Virtual Reconstructions and Building Archaeology in Bohemia

A Digital Model of the 14th-Century House U zvonu ('Zur Glocke' / 'At the Sign of the Bell') in Prague

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The pictorial representation of spatial, architectural aspects, today called 3D modelling, has a long tradition in Czech building archaeology. In order to illustrate what historical buildings looked like in the past, isometric drawings maintained the parallel lines measurable into the depth of space. This technique was more common than perspectival depictions, which converged into a vanishing point.

Nineteenth-Century Pictorial Reconstructions

The pictorial reconstruction of a no longer extant building from the past usually starts with bird's eye views. One of the oldest Bohemian examples is the pre-scientific 'reconstruction' of the shape of the Minster in Sedlec (Sedletz) at Kutná Hora (Kuttenberg) (fig. 1). A copperplate print (1824) supposedly shows the hypothetical design of the monastic complex before its destruction in the Hussite wars in 1421.[1]

It is noteworthy that the depiction of the church was complemented by relevant information about the formal architectural system of Gothic cathedrals, while the other monastic buildings and the gardens were represented in a simpler manner and in an almost Baroque or Neoclassical style, i.e. in accordance with the stylistic preference of the time. This architectural portrait, as happened in many similar cases, was aimed at local history and was not the result of professional research.

The same applies to some of the oldest illustrations in A. Sedláček's work 'Hrady, zámky a tvrze království Českého' (Castles, Palaces and Fortifications in the Kingdom of Bohemia). This very extensive and elaborate work, which was published in 15 volumes from the end of the 19th to the beginning of the 20th century, is one of the most fundamental early works of castle research in Bohemia and is still being used today as the starting point for building archaeology or for dealing with the written sources. Nonetheless, the early volumes of this work contain pre-scientific reconstruction attempts that are stylistically based on romantic inspiration.
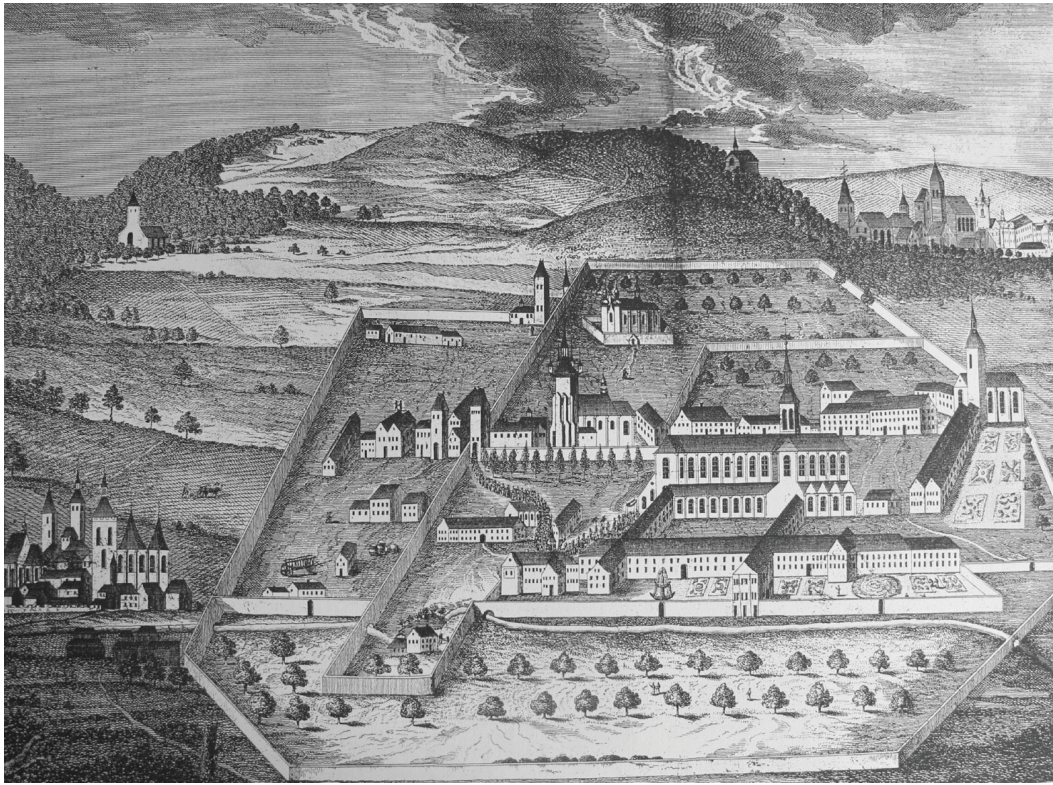
Fig. 1 Sedlec (Sedletz) Monastery at Kutná Hora (Kuttenberg) in Central Bohemia, a 'reconstruction' of the state of the monastery before its destruction in the Hussite Wars in 1421; copperplate print by F.J. Devoty from 1824; inscription above image: 'Monasterium sedlecense ante hussiticam devastationem'.

At the time, there were no walls left standing upright, only single ramparts and trenches of the little fortress Blatnik (a moated castle) in Eastern Bohemia were preserved (fig. 2 left). It was imaginatively reconstructed as a rather theatrical complex (fig. 2 right).[2]

Fig. 2 Former moated castle Blatník (Blatnik) in Eastern Bohemia; left: plan of the castle site according to F.A. Heber; right: romantic 'reconstruction' in the work of August Sedláček, 1882.

In contrast, although the reconstruction attempt of Kunětický hrad (Kunětická Hora Castle) (fig. 3 left) was also in the style of a romantic landscape painting, it still offered a relatively convincing idea of the condition of the building in the 15th century (fig. 3 right).[3]
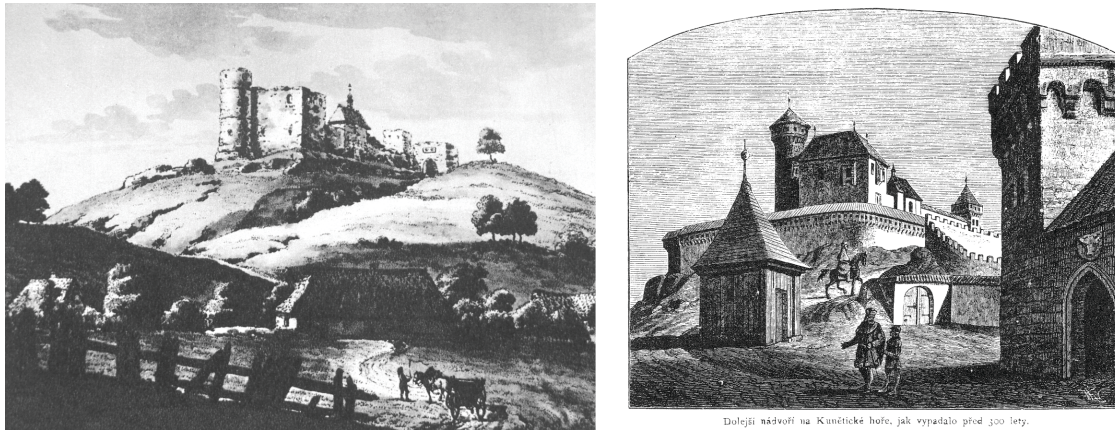

Fig. 3 Kunětický hrad (Kunětická Hora Castle) in Eastern Bohemia; left: depiction of the ruined castle at the end of the 18th century (after F.C. Wolf, 1798); right: reconstruction attempt in the work of A Sedláček, 1882.

At the time, also tangible 3D models of castles, such as the life-size model of Kokořín (Kokorschin) castle, which hosted the 1895 Ethnographic Exhibition in Prague (fig. 4).[4] It was not so much a reconstruction, as the representation of the state of the ruined castle as it stood then at its real site.
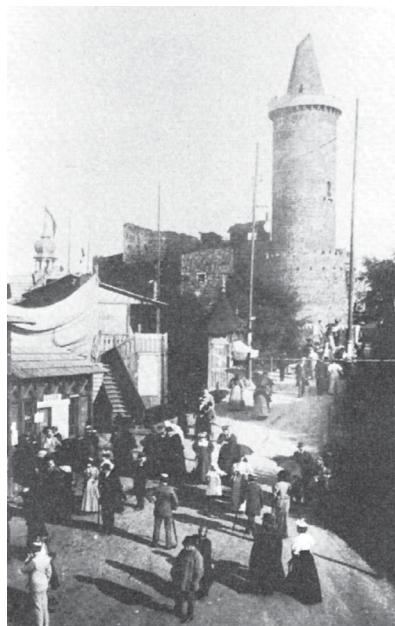

Fig. 4 Life-size model of Kokořín (Kokorschin) remains of a ruined castle at the Ethnographic Exhibition in Prague, 1895.

The life-size model of the ruin was used as a 'frame' for the dioramic presentation of a battle against the Saxon army in Northern Bohemia in 1203. Incidentally, the pavilion of the Bohemian tourist board (fig. 5) tried to look like the fictitious gatehouse of a medieval city or castle.

Fig. 5 Pavilion modelled after a medieval city gate at the same fair (photo: 1895).

Those two examples illustrate the role of medieval 'reconstructions' during the late national heritage movement in Bohemia at the turn of the 20th century. Spatial representations, in the sense of 1:1 models and perspectival images established a new and expressive medium.

The Birth of Early Building Archaeology during the First Half of the 20th Century. The Example of the St Agnes Convent in Prague

During the time between the two World Wars, the discipline of science-based building archaeology developed alongside archaeology in the young Czechoslovakian Republic. Both fields focused more closely on cultural history, art history and building conservation than on local history.[5]

A paradigm of collaboration between archaeology and building archaeology was constituted by the exploration of Prague Castle as well as by research on the St Agnes convent, built as a royal commission in ca 1230 in the Old Town of Prague.[6]

During the war, between 1940 and 1942, the detailed investigation of the convent, including the 13th-century burial place of the royal Přemyslid dynasty, was a secret expression of Czech national pride at the time of German occupation; nonetheless issues of reliability and methodology were not neglected. To the contrary – the extraordinarily elaborate documentation, including a number of isometric drawings, greatly raised the level of building archaeology at the time.

Fig. 6 Convent of St Agnes in Prague (ca 1230-1265 in four building phases); investigative campaign of ca 1940-42: Archaeology conducted by Borkovský, building archaeology by Stefan, documentation by Nezbeda et al. The former monastic church St Francis with two naves, used as a cemetery since the 18th century; isometric drawing of the fundamental structure of the building (1941) and photograph of the archaeological excavation (1940).

Along the way, it became clear that a full understanding of the fragmentary building structures would only be possible if taking into account all three dimensions. Accordingly, it was necessary to have both ground plans and sections as well as easily understandable isometric drawings conceivable in 3D (figs. 6-8). This image-based thinking was sharpened by the 'school' of Czech architectural building researchers, who were trained to consider buildings in all of their spatial dimensions and who visualized them extensively.

This special medial tradition of pictorial reconstructions in a technical draughting style was continued after the war; three-dimensional reconstruction drawings corresponding to this tradition were particularly connected to the names Menclová, Muk and Radová, well into the 1960s and 70s.
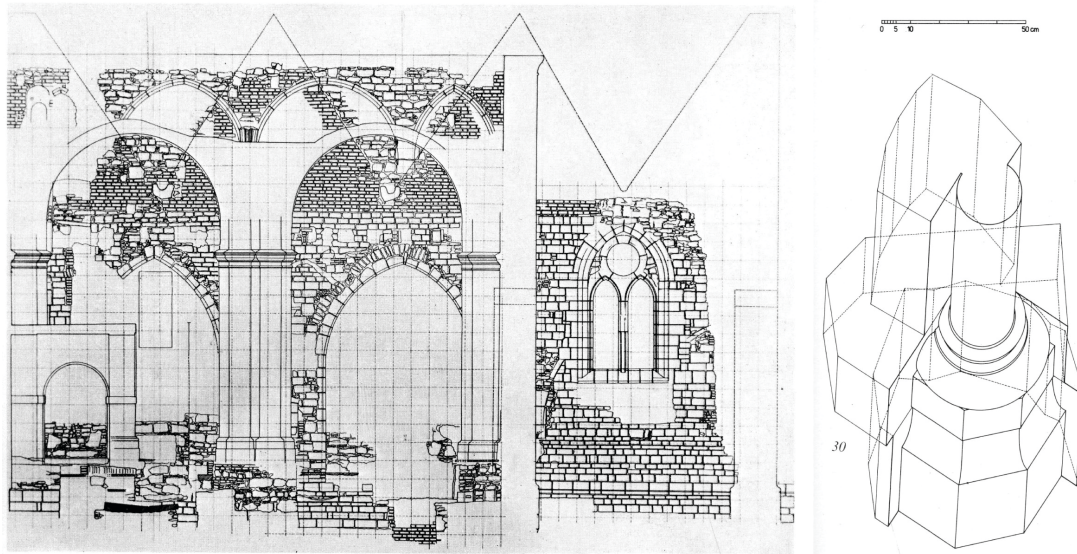
Fig. 7 Convent of St Agnes in Prague, building record of the southern wall of the church of St Francis
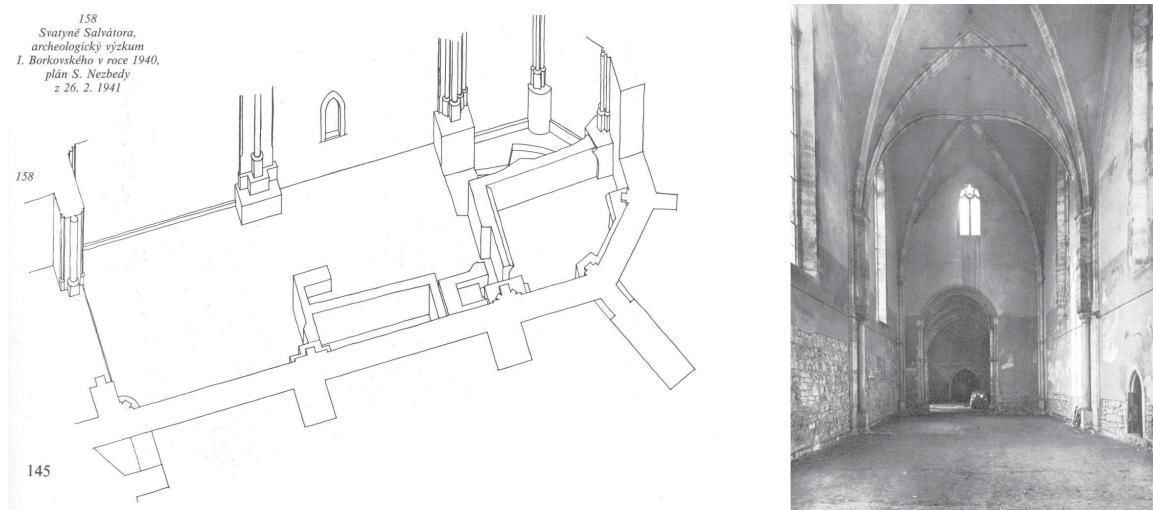(1960s) and isometry of the early Gothic bundles of shafts added to a newel (1945).

Fig. 8 Convent of St Agnes in Prague, mausoleum of the Přemyslid dynasty – St Salvator;
isometry (1942) of the burial place and overview (1943), state of preservation in the 1940s.

However, even in the 1950s examples of older depictions in the style of romantic views still existed, including imaginary theories concerning the appearance of the castles of Martinice (Martinitz), Zrbek and Zvirotice (Zwirotitz), which had been archaeologically investigated.[7] The amount of so far unknown details of the buildings to be reconstructed became a central descriptive and scientific problem (fig. 9).
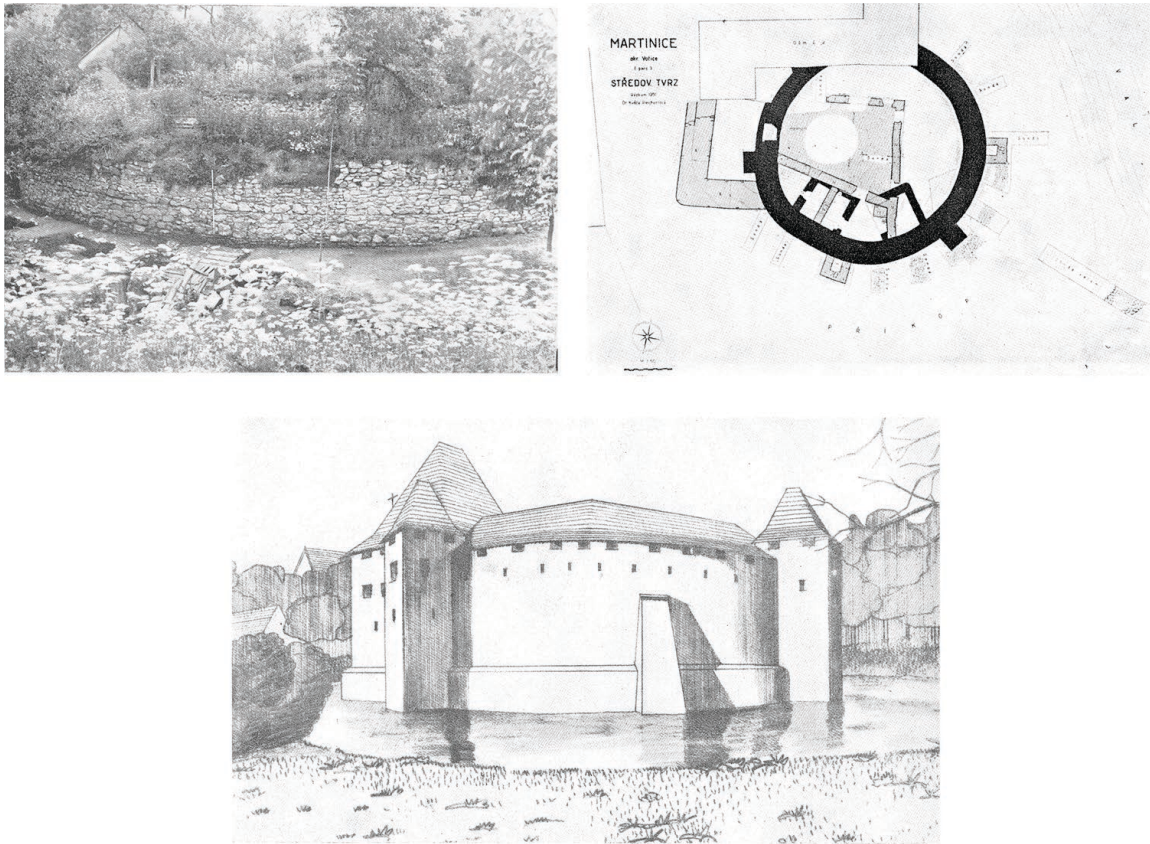
Fig. 9 Martinice (Martinitz) in Central Bohemia; state of the basic structure of the building during the archaeological excavation, ground plan and reconstruction attempt (1955).

Reconstruction Drawings by D. Menclová

The technical style of the school of architects and buildings researchers was used by D. Menclová in her 1972 work *České hrady* (Bohemian Castles).[8] While reconstructing the façades, the remaining building structure was used as a point of reference (fig. 10). Many castles were reconstructed as isometric drawings or bird's eye views; their depiction is usually based on reliable information on building structure, resulting from the research of the building's condition, as well as on spatial structures and their functions. Yet, these representations are lacking in many details and contain uncertain aspects, whose range of probabilities cannot be clearly expressed in the images.

Some reconstructions executed as tangible models (fig. 11) reached a state of appropriate clarity and simplicity while many were still beset with many uncertain details (fig. 12).
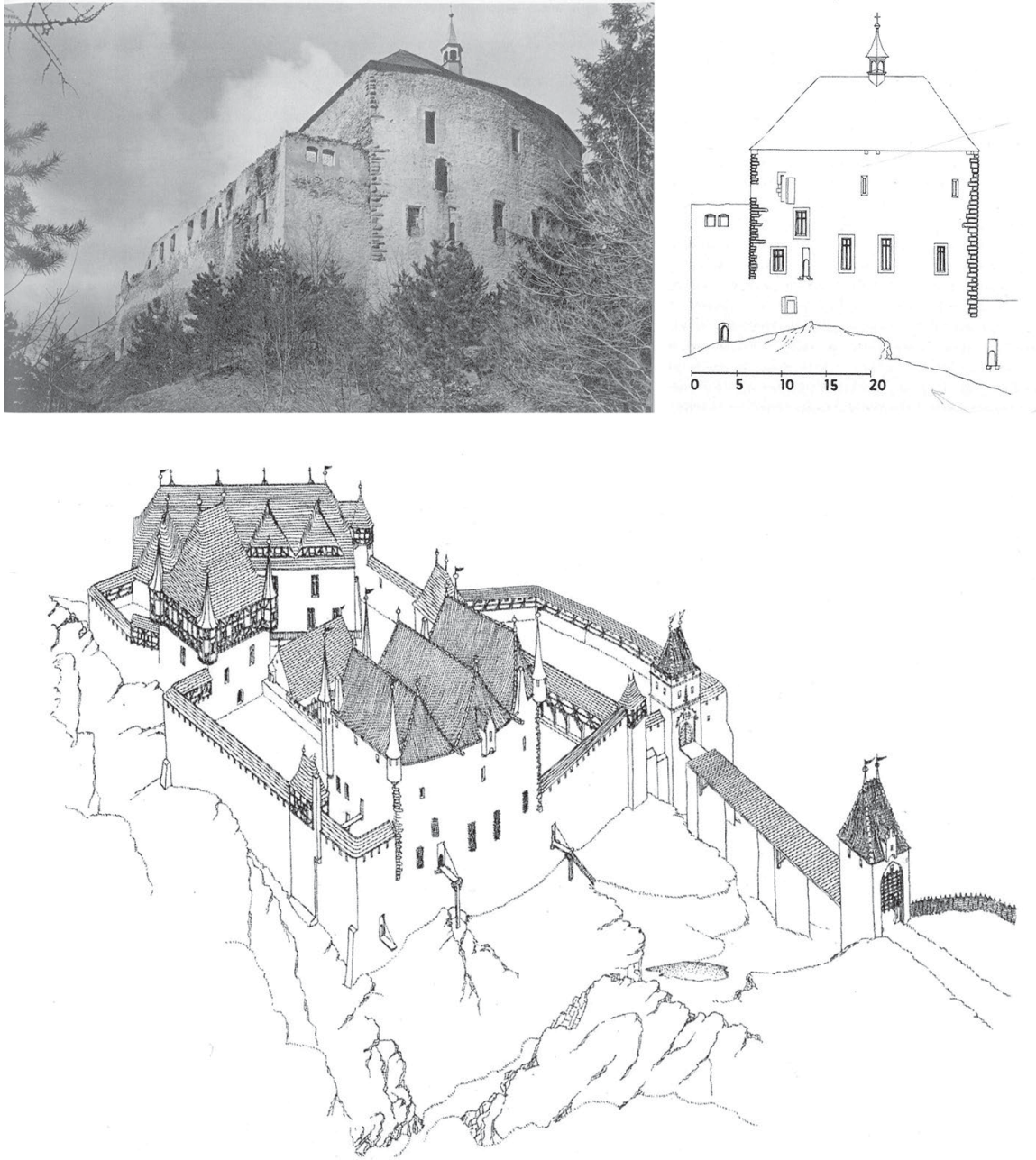
Fig. 10 Ruin of the royal Točník (Totschnik) castle, ca 1400; photo of the fundamental building structure, building survey and reconstruction from the bird's eye perspective (1972).
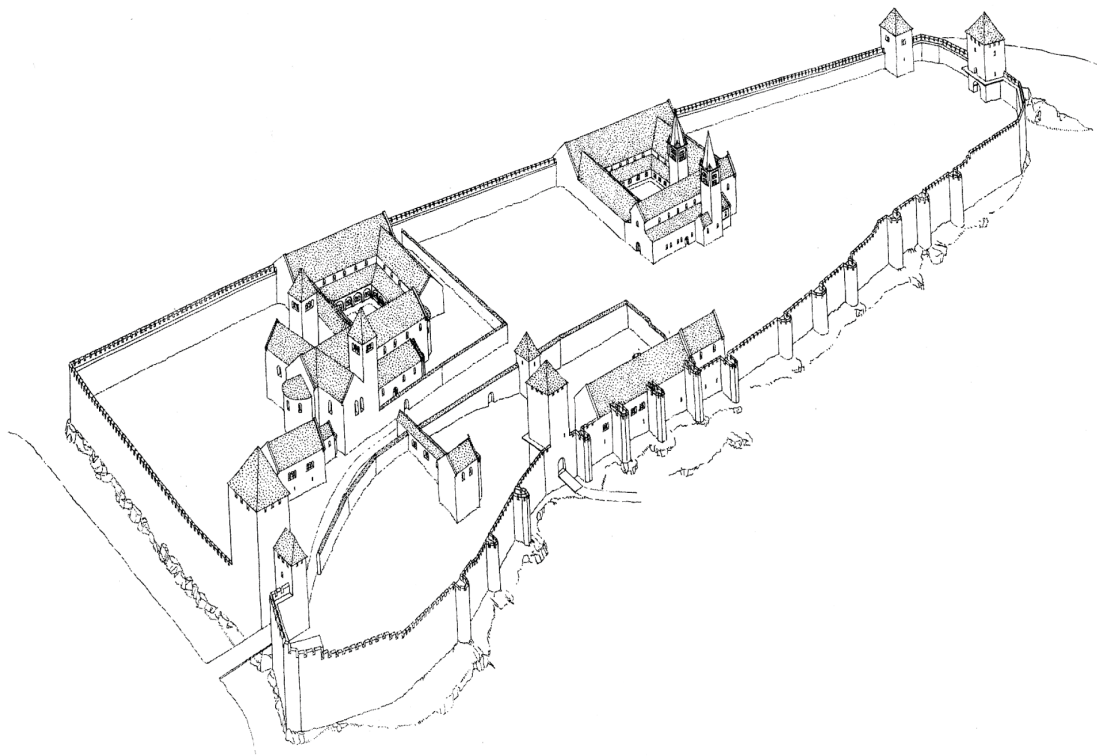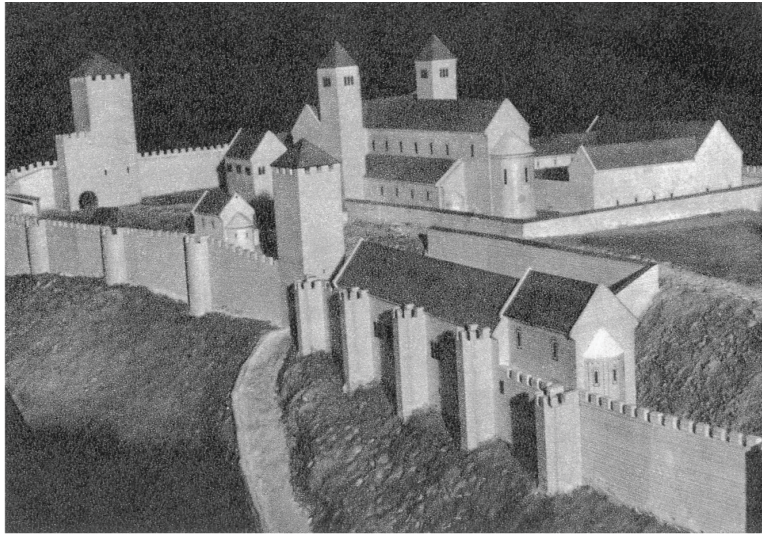
Fig. 11 Prague Castle, late 12th century; tangible model and bird's eye view (1972).
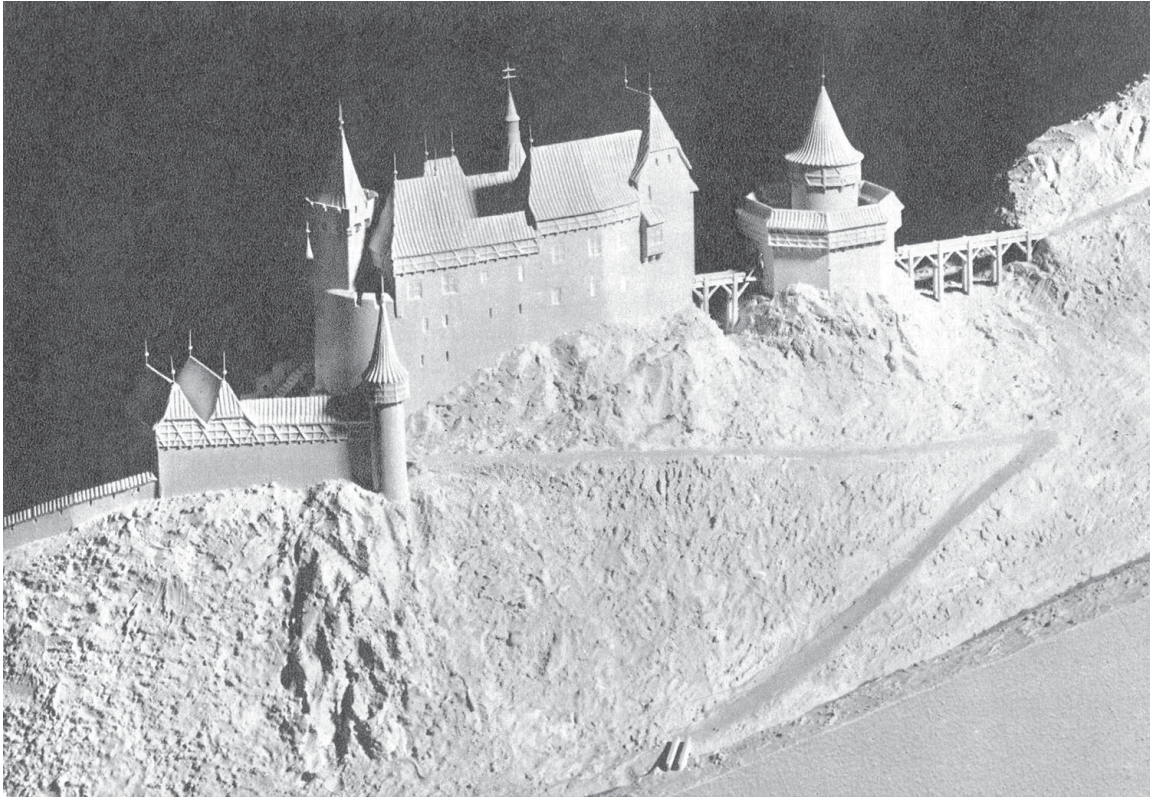
Fig. 12 Český Šternberk (Bohemian Sternberg): fortifications with ramparts from the 15th century;
model by D. Menclová, 1972.

New Methods of Representation in the 1980s: P. Chotěbor

When the work on the illustrations for the first, still very limited edition of the new compendium of Bohemian castles by T. Durdik started in 1984,[9] the artist, architect and building researcher P. Chotěbor initiated a discussion about the respective reliability of different forms of reconstructive representation.

A comparison of the depictions of Okoř castle by D. Menclová and P. Chotěbor regarding style and content illustrated the most important differences between the two philosophies of representation employed: most importantly, Chotěbor omitted all detail and the focus was on the depiction of the building's scale (fig. 13).
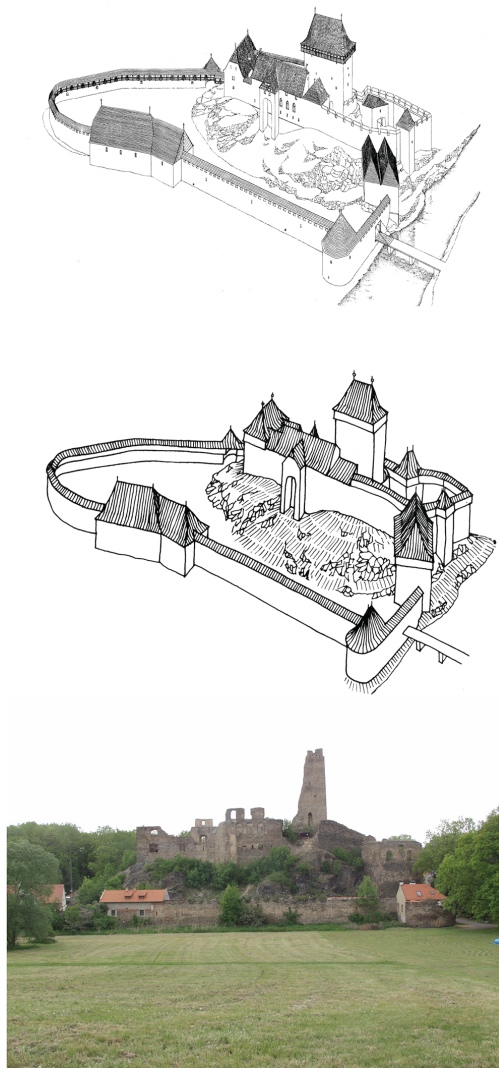
Fig. 13 Comparison of the depictions of Okoř Castle in Central Bohemia by Menclová (1972) and Durdík with Chotěbor (1984). The condition of the castle's ruin is documented in the photograph (2013).

The comparison of the possibilities, limits and risks of these different concepts of representations is easily demonstrated by using the example of Skalsko Castle (fig. 14). All that remains of the castle are the castle grounds with a clearly visible moat and a few remnants of the walls. Chotěbor exemplified diverse degrees of detail, even in the less detailed volumetric model he worked with alternatives, since too little information on the castle's ruin was available without an in-depth archaeological investigation.[10]

In addition, Chotěbor worked with different kinds of tangible models, in particular those made from clay (fig. 15). Because of his choice of material, the details that could not be clarified had to be left off.
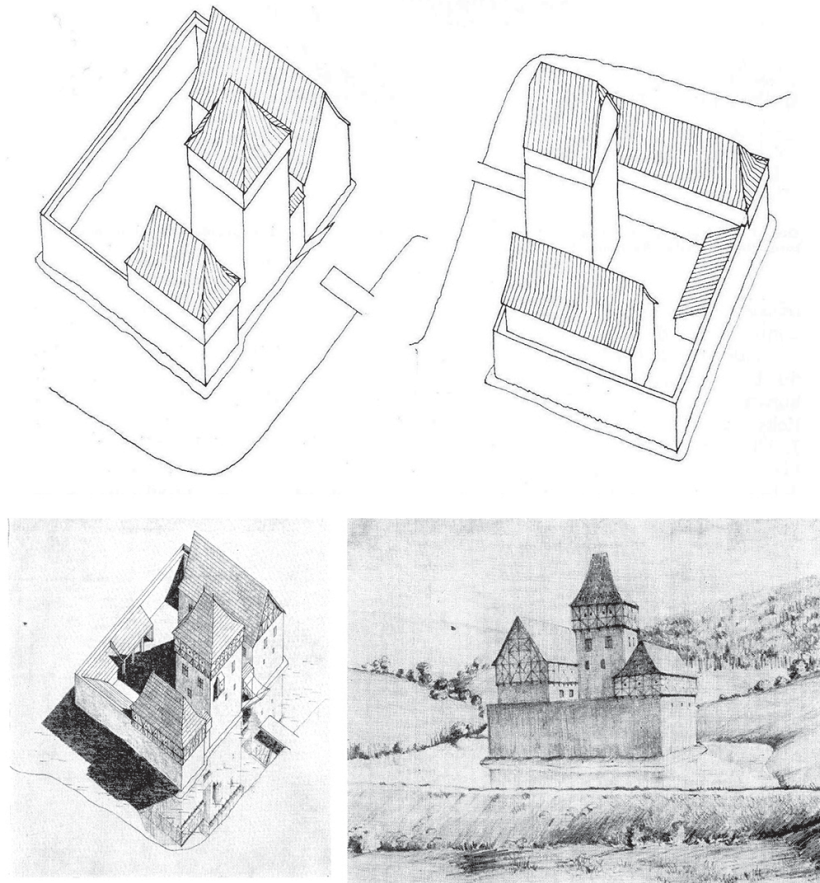
Fig. 14 Ruin of Skalsko Castle in Central Bohemia, reconstruction attempts without the benefit of
archaeological research; volumetric reconstruction depicting alternatives
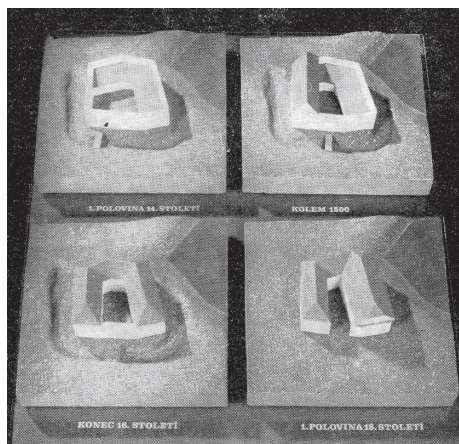compared to many uncertain details (after P. Chotěbor, 1987).

Fig. 15 Reconstruction of Dřevčice Castle in Central Bohemia in four building phases;
clay model by P. Chotěbor, 1987.

The emphasis of the less detailed volumetric reconstructions modelled on Chotěbor's example were accepted as a standard in Czech building archaeology ever since, especially for the representation of former building phases of which very little information is available, i.e. in the case of ruined castles.

Visualization of the Interior Room Structures – M. Radová, 1972

Another line of tradition needs to be introduced here: ever since the 1970s, the archaeologist M. Radová[11] and her doctoral student J. Škabrada[12] had worked with simpler, 'transparent' isometric drawings. These not only meant to depict the former outward appearance, but were also supposed to offer a way to explore the building's interior spatial structure. As a result diverse reconstruction attempts of the staircase (fig. 16) and of the vertical development of the building structure were executed. This tradition of pictorial 3D representations is rooted in a school of architectural thinking that always considers a building as a 3D object (fig. 17).
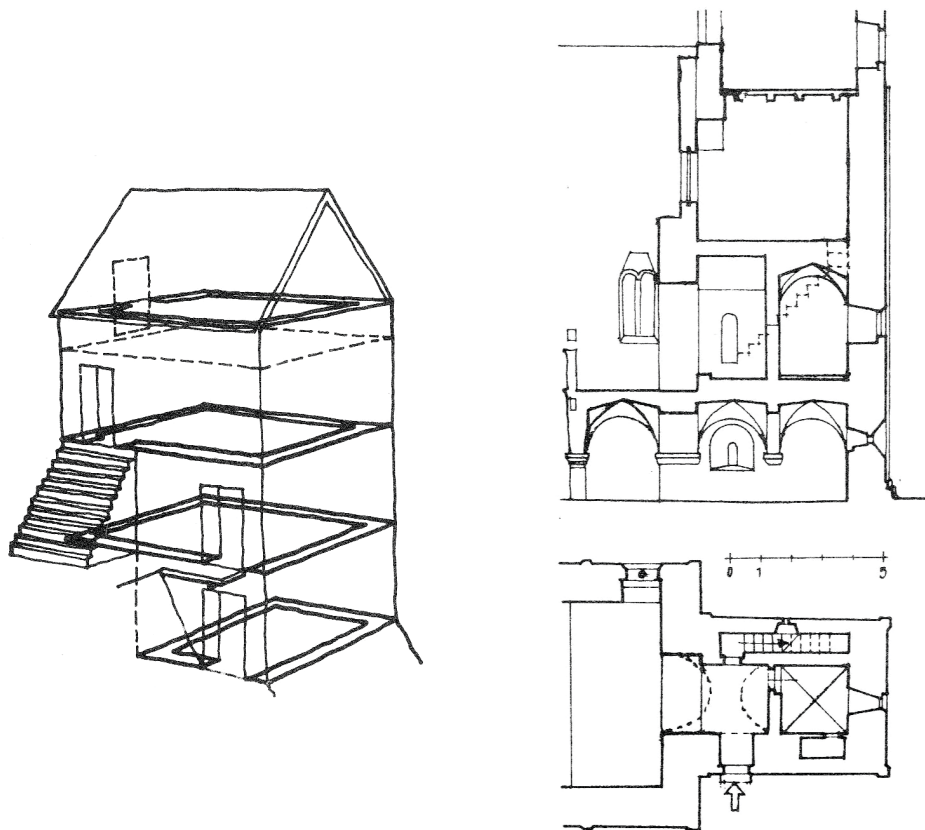

Fig. 16 Vertical communications and '3D' deliberations by M. Radová, 1972
Left: the house in Mergoscia (Tessin) in Switzerland, sketch of the motion analysis
Right: Vroutek (Rudig) in North-western Bohemia, spatial situation of the stairs
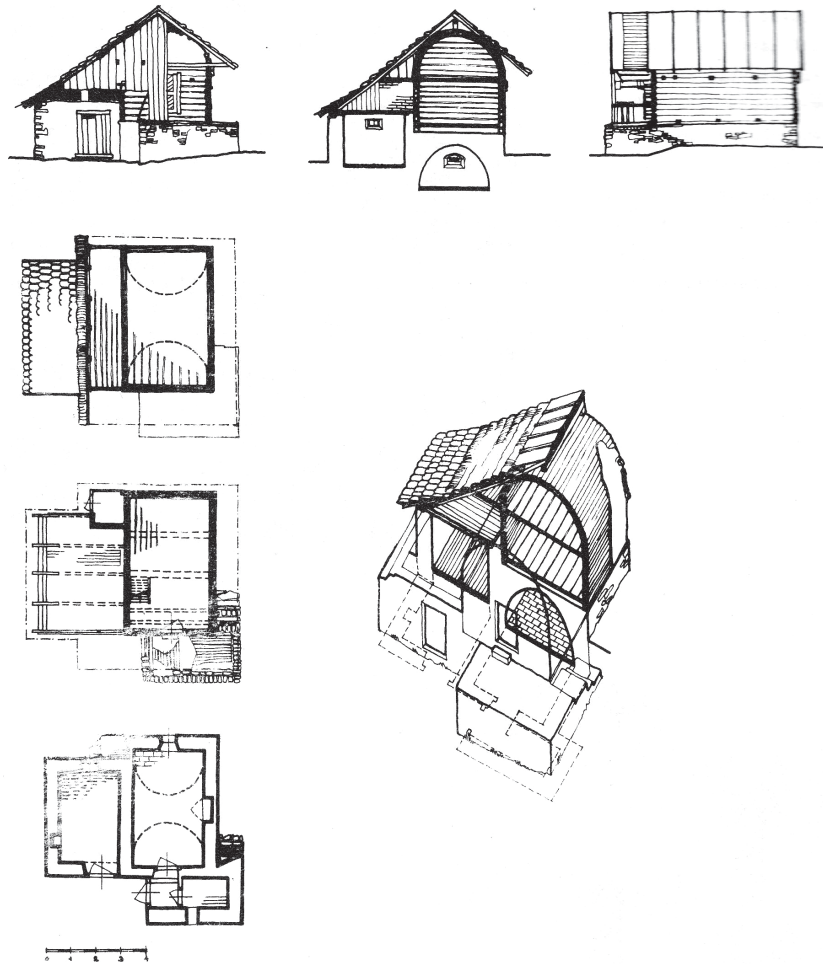in the Romanesque church.

Fig. 17 Spatial situation in the attic of the granary in Dolany (Dolan) in Western Bohemia (dated to 1807);
ground plan and isometric drawings, J. Škabrada 1972.

The Present: from Hand-drawn Images to Computer Aided Design (CAD)

What is typical for the current situation are attempts to incorporate the abovementioned pictorial methods of building archaeology into digital models via CAD. One example is the digital reconstruction of the church in Starý Plzenec by M. Hauserová and O. Malina (fig. 18). Although this research was presented at a conference in 2008,[13] it has remained unpublished.
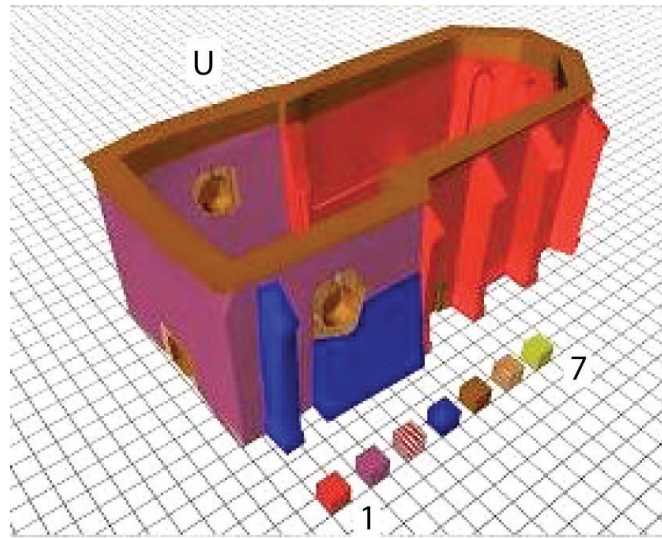
Fig. 18 Starý Plzenec in Western Bohemia, municipal church (St John Baptist); building archaeology
entered in a 3D model (after M. Hauserová and O. Malina 2008).
U – Irregularity in shape is in accordance with the ruins of the Romanesque church.
1 – High Gothic
2 – Late Gothic I
3 – Late Gothic II
4 – Renaissance
5 – Baroque I
6 – Baroque II
7 – Neoclassicist

The communication and functions within the building are an important subject of research in all European contexts. The Episcopal castle Litovice (Litowitz)[14] (fig. 19) may serve as an example for diverse types of layout of rooms distributed over several floors and how this distribution changed over time. The graphical diagrams may depict different qualities of this use of space and of the movement of people through the building: the castle owner in two areas – 'at home' and 'on the way home'; the visitor – visiting or visiting inside the house, arranged according to hierarchy and etiquette; finally, the servants, according to their rank, are envisaged as they tend to the fireplaces, dinner table and storage rooms.

This depiction in a simple isometric drawing offers the necessary clarity, and thus makes a review of theories and deliberations possible.

Pohyb domácího, tedy majitele:

přístupová trasa do bytu ve smyslu "jdu domů"

trasy pohybu uvnitř dispozice, ve smyslu "jsem doma" (nejsou rozlišeny dle četnosti pohybu) počítá se i s cestou do suterénu (spec. úschova, nespalná místnost)

zvláště významná trasa pohybu domácího: příchod do předpokládaného audienčního prostoru a do kanceláře zároveň

cílové místo k pohybu a činnosti

Pohyb návštěvy

přístupová trasa "jdu na návštěvu"

pohyb návštěvy po budově - "jsem na návštěvě"

cílové místo k pohybu a činnosti

Pohyb obsluhy

"hrubé" zásobování, beze styku s majitelem

obsluha palivem, donáška jídla z vnější kuchyně, nevstupuje do soukromých prostorů

"blízký služebník", zásobování drobnostmi ze sklepa a po celé výšce objektu v zásadě se kryje s pohybem pána vzhledem ke stáří a postavení majitele je existence takové osoby velmi pravděpodobná

cílové místo k pohybu a činnosti

Red: Movement of the owner
1 – Line of entrance on the way home
2 – Lines of movement when at home
3 – Particularly important line: from the apartment into the reception room (which probably also served as a chancellery at the same time)
4 – Goals of movement and activity (rooms with various functions)

Green: Movements of the close, familiar visitor
5 – Lines of entrance when coming for a visit
6 – Lines of movement when there for a visit
7 – Goals of movement (rooms with various functions)

Blue: Movement of maintenance, sorted by hierarchy
8 – Delivery into the storage rooms in the basement and ground floor
9 – Delivery of food from the adjacent kitchen building and tending to the fireplaces with firewood
10 – Delivery of trifles, full rights of entrance – one companion, the valet
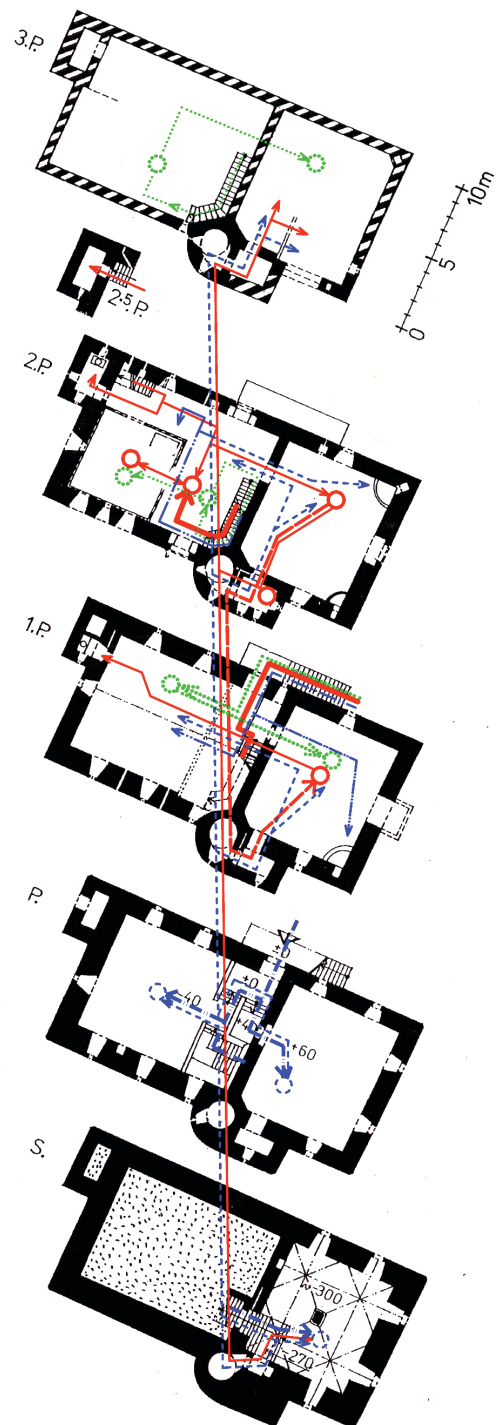11 – Goals of movement and activity

Fig. 19 Litovice (Litowitz), episcopal castle at Prague, functional scheme from the time of construction (1335 according to dendrochronology); building archaeology M. Rykl, 1995 and 2000, graphical assistance M. Fischerová, 2010.

If detailed building archaeology makes this process possible by means of documentation and evaluation, an isometric drawing of the main floor may also be considered for this purpose, in particular when it offers an appropriate amount of details. This assumption is confirmed, for example, at the town houses no. 151 (fig. 20) and no. 237 in the Old Town of Prague.[15]
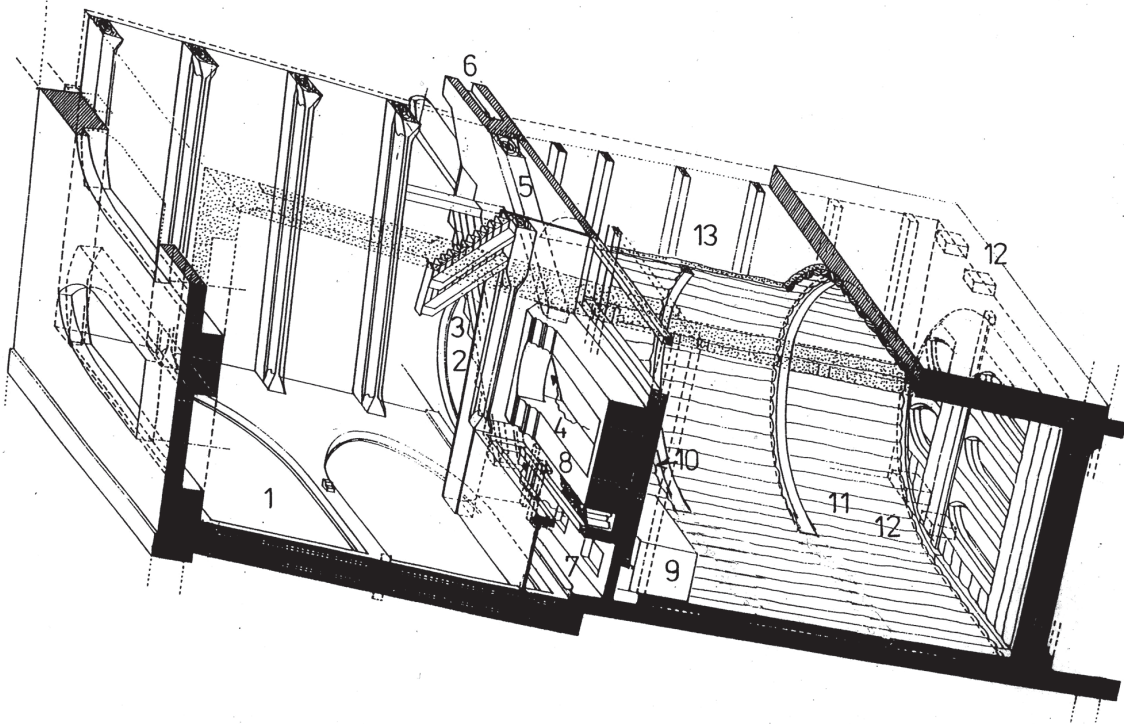

Fig. 20 House no. 151 in the Old Town of Prague, isometric drawing of the main floor – 1st floor building archaeology M. Rykl, graphical assistance D. Dobeš, 2003.

The uncertain details are drawn in broken lines (fig. 21 left). Even a small amount of details datable to the time of construction leads to a volumetric model of the ground floor and mezzanine (fig. 21 right).

The 3D representation of the group of houses in the Old Town of Prague served two functions – both as a means of evaluation and as a clear presentation – and it depicted the structure of three houses combined.[16] An analysis of the borders between the buildings led to the discovery that, surprisingly, these houses had been constructed from contiguous walls and ceilings (fig. 22).
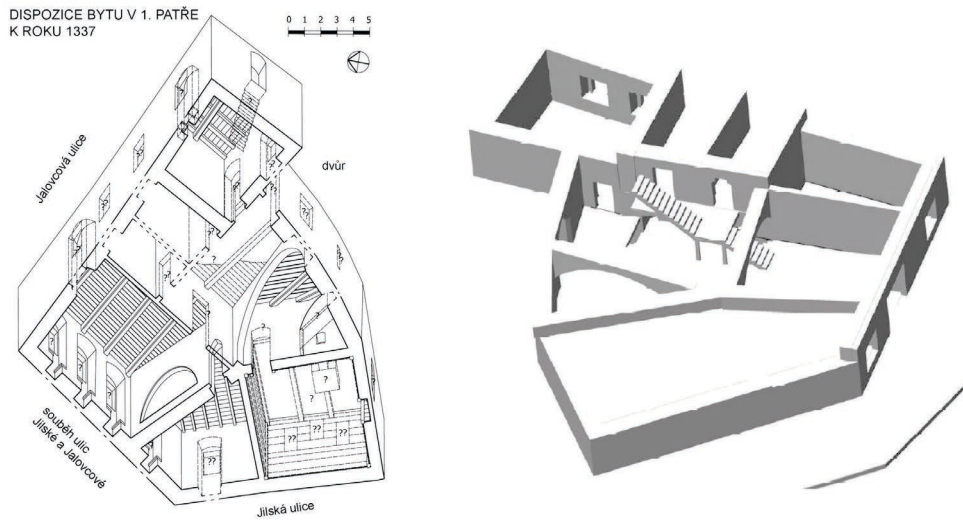
Fig. 21 House no. 234 in the Old Town of Prague; building archaeology by M. Rykl and J. Beránek.
Reconstruction of the appearance at the time of construction (1337 according to dendrochronology).
Left: isometric drawing of the main apartment on the 1st floor; graphical assistance (AutoCAD) K. Knotová
Right: ground floor and living space in the mezzanine; computer model J. Vašek, 2005.

Fig. 22 Setup of the group of houses no. 151-3 in the Old Town of Prague, 1352 dendrochronology,
selection of 20 sections; building archaeology M. Rykl, 3D computer model J. Mezera (2005).

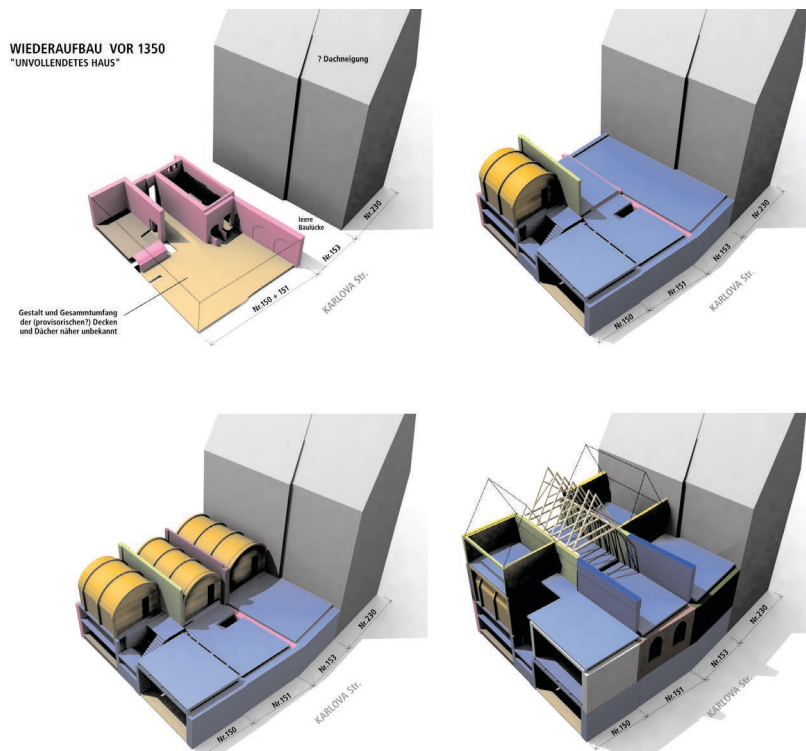Using P. Chotěbor's method as a starting point, there are now new possibilities in the portrayal of uncertain detail in the reconstruction of buildings – in traditional graphics by using broken or dotted lines, for example, which signify a different level in hierarchy, and in digital models with the help of transparent components. Malešov Castle is a case in point (fig. 23).
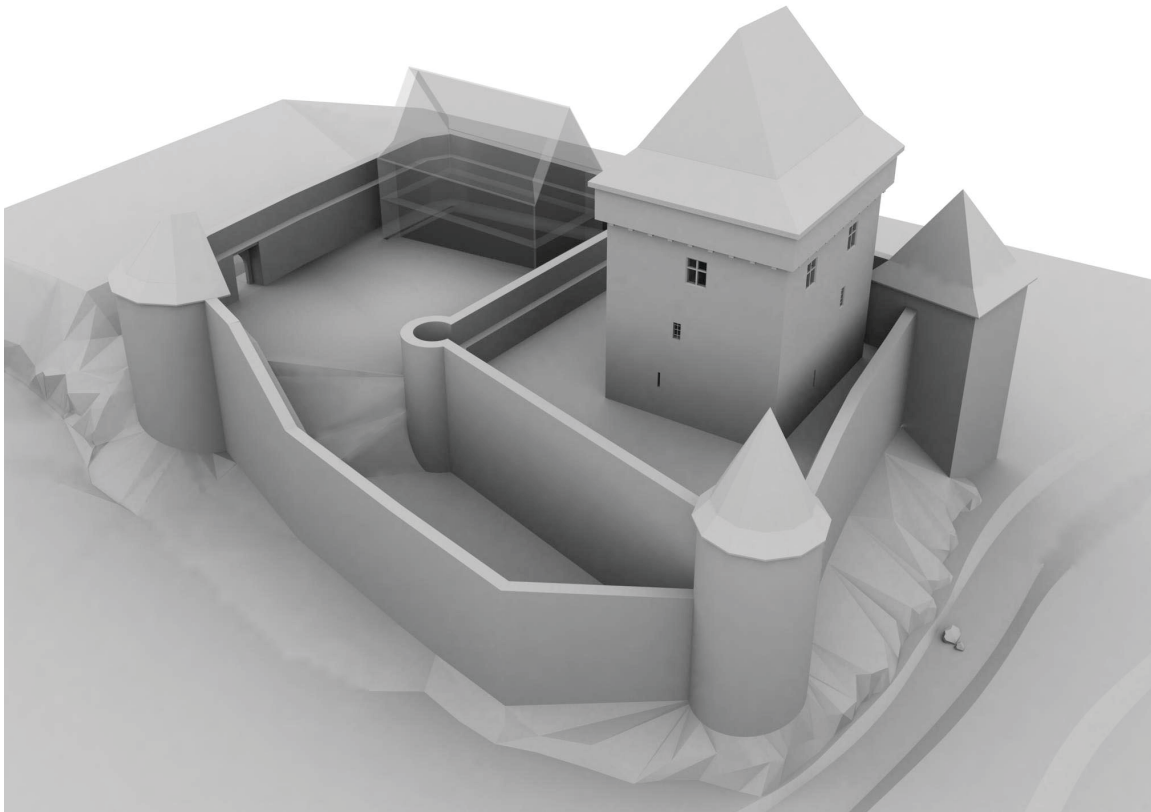

Fig. 23 Malešov (Maleschau) in Central Bohemia, reconstruction of its late Gothic appearance.
Uncertain elements are depicted transparently. Building archaeology M. Rykl and M. Semerád,
computer model V. Hájek 2009.

Recently elaborate, interactive or cinematic digital models of several Bohemian castles have been created. There is a model of Křivoklát (Pürglitz) castle,[17] for which the previous research by T. Durdik was summarized and adapted (fig. 24). A digital model with the option to do a virtual tour through and around Český Krumlov (Krumau) Castle was created and published by Z. Gersdorfová. In the subsequent building phases depicted, differences in the level of detail exist, which correspond to the available information regarding the structure of the building.

During these phases of construction diverse levels of detail were employed (fig. 25). By using the model, the author also verified certain paradigms regarding the elevations.[18] Therefore, the digital 3D model acts not only as a clearly arranged and attractive visualization, but also as a way of testing the reconstruction and our understanding of the spatial situation.

Fig. 24 The royal Křivoklát (Pürglitz) castle, computer model of its appearance in the 13th century by T. Durdík 2007, interactive computer model M. Menenga (2007).
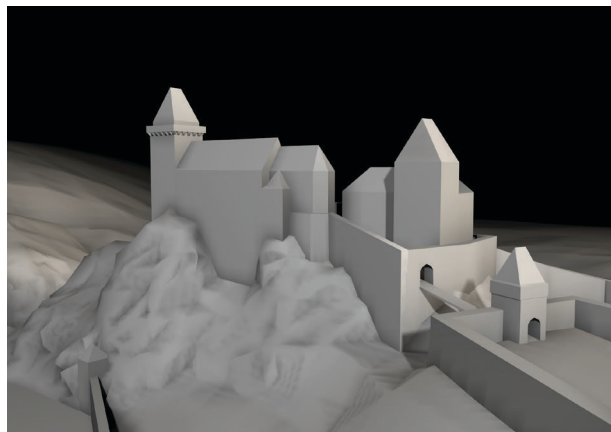

Fig. 25 The castle in Český Krumlov (Krumau), construction phase in the first third of the 15th century and again around 1600; computer model Z. Gersdorfová, published in 2010.

In conclusion it should be recognized that no model is made solely for its own sake, but mostly as a tool for research. And, sometimes the simple but clear hand drawings can be sufficiently expressive and more economical than a 3D computer graphic. In particular in those cases, in which the storeys continue on the same level, the depiction in the form of layered floor plans may be more adequate. The real and complete 3D dimensional representation, on the other hand, can be important to unravel and assess more complex forms of spatial and constructive structures – in particular when there is only a part of the actual building left.

Example: House U zvonu at the Old Market in the Old Town of Prague

In conclusion a tour through the residential tower of the house U zvonu (at the sign of the bell) in Prague shall be presented (fig. 26). This complex was built at the beginning of the 14th century as the city residence of the royal couple, using an older fabric of the palace's wings,[19] while the tower was newly built without using newer building materials.[20]
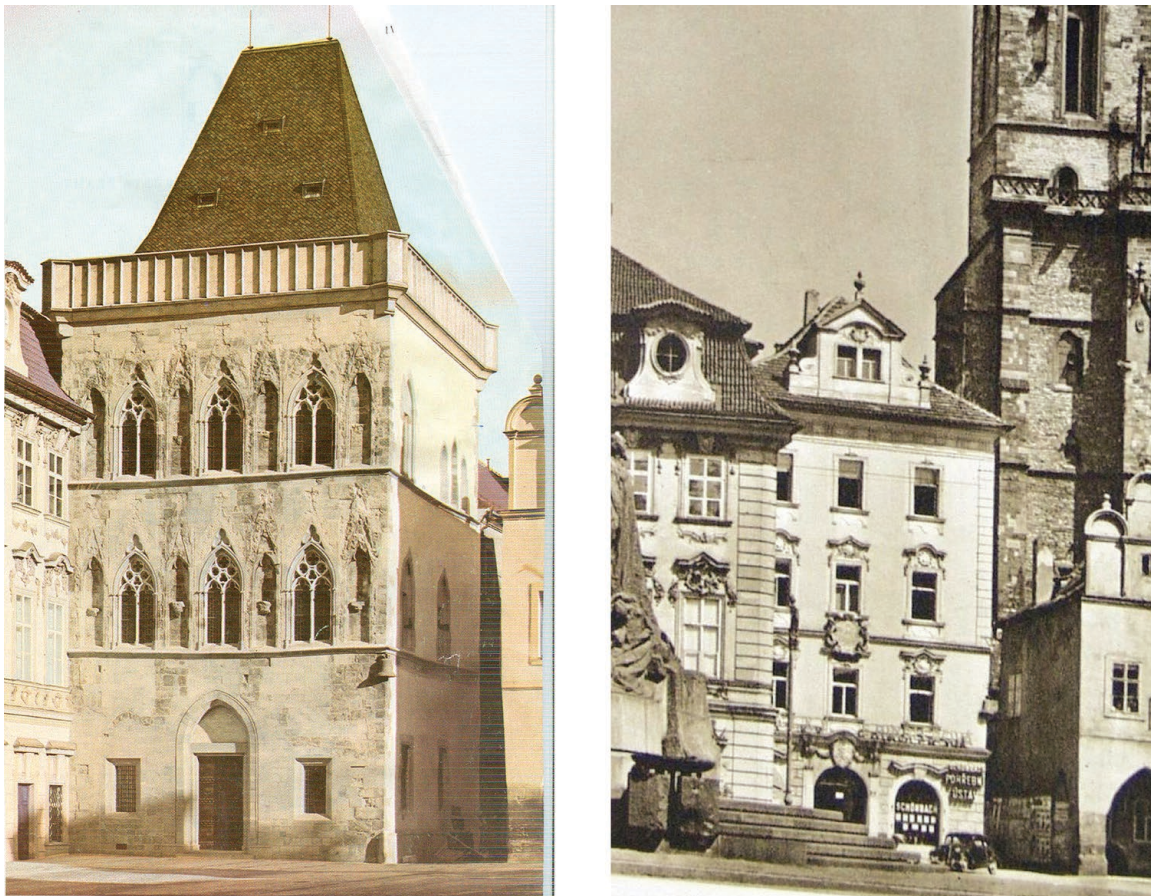

Fig. 26 Prague, Old Town, house no. 607, U zvonu, current state (left, photo from 2010) and appearance before the restoration in the Gothic style in the 1970s and 80s (right, photo published in 1955).

The building archaeology on the house was mostly conducted in the 1970s and 80s (fig. 27), before and during the real life reconstruction. But several features were misinterpreted or overlooked at the time.

The current re-evaluation in the building archaeology resulted in a changed perspective on the spatial structures in the second floor of the residential tower, in the basement and at the northern portals giving access to the spiral staircase.
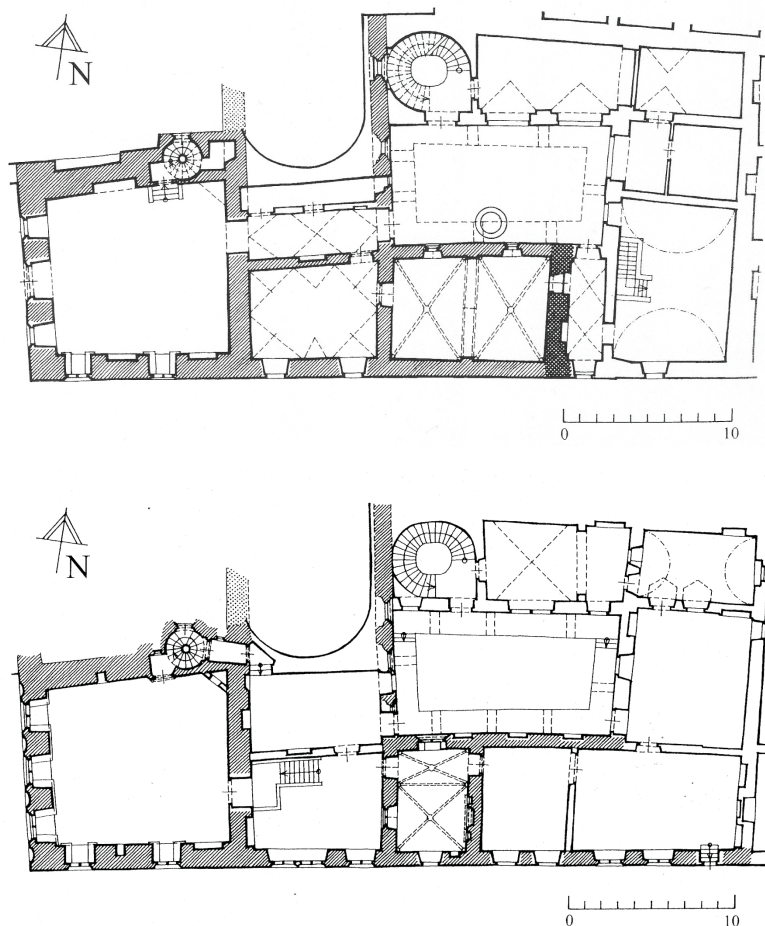
Fig. 27 Prague, house U zvonu, floor plan after J. Mayer and K. Benešovská (1971). In the intersection between the tower and the wing there is the spiral staircase, which connects all levels from the ground floor to the attic. Interpretation of the northern portals providing access to the staircase in figures 28 and 29.

For the thoughts focused on the northern portals leading to the staircase, the main method of research consisted of a survey of the elevation, using a 'table of elevations' (fig. 28). This table is a simple and clear means of inspecting the 'third dimension'.

The three rectangular portals stacked on top of each other and the distance between the portals do not correspond to a storey, neither in the tower nor in the wings.
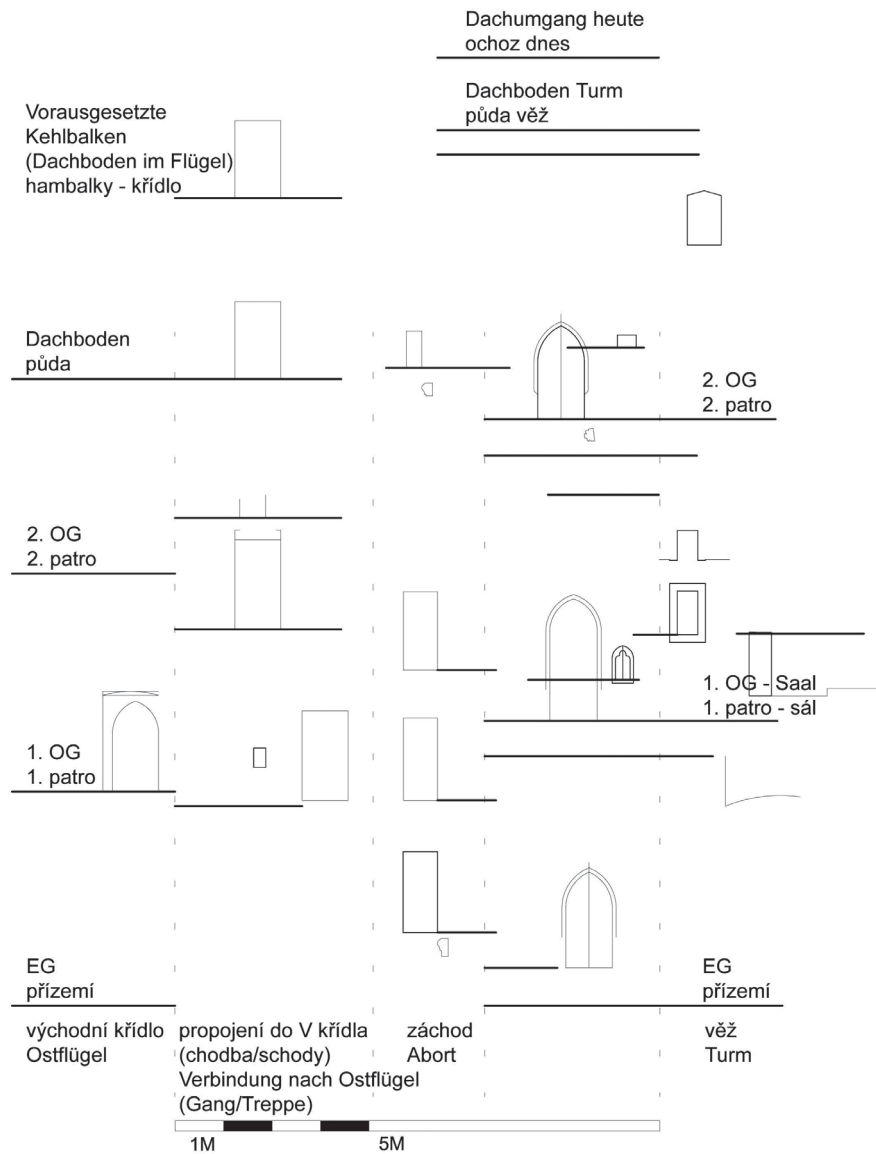
Fig. 28 Prague, house U zvonu. The table of elevations is a very clearly laid-out technique in 'three-dimensional' building archaeology. The situation surrounding the spiral staircase with three rectangular portals on top of each other can be seen in the middle of the table (2010).

Considering the spatial situation and the elevations, it was assumed that there might have been a guarderobe chute in the corner between the tower and the western wing, with three guarderobes arranged on top of each other (figs. 29-30). The room on the second floor of the tower is therefore interpreted as an apartment with a triple vaulted parlour[21] (figs. 31-33). Comparable examples of such parlours or similar rooms with a heating system (Stuben) are frequently mentioned in German literature.[22]

zwischen
1. und 2. OG

1. OG Flügel

1. OG - Saal

EG

0   5 m
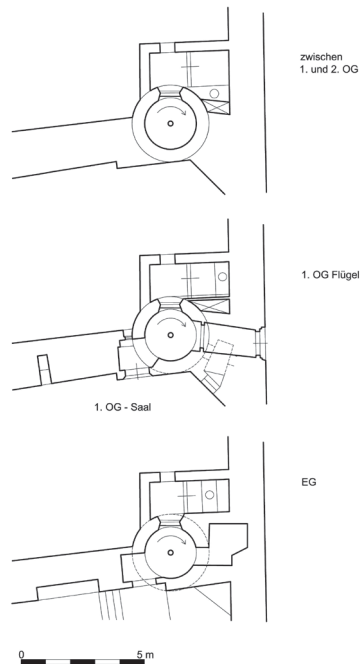
Fig. 29a Attempt to reconstruct the situation next to the spiral staircase. The three portals (passages without door leaf) lead into the antechamber of the guarderobe. The antechamber allows for minimal natural illumination of the stairs. Building archaeology M. Rykl, computer aid with the drawing (AutoCAD) V. Fanta, 2012.

Fig. 29b Rectangular portal between ground floor and first floor, the same as fig. 28 and 29c (2010).

Fig. 29c Computer reconstruction of the surroundings of the spiral staircase. Situation at the elevation level of the first floor of the tower, view towards the stairs, antechamber and guarderobe. The lighting conditions are clearly visible and vital. A video still from the virtual tour (computer graphic: V. Dvořák 2010).

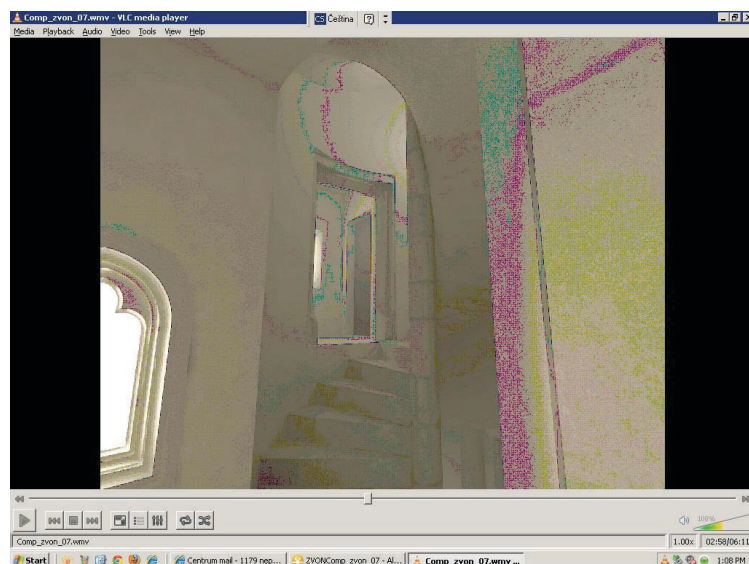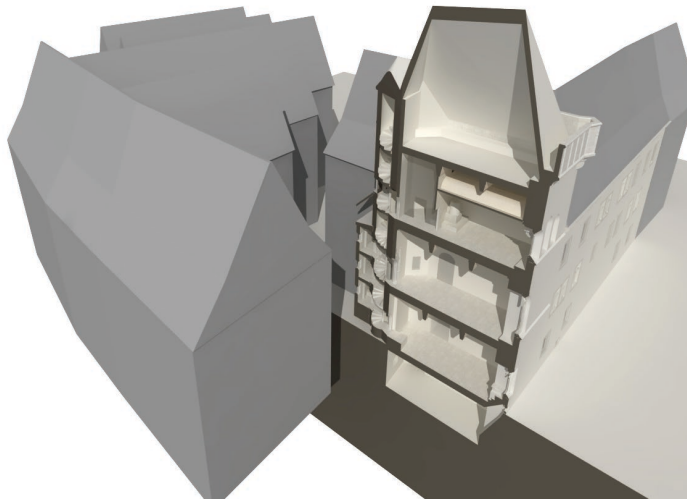Fig. 30 Section through the tower, the spiral staircase and the guarderobes. In the second floor of the tower, there is a section through the entrance hall and through the parlour with a reconstructed hearth in the corner. Additional buildings in the complex are depicted solely as empty volume.
A video still from the virtual tour (computer graphic: V. Dvořák 2010).

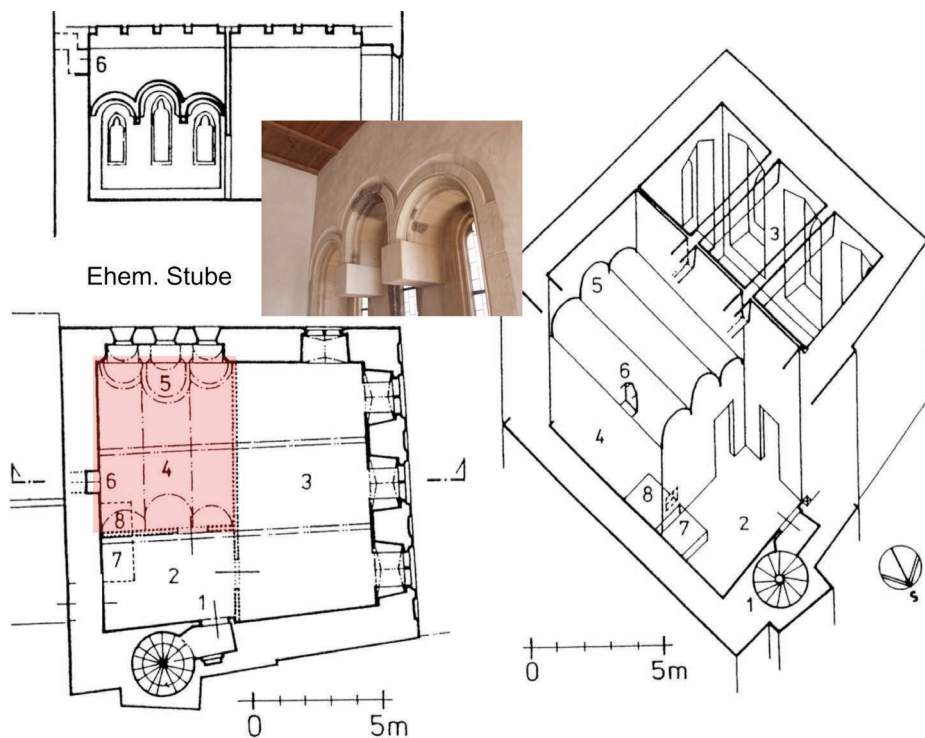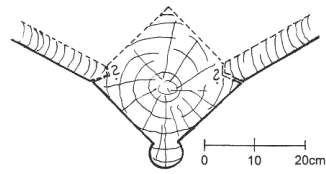Fig. 31 Ground plan of the 2nd floor of the tower. The former parlour is highlighted in red (8 is the hearth). Building archaeology M. Rykl and J. Škabrada 1996, drawing M. Rykl.
View toward the set of windows with the triple arch in the foreground.

Obr. 14. Klášter Heilsbronn ve Frankách, opatská kaple v 1. patře Nového opatství, kolem r. 1400. Trojlistý profil stropu vytápěného prostoru s omítanou čelní stěnou a fošnovou výdřevou na třech stěnách. Krajní pole trojlistu jsou tvořena třemi širokými fošnami, prostřední pole čtyřmi fošnami. Ve skutečnosti tedy jde o polygon, pouze do oblouku vytvarované

Fig. 32 Comparable room with richly carved wooden ceiling with triple arch.
Left: Heilsbronn monastery in Franconia, abbot's chapel 1400
Right: detail of the ceiling joist in Heilsbronn (drawing: M. Rykl 1997).

For the exhibition in 2010 a digital model of the house U zvonu was created,[23] which took these new findings into account. One thing should be noted regarding the credibility of this model: after a previously published discussion about the layout of the rooms on the second floor,[24] architectural elements that had neither been preserved nor analysed were nonetheless depicted as 'full graphics'. The same applied to the guarderobes next to the staircase. In other cases, the issue of the hypothetical positioning and shape is graphically and verbally broached in the current digital images (like fig. 23).

Fig. 33 The second floor, view from the staircase through the little entrance hall into the triple-vaulted parlour (left) and into the living room to the right. The precise shape of the former wooden separating walls is unknown. Taken from the virtual tour (computer: V. Dvořák 2010).

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Illustrations

Fig. 1 Copperplate print by Josef František Karel Devoty from 1824 (Devoty 1824, p. 90).

Fig. 2 Left: plan of the castle site according to F.A. Heber, cit. in: Durdik 1999, p. 68. Right: romantic 'reconstruction' in the work of August Sedláček, 1882, cf. Sedláček 1882, p. 60.

Fig. 3 Left: depiction of the castle ruin at the end of the 18th century (after F.C. Wolf, 1798, cit. in: Menclová 1972, II, p. 499). Right: reconstruction attempt in the work of August Sedláček, 1882, cf. Sedláček 1882, p. 59.

Fig. 4, 5 Photographs in the collection of the Museum of Artistry (Uměleckoprůmyslové museum) in Prague, cit. in: Vlček 1986, p. 85.

Fig. 6 Copied from Soukupová 1989, p. 25 and 26. Photo from 1940, isometric drawing by S. Nezbeda 1941.

Fig. 7 Copied from Soukupová 1989, p. 57 and 59. Left: by J. Hyzler, 1960s; right: by S. Nezbeda, 1945.

Fig. 8 Copied from Soukupová 1989, p. 145 and 150. Left: by S. Nezbeda in 1942; right: 1943.

Fig. 9 Reichertová 1955, pp. 174-176.

Fig. 10 Menclová 1972, II, p. 159, 166 and 167.

Fig. 11 Menclová 1972, I., p. 71 and 79.

Fig. 12 Menclová 1972, II, p. 316.

Fig. 13 Top: Menclová 1972, I, p. 411; middle: Durdík/Chotěbor 1984, p. 115, bottom: photo by M. Rykl in 2013.

Fig. 14 Chotěbor 1987, pp. 325-327.

Fig. 15 Chotěbor 1987, p. 324.

Fig. 16 Radová 1972 (left: p. 108; right: p. 34).

Fig. 17 Škabrada 1972.

Fig. 18 After Milena Hauserová and Ondřej Malina 2008. With the kind permission of the authors.

Fig. 19 Building archaeology Michael Rykl, 1995 and 2000, (Rykl 2002), graphic assistance M. Fischerová, 2010.

Fig. 20 Building archaeology Michael Rykl, graphic assistance D. Dobeš, 2003.

Fig. 21 Building archaeology by Michael Rykl and Jan Beránek (Rykl/Beránek 2006). Left: graphic assistance (AutoCAD) K. Knotová. Right: computer model J. Vašek, 2005.

Fig. 22 Building archaeology Michael Rykl, 3D computer model J. Mezera, 2005.

Fig. 23 Building archaeology Michael Rykl and M. Semerád, computer model V. Hájek 2009.

Fig. 24 Computer model of the state in the 13th century by Tomáš Durdík 2007. Interactive computer model M. Menenga 2007.

Fig. 25 Computer model Zlata Gersdorfová, published in 2010, cf. Gersdorfová 2010.

Fig. 26 Left: photo from 2010; right: František/Kostka 1955, fig.20.

Fig. 27 Prague, house U zvonu, floor plan after Josef Mayer and Klára Benešovská, (Mayer 1971).

Fig. 28 Table of elevations by Michael Rykl in 2010.

Fig. 29a Building archaeology Michael Rykl, computer aid with the drawing (AutoCAD) V. Fanta, 2012.

Fig. 29b Photo by Michael Rykl 2010.

Fig. 29c Computer graphic: V. Dvořák 2010.

Fig. 30 Computer graphic: V. Dvořák 2010.

Fig. 31 Building archaeology Michael Rykl and Jiří Škabrada 1996 (cf. Škabrada/Rykl 1996, pp. 12-16), drawing Michael Rykl.

Fig. 32 Left: photo copied from: Schröttel/Haußmann 1994, like fig. 22. Right: drawing: Michael Rykl 1997).

Fig. 33 Computer graphic: V. Dvořák 2010.

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[1] Devoty 1824, p. 90.

[2] Sedláček 1882, p. 60; Durdík 1999, p. 68.

[3] August Gottlieb Meissner, Historisch-malerische Darstellungen aus Böhmen nebst XIV illuminierte Kupfertafeln nach Zeichnungen von F.C. Wolf, Prague 1798, cit. in: Menclová 1972, II, p. 499; Sedláček 1882, p. 59.

[4] Photographs in the collection of the Museum of Artistry (Uměleckoprůmyslové museum) in Prague, cit. in: Vlček 1986, p. 85.

[5] One of the best at the time was the architect Kamil Hilbert. His research illustrates the foundations of the correct building archaeology methods, closely connected to archaeology. His most important activity was his research on Prague Castle.

[6] A compendium about the monastery with rich documentation from the war time: Soukupová 1989.

[7] Reichertová 1955, pp. 174-183.

[8] Menclová 1972, I + II.

[9] Durdík/Chotěbor 1984; also in: Durdík 1999, p. 68.

[10] Chotěbor 1987.

[11] Radová 1972.

[12] Škabrada 1996, pp. 105-118.

[13] Hauserová, Milena- Malina, Ondřej, Průzkum kostela ve Sterém Plzenci, presentation of the conference Dějiny staveb, 2008, Nečtiny (not published). Further: Malina 2008, pp. 221-226.

[14] Litovice in German-language literature: Rykl 2002.

[15] Rykl/Beránek 2006.

[16] Completely published in German: Hauserová/Rykl 2011.

[17] Durdík 2007, p. 9.

[18] Gersdorfová 2010.

[19] Selected literature: Mayer 1971; Benešovská 1998; Benešovská 1996; Škabrada/Rykl 1996, pp. 12-16.

[20] After the analysis of the basic building structure in the basement, even after later changes, it seems like no older building fabric had been used, except in the eastern wall, which belonged to the residential wing, on which the eastern wall of the tower was built.

[21] Compared to old interpretations, which had assumed there had been a hall. About the triple alcove as a significant aspect that could be interpreted as ceiling of the room, see also: Škabrada/Rykl 1996, pp. 12-16.

[22] Some examples from German literature: Strobel 1976, pp. 144, 145, 197, 198; Phleps 1967, p. 239; Nay 1998; Schröttel/Haußmann 1994; Beispielhafte dreifach gewölbte Holzstube um 1400: die Burg Trostburg in Südtirol, Institut für Mittelalterliche Realienkunde – digital image collection, http://tethys.imareal.sbg.ac.at/realonline/ Trostburg, 25.6.2013.

[23] Exhibition in Autumn 2010 on the occasion of the 700th anniversary of the royal wedding of John of Luxembourg with the last member of the Přemyslid dynasty, Eliška (Elisabeth). Editor of the exhibition: Klára Benešovská. The exhibition was held in the house Zur Glocke. Virtual tour by Vojtěch Dvořák.

[24] Škabrada/Rykl 1996, pp 12-16.