Can developing countries afford national archaeological records? The Polish answer

Andrzej Prinke

However strange the title of this paper may sound, it is fully compatible with the story I am going to tell. The story starts in 1986 when I became inspired by the excellent example of a powerful mainframe database at the National Museum in Copenhagen, which was just under construction at that time. Back home, I.posed to the Polish archaeological community the question, which returns now, after 10 years, as the title of this paper. The reader can already guess that our answer was a positive one. Bearing our financial limitations in mind, we nevertheless were conscious, even at the beginning of this long process, of the absolute necessity of an archaeological database in our future work.

The general development of archaeology in Poland during the next decade has proved our decision was right. In today's management of cultural heritage there is generally no doubt about the necessity of implementing a national computer database of archaeological sites. This modern way of dealing with archaeological data in its electronic, computer form has proved to be far more efficient worldwide than the traditional, time-consuming one, where the archaeologist has at his disposal several dispersed and often incomplete sources of information, not always readable (vast archives of hand-written or typed paper documents, bibliographies in the form of books, museum catalogues consisting of thousands of paper forms etc.), all of which have to be browsed through by hand. Instead, the archaeological computer database unifies all types of information into one integrated format which is easy to view on the monitor screen, edit, check, complete, analyze and, eventually, multiply by copying onto diskettes for broader use. Many examples of operating computer systems have proved that such investment intensifies further archaeological research both in the field and in the study. It also simplifies the organization of systematic, optimized protection of archaeological sites and especially rescue excavations, and automizes much of the editorial work when preparing source publications. In general, it creates a situation of positive feedback between development of the archaeological database and the discipline of archaeology as a whole.

However, acute financial shortages (a common obstacle in developing countries) often discourage representatives of the National Antiquity Service from beginning such an undertaking. Is this pessimism justified? In Poland in 1986, we started, with only a very limited budget, to build up an archaeological database called *System_AZP* which, thanks to certain adopted prerequisites, eventually proved to be both low-cost and efficient. There were four main prerequisites of this system. The first was to have a system dedicated to PC computers with standard configuration. The second was to implement a model of a 'dispersed database', therefore, of several local databases managed by identical application software (database management program) and based on the same data structure to enable exchange of data. The third was to use a popular application development package, first *Clipper '87* and then *FoxPro*, rel. 2.5, which guarantees the development of a management program with a user friendly interface and a reasonable speed of data retrieval. The fourth was a requirement to build the system in several steps, depending upon available finances, experience gathering and the promotion of the idea of the system throughout the country.

It was decided that the application we were going to develop should become one of the useful and practical tools for any archaeologist looking for basic data on archaeological sites. Hence, it had to be as universal as possible, supplying the user with the data relevant to his current requirements. Therefore, the program was designed for all archaeologists, irrespective of the kind of project they might initiate (research, education, exhibition, rescue excavation, heritage protection etc.).

To sum up, it was decided that the system we were going to design should be:

(i) cheap (in terms of both software development costs and hardware requirements);
(ii) easy, hence with a clear functional structure, enabling most of the archaeological staff to use it without a requirement for long-term training;
(iii) user-friendly, therefore fully mouse-driven, supplied with necessary on-screen explanations and context sensitive help (both in Polish), not requiring from the user any knowledge of programming languages, automatic data check wherever possible, and system guidance and prompts for the user, and
(iv) universal, therefore able to accomplish all primary types of tasks (full file and record management), complex retrieval conditions, simple and complex data analysis, and flexible printouts - pre-defined templates as well as user-defined reports.

A major advantage in developing and introducing the system just in Poland was the fact that during the last twenty years Polish archaeologists have developed and implemented a unified, country-wide system to record and document archaeological sites. This system, called the "*Polish Archaeological Record*" (in Polish: "*Archeologiczne Zdjecie Polski*" *or "AZP"*) was first applied on a large scale in the late 1970's. Its main aim was to record all detectable archaeological traces in the country, both newly discovered and verified, in a unified, textual and cartographic form.

The system

The Polish Archaeological Record (AZP) has, at present, a threefold structure: a field survey; traditional (paper) site documentation, including site register forms, site lists and maps, and a computer database.

The first two parts of this huge undertaking were prepared in the late 1970's, while the computerization of its results started in 1986. Between 1975-78 two variations of the site register form were proposed, one of which used punched cards. Eventually, a compromise version was generally accepted. In the early 1980's several additions and corrections were introduced to the AZP system (among others, updated 1:10,000 scale topographical maps).

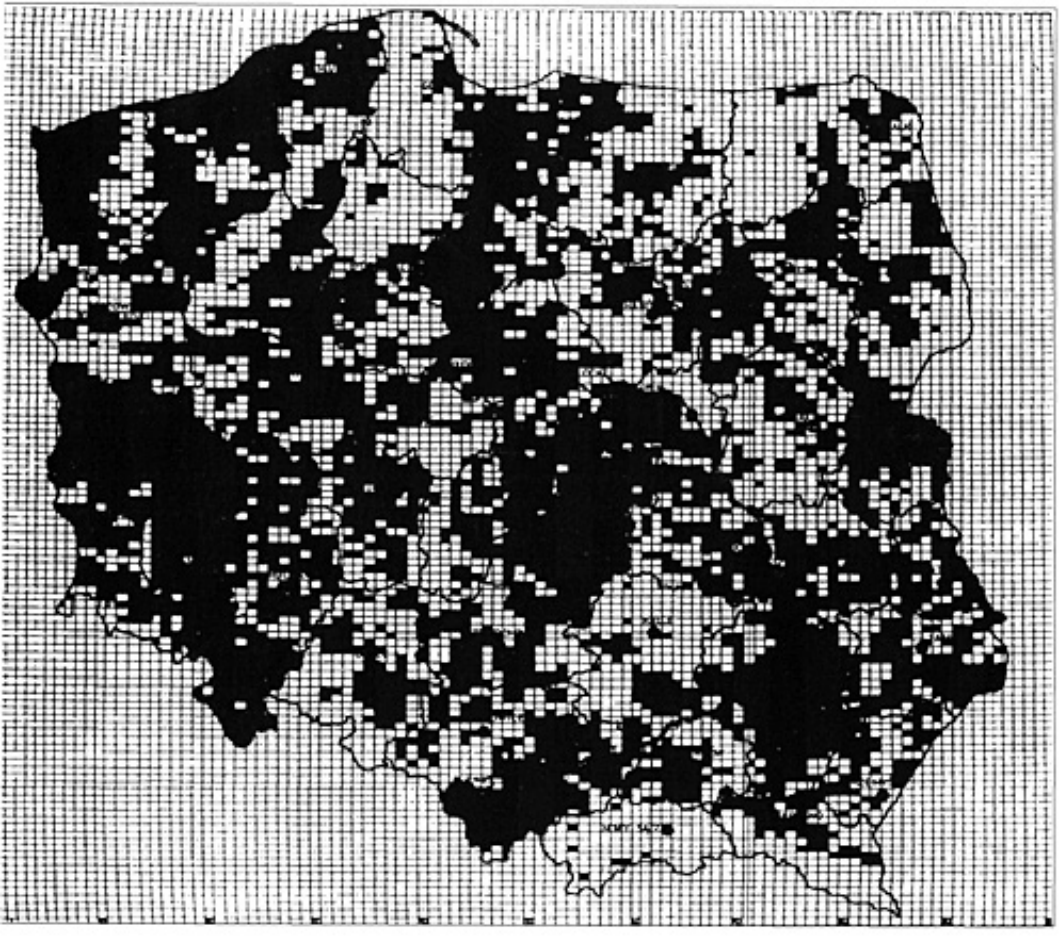

Fig. 1. Map of the ca. 8,500 AZP working areas in Poland.

Field survey

AZP is based upon several simple rules.

The National Archaeological Grid

The whole territory of Poland is divided into roughly 8,500 AZP Working Areas (Fig. 1) of 35 km^2 each, i.e. 5 x 7 km in size (Fig. 2): such an arbitrary working unit originated from the A4 format sheet of a 1:25,000 scale map. The grid provides a standard location background, independent of the map type or of the detailed location methods. The AZP Working Area number, used together with the site number within the AZP Working Area, constitutes a *unique identifier* of a single site, independent of the changing administrative borders etc. Each site also has a second, more traditional address, which consists of a locality name and a site number within the locality.

Preparations

The way of preparing and carrying out a field survey of a chosen AZP Working Area includes: archive and museum research before a field survey; verification in the field of all previously known sites, and detailed surface survey of all accessible areas within the borders of the examined AZP Working Area.

Management

The AZP survey team can be led only by an archaeologist who is a holder of the AZP license, which can be issued to him after attending a training course and passing a final exam.

Supervision

The system includes a thorough, three-level, quality control of the survey and its results, undertaken by the specialists/consultants (on the single AZP survey team level), by the Archaeological Branches of the State Service for Protection of Historical Monuments (on the provincial level), and by the Historical Monuments Documentation Center in Warsaw (on the central level).

Site documentation

Each AZP team produces the results of the field survey in the form of a standardized set of documentation for each "working area". This documentation comprises: register forms for all surveyed sites (Figs. 3 and 4); 1:10,000 and 1:25,000 scale maps of the AZP Working Area (Fig. 2); a survey report, and an excerpt of results in the form of two standardized site lists.

The main element of the documentation set is the site register form, which constitutes the first data standard in Polish archaeology (Figs. 3 and 4). After nearly 20 years of practice, it can be characterized as a successful standard as it has been accepted and used by practically all field archaeologists in the country.

Site register form

The structure of the site register form is highly formalized, which made a subsequent conversion of its contents into the computer database structure much easier. It is based upon the Polish core data standard for archaeological sites. The site register

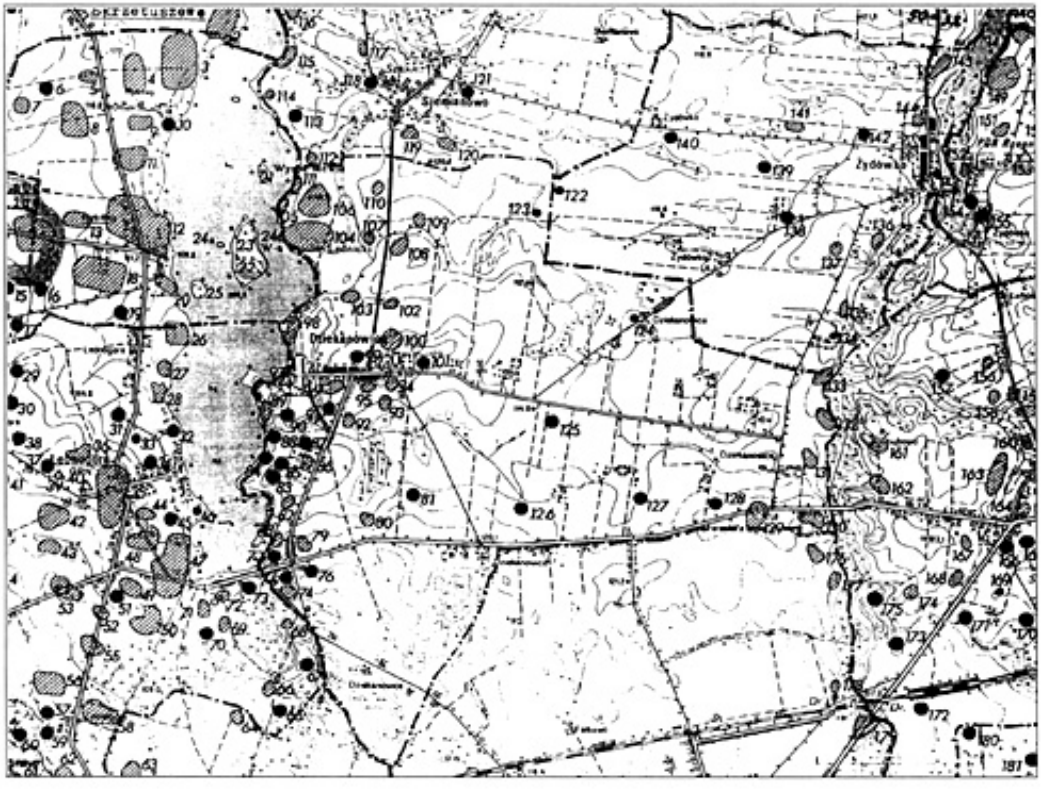

Fig.2. Map of an AZP working area at a scale of 1:25.000.

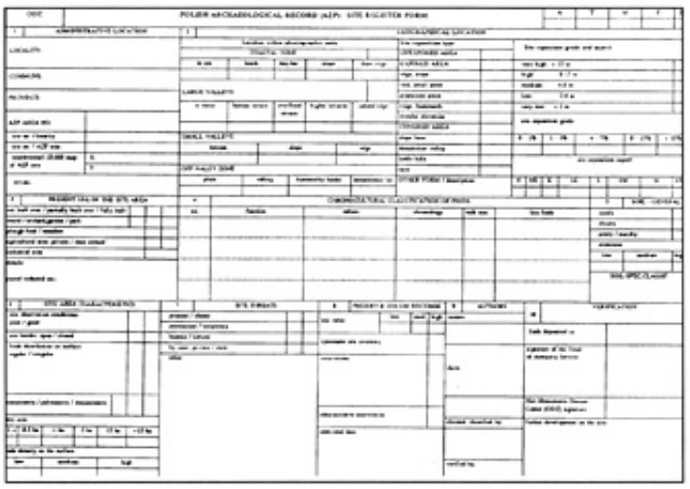

Fig. 3. AZP Site register form.

Fig. 4. AZP Site register form.

form consists of 48 fields, divided into 13 groups which describe all of the main aspects of a single archaeological site (Figs. 3 and 4). These main aspects are:

(i) its administrative and geographical location
(ii) present use of the site area
(iii) chrono-cultural classification of archaeological materials
(iv) soil type (in general and specialist terms)
(v) site area characteristics, including the distribution pattern of archaeological materials on the site surface
(vi) threats to the site
(vii) recommendations on future preservation and documentation activities
(viii) survey authors
(ix) data verification
(x) museum collection
(xi) site research history
(xii) other data (research history of the site, archives, bibliography, map sheet number and cartographic coordinates of the site etc.).

Implementation of the system

The entire AZP project is carried out under the auspices of the Historical Monuments Documentation Center in Warsaw. Local co-ordinators and supervisors of the project are the Provincial Archaeologists (i.e. Heads of the Archaeological Branches of the State Service for Protection of Historical Monuments in each of the country's 49 provinces). The field survey is carried out by about 500 archaeologists from various institutions, organized in numerous AZP survey teams. The undertaking has been financed by various sources, with the major share coming from the Ministry of Culture and Fine Arts.

Recently, the recording and documentation of archaeological sites following the AZP standard has constituted, along with their subsequent protection, the main task of the Archaeological Departments of the State Service of Protection of Historical Monuments. So far, some two-thirds of the area of Poland has been surveyed following the AZP data standard, with the result that some 500,000 sites have been recorded, dating back to all prehistoric and historic periods, from Palaeolithic to Early Modern Times.

Computerization

The very beginnings: System_AZP

As a result of the first two stages of the AZP project, extensive archives of site records in the form of paper documents were soon created in each province of the country (up to 25,000 site register forms in provincial archives and over 250,000 in the central archive at the Historical Monuments Documentation Center in Warsaw). It soon became clear that only a computer database would make it possible to collect, process and evaluate this vast and valuable set of information efficiently. In 1986 the Poznan Archaeological Museum presented a preliminary version of a database system on archaeological sites, called *System_AZP, rel. 1*. It was dedicated to the 8-bit microcomputers and written in *dBASE II/CPM* programming language. It covered almost the full scope of the data from the traditional paper form. The data structure consisted of two database files with a total of 41 fields. Later activities resulted in the launching, in 1989, of the first version of a similar system for the PC computers. It was programmed in *Clipper '87/DOS* (*System_AZP, rel. 2* and later).

Due to financial limitations, in the further development of the all-Polish archaeological computer system, a model of dispersed, regional databases, run on PC computers and based upon unified data structure and identical software, was chosen rather than one central, national database. The *System_AZP* was soon appreciated by its users as a friendly and flexible application, permitting data retrieval in practically any combination and generating formatted reports. It was then formally declared by the Ministry of Culture and Fine Arts as the national standard for all branches of the State Service for Protection of Historical Monuments. The program has, since then, been repeatedly enhanced, with some minor changes of its data structure.

Second software generation: AZP_Fox

After completing the system in its first PC version, our team working at the Poznan Archaeological Museum has accumulated rich experience as the first user of this software, exploiting it in our daily routine work. Simultaneously, as the use of the system started to spread across the country, we began to receive more and more practical comments from other users (who currently amount to over 60). In the meantime, new, much more powerful programming tools became available. All this resulted in preparing the next (third), completely revised version of the system, using one of the fastest and most progressive programming tools at hand: *FoxPro, rel. 2.0/DOS*. This stage of the project was achieved in 1993 and its result was *AZP_Fox*.

Utilising the former data structure, it appeared to be about 15 times faster and much more user-friendly.

The user can find such improvements as:

(i) a fully menu- and mouse-driven user interface
(ii) enhanced data entry control
(iii) context-sensitive help
(iv) a generator of retrieval conditions, giving the user access to all database fields as well as to all possible logical and relational operators
(v) basic data analysis
(vi) several formats of printouts including user-defined forms.

The new programming tool made it possible to prepare two versions of the system with respect to the kind of hardware used: the faster one, called *AZP_Fox, rel. 1.5X*, which requires at least 4 megabytes of RAM memory, and the standard option, called *AZP_Fox, rel. 1.5* which can use computers with minimum RAM memory (2 Mb).

The upgrade of *AZP_Fox* was accomplished in 1994. It resulted in the preparation of the next, thoroughly revised version of the system using *FoxPro, rel. 2.5/DOS*. For the first time it was prepared in two language versions: Polish and English. Consequently, the system now exists in four versions: two Polish and two English ones, each language version being available in standard or fast (X) option.

As the system still undergoes minor refinements and alterations, the release number also changes, currently being rel. 1.9 (Polish version) and 1.9E (English version). It is distributed as freeware to all users of the former system as well as to all others who have shown an interest in it. Today there are over 60 registered users of this application, who have so far entered ca 200,000 records. It is now planned to add some elements of graphics (maps, finds drawings) to its next release.

In its present shape, the *AZP_Fox* system is designed to aid archaeological documentation and recording, as well as archive research and primary analysis of data in several fields of archaeological activity, i.e. research, museum work and the management of the archaeological heritage. As far as standards are concerned, it follows the Draft International Core Data Standard for Archaeological Sites and Monuments prepared by CIDOC (CIDOC 1995). The system is aimed at survey teams, individual scholars, archaeological museums and the State Service of Protection of Historic Monuments. Using this system, the archaeologist is able to collect and manage all information on, for example, a given site, all sites from a given area or sites which share the same features. In summary, *AZP_Fox* is particularly efficient in the field of archaeological heritage, giving the central or local inspector fast and full control over information on all sites in his area of interest.

Further step: MuzArP

In the years 1993-95 another, much more powerful computer database system, called *MuzArP* (abbreviation of "Muzeum Archeologiczne w Poznaniu", ie.: "Poznan Archaeological Museum"), was developed. This application represents almost 10-years experience of the museum in designing and developing computer programs for archaeologists.

The system is designed to integrate and manage large collections of archaeological objects and documentation in order to aid the documentation and

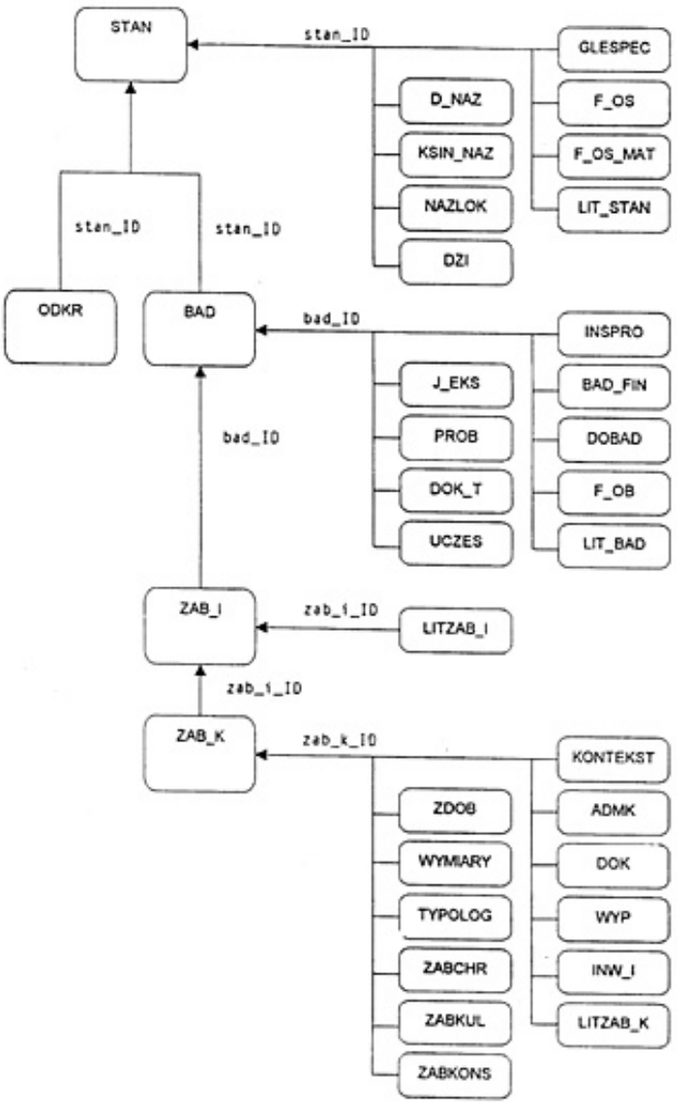

Fig. 5. MuzArP logical structure.

recording processes as well as the search for archives and the primary analysis of data in several fields of archaeological activity, i.e. scientific research, archaeological museology and management of the archaeological heritage. Therefore, it is aimed at archaeological museums, state and local departments of the Antiquities Service, research teams as well as at individual scholars. By means of the *MuzArP* system, the archaeologist is able to collect and manage all basic information on, for example, a given site, all sites from a given area, a collection of archaeological objects from a given site or area, the history of archaeological fieldwork and its results (lists of excavation teams, objects they have discovered, publications and storage locations), the contents of field as well as museum register books, and the history of the restoration of a given object, monument or site. The system is particularly efficient in the field of archaeological museology and heritage management, giving the central or local keeper, or inspector, full control over information on all sites, objects and events in his area of interest.

Unlike all former, much smaller systems that cover data on archaeological sites, the aim of the present system is to create and manage the Integrated System of Archaeological Information. In other words, this system contains not only the information on a given site itself but also information from certain other data sets which can be logically derived from it, ie.:

(i) all subsequent research activities on the site
(ii) the results of those activities, i.e. archaeological assemblages discovered there
(iii) all single artifacts from the assemblages or elementary sets of artifacts that are of any meaning for archaeologists.

The system which emerged from such a concept was developed by our museum in co-operation with a team of programmers from Datex Consulting Inc., Poznan, in 1993-95. At its highest level (1), it is compatible with the program *AZP_Fox* (data export/import option), described above. The system has been written in the *FoxPro, rel. 2.5/DOS* programming language: it consists of 234 files including 92 database files. The data structure of the *MuzArP* system includes 351 fields. Data control is executed with the help of 55 vocabularies. Its logical model consists of four levels of generality: the user, moving from the uppermost level 1 (describing a site) to the most detailed level 4 (that of a single find), following, in a way, a typical sequence of the archaeological research procedures. Much effort has been devoted to making the system user-friendly and its data entry option ergonomic. *MuzArP* overcomes several limitations of the *AZP_Fox* system both in input and output of data: it eliminates the need of any data coding while entering it to the system, as well as the extensive use of abbreviations in the fields containing much data of different character (e.g. bibliography, finds).

The following are some of the main features of *MuzArP*:

(i) *data presentation*: data on all selected records (sites, research activities, assemblages and/or single objects) can be displayed and browsed on the monitor screen. Each record of the database, i.e. all data on one archaeological site, is presented on several subsequent screens, depending on the number of elements on the lower levels (research actions, assemblages, single finds). Information from different levels can be combined by opening additional data windows on the monitor

screen (up to 5 windows can be opened simultaneously). The user can easily navigate between the screens and records by choosing the appropriate buttons with the mouse.
(ii) *data entry*: unlike all former systems developed by our Museum, *MuzArP* executes full control of the data entry by using the mechanism of numerous dictionaries (open and closed), which contain all items present in a given field. The use of dictionaries excludes typing errors, speeds up data entry and enables fast and easy terminology control. All the data entry screens have some "intelligence", therefore, they do not let the user proceed without completing fields which are obligatory and, in some cases, the system is able to check the data validity. In the latter cases, it also forces the user to correct the error. To speed up the data entry, a mechanism of 20 user-defined macros is available, which allow the user to enter the most frequently occurring terms by using a single keystroke. In such cases, the system forces the user to correct the error.
(iii) *data correcting and updating*: the system offers three different methods of editing the data to be corrected or completed in the most convenient way.
(iv) *database verification*: the system is provided with some mechanisms to verify the consistency of the database which is crucial for its further successful work. During the process of data verification one can check record duplication, the validity of the number of chrono-cultural categories related to the same site record, and the consistency of the database index.

As with *AZP_Fox*, the *MuzArP* system also respects the rules of the Draft International Core Data Standard for Archaeological Sites and Monuments prepared by CIDOC (CIDOC 1995).

During the last three years this set of simple computer tools for archaeologists has been substantially enhanced and updated by:

(1) *mAZePa* - a simple GIS application based upon MapInfo package; it is a MapBasic applet which can retrieve the bulk data on archaeological sites, generated by the former programs and to add their cartographic dimension by preparing different kinds of maps and sketches) and inserting them, if necessary, into the text documents, created by the both former applications.
(2) *KSAWery* - a Visual FoxPro database undertitled as "Computer System for Excavations Archiving" and prepared partly by the same authors, in cooperation with Institute of Archaeology and Ethnology, Poznan Branch (team leader: Lech Czerniak). It is based upon a set of standardized paper forms to be used for field documentation of archaeological excavations (site card, trench card, inventories of finds, photos, drawings, samples etc.). *KSAWery* collects data from all those forms, prints ready copies of any type of the documentation, counts and sums any category of finds or document and syntethises settlement stages by analysing chronology of every item involved,
(3) new, revised and enhanced version of *MuzArP*, which includes fields for graphical data and options to browse and search CD-ROM collections of photos and drawings.

Conclusion

The Polish example proves that it is possible for a developing country to construct a national archaeological record. I would even suggest that a national archaeological record is even more necessary in a developing country because of its positive, dynamic influence on the archaeological infrastructure as a whole. One can observe how the work on the national archaeological record project makes the archaeologist aware of the importance of documentation standards and of their compatibility. Another reason to create a national archaeological record is a practical one. With the help of such a powerful tool, one can efficiently monitor the state of preservation of sites, identify sites at risk and, eventually, extract costs of rescue excavations from the developer. Such possibilities are, of course, much more important in countries with limited public budgets for archaeological research.

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