, The latter buildings now demolished. Further additions were made in the late C.19 & C.20. The factory was closed in 1988, the site has been sold and is awaiting re-development.

Instructions are displayed in Blue Type. The instruction: **Click "Go to Bldg Survey" Button**, indicates that further information on individual buildings can be found in the Buildings Survey L1 file. Pointing the mouse at and clicking on the button activates a small programme that opens the file, finds references to the RSAF and displays all the found records as a set.

The Site Survey File is an access file to the entire Electronic Archive. As such, it contains legal, geographic and some generalised historical and macro-economic detail. For example, the name, address, map reference whether or not it has protected status of any kind, when it was founded what its primary function is, where it was re-located from and why and finally a list of sources of information. In addition to this initially displayed material there are four **buttons** located around the file heading. The “Go To Bldg Survey” button has been described above and the other three behave in a similar fashion. The “Glossary” button can be activated after highlighting any word printed in red in the “Site Summary” field to display a detailed and often illustrated description of that word. The “Survey Glossary” button transfers the operator to a file containing a description of the fields that make up both the Site Survey Detail and Buildings Survey L.1 files. It is not possible to highlight the field name while in the “Browse” mode. An option is to type the field name into a field, highlight it and use the cut facility (which ensures that the name is removed from the field as soon as its function is fulfilled) from the edit menu before clicking the “Survey Glossary” button. The field name cannot be cut or copied from the layout mode, as here it is not in a text format. The remaining button labeled “Hypercard™” is rather different, it enables the operator to exit from the database and go to a separate application programme containing files comprising a presentation of information from the Lee Valley industries.

Buildings Survey L.1

Currently this file contains seven records concerning the RSAF all of which have Grade II listed status. They are the Large Machine Shop and various terraces of workers cottages. The building summary field contains the survey findings (in this case of the RCHME, but usually my own):

Small Arms Factory for Board of Ordnance. Yellow brick with facade in polychromatic brick with red brick dressings and alternate red and yellow brick voussoirs to arches; gabled Welsh slate roofs. L-plan with range of subsidiary buildings to SW of Machine shop. Italianate style front to Machine shop. 23 window range. 3 storey clock tower and belfry to centre, with blind arches to 2nd stage, semi-circular arches with keystones to 3rd stage, stone impost courses and corbeled brick cornice beneath hipped roof; lower stage has semi-circular arch over C20 door with fanlight. Windows with glazing bars set in semi-circular arches linked by red brick impost course; red brick corbeling beneath frieze of diaper work and moulded stone cornice. Right side elevation, partly in similar style with semi-circular arches over doors and windows, has range of 9 north-light gables. Interior: 12X14 bays to front, defined by cast iron columns at 20 ft intervals, supporting wrought iron trusses with rooflights; all columns cast with Board of Ordnance initials. Central brick wall, painted, to north of which the structure continues for another 14X15 bays to the rear wall which has round arched windows. The majority of columns and roof construction here is similar in detail to those already noted; some bays re-built in C.20. Subsidiary features: range to west, adjoining River Lee, of brown brick with hipped Welsh slate roofs; 2 Storey east elevation, of 26-window range, has raised storey band and gauged flat brick arches over doors and 12 pane sashes; similar west elevation has timber framed carpenters' shop to rear. History: The machine shop was the largest and most important of the new buildings erected on the Royal Small Arms site in 1854 - 8, the result of a movement to centralise small arms production following the poor performance of British made guns in the early stages of the Crimean War.

Area of Machine shop of 14 X15 bays to rear of central brick plinth and wall is not of special architectural interest. Part of the building is in the District of Epping Forest.

The Buildings Survey L.1 File as been designed to bear as much resemblance to the Site Survey Detail file as possible. Many of the legal and geographical details are identical and have in fact been automatically looked

up by the programme when the serial number was entered and found to relate to the RSAF in the file Site Survey Detail. Such duplication may be considered by some to be redundant and for an operator editing or appending data this is true, but for someone browsing the records for information it was felt that such a display was helpful in preventing that user from becoming disorientated. The Buildings Survey L1 file also contains additional buttons to the Site Survey Detail file. The “History”, “RSAF Bldg Index”, “Artifacts” and the “Docs” buttons link the file to other database files that are described below. Where the button name is in a colour other than black, text of that colour in any of the fields can be highlighted, copied and the button clicked to find the related reference in another file.

History File

The History file contains no data at present, it has been included to anticipate information extracted from documentary sources. Essentially it is a “Year File” summarising certain aspects of an enterprise’s condition and is designed so that comparisons of a data field may be made through time. For Example all the buildings extant in a certain year could be entered and compared with other years. Similarly, turnover and profit can be considered in their own right or to see whether there might be a correlation between for example turnover and the number of buildings. The field “Total Number of Buildings” is a summary field that counts the number of buildings listed in the “Building Nos.” field and displays the sum total which is automatically updated whenever a building is added to or deleted from the “Building Nos.” field. The “Company Name” field looks up the data from the Site Survey Detail file once the “MULV1 No” field has a value entered into it.

The year is an auto entered serial number beginning at 1800 and incremented by 1 for each new record. Out of sequence numbers can be entered by overwriting the auto value however when the next auto entered value is recorded it assumes that the overwritten value still exists and increments it by 1 thus leaving a gap in the year record.

RSAF Bldg Detail

The RSAF has more than 200 buildings on the Enfield Lock site. Many of them like cycle sheds, latrines and small sheds scarcely warrant a detailed architectural survey, but together with the acknowledged more important buildings they are noted in an index type file that is designed to record the building development of the site over time. The "Type Total" field is a summary field that counts and displays the number of this type of building on the site as defined in the "Name" field. Thus, it is possible to view for example the exact number of (say) cycle sheds on the site. However, caution should be exercised as if the whole file is the current set then the type total will include buildings that are not contemporaneous. This should not normally be a problem as typically a search query might define a range of dates within which to operate, thus producing a found set of contemporaneous buildings. A fundamental drawback of using a range of years (entered thus: 1917...1945) is that although it perfectly describes the lifetime of a building it is not conducive to specific searches. If for example, the user wishes to find buildings extant in 1918 and enters "1918" into the field "Year" while in find mode, then any buildings designated by a range of values in the "Year" field which includes but does not specifically or literally mention "1918" will not be included in the resulting found set.

Fields have been designated to account for the occasions a building is re-numbered or demolished and re-built perhaps with a different number, function and design. Two picture/sound fields allow for the incorporation of multimedia data that can facilitate visual searching where the specific detail of the building is unknown or where the progressive condition of the site is sought. The information comes from the periodic building site plan.

RSAF Artifacts 1988

This is a simple index file to log various artifact types from documents, photographs, plaques etc. to material artifacts either manufactured or used at the RSAF as well as capital items that are not permanent site fixtures. Where possible a pictorial record should be maintained in the “Image” field to allow for visual searches where the exact description of the artifact is unknown. The Location field contains a value list that is displayed when the field is activated and consists of the various centres where the artifacts might be held. These options can be overruled by clicking the field a second time and typing in the desired location. This file is linked to the file Building Survey L.1 by the button “Artifacts” (see above). Any text in the Building Survey L.1 file that appears in green can be highlighted, copied and related to this file.

RSAF Bibliography

This file is an index of journal articles and papers, many of them internal. The author’s name and initials, title, publisher (vol.) number and date are all standard text fields in traditional bibliographic format. In addition, there is a text “comments” field into which a precis or summary of the article can be inserted. The image field is for still and video images, several of those included show how video can be used to record a sequence of still images

from the source as opposed to a movie. This is particularly useful where it is desirable to include several still images which formerly would have had to be incorporated into respective individual image fields which would be redundant for many of the records. The sound field shows an icon of a loudspeaker when it contains information and there is an entry in the “comments” field in blue instructing the user to double click the icon to hear the information.

RSAF Docs

This simple index file contains no multimedia fields. The fields are divided into two basic categories, headings and data. The heading fields describe the nature of the information within the document, the sort of media used to contain the document, e.g. “ring binder”, “scrapbook”, ledger etc. the earliest and latest dates of the information and the serial number of the record. The data fields are all repeating fields so that all the subjects covered in each media example can be tabulated under field headings: Contents, Source, Date and Page. Typical entries in this format might be: “Memos from Manager to Barrel Room Foreman”, “C. Sheperd”, “30/8/00”, “2”. Any text in the Building Survey L.1 file that appears in magenta can be highlighted copied and related to this file.

Glossary File

The glossary file is a collection of architectural and building terms. It consists of four fields, the “Word” field is linked to the Site Survey and Building Survey L.1 files through the “Glossary” button which is activated by highlighting and copying any word displayed in RED type. The “Comments” field is a text description of the item and the reference field is a text list of the source. The illustration field is a graphic representation of the

item either produced as a computer aided drawing or animation, scanned image, Photo-CD import, or video movie.

Survey Glossary File

The Survey Glossary File contains 222 records and is for the use of operatives conducting surveys using the Site Survey and Building Survey L.1 files. All the fields found in the survey files are listed with a description and any constraints. Various abbreviations which appear as values in pop-up lists on the survey files are explained e.g. *StneDress* is an abbreviation for “stone dressing products” industrial classification, *CoalBy* an abbreviation for “Coal By-products”, *NPre* an abbreviation for “Non-Ferrous Ore Dressing & Preparation - lead, copper, tin, zinc, gold and silver”.

Biography File

Individuals mentioned in the survey files, often architects, builders, inventors, entrepreneurs will where information is available have an entry in the bibliographic file. Additionally summary details can be extracted from the University’s oral history programme where it includes the testimony of workers from enterprises included in the survey files. The Bibliography file consists of *identifier* fields (“Surname” “Name”, “Inits”, “DOB” (Date of Birth), and “DOD” (Date of Death)), repeating *detail* fields (“Assoc. Cos”, “Honours”, “Inventions”, “Publications”, “Partner”, and “Children”), plus a picture/sound field “Photo” and “Notes” for extra details. Highlighting a name in the survey files and activating the “Biography” button can access the file and the exact record.

HYPERCARD™

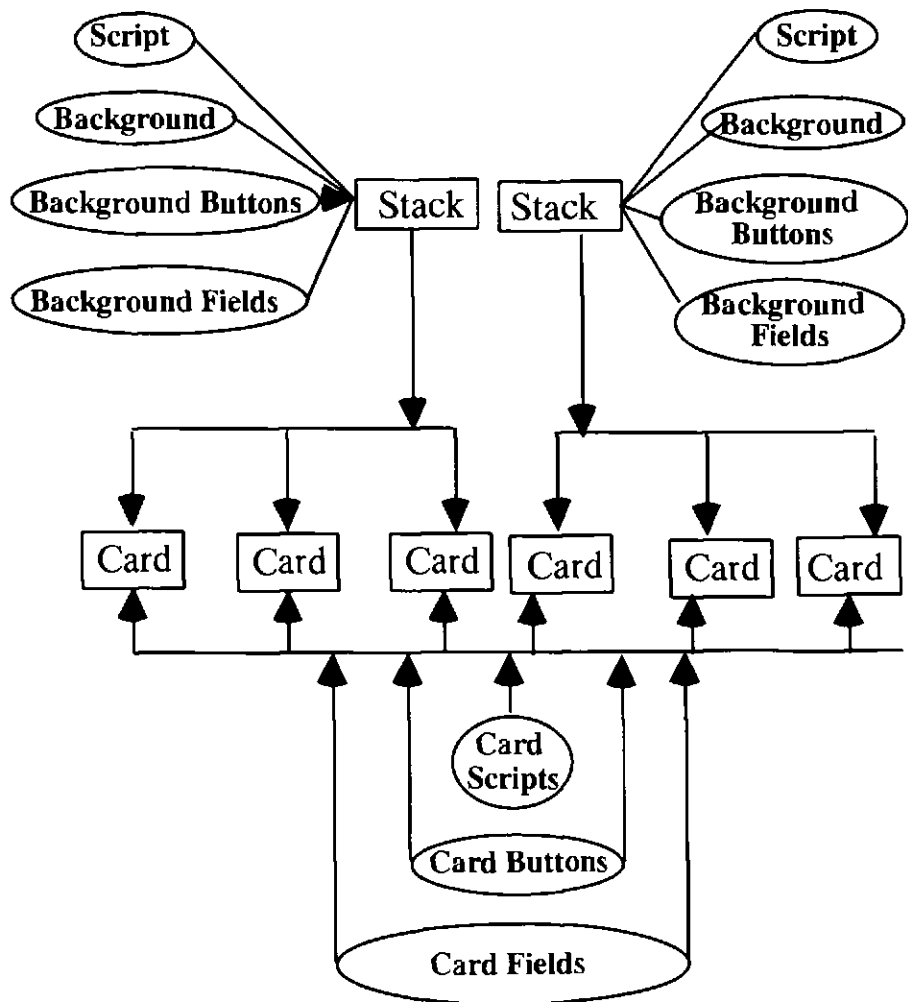
Introduction

What follows is a description of the attributes essential to the understanding and use of Hypercard™ and how those attributes have been utilised to convey summarised information from the Lee Valley Industrial Archive.

Attributes

Conceptually Hypercard™ is a hierarchical system, with the stack at the top and comprising Backgrounds, Cards, Fields and Buttons:

Industrial Heritage



It is helpful to understand that the hierarchy is an efficient way of assigning elemental events and allowing their inheritance by objects lower in the hierarchy. This is accomplished by passing messages up and down the hierarchy, an event designated at the highest (Stack) level is inherited by objects lower down unless specifically negated by an instruction to a particular object or an instruction initiated from within that object.

Stack

A stack consists of a set of record cards that contain information in fields and, optionally, buttons to add functionality against a selected background(s). The Lee Valley Industrial Archive stacks are stored in a folder named "Industrial Heritage" and include:

London Industries & Gen Ind Charts
Lee Valley & Lee Valley Charts
Printing & Printing Charts
Nursery & Nursery Charts
General Eng & General Eng Charts
Chemicals & Chemicals Charts
Foodstuff & Foodstuff Charts
Electrical Eng & Electrical Eng Charts
Vehicles & Vehicles Charts
Clothing & Clothing Charts
Furniture & Furniture Charts
Note pad
Help
References

Card

A record (or part of a record) in a stack having a background, information field(s) and (optionally) buttons.

Background

Applies to all cards in a stack. Anything placed in the background automatically appears in each card of the stack unless specifically hidden by a scripted command. Backgrounds can include artwork, fields and buttons.

Field

An area defined to accept text or graphics. A background field will appear on all the cards of the stack unless specifically excluded. Card fields only appear as a component of the specific card for which they were created.

Button

A device that adds functionality to a stack or card through a scripted command attributed to it and activated by a mouse action²⁰. Buttons can be applied to the stack background or to an individual card. Frequently buttons are hidden to avoid cluttering the display and only revealed through a controlling button. A hierarchy of buttons is thus formed for example the button “Multimedia” has dependent buttons “Pictures” and “Database”; “Pictures” in turn has dependent buttons applicable to one or many cards such as “??? Charts”, “Map” and “Factories”. Sometimes for the sake of clarity the names of the buttons on the lowest rung of the hierarchy may be changed e.g. “MK Elect Factories”.

Scripts

Stack scripts (i.e. background scripts) affect all the cards comprising a stack, therefore any function that is intended for all the cards in a stack can be simply scripted once. Where a stack-wide function is not required for a

particular card, a counter instruction can be authored as a card script that negates the function for that particular card only. Field scripts function similarly to card scripts in that stack (and card) scripts can be negated, amended or created for specific background or card fields. Button scripts are intended to increase the functionality of the project by allowing a pre-set instruction(s) to be carried out when the button is activated.

THE INDUSTRIAL HERITAGE SUITE OF STACKS

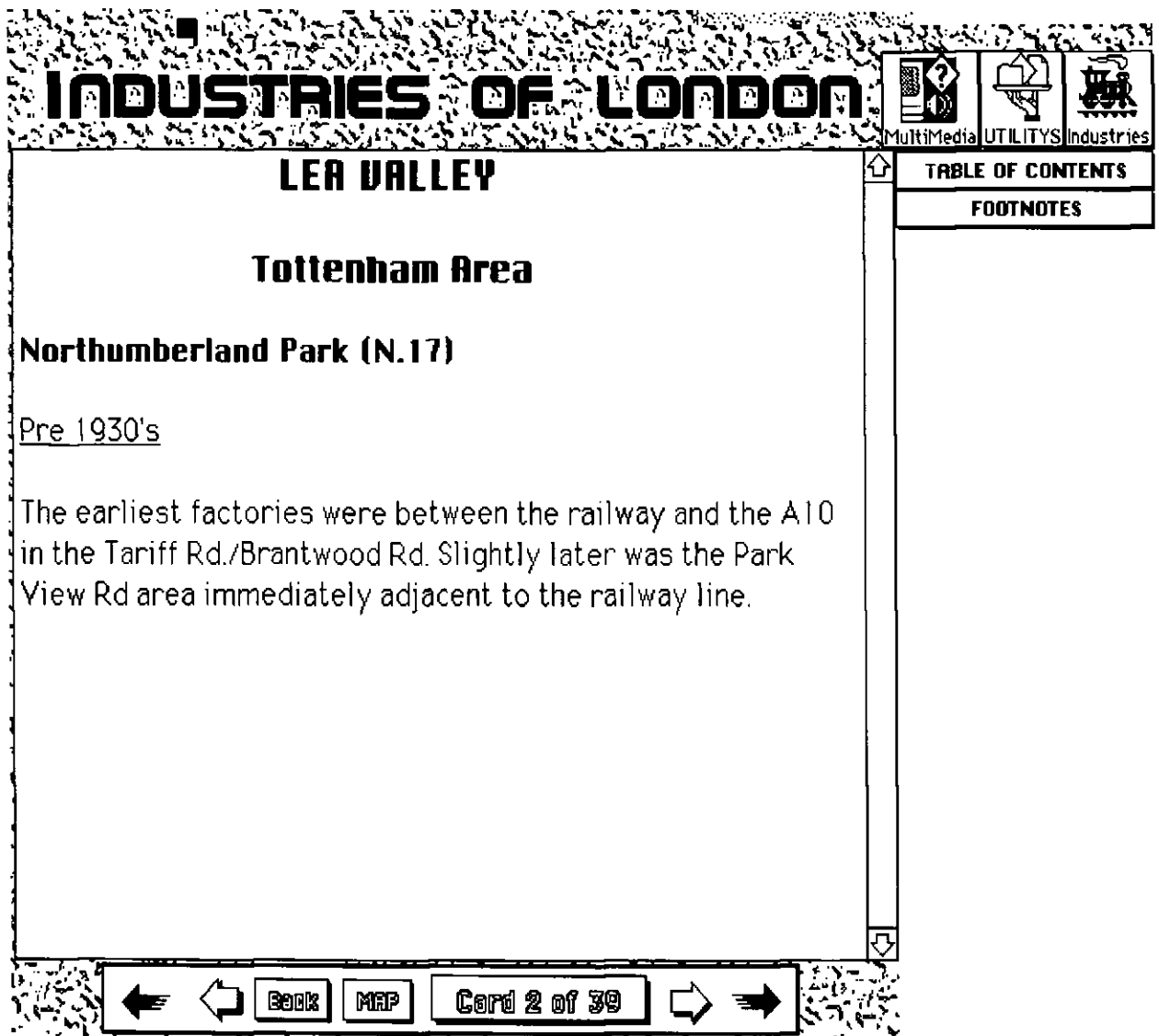
The information is organised into a number of stacks each concerned with a major aspect of the study, typically a specific industry or geographic area. These stacks are interrelated (but not on a hierarchical basis) and share the same basic layout. The individual industrial and locational stacks *do* however have dependent stacks. For example the stack “Lee Valley” is complemented by the stack “Lee Valley Charts” and “Printing” by “Printing Charts”. These dependent stacks can be accessed without first entering their “parent” stack, though this requires an act of will based on a modicum of experience with the system.

Fig. 10 shows the background art, main text field, a navigation bar and some functional buttons. The buttons represented by icons each hide or reveal a suite of specific buttons, while the “Table of Contents” and “Footnote” buttons hide or reveal other fields. From the design perspective this allows a display of the optimum “Seven plus or minus two” (in this case eight) items orthodoxy.

The Main Text field is displayed whenever the stack is opened and all cards in all the industrial and locational stacks share its layout. Only the information within this field varies from stack to stack and card to card. It is a scrolling field enabling it to contain more information than can be currently displayed on the screen at any one time. However, it is not considered good practice to have more information available than can be displayed at any one time, as the intention is to provide information in easily definable and digestible chunks rather than in a document format. In this

respect the information is organised encyclopædically so that each gobbet of information can be closely cross-referenced and those cross-reference enablers (buttons) be accessible *en suite*.

Fig.10



The Table of Contents field is displayed when the “Table of Contents” button is activated by clicking and holding down the mouse button, it is hidden when the mouse button is released. To keep the field displayed the mouse pointer should be dragged clear of the button before release. A further click of the button hides the field. The field displays the name of each card in the stack in whatever sorted sequence has been defaulted. Clicking any card name in this field transfers the display to that card;

effectively it is an automatic page index. As other cards are appended or deleted, this page index can be updated by holding down the option key and clicking the mouse while its pointer is positioned anywhere within the field.

The Footnotes field is displayed or hidden by activating the “Footnotes” button in the same manner as that described above for the “Table of Contents” button. Any footnotes are displayed in the field.

Navigation devices are centralised under the baseline of the “Main Text” field. The panel contains six buttons and one field. The field is a “Card of Cards” display which simply and only shows the current location within the cards of the stack in the form of e.g. “Card 21 of 30”. The buttons consist of a “solid” pair of left and right facing arrows, which transfer the user to the first or last cards of the stack. A second “outlined” pair of arrows in the same formation advance or return the user through the stack sequentially one card at a time. The other two buttons are named “Back” and “Map”. “Back” returns the user to the previous card browsed. “Map” transfers the user to the single card stack: “Map”, which is a graphic representation of the structure of the entire stacks comprising the “Industrial Heritage” with each label also a navigation button to that named stack.

The “Utilitys” button displays previously hidden buttons labeled (“Help”, “Notes”, “References”), when it is activated by clicking and holding down the mouse button, they are hidden again when the mouse button is released. To keep the buttons on display the mouse pointer should be dragged clear of the “Utilitys” button before release. A further click of the “Utilitys” button hides the buttons it previously displayed.

The Multimedia button displays two hidden buttons labeled “Database” and “Pictures” when it is activated by clicking and holding down the mouse key. They are hidden again when the mouse button is released. To keep the buttons on display the mouse pointer should be dragged clear of the “Multimedia” button before release. A further click of the “Multimedia” button hides the buttons it previously displayed.

The Industries button displays previously hidden buttons labeled with the names of other stacks under the umbrella of “Industrial Heritage” (e.g. “Chemicals”, “Vehicles”, “Furniture”, etc.) when it is activated by clicking and holding down the mouse button, they are hidden again when the mouse button is released. To keep the buttons on display the mouse pointer should be dragged clear of the “Industries” button before release. A further click of the “Industries” button hides the buttons it previously displayed.

The screen displayed in fig.10 is much more cluttered than that shown in fig 11, by hiding functions until the user decides (s)he needs them allows the impact of what *is* displayed to be much greater and goes some way to creating a “research by exploration” environment rather than a “guided tour”.

The Help button (revealed by activating the “Utilitys” button, see above) transfers the user to the “Industrial Help” stack. The “Industrial Help” stack comprises a main text field for subject matter and a “Table of Contents” field as described above. The four buttons are “Return” which returns the user to the previous card browsed, Arrow Left and Arrow Right for

sequential browsing, and “Subject” to hide/display the “Table of Contents” field.

The Notes button (revealed by activating the “Utilities” button, see above) transfers the user to the “Note Pad” stack. The “Note Pad” Stack comprises a main text field into which notes can be typed or copied and printed.

“Return” and Arrow Left & Arrow Right buttons are provided with the same function as described above.

Fig.11

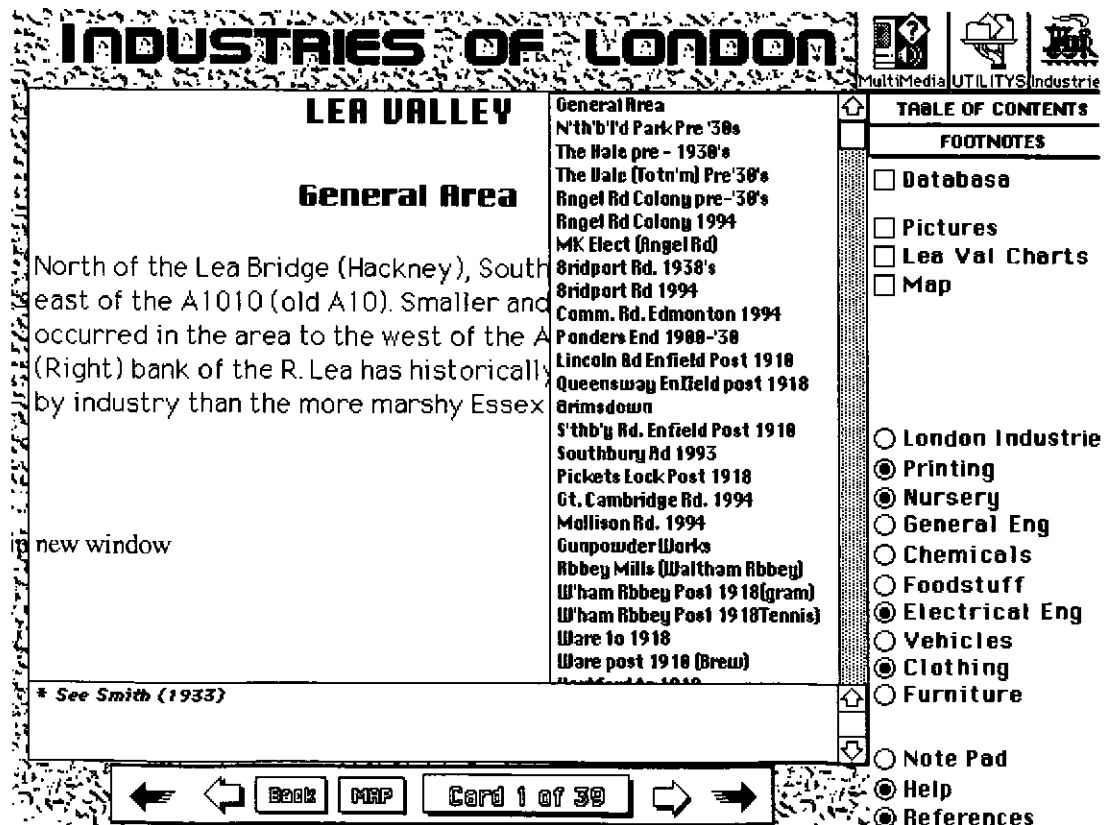


Fig. 2.3. Hypercard Full Screen Display - Lea Valley Stack

The References button (revealed by activating the “Utilities” button, see above) transfers the user to the “bibliography” stack. The information gathered in this stack comes from the Bibliography database file and is

periodically updated from that source. Updating is selective, as the database bibliography covers a wide range of subjects, not all of which are relevant to the “Industrial Heritage” stacks. Occasional additions might be cut and pasted into the stack but the usual method is to find a set in the database, omit the summary field, format it as a list and import it *en bloc*.

The Database button (revealed by activating the “Multimedia” button, see above) transfers the user to the “Building Survey L.1” database file at the last record previously browsed. For the “Lee Valley” stack, it transfers the user to the “Ind. Est. Survey File” database file as default. *It ought to be customised by stack to take the browser to the most appropriate place in the data base, e.g. if the user is in the “Printing” stack the command should also find all printing records in the site survey file and display them as a set. This would be the default background button for the stack. Other card buttons could replace the background button as required to transfer the user to a more specific location.*

The Pictures button (revealed by activating the “Multimedia” button, see above) displays previously hidden buttons labeled as appropriate for the subject to which they are the key when activated by clicking and holding down the mouse button, they are hidden again when the mouse button is released. To keep the buttons on display the mouse pointer should be dragged clear of the “Pictures” button before release. A further click of the “Pictures” button hides the buttons it previously displayed. The buttons controlled by the “Picture” button generally take advantage of the Hypercard™ XCMD (external command) function which enables features of

other applications to be accessed from within Hypercard™. This increased functionality allows the incorporation of colour pictures, videos and animations created in a variety of other applications²¹ As the “Picture” dependent buttons are usually unique to a particular card in the stack, the suite of images available is carefully selected to illustrate the theme of that card.

SCRIPTS

There follows a description of the scripts and their functions written for the “Industrial Heritage” suite of stacks, organised hierarchically first by stack, then card, field and finally, button. To avoid undue repetition where other stacks make use of similar scripts, they are noted rather than expounded.

Stack Scripts

(See Appendix 2 for the Script texts)

London Industries (Stack)

Function

Hides all buttons except the icon card navigation buttons so that they can be revealed in a customised set for each card of the stack. Enables colouring facilities for better design. Related independent stacks (Chemicals, Clothing, Elect Eng, Foodstuffs, Furniture, General Eng, Printing, Nursery and Vehicles) for the other industries have a stack script similar to that for “London Industries” but omit their own <name> button from the “hide background button” commands and substitute that of “London Industries”

Gen Indust Charts

Function

Provides Colour facilities for the stack and for the stacks: Chemical Charts, Clothing Charts, Elect. Eng Charts, Food Charts, Furniture Charts, Gen Eng Charts, Nursery Charts, Printing Charts, Vehicle Charts, L.V & W.Middx Charts, Map, Note Pad, Bibliography, Industrial Help

BACKGROUND BUTTON SCRIPTS (- ALL STACKS)

Navigation Buttons

Go to First Card



Function

Visible when stack is opened, clicking this button opens and displays the first card of the stack.

Go to Last Card



Function

Visible when stack is opened, clicking this button opens and displays the last card of the stack.

Go to Previous Card

Function

Visible when stack is opened, clicking this button opens and displays the previous card in the stack.

Go to Next Card

Function

Visible when stack is opened, clicking this button opens and displays the next card in the stack.

Back

Function

Visible when stack is opened, clicking this button opens and displays the previous card browsed.

Map

Function

Visible when stack is opened, clicking this button opens the card displaying a graphic representation of the structure of the Industrial Heritage Application. Each item on the map is itself a button which when clicked opens and displays the relevant card.

Table of Contents

Function

Visible when stack is opened, clicking this button reveals the hidden "Table of Contents" background field.

Footnotes

Function

Visible when stack is opened, clicking this button reveals the hidden "Footnote" field.

Utilitys

Function

Visible when stack is opened, clicking this background button reveals hidden "Note Pad", "Help" and "References" background buttons.

Industries

Function

Visible when stack is opened, clicking this button reveals hidden "Printing", "Lee Valley", "Nursery", "General Eng", "Chemicals", "Foodstuff", "Electrical Eng", "Vehicles", "Clothing" and "Furniture" background buttons.

INTER-APPLICATION FEATURES (XCMDS)

Macromind Player (Including "Projector")

Enables multimedia presentation movies to be displayed from within a Hypercard™ stack.

Pictures

A Hypercard™ external command which enables full colour graphics to be imported into the stack and displayed in a separate window.

Steering Pres Mm3 1st Seq Maps

An example of a Macromind Player sequence displaying a full colour map of the Lee Valley area with highlights to represent particular areas of interest.

MultiMedia

Function

A background button, visible when stack is opened. Clicking and holding down this button reveals hidden "Database" & "Gen Ind Charts" background buttons from the suite of multimedia button templates i.e. 33-- "PlayMovie"* , "Gen Ind Charts", "Master Pictures", "Template", "Database", "Map W Abbey to N.Circ." "Gen Ind Charts" buttons. (*All buttons are numbered automatically by the Hypercard™ programme and this number is sufficient for the script to operate effectively. The <"Name"> is for clarity and can be used instead of the number as is the case for the other buttons in this script, and the <"--"> shows what follows to be a comment which is not crucial to the operation of the script. Buttons can be identified using either format, in this case the number is the operative part and the name - a comment). Releasing the mouse button causes the sub-buttons to

disappear. To allow the sub-buttons to remain on display for subsequent use, the mouse pointer should be dragged off the Multimedia button before release.

For effective use of this facility, the sub-buttons displayed after clicking the “Multimedia” button are customised for the particular card of the stack in which they are displayed. The simplest way to do this is to copy the button from the background to the foreground and alter the button script to call up the multimedia functions required. Appending an instruction to the “Card” script should then hide the background button. Then only the customised foreground button remains on display for that particular card. The background button remains displayed on all other cards until the process is repeated to customise another particular card. In effect, the background button “Multimedia” is used as a template. Where it has not been customised for a card, the original multimedia examples remain available. Finally, it is important to ensure that card buttons are created to suit each multimedia request detailed in the customised “Multimedia” card button script.

HIDDEN BACKGROUND BUTTONS

Printing (& Nursery, Chemicals, Clothing, Elect Eng, Foodstuffs, Furniture, General Eng, Vehicles, London Industries, Lee Valley, New Industries, Old Industries,)

Function

Opens and displays the stack “Printing”, (&c.). Note: Each “...Industry” stack does not display its own <name> button.

Database

Function

Opens the database file “Building Survey L.1” at the first record.

Help

Function

Opens and displays the stack “Industrial Help”.

Note Pad

Function

Opens and displays the stack “Note Pad”.

References

Function

Opens and displays the stack “References”.

CARD BUTTON SCRIPTS

MultiMedia

Function

The same as the “Multimedia” (background button) described above but details have been customised to allow features peculiar to the particular stack and card (in this case the “Lee Valley” stack) to be utilised. The background button “Master Pictures” has been copied to the card and re-named as “Pictures”. “Master Pictures” remains in the background available as a template when next required. “Pictures” is hidden or displayed on the card by clicking/releasing the mouse button. The card buttons “Lee Val Charts”, “Map” (not to be confused with the background button “Map” which is a structural chart of the Industrial Heritage suite of stacks) and “Factories” are hidden and only revealed when the “Pictures” button is activated.

HIDDEN CARD BUTTONS

Pictures (Lee Valley Stack)

Function

This is a “sub-button” of the “Multimedia” card button; it hides other buttons thus reducing screen clutter. Clicking and holding down the mouse key reveals its own hidden sub-buttons, while dragging the mouse off before release enables those sub-buttons to remain on display. This script is typical of all the “Industrial Heritage Stacks”, but individual cards within the stacks may be scripted with more or less sub-buttons depending on their content.

Gen Ind Charts (& L.V & W.Middx Charts, Gen Indust Charts, Gen Eng Charts, Furniture Charts, Food Charts, Elect. eng Charts, Clothing Charts, Chemical charts, Vehicle Charts, Nursery Charts, Printing Charts.)

Function

A sub-button of "Pictures", it opens and displays the stack "Gen Indust Charts", (&c.). Note: each customised "...Chart" button only appears in the appropriate related stack. For example, the "Food Charts" button only appears in the "Foodstuffs" stack (and the "Map"). Access to any chart other than this can only be obtained by first using the "Map" button and then locating and clicking the appropriate "...chart" button from the "Map".

BACKGROUND FIELDS

Text

Function

A scrolling field containing subject information in 14 point plain "Geneva" font, which can only be edited after responding positively to two system generated prompts. Some cards are provided with transparent buttons in this field, their presence indicated by Outlined text. Such buttons are known as "Hotkeys" whose function is rather like an index in a conventional book except that Hypercard™ automatically relocates the browser to the card containing the reference. The text is locked into the field so that future editing does not "de-synchronise the button from the outline text string".

Card of Cards

Function

Displays the number of the card currently being browsed in the format (e.g.)

“CARD 1 OF 39”

HIDDEN BACKGROUND FIELDS

Table of Contents

Function

This scrolling field is displayed by holding the mouse key down on the button “Table of Contents”, the field disappears when the mouse key is released unless it has first been dragged clear of the button. A list of all the card identifiers in the stack is tabulated and pointing and clicking the mouse over an entry conveys the user to that selected card. The identifier is generated by the system in the form of: “Card Id 1234”, however a more descriptive personalised name can be substituted by the author for clarity. A name allocated by the author takes precedence over a system generated Card Id Number. Text is locked and cannot be wrapped (each entry must be contained on one line only). When selected the field is displayed so that its right vertical edge terminates in line with the right edge of the “Text” field and is the same height. Text in the field is **10-point bold Chicago** font to ensure a suitable contrast with the “Text field”.

Footnotes

Function

This scrolling field is displayed by holding the mouse key down on the button “Footnotes”, the field disappears when the mouse key is released

unless it has first been dragged clear of the button. Text is displayed in **9 point Geneva bold italic font.**

SUMMATION

Unless the Lee Valley Industrial Archive helps to teach the undergraduate students the **critical** skills that a historical education has conventionally provided it will be a failure. Traditionally students are shown how to read a book critically and this basic approach should be used with computer assisted learning packages. There is though a major problem for the LVEA achieving to this aim. Published material directly relating to the industries of the Lower Lee Valley is not abundant so there is a real danger that any synthesis will be biased towards the findings of this project. Turning this weakness into a strength can be achieved through the adoption of a number of approaches.

Emphasising Systems & Methodologies

The LVIHEA project was piloted within the Centre for Applied Historical Studies and the issues arising from it were utilised initially by students following the “Sources & Methods” and “Historical Studies in the Community” modules. Students were encouraged to engage, analyse and interpret the historians’ raw materials. This involved elements of historiography including data gathering, appreciation of sources and historical detective work through the exposition of archiving & retrieval techniques. In addition to the familiar documentary and artifactual resources, students were introduced to diverse data formats, including graphics (still and animated) and sound, plus the practical problems and opportunities presented by accessing them from local and remote archives. The training

environment acquainted students to research strategies beyond traditional archive/library routines to English Heritage survey techniques. Practical skills were supplemented by instruction in the digitisation of information using scanners, video etc. Interpretative opportunities included qualitative and quantitative analysis through the manipulation of the LVIHEA data.

Hypotheses

It is considered by the tolerant as poor form, the impatient as vandalism and the legalistic as criminal damage to annotate original or secondary sources owned or held by others. The electronic archive values such interaction because it has a tough outer coating that allows the graffiti to be easily wiped away while facilitating the simple incorporation of corrections, amendments, appendices, comments, tests analyses and hypotheses to form new editions. As history like most of the humanities is usually re-interpreted with each generation (decade?), the former last word on a subject becomes progressively an archetype, stereotype, cliché and footnote. A classic work like Macaulay is consulted less as an authority on the late seventeenth and eighteenth centuries than as an insight into Macaulay's own intellectual world of the early nineteenth century. Some like Gibbon's "Decline and Fall..." have their historiographic authority extended and renewed through major revisions and abridgements and have the name of that editor (D M Low) appended to the title. Bury's early twentieth century definitive "History of Greece" has had to be virtually re-written in the light of archaeological evidence particularly for the pre-classical period and now appears as "A History of Greece by Bury and Meiggs". Obviously, this re-invention process mainly applies to works which are themselves syntheses

rather than original source material or study. Yet original sources are not necessarily “true” simply because they are original. The act of recording data is itself a selective process. Even (particularly?) legal documents are compiled to fortify a certain stance. Would we for example give uncritical credence to the veracity of an individual or company’s Inland Revenue returns, or ignore the possibility of a quartermaster’s rake off of military supplies? The picture is exponentially clouded when a report of an activity is made. Facts do not “speak for themselves” they are articulated by persons with an agenda be they politicians, the media or cab drivers. No attempt is made here to place the LVIHEA in the company of histories of the stature of Thucydides, Gibbon, Macaulay, Round, Trevelyan, Postan, Stenton or Thompson, but the LVIHEA can, like them, be expanded, updated, re-interpreted though not as a single new edition, but as history is daily made. Nor will only the most eminent of scholars be trusted to assume revision rights. It is hoped that any scholar consulting the archive will publish their findings back to the archive. It is also feasible that the LVIHEA may become a primary source as some institutions, buildings and records fade into obscurity.

PHOTO CD IMPRESSIONS

Photo CD is an effective way of storing photographic images. The medium allows for approximately 650 MB of images to be held on a single disk amounting to approximately 100 images in a variety of sizes. Three icons are displayed when Photo CD is opened (see Photo CD fig.1). "Slide Show" contains thumbnail images for easy reference (a visual "table of contents" 3.1MB in size). "Viewer" is a 96K-application programme that manages the image display. The "Photos" folder contains the photographic images in a variety of size formats. Double clicking the "Slide Show" activates a second window that can be re-sized but loses resolution. A slider bar can be dragged to select images for viewing, or the step button (forward or back) allows sequential viewing at the user's pace, while a play button plays the whole sequence without any further intervention by the user. Double clicking "Photos" reveals five folders labeled 192 X 128, 384 X 256, 768 X 512, 1536 X 1024 and 3072 X 2048.

The numbers represent sizes in pixels, double-clicking any of these folders opens the suite of thumbnail images.

Viewing landscape-oriented images present few importation problems however, portrait orientation first requires that the image be rotated in a package like SuperPaint or Ofoto.

SuperPaint encounters memory problems with image sizes above 384 X 256 pixels (it will not open the file even when the application is set to work in 12MB of reserved RAM). It can open the 192 X 128 & 384 X 256 in 4-6 seconds.

Ofoto manages the sizes below 1536 X 1024 adequately but this size takes approximately 25-1/2 minutes to load.

Macromind Director can load a 1536 X 1024 image in approximately 2 seconds but does not have the image manipulation facilities of SuperPaint or Ofoto.

CAPTURING VIDEO IMAGES

Introduction

Unsurprisingly in an age where much of our interaction with the world is through the medium of television, video presentation is arguably the most immediately impressive feature of a multimedia package. However, incorporating video images into computer presentations is rather like using a mini to move house. After all the squashing and the time taken to make repeated journeys in order to deliver travel soiled and damaged items, one wonders whether Pickfords might have been the better bet. In computing video is the king of conspicuous consumption. It devours working memory, ravishes storage space and assails time, but so powerful is our perception of the efficacy of the moving image to educate and inform that, for all its tyrannical tendencies, video is a constitutional monarch. Increasingly these worst excesses are being mitigated, compromises achieved and an accord established through advances in technology and the more restrained design aspirations of multimedia producers. Compression and an acceptance of “video in a window” enabled pioneering video management projects to proceed and stimulate the development of more economically priced video capture suites while simultaneously increasing the demand for faster processors²² and affordable hard disk drives of a gigabyte or more.

Video Spigot™ is an inexpensive video capture facility that has been around for a few years now. It does not provide full screen/full motion video, sound capture or have the ability to pass computer files to video tape, but it can be used on the sort of Apple Macs routinely found in academic institutions to provide feasible multimedia presentations. This paper is not

the result of a controlled experiment under laboratory conditions to measure and assess the validity of the manufacturer's claims (such details can be obtained from bench tests in computer magazines possibly performed by a technician who may never use the programme again). It does though explore some of the mysteries of capturing video. The accuracy of the measurements is rudimentary, such tools as were used were the computer desktop clock, file and display statistics, the windows were measured by placing a ruler against the monitor! What follows is an assessment of the programme in practical use, how to capture, compress, save and edit video images and stills. The "drive" referred to throughout is a SyQuest 88 MB C²³ which accepts 88 MB and 44 MB hard disk cartridges.

Video Spigot²⁴

Video Spigot NuBus is a combination hardware and software digital-video system. It captures video from a video source (TV, monitor, camera, video tape deck, or VCR) and converts it to digital data. Once saved the video can be edited and played on a properly equipped computer. The software ("ScreenPlay") is the control for the entire system. To operate it requires an Apple computer with a minimum specification of:

- Colour Monitor with 8-bit or greater graphics card
- At least 4 MB of RAM (8 MB recommended)
- At least 40 MB hard disk drive (80 MB or more recommended)
- System 6.0.7 or later
- 32-Bit Quickdraw™, version 1.2 or later

- QuickTime, version 1.0 or later

It recognises video in National Television Standards Committee (NTSC) 30 frames per second, and Phase Alternate Line (PAL) at 25 frames per second. Three drop down menus provide for very simple operation. The File Menu enables the opening, closing and saving of files and quitting the programme. The Edit Menu performs standard cut, copy, paste and clear functions. The Spigot Menu controls the colours and preferences to enable the working area to be specified, sized and the video frame capture rate set. The user is presented with a window 96 X 80 mm (33/4 X 3 inches) expandable to 145 X 133mm (5 3/4 X 5 1/4 inches) that includes an active video screen area of 71 X 58 mm (23/4 X 21/4 inches) expandable to 142 X 114mm (5 5/8 X 4 1/2 inches). Control is established through 4 buttons (plus the standard re-size and quit icons at the top) the first labeled “Live” and the others identified by familiar standard icons.

Video images can be captured either from a video recorder or directly from a video camera by first mouse clicking the “Live” button and then clicking the “Record” button at the start of the required sequence. A thumbnail video image is shown with a counter below that records the duration of the video clip in minutes and seconds. If only a section of the video images is required then the cropping tool should be used before recording. When the recording is complete click the “Stop” button, (termination is automatic when disk storage space is exhausted). A “Playback” window very similar to the initial window is displayed that additionally includes the heading “Untitled (n)” and frozen statistics concerning the duration of the clip and its size in Kilobytes plus a dynamic

indicator of the location of the viewed frame in time. Directly above these buttons is a slider control including Start and Stop flags and a frame locator. The frame locator can be dragged forward or back to change the frame displayed in the image screen. The Start and Stop flags can only be used to set the commencement and termination of the clip and it is after this option has been exercised if required that the file should be compressed and saved with an appropriate filename.

Still images can be captured from the “Live” window or the “playback” window by simply locating the mouse pointer over a moving or static screen image, depressing and holding down the mouse key while dragging the image off to another part of the computer desktop. Another window with the suffix “Still - n” is thereby created which can be re-named, compressed and saved.

Compression

Large temporary files are created during both the capture and the saving process so it is essential that the preferences are set to work with a drive that has sufficient space. If the clip is to last only a few seconds a minimum of 10 Mb should be available, a rough rule of thumb I have found appropriate is to reserve at least 2Mb of disk space for every 1 second of video to be captured. A serviceable perspective is upheld by recognising that a floppy disk might contain 2 seconds of uncompressed video playback, a 100Mb drive approximately 1 minute and a compact disk (CD) some 6 - 7 minutes. Compressing and saving the captured video clip is also a very profligate process and if you are unfortunate enough to have insufficient disk space during this process only part of the file will be saved and the remainder lost.

This aspect of multimedia work is most frustrating because the final file may only occupy a few megabytes. Its creation though will probably require storage resources ten or twenty times as great due to the nature of the editing process (usually supplemented by a separate editing programme such as Adobe Premiere).

Serviceable use of video files can only be achieved by using compression facilities. Video Spigot can take advantage of all six (software) options shipped with Apple computer's QuickTime™. Each option offers gains and losses. For example, saving and compressing a 16-second video clip took approximately 3 minutes using the compression option "Video" and resulted in a reduction of the file size from 7,972 KB to 6,800 KB, a saving of 1,172 KB. Put another way the compressed file was 85.3% of the size of the uncompressed file. There appeared to be little discernible visual diminution in the quality of image in the compressed file (see "Carding 2" of Table). By contrast, the compression option "Compact Video" is a very slow process (55 minutes to save 10 seconds of a 16-second clip) but results in significantly greater reduction in file size (to 20% of the original size) without significant loss of image quality. However this routine is a colossal user of temporary files and the routine terminated with an insufficient 7.6Mb or storage space available (see "Carding 3" of Table).

None:	Save without any compression. Not intended for playback but as a resource.
Video:	Quick save with moderate file size reduction. Colour at 16 bpp ²⁵

Video Compact:	Slow save with good file size reduction. Colour at 24 bpp
Photo JPEG:	More suited to compressing still images. Colour at 24 bpp
Animation:	Unsuitable for usual photo-video clips because of visual noise and the file size may increase.
Graphic:	Poor quality resultant image makes it unsuitable for photo-video files. Designed for use with 8-bit systems (256 colours)

A further test using the “**Video**” facility was carried out on a 5-second video clip previously stored uncompressed with a file size of 11,881 KB. Processing required 2.1 MB of disk space and the file was reduced to 2,397 KB a 79.3% file size reduction that took 1 minute 45 seconds. The original uncompressed 11,881 Kb5 second clip was re-opened, compressed and saved using the “**Compact Video**” facility. At the commencement of the test 9.5 MB was available on the drive and only 0.9 MB of this was used to complete the entire compressing and saving process which resulted in a compressed file size of 936 KB, a 92% reduction. The visual quality of the compressed file was not obviously different from that of the same file after compression using the “**Video**” facility, but the time taken for the process was 31 minutes 50 seconds. Finally the file compressed using the “**Video**” facility was recalled and re-compressed using the “**Compressed Video**” Facility. The resulting compressed file size was 936 KB (the same as the original file after direct use of the “**Compact Video**” facility). However the time taken was 36 minutes 6 seconds which if added to the to the 1 minute 45 seconds taken for the initial “**video**” compression meant that the whole

process took 37 minutes 51 seconds. This compared unfavourably with the 31 minutes 50 seconds taken when using “**Compact Video**” directly on the uncompressed file. It may happen that the user feels that (s)he cannot wait for the additional savings that the longer process takes, after all 40 seconds of video in 5 second clips would take half a working day to process using “**Compact Video**”. If the storage resources are adequate the “**Video**” facility would seem to be the more appropriate bearing in mind that the clips can be re-compressed later using “**Compact Video**”.

Video:

The “Rates Book” video lasts 27 seconds and occupies 10.8 MB of storage space. Compression using the “**Video**” system reduces the clip to 23 seconds and the file size to 6.7MB. “**Compact Video**” is much slower but reduced the clip to 4 seconds and the file size to 457KB.

Further Editing

Editing in Video Spigot is limited to fixing the start and stop points and varying the colour, it can be very slow. There are more sophisticated bespoke video editing applications such as Adobe Premiere (used here) and VideoFusion which have facilities including integrated audio editing, splicing, integrating other graphics and text, provision of filters, provision of transitions and importantly in this context a suite of compression facilities.

ADOBE PREMIERE

(See Chart Appendix 1)

VIDEO SURVEY TECHNIQUES (VST)

There are many site survey recording techniques from which to choose but most of them pre-suppose a warm, not too sunny, windless, rainless day.

To avoid the sun dazzling a portable screen and the wind blowing papers into the nearest puddle, and the delays of photo processing time before realising a site re-visit is needed because what you've got is not what you thought you had, VST is a realistic alternative. For every second that the recorder records, 35 frames are shot. 10 seconds of video time is easily enough to record four elevations of a building. A few more seconds to zoom in on features and you have a thousand frames, play them back immediately to preview, re-record until satisfied then examine and analyse them individually for your report. The video camera²⁶ can be used as a kind of reporter's notebook/sketchpad. It is important not to try to create a story, use it as you would use your eyes: know what you are looking out for locate it and record it (exactly as you would any other survey).

Spatial Context Survey

In spite of the claims for economy made above, there is little reason to be so parsimonious. Virtually the only constraint on what you record is the life in the battery. Having ensured that you have captured the specifics move to the general. Try to gather images that set the subject in its wider environment by using wide-angle shots and panning through 360°. Record prominent landmarks (it helps later when mapping the subject precisely). Do not worry about unexpected intrusions into shot by cars, people etc. (think of the social historians of the future) it all helps to create the atmosphere.

NOTES

¹ A site can (could of) consist(ed) of one or many buildings, however every building included in the archive is, or is related to, a particular site with a unique LVIHEA serial number. In many cases the Site Survey Detail File is sufficient to record details of a building up to level one survey detail if the building is the only one on that site.

² Everest, C G, Database Management - Objectives System Functions And Administration, (Maidenhead, UK, McGraw Hill, 1986) p.28

³ Benyon, D, Information & Data Modeling (Oxford, Blackwell, 1990) p. 41

⁴ *Ibid.*

⁵ A relational database is founded on mathematical theory (see Codd, E F, "A Relational Model Of Data For Large Shred Data Banks" Comm. ACM, Vol. 13, No. 6, (1970) pp. 377-387.)

⁶ M^cFadden, F R, & Hoffer, J A, Modern Database Management (Menlo Park, CA, Benjamin/Cummings Publishing Company, Inc, 1994) p. 582

⁷ Data is collected in a DBMS that has the potential function to allow information to be derived from it. "(Information is) the meaning that a human assigns to data by means of the known conventions used in their representation.". ISO (International Standards Organisation) & ANSI (American National Standards Institute), "American National Dictionary for Information Processing"; Computer & Business Equipment Manufacturers Association (CBEMA) Report No. X3/Tr-1-77 (Washington DC Sept. 1977)

⁸ A file is defined in this context as a collection of records

⁹ Benyon. (*op. Cit.*), pp. 69-71

¹⁰ For an introduction to normalisation theory see Benyon (*op. Cit.*), p113-126 & M^cFadden & Hoffer (*op. Cit.*), p.209

¹¹ A table (or *relation*) is taken to comprise of columns representing the attributes of an entity and the rows its occurrence (see M^cFadden & Hoffer (*op. Cit.*), pp.23, 205

¹² *ibid.*, (p.206)

¹³ *ibid.*, (p. 20)

¹⁴ "Historians have for centuries considered the edition of historical sources, to make them available to their colleagues as a legitimate activity of an historian". M. Thaller, "Methods And Techniques Of Historical Computation", in History and Computing, edited by P. Denley & D. Hopkin (Manchester, Manchester University Press, 1987), p. 154.

¹⁵ where "L.1" represents Level One survey depth - see chapter 1.

¹⁶ *Ibid*

¹⁷ A menu that "pops-up" whenever the field to which it is attached is activated.

¹⁸ See: Index Record for Industrial Sites (IRIS) Recording the Industrial Heritage (Leicester, Association for Industrial Archaeology 1993), Appendix I.

¹⁹ "Levels" as defined by "Recording Historic Buildings - A Descriptive Specification RCHME (London, HMSO 1991).

²⁰ This action is usually a "click", but conditions can be activated depending whether the mouse button is held or released. Furthermore it is possible to activate buttons by "MouseEntry" where the button is activated without the need to click. For fuller information see the Hypercard™ manual.

²¹ E.g. including Photo CD for photographic images, Superpaint for original artwork and edited projects from other sources including photographs and scanned images, Macromind Director for animations and presentations) to be displayed from within the Hypercard™ stack.

²² e.g. RISC technology formerly found in Sun Workstations, now being used by the IBM/Apple Power PC/Power Mac

²³ An infinitely extensible random access system of storage.

²⁴ Ref: Video Spigot manual 1991

²⁵ bpp = bits per pixel

²⁶ A Sony Hi-8 was used

CHAPTER III - USING & EVALUATING THE LVIHEA

PREAMBLE

The LVIHEA prototype is derived from an exploration of the ways that artifacts can be recorded using multimedia technology. The associated data files of the LVIHEA contain over a thousand records, many of them illustrated and the best way to appreciate this project is to use the artifact to browse and interrogate the accumulated records of Lee Valley industrial resources. DBMSs have an established place in historical research often concentrating on discrete projects where the data may come from disparate perhaps widely scattered sources even when they comprise a single medium only. The LVIHEA was designed to provide an adaptable response to the diverse agenda of individual constituencies by providing gateways to associated resources (a teaching and learning system, an architectural photo library, a measure of industrial activity, land use diversity, building glossary &c.).

This diversity dictated that a flexible methodology was adopted, one based rather like English Law, on acknowledged precedent rather than a written code. Initially, because so little was known about the data, it was not possible to model the system and normalise all the relationships between data and data formats and as a consequence of this amorphousness Soft Systems Methodology (SSM) was used in an attempt to create a methodological framework. Checkland¹ designed SSM to model and if necessary to **re-define** existing systems where there was a perceived vagueness of purpose. The original idea for the LVIHEA was to **devise** a recording system that incorporated the needs of a variety of user groups with complementary interests but, where no system of interchange previously

existed; or where such systems did exist, looked for methods of incorporating them using digital recording techniques.

In the previous sections of this thesis, only oblique reference has been made to SSM but it has always loomed in the background as a sort of flexible friend. Some elaboration of its importance to the LVIHEA is appropriate in regard to both the efficacy of the system and the suitability of SSM to provide a methodological background to the study. This section attempts to link the previous two sections with reference to SSM categories and evaluate them based on the core functionality of the LVIHEA and its potential for wider dissemination. These developed core functions will no doubt spawn further stages of development and other methodologies may then be considered.

Soft systems Methodology (SSM)

SSM is a seven-stage system. Stages one and two identify elements of structures and processes. Stage three records what systems are, not what they do. Stage four constructs a general model of the system that can be modified in the light of continuous feedback. Stage five aims to generate that feedback through debate with people concerned with the problem area. Stage six concentrates the minds of the actors referred to in stage five to see if changes are feasible and desirable. Stage seven is where action taken on stage six defines new problems. Broadly speaking stages one to three form the first chapter, stage four and elements of stage five the second and the remainder comprise this section. SSM is not a rigid discipline. It helped create a foundation for the project but was never intended to be a template

for the entire methodology though its common sense approach to problem solving was useful throughout (see fig. 12).

Fig.12

Schema Showing The Structural Format Of Each Section In Acknowledgement Of The Insights Derived From Soft Systems Methodology

Blue = Grand Scheme (Stages 1&2); Red = Design matters (Stage 3); Green = Methodology (Stage 4); Magenta = Dissemination (Stage 5); Cyan = Evaluation (Stages 6 &7);

Chapter 1 : "The Design Of The Prototype"	Chapter 2 "The Electronic Archive Model"	Chapter 3 "Using & Evaluating the LVIHEA"
<p>Aims And Objectives What do we want?</p> <p>Basic Design Parameters</p> <p>Resources</p> <p>Problems</p> <p>Who Was Consulted</p> <p>Roles For The Project Under Consultation</p> <p>Internal - Design Methods</p> <p>External - Richme Formats</p> <p>Design Criteria In Relation To Resource Defined Roles</p> <p>Development Of Prototype</p> <p>Evaluation & Justification Of Equipment Choices</p> <p>Hardware</p> <p>Software</p> <p>Paper Model Of The System</p> <p>Forms And Template Design</p> <p>Evaluation Of How The Prototype Meets The Original Criteria And Its Experimental Use</p> <p>Resolved, Partially Resolved & Unresolved Questions</p> <p>Crucial Choices For Year 2</p>	<p>Structure Of The Survey Files How to do it?</p> <p>Structure of Hypercard™ Stacks</p> <p>Sorting</p> <p>Inter-Application Features (Xcmds)</p> <p>Finds, (queries)</p> <p>Cd_rom And Video</p>	<p>Evaluation</p> <p>What can the LVIHEA Database do & How</p> <p>Layout options</p> <p>Noting spelling problems</p> <p>Operations on Found Sets</p> <p>Merge</p> <p>Exports</p> <p>Parameters</p> <p>Does it work as intended?</p> <p>Conclusion</p> <p>Dissemination</p> <p>Introduction</p> <p>CD-ROM</p> <p>Telematics</p> <p>Through the University's local area network (LAN)</p> <p>Hardware Connectivity Systems</p> <p>Internet</p> <p>Conclusion</p> <p>Evaluation of LVIHEA</p> <p>Introduction</p> <p>Co-operatinn</p> <p>Different Agenda and Priorities</p> <p>Super Testing</p> <p>1) Computing module</p> <p>2) Other Tutors</p> <p>3) Wider community</p> <p>Conclusion</p>

SSM helped define the core functionality of the LVIHEA. Initially the structures and processes of stage one and two were defined by the project specification. It drew attention to material structures like the artifacts and the more abstract structures that define the processes which produced, maintained and conserved them like the business, workers, governing and archiving communities. Stage three examined those systems so that the relationships within and between them could be modeled for use by for example academics, archivists, planners and conservationists. To achieve this the structure of other archives; such as the RCHME and the Enfield Borough Council (EBC) Business List: the former a manual and the latter a digital record, were examined. Typical data was identified and the initial fields defined for the DBMS. Help to identify the relevant systems that define the LVIHEA was found in discussion with interested individuals and communities and with reference to bibliographic material. These relevant systems might be expressed as (say)

- 1) “A system to record the industrial buildings situated in the Lee Valley”, or
- 2) “A resource for use in teaching and learning systems”; or
- 3) “A heritage Management tool”.

As 1) it included choices of field nomination and format and had to be able to access related records efficiently.

As 2) it needed to be initially welcoming and intuitive enough to encourage structured exploration.

As 3) it needed to be flexible enough to accommodate the diverse outlooks and skills of a wide range of potential users.

Checkland constructed a formula that attempted to bring together the relevant systems with the localised issues to form a root definition of a project to which he gave the mnemonic:

**CATWOE= Customers, Actors, Transformation,
Weltanschauung, Owners, Environment;**

In the case of this project:

Customers = The Community of the Lee Valley;

Actors = Centre for Applied Historical Studies

Transformation = A disparate, widely dispersed and incomplete record to a more complete multimedia digital record linking various constituents of the community;

Weltanschauung = Access to accurate information can lead to more informed decisions;

Owners = Middlesex University;

Environment = Socio/economic/political/historical environment of the Lee Valley

Applying this formula enabled the proposition of a working Root

Definition:

The Centre for Applied Historical Studies (actors) of Middlesex University (owners) will investigate the industrial structures and the related socio/economic and politico/historical environment of the Lee Valley (environment) to provide a multimedia digital archive for the use of the academic and Lee Valley community by linking various components (transformation) from a disparate, widely dispersed and

incomplete record (environment) in the belief that increased access to such information will enhance debate and decision making on issues of heritage management (weltanschauung).

Other considerations are the **efficacy** of the project methodology: “Does the means chosen produce the desired output”.

Its **efficiency (E)** “Is the transformation being carried out with the minimum use of resources ($E = \text{Outcome} / \text{resources}$).

Its **effectiveness**: “ Does it achieve the long term aim?”.

Section Two was concerned with the practical manifestation of these various elements to produce the LVIHEA prototype (SSM stage 4). An iterative process defined the form of the prototype as presented in that section.

DBMS file models were constructed, tested and refined to accommodate the continuing programme of site surveys, documentary searches and oral testimony. Debate was generated with people concerned with the problem area through seminars. Those engaged included archivists, members of the Middlesex University Graduate Centre², amenity groups (individually and collectively), academics with associated interests³ and by practical work sessions (SSM stage 5). However, a linear progression from one SSM stage to another was continually affected by a “rescue archaeology mentality” which dictated that whenever the opportunity arose to examine a “condemned” resource, that opportunity had to be seized. Although it is true that many examples have not been fully processed, others have provided unanticipated information requiring revisions to be made to the LVIHEA metasystem⁴. This also applied to techniques of gathering data. For example

at the start of the project site images were recorded by a 35mm camera, but the later purchase of a Hi-8 video camera had implications for survey methodologies (as described above - cap.2. p.152 "Video Survey Techniques"). It lead to a revision in the way that still images gathered by 35mm camera or scanner relating to a particular record could be presented by "stacking" them into movie⁵ using video editing techniques and software (Adobe Premiere).

The project could now be said to be at stage six as it is being more widely disseminated though still under controlled supervision. Already stage 7 (where action taken on stage six defines new problems) is being defined by investigating dissemination opportunities for multimedia offered by telematics.

A philosophical concern with SSM is that when an "unwritten constitution" is codified it ceases by definition to be a "soft system". Consequently, though an essential factor SSM was not a "template" for the project methodology. The essence of SSM was not lost through the interpretation of its codified expression and solutions appropriate to local problems encountered in the project were considered to be in keeping with its spirit. For example, rich pictures have not been used because the *owners* (supervisors) were appraised in other ways *viz.* periodic progress reviews and orthodox presentations that went beyond rich pictures. They received a fuller account on which to base a critical feedback, in other words academic standards and protocols seemed to require a more rigorous account/explanation of the methodology(s) than that offered by rich pictures. Checkland was (I believe) primarily addressing a business oriented

constituency with a different decision making ethos where a greater degree of summarisation is acceptable. Nevertheless, the lesson Checkland is teaching that illustration has great impact, is not lost on a multimedia project and the models and diagrams, which are the subsequent phase of rich pictures, have been developed and presented.

Section one defined the project specification in terms of its aims, objectives and geographic scope. Section two detailed how the model might achieve the parameters defined in section one e.g. the structure of the survey files & stacks. Section three reviews and analyses the project including an evaluation of the functions of the system in terms of the physical performance of the DBMS in consideration of its efficacy and effectiveness.

GENERAL INTRODUCTION: USING THE ELECTRONIC ARCHIVE

The prototype LVIHEA is a multimedia sample of information about industry in the Lee Valley, an evaluation examining and assessing its capabilities should consider its performance in terms of its ability to manipulate information and provide effective links to other data sources for further processing in diverse application programmes.

Introduction

If the data collected for the LVIHEA is appropriate, what indication is there that the information derived from it is appurtenant and organised efficiently? The following section considers some of the ways that the generation and presentation of this information can be evaluated. This ranges from straightforward decisions concerning the format of the database fields and demonstrated by the sorting and finding of sets of records, and by the operations that can be carried out on found sets such as merging, exporting and importing. How can we ensure that the fields are in the most appropriate format for the type of manipulation envisaged (particularly concerning fuzzy data⁶). Obviously there are constraints, calculation fields work most efficiently if the data entered is in mathematical (including Boolean) format. Overuse of "Comments" fields indicate that the decomposition of data has not been taken far enough. Comment fields are used in the LVIHEA to supplement the abbreviated data stored in other fields. As such, they should be used like the sound or picture fields to illustrate an aspect of the information in the record that is not obvious from the examination of a tabulated report. It would be inappropriate to try to implement a field for

each architectural feature or nuance of a building. At the risk of oversimplifying, the specific fields are used to locate records. Comments are included to explain the wider context. In this respect, they are part of the holistic approach to information storage and retrieval of the LVIHEA. Modern information technology allows the more accessible aggregation of resources, either as a physical part of the DBMS or through internal hyperlinks on a single workstation or across a LAN, or throughout the world through the Internet. Formerly DBMSs were often coded columns and rows not least due to severe limitations of working RAM and long term storage. The DBMS FileMaker Pro 3.0 occupies 2.2 MBs of disc space while the less versatile Microsoft Access (the most widely used DBMS in IBM/PC format) occupies 2.85 MB. Both of these applications would typically be backed up with a GB of internal hard drive for long term storage. File servers on LANs can reduce storage considerations still further. Ideally, a modern archive would enable the viewing of all relevant resources from a single workstation, but there is inevitably an impressive backlog of sources yet to be digitised.

Sorting

By default, the records are sorted on the field "MULVI NUM", in ascending order. If the user wished for example to find all records relating to sites founded in the 1930's (see below: "Finds" for the methodology), the resulting found set would be presented in record compilation order. A more appropriate sequence would be based on (say) name or activity or site foundation date or all of these. The procedure is to select "Sort" from the edit menu and, from the following dialogue box, double click on the field

name from the full list of fields in the left-hand column. The selected field is appended to the right hand “Sort Order” column. The option of sorting in ascending or descending order should then be selected. Other fields may also be selected for secondary, tertiary &c. conditions. In other words if (say) the field “Activity” is the primary, “Site Name” the secondary and “Site Foundation Date” the tertiary sort condition, then the records will be

Diagnostic Techniques	Car Repairs	1930's appears before:
M J Cars	Car Repairs	1920's, and both appear before:
Athenian	Clothing Manufacturers	1900's regardless of the fact that their MULVI NUM are 675, 672 and 207 respectively.

sorted such that all Car Repair industries will appear before Clothing industries. Within this primary category records will appear in alphabetical Site Name order and finally in Site Foundation Date order. Thus the record:

Finds, (queries)

Layout options

The LVIHEA survey files are equipped with several layout options. The full working layout is intended for the input of data from surveys or documentary evidence and contains all the fields (with the exception of summary and calculation) of the file, it is also an effective layout for casual browsing. There are other layouts specifically designed to assist structured interrogation sessions where the data is filtered to provide high level information only, in a listed format e.g.

“Query Info/Report” Layout

Full listing of: MULVI NUM, Site Name, Local Address, District, Post Code, Circa., Site foundation date.

Query/Info Report Layout					
NUM	NAME	ADDRESS	DISTRICT	P/CODE	DATE
207	Athenian Fashions	1/19 Wakefield St.	Edmonton	N18 2BZ	C. 1930's
209	Girlypride	Wakefield House, 1 - 19 Wakefield St.	Edmonton	N18 2BZ	C. 1930's
205	Huxley, John	1/19 Wakefield St.	Edmonton	N18 2BZ	C. 1930's
206	P.P. Gowns	1/19 Wakefield St.	Edmonton	N18 2BZ	C. 1930's
208	Staffburn Ltd	Wakefield House, 1/19 Wakefield St.	Edmonton	N18 2BZ	C. 1930's

“Legal Summary” Layout

Full listing of: MULVI NUM, Site Name, Local Address, Activity, Tel., Site Foundation Date.

Noting spelling problems

Lack of care over spelling can invalidate a query. There are approximately 500 records in the Site Survey Detail file for the London district of Edmonton, if the query criteria were entered as “Ednionton” or “Edmanton” none of those records would be found. Using the smallest valid string possible should ensure that all suitable records will provide a found set even though the set may include some ultimately unwanted records e.g. “elec” will find: electric, electricity, electrical, electro-..., electronic, elect eng &c.

Data Dictionary

A useful way to ensure that the spelling is valid is to let the computer input the data by first activating the field to be searched and then using Cmd+ “i” keystroke to display the field's data dictionary. A window containing an entire list of all character strings used in that field is produced. Highlighting a string and then selecting paste (or double clicking on the string) from the window allows that string to be pasted into the field. If this function is used while in find mode, all records containing that string will be found.

Dates

Accurate dating is a traditional concern of historians and archaeologists but it represents one of those fuzzy areas for IT data entry. Specially formatted “Date” fields are available but the formats are better suited to the business community because they assume that information concerning the day, month and year is entirely available. In reality the LVIHEA is generally unconcerned whether a structure was erected on the 10th or 20th of March or May as both may be accurate because one could represent the commencement and the other the conclusion of the work. The year is of more importance but identical buildings may be constructed over a period of a few years. Major buildings may be modified at intervals throughout their lifetime, eventually nothing may remain of the original structure. The older the building the wider may be the range of date approximation.

The imported EPIX dataset from Enfield Borough Council and the similar dataset from the North London TEC does not include building dates. The nature of the data collection methods does not facilitate accurate dating as the level 1&2 survey strategies do not include the documentary searches that

are most likely to provide authoritative data in this area. Imported RCHME surveys generally include accurate dates because they have utilised deeper survey levels including documentary searches. Thus, the information available in the LVIHEA contains some accurately verified dates but more fuzzy data. This presents modeling problems: Number fields offer greater scope for manipulation in summary or calculation fields in that, for example the maximum, minimum or average functions cannot be used on text fields thus reducing the potential for producing comprehensive reports.

The contents of number fields can only be set globally, they cannot be individually formatted. It is not possible to (say) colour the entry to indicate its degree of accuracy. The (text) field "Circa." indicates that the date is approximate. Other indications might include the use of the symbols "<" (earlier than) and ">" (later than) and "?" (best guess). The use of standard shorthand such as "C.19c" (for about the nineteenth century), are avoided because if a dataset is sorted in ascending order on the basis of a numeric field containing a date then "19c" would correctly appear after "18c" but incorrectly before "1799", in fact before any record with a date later than "20". Care must be exercised to exclude symbols that can be interpreted as operands (e.g. /, *, -, + etc.). Finds cannot be performed using alphanumeric characters. For example if the (valid) data: "1930's modified 1980's" is entered in a number field that record cannot be found later by entering "modified" into that field while in "Find" mode, though the record would have been found if the search criteria was set to "1930". If more than one date is included it must be separated by at least two full stops ("..")s (spaces before and after the symbol are optional, but there must be no space between

the “.”s). A second date in the field cannot be used as a find criteria because using the above example the computer interprets the number as terminating on the space between “1930” and “Modified” therefore the last part: “1980” is interpreted as part of the alphanumeric character “Modified...”.

Setting the “Site Foundation Date” field as a “Text” field allows finds on any of the alphanumeric characters in the field. Thus in the example above not only can the record form part of a found set based on “1930” but also “1980”, and indeed on “1”, “9”, “3”, “0”, “modified”, “m”, etc. Text fields however are limited in other respects, most notably because the only summarising function available for them is “Count”, but a range of Calculation options are available although calculations operate on the whole field and can produce sometimes bizarre results if not thoroughly thought out in advance.

Searches that are more inclusive can be performed using text fields but due to their lack of summarising capability, consequently they may produce less effective reports. Fortunately, the field type can easily be changed from text format to number format and vice versa. A method for obtaining the best of both worlds is to find a set of records using “Site Foundation Date” as a text field and then export the set to a new file and produce reports from that file having first converted the said field to “Number” format. Text fields seem more suitable for handling fuzzy dating information and provide the default format for the LVIHEA "dating".

There are positive aspects concerning the inclusion of fuzzy dates, for example the inter-war period was one of significant growth for industry in

the Lee Valley. During both wars, there was an understandable decline in the number of new industrial premises, other than for the war effort. Many production lines; particularly during WW2, were converted to augment the war effort but there was little in the way of permanent new buildings for four and six years respectively. During these years, electricity was almost universally adopted as the prime motive power for industrial production. The demise of steam power had huge design implications because it enabled lateral rather than vertical expansion and lateral expansion was more suited to accommodating the new production line techniques pioneered by the Ford Motor Company. The car itself had a role in factory design because new factories were increasingly sited along the new arterial roads (themselves often job creation schemes for the returning heroes) and were designed to be an advertisement for the company aimed at the passing motorist. Factory fascias which once used to mimic romantic gothic castles in an attempt at ostentatious display then acknowledged the great machines and the Hollywood disseminated art fashions of which art deco was foremost⁷. Though the second war again interrupted factory building and resulted in the destruction of many others it could be argued that because of the late entry into the war and its freedom from bombing the USA ensured that the evolution of factory design was not so dramatically changed. Buildings in the Lee Valley such as the Solcrown factory at Edmonton re-built in the early 1950's exhibit strong art deco design features. The "Site Foundation Date" field of the Solcrown record contains the information "1930...1950's rebuild (bombed 1942)". This format allows the record to become part of a 1930's, 1940's and 1950's found set although it is a 1950's building. It

invites the researcher to proceed from a broad basis on the generous inclusion of what might be regarded as residual information but information that could assist in the clarification of the overall context. Had the search been conducted on the basis of “art deco” style then the inclusion of a 1950’s building in the found set would pose some interesting questions: is the date correct? If correct, is the typological category correct? If both are correct does the choice of building style reflect an economic, functional, artistic, environmental, planning regulatory or even an emotional decision and if this were the case are there other examples and if so can this indicate discernible local or national trends? How long a life did any perceived trend enjoy? Research may be stimulated beyond the information already existing in the LVIHEA in order to answer any of these questions. What is important is that, knowing the dates are frequently estimates on the basis of typology, it is vital that records should not be excluded from relevant sets on the basis of erroneous data, but that the emphasis be on wide inclusion later narrowed at the behest of the researcher. It is better to have found sets that include records that should not be there rather than have found sets that omit records that should be included.

Operations on Found Sets

Merge

As a relational database combines tables to show different facets of the information so the LVIHEA must be able to present “related” data in a similar format. Many of the relational aspects of the LVIHEA have been pointed out earlier. In summary, the inclusion or exclusion of information

from displays, the look-up facilities that ensure the integrity of information originating as data in separate files and the button links with their encoded macros that act in a similar manner to the SQL (Structured Query Language) of relational DBMSs. Two methods of merging records are described below. The “relational” method can be used to obtain a new file that can be sorted to show the site detail followed by details of the individual buildings on each site and then printed out as (say) a list. The second method does not create a new file but allows the records of two (or more) files to be browsed simultaneously on screen.

The “Relational” way:

If for example a listing was required of certain sites and their attendant buildings from the LVIHEA then it is necessary to merge data from two files, the Site Survey Detail and the Building Survey L.1. The procedure is as follows. First obtain a found set in “Site Survey Detail” file, export it to a new file, and name it (say): “merge 1” specifying which fields should be utilised. Repeat for the found set of “Building Survey L.1” as (say “Merge 2”). Open a New file called e.g. “<Company name> Merge”, and define the fields. Ensuring that the “Add records” option is selected, first import the records from “Merge 1” and then the records from “Merge 2”. Sort the resulting file based on the MULVI No. The site with the lowest MULVI number will be displayed followed by each building on that site followed by the next site, its buildings and so on. The procedure may seem lengthy but the basic steps, i.e.:

Find set/export to file 1;

Find set/export to file 2;

Create a new file;

Import records from file 1;

Select “add records”;

Import records from file 2;

Sort

are little different from the equivalent SQL coding required but with the added bonus that no programming language expertise is required and that the entire procedure can be carried out by pointing and clicking the mouse.

A FMP alternative:

Obtain a found set of records in the “Site Survey Detail” file using a list type layout, e.g. “Query Info Report”. Click any field in the first record and click the “Go to Building Survey” Button (or the appropriate script from the “Script” drop down menu) which has the effect of opening that file in a new window. Reduce the window sizes of the two files so that both can be viewed simultaneously.


The illustration below shows the “Site Survey Detail” and “Building Survey L1” records for the M K Elect Ltd. company.

**Split Screen Showing Site Survey Detail file (top) & Building
Survey L1 file (below)**

IUM	NAME	ADDRESS	DISTRICT	P/CODE	DATE	LISTED?
88	M K Electric Ltd.	Shrubbery Road / Park Road	Edmonton	N18	1898	No
41	M K Electric Ltd.	Genista Rd	Edmonton	N18 2DU	>1920	No
61	M K Electric Ltd	Unit 15d/f/j/m Stonehill Business Park	Edmonton	N18		

Browse 

MULYI NO.	Local Name	Local Address	District	Post Code	Bldg Date	Status
241/a	M.k. Electric Ltd.	Genista Rd	Edmonton	N18 2DU	c. 1930	
188/a	MK Electric Ltd.	Shrubbery Road / Park	Edmonton	N18	c. 1960?	None
188/b	MK Electric Ltd.	Shrubbery Road / Park	Edmonton	N18	c. 1950's ?	None
188/c	MK Electric Ltd.	Shrubbery Road / Park	Edmonton	N18	c. 1950's ?	None
188/d	MK Electric Ltd.	Shrubbery Road / Park	Edmonton	N18	c. 1980's?	
188/e	MK Electric Ltd.	Shrubbery Road / Park	Edmonton	N18		None

Browse 

Note that the survey file record number 461 does not have a corresponding building survey record as that particular site constitutes a single building only on the Stonehill Industrial Estate. Building survey records for this site would only be raised if a full survey of the building provided information that could not be accommodated within the site survey file.

Exports

Introduction

This section outlines the procedures, with examples, required to export fields from one DBMS to another DBMSs, word processor, spreadsheet (or statistics programme) application.

Process

Select “Export” from the “File” menu and then select the fields to be exported, give the exported data a file name and save the file.

Export Format

Many options are offered of which “Tab Delimited” is often appropriate. The data is formatted to flow into the destination file separated by a tabulation mark. In the case of a DBMS file with fields sequentially accessed by “Tab”, a new field is selected to accept the data every time a “Tab” code is detected. For word processed documents it is a reasonable way of keeping the data elements separate. It has the advantage that if the data is to be presented in a table this can be achieved simply by dragging the mouse pointer over the imported data to highlight it and then selecting the “Table” icon from the tool bar and agreeing the format in the dialogue box. Other export formats including “SYLK” (see below) are also available⁸

Export To other Database files

Information may be exported from the LVIHEA to other database files for a variety of reasons. A potential user with an existing DBMS application

programme other than FileMaker Pro can use LVIHEA export files so long as protocols between the two can be established. This also applies across different IT architectures e.g. between an Apple Mac and an IBM PC. The export format selected affects the way that the data is organised in the destination file. Full details of the protocols and procedures can be found in the appropriate application user manual. Typically, exports are used to transfer a series of data elements from one or more fields of the database file. Export may be used to store a permanent record of the results of a query session or of finalised reports. One or many fields can be exported from a found set to form a new file consisting only of those specific fields or alternatively to an existing file where certain of its fields are formatted correctly and designated to receive that exported information while its other fields are ignored. Exported fields can replace existing data or be appended to it. Exported files cannot be opened directly, they can only be imported into newly created or existing files.

Procedure

Selecting "Export" from the "File" menu and "Export Records" from the sub-menu will produce a dialogue box. Create a new file by entering a file name into the "Export To" area of the dialogue box and "Tab Separated Text" from the "File Type" pop-up menu for export to other FileMaker Pro files (see the user manual for the best formats for other DBMS applications). Specify the fields and their export order from the next dialogue box. If a new file is needed it should be created in the usual way and its fields specified. Select "Import" from the "File" menu and match up the fields of

the current file with the export file in the import file dialogue box. Click OK to import the records.

The LVIHEA file "AC Code Report master" was created to accept data from the fields shown in "Query Info/Report" layout of the "Site Survey Detail file". Because of its corresponding design, data from the "Building Survey L.1" can also be used. The "Area Code" and A C Sum" fields were added, as could other fields from the file if required. The file is intended to be a template for the permanent storage of queries and reports generated in the survey files where a listing plus summaries is required. The Export function of the "Site Survey file" was used to create the file "AC '18...'39 expt" which was then imported into the file "AC Code Report master". "AC '18...'39 expt" is the result of a query requiring the names and addresses of all industrial sites built between 1918 and 1939 in Edmonton listed in the "Site Survey Detail file". A similar file (say) "AC _ 1918" could show sites founded during or before 1918 but otherwise with the same criteria. The latter file could be appended to "AC Code Report master" or a blank duplicate of "AC Code Report master" if the existing data in "AC Code Report master" is to be retained unaltered.

To a Word processor

LVIHEA records can be exported to a word processor for the creation of a merged address list, bibliography, serial number and other lists. If required the data can be imported directly into tables format. The facility could be used to embellish database reports with textual explanation and analysis as demonstrated throughout this document.

To Spreadsheets or Statistics packages

Basic statistical functions are available using summary and calculation fields within the DBMS, however it is a simple process to export data to a spreadsheet or statistics package in order to take advantage of their charting and analysis facilities. As a basis for calculations, SYLK⁹ formatted, numeric summary and calculation fields, can be exported to a spreadsheet or statistics package, while alpha fields can provide headings and labels for the layout, calculations and charts. For example, a query to find all sites contained in the "Site Survey Detail" file of the LVIHEA sited either in Enfield or Edmonton and founded during the inter-war years yielded 102 records. The field "AC Code" sorted the records and this was incorporated into a leading summary categorising the ensuing groups of records. The summary field "AC Sum" was incorporated into a trailing summary to count the records grouped in each section by their AC code. The fields "AC Code" and "AC Sum" could be exported to a file, named (say) "AC Code & Sum Expt", and then loaded into a spreadsheet under the column headings "AC Code" and "AC Sum". The first row would then contain the Code "AC" in the first column and the number "5" in the second column. The next row would contain the data "BC" & "2" respectively and so on. Little can be achieved by way of calculation in this example. The text field "AC Code" can be counted but that is all. The summary field "AC Code Summary" containing numeric data is more flexible as it can display the maximum and minimum details, be summed and averaged, (all of which are available from within the DBMS containing the LVIHEA). In addition calculations relating to different columns and rows of any other numeric data that may be

included can be performed. An appreciation of the attributes of the various number fields is essential if meaningful statistical calculations are to be performed. For example, the fields "MULVI Num", "Tel. No." and "SIC" all contain numeric data. In each case it is of nominative order and unsuited to certain calculations although these could be performed, the data would be spurious. It would be inappropriate to (say) correlate the data between (say) "MULVI Num" (an auto-entered serial number) and "Tel. No.". However, this type of operation could be performed using data from the fields (say) "Number of Buildings" and "Site Area".

Charts

To illustrate reports. The "Area Code" and "Area Code Summary" fields could be used to produce (say) a bar chart to illustrate the number of industrial sites per estate at a particular time or over a period of years.

Conclusion

Can the LVIHEA behave as a "structured framework for the collection of data to be filled with material by users (for their own purposes)"¹⁰

In 1987 Manfred Thaller noted that historians face special problems when designing and constructing databases¹¹. Initially there is the type of hardware available not only to historian designers but also to the majority of historian users. Since 1987 funding of IT equipment has been one of the most consistent factors in higher education and this has ensured that most historians have desktop computers linked to networks. Then there are the level of IT skills that a historian can be expected to acquire "...without refocusing his main research interests" (p.148). He further argued that data

should be administered “without assumptions”. Assumptions should be administered in tables generated from the unadulterated data.

Issues of hardware obsolescence were easier than expected to resolve. It was recognised that during three or more years of project activity there would be a massive growth in the use and performance of IT equipment. Despite developing the system on as advanced a desktop computer as was available at the time, those advanced features would soon become commonplace. An Apple Mac system with its intuitive graphical user interface was selected as most appropriate for anticipating the sort of skills non-IT literate users would most likely quickly acquire while getting to grips with the subject matter without first having to hurdle the technology. There was a considerable danger that Apple with less than a 10% share in the market would be forced out by IBM type systems with their massive market share. To a certain extent, this has happened and many are predicting Apple’s demise. Much of their decline was due to IBM challenging their lead in the “user-friendly” environment and producing systems that emulated the Apple. Later IBM collaborated with Apple to produce equipment that could use each other’s systems. The popular Windows 95™ operating system is similar in important respects to Apple’s system 7; there is less prospect of user disorientation between two architectures exhibiting such similar interface design principles. Exchanging information between the two may be awkward or time consuming on occasion but where the effort is justified it is rewarding. Improvements will no doubt continue but are now being overtaken by the standardisation of network transfer protocols as more information is exchanged through the Internet.

It was also relatively straightforward to overcome the issue of “assumptions” by formatting the LVIHEA as a collection of stationery files (files that are re-named by the computer system when opened thus providing a clone of the original file for use and preventing the original file being accidentally overwritten).

By far the most problematic of Thaller’s categories was that alluding to the special problems of historians, the most typical of these i.e. fuzzy data has been discussed above in the context of ensuring that potentially important data is not excluded from consideration because of its ambiguity or inexactitude.¹²

This concern for a satisfactory form is I believe satisfied at a fundamental level, above this level choices can certainly be criticised on a subjective level (is this the most suitable colour?); could the coding of a particular hyperlink be more efficient?). Such issues are best addressed during SSM stage seven.

Reports

The LVIHEA consists of structured information that can be interrogated to provide a structured sub-set of records conforming to certain pre-defined parameters. This sub-set can be formatted into a default layout to display the relevant data and can include facilities for automatic summarisation and calculation. The complete layout of the information can be viewed in the Preview mode (Browse will only display the information contained in fields located in the <Body> Part), information located in the <Summary> parts will not be displayed until a “Sort” process has been activated. A report can

be interpreted as a sorted and saved query. Regular queries can be presented in a standard form that can be printed directly or saved electronically for future use. Saved report files can be merged with earlier reports to produce data with a time dimension. Numeric data can be extracted for export to a spreadsheet or statistical analysis software.

Example

Find all buildings with a site foundation date in the range of 1918 to 1939 in Edmonton. Display them grouped by their area codes and total the members of each group.

Perform Find
Enter "1918...1939" into the field <Site foundation date>
Enter "Edmonton" into the field <District>
Click "OK" (or press "Enter")
104 sites found
Sort
Select:
Area Code
Site Name
Site foundation Date
Sort in ascending order
Click "OK" (or press "Enter")
Create Report
Save the report file

Select a listed layout such as Query info/Report and duplicate it giving the new layout an appropriate title (say) "Site/Listed Index". The <Body> of the new layout displays the same fields and design: (MULVI Num, Site Name, Local Address, District, P/code, Site Foundation Date, Listed)

Create <Title Header>
Select Define Parts from the Layout drop-down menu
Select "Create"
Select "Title Header" & click OK

<Title Header> will appear at the top of the dialogue box, click "OK" to return to layout mode, the <Title Header> appears at the top of the display.

Enter "Site/Listed Index" in an appropriate font and style and drag it into position within the confines of the <Title Header> area. Go into Preview mode to see that "Site/Listed Index" appears at the top of the first page only.

Create <Header>
Select Define Parts from the
Layout drop-down menu
Select "Create"
Select "Header" & click OK

A header will appear on the second and subsequent pages of the report.

Select **Define Parts** from the
Layout drop-down menu
Select "Create"
Select "Header" & click OK

The <Header> will appear at the top of the dialogue box, click OK to return to layout mode, The <Header> appears below the <Title Header> of the display. The field names from the duplicated layout (MULVI Num, Site Name, Local Address, District, P/code, Site Foundation Date, Listed) are already on display in the <Body>: Copy them and move the copy to the <Title Header> area of the screen and move the originals to the <Header>

area. This will ensure that the field names will appear on all pages of the printed report (the title of course only appearing on the first, the header from page 2 on).

Create Sub-summary (when sorted by) Leading

Select the field <Area Code>

Proceed as described for <Title Header> above positioning and formatting the field <Area Code> above the Body of the report

Create Sub-summary (when sorted by) Trailing

Select the field <A C Summary>

Proceed as described for <Title Header> above positioning and formatting the field <A C Summary> below the Body of the report

SITE/LISTED INDEX						
Title Header	E	ADDRESS	DISTRICT	P/CODE	DATE	LISTED?
Header	NAME	ADDRESS	DISTRICT	P/CODE	DATE	LISTED?
Area Code (Top)						
Sub-summary by Area Code (Leading)						
M.I.L.V.	Site Name	Local Address	District	POST. CODE	Site Endtn	Listed?
Body						
						A C Sum Sum
Sub-summary by Area Code (Trailing)						

SITE/LISTED INDEX

NUM	NAME	ADDRESS	DISTRICT	P/CODE	DATE	LISTED?
Area Code AC						
207	Athenian Fashions	1/19 Wakefield St.	Edmonton	N18 2B2	C. 1930's?	No
209	Girlpride	Wakefield House, 1-19 Wakefield St.	Edmonton	N18 2B2	C. 1930's?	No
205	Huxley, John	1/19 Wakefield St.	Edmonton	N18 2B2	C. 1930's?	No
206	P.P. Gowns	1/19 Wakefield St.	Edmonton	N18 2B2	C. 1930's?	No
208	Staffburn Ltd	Wakefield House, 1/19 Wakefield St.	Edmonton	N18 2B2	C. 1930's?	No
A C Sum						<u>5</u>
Area Code BC						
701	Belling & Co.	Southbury Road	Enfield	EN1	1924	No
300	Ripaults Factory	Southbury Road	Enfield	EN1	1936	Yes
A C Sum						<u>2</u>
Area Code IC						
703	??	?720 Great Cambridge Road	Enfield		C. 1920's?	

Etc.

Parameters

Does it work as intended?

The author has demonstrated that the LVIHEA "works" however he has the fullest understanding of the system, and may (sub-consciously) "force" it to work as intended or overlook some omissions by being too close to the problem. How compliant though is the LVIHEA in the hands of other users? Is the programme functional, do the links work, is the learning curve acceptable? Ideally representatives from all the groups of potential users would be asked to try out the prototype, for each may bring a different perspective to bear and is likely to highlight aspects of their work that are not catered for within the LVIHEA. Having said that the author realises that

he cannot anticipate and satisfy all the requirements other's may make on the system and that some compromises have to be made.

Academic colleagues are preoccupied with teaching, research and administration, all of which can benefit from utilising IT. They possess varying degrees of IT literacy and one of the secondary aims of this project was to increase their awareness of IT and its potential. Many historians have little or no experience of handling large electronic datasets. Some practical experience of one might induce them to consult others more specific to their subject or consider constructing their own. Furthermore they intuitively ask the sort of questions to make information available for interpretative analysis and offer sound methodological insights. They can consider whether the teaching & learning model lends itself to their subject area. They may be influenced by the manner in which information can be made available to students without resort to the traditional process of producing multiple copies of hand outs from their own notes. It will be seen as a vindication of the LVIHEA if colleagues are so unintimidated by the media that they are influenced by its apparent ease of use into producing their own digital resources. For example, Vivien Miller¹³ is now developing a DBMS on Florida Prison releases c.1900. It will be a major achievement if colleagues are able to utilise the LVIHEA resources or model their own subject material into a similar format as the LVIHEA. Complementary links referenced by either could then be established. The Middlesex University Oral History Register (MUOHR) prepared with Dr. Daniel Weinbren¹⁴ is another example of this reciprocal development. Through the interaction of informed feedback it should be possible to develop a "House" style that

allows students in the future to access an increasing reservoir of digital resources on the basis of a common root.

Students have an important, sometimes unwitting role to play in the LVIHEA development. It has been used as a teaching aid to illustrate database functions and show how they can be utilised by historians. Fewer historians will create database systems than will access them in the course of their activities and more emphasis was placed browsing, editing, appending and querying than on design aspects. As a result students have entered data into files they have created and these files test the import/export system while the data contained in them has added to the sum of information within the LVIHEA¹⁵. The database files are also used for exercises in sorting, finding and linking records by the barely database literate and have emerged unscathed. Some students have expressed a wish to develop their new skills in a conjectural advanced History and Computing module, others have undertaken assignments that build on their new skills, in some cases digitising and analysing information for the MUOHR and Florida Prisons projects.

Difficulties were experienced obtaining the impressions of museum and other archiving specialists, local authorities, business and amenity groups but the vastly diverse interests represented make it potentially the most exciting. Those with existing digital systems are unlikely to wish to make a major investment in new equipment and the software to read the LVIHEA. The market forces operating make it difficult to foresee many individuals willing to invest their time to investigate the system. There is likely to be

some misconception as to whether they are witnessing an academic seminar or a sales presentation. In either case numbers attending a demonstration or seminar are likely to be small. However the value of the opinions expressed about the LVIHEA by these professionals well versed in manual and/or electronic systems of storage, retrieval and display is likely to be of the highest value even though it may not be quantitatively significant.

A solution is to make the LVIHEA files available through the Internet and alert them to its presence. Attaching a questionnaire to the files as part of the log-off procedure and while it will be important to keep it brief it should be possible to trace the users through the E-Mail system as it forwards the completed questionnaire and enter into a deeper correspondence.

User Groups: Input & Output - Evaluation

Positive

Negative

	Positive	Negative
RCHME	Professional. Long Experience. Publications. Some standardisation.	Existing paper archive that has evolved over decades is being gradually computerised, but this system of adapting the existing system to the new technology fails to utilise the full scope of the technology.
IRAS	Research through Leicester University has produced a Standardised list of site and component terms. Have produced their own Survey Form	
MULVCC Groups	Amateur organisations often having professional people as members which bring a diverse range of skills and perspectives. Can be a fount of information. Volunteers often hard working and enthusiastic. Views are usually sharply focused. Frequently the "front line" in articulating community opinion and organising support or opposition to issues.	Can reflect a too parochial viewpoint.
Local Authority	Professional and full time staff. Decision-makers with financial accountability. Access to technical and legal protocol.	Can be too bureaucratic. Policies can shift due to financial and political constraints
Others: Academics	Skilled evaluators. Accessible. Vested interest in reviewing new developments.	"Ivory tower" syndrome
Students	Fresh outlook. Capable of investing time and commitment.	Concerns for academic achievement may be at variance with true objectivity.
General Public	Close to the issues. Can have an historically tempered grasp of the local environment. Lack of personal stake in the presentation to which they can respond intuitively.	Inexpert in evaluation techniques. Can lose interest resulting in incomplete appreciation of the scope of the application.

Conclusion

The majority of the quantifiable feedback will inevitably come from within the academic environment. However, the ability of the Internet to reach all over the world offers genuinely exciting prospects. It may produce little response but it may hit the jackpot and provide thousands of replies if it excites some interest.

DISSEMINATION

Introduction

The traditional way of delivering large information files is by duplicating them onto some sort of digital disk. Floppy disks can store a maximum of 1.44Mb and as the DBMS survey files alone currently contain about 27Mb it would take about 30 floppies to contain them. Clearly this is not a serious option. SyQuest portable hard disks come in 44MB, 88Mb and 120MB sizes, a 120Mb drive unit can read disks of all sizes but the smaller drives cannot read the larger disks (this project uses an 88 drive unit therefore it cannot read or write 120Mb disks). Compact Disks can store up to 650Mb of data. Floppies and SyQuest disks can be written using their standard drives but CDs require a bespoke drive to write to disk. The alternative is to provide access directly to the files through the more recently available telecommunications systems.

CD-ROM

CD-ROMs are a proven method of disseminating digital multimedia. At 650-Mb storage capacity, they are ideal for storing large volumes of information. Compared with a hard disc their access time is slower but even this relative tardiness is usually faster than obtaining a similar volume of

multimedia data through the Internet. They are durable and cannot usually be overwritten. Though more and more computers are equipped with a CD drive as standard and external drives are inexpensive, writing to CD requires fairly expensive equipment. At the start of the project prices began in excess of £1,000. They are not commonly available so an outside agency would usually have to be commissioned to write data to a CD from (say) a number of SyQuest (portable) hard disks or an external (portable) hard drive. Small runs are likely to be relatively expensive.

Telematics

Telematics is defined here as the transmission of digital information between computer systems other than by intermediate disks or direct short cable connections. It will have the ability to carry multimedia files at realistic speeds. No consideration is given here to receiver terminal requirements for example systems to read graphic, video and sound files as good applications software can be downloaded at little or no cost through the Internet.

The University's local area network (LAN)

It is important to consider the performance of the Middlesex University LAN for two reasons. Firstly, most of the early use of the LVIHEA was within the University because the author made increasing use of it as a teaching example during its testing and evaluation phase. The integrity of the LVIHEA can be protected through the use of access controls and stationery files. Secondly, as the LVIHEA becomes more generally available it may be distributed internally by participating organisations

through a similar LAN system regardless of whether that organisation obtained it through the Internet or on CD-ROM.

Stationery files

Stationery files is the name given by Apple to files that in an IBM PC environment are designated as "Read Only" files. It is a system whereby the integrity of a file is maintained while many users access the file. When a stationery file is opened the user is prompted for a new file name (in the case of DBMS files). As a DBMS file automatically updates while in use these updates are recorded to the new file while the original file is left untouched. New information added to the stationery files can be validated and if required imported into the original DBMS file. Others e.g. word processed files are opened in a new "Untitled" window and the user is prompted for a new file name when the file is saved.

Access

The LVIHEA author is able to protect the DBMS files by restricting access privileges through a system of passwords and user groups. For example the author would create a password and allow all privileges for layouts and field access. Degrees of access are established for example a user group called (say) "Guest" is allowed to perform a limited number of actions on the file, e.g.: browse and print/export. A more privileged group called (say) "UGrad" might be allowed in addition to create new records and design layouts. Another group called (say) "PostGrad" might in addition be allowed to edit and delete records and override data entry warnings.

General

The University network provides a range of services that are indispensable to its users: access to software, printers, other networks &c. but these services are provided for not least because they are a cheaper alternative to providing individual facilities at each terminal. Licensed copies of software could be made available for each desktop computer at no extra cost than providing those same copies on a fileserver but here the cost is identified in respect of the valuable extra available disk space at the individual terminals. However users with their own terminals and privileges are encouraged to copy the licensed software onto their own drives each time they load the software, because it is recognised that accessing the network can be rather slow when many users are logged in. A problem for Apple Mac users at Middlesex University is that the network is based on the IBM compatible Novell system. This provision is adequate for the majority of the Apple Mac generated traffic but more complex files such as those containing multimedia data sometimes falter on the obstacle course of emulators, transceivers, routers, switches and bridges. It has also been University policy to give priority to the IBM/PC family when upgrades, renovations and renewals are planned¹⁶. There is also anecdotal evidence that the system functions even more inefficiently when used by the latest Apple range of PowerMac computers equipped with system 7.5.

Hardware Connectivity Systems

An IT Glossary database file is included in the project but some of the principal components are included below to provide a context for the technical environment in which the LVIHEA exists. Telematics are of particular importance because they represent a major growth area in IT¹⁷.

Academics were early pioneers of online communications using the venerable JANET facility and now other communities are entering this world and demanding and receiving more polished facilities assisted of course by advances in multimedia technology. It makes sense to adopt suitable developments that advance knowledge dissemination from whatever source that can appropriately provide them. There follows a short section detailing some of the technical resources available to assist with the dissemination of the LVIHEA.

Public Switched Telephone Network (PSTN)

The majority of information transferred between computers beyond their local area network (LAN) is transmitted on a telephone network system that was constructed to carry analogue signals. The digitised signals generated by computers have to be converted to analogue between the source computer and the telephone system and then reconverted back to digital between the telephone system and the destination computer. This conversion is carried out by a **modem (modulator/demodulator)**. Modems can be either internal or external features of a computer. The PSTN system is gradually being replaced by ISDN.

Integrated Switched Digital Network (ISDN)

ISDN is a newer faster telephone service based on digital transmission. In this system terminal adapters (TA) replace redundant modems. The initial installation costs are greater than for a modem & PSTN arrangement, but the faster set up times (typically 1 - 2 seconds compared with 10 - 20 seconds) cut call charges (up to 50%) by allowing entire files to be downloaded and

the connection closed. It allows digital information to be transmitted at speeds of 128Kb/s over the normal telephone while the cost remains the same as a normal telephone call.¹⁸

Packet

A bundle of data that traverses a network is known as a "packet". On the Internet a packet is formed by the IP part of the TCP/IP protocol. It must contain the source address (where the packet's come from), the destination address (where it's going), a packet identifier (so that the receiving computer can tell what sort of packet it is) and some data.

Joint Academic Network (JANET)¹⁹

JANET was set up by the Science Research Council (SRC) to provide a network link for UK universities and research labs. It delivers a 64Kbs/second access link coupled to a 2Mbs/second trunk. It has a combined bandwidth of all channels to the USA of 3.5Mbs/second (Aug. '94) and 256kbs/second to France. It is designed to make use of the gateway between EMPB and Ebone operated by DANTE. A 34Mbs/second capacity is required for both Europe & USA but currently high tariffs from the carriers are preventing this. The formation of TEN-34²⁰ is an attempt to overcome this problem. Gateways have been established at University of London Computer Centre (ULCC) for international traffic and at Brunel University for the X.500 Directory of WWW interfaces²¹. See also Metropolitan Area Network (MAN)²²

SuperJANET

SuperJANET is a high performance wide area network provided in collaboration with BT. It comprises a 34Mbs/second pilot data network with plans to develop to 140-155Mbs/second ATM/SDH network "...an advanced high speed optical fibre network linking a large number of sites within the academic community. Via the network, people at these different locations are able to share massive amounts of data, audio and visual information"²³

SuperJANET claims a 70 fold increase in performance compared with the existing JANET network. To put this capability in a day-to-day context means that the equivalents of a 5,500 page report can be sent in less than one second. There are plans to enhance SuperJANET to provide higher performance with transmission speeds up to 600 Mbits/second by BT in collaboration with the academic community to provide a pervasive network based on the most advanced technology. The aim is to maximise the number of sites connected and to offer a range of access speeds to meet individual requirements for services. Discussions are already under way on ideas for links with the USA and across Europe. The network may be extended to embrace overseas academic institutions and the business world. Such collaboration is hardly surprising given the practical and philosophical convergence of the academic and business communities. Ultimately, SuperJANET will become part of a global high bandwidth network - "... an information superhighway which knows no national boundaries."²⁴

The Internet

When the first letter is capitalised the worldwide Internet (often shortened to the Net) is indicated. If it is not capitalised, this generally means a collection

of networks and is really a lazy way of saying 'internetwork'. Internet traffic is now estimated at more than 30 terabytes of information each month²⁵. In 1994, around 21 per cent of US library authorities had Internet connections, with 13 per cent of them offering direct public access. In Britain, connections to the Internet from public libraries are growing slowly²⁶. When access to the Internet has been established, much of the software to take full advantage of its many facilities can be downloaded directly from the Internet, often at no or low cost.

Online Facilities

E-Mail

This provides a unique address within the Internet for sending and receiving messages. It comprises your name, the @ symbol and your domain name, so the address *Brian4@mdx.ac.uk* is the address for the user Brian Budd at the domain *mdx.ac.uk*. E-mail is claimed to be instant communication but this ignores all manner of delays as the message is batched and forwarded to various computer zones, It would be unusual however for a message to occupy more than half an hour between transmission and receipt anywhere in the world. It has obvious advantages over traditional postal services in respect of time and costs; a typical message would only cost about one penny.

Most messages though are between users of a LAN where it is seen as a convenient, semi-official, cost-effective medium. Other files can be attached to e-mail messages rendering the import and export data more convenient.

World Wide Web (WWW)

The designations Internet and WWW are for most practical purposes interchangeable. The WWW has been defined as an intuitive hypermedia information system that allows information to be provided on the Internet in a format accessible to non-technical users. Basically it consists of home pages and links to other home pages. Middlesex University has a home page address of <http://www@mdx.ac.uk>

Necessary accompaniments to the hardware innovations are the software developments.

Newsgroups, Usenet, or the Bulletin Board System (BBS)

The collective name for these newsgroup servers is the Usenet. To access the newsgroups stored on an access provider's newsgroup server, a news reader program is required. It is the electronic equivalent of the office pinboard. Users can log into it to leave messages and files that can then be read by other people logging in²⁸. An internal example of such a system is that established by Dr. Jeff Mason at the School of Philosophy Middlesex University, to behave as a remote seminar session for students. There are around 14,000 newsgroups on the Internet covering almost every subject under the sun. Most independent access providers (IAPs) and organisations have a newsgroup server which periodically receives a feed of news from another newsgroup server on the network - it takes all new messages from the feed and then adds the messages which have been posted by its own users. The feed then goes onto another newsgroup server. A WWW browser such as Netscape makes it easy to receive the information posted at any Usenet site in conjunction with an E-Mail facility (the digital equivalent of a stamped addressed envelope) which requires the user to simply type the

word “subscribe”. Subsequently URLs of all additions to that newsgroup are referenced and the total number of them displayed in a distinct area of the browser, clicking this area displays the list, clicking an item on the list displays the information. To cancel the facility: send the message “unsubscribe”. These procedures are known as **Network News Transfer Protocols**. There is an increasing number of newsgroups that are concerned with heritage issues, for example the Association for History and Computing and the Association for Industrial Archaeology. They enable the brainstorming of views, the dissemination of information and support for research by allowing researchers to publicise their interests and request specialised expertise from the other group members. In many ways they are online research helpdesks with a diverse and expert staff.

Home page

Technically a home page is the opening view on a WWW site. It is also used as a generic term to refer to a company, or an individual’s site. The LVIHEA home page would present an overview of the project and provide URL links to the LVIHEA (FTP) files and other relevant sites.

Content of Home Page Showing HTML Codes

<HTML><TITLE>River Lee (Lee) Valley Middlesex University Multimedia Industry Archive, Industrial Estates, Sites, Factories, Listed Buildings, History,

Heritage</TITLE><H1>The Lee Valley Industrial Heritage Electronic Archive</H1>

<H2>What is it?</H2>

<BODY>The River Lee (or Lee) flows through greater London in a north/south direction confluenting with the River Thames to the east of the Isle of Dogs, it is navigable as far as Ware in Hertfordshire. A programme of canalisation was adopted during the eighteenth century.</BODY> <URL to K. Fairclough doc²⁹.>

<H2>Water Power</H2>

<BODY>The power generated by the river has supported mills certainly from the eleventh century and probably from Roman times. The Waltham Abbey Gunpowder Mill site just to the north of the M25 has produced gunpowder and other explosives since the sixteenth century and further downstream is the eighteenth century Wright's Flour Mill at Enfield and beyond is the Coppermills at Walthamstow and the Three Mills at Bromley by Bow.</BODY>

<H2>Victorian Factories</H2>

During the mid-late nineteenth century The Royal Small Arms Factory at Enfield Lock was in the forefront of the adoption of the new industrial practice of parts standardisation which led to the familiar manufacturing techniques that enabled the United Kingdom to establish her lead in world markets. The river played an important role in the transportation of raw materials and finished goods to London, that most local of international markets and by the end of the nineteenth century many "dark satanic mills" producing timber products, dyestuffs, lino and crêpes were built along the banks of the River and the Navigation.

<H2>War & Peace</H2>

<BODY>During the First World War many munitions sites were established and at the cessation of hostilities were colonised by more peaceful industries. The Interwar years were the "Golden Age" for the Lee Valley Industries chiefly due to the electric and electrical goods production in new electrically powered factories.</BODY>

<H2>Decline</H2>

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<BODY>By the late 1960's a slow decline was beginning that accelerated during the early
1980's and now the Lee valley is distinguished by warehouses, supermarkets, the
conversion of large factories to groups of small individual enterprise units and large tracts
of derelict land.</BODY>

<H2>The Archive</H2>

<BODY>The pace of the change and the transformation of the familiar working
environment has been the spur to this study. An attempt has been made to record those sites
that remain by on-site survey using text, photography and video and collect the data into a
multimedia database. This is an artifact led study but provision has been made in the
archive for supplementary historical documentary data.</BODY>

<H2>Potential Users</H2>

<H3>Planners</H3>

<H3>Business</H3>

<H3>Heritage Managers</H3>

<H3>Community Amenity Groups</H3>

<H3>Academics</H3>

<H3>Students</H3>

<H3>Local Historians</H3>

<H2>Structure of Archived Resources</H2>

<BODY>Schematic Drawing of LVIHEA files available on the Internet

<URL> to LVIHEA Files

</BODY> </HTML>
```

LVIHEA files

There are two options concerning the physical location of the LVIHEA files. The first is on the networked desktop computer used to develop the prototype and the other is to use the University Alpha mainframe computer. The former option had several disadvantages. Initially the hard drive was limited to 120Mbs, which was insufficient to contain all the LVIHEA

information plus the application programmes. Even as the system is upgraded to provide adequate easily accessible storage it would have to be kept switched on and there is insufficient staff available to supervise and maintain the integrity of the system. The latter option is more feasible as it is "permanently online, is supported by a technical staff and the LVIHEA files can be administered from any of many terminal locations.

Links

Unique Resource Locations (URLs) will be established to synthesised gobbets of information concerned directly or peripherally with the LVIHEA and to Web sites

Standard Generalised Mark-up Language (SGML)

SGML is a protocol for marking up documents with tags that allow their content to be separated from their formatting and structure. Originally intended for publishing, it is becoming increasingly useful as a data interchange format. HTML is the language of SGML³⁰

Hypertext Markup Language (HTML)

HTML is the mark up language that allows documents to be formatted for the WWW. HTML is one application of SGML³¹. Server Push is a Netscape³² extension to HTML that allows a document to be continually updated. When a user requests a document that contains a server push, the Web server keeps the connection between the client and the server open, by telling the client that there's more to come. The server can then send updates to the client as it wishes. This differs from a client pull in two ways. Firstly there's a continuous open connection between the client and the server;

secondly it's the server's responsibility to send updates to the client rather than the client making requests. Client Pull is another Netscape extension to HTML that also allows documents to be updated. An HTML document can contain a refresh command in the header. When a user requests and decodes such a document, the browser reads the header and then will automatically go back to the server to re-request the document after a specified time period. Client pull relies on the user's browser to refresh the document and it makes a new connection each time. Either system has clear implications for currency of the LVIHEA files.

Unique Resource Location (URL)

An addressing system to locate resources based on their site, path and file name, e.g. URLs are added to a home page to provide hyper links to information in other areas of the file or to other files.

Serial Line Internet Protocol/Point to Point Protocol (SLIP/PPP)

A dial-in connection that allows full access to the facilities available on the Internet using almost any computer, a modem³³, an account with an Internet Service Provider (ISP), SLIP/PPP communications software and a standard telephone line. Allows multiple simultaneous connections - meaning that downloading of files can occur at the same time as the WWW is being browsed³⁴.

File Transfer Protocol FTP

FTP has its origins in an early text only system that allowed files to be copied from one computer to another via the Internet, assuming sufficient

access rights are secured. By August 1995 an estimated 6,000 gigabytes of stored files were available through FTP. Access to the files is managed by defining types of user, e.g.:

Owner: - The “file system” owner (as defined by the Users & Groups owner name).

User: - Anybody with a user name and a password set up in the User & Guest settings.

Guest: - Anonymous logins (user name of “ftp” or “anonymous”, any password).

Anonymous FTP provides unrestricted public access to designated directories/folders flagged by the instruction “You can get files by anonymous FTP from...”³⁵. Usually these files can be accessed by typing “anonymous” when prompted for a <User ID> and “<your e-mail address>” when prompted for a <Password>. Access privileges are defined as follows:

None: - No access.

Read Only: - Access to read existing files, but no write access.

Upload: - Access to read existing files, and add things to the file system, but not change what is already there (including not overwriting existing files).

Full: - Full access to the file system, Read/write files, delete files and (empty) directories, and rename files.

An estimated 6,000+ gigabytes of stored files cannot require some sort of index reference system to advertise their presence to potential users. Can be searched by “Archie”: a database of files (usually text based) and their

locations that can be downloaded by FTP. Covers approx. 1500 FTP sites (August 1995).

FTP is a three part system comprising:

- 1) **A Search Engine** that regularly trawls the Internet for sites and compiles a database of the finds.
- 2) **The server** that takes the search requests and returns a list of files from the databases that fulfil the request.
- 3) **The client** who may be:
 - a) **Dedicated,**
 - b) **Telnet,**
 - c) **Web,**
 - d) **E-mail.**

Archie software can itself be downloaded from the Internet³⁶ as can “Gopher”³⁷ another very useful Internet reference and search tool. Gopher is used for the easy tracking of Internet information through a system of menus and sub-menus and search tools for specific words and phrases.³⁸ . Gopher can be used within Netscape³⁹ by opening a Gopher location as if it were like any HTTP site. Although it was designed for text based systems it can manage graphics using helper applications like “**Mosaic Client**”. The so called “mother of all gophers” is at Minnesota and is often set as a default which can be changed if preferred to a more local centre. The “Turbo Gopher” software can be obtained via the Internet⁴⁰. “Fetch” is a Macintosh program for transferring files. It uses the File Transfer Protocol (FTP) and therefore allows a networked Macintosh to transfer files with any connected machine that supports FTP. “Fetch” requires the user to have an appropriate

application to read the file (e.g. FMPro). "Fetch" software can be obtained from the Internet⁴¹.

Conclusion

Telematics is clearly the most promising path to follow for the dissemination of this type of multimedia project, if for no other reason that many basic files can be accessed no matter what IT architecture is used. Consequently, there are economies on troublesome pre-emptive format protocols - if it gets onto the net it should be capable of being read at any terminal. However there is a difference between the extravagant claims made for the Internet and the *actualities*. CD-ROMs are a popular and proven medium for the transfer of information which should never encounter firewalls, refused entry, busy lines and other gremlins that plague the Internet. Often it is possible to make the same CD function with either Mac or IBM machines. CDs suffer from being perceived as "expensive" when compared with the "free" Internet. This is unfair and may even be untrue if the development time involved in preparing documents for the Internet is taken into account. At the commencement of the LVIHEA project CD writers were prohibitively expensive, late 1997 they were available for about two hundred pounds.

EVALUATION OF LVIHEA

Introduction

Co-operation is as needed in the evaluation of the project as in its compilation. It is recognised that different groups have different agenda and priorities and insinuating the LVIHEA into these groups will be at least partially dependent on identifying mutual interests. Contacts may bear some early fruit but where such mutuality is not evident how much of the early enthusiasm may be sufficiently sustainable for translation into active participation?

Co-operation

It is acknowledged that the success of the project is related to the degree of co-operation with the many individuals and organisations that make up the Lee Valley industrial landscape. The expectations and the accomplishments require some elaboration. Co-operation is a two-way process; some organisations provided more information for the LVIHEA than they received from it and vice versa. In part, this is due to the data collection strategy adopted and partly to do with the nature of the organisations themselves. One of the aims of the LVIHEA is to provide information identifiable as appropriate by groups whose main interests lay outside the appreciation of industrial buildings, so that common strategies balancing conservation and regeneration can be devised. Attempts to identify ways in which these organisations might use the LVIHEA were made at the design stage in the belief that sooner or later these organisations would make greater use of IT and hopefully model their own systems to a format recognisable by the LVIHEA. General concepts and strategies discussed at

meetings with group representatives indicated a willingness to provide mutual or reciprocal access to records. Presentations given to amenity group meetings and individual members identified with whom to conduct further investigations. For the purposes of this project records could be categorised as either manual records and digital records, digital being the preferred medium because in general incorporating them was less time consuming. Providing some rudimentary formatting (e.g. ASCII or one of the many DBMS protocols) is established, many hundreds of records can be incorporated quickly and easily. Enfield Borough Council kindly allowed access to their EPIX data copies of which were held by the University's Geography department and the transfer of data was successfully carried out using floppy discs. The data consisted of legal and locational details of the industrial enterprises situated in the Borough. Retail and administrative support businesses were filtered out, as were enterprises located outside the designated geographic scope of the LVIHEA. This dataset; later supplemented by data gathered on personal site visits, provided the backbone of the LVIHEA. I was unable to obtain data in this format from the other London Boroughs situated in the Lee Valley. Data for Enfield and other London boroughs was obtained from the North London TEC (a quango with responsibility for employment and training initiatives). The data entity attributes were similar to EPIX but the information was received in the form of a computer printout listing and consequently was manually entered into the LVIHEA. Manual entry of records is a time consuming task that because of the dot matrix quality of the printout could not be expedited using a scanner in conjunction with OCR software. Lower priority was

given to the task of entering these records because although their incorporation is essential to the LVIHEA, they are not essential to the prototype model, which has sufficient records to demonstrate its features and functions effectively. Most have been entered into the LVIHEA by students learning to use DBMSs as a component of their IT instruction, while other students use the data for as part of their research into community history projects which in turn feed back more information into the LVIHEA.

The RCHME provided invaluable historical, archaeological and architectural information from their manual record. Listed buildings records for fifteen sites comprising thirty three listed industrial buildings of the region were incorporated into the LVIHEA. This does not include those listed as an outcome of RCHME's recent comprehensive survey of the Waltham Abbey Gunpowder Works. A copy of the full RCHME report including site plans together with a LVIHEA photographic survey record is held in a manual format awaiting digitisation into the LVIHEA. The LVIHEA has been able to provide photographs and level 1 survey reports to the RCHME when requested in response to the planning applications routinely passed to it by local authorities, which could affect the future of such buildings. Similarly where indications of the possible destruction of unlisted but remarkable buildings exist, details are forwarded to RCHME for consideration of possible protective measures. Such cases often come to light through the communication channels operating within the amenity group network and where no record already exists in the LVIHEA a site survey visit is arranged and the information then forwarded to the RCHME⁴². Potentially this is a very important application of the LVIHEA

because it opens further communication channels between individuals, communities, government and a principal conservation agency.

Communications are more efficient where protocols are established. The Association of Industrial Archaeology has developed the Index Record for Industrial Sites (IRIS) and where possible IRIS terms are used as default values for automatic data entry into certain of the LVIHEA data fields.

Different Agenda and Priorities

Many of the members of local amenity groups are mature individuals with little or no background in IT and with little ambition to acquire the necessary basic skills or make even the relatively modest investment for computing equipment. If the LVIHEA is to move forward it will require the skills of a good communicator experienced in the field of public relations.

Amenity Groups & Individuals: *NRAG, GLIAS*

Amenity groups have not contributed records, few of them have IT facilities and none of them has a direct or exclusive interest in industrial buildings.

It may be difficult to motivate volunteers to allocate more of their free time for administration than for more direct action in specific areas of their interest. It is appreciated that this extra effort will be "rewarded" by the necessity of finding funds for IT equipment in order to take advantage of the eventual resource.

Professional & Business Groups: *BOC, British Aerospace*

Management

Management is often reluctant to allocate time and funds to develop a general system in conjunction with other bodies. They would rather use their own system or adapt a proven alternative. Thus alternatives run the risk of being squeezed by a reluctance to “re-tool” and commit resources to inputting the data. Introduction of a new system would require full time professional marketing and sales techniques not available to this project.

Part-time community liaison worker

The position of Community Project Coordinator was created within the humanities faculty so that legitimate links could be formed with amenity groups, local authorities and industry. With the aid of the community newsletter “Catalyst”, a two-way information conduit has been formed.

The LVIHEA is not a major priority for external organisations and groups. New contacts need to be massaged. Presentations usually bear some immediate fruit but often no realistic programme of continued interchange emerges. This is often because most contacts have a specialised knowledge of a specific aspect of the LVIHEA sample, however this can enhance the overall structure of the LVIHEA’s because accommodating the new data is another test of its resources and flexibility and enables further refinements to be carried out. Some examples of the differing contributions of outside groups and their implications for the LVIHEA are given below. Contacts are maintained and made through the “Catalyst” Newsletter⁴³ published approximately three times a year and distributed to about 500 recipients representing the variety of interest groups in the Lee Valley. It aims to present heritage issues in a community context, build and maintain links, and be a forum for debate.

New River Action Group (NRAG)

NRAG are a well established local amenity group dedicated to research and conservation on the archaeology of the New River which flows from Ware in Hertfordshire to Islington North London. Its entire course hugs the 30 metre contour line to the east of the River Lee thus it could be argued that the New River defines one of the geographical boundaries of the LVIHEA project. The New River was created to supply London with a pure drinking water supply. Work digging the New River commenced in the late seventeenth century and its course contains many Artifacts such as bridges, pumping stations, monuments and boundary posts. A digital register and survey form was designed by the author in conjunction with Don Munday of NRAG with LVIHEA and AIA formats in mind and the register completed with 161 entries, surveys of the individual Artifacts is an ongoing project.

NRAG Register

Records the New River Artifacts by **Ref, Name/Nature, Address, Local Authority, Ordnance Survey Key, Grid_casting, Grid_northing, Survey date**

Survey Forms

A database file has been designed and is available for NRAG when they have the IT system to run it. Otherwise forms printed from it to maintain records manually. It is essentially a customised version of the “Site Survey Detail” file of the LVIHEA. Records from subsequent NRAG surveys will be stored on the LVIHEA as a separate file while records of industrial premises will also be imported to the “Site Survey Detail” and Building Survey L1” files where appropriate. *Thos Ridgewell Brush works*

Following a day school seminar of the LVIHEA to postgraduates I was contacted by Professor Barrett and loaned a 1930's photograph album, written reminiscences of her grandfather's business one Thos W. Ridgewell Brush Manufacturer of 27 Acacia Road Enfield from 1919 to 1940 plus a survey report compiled that weekend. For the moment the reminiscences have been included in the survey files but it is likely that as more data of this kind becomes available including oral histories a new individual file will be created specifically to accommodate them with the usual hyper links included for ease of research.

BOC

Following a contact established by the Community Liaison Officer a site meeting was arranged with a former senior manager. A full tour taking in the buildings revealing their relationship to the production processes was preceded by an illustrated talk covering aspects of company history and its role in developing new technologies over ninety years in the Lee Valley. Documents giving details of company plant and site plans over many years were donated and were used to refine the "Company Plant Index" and "Plant Pictures" files that provide a framework for data collected on surveys going beyond the RCHME defined Level 2.

Bysouth Stone Masons (Bruce Custle Museum Collaboration)

The premises occupied by Bysouth Stone Masons since 1873 were sold for housing development in 1995. There was time to complete a survey of the building interiors as well as exteriors. A large number of photographs and video footage was compiled. Artifacts (mostly documentary) have been

lodged with the Bruce Castle Museum and such is the volume that they remain unclassified or sorted. Undergraduates studying the history in the community module will be assisting with the archiving and producing projects based on aspects of the company's history possibly including some information from other sources. Much of the information will be digitised for the LVIHEA.

South Yorkshire Application

Originating in 1933 The South Yorkshire Industrial History Society is one of the world's oldest local industrial history and preservation societies. It owns important historic sites including late C.17 Wortley Top Forge, which it has opened to the public as a working industrial museum. It safeguards historic buildings conducts research and recording through a close association with the Association for Industrial Archaeology (AIA). It also runs a programme of public lectures by local and national industrial archaeologists and historians and publishes papers and an annual magazine "Cutting Edge". The Society's records are stored in a manual system many of them maintained on AIA IRIS proforma.

The industrial landscape of South Yorkshire exhibits many of the features found in the Lee Valley. It varies importantly in the greater incidence of extractive and primary process industries (such as coal & iron extraction and steel manufacture). Whereas in the Lee Valley these absent and but for the early extraction of brickearths have never been a feature. In order to evaluate the flexibility of the LVIHEA design and to provide the Society with a digital format for their extensive resources, it was agreed that I would provide a customised clone of the LVIHEA DBMS files into which would be incorporate a large sample of the existing manual records. This was a

significant test of the LVIHEA's ability to act with a well-organised society that itself was adopting standardised recording procedures.

The adaptation of the DBMS was mostly a case of re-defining some field names to conform to local usage while some new fields were added. This process was so straightforward that it seemed little problem that original on site surveys were not conducted as it could be confidently expected that any changes suggested by later surveys could be incorporated as easily. Other than this, the changes were largely cosmetic.

The process did involve a closer look at the relationship between the LVIHEA design and the similar AIA design and it was the regular encounter with AIA structured records that eliminated some small anomalies between the two. Again, this was resolved by attempting an even closer union of the defining categories of data entry.

The other practical aspect of this project was the delivery of the new digital archive. The Society did not have its own computer system though many of its members had their own personal computers. Members of the Society's Recording Group included archaeologists and historians from Sheffield University some of whom were already familiar with the LVIHEA through the presentation of a paper and workshops at the Annual Conferences of the Association for History and Computing. In partial response, they were using FileMaker Pro™ to assist in their own research. The Society had good contacts with other Heritage organisations including access to the IT facilities at Sheffield's Kelham Island Industrial Museum. The lack of centralised IT facilities was frustrating but characteristic of the voluntary

heritage sector and offered a worthy example of the difficulties to be expected disseminating the archive in the real world.

Confronting these problems emphasised the distinct categories to be addressed and the scale of the task ahead. Firstly the delivery of the digital archive. Secondly the instruction in its use. Thirdly, maintaining its integrity.

The third cannot be resolved until the Society owns an IT system when standard techniques such as those outlined by Everest⁴⁴ for example and is not considered here. The second of these has already been addressed in respect of the Lee Valley through instruction by integration into the teaching modules of degree students and through presentations to local groups and more subtly perhaps through the series of student internships with local organisations. A similar programme can be used in South Yorkshire.

However, on line learning techniques with students at Northern College, Barnsley and e-mail links with Society members at Sheffield University have been developed to assist dissemination.

The first issue is covered here in some detail. A questionnaire was distributed and established the computing resources of the members. The files developed on the Apple Mac were attached to an e-mail message to colleagues at Sheffield University. For the smaller files there were no transfer problems but for the files greater than 1MB that is the survey and glossary files, warnings were given by the system that difficulties might be experienced and this proved to be the case. The Building survey file (@1.2 MB) survived but not the larger survey file (@1.7MB) or the Glossary (@3.0 MB). An alternative strategy was to load the files onto a SyQuest

drive (88 MB) and forward the disk⁴⁵. All other members of the Society used IBM type PCs. Copies for the PC version of FileMaker Pro were easily produced by creating versions of the Apple Mac files without the survey records that were small enough to fit on a PC formatted floppy disk and transferring them from the Mac to the PC. They could then be opened directly into the PC version of FileMaker Pro. The survey records could then be saved as FileMaker Pro formatted export files in the Apple Mac, saved to a PC formatted floppy disk and imported to the PC FileMaker Pro files. This was achieved with no corruption of the records. Copies of the files could then be saved to floppy disk and distributed to society members.

Unfortunately, none of the members had copies of the FileMaker Pro software. For these members export versions in various formats were produced⁴⁶. The complete set of records of any of the survey files did not exceed the 1.4-MB floppy disk limit in export format. The major problem of exporting rather than copying files is that for the recipient to import the records (s)he must first create a DBMS file with the corresponding fields. In recognition of the time involved and in the knowledge that most PCs are equipped with Microsoft's Windows 95 and Office software which includes the DBMS "Access", copies were prepared in Access format and anyone using this system could open the survey files directly.

A README file was included with all disks. Members were encouraged to raise queries by e-mail, telephone or conventional mail. Details were also expounded at regular meetings of the recording group.

Super Testing

The modeling strategy of the LVIHEA draws on Checkland's Soft System Methodology, a feature of which is to test, review, and evaluate on a frequent and iterative basis. The details of much of this process has been recorded above, but relatively little formal assessment of the educational efficacy has occurred though a plan has been devised and is outlined below.

1) Computing module

Students can divide into two groups, one using the LVIHEA for methodological and research, the other using more traditional methods. Progress should be monitored and “before and after” exercises designed. This is not practicable because of the short duration of the existing introductory course but could form an important part of the putative advanced “History and Computing” module where an evaluative approach to historic sources is envisaged.

2) Other Tutors

Tutors could their provide their own data to a modified archive reflecting their specialty and teach (say) one class of History and Computing so giving a practical illustration of how historians actually use IT. Preparation could be in conjunction with a project in the "Historical Studies in the Community" module on parameters specified by the subject tutor

Conclusion

Self-assessment proceeded according to plan, the iterative process ensured continued refinement of the system as new data and new data formats were

assimilated during the research programme. It has been demonstrated at seminars for staff and other postgraduates and at meetings with community groups at various stages of its development and the subsequent discussions have been a significant factor in its development. Some undergraduate students studying the “History in the Community” module worked directly on the data gathering aspect of the LVIHEA project. Others taking the “History and Computing” module have used the LVIHEA files as a teaching and learning tool for their study of DBMS and have created their own files of North London TEC data which was successfully incorporated into the main survey files.

GENERAL CONCLUSION

A multimedia archive of the industrial heritage of the Lower Lee Valley has been created utilising data from a range of contemporary and historic sources. The research considered procedures to handle large volumes of data in diverse media, and addressed presentational issues. The scale of the project was much greater than originally envisaged. The thousand or so records constitute data from two London boroughs together with a handful of additions of historical importance gleaned from other boroughs through the listed buildings register of the RCHME. A few hundred records were individually surveyed and only a handful at a depth greater than Level I. System design was facilitated by the application of Soft Systems Methodology because its problem-solving approach was appropriate where boundaries were nebulous or unknown. Particular site anomalies tested an archive structure that should remain consistent

whether it contains one or many records. The success of the basic design parameters has proved the Archive flexible and adaptable. Closely associated with it are the archives for the New River Action Group and the South Yorkshire Industrial History Society, while the Florida Prisons and the Oral History Register are rather further removed.

Further Research

The emergence of the Internet as a mature medium of mass communication offers a significant area for further research. Its popularity should boost use of IT equipment to members of amenity groups. This will undoubtedly assist in the dissemination of the project in two ways. The increased computing base will allow more individuals and groups to access the LVIHEA and the ability of the Internet to ignore the platform on which a project is created will enhance its wider dissemination. It is possible for LVIHEA information to be made available on the Internet, but true interactivity, whereby the user can for example interrogate the DBMS with his/her own search and query criteria is still difficult. The use of Java holds out the prospect of success.

Currently, the most effective way for distance users to interrogate the LVIHEA is to have their own copy of the application software. The LVIHEA can be exported in many formats but not all DBMS have the facilities to display all of the information. Typically the popular Microsoft Access™ DBMS that comes bundled with Windows cannot manage repeating fields and has problems with some graphics transfer protocols. Fortunately, Claris have now produced a Windows version of FileMaker Pro that is compatible with and has the features of the best Mac version.

The project symbolised willingness on the part of the school of History and Politics AT Middlesex University to recognise the relevance of IT. It encouraged an exploration of ways to incorporate IT to create new perspectives of history. Teaching was broadened to include statistics and structured data design. Students had the opportunity to collect and digitise data from local archives, and industrial sites and to present their findings in seminars and museum displays. Teaching staff provided students with projects from their particular subject which were conducive to the application of various IT techniques. In particular several students sorted, manipulated and summarised data concerning Florida prisons of the late nineteenth and early twentieth centuries.

The School also embarked on a programme to equip all tutors with computers linked to the University's LAN. Staff were encouraged to adopt modern methods of course material production including using the LVIHEA digital scanner and the experience of IT literate staff.

Some tutors opted for Apple Macs after seeing the LVIHEA and in the knowledge that history students were using them as a preferred IT platform. The issues of network compatibility were not fully resolved, the transfer of large files (in particular, those including high resolution graphics) to printers sometimes caused crashes on the desktop PC and the Server.

This study aimed to provide a renewable information resource that could produce editions for manipulation and analysis. It is not limited to providing snapshots of a particular area at a specific moment. The LVIHEA will provide future studies with a flexible, updateable resource

allowing a frequent re-evaluation of the Lee Valley industrial legacy and its historical significance.

NOTES

¹ *Op. Cit.*, Checkland (1981)

² A University wide forum for post graduate students in all disciplines

³ A paper was presented to Association for History and Computing (UK) Branch Conference (1995) (Selwyn College Cambridge).

⁴ A significant example of this is the formatting of the "Date" fields in the DBMS. As soon as building phases were taken into account it was important that temporal searches had the greater inclusivity of a "Text" format

⁵ e.g. see record number 736 of the LVIHEA "Site Survey Detail File"

⁶ "Any software able to accommodate inherent properties of historical data has to provide means to take account of the inherently fuzzy character of the information contained within historical source material." Thaller, M, "The Need for a Theory of Historical Computing" *History and Computing II* (ed.) P Denley et. al. pp.2...11 (Manchester, Manchester University Press, 1989).

⁷ See Weber, E, *Art Deco*, (New York, Brompton, 1989) "As the industrialisation of the twentieth century gathered pace... (it) confidently celebrated the machine age with emphatic geometric lines and shapes, vibrant colour schemes and the use of modern man-made materials. Skyscraper deco, streamline style - its forms revelled in a headlong rush towards the future." and Beyer, P, *Art Deco Sourcebook – A Visual Reference to a Decorative Style 1920-1940*, (London, Guild Publishing, 1988), pp.111 & 160

⁸ See the FileMaker Pro manual for full details

⁹ Symbolic Link format it can be arranged by columns or by rows where each column is equivalent to a database field and each row equivalent to a database record. Where a field contains both numeric and alpha characters, only the numeric values are output. SYLK cannot accept data fields of more than 245 characters.

¹⁰ see *Craft 15* p. 10

¹¹ Thaller, M (1987), *Op. Cit.*;

and Thaller, M, "The Need for a Theory of Historical Computing", *History And Computing II* (ed.) P Denley & D Hopkin. (Manchester, Manchester University Press, 1989)

¹² *Ibid*

¹³ Of the American Studies set of the School of History & Politics at Middlesex University

¹⁴ Of the School of History & Politics at Middlesex University

¹⁵ Several of these student files are included with the main LVIHEA files and can be imported by reviewers/examiners to validate the claims made in this thesis.

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- ¹⁶ e.g. the mainframe computers were replaced during the summer vacation of 1995 and links installed for the IBMs before the new term began in October '95. At the time of writing (March '95) Apple Mac terminals still cannot access the Library facilities.
- ¹⁷ So much so that Microsoft are reputed to be prepared to pay \$1 million per day in contempt of court rather than modify their policy of "Internet imperialism" seen by the courts as unfairly monopolistic.
- ¹⁸ Robert Barrett, Internet Magazine Aug '95 (p.54) & Oct '95 (p.109) Internet address: barrett@market.demon.co.uk
- ¹⁹ UKERNA, The Networking Programme Report 1994..1995, (Oxon. UK, The JNT Association, 1995)
- ²⁰ Interconnection of European Research and University Networks at 34-155 Mbit/s. Backed by European Union funding. For the interconnection of national networks.
- ²¹ NetUser Iss.3. Sept.'95. <http://www.ja.net>.
- ²² UKERNA: *Op. Cit.*
- ²³ Taken from Super JANet's Internet home Page
- ²⁴ *Ibid.*
- ²⁵ Anon., "Stuck in Space" The Guardian (1/8/95)
- ²⁶ G. Cole "Taking out time online" The Guardian 10/8/95
- ²⁷ Hyper Text Transfer Protocol. a WWW protocol for transferring HTML encoded documents
- ²⁸ Internet Magazine 11 Oct 1995 p.108-110)
- ²⁹ Fairclough, K, "The River Lee 1571 – 1767" (Paper/seminar given to the Middlesex University Historical Research Studies Group (1994)
- ³⁰ Internet Magazine 11 Oct 1995 p.108-110)
- ³¹ <http://union.ncsa.uiuc.edu/HyperNews/get/www/html/converters.html>
- ³² A browser program which allows your computer to download and display documents from the World Wide Web.
- ³³ A piece of hardware used to Convert digital signals to analogue and vice versa. Used between the computer and the telephone network connection
- ³⁴ MDA fact sheet 43. Museums & Internet
- ³⁵ Dial:- ftp.microsoft.com
- ³⁶ Dial:- ftp.red.net/pub/mac/comms/ftp/
- ³⁷ For Turbo Gopher software and helpers, dial:
Ftp.boombox.micro.umn.edu/pub/gopher/TurboGopher/TurboGopher2.0b5.sea.hqx
- ³⁸ "For tracking down hard information, rather than surfing through gigabytes of online advertisements and tedious home pages. Its hard to beat the Gopher. Its sleek, fast and easy to use". NetUser, Iss.3. Sept.'95 (p.37)
- ³⁹ A popular WWW browser that can be obtained at: ftp.red.net/pub/mac/comms/www/
- ⁴⁰ ftp.cyberspace.com/pub/ppp/mac/gopher (PC users should substitute "PC for "Mac" in the address)
- ⁴¹ Dial:- ftp.red.net/pub/mac/comms/www/
- ⁴² Sites such as the old Tottenham Gasworks at Willoughby Rd.; Pickfords, Great Cambridge Rd./Southbury Rd. Enfield
- ⁴³ Catalyst is published by the Centre for Applied Historical Studies at Middlesex University. Editor B. Budd
- ⁴⁴ *Op. Cit.*, (1986)
- ⁴⁵ In fact the recipients had no SyQuest drive to read the cartridge but the files could be transferred by physically visiting the site with the LVIHEA drive, connecting it to the members' computers and downloading the files.
- ⁴⁶ DBF being the most popular but versions were also saved in Tab delimited, DIF and WKS format
- ⁴⁷ Elliotte Rusty Harold, elharo@sunsite.unc.edu, Last Modified June 23, 1998

APPENDIX 1 - MAIN SURVEY FILES:- FIELD COMPARISONS

<u>AIA File</u>	<u>Site Survey</u>	<u>Buildings</u>	<u>Field Descr.</u>	<u>Comments</u>
Site Name	Site Name	Local Name	Text("Look-up" for "Buildings")	
Address	Address	Address	Text("Look-up" for "Buildings")	
Dist/Borough	District	District	Text("Look-up" for "Buildings")	
Parish/Township	{incl. above in	:-"Address"}	Text	
IRIS Number	N/A	RCHME/IRIS Num	Text	
Part Of	N/A	N/A	Text	
Assoc. With	N/A	N/A	Text	
SMR no.	N/A	N/A	Text	
MNR no:	N/A	N/A	Text	
NGR1 }	Map Ref	Map Ref	Text	
NGR2 }	N/A full ref in :-	"Map Ref"	Text	
Class	IRIS Class	N/A	Value	c.g. INDUSTRY [IND] FUEL & POWER PRODUCTION [FUEL] Char, Coal, CoalGas, Coke, Elec, Hydra, OilE, OilR, Peat, Clay MINERAL EXTRACTION [MNRLEXT] SaltExt, Sand, Stone, OthrExt, etc.
Site Term	IRIS Site Term	N/A	Text	
Site Signif	N/A	N/A	Text	
At Risk?	At Risk?	At Risk?	Value	In use; Partly in use; Disused;, Unknown; Yes, No, Unknown Ditto "Fixtures"
Fixtures	N/A	N/A	Value	
Machinery	N/A	N/A	Value	
Site Details	Site Summary	Building Summary	Text	
N/A	N/A	Previous Power Supply	Repeating, Value	Muscle, Wind, Water, Hydraulic, Steam, Pneumatic, Electric, Combustion, None Ditto "Previous Power Supply"
Prime Motive Power	N/A	Current Power Supply	Repeating, Value	
No.	N/A	N/A	Repeat, Auto serial, Unique, Number, Range	
Compnt Term	Site Components	N/A	Repeating, Value	See IRIS Handbook; appendices II & III
Period	N/A (all detail to be included above in "Site Components")	N/A	Repeating	

Form	Condition	Condition	Repeating, Value	e.g. Roofed Building Structure, Machinery Linear Feature, Other Feature, Roofed Ruin, Ruin Ruined Structure Foundations, Earthworks, Crop Mark, Soil Mark, Geophysical Survey Finds Spot, Documentary, Oral, For Sale/Lease, Good, Moderate, Poor, Excavated Removed, Good, Moderate, Poor, Renovating, Demolished
Importance Status	Ditto "Period" N/A (but see "Listed?" below)	N/A Status	Repeating, Value Repeating, Value	High, Moderate, Low Listed, Scheduled Guardianship, None
Other Status Site History	Other Status N/A (perhaps use "Site Summary")	N/A N/A	Value Text	SSSI, ANOB etc.
Name	Assoc Persons/COs	Assoc. Pers/Cos	Repeating	
Details	N/A (all detail to be included above in "Name")	Assoc. Details	Repeating	
Site Recording N/A	N/A N/A	N/A Location of Records	Text Repeating, Value	e.g. RCHME, PRO Kew, PRO Chancery Lane, Haringay LA, Enfield LA, Greater London RO Islington, MOD Nottingham
Sources	Sources (general for site)	Sources (for specific structure)	Repeating	
Date of Last Visit	N/A	N/A	Date	
Reporter	Recorder	Recorder	Text	
Compiler	N/A	N/A	Text	
Date	Date	Date	Creation/Modification Date	
Society N/A	N/A Activity	N/A Activity	Text Value	e.g. Furniture, Clothing, Dyers, Armaments, Gas, Water Supply, Sewerage, etc.
N/A	Area Code	N/A	Text	
N/A	Company	Company	Text ("Look-up" for "Buildings")	
N/A	Emp. Code	N/A	Text	
N/A	Key Locn. Factors	N/A	Text	
N/A	Land Use	N/A	Text	

N/A	Listed?	N/A	Text	Auto Entered Serial Num for "Site"; Rqd. value, Unique Num, Range for "Buildings"
N/A	MULVI Number	MULVI Number	Number	
N/A	Post Code	Post Code	Text	
N/A	Previous Location	N/A	Text	
N/A	SIC	N/A	Number	
N/A	Site Area Mtr Sq	Site Area Mtr Sq	Number, ("Look-Up" for "Buildings")	
N/A	Site Detail	Building Detail	Picture/Sound	
N/A	Site Location Date	Site Location Date	Text, ("Look-Up" for "Buildings")	
N/A	Tel	N/A	Number	
N/A	N/A	Building Name	Text	
N/A	N/A	Bldg No	Text	
N/A	N/A	Building Date	Text	
N/A	N/A	Building Materials	Value	e.g. Brick, Stone Concrete, Timber Metal, Asbestos
N/A	N/A	Bldg Area Mtr Sq	Number	
N/A	N/A	Dcmolition Date	Text	
N/A	N/A	Video	Picture/Sound	
N/A	N/A	Building Components	Text	
N/A	N/A	Storeys	Number	
Continuation	N/A	N/A	Text	

Ind. Est Survey File - Special Fields

(*Pop-up menus provided on these fields:)

<u>FIELD NAME</u>	<u>CONTENTS</u>
Value List fields	(See Survey Form Glossary for clarification of initials)
*Recorder	B. Budd; EBC.
*Area Code	AA; AC; BA; BB; BC; IA; IC; ID; IE; IF; IG; IH; II; IJ; IL; IO; IN; IP; IQ; IU; IV; IW; IX; IY; IZ; KM; KB;
*Other Status	AAI, AONB, CA, ESA, GRB, LNR, NNR, NP, NTL, RPG, RSGI, SSSI
*Location of Recs. (also repeating field - see below)	RCHME; PRO Kew; PRO Chancery; LA Harringay; LA Enfield; LA Greater London; RO Islington; MOD Nottingham.
IRIS Class	e.g. INDUSTRY [IND] FUEL & POWER PRODUCTION [FUEL]...Char [IND][FUEL]; Coal[IND] [FUEL]; CoalGas [IND][FUEL]; OthrGas [IND][FUEL] etc.
Repeating Fields	
Location of Records	5 Repeats
Sources	5 Repeats
Auto Input Fields	
Date	Initially the creation date, subsequently the modification date
MULVI Num	An auto entered serial number: first record = 1, not empty, unique, range:1...99999.
Num Listed Bldgs	Look-up (Locked): Consults the Site Survey file field: "Total Sites with Listed Buildings" when the values in the fields "Area Code" match
No. of Additional Buildings Surveyed	Number, Look-up: Consults the Site Survey file field: "Additional Buildings Surveyed on Estate" when the values in the fields "Area Code" match
Total No. of Buildings Surveyed	Calculation: No. of Enterprises + No. of Additional Buildings

Site Survey Detail File

<u>FIELD NAME</u>	<u>CONTENTS</u>
Value List fields	(See Survey Form Glossary for clarification of initials)
*Recorder	B. Budd; D. Munday; J. Lewis; RCHME; SMR.
*Activity	Electrical, Furniture, Clothing, Armaments, Dyers, Gas, Water Supply, Sewerage
*Condition	Roofed Building, Structure, Machinery, Linear Feature, Other Feature, Roofed Ruin Ruin, Ruined Structure, Foundations Earthworks, Crop Mark, Soil Mark, Geophysical Survey, Finds Spot, Documentary, Oral, For Sale/Lease, Good Moderate, Poor, Excavated, Removed
*At Risk?	In Use; Partly in Use; Disused; Unknown;
*IRIS Class	INDUSTRY [IND] FUEL & POWER PRODUCTION [FUEL] Char, Coal, CoalGas, Coke, Elec, Hydra, OilE, OilR, Peat, Clay MINERAL EXTRACTION [MNRLEXT] SaltExt, Sand, etc. (see Appendix ? for a full listing)
*Listed?	Yes, No
*Area Code	AA; AC; BA; BB; BC; 1A; 1C; 1D; 1E; 1F; 1G; 1H; 1I; 1J; 1L; 1O; 1N; 1P; 1Q; 1U; 1V; 1W; 1X; 1Y; 1Z; KM; KB;
*Land Use	IN; VI; CF; VC; CS; CY; SF; SN; VS; OG; VO; TC; VT; TD; VT; TD; UM; VU; UT; VL.
*Other Status	AAI, AONB, CA, ESA, GRB, LNR, NNR, NP, NTL, RPG, RSGI, SSSI

Site Survey Detail File (Cont.)

<u>FIELD NAME</u>	<u>CONTENTS</u>
<p>*Site Components (also repeating field - see below)</p>	<p>Hydraulic Power ACCUMULATOR TOWER, etc. Muscle Power CRANEWHEEL, DOG WHEEL, DONKEY WHEEL, GIN CIRCLE HAND CAPSTAN, HAND WINCH, etc. (see Appendix ? for a full listing)</p>
Repeating Fields	
IRIS Site Term	10 Repeats
Site Components	5 Repeats
Assoc Persons/COs	5 Repeats
Sources	5 Repeats
Auto Input Fields	
Date	Initially the creation date, subsequently the modification date
MULVI Num	An auto entered serial number: first record = 1, not empty, unique, range:1...99999.

Building Survey L.1 File

<u>FIELD NAME</u>	<u>CONTENTS</u>
Value List fields	(See Survey Form Glossary for clarification of initials)
*Recorder	B. Budd; D. Munday; J. Lewis; RCHME; SMR.
*Activity	Electrical, Furniture, Clothing, Armaments, Dyers, Gas, Water Supply, Sewerage
*Condition	Roofed Building, Structure, Machinery, Linear Feature, Other Feature, Roofed Ruin Ruin, Ruined Structure, Foundations Earthworks, Crop Mark, Soil Mark, Geophysical Survey, Finds Spot, Documentary, Oral, For Sale/Lease, Good Moderate, Poor, Excavated, Removed
*At Risk?	In Use; Partly in Use; Disused; Unknown;
*Status	Listed, Scheduled, Guardianship, None
*Building Materials	<i>*These fields do not have "pop-up" menus, all values are permanently displayed e.g.</i> Brick, Stone, Concrete, Timber, Asbestos, Terra-cotta, Stucco, Pressed Steel, Corrugated Iron, Ironwork, Slate, Tile, Patent Glazing, Fibre Glass, UPVC.
*Location of Records (also repeating field - see below)	e.g. RCHME, PRO Kew, PRO Chancery Ln, Harringay LA, Enfield LA, Greater London RO Islington, MOD Nottingham
*Current Power Supply (also repeating field - see below)	<i>*These fields do not have "pop-up" menus, all values are permanently displayed</i> Muscle, Wind, Water, Hydraulic, Steam, Pneumatic, Gas, Electric, Combustion, None
*Previous Power Supply (also repeating field - see below)	Ditto "Current Power Supply"

Building Survey L.1 File (cont.)

<u>FIELD NAME</u>	<u>CONTENTS</u>
Repeating Fields	<i>*These fields do not have "pop-up" menus</i>
Assoc Persons/COs	5 Repeats
Assoc Details	4 Repeats
Sources	5 Repeats
Auto Input Fields	<i>*These fields do not have "pop-up" menus</i>
Date	Initially the creation date, subsequently the modification date.
MULVI Num	A sequential number: first record = 1. A required value field of type: "Number", range: 1..99999.
"Look Up" Fields	<i>These fields are not "pop-up" menus, but look up values from another file.</i>
Local Name	A Text field that takes its data from "Site Survey Detail" file, "Site Name" field.
Address	A Text field that takes its data from "Site Survey Detail" file, "Address" field.
District	A Text field that takes its data from "Site Survey Detail" file, "District" field.
Company	A Text field that takes its data from "Site Survey Detail" file, "Company" field.
Site Area Mtr Sq	A Text field that takes its data from "Site Survey Detail" file, "Site Area Mtr Sq" field.
Site Location Date	A Text field that takes its data from "Site Survey Detail" file, "Site Fndtn Date" field.

Main Survey Files:- Field Comparisons

<u>AIA File</u>	<u>Ind. Est</u> <u>Survey File</u>	<u>Site Survey</u> <u>Detail</u>	<u>Buildings Survey</u> <u>L1</u>	<u>Field Description.</u>
Site Name	Name	Site Name	Local Name	Text ("Look-up" for "Buildings...")
Address	Estate Address	Address	Address	Text ("Look-up" for "Buildings...")
Dist/Borough	Estate District	District	District	Text ("Look-up" for "Buildings...")
Parish/Township	N/A	{incl. above in	:-"Address"}	Text
IRIS Number	N/A	N/A	RCHME/IRIS/SMR No.	Text
Part Of	N/A	N/A	N/A	Text
Assoc. With	N/A	N/A	N/A	Text
SMR no.	N/A	N/A	N/A	Text
MNR no:	N/A	N/A	N/A	Text
NGR1 }	Centre Map Ref	Map Ref 1	Map Ref 1	Number ("Look-up" for "Buildings...")
NGR2 }	N/A	Map Ref 2	Map Ref 2	Number ("Look-up" for "Buildings...")
Class	N/A	IRIS Class	N/A	Value
Site Term	N/A	IRIS Site Term	N/A	Repeating
Site Signif	N/A	N/A	N/A	Text
At Risk?	N/A	At Risk?	At Risk?	Value
Fixtures	N/A	N/A	N/A	Value
Machinery	N/A	N/A	N/A	Value

Main Survey Files:- Field Comparisons (Cont.)

<u>AIA File</u>	<u>Ind. Est Survey File</u>	<u>Site Survey Detail</u>	<u>Buildings Survey L1</u>	<u>Field Description.</u>
Site Details	Estate Description	Site Summary	Building Summary	Text
N/A	N/A	N/A	Previous Power Supply	Repeating, Value
Prime Motive Power	N/A	N/A	Current Power Supply	Repeating, Value
No.	N/A	N/A	N/A	Repeat, Auto serial, Unique, Number, Range
Component Term	N/A	Site Components	N/A	Repeating, Value
Period	N/A	N/A (all detail to be included above in "Site Components")	N/A	Repeating
Form	N/A	Condition	Condition	Repeating, Value
Importance	N/A	Ditto "Period"	N/A	Repeating, Value
Status	N/A	N/A (but see "Listed?" below)	Status	Repeating, Value
Other Status	Other Status	Other Status	N/A	Value
Site History	N/A	N/A (use "Site Summary"	N/A	Text
Name	N/A	Assoc Persons/COS	Assoc. Pers/Cos	Repeating
Details	N/A	N/A (all detail to be included above in "Name"	Assoc Details	Repeating
Site Recording	N/A	N/A	N/A	Text

Main Survey Files:- Field Comparisons (Cont.)

<u>AIA File</u>	<u>Ind. Est</u> <u>Survey File</u>	<u>Site Survey</u> <u>Detail</u>	<u>Buildings Survey</u> <u>LI</u>	<u>Field Description.</u>
N/A	Location of Records	N/A	Location of Records	Repeating, Value
Sources	Sources	Sources (general for site)	Sources (for specific structure)	Repeating
Date of Last Visit	N/A	N/A	N/A	Date
Reporter	Recorder	Recorder	Recorder	Value
Compiler	N/A	N/A	N/A	Text
Date	Date	Date	Date	Creation/Modification Date
Society	N/A	N/A	N/A	Text
N/A	N/A	Activity	Activity	Value
N/A	Area Code	Area Code	N/A	Value
N/A	Owner	Company	Company	Text ("Look-up" for "Buildings")
N/A	Owner Address	N/A	N/A	Text
N/A	Owner Tel No	N/A	N/A	Text
N/A	N/A	Emp Code	N/A	Text
N/A	N/A	Key Loctn Factors	N/A	Text
N/A	N/A	Land Use	N/A	Value
N/A	N/A	Listed?	N/A	Text

Main Survey Files:- Field Comparisons (Cont.)

<u>AIA File</u>	<u>Ind. Est Survey File</u>	<u>Site Survey Detail</u>	<u>Buildings Survey LI</u>	<u>Field Description.</u>
N/A	MULVIE Number	MULVI Number	MULVI Number	Number, auto entered serial number, required value, unique
N/A	N/A	Post Code	Post Code	Text
N/A	N/A	Previous Location	N/A	Text
N/A	N/A	SIC	N/A	Number
N/A	Estate Area	Site Area Mtr Sq	Site Area Mtr Sq.	Number, ("Look-Up" for "Buildings")
N/A	Estate View	Site Detail	Building Detail	Picture/Sound
N/A	Date of Main Estate Creation	Site Frndtn Date	Site Location Date	Text, ("Look-Up" for "Buildings")
N/A	Estate Tel No	Tel	N/A	Number
N/A	N/A	N/A	Building Name	Text
N/A	N/A	N/A	Bldg No	Text
N/A	Date of Newest Building	N/A	Building Date	Text
N/A	Date of Oldest Building	N/A	Building Date	Text
N/A	N/A	N/A	Building Materials	Value
N/A	N/A	N/A	Brick Bond	Value
N/A	N/A	N/A	Bldg Area Mtr Sq	Number
N/A	N/A	N/A	Demin Date	Text

Main Survey Files:- Field Comparisons (Cont.)

<u>AIA File</u>	<u>Ind. Est Survey File</u>	<u>Site Survey Detail</u>	<u>Buildings Survey LI</u>	<u>Field Description.</u>
N/A	N/A	N/A	Video	Picture/Sound
N/A	N/A	N/A	Building Components	Text
N/A	N/A	N/A	Storeys	Number
Continuation	N/A	N/A	N/A	Text
N/A	No. of Enterprises Surveyed	Total Enterprises This Set	N/A	Number
N/A	No. of Additional Buildings	No. of Site Buildings	Number of Buildings This Set	<u>Ind. Est. Survey & Site Survey: Number;</u> <u>Building Survey L.1:</u> Summary = Count of (Field) "Area Code"
N/A	N/A	Summary of Surveys Recorded	N/A	Summary: = Count of (Field) "Recorder"
N/A	N/A	Total Sites with Listed Buildings This Set	N/A	Summary: = Count of (Field) "Listed"
N/A	Total No. Of Buildings Surveyed	Additional Buildings Surveyed on Estate	N/A	<u>Ind. Est. Survey</u> Calculation = No. of Enterprises + No. of additional Buildings. <u>Site Survey: Number</u>

Table 2.2 (See p.152 Adobe Premiere)

Name	Method	Software	Time	Size (KB)	Comp. Size (KB)	Diff.	%age of Orig	Time To Save	Quality	Comments
Carding	Video JPEG	Video Spigot	16 secs.	8,053	-	-	-	8 ' 55 "	Good.	Lost Due to insufficient disk space. Use this method for video stills only.
Carding 2	Video	Video Spigot	16 secs.	7,972	6,800	1,172	85.3	2' 54 "	Good.	Quick & effective but not a great saving of disk space.
Carding 3	Compact Video	Video Spigot	16 secs.	7,756	1,506	6,250	19.4	55 ' 0"	Good.	Compressed clip restricted to 10 secs because of lack of disk space for temporary work files.
Carding 4	Compact Video	Video Spigot	16 secs.	2,216	460	1,756	20.8	17' 20 "	Very Poor.	Results peculiar to 44 Mb (all other tests carried out using 88 Mb) Syquest cartridge; (see main text).
Carding Graphic	Graphic	Video Spigot	16 secs.	8,242	3,378	4,864	40	4 ' 46 "	Very Poor.	Not suitable for normal video clip compression.
Carding Animation	Animation	Video Spigot	16 secs.	8,242	15,300	None - file size increased	-	1 ' 50 "	Good	In spite of 23 Mb available on disk, compressed clip limited to 1 sec.
Carding No Comp.	None	Video Spigot	10 secs	8,242	18,500	None - file size increased	-	2 ' 0 "	Good	Same file as above but reduced to 10 secs. duration before compression.
Carding No Comp.	None	Video Spigot	5 secs	2,973	11,880	None - file size increased	-	1 ' 0 "	Good	In spite of 23 Mb available on disk, & 10 Mb when compression was terminated this was insufficient for the required temp. files.

Name	Method	Software	Time	Size (KB)	Comp. Size (KB)	Diff.	%age of Orig	Time To Save	Quality	Comments
Carding Video	Video	Video Spigot	5 secs	11,880	2,397	9,483	20.7	1' 45"	Good	Only approx. 2 Mb required for temp. files.
Carding Video	Compact Video	Video Spigot	5 secs.	2,397	936	1,434	39	36' 06"	Good	Only approx. 1 Mb required for temp. files.
Dragon Boat Comp Video	Compact Video	Video Spigot	5 Secs.	2681	851	1830	21.66	33' 0"	Good	Compression - High 3.99
Dragon Boat Premiere Comp Video	Compact Video	Adobe Premiere 2.0 LE	5 Secs.	2681	337	2344	12.5	10' 36"	Good	Compression - High 4.00
Dragon Boat Video	Video	Video Spigot	5 Secs.	2681	2450	231	91.38	0' 50"	Good	Compression - High 3.99
Dragon Boat Premiere Video Vid	Video	Adobe Premiere 2.0 LE	5 Secs.	2681	531	2151	19.8	0" 23"	Good	Compression - High 4.00
Carding Comp. Video	Compact Video	Video Spigot	5 secs.	11,880	936	10,945	7.9	31' 50"	Good	Only approx. 0.9Mb required for temp. files.

APPENDIX 2 - DATABASE SCRIPTS - Listings

IND EST FILE

Enterprise Total

Script

Copy [Select, "Area Code"]

Open ["Site Survey Detail"]

Perform Script [External: "Site Survey Detail-- <"Number of Enterprises">"]

Pause/Resume Script *

Paste [Select, "No. of Enterprises"]

Building Totals

Script

Copy [Select, "AreaCode"]

Open ["Building Survey L.1"]

Perform Script [Sub-script, External: "Building Survey L.1-- <"Find All Buildings for Ind Est">"]

Paste ["No. of Additional Buildings Surveyed"]

Site Classification

Script:

Go to field ["IRAS Class"]

Pause/Resume Script (allows the find request to be verified)

Copy [Select, "IRAS Class"]

Paste [Select, "IRAS Class"]

Perform Script [Sub-scripts, External: "Site Survey Detail -- <"Search on IRAS Class">--"]

Paste [Select, "IRAS Class"]

SITE SURVEY DETAIL

Go To Building Survey

Script:

Copy [Select, "MULVI Number"]

Open ["Building Survey L.1"]

Perform Script [External: "Building Survey L.1 -- <Find Corresponding Record>--"]

Survey Form Glossary

Script -- (Before performing the script manually enter the relevant field name to the clipboard.) --

Open ["Survey Form Glossary"]

Perform Script [Sub-scripts, External: "Survey Form Glossary-- <Find Word>--"]

Glossary

Script

Copy []

Open ["Glossary"]

Perform Script [Sub-Script, External: "Glossary -- <Find Word>--"]

Find Corresponding Record

Script

Enter find mode []

Paste [Select, "MULVI Number"]

Perform find []

Find Set

Script

Enter Find Mode

Paste ["Site Summary"]

Perform Find []

Re-serialise MULVI No.

Script

Re-serialise ["MULVI Number"]

Go to Next Record/Request [Exit Script after Last]

Copy Map Ref

Script

Enter Browse Mode []

Copy [Select "Map Refs"]

Go to Next Record/Request []

Paste [Select, "Map Refs"]

Go to Previous Record/Request []

Copy [Select, "Map Ref 2"]

Go to Next Record/Request [Exit Script After Last]

Paste [Select, "Map Ref 2"]

Perform Script [Copy Map Ref]

Go Hypercard™

Script

Send Apple Event ["aevt", "odoc", "Hypercard™"] -- {where the document specified
("odoc") is the file "Map"}

Number of Enterprises

Script

Find All

Go Layout ["Research"]

Enter Find Mode

Paste [Select, "Area Code"]

Perform Find[]

Pause/Resume Script *

Copy [Select, "Total Enterprises This Set"]

Bibliography

Script

Open ["RSAF Bibliography"]

Go Help

Script

Open ["Help"]

Site Only

Script

Find all []

Enter Find Mode

Go to Field ["Site Summary"]

Paste Litteral ["Go to Building Survey"]

Omit

Perform find [Restore]

Get No of Buildings on Site

Script

Go to Layout [Refresh, "Research"]

Copy ["MULVI Number"]

Open ["Building Survey L.1"]

Perform Script [Sub-Script, External:"Building Survey L.1--<Find all Buildings for Site Survey Detail>"--]

Pause/Resume Script

Paste [No Style "No. of Site Buildings"]

Cummulate Building Totals

Script

Copy ["Area Code"]

Open ["Building Survey L.1"]

Perform Script [Sub-Script, External:"Building Survey L.1-- <"Find all Buildings for Site Cummulation Total">--]

Pause/Resume Script

Paste [No Style "Additional Buildings Surveyed on Estate"]

Listed

Script

Enter Find Mode []

Go to Field ["Listed?"]

Paste Literal["Yes"]

Perform Find []

Search on IRAS Class

Script

Enter Find Mode [Restore]

Paste [Select, "IRAS Class"]

Pause/Resume (to manually enter other search criteria)

Perform Find []

Enter Browse Mode [Pause]

Copy [Select, "Total Enterprises This Set"]

BUILDING SURVEY L.1

Go To Site Level 1

Script

Copy [Select, "MULVI Number"]

Open ["Site Survey Detail"]

Perform Script [Sub-Script, External: "Site Survey Detail -- <"Find Corresponding Record"> --"]

Survey Form Glossary

Script -- (Before performing the script manually enter the relevant field name to the clipboard.) --

Open ["Survey Form Glossary"]

Perform Script [Sub-scripts, External: "Survey Form Glossary" -- <"Find Word"> --

]

Glossary

Script

Copy []

Open ["Glossary"]

Perform Script [Sub-Script, External: "Glossary" -- <"Find Word"> --]

Find Corresponding Record (Sub-script)

Script

Enter find mode []

Paste [Select, "MULVI Number"]

Perform find []

Find Set

Script

Enter Find Mode

Paste ["Bldg Summary"]

Perform Find []

Go to RSAF Building Index

Script

Open ["RSAF Bldg Detail"]

Go to Artifacts

Script

Copy []

Open ["RSAF Artifacts"]

Perform Script [Sub-scripts, External: "RSAF Artifacts 1988" -- <"Find Artifact"> --]

Subscript "Find Artifact" (File: RSAF Artifacts 1988)

Enter Find Mode []

Paste [Select, "Description"]

Perform Find []

Docs

Script

Copy []

Open ["RSAF Docs"]

Subscript "Find" (File: RSAF Docs)

Enter Find Mode []

Paste [Select, "Contents"]

Perform Find []

Perform Script [Sub-scripts, External: "RSAF Docs" - <"Find"> --]

Go To History File

Script

Copy [Select, "Bldg No"]

Open ["History Record No1"]

Perform Script [Sub-scripts, External: "History Record No1" -- <"Find"> --]

Subscript "Find" (File: History Record No1)

Enter Find Mode []

Paste [Select, "Building No.s"]

Perform Find []

Go Hypercard™

Script

Send Apple Event ["aevt", "odoc", "Hypercard™"] -- {where the document specified

("odoc") is the file "Map"}

Find Corresponding Record Area Code

Script

Enter Find Mode[]

Paste [Select, "Area Code"]

Perform find[]

Pause Resume Script

Find All Buildings for Ind Est

Script

Enter Find Mode[]

Paste [Select, "Area Code"]

Perform find[]

Pause Resume Script

Go to Field [Select/Play, "Number of Buildings This Set"]

Perform Script ["Get Number of Site Buildings"]

Find all Buildings for Site Survey

Script

Enter Find Mode [Restore, Pause]

Paste [Select, "MULVI Number"]

Perform Find []

Pause/Resume Script

Go to Field [Select/Play, "Number of Buildings This Set"]

Perform Script ["Get Number of Site Buildings"]

Get Number of Site Buildings

Script

Clear []

Copy [Select, "Number of Buildings This Set "]

GLOSSARY

Go to Site Survey

Script

Open ["Site Survey Detail"]

Survey Form Glossary

Script

Open ["Survey Form Glossary"]

Go to Building Survey

Script

Open ["Site Survey Detail"]

Find Word

Script

Enter Find Mode

Paste [Select, "Word"]

Perform Find

Find Set

Script

Copy [Select, "Word"]

Open ["Building Survey L.1"]

Perform Script [Sub-script, External:'Building Survey L.1', "Find Set"]

Sub-script

Enter Find Mode

Paste ["Bldg Summary"]

Perform Find []

Open ["Site Survey "]

Perform Script [Sub-script, External:'Site Survey ', "Find Set"]

Sub-script

Enter Find Mode

Paste ["Site Summary"]

Perform Find []

Look Up

Script

Copy []

Enter Find Mode

Paste [Select, "Word"]

Perform Find []

SITE SURVEY GLOSSARY

Go to Site Survey Form

Script

Open ["Site Survey Detail"]

Go to Building Survey Form

Script

Open ["Site Survey Detail"]

Glossary

Script

Open ["Glossary"]

Find Word

Script

Enter Find Mode

Paste [Select, "Word"]

Perform Find

HISTORY RECORD NO. 1

Get Building Numbers

Script

Copy [Select, "Year"]

Open ["RSAF Bldg Detail"]

Perform Script [Sub-script, External: "RSAF Bldg Detail"] - Perform Sub-script

"Expt Bldg Numbers"

Sub-script "Expt Bldg Numbers" (File:RSAF Bldg Detail)

Enter Find Mode

Paste [Select, "Years"]

Perform Find[]

Export Records [Restore, "Export Test"]

ARTIFACTS

Sub-script "Find Artifact" only - see above -.

DOCS

Sub-script "Find" only - see above

RSAF BLDG DETAIL

**SUB-SCRIPT "EXPT BLDG NUMBERS"
ONLY - SEE ABOVE -.**

HYPERCARD SCRIPTS

STACK SCRIPTS

LONDON INDUSTRIES (STACK)

Script

```
On openStack
  AddColor install
  hide field "Footnote"
  hide field "Table Of Contents"
  hide background button "Printing"
  hide background button "Lee Valley"
  hide background button "Nursery"
  hide background button "General Eng"
  hide background button "Chemicals"
  hide background button "Foodstuff"
  hide background button "Electrical Eng"
  hide background button "Vehicles"
  hide background button "Clothing"
  hide background button "Furniture"
  hide background button "Note Pad"
  hide background button "Help"
  hide background button "References"
  hide background button "Database"
  hide background button "PlayMovie"
  hide background button "Gen Ind Charts"
  hide background button "Master Pictures"
  hide background button "MK Elect. Leopold Rd."
  hide background button "Template"
  if the tool is "button" then Show AllBtns
  pass openStack
End openstack
On openCard
  Send colorMe to this card
  pass openCard
End openCard
On closeCard
  lock screen
```

```
pass closeCard
End closeCard
On colorMe
  AddColor colorCard,stamp,30
End colorMe
On closeStack
  AddColor remove
  pass closeStack
End closeStack
```

GEN INDUST CHARTS

Script

```
on openCard
  Send colorMe to this card
  pass openCard
end openCard
on closeCard
  lock screen
  pass closeCard
end closeCard
on colorMe
  AddColor colorCard,stamp,30
end colorMe
on openStack
  AddColor install
  pass openStack
end openStack
on closeStack
  AddColor remove
  pass closeStack
end closeStack
```


Background Button Scripts (- all stacks)

Navigation Buttons

Script

```
On mouseUp  
visual effect barn door open  
go to first card  
End mouseUp
```

Script

```
On mouseUp  
visual effect barn door close  
go to last card  
End mouseUp
```

Script

```
On mouseUp  
visual effect iris open  
go previous card  
End mouseUp
```

Script

```
On mouseUp  
visual effect iris close  
go next card  
End mouseUp
```

Back

Script

```
On mouseUp  
    visual effect checkerboard  
    go to recent card  
End mouseUp
```

Map

Script

```
On mouseUp  
    visual effect dissolve  
    go to map  
End mouseUp
```

Table of Contents

Script

```
On mouseUp  
    hide field "table of contents"  
End mouseUp  
On mouseDown  
    show field "table of contents"  
End mouseDown
```

Footnotes

Script

```
On mouseUp
  hide field "footnote"
End mouseUp
On mouseDown
  show field "footnote"
End mouseDown
```

Utilitys

Script

```
On mouseUp
  hide background button "Note Pad"
  hide background button "Help"
  hide background button "References"
End mouseUp
On MouseDown
  show background button "Note Pad"
  show background button "Help"
  show background button "References"
End mouseDown
```

Script

```
On mouseUp
  hide background button "Printing"
  hide background button "Lee Valley"
  hide background button "Nursery"
  hide background button "General Eng"
  hide background button "Chemicals"
  hide background button "Foodstuff"
  hide background button "Electrical Eng"
  hide background button "Vehicles"
  hide background button "Clothing"
  hide background button "Furniture"
```

```
End mouseup
On mousedown
  show background button "Printing"
  show background button "Lee Valley"
  show background button "Nursery"
  show background button "General Eng"
  show background button "Chemicals"
  show background button "Foodstuff"
  show background button "Electrical Eng"
  show background button "Vehicles"
  show background button "Clothing"
  show background button "Furniture"
End mouseDown
```

Inter-Application Features (XCMDs)

MultiMedia

Script

```
On mouseUp
  hide background button 33-- "PlayMovie"
  hide background button "Gen Ind Charts"
  hide background button "Master Pictures"
  hide background button "Template"
  hide background button "Database"
  hide background button "Map W Abbey to
N.Circ."
End mouseUp
On MouseDown
  show background button "Database"
  show hackground button "Gen Ind Charts"
End MouseDown
```

**Printing (& Nursery, Chemicals, Clothing, Elect Eng, Foodstuffs,
Furniture, General Eng, Vehicles, London Industries, Lee Valley, New
Industries, Old Industries,)**

Script

```
On mouseUp  
    visual effect barn door open  
    go to printing (&c.)  
End mouseUp
```

Database

Script

```
On mouseUp  
    open "Macintosh HD:Filemaker Pro 2.0  
    folder:Lee Valley Inv:Lee Valley Main  
    Files:Buildings Survey L.1" with "FileMaker Pro"  
    visual effect barn door open  
End mouseUp
```

Help

Script

```
On mouseUp  
    visual effect barn door open  
    go Industrial Help  
End mouseUp  
function scriptBody  
    return "on mouseUp" & return & "visual effect  
    barn door close" & -  
    return & "go recent card" & return & "end  
    mouseUp"  
end scriptBody
```

Note Pad

Script

```
On mouseUp  
    visual effect barn door open  
    go to note pad  
End mouseUp
```

References

Script

```
On mouseUp  
    visual effect barn door open  
    go to bibliography  
End mouseUp
```

CardButton Scripts

MultiMedia

Script

```
on mouseUp
  Hide background button 33-- PlayMovie
  Hide background button "Gen Ind Charts"
  Hide background button "Master Pictures"
  Hide button "Pictures"
  Hide background button "Template"
  Hide background button "Database"
  Hide background button "Map W Abbey to
  N.Circ."
  Hide button "Lee Val Charts"
  Hide button "Map"
  Hide button "Factories"
end mouseUp
On MouseDown
  Show button "Pictures"
  Show background button "Database"
End MouseDown
```

Hidden Card Buttons

Pictures (Lee Valley Stack)

Script

```
on mouseUp
  Hide background button "Template"
  Hide background button "PlayMovie"
  Hide background button "Gen Ind Charts"
  Hide button "Lee Val Charts"
  Hide button "Map"
  Hide Button "Factories"
end mouseUp
on MouseDown
  Hide background button "Note pad"
  Hide background button "Help"
  Hide background button "References"
  Hide background button "PlayMovie"
  Hide background button "Gen Ind Charts"
  Hide background button "Database"
  Hide background button "London Industries"
  Hide background button "Printing"
  Hide background button "Nursery"
  Hide background button "General Eng"
  Hide background button "Chemicals"
  Hide background button "Foodstuff"
  Hide background button "Electrical Eng"
  Hide background button "Vehicles"
  Hide background button "Clothing"
  Hide background button "Furniture" -- {i.e. other
buttons & fields, Gen Ind Charts, PlayMovie, --
Database, Pictures 2, pictures {all industries &
  all Utilitys}
  Show button "Lee Val Charts"
  Show button "Map"
  Show button "Factories"
end MouseDown
```


Gen Ind Charts (& L.V & W.Middx Charts, Gen Indust
Charts, Gen Eng Charts, Furniture Charts, Food Charts, Elect. eng
Charts, Clothing Charts, Chemical charts, Vehicle Charts, Nursery
Charts, Printing Charts.)

Script

```
On mouseUp
  go Gen Indust Charts -- (&c.)
End mouseUp
```

Background Fields

Text

Script

```
on openField
  answer "Are you sure you want to change the
data?" with "Yes" or "No"
  if it is "No" then set lockText of me to true
end openField

on mouseUp
  answer "Would you like to unlock the field?" with
"Yes" or "No"
  if it is "Yes" then set lockText of me to false
end mouseUp
```

Card of Cards

Script

```
function cardData
  -- this handler stores the card data specified by the
  -- user. DO NOT MOVE THE POSITION OF
  THIS HANDLER!
  return "bkgnd"
end cardData
on newfield
  -- create a new openCard handler when pasted
  put word 1 of the long name of me into fieldType
  if fieldType is "Bkgnd" then set sharedText of me
  to true
  addStackScript fieldType
  updateCardData fieldType
end newfield
on deleteField
  removeScript
end deleteField
on removeScript
  -- removes the openCard handler added on
  newField
  put cardData() into fieldType
  get script of fieldType
  if line 1 of scriptBody(fieldType) is in it then
  put offset(line 1 of
  scriptBody(fieldType),it) into startBlock
  put startBlock + number of chars in
  scriptBody(fieldType) + ↵
  the number of lines in scriptBody(fieldType) + 1
  into endBlock
  delete char startBlock to endBlock of it
  set script of fieldType to it
  end if
end removeScript
on mouseUp
```

```

-- rebuilds the openCard handler in the stack script if
necessary
  addStackScript cardData()
end mouseUp
on addStackScript fieldType
  get script of fieldType
  if "openCard" is in it then
    if (fieldType && "field id" && id of me) is not in it
then
      put scriptBody(fieldType) & return after char →
      (offSet("openCard",it) + 8) of it
      set script of fieldType to it
    end if
  else
    if it _ empty then
      if last char of it = return then put return after it
      else put return & return after it
    end if
    -- write the full handler
    put "on openCard" & return & scriptBody(fieldType) &
return & ↵
    "pass openCard" & return & "end openCard" after it
    set script of fieldType to it
  end if
end addStackScript
function scriptBody fieldType
  -- returns the body of the openCard handler
  return "if there is a" && fieldType && "field id" && id
of me & return & ↵
  "then put" && quote & "Card" & quote && "&& the
number of this card && " & ↵
  quote & "of" & quote && "&& ↵" & return & "the
number of cards into" && ↵
  fieldType && "field id" && id of me
end scriptBody
on updateCardData fieldType
  -- write range back to the data handler in this script
  -- doesn't take effect until idle
  get script of me
  put quote & fieldType & quote into newData

```

```

put newData into char offset(quote,it) to (offset("end",it)
- 2) of it
set script of me to it
end updateCardData

```

Hidden Background Fields

Table of Contents

Script

```

on mouseDown
  if the shiftKey is down then sort lines of me
  else if the optionKey is down then
    createCardNameList -- rebuild list
  exit mouseDown
  else
    -- go to the card associated with the click
    currentLine
    put the ticks into theTicks
    repeat until the mouse is up
      if the mouseLoc is within the rect of target then
        currentLine
        put the ticks into theTicks
      else select empty
    end repeat
    if (the ticks - theTicks) < 10 then
      get the value of the selectedLine
      if it is empty then exit mouseDown
      visual effect iris open
      if the style of me is "Scrolling" then set scroll
of me to 0
      go cd it
    end if
  end if
  select empty
end mouseDown
on currentLine
  put (((the mouseV - top of the target) - 4) + scroll
of the target)-

```

```

div (textHeight of the target) + 1 into theLine
select char 1 to ((number of chars in (line theLine
of target)) + 1)->
of line theLine to (theLine + 1) of target
end currentLine
on createCardNameList
-- create the list of card names
set the dontWrap of me to true
set the lockText of me to true
if the style of me is "Scrolling" then set scroll of
me to 0
if "bkgnd" is in the target
then set the sharedText of target to true
put empty into me
repeat with curCard = 1 to number of cards
set cursor to busy
get the short name of card curCard
put it into line curCard of me
if the length of me > 30000 then
answer "Sorry, but this field's 30000" &&-
"character limit has been reached." --_
exit to Hypercard™
end if
end repeat
end createCardNameList
on newField
-- auto builds a new list when this field is pasted
createCardNameList
end newField

```

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