# 32
# Towards a computerised desktop: the Integrated Archaeological Database System

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## 32.1 Introduction

The concept of a computerised Integrated Archaeological Database System, IADB for short, was formulated over five years ago. The project was initiated by Stephen Stead and has been developed by the present writer with archaeological support from Peter Clark and Richard Sermon.

## 32.2 Data Structures

The IADB is built around the Scottish Urban Archaeological Trust (SUAT) site recording system which itself has undergone development and refinement over time. In the early 1980's, the quality of a recording system seemed to be measured by the number of discrete boxes on the Context recording sheet and the thickness of the Codes dictionary required to fill it in. At SUAT, in recent years, we have gone through a process that has seen the number of distinct fields, particularly in Context records, drastically reduced, and coding of data almost entirely removed from the system.

The overall structure is essentially hierarchical and consists of five levels: Finds, Contexts, Sets, Groups, and Phases. The first two levels, Finds and Contexts, are formed by the Level II site records.

## 32.3 Level II Data Input

The input data includes the Context assignment for each Find and the stratigraphic relationships for each Context (Figure 32.1). All primary data tables may be viewed and edited either via an input form or in tabular format. This is particularly suitable for the rapid entry of large numbers of Find records.

Each basic Find or Context record only contains data fields that are applicable to all Finds or all Contexts. More specialised data applicable only to a specific class of Finds or Contexts is recorded using 'Specialised Recording Sheets' (SRS's), a term that derives from one aspect of the paper-based site recording system developed by Peter Clark while at SUAT and known as the Toolbox system (Clark 1988). Three computerised equivalents of the SRS's are in use at present for Pottery, Skeletons, and Timber (Figure 32.2).

All single context plans are digitised using AEGIS (Rains 1989) which is now fully integrated into the IADB system (Figure 32.3).

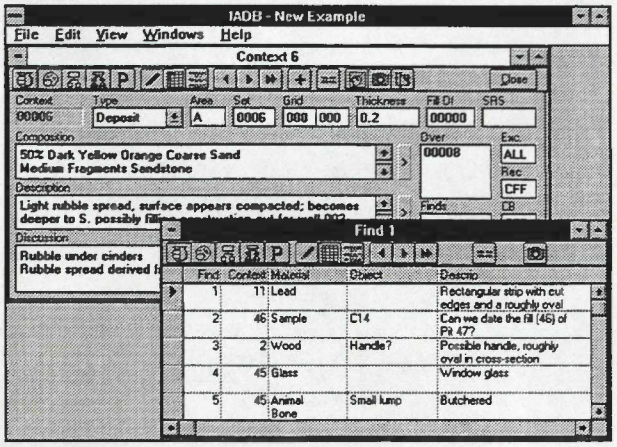


**Figure 32.1:** Context data input window in Form view, and Finds data input window in Table view.

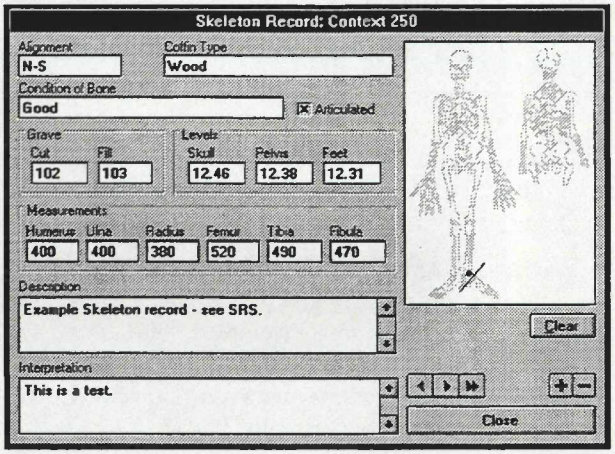


**Figure 32.2:** Skeleton SRS recording window.

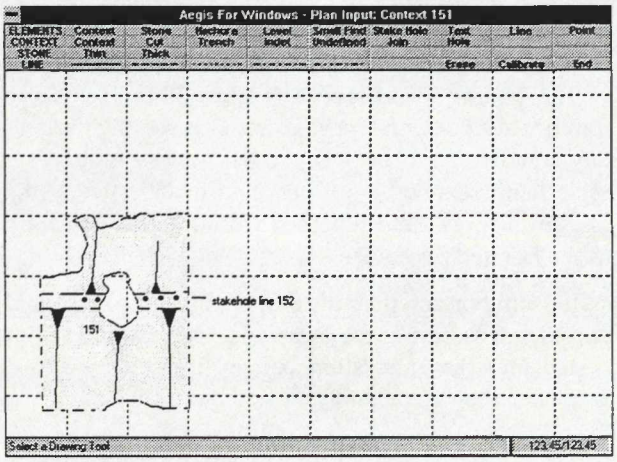


**Figure 32.3:** AEGIS Plan input window.

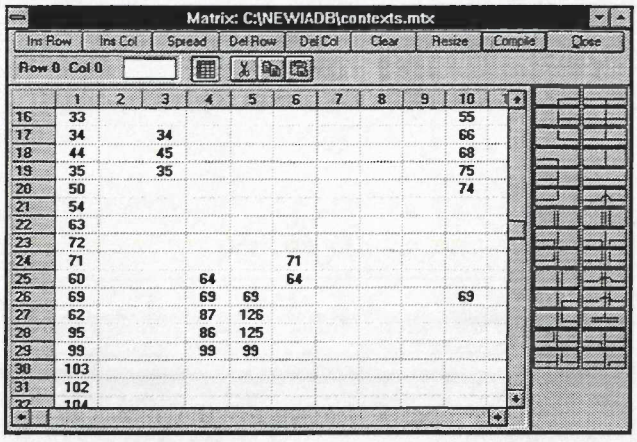


**Figure 32.4:** Output from the CONSORT matrix compiler displayed in the matrix editor. Connected columns are shown by repeated Context numbers.

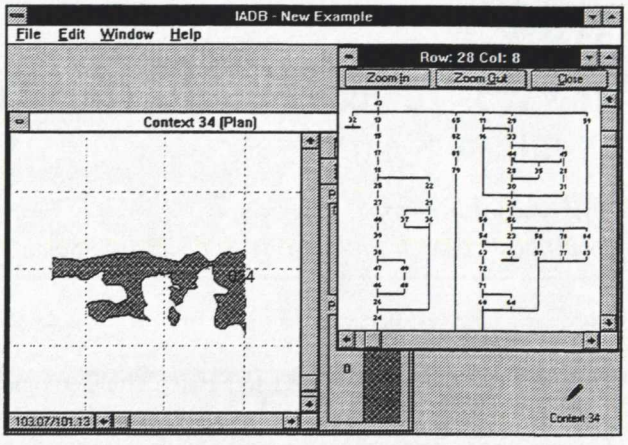


**Figure 32.5:** A Matrix display window linked, via a minimised Context data window, to an AEGIS plan window. The Plan window is updated whenever the user clicks the Matrix window.

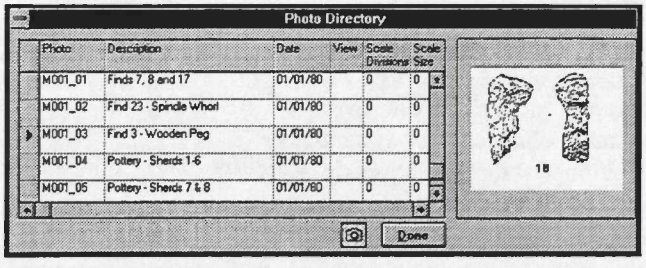


**Figure 32.6:** The photographic catalogue

The IADB system includes the CONSORT matrix compiler and a matrix editor which can be used together to produce stratigraphic matrices from the underlying Context relationships.

The matrix compiler is used to check all stratigraphic relationships for integrity and then produce a 'raw' matrix in which contexts are assembled into stratigraphic 'strands'. These are presented in a spreadsheet–like fashion with connections between strands shown by repeated context numbers (Figure 32.4).

The matrix editor is then used to 'polish' the matrix. This involves inserting vertical and horizontal lines into the matrix and reorganising columns or strands to improve the visual appearance of the matrix (Figure 32.5).

The photographic record (Figure 32.6) includes both traditional slides and prints that may be digitised using any standard scanner – at SUAT we use a simple grey scale hand scanner – but can also include purely digital images such as those obtained with a digital camera such as the Logitech Fotoman.

It is important that these data input tasks should be considered as part of the excavation process and should be costed into the excavation budget, irrespective of where and when they are actually carried out.

## 32.4 Developing The Level III Report

The completed Level II data records form a fully cross-referenced resource for use in post-excavation analysis, during which the higher levels of the data hierarchy (Sets, Groups and Phases) are developed. All elements of the Level II data, including text, plans, stratigraphic matrices and photographs, are available in a fully cross-referenced and easily accessible form.

For the development of Level III records, free text notepads, each up to 65,000 characters long, are provided for each Set, Group and Phase (Figure 32.7). These are the 'factory floor' of the IADB system in post-excavation. It is here that textual descriptions of the Level III objects are assembled and it is usually in this window that Contexts are assigned to Sets, Sets to Groups, etc., although Contexts can be assigned to Sets individually Context by Context if required. In assembling Set, Group and Phase descriptions the standard Windows Cut, Copy and Paste commands are used to minimise the amount of retyping required.

From any Set, Group, or Phase, the user can easily 'drill down' to the underlying data objects and examine any aspect of them. Each Set, Group, and Phase window contains a visual display of the underlying structure of the object that will be familiar to all users of the Windows File Manager. These structure lists, and all other places where Find, Context, Set, Group or Phase numbers appear, are 'live' in that double-clicking on them will display the data window for the selected item.

The full integration of AEGIS For Windows into the IADB system allows composite plans, such as a Group plan (Figure 32.8), to be generated automatically,

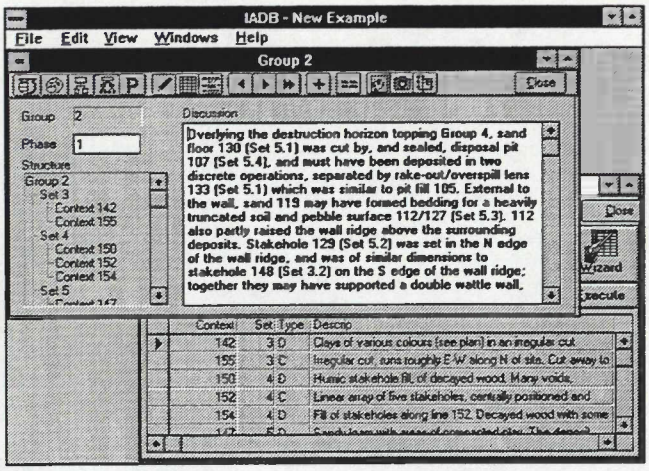


**Figure 32.7:** Group data input window, showing structure list and free text, with associated SQL window showing Context list for Group 2.

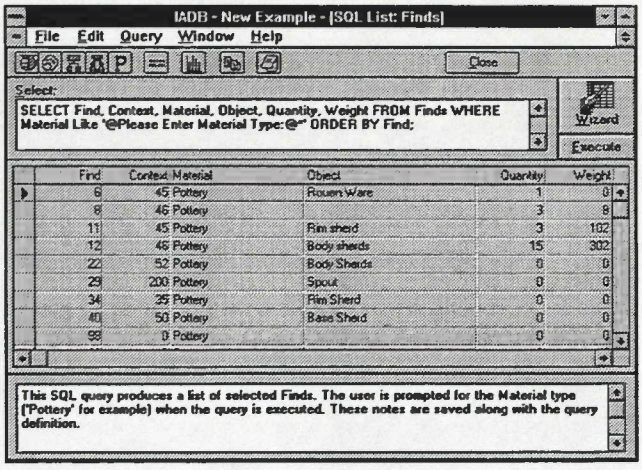


**Figure 32.9:** SQL Query window. The query includes a replaceable parameter (surrounded by '@' symbols) and has a notepad.

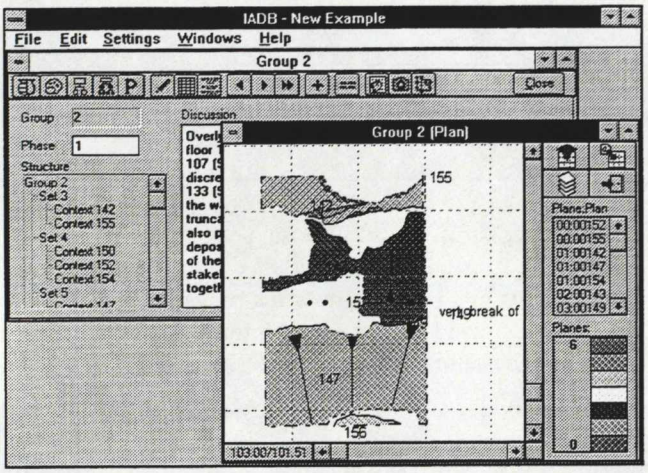


**Figure 32.8:** Group 2 data window with its associated AEGIS plan window.

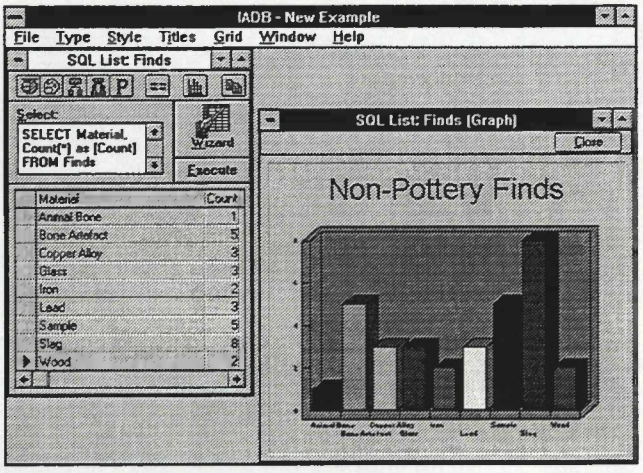


**Figure 32.10:** SQL Query window and associated Chart window. The SQL query uses an aggregate function (Count(*)) to produce a summary report.

manually, or using a combination of the two methods. Typically, a Phase plan will be generated automatically and will initially include all Contexts assigned to the phase with their order of superimposition controlled by the stratigraphic relationships of the Contexts. It might then be decided to manually remove one or more Contexts from the plan (but not from the Phase!) to improve the overall clarity of the plan. All AEGIS plans can be saved as Windows metafiles which makes them accessible to WordPerfect and many other Windows applications including, for example, Corel Draw! An AEGIS plan file to AutoCAD DXF file conversion utility is also available.

As Sets are always defined stratigraphically within the SUAT recording system, Set matrices can be produced in a similar way to Context matrices. In this case Set relationships are taken to be the sum of the stratigraphic relationships of their constituent contexts. Groups and Phases on the other hand are not generally defined in purely stratigraphic terms and so automatic generation of Group and Phase matrices is not possible. However they can be built manually using the matrix editor.

## 32.5 Using Structured Query Language

Full access to ANSI standard SQL (Structured Query Language) is provided for simple or complex interrogation of all underlying data tables (Figure 32.9). Complex SQL query definitions can be saved for later reuse, and replaceable parameters may be used to build generic query definitions. Suitable SQL query result tables may also be graphed in a number of styles (Figure 32.10).

As with Data Input windows, wherever Find, Context, Set, Group, or Phase numbers appear in an SQL query result table, an AEGIS plan window, or a stratigraphic Matrix window, they are 'live'. Double-clicking on one will automatically display the appropriate aspect of the underlying data record in any other open windows. In this

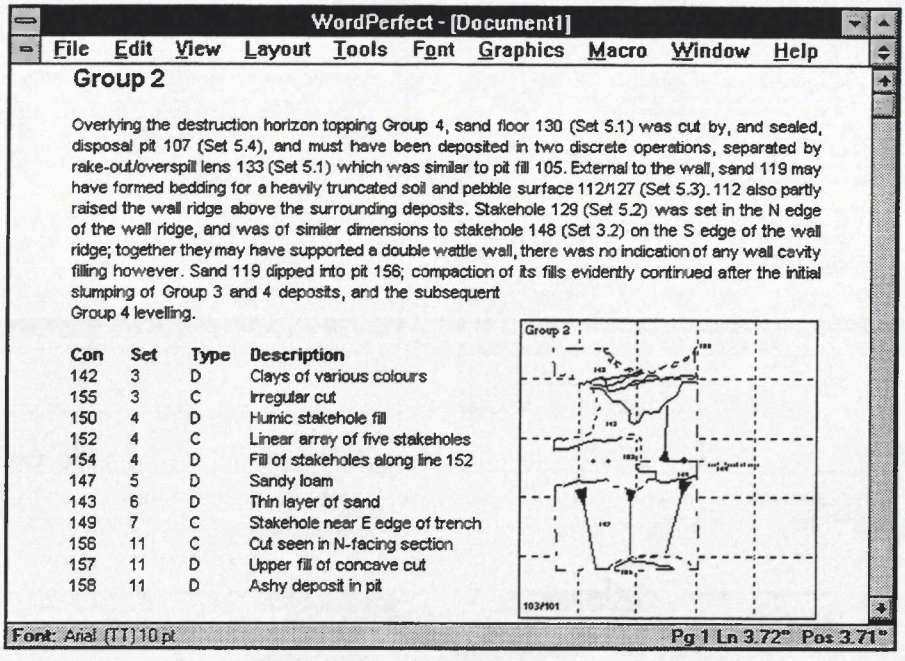


**Figure 32.11:** A WordPerfect document containing free text, an SQL query result table, and a plan, all transferred directly from the IADB.

way, for example, SQL query result tables or Matrix windows may be used as Plan browsers.

Whilst the Windows clipboard allows most IADB objects including text, SQL Query result tables, AEGIS plans, etc. to be transferred directly to any Windows program capable of receiving them, the IADB system includes several features designed to be used in conjunction with the WordPerfect word-processing program (Figure 32.11). All SQL query result tables, as well as individual data records, can be saved directly to WordPerfect (version 5.1 and later) document or secondary merge files. The use of secondary merge files produced by the IADB in conjunction with the merge facilities within WordPerfect provides a particularly powerful and flexible method of producing customised reports of IADB data. These facilities have been considerably enhanced in WordPerfect for Windows Version 6.0. Visual objects, such as graphs and plans, may be saved as Windows bitmaps or metafiles.

## 32.6 Future Developments

Several avenues exist for possible future development of the IADB.

The SRS system described above provides a mechanism by which the IADB data structures can be extended as required. The provision of SRS's for Environmental Samples and Architectural Fragments is at present being considered.

The SQL dialect of the IADB can be used to 'attach' external data tables in a variety of common formats to the IADB data structures. The supported formats include Microsoft Access, xBase, Paradox and Btrieve. Such attachments can be made on a temporary *ad hoc* basis in SQL Query windows, or can be made more permanent through the use of SRS's.

'Integrated' has always been the key word in the IADB title. In the early days the possibilities for true integration were very limited. The adoption of Windows a couple of years ago first began to turn the concept into a reality. The advent of OLE 2 technology, already available to the programmer, and now beginning to appear in mainstream applications such as Word and Excel under the banner Microsoft Office Links, promises true integration between different applications from different vendors.

On the hardware front, two technologies that are gradually moving within financial reach and may offer great potential for use within the IADB system, are pen computing and digital cameras. The first of these may eventually turn on-site data input, especially of AEGIS plans, from a long cherished dream into a reality. Digital cameras have of course been available for several years but it is only recently that devices such as the Logitech Fotoman have begun to be marketed as consumer items that even archaeologists can afford!

## References

CLARK, P.R. 1988 'Studying formation processes in rescue sites: the Toolbox System', in *Archform* 3, 6–7.

RAINS, M. 1989 'Computerising the plan database: the AEGIS system', *Archaeological Computing Newsletter* 21, 1–2.