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Collecting and collating:
managing data in archaeology

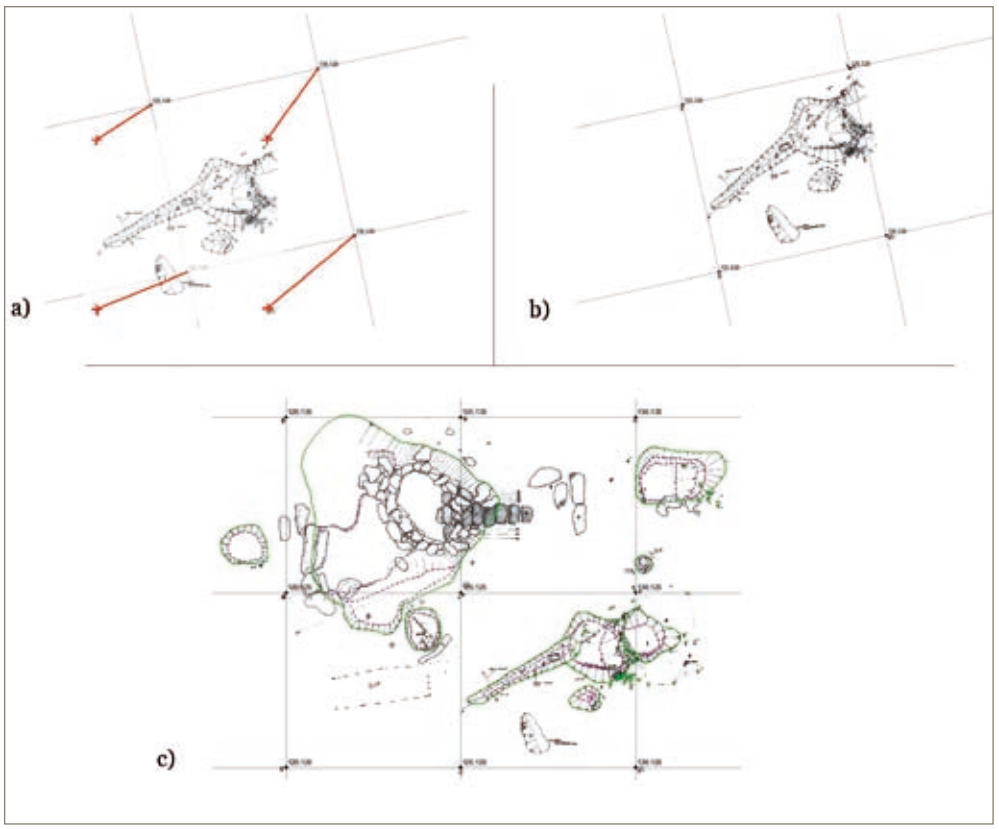
Maurizio Toscano, a Geographical Information System (GIS) specialist with Eachtra Archaeological Projects, gives an insight into how one of Ireland's archaeological consultancies marshals the evidence it recovers during excavations.

Databases combined with a GIS should be the perfect tool for an archaeologist trying to untangle and manage the written records, lists, photographs and plans generated during an excavation. A GIS computer software package combines a map of the site with a database of the archaeology found, allowing the various aspects of the excavation record to be viewed and presented as a whole. A working system would allow all the recorded data to feed into the production of a realistic story about the activities and lives of the people represented by the mass of data collected from an archaeological site. For such a system to work, however, requires significant pre-excavation planning and system-building.

Since September 2007 Eachtra has used an integrated database and GIS system for managing and analysing the data produced from 75 archaeological excavations spread across three large-scale road projects: N7 Castletown–Nenagh, N18 Ornamore–Gort and N8 Fermoy–Mitchelstown. The benefits have been such that we now routinely use the system at the outset of all excavation projects. The system that Eachtra has implemented is composed of two main cores: a relational database, used to store and manage pictures and alphanumeric data (data made up of any of the letters of the alphabet and any digit from 0 to 9); and a geo-database (a database designed to store and manipulate spatial data), used to manage the post-excavation drawings completed in the field. The data-model for both databases has been created from scratch to specifically deal with archaeological data, merging the recording methodology already in use by Eachtra with the experience gained by the author in computer science in the Archaeological School of Siena, Italy. The structure has been organised in order to gather (in a stratified way) the whole information set of an excavation.

The first group of data that is stored in the GIS database is the geographical extent of the excavation area and the site grid (a grid layout that divides the site for ease of recording features and artefacts recovered). The plans are scanned and geo-referenced (process of establishing the location in terms of map projections or coordinate systems) in the GIS platform. In this way, the plans are stitched together and a complete mosaic of the site is produced. This image is then used to digitise the plans. A large selection of other data sets, such as aerial photographs, geophysical data and historical maps, can also be geo-referenced and manipulated on the GIS platform.

Our platform enables the production of a high-quality set of outputs, ranging from simple post-excavation plans to more advanced illustration of statistical and spatial analysis and on to a wide range of maps, including topographic, thematic and distribution, at various scales. The standard is comparable to any of the individual illustrating computer programmes currently available. Furthermore, storing the drawing in a proper database instead of using a simple CAD (Computer Aided Design) sheet enables us to link them with textual information in order to search and filter the data. It also prevents the creation of duplicates of the drawings, made for various purposes, and alleviates the common problem of updates.



(Drawing: Eachtra Archaeological Projects)

Digitising process of site excavation plans. Individual plans of specific features are scanned and stitched together to form a mosaic of the entire excavation site, which is subsequently digitised.

The second main core of the system is the EAPOD (Eachtra Archaeological Projects Office Database). Data entry starts during the excavation process, filling the EAPOD with on-site registers, context sheets and photographs. The use of a proper database instead of a simple spreadsheet gives us the ability to ensure the integrity of the data and to control the language. It is only with this tight control of the collected data that the full range of data-analysis techniques can be optimised. The data entry continues during the post-excavation phase, especially with

(Image: Eachtra Archaeological Projects)

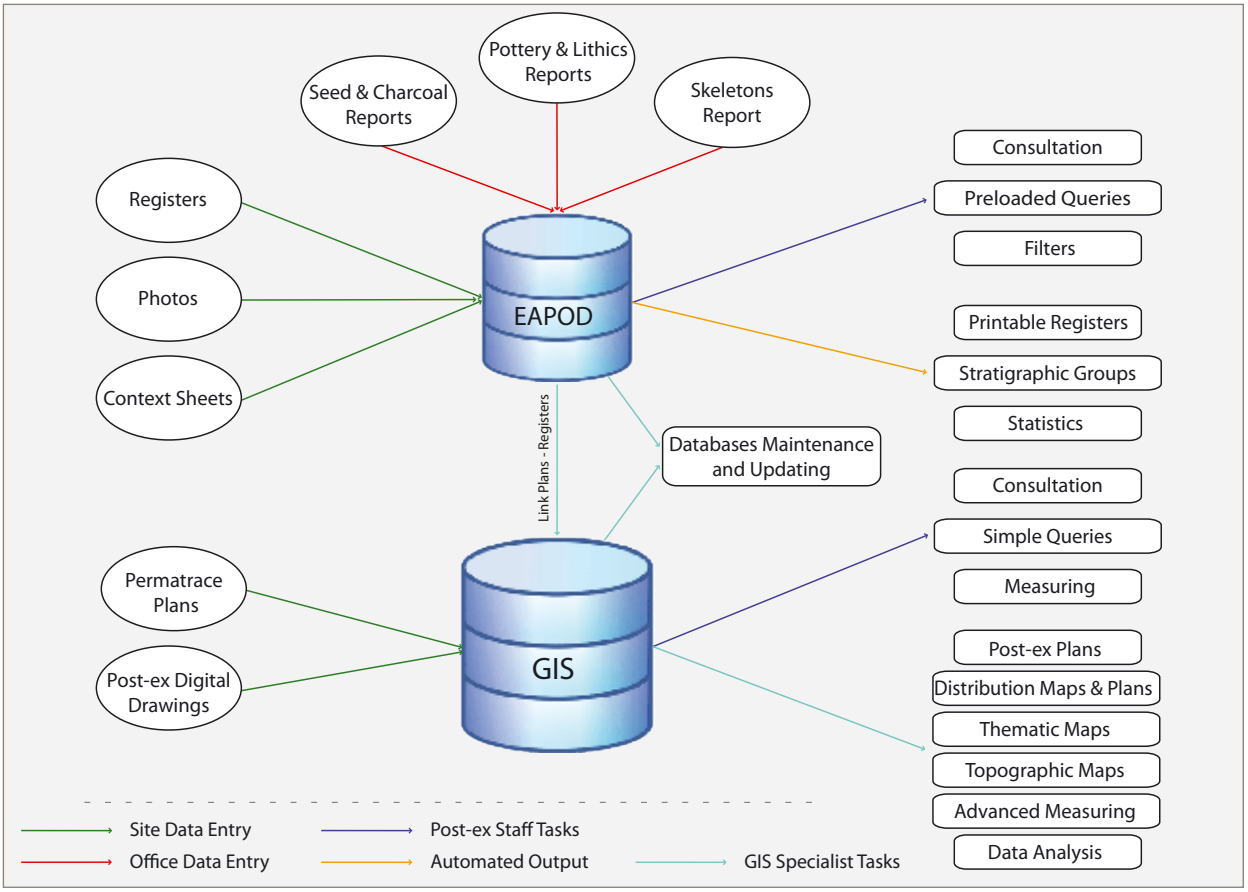


Diagram illustrating the Eachtra Archaeological Projects workflow.

the addition of all the specialist reports relating to artefacts and environmental samples. The final product is an archive that integrates all the available information, avoiding redundancy of data through a series of relationships established between the individual components. The context number, given initially on-site, represents the key that links the documentation together.

The EAPOD, integrated with the GIS platform containing the post-excavation plans, offers the post-excavation team a circular data system that can follow and support the interpretation of the archaeological stratigraphy, in contrast to the more traditional system that comprised text documents, spreadsheets and individual images. The idea at the core of this system is linked data and the assumption that when you connect data together, you get an additional value in a way that does not happen with data stored and managed separately. It allows you to view, understand, question, interpret and visualise your data in ways simply not possible in the rows and columns of a spreadsheet.

A good example of a significant archaeological site managed from the beginning with our system, as outlined, is Owenbristy (excavated on the route of the N18 Ornamore–Gort), which is discussed in the next article. The system is proving its usefulness by linking the substantial volume of site data created in the field (526 contexts, 95 skeletons, 132 finds, 577 samples, 307 drawings and more than 2,000 photographs) and integrating it with the results of post-excavation analyses as they become available. This should result in all of the available data having an influence on the final excavation report.

In conclusion, we can assert that the adoption of the GIS has resulted in various benefits in both data management and project development, which can be summarised by the following points.

- The vast amount of data that forms the archaeological archive is all incorporated into the production of the excavation results.
- At the end of the project, the GIS platform represents a complete digital archive, giving post-excavation researchers a powerful tool to improve the degree of accuracy of site interpretation and the quality of the final report.
- GIS methodology requires an organised and standardised approach to all aspects of an excavation project, ranging from workflow and data-recording techniques to on-site data entry and digital storing.
- The creation of a composite plan represents a comprehensive digital archive for all of the site's drawings.
- GIS approach transforms plans from an illustration of something already completed to an instrument of research that can be useful during site interpretation.
- The digital archive becomes a valuable resource for future researchers.

All kinds of data imported into or created in GIS can subsequently be manipulated and analysed in various ways (attributes and spatial queries, statistical and spatial analysis, measures, etc.). For this reason the GIS specialist should work in tandem with other team members to ensure that the data is suitable to be processed and should also have a strong archaeological background to be able to completely understand the goals and problems of the research.

(Image: Eachtra Archaeological Projects)

Screen shot of the EAPOD (Eachtra Archaeological Projects Office Database) graphic interface.

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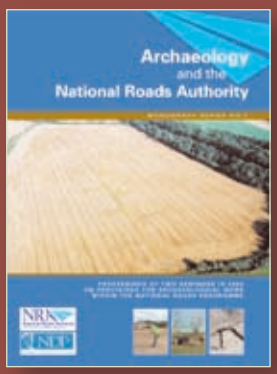
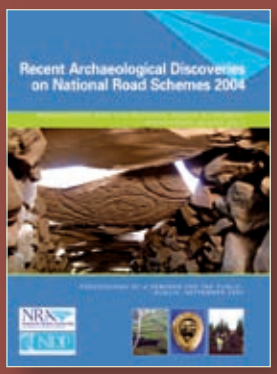
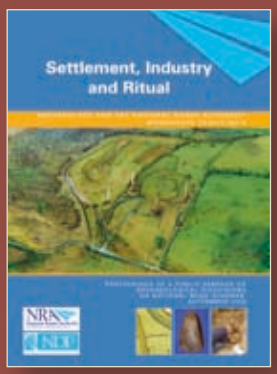
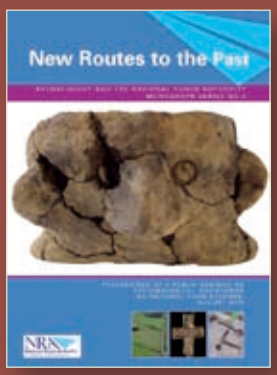
OTHER ARCHAEOLOGICAL PUBLICATIONS AVAILABLE FROM THE NRA



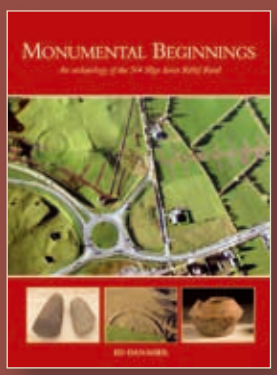


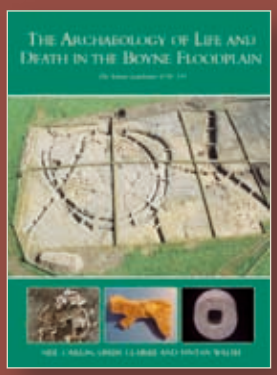


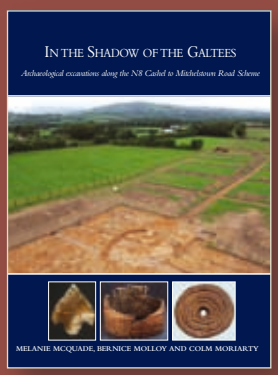


ARCHAEOLOGY AND THE NATIONAL ROADS AUTHORITY MONOGRAPH SERIES

The NRA initiated its Archaeology and the National Roads Authority Monograph Series in 2003 to publish the papers given at its annual National Archaeology Seminars. In common with the seminars, the monographs are presented in an informal and easily understood format and contain numerous colour illustrations. The sixth monograph in the series was published in August 2009 and the seventh volume is currently in preparation.







NRA SCHEME MONOGRAPHS

The NRA launched its scheme-specific monograph series in December 2007. These monographs detail the results of discovery and archaeological excavation along specific national road schemes. An accompanying CD-ROM to each publication incorporates all the final excavation reports and specialist reports. The third monograph in the series was published in December 2008 and the fourth and fifth volumes are currently in press.

All of the above publications are available through bookshops, or directly from Wordwell Books (www.wordwellbooks.com or tel: +353-1-2947860).

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NDP National Development Plan 2007 - 2013
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