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## VISUAL PRESENTATION OF SETTLEMENT COMPLEXES FROM THE EARLY IRON AGE FROM MILEJOWICE, SITE 19, AND SELECTED PROBLEMS OF 3D MODELLING IN ARCHAEOLOGY

Archaeological excavations in Milejowice, Wrocław district, were carried out in 1999-2002 in connection with the modernization of the A-4 motorway. During those excavations, relics of a settlement from the early Iron Age were discovered that were distinguished by the layout of the buildings. The visual presentation in the form of a 3D reconstruction of the Hallstatt settlement from Milejowice is a computer created image based on analysis of the sources obtained during excavation work. The purpose of 3D imaging of the features discovered on site was to provide a spatial representation of the settlement's buildings, divided into individual phases. An analysis of the development and spatial organization of the settlement complexes discovered at site No. 19 in Milejowice, was carried out by Jarosław Kopiasz from the Archaeological Museum in Biskupin. For spatial reconstruction, one of many possible suggestions for interpreting the buildings of this settlement was selected. In the 3D technique six separate settlement zones were reconstructed at this site, along with the individual phases of their functioning. The visual presentation of settlement complexes discovered at the Milejowice site is a valuable source of information on early Iron Age construction. The visualization verified the collected data, and 3D modelling facilitated the interpretation of the research results. With the help of Computer Aided Design (CAD) and three-dimensional modelling, it was possible to analyze the spatial organization of settlement complexes from Milejowice and to separate the individual phases of development of the designated zones. It should be noted, however, that digital reconstructions of settlement complexes from Milejowice remain the hypothesis of researchers, based on their analysis of documentation and theoretical assumptions.

KEY WORDS: visualization, 3D reconstruction, early Iron Age, Milejowice

### 1. INTRODUCTION

Twenty years ago, during the inspection of construction excavations related to the modernization of the A-4 motorway, remains of a settlement were discovered near the village of Milejowice in Wrocław district (Drużyłowski 1999, 2). Excavations at site No. 19 in Milejowice were carried out in 1999-2002 by the Archaeological Rescue Re-

search Team of the Institute of Archaeology and Ethnology of the Polish Academy of Sciences in Wrocław<sup>1</sup> (Fig. 1, 2.1). Based on movable artefacts,

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<sup>1</sup> The research consultant was Prof. dr hab. Bogusław Gediga. Field work was managed by Dr Ewa Bugaj, MA Jarosław Kopiasz, Dr Robert Szwed, and MA Małgorzata Kopeć. The chronological and cultural classification of movable artefacts from this site was carried out by Prof. dr hab. Grzegorz Domański.

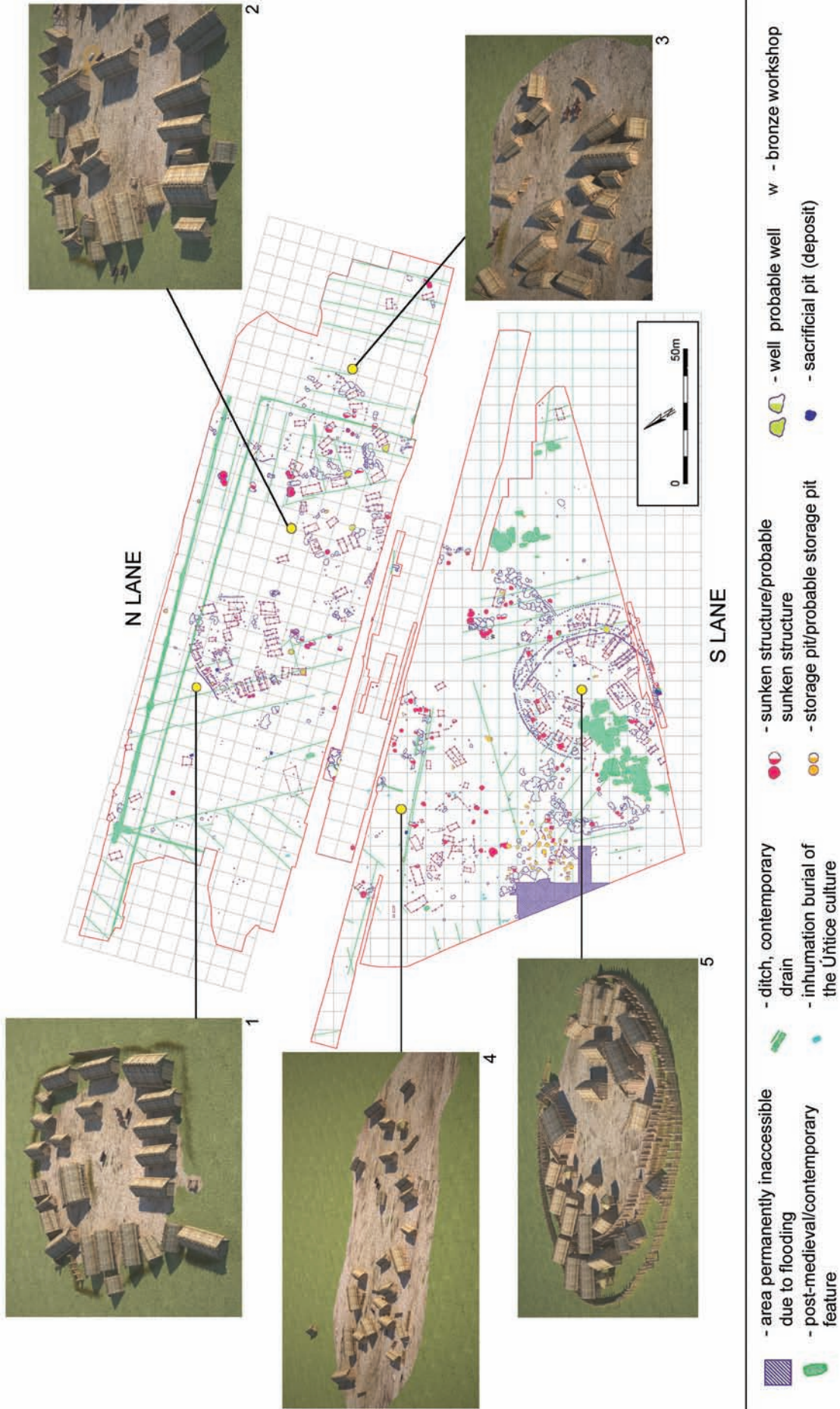


Fig. 1. Milejowice, Żórawina commune, site 19. Site plan along with the reconstructed buildings: 1 – complex 1/N; 2 – complex 2/N; 3 – complex 3/N; 4 – complexes 1/S-2/S; 5 – complex 3/S (visualizations by M. Markiewicz; plan with corrections by J. Kopiasz edited by D. Bobak; after Bugaj and Kopiasz 2006)

mainly fragments of vessels, it was found that the settlement complex in Milejowice functioned in the late Bronze Age, and above all in the Ha C sub-period of the early Iron Age. This dating is also confirmed by the results of dendrochronological analyses (Krapiec 2001; 2001a) and the examination of animal bone samples via the  $^{14}\text{C}$  method (Pazdur 2001; Goslar 2006; 2019).

899.95 ares of the site surface were excavated and 2,986 archaeological features were found<sup>2</sup>. These were mainly the remains of wooden post type buildings, sunken buildings, wells, and various types of pits. Six settlement complexes were distinguished in the studied area (three on the N lane: 1/N-3/N and three on the S lane: 1/S-3/S; Fig. 1). An extremely interesting complex was found on the southern lane (3/S). In this area there was a separate zone surrounded by a regularly circular structure in the form of palisades. Within this complex, buildings erected in post construction occurred. This was an inhabited, clearly separated part of the settlement. A similar complex was excavated in the settlement from the early Iron Age in nearby Stary Śleszów (Kopiasz 2003; Buchner 2018; Markiewicz 2018).

Thanks to archaeological open-area excavations, numerous new sources have been obtained, ones that significantly enrich the existing knowledge about the settlements of the Hallstatt period in Lower Silesia. Spectacular discoveries became the basis for further studies related to, amongst other things, the spatial layout of the settlement, site sociotopography, construction, and production.

In recent years, many publications concerning archaeological research at Milejowice site 19 have appeared. The first preliminary results were published in general reports on rescue excavations carried out on the A-4 motorway in Lower Silesia (Bronowicki *et al.* 2001, 41-61; 2003, 159-177; Gediga *et al.* 2001, 100-108; 2001a, 147-163). The results of the 1999 excavations were presented by Jarosław Kopiasz (2001, 238-245), and in 2002 an article was published in the *Śląskie Sprawozdania Archeologiczne* concerning the three seasons of rescue research (1999-2001) on site No. 19 in Milejowice (Bugaj *et al.* 2002, 235-251). The report on the entire excavations (1999-2002) by Ewa Bugaj and Bogusław Gediga was published in 2004

in the *Zeszyty Ośrodka Ochrony Dziedzictwa Archeologicznego – Raport 2001-2002* (Bugaj and Gediga 2004, 216-233, 333-349). In the same year Bogusław Gediga published an article on the sociotopography of the settlements of Lusatian culture, including the site in Milejowice (Gediga 2004). In 2006 Ewa Bugaj and Jarosław Kopiasz conducted an analysis of the spatial development of the settlement in the publication *Próba interpretacji zabudowy osady z wczesnej epoki żelaza na stanowisku Milejowice 19, pow. Wrocławski* (Bugaj and Kopiasz 2006, 175-207). Another article of these authors from 2008 also deals with issues related to the spatial organization of the settlement, as well as the topic of social changes in the early Iron Age in southwestern Poland (Bugaj and Kopiasz 2008, 101-115). In addition, the results of rescue excavations carried out in the settlement in Milejowice were presented in the popular science journal *Archeologia Żywa* (Bugaj 2006, 40-46) and in the *Informator Archeologiczny* (Informator 2011, 2012).

The extremely interesting results of archaeological excavations carried out on site No. 19 in Milejowice prompted researchers from the Institute of Archaeology and Ethnology of the Polish Academy of Sciences in Wrocław to undertake further analyses on the development of this settlement. Since 2016, thanks to funds granted by the Ministry of Science and Higher Education (National Science Centre), a project entitled *Spatial and functional structures of settlements in the early Iron Age in Silesia in the social aspect* has been implemented (No. 2015/17/B/HS3/01314). The head of the research is Prof. dr hab. Bogusław Gediga. The team members are: MA Aneta Buchner, Dr hab. Ewa Bugaj, MA Jarosław Kopiasz, and Dr Małgorzata Markiewicz. The aim of the project is to develop models of social structure based on research on the spatial and functional organization of settlements from the early Iron Age discovered on sites Milejowice 19 and Stary Śleszów 17. The project includes extensive analyses using advanced analytical tools of the Geographic Information System (GIS) and 3D modelling.

An analysis of the development and spatial organization of the settlement complexes discovered on site No. 19 in Milejowice, was carried out by Jarosław Kopiasz from the Archaeological Museum in Biskupin (Kopiasz 2019). For spatial reconstruction, one of many possible suggestions for interpreting the buildings of this settlement was

<sup>2</sup> This is the number of all the features discovered at site Milejowice 19, including those dated to the early Bronze Age and prehistory.

selected. Individual stages of development of settlement complexes were determined based on the stratigraphic relations of features, absolute dating (dendrochronological and <sup>14</sup>C analyses), and artefactual dating (mainly fragments of pottery and special artefacts). In the event of difficulties in distinguishing the relics of buildings as being older or younger, J. Kopiasz applied the theoretical spatial-metric analysis of the settlement development, citing the findings of Dr hab. Tomasz Gralak regarding length measurements used in the construction and layout of settlements from the early Iron Age in Lower Silesia (Gralak 2009, 73-97; 2013, 329-347; 2017).

## 2. MATERIALS AND METHODS

According to Włodzimierz Rączkowski (2018, 227) 'visualization is a construct which is the result of many complex decision processes made based on knowledge, technical capabilities, skills, goals, and expectations'. The 3D reconstruction of the Hallstatt settlement from Milejowice is a computer-generated image which reflects the knowledge obtained as a result of analysis of sources obtained during excavations. The digital model of this complex was created on the basis of the available documentation and literature. The purpose of 3D imaging of the features discovered at the site was to present a spatial representation of the settlement's development, divided into individual phases, as well as verification of data collected during archaeological work. Analysis of plans, photographs, drawings of features, and descriptions made (excavations log, catalogue of features) allowed us to detect and correct errors in documentation.

Visualization of the settlement's development in Milejowice was created as a result of analysis and interpretation of source data, in accordance with the guidelines contained in the *London Charter*<sup>3</sup>. This document is a development of methods ensuring the highest quality of 3D reconstructions and control mechanisms which allow checking the historical

reliability of 3D models. The formulated rules are to contribute to raising the scientific rank of digital visualizations so that they become a reliable form of presenting research results (Bendkowska-Kafel 2008, 43-46).

The scope of information contained in the digital visualization depends on the purpose for which the model was made. According to the definition proposed in the monograph *Informacyjne środowisko rekonstrukcji. Przedlokacyjna struktura osadnicza w Pultusku w XIII-XIV wieku* by architect Sławomir Kowal (2015, 26-28), 3D visualization of the Hallstatt settlement in Milejowice can be considered an *iconic-imaginary* model. The iconic model aims to recreate the appearance of the object being represented, i.e. in this case the settlement buildings. The imaginary model, instead, which is most often used in archaeology, is created based on presumptions, judgments, and predictions concerning the lost area of historical reality. S. Kowal notes that this model requires that its creator make hypotheses which are helpful in understanding the relationship between archaeological artefacts, i.e. the so-called axioms of history, and the creative complement to the picture of the whole, based on imagination and knowledge. Often the reproduction of missing or probable data results from the logic of the arrangement, i.e. the analysis of the feature as a whole. These activities are based on the experience of researchers using mainly analogies to build a model. The 3D visualization is therefore a record interpreting the collected documentation. This is the author's creation, which is the result of the adopted research method and a specific interpretation, i.e. elements of a hypothetical nature (Pawleta 2014, 189). In connection with the above, spatial imaging of the settlement in Milejowice cannot claim to be a historical proof.

Like any image, the 3D visualizations have two basic functions: communication and cognitive. Constructed with the help of appropriate software, the digital illustration becomes a message, a carrier of information about the past. Through contact with 3D images the recipient makes an effort to search for the meanings and values which a given cultural heritage resource brings (Szrajber 2016, 24). Contemporary culture is widely recognized as visual culture. In many situations, the image replaces the word, as it strongly appeals to the imagination and quickly settles in memory. In visual culture, senses (not intellect) are increasingly used to experi-

<sup>3</sup> London Charter. Rules regarding computer methods of visualization of cultural heritage. 2009: [http://www.londoncharter.org/fileadmin/templates/main/docs/london\\_charter\\_2\\_1\\_en.pdf](http://www.londoncharter.org/fileadmin/templates/main/docs/london_charter_2_1_en.pdf) [access: 5.08.2019].

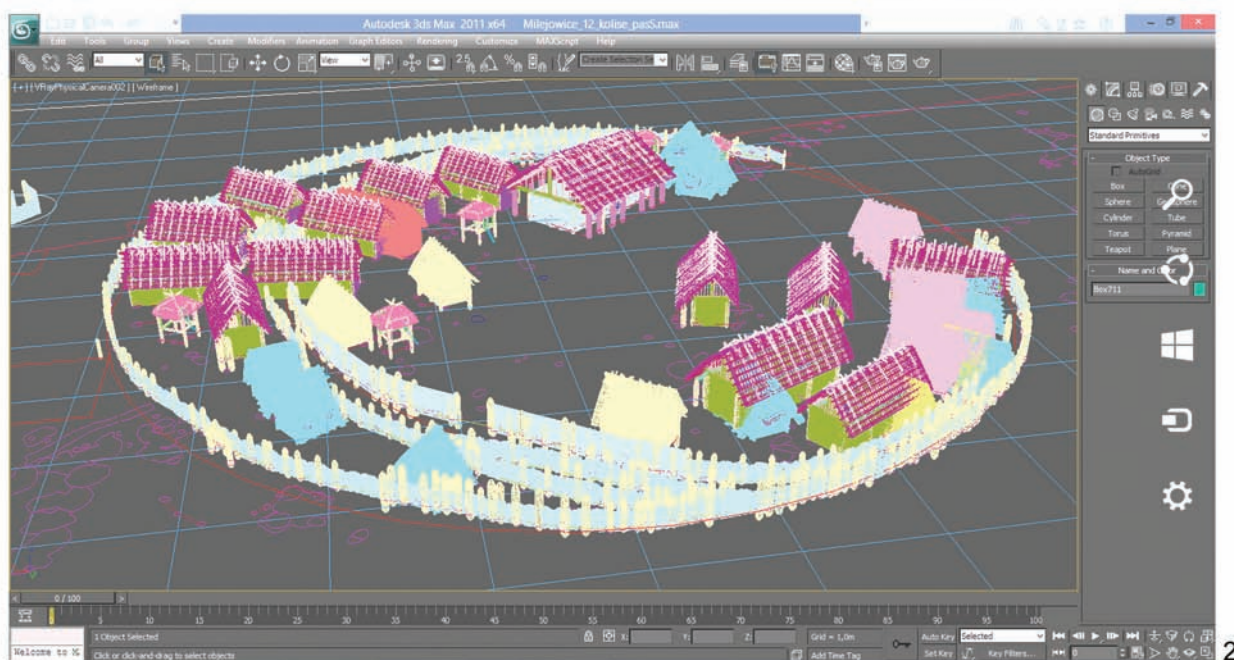


Fig. 2. Milejowice, Żórawina commune, site 19: 1 – archaeological excavations on site (photo by W. Waniek); 2 – a 3D model of a circular feature discovered on the southern lane (edited by M. Markiewicz)

ence the past (Szpociński 2009, 227-236; Pawleta 2014, 182-183). Spatial imaging of archaeological features has become a new form of iconographic message.

Currently, with the image beginning to play a dominant role in the process of cognition, popularization of the past through digital reconstruction is extremely important. It is visibility that determines how we experience and analyze historical knowledge (Koszewski 2015, 95). 3D visualizations are

intended for professionals, but they are also directed to those social groups that are not interested in the past shared in the form of descriptive or verbal narrative, forcing possession of specific knowledge in the field of specialist terms. The 3D visualization constitutes a new quality of analyzing the past. It significantly accelerates the process of remembering new pictorial information and associating it with known images which exist in the recipient's memory (Markiewicz and Kolenda 2015, 226;

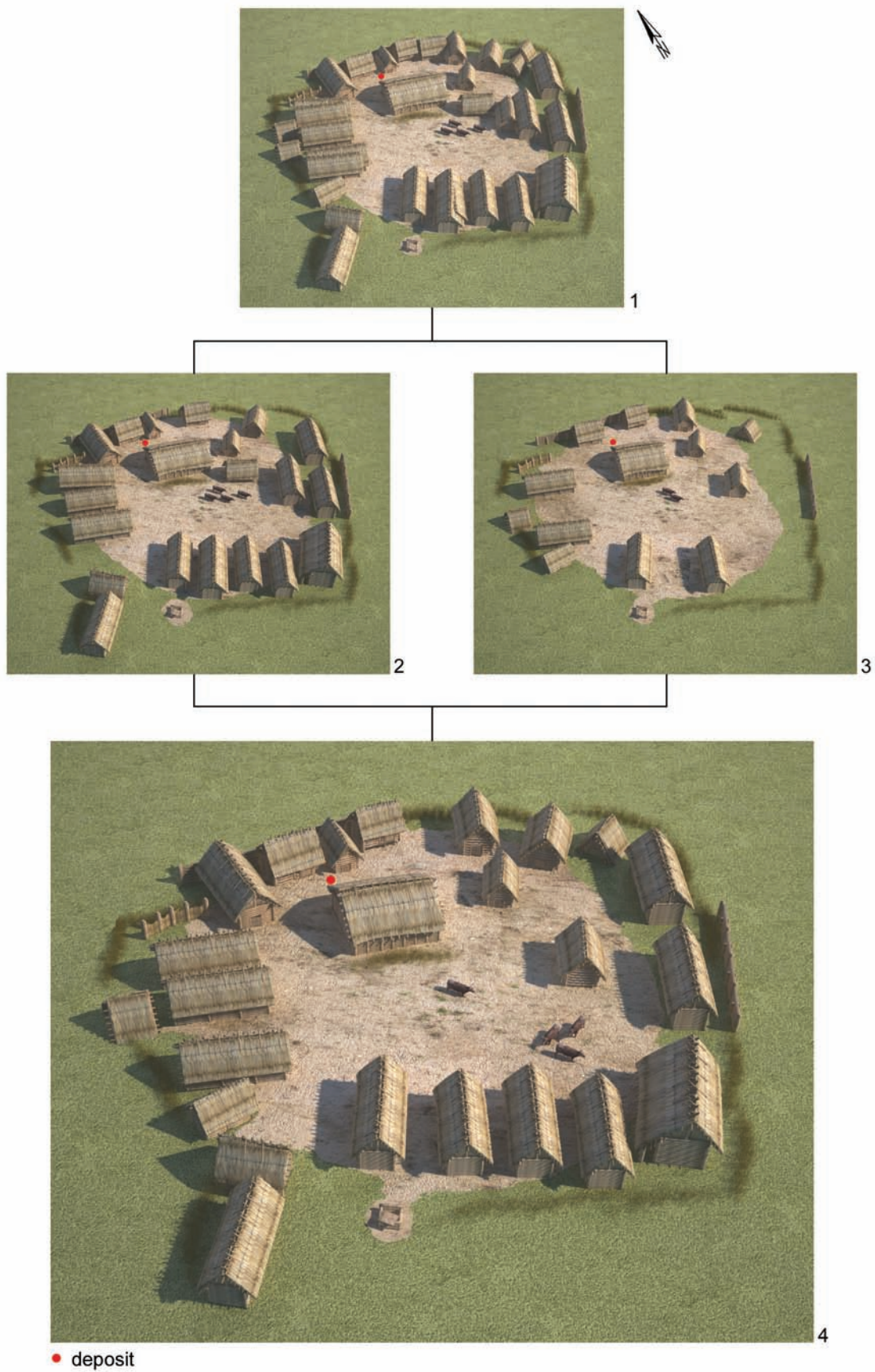


Fig. 3. Milejowice, Żórawina commune, site 19. Visualization of the complex 1/N: 1 – all buildings unearthed in the complex 1/N; 2 – phase 1 buildings; 3 – phase 2 buildings; 4 – phase 1+ buildings (buildings probably built in phase 1 that could have functioned in phase 2 of the complex) – edited by M. Markiewicz



1



2

Fig. 4. Milejowice, Żórawina commune, site 19: Visualization of the complex 1/N: 1 – southern frontage; 2 – northwest part, view of the building 12a/12b (edited by M. Markiewicz)

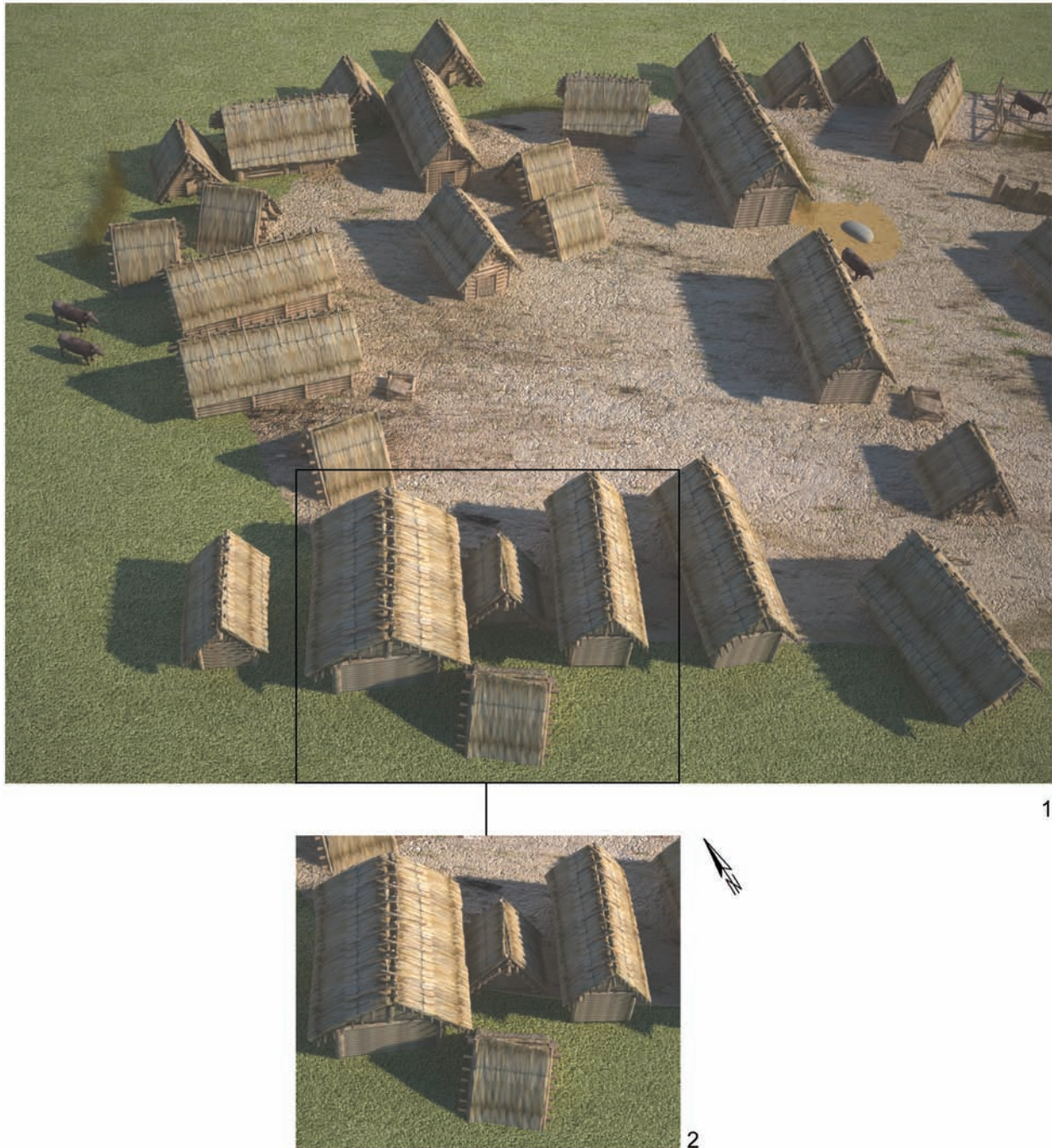


Fig. 5. Milejowice, Żórawina commune, site 19: 1 – visualization of the complex 2/N; 2 – fragment of the settlement with the redesigned building No. 52 (edited by M. Markiewicz)

Kolenda and Markiewicz 2017, 440; Stobiecka 2018, 154). Therefore, 3D visualization is a new form of narrative in archaeology which complements the descriptive message (Minta-Tworzowska 2011, 323-324; Pawleta and Zapłata 2011, 353).

The visualization process of the settlement buildings from the early Iron Age in Milejowice included three phases.

### Phase 1: preparation of the project

The work on the 3D reconstruction of the settlement buildings in Milejowice began with a wide-ranging query of sources, which is the basis for a reliable visualization of archaeological buildings (Zapłata 2017, 126). All available documentation from archaeological research (site plans, features' plans, drawings, photographs, catalogue





Fig. 6. Milejowice, Żórawina commune, site 19. Visualization of the northwest settlement of the complex 2/N (edited by M. Markiewicz)

of features) and publications on construction from the Hallstatt period were analyzed (Niesiołowska-Hoffman 1963; Kopiasz 2015; Gralak 2017). At this stage, consultations with specialists, searching for iconographic analogies available in the literature and publications presenting various types of reconstruction of buildings from the Hallstatt period were also important. During the work, paradata were acquired, i.e. the baggage of knowledge which is acquired during virtual reconstruction, in the process of analysis and interpretation of source material, as well as by analyzing missing data (Bentkowska-Kafel 2008, 44). All paradata which became the basis for further work on the digital reconstruction of the settlement buildings were collected in the catalogue and archived. The activities undertaken at this stage – query, analysis, scientific development of the model – were crucial for further work related to digital modelling.

### Phase 2: workshop

As part of the next stage, the so-called workshop phase, based on previously digitized and vec-

torized plans (scale 1:100 and 1:20), 3D models of individual buildings were produced (Fig. 2.2). Moreover, models of plants, animals<sup>4</sup>, and fences were made. Such feature-modelling was performed using 3D graphics creation software – *Autodesk 3ds Max* with *V-ray Adv for 3ds max* rendering engine (*Chaos Group*). On ready 3D features were superimposed textures created on the basis of suitably prepared photographs in the *Adobe Photoshop* raster graphics creation program. To reconstruct the buildings of the settlement from Milejowice, photographs of clay, stones, soil, sand, old wood, grass, and animal hair were used. Appropriate lighting parameters, reflection and refraction were determined at this stage of work. The next step was to set up the properties of the virtual cameras. Thus, the

<sup>4</sup> The presence of animals (cattle and pigs) in the settlement is confirmed by archaeozoological studies. The expert opinions were made by W. Chrzanowska and A. Krupska from the Department of Anatomy and Histology at the Faculty of Veterinary Medicine, Wrocław University of Environmental and Life Sciences. Typescripts are available in the archives of the Institute of Archaeology and Ethnology of the Polish Academy of Sciences in Wrocław.

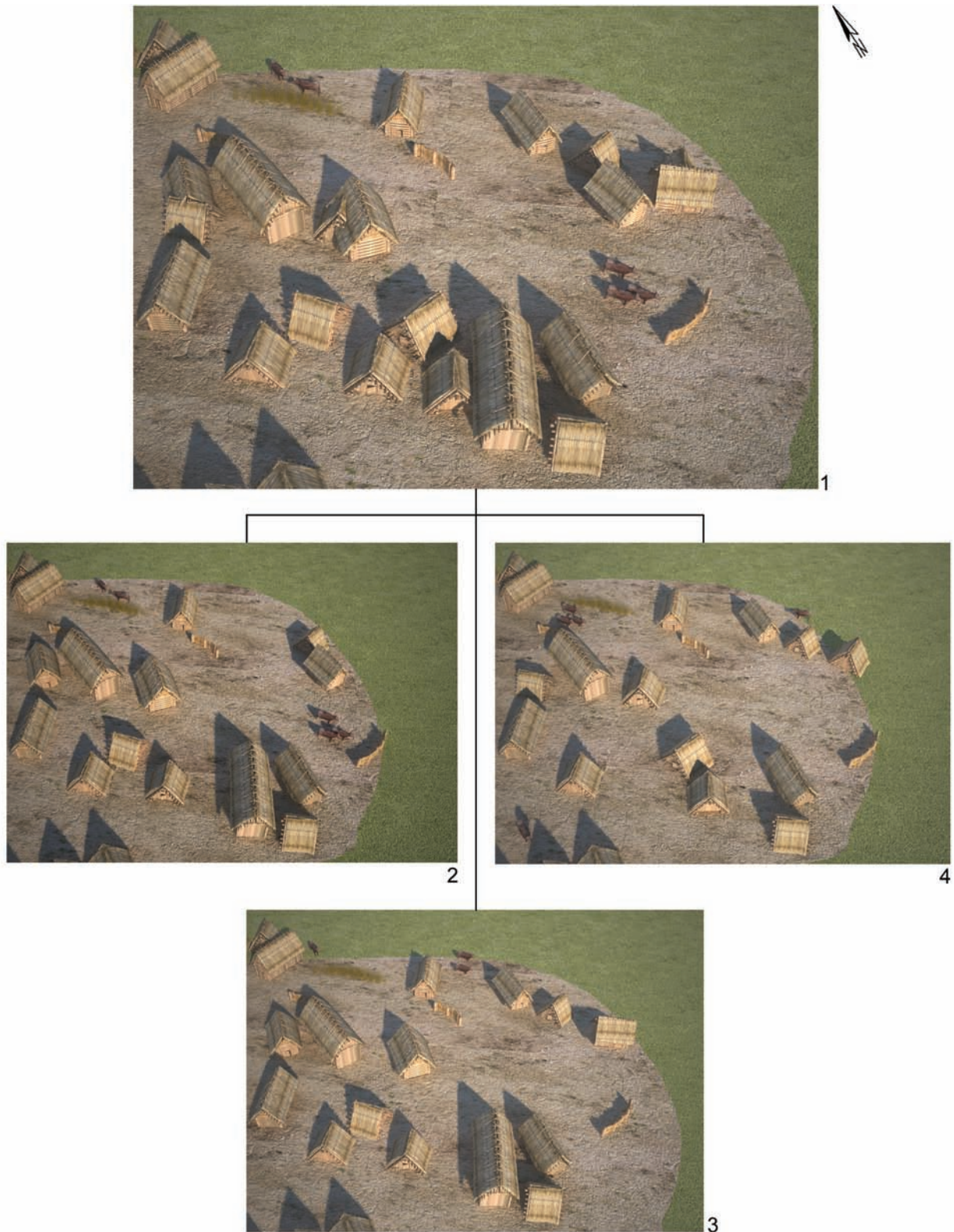


Fig. 7. Milejowice, Żórawina commune, site 19. Visualization of the complex 3/N: 1 – all buildings unearthed in the complex 3/N; 2 – phase 1 buildings; 3 – phase 2 buildings; 4 – phase 3 buildings (edited by M. Markiewicz)

so-called observation points were determined on which the recipient's later perception of the entire visualization depends (light and textures determine how the recipient perceives the visualization).

### Phase 3: production

The final stage of the digital reconstruction of the settlement is rendering, i.e. creating an im-

age based on the model. During this process, the program analyzed interactions between matter and light; it considered, amongst other things, reflections and shadows. The purpose of this is to present the model as realistically as possible. The *V-ray* rendering engine (*Chaos Group*) was used to visualize the settlement buildings from Milejowice. Thanks to this, the resulting image is more realistically reflected. The ready digital illustrations have been saved.

Through an earnest source query, it was ensured that 3D visualizations were historically reliable. Care was also taken of appropriate archiving and documentation of the reconstruction process in order that the collected data be easily verified, updated, and possibly corrected.

### 3. RESULTS

In the 3D technique, six separate building complexes at the settlement in Milejowice were recreated (three on the N lane: 1/N - 3/N and three on the S lane: 1/S - 3/S; Fig. 1). The distribution of postholes within the complexes indicates that, during the use of individual zones, above-ground buildings were rebuilt. Therefore, it was undertaken, with the help of chronological and spatial analyses and 3D modelling, to divide the separated complexes into individual phases of their functioning.

With the help of software for creating 3D images, the complex 1/N with buildings erected on the plan of an irregular pentagon was spatially depicted (Fig. 3). Visualization of above-ground buildings in the post construction, most likely erected in vertical-post log technique (Fig. 3-4), as well as sunken buildings, wells and fences. Some of the above-ground buildings, probably fulfilling dwelling and utility functions, were rebuilt. Based on theoretical spatial-metric analysis, mutual relations and distances between individual features, two phases of use of buildings in this zone were determined. It should be noted, however, that some of the houses built in phase 1 probably also functioned in phase 2 (buildings 1+). The whole 1/N complex was probably surrounded by a fence. It survived in fragments in the form of two shallow ditches. In the places which were interpreted as relics of the fence, these structures were recreated. However, where it

was only presumed, its functioning and its likely erection through the green belt was emphasized. The water well located outside the southern building line was also spatially reconstructed. It was assumed that it was built with a log construction. Similarly depicted were sunken buildings, located mainly at the northern and eastern building lines. The red point marks the place where the deposit was discovered next to building No. 12a/12b<sup>5</sup>.

In the technique of 3D computer imaging, the complex 2/N was reconstructed (Figs. 5-6). This fragment of the settlement from Milejowice by its layout resembles the complex 1/N, but buildings of this zone, compared to the complex 1/N, are more dispersed. The buildings were located at a quadrilateral square. In its central part single buildings were located (house No. 34 and two dugouts: No. 119, No. 177). Fourteen dwelling and utility buildings erected in post construction, as well as above-ground buildings and wells were reconstructed spatially. The latter were probably built in log technique. During the operation of this complex, house No. 52 was rebuilt. This is evidenced by the overlapping negatives of the postholes of this building.

The last complex (3/N) distinguished on the northern lane was probably delineated on the plan of circle (Fig. 7). Similarly as in the case of the previous two complexes, buildings erected in post construction and sunken buildings were recreated in 3D technique. Thanks to the use of spatial-metric analysis, three phases of the development of this zone were determined. It seems that some houses erected in the first phase of the complex's operation may have continued in the second or even the third phase. The last phase of the development of this complex was characterized by domination of above-ground buildings over sunken ones. The dugouts were probably used after the destruction of the houses built in a post construction.

Three settlement complexes (1/S - 2/S; Fig. 8) were discovered on the southern lane of the excavated area, in the northwestern part. As on lane N, the buildings were erected in post construction. The complex 1/S was used in two phases. Buildings Nos. 66, 68, 75 from the first phase of development were probably located on a rectangular plan. Com-

<sup>5</sup> The deposit (feature No. 65) was a vase-like vessel, inside which were bones, fragments of pottery, bronze products (including an axe fragment), and bronze raw material (Bugaj and Kopiasz 2006, 182).

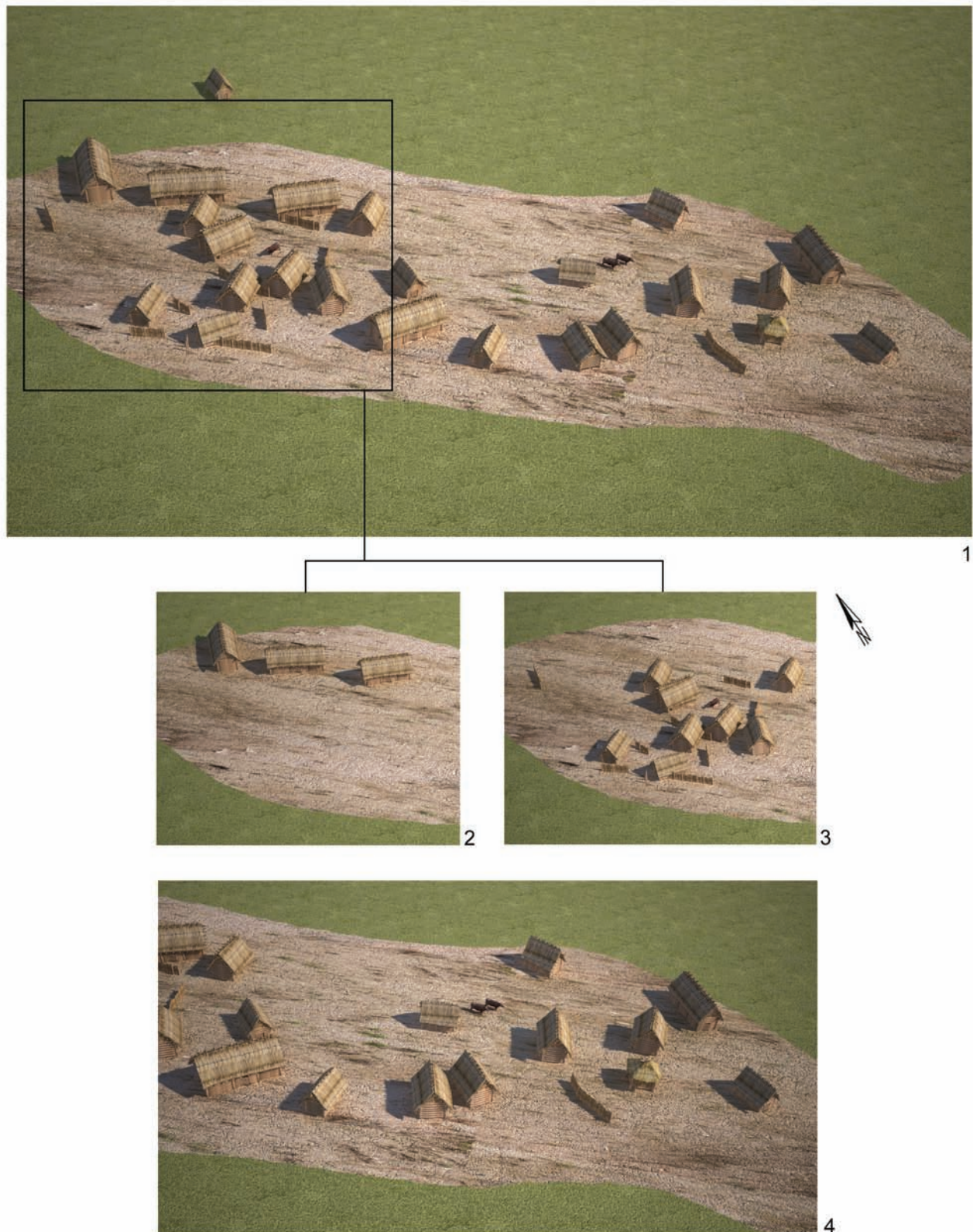


Fig. 8. Milejowice, Żórawina commune, site 19: Visualization of the complexes: 1/S-2/S: 1 – all buildings unearthed in the complexes 1/S-2/S; 2 – phase 1 buildings of the complex 1/S; 3 – phase 2 buildings of the complex 1/S; 4 – settlement of complexes 2/S (edited by M. Markiewicz)

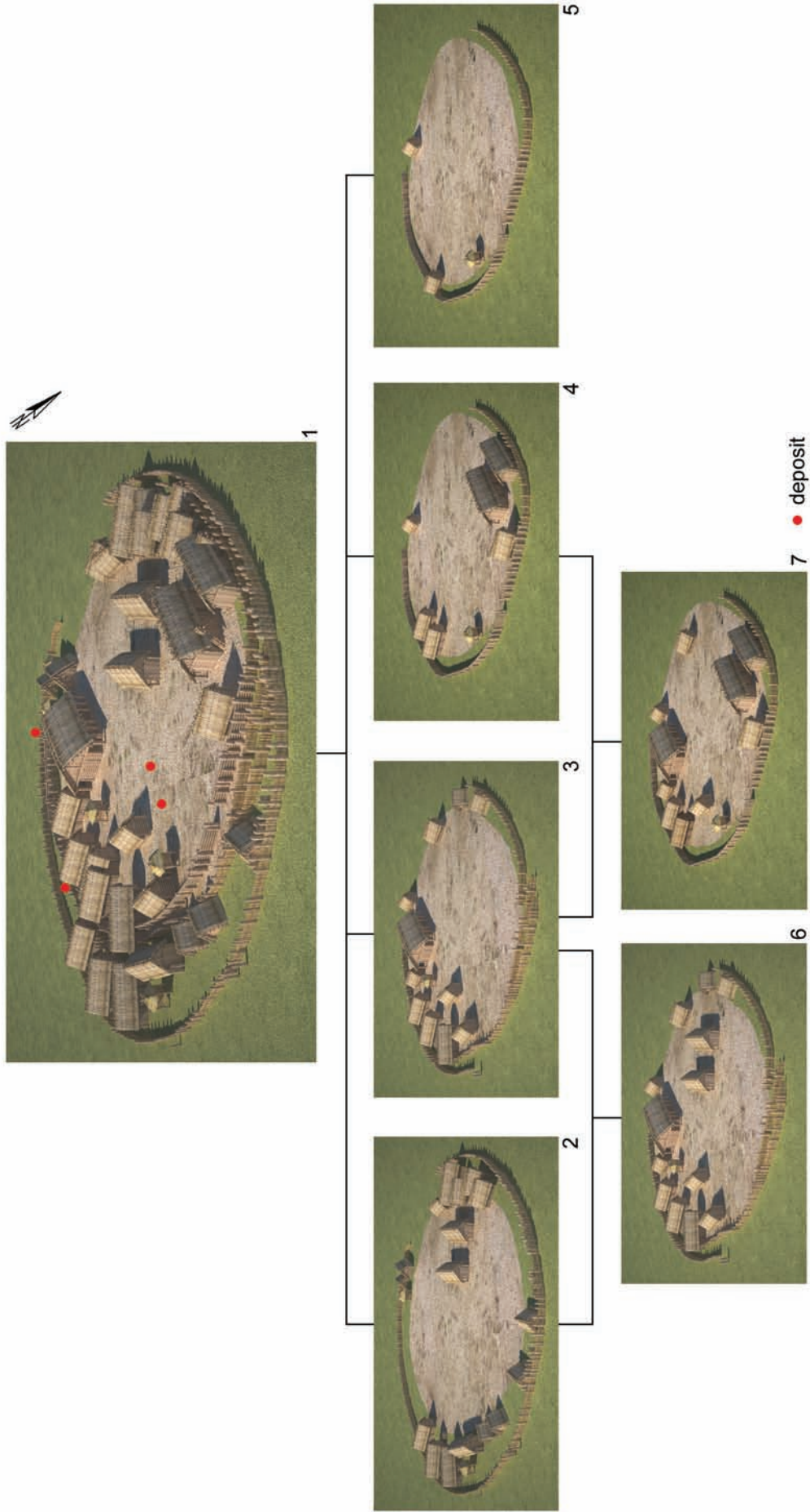


Fig. 9. Milejowice, Żórawina commune, site 19. Visualization of the complex 3/S on the southern lane: 1 – all buildings unearthed in the complex; 2 – phase 1 buildings; 3 – phase 2 buildings; 4 – phase 3 buildings; 5 – phase 3+ buildings; 6 – phase 1+ buildings; 7 – phase 3+ buildings (edited by M. Markiewicz)



Fig. 10. Milejowice, Żórawina commune, site 19. Visualization of buildings discovered during archaeological research on the southern lane of the motorway (edited M. Markiewicz)

plex 2/S can be divided into two groupings: 2a/S and 2b/S. Analyzing the spatial layout of these two groupings, it can be seen that the buildings of these zones were built on circular plans. This is more perceptible in the case of the complex 2a/S, where buildings Nos. 80, 81, 83-85 and 127 are located on the circumference of the circle. An analogous arrangement of houses was observed on the northern lane – complex 3/N. All above-ground buildings of the complexes 1/S - 2/S have been reconstructed in the technique of 3D imaging (Fig. 8).

The next complex (3/S) discovered in the southeastern part of the excavated area (S lane) is extremely interesting in terms of spatial organization. This complex included features which were interpreted as the remains of dwelling and utility buildings erected in post construction. The whole of this clearly separated circular zone was surrounded by fences (one palisade, delineated on circular plan, surrounded the buildings in the west, while three or four in the east). The inner section of the fence in the eastern part has been preserved in the form of a ditch. The diameter of this structure was about 55 m. As previously mentioned, a similar structure was discovered in the early Iron Age settlement in

nearby Stary Śleszów, Żórawina commune (Kopiasz 2003; Buchner 2018; Markiewicz 2018).

In the central part of the complex discovered in the southern part of the settlement in Milejowice, two deposits were documented (features: 901 and 902). Feature 901 delineated the geometric centre of the outer ring of posts. The third deposit – No. 442 – occurred in the southeastern part of the circular structure. Whereas in the southern part relics of a votive offering were discovered (feature 1642)<sup>6</sup>. Within a separated circular zone, a well (feature 914) with preserved timbered walls has been documented (Bugaj and Kopiasz 2006, 192-196).

<sup>6</sup> The deposit from feature No. 901 consisted of two vessels inserted into each other and animal bones. In feature No. 902 occurred a storage vessel covered with another clay container, inside of which bowls and animal bones were deposited. The third deposit – feature No. 442 consisted of two storage vessels, inside which a mug, two bowls, and bones were discovered. The next deposit (feature No. 1642) consisted of a storage vessel, a cup, and a large vase. Inside the storage vessel, the skeleton of a dog, a pig, and cattle bones, along with a mug and an iron knife were discovered (Bugaj and Kopiasz 2006, 193, 196).

Thirty-one dwelling and utility buildings, nine sunken structures, a well, and a fence were distinguished and reconstructed in the 3D imaging technique (Figs. 9-10). Based on stratigraphic data, spatial and chronological analyses, as well as appropriate manipulation of 3D models, four phases of development of this complex were determined (Fig. 9). As in the case of the complex 1/N, it was noted that phase 1 buildings could have also functioned in phase 2 (phase 1+). Similarly, houses from phase 2 were still used in phase 3 (phase 2+). The buildings from the separated phase 3 still existed in phase 4. The well (No. 914) was used only in phases 1 and 2.

As a result of analyses carried out with the use of a computer program for creating 3D images, twenty-four images were created presenting the development of complexes discovered at site 19 in Milejowice.

#### 4. CONCLUSIONS

In the article by Ewa Bugaj and Jarosław Kopiasz from 2006 (2006, 178), the authors, discussing the spatial organization of buildings in Milejowice 19, noticed that 'based on the existing premises, including mainly the pottery material at our disposal, we cannot define subsequent stages of development'. A few years later, thanks to the use of *Computer Aided Design*<sup>7</sup> (CAD) and 3D modelling, it was possible to carry out an analysis of spatial organization of settlement complexes from Milejowice and to determine individual phases of development of designated zones. Thanks to spatial imaging one can now see more. The possibility of working in a program for creating 3D images, viewing models from any angle and distance introduced a new quality to research work.

<sup>7</sup> Jarosław Kopiasz used CAD software to analyze the spatial organization of settlement complexes from Milejowice.

The visual presentation of settlement complexes from the early Iron Age discovered at the site in Milejowice is a source of information on the construction of the Hallstatt period. The visualization verified the collected data, and 3D modelling supported the interpretation of research results. 3D images are becoming an increasingly popular form of presenting knowledge about cultural heritage. Showing the structure of the settlement in a spatial way allows the recipient to better understand the message. A clear image message does not require specialist knowledge to read it. However, it should be remembered that it was created in accordance with the intention of researchers. This means that the image in the form of a reconstruction is completely complemented and it leaves no scope for a wider interpretation. The results obtained are not a reproduction of the past, but its probable version (Koszewski 2015, 99). Based on similar sources, one can build different visions of the same archaeological feature. The process of data interpretation and processing depends on the researcher, which means that the final digital model created is marked by the decisions made by its creator (Szrajber 2014, 115). Wrong decisions contribute to the dissemination of a false iconographic message. Włodzimierz Rączkowski (2018, 232) aptly described this problem. "[...] once prepared, a visualization becomes a kind of 'binding' representation of a given feature/site/landscape. According to M. Heidegger, it 'covers' a real object and hinders the creation of new, alternative ideas. Visualization created and 'dedicated' to the recipient as a form of interpreting reality, although it is subject to the recipient's assessment, also acquires a kind of agency. Through its existence it somehow shapes/affects our imagination". Despite the fact that the reconstruction of the settlement complexes from Milejowice made by using modern imaging methods is not free from hypothetical elements, it does contain important information on spatial organization and the construction of settlements from the early Iron Age. The visualizations presented in this article are, as already mentioned, a certain suggestion which can become a contribution to further discussion on the use of 3D modelling for the reconstruction of archaeological features.

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