



# Themata 5 E-learning Archaeology, the Heritage Handbook





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# E-learning Archaeology

## the Heritage Handbook

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# Urban archaeology *by Andrzej Gołębniak*

### **m**sco General information

#### > **A**nimation

Scholars dealing with urban archaeology are to a considerable degree unanimous with regard to the description and the definition of the subject of their interest. One of few controversies is the very name of the area of specialisation. Some researchers call it archaeology of historic towns while other scholars use the term urban archaeology.

It seems that both of these terms may function in parallel; there is, however, a certain difference in their contents. The first term refers to research on structures of historic towns while the other one concerns any research within boundaries of historic towns, including locations of different origin and of various nature. The choice will therefore depend on the way of understanding the historic space of a town and on what we consider as a constituent of its history.

At present, it seems that the only reason why both terms are in use is a different way of managing the historic space. This applies both to research institutions as well as to heritage protection services which safeguard the historic space. In most opinions a historic urban space is one vast archaeological site. In many towns there are internal diversities which separate spaces with other functional classifications. In most cases, however, such diversities result from traditional divisions.

#### → **LU** Basic problems and definitions *by Andrzej Gołębniak*

### **s**co A short history of urban archaeology

The history of urban archaeology

#### > **A**nimation

The history of urban archaeology can be traced back to the amateur searches for the ancient ruins of Heraculaneum and Pompeii. Systematic research was undertaken only right after WWI, by Sir John Marshall in Mohenjo-daro and Harappa. Rudiments of modern urban archaeology were laid almost at the same time in three European cities:

Winchester (England), Bergen (Norway) and London (England). In the two latter cases the effects of archaeological works were crowned with the foundation of two archaeological museums:

#### > *The Bryggens Museum – opened in 1976*

Asbjørn Herteig was the director of archaeological works in Bergen for many years. This scholar is considered as the actual founder of modern urban archaeology as a field based on open-area examinations and measurement discipline.

#### > *The Museum of London – opened in 1978*

Edward C. Harris (Winchester) is considered as the founder of rudiments of examination methods. The fullest description of excavation proceedings was offered by Philip Barker. The specificity of urban archaeology, resulting from different chronology, conservation status, or local specificity (topography, type of architecture), causes the fact that each country has a different history of the development of this branch of science. Local traditions are the main basis for research models and rules of administrative procedure. This in turn influences not only the value of such research, but also the research and conservation politics of the city.

### **s**co Peculiarity of research

Urban archaeology is the area of specialisation of enormous difficulty. The main reason for this complicatedness is the fact that research work is being done in the direct vicinity of the living urban infrastructure. Furthermore, in a vast majority of cases the history of examined places is recorded in thousands of layers. In most cases these layers form deposits with a total thickness of several metres. They are related to numerous levels of constructions, of various form, nature and function. Such constructions were built using various techniques and various materials. This diversity of forms and functions originated as a result of processes of stratification.

On the other hand, a precise analysis carried out by archaeologists in Oslo has proved that it is (or was) numerous (continuous) levellings that are the essence of the sequence of layers as recorded by the archaeologist. The same research has proved that in most cases an archaeological site within a town of medieval origin is represented by layers with a total age of sedimentation being less than a half of the history of the examined location. The rest has disappeared in result of repeated topographic regulations. The stratigraphy of urban sites (as well as other multi-layer sites) is not the result of the process of continuous accumulation. It results from dynamic topographic changes. Historic continuity is usually notable in constructions discovered in the course of research.



Urban archaeology is therefore a field which encompasses not only historical, archaeological and urbanist knowledge, but also a broad knowledge of natural sciences. Urban archaeology is thus a truly interdisciplinary field. Due to a complexity of its research subject it has become a motive power of methods of archaeological research in the last half-century. It is enough to mention the merits of two key personages in urban archaeology:

- > Esbjorn Hertaig; Field strategy,
- > Edward Harris: Field methods and theoretical solutions,
- > Harris's laws of archaeological stratigraphy.

### sco Examples of simple stratigraphy and its analysis

#### > Animation

Find the corresponding elements in the photo and figure. Add adequate numbers on the figure.

The profile of an excavation site situated on the roadside (Płock – Central Poland)

The profile represents a history of 650 years of the city under study. The total time of functioning of the levels, visible in the profile is 215 years. The sandy ballast stone pavement (4, 13, 46) functioned for the longest period of time (200 years). In each of the three cases, the pavement did not survive (2, 12, 44). The other units are the witnesses of short-term episodes, except for 'layers' 50, 32, 22, 15, 7 and 1.

The ceiling was cut (71) in order to construct a free-standing oven. The entire sequence is representing 75 years of the city history. The fact that the oven was used is known thanks to the sediment 70, formed from sequential lenses of coals of wood and ash.

The next sediment is unit 69, being witness to cleaning the furnace chamber. Deposit 68 is made up of a ruined oven, which, most probably, functioned only for a couple of years. The unit, exposing the destruction of the oven, was covered with a clay deposit (66). This was a levelling that was to prepare the surface for the building of a small utility building. Connected with its functioning is bulk 50 – a layer made up of organic remains accumulated in a short period of time. The primary structure of the layer was obliterated due to intense postdeposit processes, taking place beneath the sandy ballast 46 (access of oxygen and rainwater). The building functioned for around 20 years. Layer 50 represents a similar time period. Its ceiling was cut (49) before restructuring the space and deciding to create a small, paved courtyard (ballast 46), which functioned for around 25 years. After removing the pavement (44) the area was left open. This state prevailed for around 5 years. On the ceiling, there formed a layer (bulk 32), accompanying

a nearby building. A large amount of sandy fractions and clay, with a significant distribution of organic debris, allows to state that the accumulation process was slow. The researched area was hence a small courtyard of the property adjacent to the street.

The ceiling of layer 32 was taken off (cut 37). It is possible that alongside with ceiling 32, other layers were removed at the same time. In total 50 years 'disappeared'. After making this levelling, a clay layer was exposed (30). Above it, levelling sediment was found, made up of something similar to 30 thin clay layers, divided by lenses of organic remains. Apparently, the levelling process was slower (29). At a certain point, it was almost entirely suspended, as it is suggested by layer 28. At that time, the decision about stopping the levelling works was made and focusing on making a deep dig in (31), filled with deposit 29. After that, the previously started levelling was carried on (27). The ceiling of the levelling, as well as the wooden construction beneath it, was removed (cut 26). This decision was caused by the unstable ground (loose structure of filling 29).

The sequence of layers above is the proof of quick accumulation, connected to the functioning of a nearby building. The irregular surface of the ceiling layer is still caused by the deposition of filling 29. This is yet a further argument in favour of the quick accumulation of layers 25 and 24.

They formed a part of the levelling prepared to restructure the place, in which another utility building and the accompanying layer 22 appeared. Its ceiling was cut (20). Above it, there was another levelling layer (19). Its ceiling, along with the above layers, was cut (17). A new utility building emerged, which was accompanied with a slow accumulation process in the courtyard (bulk 15).

The construction element (16) is a small pillar, placed in the ceiling layer of the final phase of building use. The ceiling of the layer was levelled as a result of the decision to widen the street (cut 14) and arranging a stone pavement on sandy ballast (deposit 13). The period of functioning of this pavement ends with the works carried out to build an aqueduct (cut 8, deposit 9), which was covered with layer 7. Above it, there emerged another level of the street (4), which after several years, was removed again (cut 2).

Depositional history registered on a profile of the small trench

#### *The division into phases*

The division into phases and the proportional share of the layers in the stratigraphy (filled with colour) and levels (constructions) removed as a result of urban development. This scheme seems to prove the rule mentioned in the text, which considers 'stratigraphical gaps' as the basis of



stratigraphic analysis in urban surroundings (multi-layer). Modern urban archaeology differs from the pioneer works of the two scientists mentioned above. It is difficult to find archaeologists keen to research with enthusiasm and in accordance with the canons set by Harris and Baker. Archaeologists are busy with many difficult tasks, mainly being a part of planned investments. Hence, they are subject to a certain timeframe and cost estimates, in which their research has to be finalised. Research strategy is therefore chosen to suit the conditions imposed on archaeologists. In the past decade, a model of research has been introduced, in which the organizational efficiency of researchers is more important than the quality of research. This is true for urban archaeology in almost all countries. Rare exceptions only prove this rule. This study is based on the works of classics, but it is also possible to realize it in reality.

#### sco Legal framework

Theoretically, a legal framework for archaeological fieldwork, including historic spaces, is provided by the European Convention on the Protection of Archaeological Heritage (the Maltese Convention) of 16 January 1992, as well as national laws which usually refer to it. The Convention was ratified by 35 states. However, in practice, it are the internal legal regulations of each country that form the basis for all administrative and program decisions, despite often being in contradiction with European laws.

The Convention says:

Art. 3 of the European Convention: 'To preserve the archaeological heritage and guarantee the scientific significance of archaeological research work, each Party undertakes: I. to apply procedures for the authorisation and supervision of excavation and other archaeological activities in such a way as:

- a. to prevent any illicit excavation or removal of elements of the archaeological heritage;
- b. to ensure that archaeological excavations and prospecting are undertaken in a scientific manner (...);
- II. to ensure that excavations and other potentially destructive techniques are carried out only by qualified, specially authorised persons;
- III. to subject to specific prior authorisation, whenever foreseen by the domestic law of the State, the use of metal detectors and any other detection equipment or process for archaeological investigation.

#### sco Health and safety

Think about the risks that an archaeologist can face while carrying out research in an urban surrounding.

- > **Animation**
- > Exercise

A major obstacle for the archaeologist who carries out research within a historic town is not only a need to organise the examinations in the direct neighbourhood of the living urban infrastructure but also to carry out the exploration on a broad surface and to a considerable depth. While mentioning a necessity of conforming to health and safety issues in the course of research, I need to remind the reader that archaeologists who carry out research near electrical, gas, waterworks and sewage installations, near functioning traffic routes, and in the direct vicinity of buildings, are obliged to conform to relevant legal regulations of particular European countries. It must also be remembered that participants in excavations must be immunised against tetanus.

#### sco Terminology

Urban archaeology is effectively opposing the introduction of rigid research norms. One of the signs of this is the existing lack of a standardised terminology and different conceptualization of the used terms. This applies e.g. to the term 'layer'. Some people find this state embarrassing, while others see it to be the strength of urban archaeology. Nevertheless, the dominating position of the English school in the last twenty years of the 20th century caused the fact that most terms were defined and many urban archaeologists use them to this day. This is especially important considering the modern technological revolution. Using new documenting technologies in archaeology, such as close range photogrammetry, laser scans and computer systems of gathering and classifying data, will force archaeologists to change the research strategy. This will include the need to standardize research methods and terminology.

#### > Animation

Far-reaching freedom during research and the later analysis of its outcomes should not mean that archaeologists are not obliged to report their work in detail, including an explanation of used terms. Despite the fact that the meaning of terms such as stratigraphy, stratification, unit, layer, structure, object, construction, element, cut, interface, horizon, phase, settlement level, and others is widely known, it is useful for the researcher to define such concepts each time. This would allow hindering the dangerous situation, where from the same urban setting; a couple of studies emerge using the same concepts in different ways.

From the discussion about the meaning of basic terms in archaeology, it is useful to stop for a while when defining the term 'layer'. Despite the fact that in many studies this

word has been replaced by the term 'unit' (which I find to be a considerable achievement), it is useful to introduce the proposals for stratigraphic analysis based on Polish-Norwegian experiences.

### sco Basic definitions

Connect the keywords with their definitions.

#### > Animation

##### *Urban archaeology*

Research specialisation which makes use of archaeological methods for the purpose of examining the history of towns and urbanised spaces, as well as identifying urbanisation processes in their entire chronological dimension.

##### *Multi-layer archaeological sites*

Spaces with a defined extent. The stratigraphy of these spaces consists of a sequence of archaeological layers of diverse chronology and defined context.

##### *Stratification*

A process of origin of the layer composition of a site, consisting of a sequence of units of diverse origin.

##### *Stratigraphy*

An existent system of spatially defined units, which is recorded by the archaeologist. The units are divided into layer units, non-layer units (objects and constructions) and interfaces/cuts.

##### *Archaeological layer*

(based on the definition by M. B. Schiffer)

A defined and dynamic system which undergoes periodical processes of change. The system has two points of creation: a quantitative growth of components and the point of final growth. The latter closes the process of layer formation. The system then becomes a relic form and at the same time it is excluded from the set of elements of the living social-cultural system.

### sco Stratification units

Fill in the diagram and check the correctness of the answer.

#### > Animation

##### *Stratification units*

##### *Layer Units*

An introductory analysis of the contents and the structure of a given layer unit is to be done in the course of exploration in a multi-layer site. This analysis should result in a decision on to which of the three types the examined unit belongs. Thanks to the use of types of layers it is possible to eliminate the ambiguous term 'layer' from the description of stratification processes.

##### *Deposits*

A spatially defined unit with homogeneous or mixed composition. The unit is distinguished by its stratigraphical context, physical features and cultural contents. It originates in result of an activity or occurrence of homogeneous nature.

##### *Sediment*

A continuous sequence of identifiable deposits. These deposits resulted from repetitive activities or series of subsequent activities which took place in the same spatially defined place and which were conditioned with a similar cause. A separation of a sediment results therefore from an interpretive process by which two or more connected deposits are grouped together into a single cultural unit. In order to distinguish between types of sediments, it is worth introducing three types of sediments into archaeological records, depending on the legibility of their structure:

- > Evident (clear, laminar structure)
- > Certain (disturbed structure)
- > Unclear (unified structure, e.g., fills of latrines)

##### *Bulk*

A spatially defined unit which is distinguished by its stratigraphical context, its physical features and its cultural contents. Its original nature is impossible to define.

##### *Non-layer (object) units*

##### *Object*

A feature which originates in result of a planned human activity and which is supposed to fulfil a given function. It consists of at least two units of different nature (e.g., layer unit + interface).

##### *Element*

A unit which is distinguished by its structure and material, and located in a constructional position. It is part of a spatially defined system and it constitutes integral part of a construction.

##### *Set of elements*

A group of elements which is spatially defined and which is distinguished by its context and material. The elements are mutually dependant in a direct, constructional and functional way.

##### *Construction*

A group of elements or sets which is spatially defined and distinguished by its context and material. The elements are mutually dependant in a direct, constructional and functional way and the construction forms a functionally closed entirety.



### sco Units of stratigraphical analysis

Connect the keywords with their definitions.

#### > Animation

##### *Unit*

Each unit (layer unit or object unit) which was separated by the archaeologist and which was provided with an individual identification number.

##### *Horizon*

A defined unit of stratification or a set of chronologically convergent units which are in a direct stratigraphical relation or which are spatially dependent on one another. This unit or set corresponds to defined stratigraphical events.

##### *Settlement level*

A horizon or a set of horizons which are directly related to other units in the site in stratigraphical and chronological terms. This relation, however, is not necessarily of functional nature.

##### *Phase*

A unit or a series of stratigraphical units being a testimony to a planned, carried out and completed idea of organisation and functioning of a given space. This idea had its beginning and the resulting organisation and functioning lasted until a given activity was stopped or was subject to destruction. The latter implied a need for structural and spatial changes within the new space.

The problem with terminology that is used when writing down the outcomes of excavation works is open and constantly evolving. It is enough to compare the content of publications of the leading theoreticians of excavation methodology in the past several years. From the most commonly used 'layer', through 'stratum', 'unit', 'feature', recently, the term 'context' is increasingly popular. In each of these cases, the terminology was strictly connected to the concrete research methods and documenting strategies. Currently, the expression advocated by British scientists is the 'single layer context' rule. The set of terms presented is not to undermine the legitimacy of existing arrangements. It is to provoke discussion and prepare ground for new terminology, which, sooner or later, will change the existing fieldwork methods and systems of documentation. It is hence important to inform those dealing with the same problems, that both research methods and the used terminology should be a creative process. At the same time, it is crucial to maintain a precise description of the techniques used during excavations and the ways of transcribing its outcomes.

### sco Analysis of the sample section

The basic step in a proper recognition of the nature of stratigraphic unit is by analysis of the sample section. It is only by looking at its texture, the archaeologist is in a position to recognize and document its laminar structure, internal composition and integration of elements making up the layer. There is a number of simple procedures making possible to define the pace and character of accumulation, themselves characterizing deposition and post-depositional processes.

> Exercise: Connect the photos with their definitions

### sco Characteristics of stratigraphy of urban sites

The main reason for a considerable complexity of stratigraphy of most urban sites and a considerable dynamics of their stratification processes were constant changes in the buildings' structure and in the pace of growth of layers (chiefly waste layers). In many cases, especially in cities distant in the time of their existence, such changes were connected to a full restructuring of the urban surroundings, a change in the style and manner of using urban spaces. All this influences the fact that the thickness of archaeological layers, in multiple cases exceeds many meters. This process of stratification created multi-layered, culturally diverse archaeological sites. In the case of middle ages cities, the rapid growth in the quantity of waste and the impossibility of their current utilisation had two main consequences. It was due to this process that a vast majority of areas within historic towns (usually of medieval origin) are multi-layer sites. Furthermore, in most cases these layers are filled with organic material. This is because the pace of accumulation and the resulting permanent humid environment created anaerobic conditions. These preserved the contents of layer units in an almost unchanged condition, including items of everyday use and construction elements of buildings.

Furthermore, one must bear in mind frequent restructuring of urban buildings, both at a local scale and within the entire town, which resulted from modernisation, local fires or conflagrations of entire towns, planned changes in the spatial layout of a town, fortification works or similar activities. Due to these, layers which make up historic contents of the examined site are often found in secondary deposits. They therefore render the interpretation of archaeological discoveries additionally difficult. This should be taken into consideration when creating proper working conditions for archaeologists, as it is accuracy that should be the essence of archaeological research in towns. This is due to the fact that researchers working in towns usually examine structures

whose history is known in broad terms. It most cases it must be completed with detailed information.

> **Animation**

The 'truth' about each archaeological layer can be found from its content and structure. The complementation of this information is the context, in which it was found. The basic task of an archaeologist during excavations is hence recording all possible physical characteristics of the unit under study. The outcome of the analysis is the only way to identify the character and define the layer (deposit, stratum, bulk), as well as exposing its role in the process of stratification (establishing the category: continuity, disturbance and destruction). The next phases of analysis complement each other, showing forms of dependency typical for the processes (depositional and postdepositional) of the layer types. This complex, but based on simple tests and steps, process, becomes a part of the scientific description of each of the researched layers. It is crucial for a full understanding of the dynamics and details accompanying stratification processes. It is the quintessence of urban archaeology sites and it provides a descriptive complementation of the archaeological 'single layer context' rule.

Eliminating or limiting the scope of detailed analysis and description of all layers, just as making intuitive selections of units is a threat to the value of the excavation works.

Modern urban archaeology is usually realized in the form of rescue research, based mainly on evaluating the relations of space and context. The latter relates to the relations between layer units and objects (between a group of dynamic units, layers and static – constructions). It is important to mention that an experienced researcher, with a sensible budget, allowing the possibility of developing interdisciplinary studies, is able to maintain research precision based on general arrangements, basing on spatial analyses of the site. It is therefore up to the archaeologist (and his responsibility) to choose the appropriate research methods. We must keep in mind that the essence of detailed research is the evaluation of the dynamics of the processes taking place in each settlement horizon. In the case of rescue research, the archaeologist is forced to shift these evaluations into a more general level, concerning settlement levels and phases.

New terminology, especially that distinguishing between layer types, forces the archaeologist to analyze each of them in detail during the excavations. For some, these are simple and quick steps, while for others they are complicated and time-consuming. This process can take place on the excavation site, during the explorations, or outside of

the site, while analysing the drawn sample (micro-exploration). The second method is especially useful for research on organic layers. Thanks to such in-depth observations, it is possible to state if the researched layer is a primary deposit, or a translocated unit. This information is fundamental for the analysis of the stratification process. It allows deciding on the time-schedule of the works (since primary deposits require different methods of exploration). It is also a way of preparing a defined, broad-context plan of the findings, which is especially important when using documenting methods such as photogrammetry and laser scans. Such methods enable a time-saving and effective way of conducting research. Moreover, a detailed description of the physical characteristics of the layers proves to be the best method for the later monitoring of the layers being in close proximity to the excavation site. The best example for this are the works carried out by archaeologists in Bergen.

> sco Exercise

> sco Exercise

→ **LU Selected elements of research strategy**  
by *Andrzej Gofembnik*

**sco Research strategy**

Archaeological research within living towns usually takes place as rescue excavation. This term refers to a scholarly procedure where not everything depends on the researcher's will. Three key issues remain outside his or her decision: the selection of place, the duration of examinations and the financial framework of research. It is the form of research that forces the archaeologist to decide on a strategy which would match imposed conditions. In many cases it leads to improvisation or simplifications, with both of them being detrimental in archaeology. Another form of urban archaeology, which is far more dangerous, is a so-called watching brief. This is an attempt at limiting the participation of the archaeologist and reducing his or her role to a mere observer of ground works being carried out. Such activities drastically reduce cognitive opportunities. They are deprived of scholarly features and in consequence they reduce the value of offered conclusions. Such methods should be used in emergency only and for works in small areas. It must be underlined, however, that this recently widespread form of participation of the archaeologist in ground works in historic towns is contrary to the rules of the Maltese Convention.

### sco Pre-excavation research

#### *Pre-excavation research*

An efficient completion of archaeological research in a town requires a consistency in activities and a strict observance of procedures. The first duty of the archeologist is to gather knowledge about the place where excavations will be carried out. On the one hand, conditions of excavation works and the required extent of future research are defined in the administrative decision of the Conservator who gives a permit to carry out the research. On the other hand, an efficient completion of future works depends to a great degree on the archaeologist's own activity. It is his or her duty to gather a possibly comprehensive knowledge on the history of the place of future research. All acquired information should help decide on the research strategy and support the efficient completion of research, including a preparation of a project cost estimate. Tasks of the research director include: to make (acquire) a land survey plan of the examined area with the present urban underground infrastructure; to examine historical sources and to analyse existing maps; to identify the state of research on the area where the excavations will be carried out; to check its geological and hydro-geological conditions; to identify the structure of layers and the compactness of soil; to examine the state of preservation of archaeological contents and the depth of their deposition. They also include introducing the basis of the proposed research strategy and describing the used terminology

#### *Non-invasive examinations*

Non-invasive examinations are of secondary importance in urban spaces. They may help in deciding on a proper strategy while examining broad surfaces which are not built-up. In such cases these examinations may chiefly consist of test drills and geophysical survey. Among the latter, resistivity survey and ground-penetrating radar survey are still most commonly used in open urban spaces. Both methods bear a risk of error, chiefly due to the presence of rubble layers and underground urban infrastructure. In the cases of dense urban building network aerial prospection may be of equally minor importance. Analogously to field surveys, it can be successfully applied only for examinations of building-free areas of towns.

### sco To fence or not to fence?

Try to answer the following question: Is it useful to fence the excavation site in urban surroundings?

#### > *Animation*

Yes

Archaeological research, carried out in cities, is visible to the eyes of almost all of its inhabitants. Due to health and

safety regulations, the investment organisers usually fence the excavation site. In many cases however, this is not the only reason for the existence of such fences. Common causes for closing the excavation site are the conditions, in which the research is being conducted. This is not a healthy practice.

No

Properly conducted research should have its scientific and social dimensions. The best way of making research public is opening it to a wider audience. In many cases, the excavation site is opened for visitors only in a set period of time. This is a sensible way of approaching the role that the archaeologist has, and the best way of making scientific research more popular in an educational way. It would therefore be good, if this became commonplace.

### sco Localisation of examined places and measurement works

The easiest way to describe a localisation of a place of examinations is a system based on an arbitrary division of the urban space. Lines of the land survey grid are the basis for the localisation of trenches. These lines make up squares (marked with symbols) within which the examined space is recorded. Apart from the symbols of squares and land survey coordinates, the name of the examined place is defined by its catalogue number and its postal address. This method sets up a complex, two-stage localisation of the examined place: a permanent one (based on the grid) and a temporary one, based on the current postal address. The added individual catalogue number of the place (indispensable for archiving purposes), becomes the main determinant of the research activity. The main element of the research strategy is to adopt one of two ways of managing the space under examinations. Basically, two ways may be chosen: the open-area one, which encompasses the entire examined surface at the same time (most common, preferred by English researchers), and the sectional one, when the examined space is divided into smaller sections by the archaeologist (popular in Scandinavia). The choice of one of these two ways depends on numerous factors. The most important ones are: personal preferences and character of the archaeologists, who draws (or not) conclusions based on series of internal sections, working conditions and the degree of complexity of the stratigraphy of the site. It is important to mention that archaeologists value the freedom to choose their own research methods and ways of documenting their findings. This is because their main objective should be the reliability of their research, not the spatial organisation of the excavations.

### > Animation

#### *Open-area examinations*

Open-area examinations consist of opening and exploring the entire space, which is available for archaeologists at the same time. This type of examinations is the most popular way to manage urban excavations. This particularly concerns areas with dense historic building. It allows a global perspective, which tackles the problems of spatial planning, the relations between open complexes, controlling the context, and defining its character and function. It will nevertheless be recalled that the lack of internal divisions which facilitate the interpretation of local stratigraphical complexities, bears the risk of interpretation simplifications. The main advantage of the open-area method with no internal divisions is a spectacular image of excavation works. This method eases organization problems, mainly when it comes to moving around the site, carrying out measurements, simplifying earth disposal, and the possibility of making visual documentation (overhead photography). It must be admitted that examinations which are efficiently done in this way, provide the researchers with a unique opportunity of global thinking. This is why this method is recommended for experienced archaeologists. It is a method mainly used in England; however it is becoming increasingly popular in other countries as well.

#### *Open-area examinations with an internal division*

Based on practical experience of numerous archaeologists carrying out their excavations in broad surface complex urban sites, it can be said that an internal division of the site is indispensable to secure control over the course of works. This method, widely used in Scandinavia in the past century, is still very useful. The basis of this method is dividing the excavation space with a measuring grid. It is also possible to divide the space according to the spatial arrangement of buildings on the site. In both cases, the aim is to gain additional sections and enable efficient organisation, by establishing a couple of cooperating groups of researchers. Providing the participants in the open-area examinations with a division of the area into permanent measurement and recording units forces them to adapt a disciplined way of work. On the one hand, an established surface (e.g., a half of the area) is large enough to secure an opportunity to make valuable scholarly observations. On the other hand, it is small enough to enable the excavation director to control the progress of work. In practical terms, it not only means a division into sections but also a competence division within the team. This supports the internal organisation of works. The internal division of the site enables one to control, verify

and compare, as well as facilitates further activities when attempting at changing the strategy.

#### *Multi-stage examinations with an internal division*

In the case of the lack of experience or the presence of particularly complex systems it is acceptable to divide the area of examinations into smaller sectors and to explore it, e.g., within a chessboard system. In this case the spectacular way of recording the open area gives way to the accuracy of research. The opportunity to immediately verify the research results is an advantage of this way; furthermore, it is considerably easy to correct errors, chiefly due to the network of sections. The lack of opportunity of global thinking deprives the field documentation of the element of introductory synthesis. This, however, can be successfully done after the entire documentation is put together. This way of examinations proves useful in an open area with a complex stratigraphy. It is the least popular research method in urban archaeology. It is useful to its detailed nature, but difficult in putting to life in modern conditions.

#### *Role of sections*

A system of internal sections has always been important in archaeological study and is highly recommended for research on complex issues. These may be standing sections (used, e.g., in the 'chessboard' method), or temporary cumulative sections. The latter are mainly used in the cases of excavations based on the horizontal excavation principle. One may therefore create a network of sections along the lines of the grid system in the area of the examined site. The sections may also be created ad hoc, in order to decide on a current issue. Sections are especially recommended for objects of complex multi-layer stratigraphy, where the cross sections method is particularly useful. Sections are set up depending on interpretation needs. The presence of sections enables one to exercise full control over the course of recording and interpreting of stratification processes. On the other hand, their presence in the examined area renders a spatial analysis of discoveries difficult; furthermore, it disturbs their spectacular view. Therefore, should this method be used in modern urban archaeology? This decision lies with the archaeologist himself. The presence of sections should result from a sound compromise, with the principle of scholarly accuracy being in the forefront. It is not true that only a proper horizontal excavation secures a proper identification of complexities of stratification processes. It cannot be held for true, either, that a section records all the possible relations between identified units.

#### *Principles of using the measurement grid*

Lines of a measurement grid in an archaeological site have,

until recently, been the basis for all documentation works. Sir Mortimer Wheeler and Kathleen Kenyon are considered to be the inventors of the grid square system. As a rule, these lines should be a detailed development of the localisation grid and, as in the case of the latter, they should be based on land survey coordinates. It is recommended to use the grid lines which are referred to with full coordinate values. A grid which is set up this way should be stabilised outside the edges of research trenches. A local grid with no land survey coordinates should not be used in urban archaeology. The role of documentation measurement networks has presently been reduced by the more and more widespread use of total stations.

#### *Elevation measurements*

Elevation measurements should be done in reference to a level value of a state benchmark. The benchmark should be situated in a safe place, outside the area of excavation works. Its position and its absolute value should be marked on a situation plan of the site. Temporary benchmarks are used in the course of examinations. Their values must be recorded in the excavation journal.

### **sco Remaining elements of strategy research**

#### > **Animation**

##### *Selection of specialists from other fields*

It is at almost every occasion that theoreticians of urban archaeology underline the manifoldness of conducted research. In their opinion the research develops in two basic directions: a spatial and a social one. Due to the complexity of research issues, this situates urban archaeology at the touch point of many branches of scholarship. A recommendation for interdisciplinary cooperation already at the introductory stage is commonly stressed. A requirement of field cooperation and a need to confront the results of excavations with opinions of specialists from other fields at the stage of conclusions must also be stressed. If understood this way, this necessity requires everyone to undertake particular organisation effort; to enforce high standards of excavation works; and to ensure high qualifications of archaeologists. Furthermore, it demands considerable financial expenses and necessary time for research.

##### *Mechanical equipment in archaeological sites*

There is no doubt that the pace of work resulting from the pressure put by developers is a problem for archaeology. In result of this, the presence of mechanical equipment in archaeological sites is more and more widespread. The presence of mechanical excavators in urban sites has been a common feature in Europe. As this misfortune occurred

and the mechanical equipment is part of today's reality, every effort must be made to ensure its fully controlled use in the area of archaeological examinations. This problem has not been solved so far and it must be said that the mechanical equipment may be used only to remove present-day soil overburden and modern period rubble.

#### *Organisation of research discipline*

A crucial element of the strategy of field examination is to define and to rigorously observe rules of carrying out excavation works. This concerns both general organisation affairs and particular solutions concerning exploration, the way of preparing documentation and collecting finds. All this should be put together into a transparent organisation scheme of works. An expedition should have several copies of such an instruction, which is a collection of principles to be observed in the course of works. This instruction should contain information on: the principles of the internal division of the site, a valid measurement system together with the coordinates of the main lines, as well as the location and the elevation of the benchmark. It should also include a set of definitions of basic terms used to describe and interpret the processes of stratification and to analyse the stratigraphy of the examined site; a template and an explanation of principles of preparing descriptive documentation; a template and an explanation of principles of preparing drawing documentation. Furthermore, a system of collecting, storing and labelling of finds must be included.

- > sco Exercise
- > sco Exercise

### → **LU Research procedures** *by Andrzej Gotembnik*

#### **sco Exploration**

##### > **Animation**

##### *Stratigraphical exploration*

Exploration is the main research activity undertaken in the course of excavation works. This term includes a set of mechanical activities related to: the examination of the extent, the composition and the nature of examined units of stratification; the collection of finds; taking of necessary samples; physical removing of all these outside the examined area. After a many years' discussion, started at the beginning of the last quarter of the 20th c. by the English archaeologist E. C. Harris, it was concluded that the method of stratigraphical exploration should be mandatory in multi-layer sites. This method consists in removing all the layer units of stratification and part of object units in

the reverse order from their chronological sequence. In other words, this method relies on the principle of removing the stratification units from the latest to the earliest one. This method is presently considered as the most appropriate way of examination of multi-layer sites. Its application raises the rank of exploration, thus making it scholarly activity. The search for the extent of separated units and attempts at defining their context secure a basis for more in-depth analyses of topographic changes. These analyses are the main component of spatial reconstructions of the examined site done by archaeologists. The principle of stratigraphical exploration has profoundly changed not only research strategies and forms of prepared documentation but also the way of summarising the research results.

#### *Exploration using arbitrary layers*

This is a traditional way of doing excavation works. It corresponds to the previous research strategy, which was based on simplified forms of documentation. In present-day urban archaeology this method is acceptable only for a conscious division of such layers whose thickness and structure render another division impossible. A decision to use this method of exploration may result from practical reasons only. At the present stage of development of methods of urban archaeology this method is not considered scholarly.

### **sco Separation of stratigraphical units**

#### > **Animation**

##### *Separation of stratigraphical units*

One of the main tasks of archaeologists who carry out excavations using the stratigraphical exploration method is to separate stratigraphical units. The effort of archaeologists aims at plastically preparing the top of a unit and defining the boundaries of its extent. This task requires knowledge on basic physical properties of explored layer units. Furthermore, experience is necessary in order to draw proper conclusions on the ongoing basis. It must be remembered that an improper use of the stratigraphical method can inflict damage which is difficult to redress. A proper final result is also influenced by an appropriate choice of work tools and by the pace of work which is imposed on archaeologists. The repertoire of 'digging' techniques comprises numerous ways of controlling the process of exploration. These depend on the competence and personal preferences of archaeologists. Least skilled archaeologists are recommended to use local vertical cuts. Detailed observations must be accompanied with a topographic reflection and a full understanding of the context.

This must be borne in mind in order to eliminate the factor of subjectivism (which accompanies the method) and a natural reflex to deal with the problem as soon as possible. The latter is particularly important in the circumstances of pressure, which is so often put on archaeologists. In order to secure a proper documentation order, each identified unit must be provided with an individual symbol (number). It is recommended to use an ongoing inventory, with a distinction between layer and object units (cf. definitions: deposit, sediment, stratum, interface/cut, object, construction element, construction set, construction).

#### *Principles of separation of layer units*

Controlling the work of explorators is the duty of the archaeologist who supervises the progress of works in the archaeological trench. If the examination is done properly, a decision on the extent of layer units is a resultant of data acquired during mechanical exploration activity and of the knowledge of the person responsible for recording the sequence of units, including the context and all topographic conditions which accompany stratification processes. Practically, this two- or often three-stage system of making decisions increases their credibility.

Another important task of the archaeologist who makes final decisions is to determine the detailedness of separations being done. One of rudimentary features of stratigraphy of urban sites are traces of recurrence of occurrences and activities which make up a process of 'layer' making. This fact is a reason for a separation of three types of layer units. This provides the archaeologist with an opportunity to combine deposits into a unit with a compound (usually laminar) structure. This means that the process of separating layer units must be done in parallel with activities aimed at preparing their comprehensive characteristics. Principle of analysis and recording of the contents of layer units

Defining a full extent of each examined unit of stratification (both horizontally and vertically) and attempting at offering its comprehensive description and definition are part of proper exploration. With regard to that, the archaeologist's duties include: to determine the material contents of a unit; to identify and define its physical properties; to identify the mechanisms of accumulation; and finally to specify mechanical and natural factors responsible for post-deposition processes. These analyses should result in a decision of assigning the examined unit to one of three categories of layer units (as described above). The last stage of the analysis is to determine the original nature and characteristics of the unit.

#### *Principles of identifying the contents of layer units*

Identifying the contents of a stratification unit seems to be the easiest task. Analogously to all remarkable features of 'layers,' the degree of identification depends on their state of preservation. Basic data on this are also acquired during the exploration and simple supplementary tests (e.g., sieving on geological sieves). The contents of a layer unit may be homogeneous or heterogeneous and they may consist of various combinations of organic and mineral components as well as relics. Sieving a sample of a layer and dividing its contents into groups (depending on their size) enables the researcher to identify considerable part of them and to approximately assess their proportion. It also provides one with an opportunity to determine the degree of humification of organic remains.

#### *Identification of physical features of layer units*

As a routine, the colour is one of remarkable features of layers that should be identified (it is done in a descriptive manner or using a catalogue code, e.g., according to A.H. Munsell's classification). At this occasion, many researchers attempt at identifying the degree of the colour change. This is a good test for chemical reactivity of a unit. The most important task, however, is to determine its other physical features, the degree of compactness and cohesion of its components as well as its structure. Elasticity is another feature which is worth identifying and which helps in determining the pace of accumulation. This feature, analogously to the previous ones, is easy to identify provided that exploration is done carefully and that simple tests on taken samples are applied. Such tests may include, e.g., breaking, crushing, squeezing, twisting, rolling, etc. These may be supplemented with results of chemical analyses using simple pedological sets. The identification of physical features already at the stage of field examinations provides the archaeologist with a basis for a trustworthy identification of the type of the examined stratification unit (a deposit, a sediment, a stratum – compare with the chapter on definitions).

#### *Identifications of categories of layer units*

The next aim of analyses being carried out during field examinations is to assign examined units to one of three stratification categories: continuity, disturbance or destruction. As a consequence, this enables the archaeologist to divide units into these in situ and those which were in a secondary deposit. This stage of the stratigraphical analysis is no doubt useful, e.g., for a more comprehensive under-

standing of the stratification process and for a proper evaluation of finds discovered during the exploration. This state consists in putting together and analysing all the acquired features. The following rudimentary features are the most useful for identifying the category of layer units: the topography of the layer's top (a degree of intermingling of the top and the bottom of neighbouring units), the degree of lamination, the position, the state of preservation and the degree of overlapping of components which make up their contents. Each identified feature of a unit is nevertheless significant for the value of conclusions. This is because a decisive role in their final list may be played by a potentially least important one. A preparation of such a list is anyway a complex task.

#### *Attempt at identifying the original nature of a layer unit*

A complete identification of features of a layer unit, that is, an attempt at identifying its original nature is a resultant of all the physical features (as determined in the course of examination of physical features), their cultural contents and the results of all intermediate analyses. An appropriate identification of the contents (including relations between layer units and object units) no doubts supports the archaeologist in his or her attempts at reconstructing the stratification process. It is a good habit to secure the cooperation of an architect (when attempting at identifying relations between layer units and object units) and a botanist (when describing and analysing the contents and the nature of layer units).

#### **sco Role of cuts/interfaces in the stratigraphical analysis**

The notion of cuts/interfaces was introduced into archaeology by E. C. Harris. At present it is difficult to imagine any serious archaeological excavation without using this category of stratification units. While attempting at discussing the question of cuts/interfaces and their role in the stratigraphical analysis it is worth stressing again that only part of originally deposited layers survived in historic towns. This is obviously due to stratification processes. The principal task of the stratigraphical analysis is therefore to first identify places where an interruption or a disturbance of continuity of the stratification process occurred. An identification of such a place (let us call it a 'stratigraphical gap') is a confirmation of a past occurrence which resulted in a formation of a final stratification system. It is the trace of such an activity, which is notable only as a touch line (or plan) between units, that must be provided with an individual number in the course of work and must be consid-

ered as an essential element of reconstructed history. In this system, an interface is rather understood as the term 'cut,' or a proof for a conscious, dynamic activity. This activity results in a change of the original sequence of units. In the case of layer units these may be horizontal lines (testimonies to levelling) and vertical lines (testimonies to digging in).

All the afore-mentioned remarks concern relations between object units. An interface is a trace of an interference in the original structure of a construction. This interference results in disassemblage or rebuilding of the construction and as such it must be subject to the same rigorous documentation procedures.

#### sco Identification of object units of stratification

According to definitions used in this paper, the list of object units comprises: an object, a construction element, a set of elements and a construction. They are all subject to the same principle of being provided with individual numbers and being situated in a proper location in the stratification process (and in the inventory of units). It must be remembered that a compound construction (as in the case of each 'layer') has its internal stratigraphy. In this case, however, it is possible to identify almost each element of such a construction (as opposed to 'layers'). This poses a dilemma for the archaeologist (or an architect) concerning how to determine the number of elements which must be recorded. No-one will provide, e.g., each brick in a wall with a unit number. The archaeologist who analyses the structure of a wall consciously puts elements into groups. In this way, he or she defines sets of elements and provides them with a common construction or functional feature. Based on this, such a set is given one identification number. On the other hand, such an individual number may also be given to a single element. This occurs in cases considered relevant for the process of building, provided that a position (or a feature) of this element played a significant and definable role in the construction process. This means, however, that constructions (as opposed to 'layers') may be divided into several individual numbers and then they may be grouped again into units. Such units are provided with one number which refers to the entire construction. This is why such a construction becomes an independent and permanent being. In most cases it undergoes a separate (architectural) analysis. This permanence and usually a considerable cubic capacity render a construction an important element of history of the examined site. It must also be remembered that the marvel of archaeology consists in the fact that in numerous cases it is a narrow layer or a small single find that become the most important discoveries of examinations. Such discoveries change hitherto ideas of historians.

#### > Animation

- > List of building units
- > Object
- > Sonstruction element
- > Set of elements
- > Construction

#### sco Wooden architecture in urban sites

##### > Animation

###### *Open-area examination*

One of the most difficult methodical problems of urban archaeology is the way of examination of settlement levels which contain remains of wooden constructions. Although the same principles of exploration are valid, this stage of research is usually one of the most difficult ones. This is because of manifoldness of analyses which are carried out in the trench. This usually concerns earlier levels, that is, levels which are usually least known. A remarkable feature of the stratigraphy of such levels is the dynamics of stratification processes. It is related not only to the rapid process of layer accumulation, but also to frequent reconstructions of wooden architecture. Frequent changes of the spatial organisations were in most cases related to profound topographic regulations. In their course parts of layers were removed, and other ones were relocated. Yet other ones originated as by-products of building processes, and the remaining ones were intentionally placed for the purpose of construction. This dynamic beginning evolved into static duration of erected constructions. Processes of rapid layer accumulation and frequent levelling took place around them. The main task of the archaeologist who is responsible for examination of these processes is first of all to determine the nature of such layers (a complete analysis of contents and structure). One then defines relations between layer units and elements of constructions (and entire constructions). Eventually, one undertakes a complete analysis of the examined construction

###### *Open-area examination with an internal division*

A latrine (often being an old well) is a typical usage construction that is discovered in most urban sites. In most cases it is a wooden construction, which often originally fulfilled a function of a well. Archaeologists consider the exploration of such objects to be important, due to the contents and properties of fills. An opportunity to explore the interior of a latrine is a fascinating task. It both yields finds in excellent condition of preservation and a great bulk of material for further analyses. The problem is,



however, that this task is both dangerous and methodically complex. Namely, a latrine fill is a sediment which cannot be explored in a stratigraphical manner. Removal of the fill can therefore be done in a 'freestyle' manner, with an observation of strict safety rules. The location of found items should be recorded either individually or within arbitrary layers. At this occasion it must be remembered that latrines were objects which were frequently emptied. It was part of the executioner's duties in medieval towns.

#### *Multi-stage examinations with an internal division*

Numerous wooden constructions are exposed in the course of excavation examinations of the earliest settlement levels (in most European towns). In most cases these constructions are remains of buildings of various kind. In the course of time, masonry houses appeared in the front parts of plots in most towns. Wooden constructions, which fulfilled household functions, were usually built in the backyards. In result of both dynamics of stratification processes and profound topographical changes only bottom parts of such constructions survived. It is in few cases only that walls survived higher than the lintel board. Constructions of walls with surviving full-size door openings are unique discoveries.

Examinations of wooden constructions and their stratigraphical contexts are among the most interesting stages of field examinations. This is due to their broad research spectrum, which usually consists of a legible spatial layout, supplemented (in most cases) with well-preserved contents of organic layers. It is because of the amount of available information, manifoldness of finds and even particular colour and smell of examined constructions and layers that there is no other specialisation in archaeology where a researcher would be so close to the past inhabitants. It is therefore no surprise that examinations of this part of urban stratigraphy trigger most inventiveness. Settlement levels with wooden constructions yield the most numerous and diversified assemblages of artefacts. Furthermore, most samples are taken and the number of separated stratification units is usually the highest there.

#### *Role of sections*

Another type of problems is encountered while exposing open-area surface constructions, such as pavements or paddings. Archaeologists usually enjoy their presence in the trench. Such constructs bring order into the examined area and they offer a chance of referring various sections of examined space to a common level. On the other hand,

they also pose difficulties. Particular care is necessary while working with wooden paddings. This is mainly due to departures from the law of superposition

#### *Principles of using the measurement grid*

Archaeological excavations are by nature destructive examinations. Conservation issues therefore become the main dilemma in the course of excavation examinations and are difficult to cope with. This particularly refers to exposed wooden constructions. Wood which is in most cases moist, loses its properties within a few hours after the exposure. Rapid evaporation irreversibly destroys its original structure. Although there are procedures which can slow down the pace of destruction, they are unable to stop it completely. This remark concerns all the species of wood, although to a various degree. This is why in most cases exposed elements of wooden constructions are subject to destruction. It is only few and best preserved objects which are most valuable for research that undergo conservation. Is this good practice? No. There is, regrettably, no other choice, due to the number of exposed construction elements, potential conservation costs and difficulties with finding proper storage space. What remains to be done by archaeologists is to prepare exhaustive documentation of exposed objects. New photogrammetrical technologies and an opportunity to make 3D models of exposed structures can prove useful here.

#### **sco Research on masonry architecture**

##### > *Animation*

##### *Masonry architecture*

##### *Research on masonry architecture*

A presence of large-scale masonry architecture in the archaeological trench has decisive impact on the way of doing research. A network of foundations or cellar rooms naturally limits an opportunity of arbitrary divisions and imposes a division system which results from positions of particular constructions. For this kind of research, a system of open-area examinations can be fully used. If complex constructions are discovered, it is a good habit to invite an architect to cooperate.

##### *Separation*

##### *Separation of stratification units*

Each construction, be it wooden or masonry, has its own internal 'stratigraphy.' In other words, each element of the

construction appeared in its body in a certain sequence. In theory, this sequence is possible to define. This does not make much sense in the case of masonry constructions. Researchers therefore concentrate on identifying sets of elements, which constitute a 'phase' of a building. The phase is provided with an individual number, analogously to an object interface, which marks the line of division between subsequent phases. It depends on the researcher's experience and research preferences how many individual numbers will be assigned to the examined construction. It is recommended to assign as many as possible.

#### *Defining*

##### *Defining a rudimentary stratigraphical relation*

As opposed to wooden constructions, remains of masonry structures (chiefly foundations and cellars) survive for much longer in the urban space. These are accompanied with numerous layers, which origin in the vicinity of a building at various stages of its history. It depends on the experience of the researchers and the conditions of work whether all of them are assigned to proper episodes. The main task of the archaeologist is to find and properly document the moment of the beginning of building works. In most cases it is a fairly easy task and it is usually limited to identification of the level from which the foundation ditch was dug out. The next step is to assign numbers to the boundary of the ditch (i.e., the cut) and its fill and to place them in the stratigraphical scheme of the examined site.

#### *Determination*

##### *Determination of relation between layer units and the construction*

Determination of stratigraphical relations between layer units and the construction is done in two research spaces: inside and outside the construction. As a rule, especially in the case of examination of cellar rooms, layers with the same chronology can be found on different levels. This obvious impediment opens another field of complex stratigraphical correlations for the archaeologist. As a rule, it is the layer sequence of the interior that is more important for examinations of the construction's history. In order to secure proper research accuracy and documentation it is recommended to set up control sections. Outside, padings and pavements are the most important units with a direct contact.

#### *Conservation issues*

#### *Conservation issues*

As opposed to wooden constructions, buildings and associated objects which are made of bricks or stone receive more conservation care, although these are usually later and more common. This results, however, not from their historic value, but from practical reasons. Decisive arguments are the following: durability of material, lower costs of conservation and later maintenance as well as the opportunity to use historic walls in new architecture. This does not mean that all masonry constructions that are exposed by archaeologists are subject to strict protection. Practically, considerable part of them, especially those of later origin and minor historical value, are removed from the area of excavation with the consent of heritage protection services.

#### **sco Urban archaeology – 'step by step' of the archaeological research**

- > **Animation**
- > sco Exercises

→ **LU Principles of gathering of relics** by Andrzej Gofembnik

#### **sco Monuments and properties**

- > **Animation**

##### *Labelling and listing of artifacts*

Tens of thousands of tiny items are being found during urban excavations. Each find which belongs to a given unit must be provided with a label. The label must state the location and the time of extraction of an assembly (or a single find) and its nearest context. This procedure is indispensable for this part of the team who simultaneously wash, catalogue and record finds in the inventory. These procedures seem to be necessary, due to a considerable number of finds and a necessity of ongoing tracing of stratigraphical complexities. They provide excavation directors with an chance for an introductory assessment of discovered artefacts. When the listing is complete and the introductory assessment is done, assemblages of finds should be packed and stored in storage spaces.

#### *Conservation issues*

Almost every archaeologist enjoys great numbers of acquired finds. This, however, is not shared by museum employees who are responsible for storage of discovered items. Assemblages of artefacts from urban excavations are

on the one hand tons of pottery and animal bones. On the other hand, there is a considerable amount of unique finds. Some of these are made of organic material, which requires complex conservation treatment. Mass presence of movable finds is a perennial component of urban research. It is also a perennial problem – what can one do with thousands of tiny leather scraps, gathered from a single ‘layer’ only? There is no decisive answer to this in archaeology. In theory, each discovered item should be listed. On the other hand, there are groups of finds which will never undergo individual assessment, such as the afore-mentioned thousands of tiny leather scraps. What to do with these? Archaeology knows cases when such finds were counted, conclusions were noted and then the finds were buried again in a marked place.

#### *Sampling*

Taking samples for specialist examinations should not pose a problem. A specialist who cooperates with the archaeologist should be responsible for selecting the location, the number and the size of samples. The only problem which may be difficult to solve by the archaeologist is to secure a research budget which would be high enough to enable such analyses. Despite the fact that the list of specialisations useful for archaeological analyses is getting longer and longer, it is obvious that they are very important for the final outcome of the research process. There are three types of such analyses: those enhancing the precision of dating the findings, those complementing environmental knowledge, and those allowing a better understanding of various technological processes. It is up to the archaeologist to cooperate with the specialists in the field and keeping a detailed description of these efforts in the inventory.

#### **sco Documentation and interpretation of discoveries**

The next duty of the archaeologist who carries out the research is to prepare comprehensive documentation of discoveries. To a great degree, its quality is a derivative of well-chosen strategy and accuracy of exploration. In other words, the accuracy which is indispensable for preparing subsequent plans and sections yields profits in accuracy and detailedness of recording. Properly prepared documentation offers all facts recorded in the course of work in a descriptive, drawing (photogrammetrical) and photographic form. It also classifies such facts, with a precise distinction between facts and interpretations. An essential change in this field was caused by new computer software, including user-friendly databases. These

gather and sort data acquired in the course of research.

#### *Documentation strategy*

Well-chosen strategy is a key to success in archaeological research in extreme conditions of urban archaeology. The archaeologist who decides on rules to be enforced in the course of works should establish a system which would successfully combine exploration, documentation and parallel desk-based works (listing and ongoing control of prepared documentation) into a sequence of mutually completing activities. Success depends on the efficient flow of information.

#### **sco Descriptive documentation**

##### > *Animation*

###### *Excavation journal*

An excavation journal, being a peculiar chronicle of works, is a basic document. This traditional form of recording observations has been subject to modifications in the course of time. It assumed the shape of a diary which includes all the information concerning the course of works.

###### *Documentation inventories*

Inventories are the main document which helps secure order in the field documentation. A register of identified stratification units is the principal one. It consists of a list of numbers of identified units, including basic information, such as daily date, location, short description, stratigraphical position (definition of context) and references to other types of prepared documentation. These should also be listed as inventories (drawing documentation and photographic documentation inventories).

###### *Interpretive descriptions*

Haste which often accompanies urban archaeology often extorts departures from classical excavation methods, including the way of documentation. Exploration exposes surfaces where the examined unit is being recorded, together with its context of several (or more) units. After the drawing or photogrammetrical recording, such a plan should be provided with an interpretive description. It should include a set of information which explain the registered system of units. Such a description should be provided with the Harris matrix (a graphical and schematic way of presentation of stratigraphical relations between examined units). This type of descriptive documentation accompanies the more and more popular form of photo-

grammetrical recordings. The latter are based on the principle of documentation of horizons identified in the course of exploration.

#### *New techniques of documentation*

Modern archaeology bases on a written interpretation of the findings, registered in the increasingly popular CAD and GIS systems. Haste which often accompanies urban archaeology often extorts departures from classical excavation methods, including the way of documentation. Exploration exposes surfaces where the examined unit is being recorded, together with its context of several (or more) units. The characteristics of findings are described in sheets that are the basis of documentary discipline. Near future will show if the Museum of London and Bryggens Museum will experience a renaissance. Theoretically, this is what should happen, since the ability to directly write down the characteristics of units and their context and illustrations, using computers, is an amazing opportunity to compose multithreaded comparisons.

#### **sco Drawing documentation**

##### > **Animation**

#### *Drawing documentation*

This type of documentation is the other element of traditional methods of archaeology. It has undergone numerous modifications in the course of the last century, mainly due to changes in excavation techniques. It encompasses nearly 'artistic' drawings with no clear boundaries of examined units and colour drawings, and in the last quarter of the last century it became a schematic monochrome drawing. Such a drawing only depicts the extent of particular units with their main components. This type of drawing documentation, introduced by English archaeologists, is a derivative of the technique of stratigraphical exploration. An obligation of giving numbers assigned to identified units is part of this type of recording.

#### *Photographic documentation*

At present, this is the most popular type of field recording. It owes its popularity to the development of techniques of digital recording of images. Digital cameras are easily available, easy to use and they offer an opportunity to make almost infinite numbers of photos. Due to this, photography assumed a 'coverage' form in the course of time, instead of required static recording. This is no question detrimental for archaeology. More and more severe conditions of excavation works also negatively influence

this type of documentation of archaeological discoveries. The pace of work imposed on archaeologists is not favourable for the accuracy of exploration and it thus renders preparation of appropriate documentation even more difficult.

#### *Digital processing of photographs*

Widespread use of digital cameras introduced another stage into documentation works. What is meant is digital processing of photographs. This offers opportunities of processing images using software which is sold together with digital cameras, joining photographs and providing them with graphical interpretations (vectorial or descriptive ones). This results in photographic documentation being more and more often replaced with imprecise pseudo-photogrammetrical images. This is no doubt a dangerous phenomenon in present-day urban archaeology.

#### *Digital photogrammetry*

Digital photogrammetry is the newest way of recording discoveries and a chance for present day archaeology, not only urban one. Its strengths are both photographic fidelity of images and accuracy. It is done using a calibrated digital camera and special software, which enables one to prepare an ortophotoplan. The greatest advantage of this type of documentation is the easiness of relating the image to the measurement base of the site and placing the image within a defined space, which is determined by land survey coordinates. This method of registration is not fully accepted, mainly because of the groundless allegation about its lack of an interpretative layer. There is nothing more misleading. The interpretation of the registered surface is done during the exploration and while preparing the documentation. Visual interpretation is done not only on paper, but also on the registered surface. This makes the exploration process more scientific in character, raises its standards. It has recently become possible to do close range photogrammetry. It is not difficult to guess that this technique will dominate archaeological documentation, not only in towns.

#### *Laser scanning*

Another innovation is the possibility of laser-scanning the findings. This completely new method is especially useful for urban archaeology. Its main advantage is precision and the possibility of faithfully documenting the context of the findings. This type of documentation forms a reliable, 3D model of the registered surface in 1:1 scale. This is very

important, especially when it comes to the destruction of most of the studied structures. Such new methods will require the introduction of many methodological changes in near future.

#### **sco** Archivisation and preparation of research results

A rapid process of change in forms of preparation and archivisation of research results takes place in present day urban archaeology. This is due to modern measuring equipment and widespread access to software which enables one to combine popular archaeological databases with image recordings, situated within the land survey space (the CAD system). This type of recording has recently begun to give way to the GIS system. The latter provides an opportunity to combine the image with active database recording, apart from gathering images which are situated within the land survey space. There is no doubt that the number of users of this system will increase in the course of time. This is due to the fact that the structure of this system combines almost all the perennial expectations of archaeologists. Furthermore, the system gives historic town authorities a chance to exercise full control over historic space.

##### > *Animation*

###### *Preparation of research results and archivisation within a site*

Present day urban archaeology is able to create a systematised archive almost in parallel to the fieldwork being carried out. This is based on: the afore-mentioned system of recording; proper principles of stratigraphical exploration; standardised way of recording observations; accurate measurements done with the use of total stations and recorded using the CAD/GIS system; and digital photogrammetrical image recording, completed with interpretive descriptions. The amount and value of records within this archive depends on the archaeologist and on conditions which are created for him or her.

###### *Correlation and phasing*

A graphical manner of demonstration of stratigraphical relations between examined units is a significant element

of ongoing summary of results of excavation works. The Harris matrix is the most popular form of such a scheme. At present, it is possible use specialist software in order to prepare this no doubt the most perfect form of presentation of stratigraphy. The next step of the stratigraphical analysis and the schematic presentation of research results is to complete the matrix with additional data. Based on these data, units which were separated and situated within a schematic sequence can be assigned to defined horizons, phases and settlement levels. In the course of further analysis, the latter may be divided or grouped according to other criteria selected by the archaeologists. Such criteria are, e.g., nature, function and dating.

##### *Report*

A report which summarises the research results is an indispensable element of each excavation. In urban archaeology, where numerous examinations are carried out within one site (i.e., the town itself) by researchers with various habits and different research tempers, it should be mandatory to conclude the research results with a comprehensive report. If such a rule, however, is to make any practical sense, such reports should be prepared according to principles worked out individually for each town. One of such principles which is worth suggesting is an obligation to define all the terms to be used in the course of research. Such definitions should be offered already in the introduction to such a report. The following elements of the report should be the most important: a complete list of all the documentation, together with other inventories; a summary of the research strategy and the course of works; a schematic presentation of recorded stratigraphy – this should be calibrated and situated within a general plan with land survey coordinates; a presentation of all the graphical records with their interpretation; an identification and dating of units of stratigraphy with their complete characteristics; conservation recommendations, i.e., a summary of information on the examined issues and suggestions for neighbouring areas which will perhaps also attract research interest in future.

##### *Administration archive*



An administration archive is (or should be) significant part of urban archaeology management strategy. GIS software is a chance for this type of research management. It is successfully used in numerous European towns. There is no exaggeration that it is the only efficient way to gather systematised knowledge in urban archaeology. The archives of institutions, that manage historical heritage of cities, should include basic knowledge. It should be kept in two primary forms: graphic, in which the content will be written into the measurement grid, and a database one, containing the basic information about many different aspects of the structure and infrastructure of the city, as well as its history. Such a database should have an archaeological layer, being the storage place of subsequent research results. The information from the final phase of excavations should be presented in a graphic form: containing plans showing the spatial changes of subsequent sediment phases and sections illustrating the complexity of the stratigraphy of the site. It should also contain information about the excavations: the dating of the findings, topography, and the character of the buildings, its state, and relations between the relics of old architecture with the contemporary structure of the city.

#### *The research archive*

The proper organisation of the research and conservation services, in historic cities, is based on the efficient gathering and processing of detailed information coming from

subsequent explorations. This 'bank' of information forms the basis for rational conservation decisions, defining the character and scope of the planned excavation works. In the era of global archaeology, such as urban archaeology, the functioning of a second archive is necessary – the archive of the institution responsible for gathering complete results of all research. Depending on the local structure, these can be offices hiring officials or institutions formed by groups of researchers. The aim of such institutions should be to gather and search through information effectively, classify it, and give access to detailed and objective knowledge about the field to those interested in any intrusive activity in the historic surroundings. One of the methods enabling this is the GIS software.

#### **sco Publication of research results**

##### > *Animation*

##### *Ongoing form*

Archaeology is a social science, particularly in the urban dimension. Here, research is carried out at the heart of large human agglomerations, usually in historic centres. The research usually provokes considerable interest (less frequently hostility and reluctance) of inhabitants and visitors. With regard to that, it should be the task of the archeologist to undertake steps aimed at making the excavation area reasonably accessible. There are many ways of making the excavations accessible to the public, from open-work fences to opening the excavation area at certain times. One of the most interesting ways of making excavations public is organizing history lessons for the students of local schools. Thick fences and lack of access for the members of the public to the excavation area, suggest an intention to conceal embarrassing facts. This is most regrettably much too common in present day urban archaeology.

Interactive websites are another way of publishing the research results. This method is more and more widespread, thanks to the application of new digital documentation techniques.

##### *Classical publication*

The lack of classical publications is the greatest weakness

**Figure 1** Stone with carvings before and after looting



of urban archaeology. The main reason for this is an intensive system of works, the scale of discoveries and the amount of gathered information and found relics. The fact that works are frequently undertaken again is also of considerable significance. This forces local archaeologists to undertake new research before the results of previous examinations are summarised. This is perhaps the most ardent issue of present day urban archaeology. This problem can be solved with administrative means only.

#### *Museum displays*

Another form of publishing the results of urban excavations is to organise museum exhibitions. It seems that a traditional form of a museum is not attractive any more. Exhibitions organised in the sites of discoveries become therefore more and more popular. It must be underlined that museums organised in this way are usually one of more prominent attractions of historic towns (e.g., the frequently mentioned Museum of London, the Bryggens Museum, Yorkvik, Gdansk with the former Dominican friary). The extent of ground works in towns and cities, and thus the number of spectacular finds, seem to support such initiatives.

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#### **msco References**

