

## Teaching building surveying of valuable historical timber architecture

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**ABSTRACT:** Presented in this article are the traditional and modern methods of teaching architecture students the preparation of building survey documentation. Timber buildings that have stood for tens of years deteriorate and suffer damage. To repair and subject them to adaptive reuse, it is necessary to prepare the building survey documentation because in many cases the documentation for such historical buildings has not survived. Survey documentation including drawings and measurements is prepared for developers, with the intent of supporting conservation work and academic research, as well as listing in the monuments register. The author has almost 20 years' experience in supervising student practical training in building survey documentation preparation, gained in the Faculty of Architecture at Cracow University of Technology (FA-CUT), Kraków, Poland. This training took place in Zakopane, Poland, during which exceptional specimens of timber architecture built towards the end of the 19th and the start of the 20th Century were recorded, to document historical buildings for the Tatra Museum archives.

**Keywords:** Building surveying, architectural inventory, architectural education, practical training, timber buildings

### INTRODUCTION

After the conclusion of the third year of study, a requirement of the curriculum of the Faculty of Architecture at Cracow University of Technology (FA-CUT) in Kraków, Poland, is that students undergo two weeks of obligatory building survey training as a separate module. This has been carried out since the 1950s by the Institute of History of Architecture and Monument Preservation. The training takes place in various localities and students can choose where they will undergo the training from propositions presented by organisers. The surveying primarily covers historical timber buildings because their durability is much less than that of masonry buildings. Deterioration has taken place of hundreds of timber cottages in rural areas, as well as of larger villas, guest houses and religious buildings. The timber architecture of each of Poland's regions has different stylistic features [1]. The timber architecture of Zakopane in Poland, which developed towards the end of the 19th and the start of the 20th Century, is exceptional and stands out from the architecture of other regions. It developed in response to the harsh local climate that features heavy snowfall, as well as cultural influences stemming from a period in which this part of the country was occupied by Austria.

### ZAKOPANE STYLE OF ARCHITECTURE

Zakopane was once a small highland village located in the south of the country, at the foot of the Tatra Mountains, which are the highest in Poland and the rocky peaks of which are at an elevation of more than 2,000 metres above sea level. In 1873, the village was visited by Dr Tytus Chałubiński, who proposed medical treatment exploiting the local air. The physician's views began to attract the Polish intelligentsia and burghers to Zakopane. The resulting new building developments had to be larger than the existing highlander cottages with their tall and high-pitched roofs. Slowly, two- or three-storey buildings began to appear. They featured guest rooms for patients visiting the Tatras, along with porches, verandas and balconies, covered with small roofs to protect against snow and wind. Reclining on the verandas was an element of treatment. In 1885, Zakopane was given the status of a health resort. It also saw the emergence of an architecture that distinguished the local villas from health resort buildings constructed in other European and Polish spas during this time [2].

During this period, the territory of Poland was partitioned between three powers: Russia, Prussia and Austria. During the third quarter of the 19th Century, timber villas began to appear between Góral (traditional ethnic) farms in Zakopane and around it. They were modelled on Swiss, Bavarian or Tyrolean architecture. Ornaments on the boarding of balustrades,

joists, and window and door surrounds were cut with a jigsaw, copying Austrian patterns from Tyrol. However, local, primarily floral motifs were used much more often, as they were well-known by builders and had been previously used. These works were supervised by Hungarian-born Edgar Kováts, the Director of the Timber Industry School, which promoted such architecture and taught its construction.

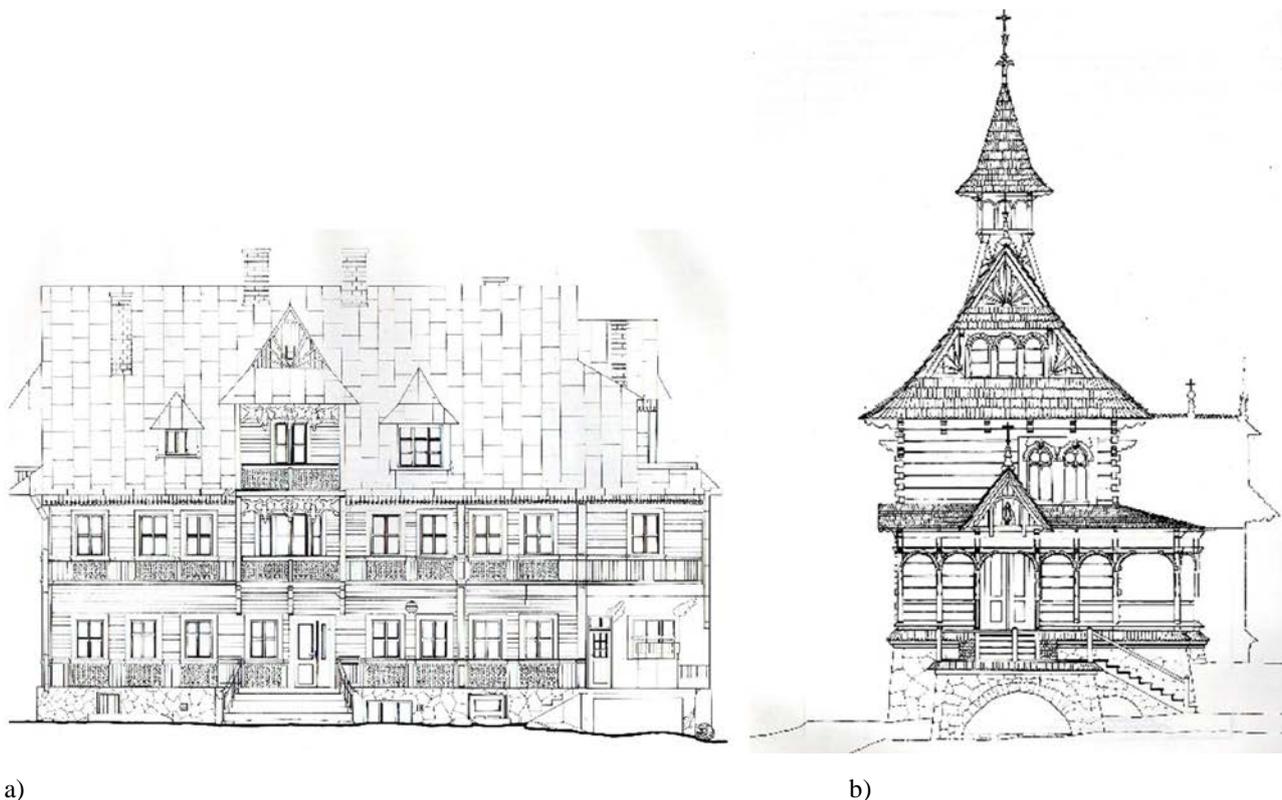


Figure 1: a) villa *Jerzewo* in Zakopane, 40 Jagiellońska Street, built 1885 in *Tyrolean style* (Drawing by I. Golicz, 1984); and b) the shrine in Jaszczurówka, dedicated to the Sacred Heart of Jesus, designed by Stanisław Witkiewicz 1904-1905 (Drawing by R. Rafacz, 1979), both students from the FA-CUT.

Towards the end of the 19th Century, Zakopane became established as the summer tourist *capital* of Poland and remains so to this day. This place of exceptional beauty and harsh climate, with the unique landscape of the rocky Tatras, was a meeting spot for the intellectual and cultural elite of the three partitions of Poland. Gatherings in Zakopane and Podhale were also facilitated by the situation of Poles in the multi-cultural Austro-Hungarian Empire, which was comparatively better than in the other partitions.

In 1886, Stanisław Witkiewicz formulated the concept of the Zakopane style, which replaced the *Tyrol style*, propagated by Kováts. While building successive villas around the town, Witkiewicz's architecture was based on traditional Góral buildings, a style inspired by the native Góral of the Podhale region. However, he adapted this to new needs by increasing the scale [3].

The first of these was the *Koliba* villa, erected in the years 1892-1893 at 18 Kościeliska Street. The building was placed in the architectural monuments register in 1983, and from 1993 has become the location for the Museum of Zakopane style. The roof of this building featured so-called *lookouts* (*wyglądy* in Polish) that Stanisław Witkiewicz designed. They were inspired by small pieces of roofing lifted on a long stick to make it easier to throw out hay or straw to the outside of Góral sheds [4]. This is how glazed verandas or balconies were created. Afterwards, he built the villas *Pepita*, *Oksza*, *Zofiówka*, *Jerzewo* (Figure 1a) and *Pod Jedłami* (Figure 2), as well as *Konstantynówka*.

Also popular was the shrine in Zakopane - Jaszczurówka (Figure 1b) built 1904-1905 and designed by Stanisław Witkiewicz. The houses were built on stone plinths and their high-pitched roofs with lookouts in the attic were covered by wooden shingles. The Zakopane style is not only an architecture rich with detail: studded wooden doors, external and internal window and door surrounds, protruding lynxes or pazduras on roof ridges, and so-called *little suns* placed on gables. Considerable attention was paid to interior décor furniture, kilims, window curtains, interior decorations, glass paintings and regional folk costumes. When creating the Zakopane style, Stanisław Witkiewicz believed that Zakopane was where elements of an old ancient Polish style had survived and which is why he thought it could become the Polish national style.

This proposal was seen as attractive in a country that had its statehood taken away and it became popular in areas outside Poland, e.g., in Belarus, Ukraine and Lithuania, where a train station was built in Saldutiškis (northeastern Lithuania), as a symbol of the Polish identity of the area at that time. To many Poles, this newly introduced style became

a symbol of Polishness and patriotism. This is how Jagiełło described it: *It was believed, following Witkiewicz, that an ancient Polish and indigenously Slavic architecture and a native, authentic ornamentation had survived in Podhale. Thus, ...zakopiańszczyzna was treated outside Podhale as a rebirth of national architecture and ornamentation...* [5].

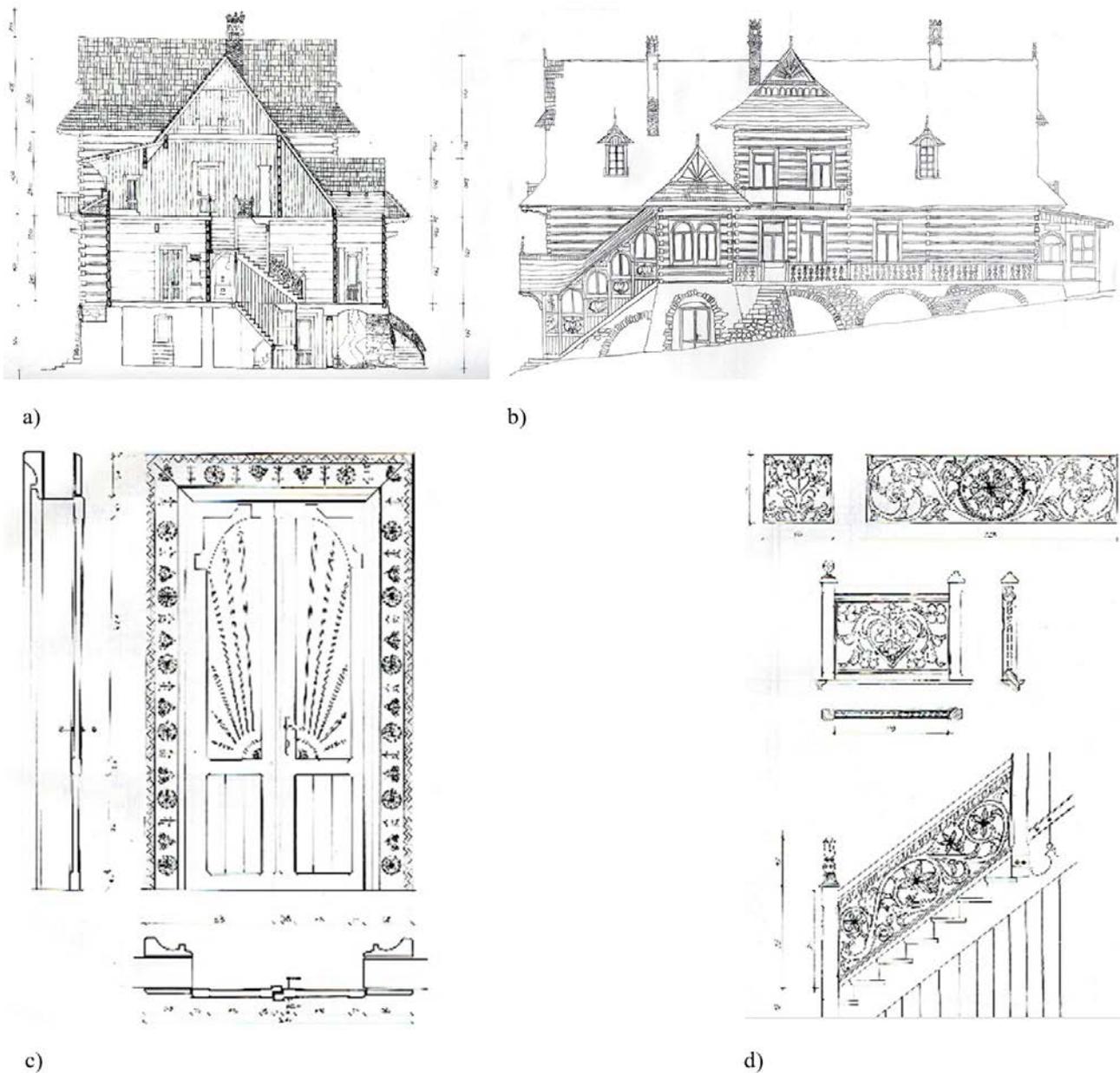


Figure 2: villa *Pod Jedlami*, designed by Stanisław Witkiewicz in 1897, in Zakopane style: a) section of building (Drawing by E. Mordarska, 1980); b) front view of building (Drawing by P. Rafacz, 2020); c) interior door (Drawing by E. Mordarska, 1980); and d) details of ornaments on the boarding of balustrades, ornament on the joist (Drawing by E. Mordarska, 1980). Drawings are by students from the FA-CUT.

## RESEARCH PROBLEM

Interest in disappearing timber architecture and its surveying was by the 1950s incorporated into the curricula of Polish architecture schools. Zakopane as a site was introduced into the curriculum in 1978 and was present until 2001. During this period, students of the FA-CUT surveyed more than 70 buildings. The surveys included both timber buildings from the turn of the 20th Century and displayed characteristics of *Tyrol architecture*, as well as buildings designed by Stanisław Witkiewicz and his followers of the Zakopane style. The final drawings and measurements of Zakopane buildings, as prepared by students, were transferred to the archives of the Tatra Museum. Building surveys that include measurements and drawings are an important element used to explore the construction history of a building and are necessary in the education and later professional work of Bachelors of Engineering majoring in architecture. The surveys are a basis for preparing technical and construction-phase designs of buildings slated for renovation or adaptive reuse [6].

Building surveys are also necessary in keeping monument records and performing reconnaissance of historical assets in a given area. At present, the quality of documentation can differ significantly. For decades, the primary method of performing the surveys was the manual preparation of drawings and measurements using measuring tape. Such were and

are the methods applied during practical training hosted by the FA-CUT. Initially, drawings of floor plans, cross-sections and elevations were prepared by students on *notes* prepared by the Chair. The drawings were made using a single linetype, without hatching and without depicting spatiality through shading. Dimensioning was applied to the drawings using colour. A major principle was to measure not only each wall of a room but also its diagonals, so as to record any deformations or curves. To avoid mistakes, it is important to obtain the measurement (with tape) in a single sequence. Sometimes, room fragments can be blocked by appliances, wardrobes or shelves, while in cellars or attics there may be even greater problems with wall surface accessibility. In such cases, apart from 10 m or 20 m measuring tape and poles, laser rangefinders have been used for several years.

When preparing cross-section drawings, it is crucial to include comparative elevations and control height differences. In student training, safety was essential; for instance, in the case of buildings with several storeys, the measuring of roofs and chimneys proved problematic. Many examples of preparing such traditional survey documentation assumed that the height of roofs and tall chimneys could be measured in proportion to elements below them. Building survey documentation can be useful to conservation services in preparing green charts for architectural monuments or white charts that must also feature ground-floor plans, and sometimes cross-sections and structural drawings [7].

At the start of the training, students are divided into groups. A small rural cottage typically can be measured by a group of three students, with two holding the measuring tape and a third recording the measurements. Of course, if a building is larger, additional persons are required. In Zakopane specifically, students focus on, and are sensitised to, stylised interior details. They attach drawings of shelf and joist ornaments, floral details on internal and external balustrades and drawings of sculptures with floral ornaments found at the intersections of beams in the corners of the houses. In terms of showing the structural systems of buildings on the drawings, it is assumed that only visible elements are drawn, and the foundations, any columns or joists obscured by walls and ceilings are not shown, as are obscured roof structures. Most of the houses in Zakopane are privately owned, and the buildings selected for surveying were chosen from among those whose owners had given permission.

Inaccessible spaces very rarely were found in the buildings. Students were dedicated and charmed by the atmosphere of these historical timber buildings, most of which are now in the historical monuments register. The work of the FA-CUT's students contributed to this. The student-made documentation was transferred to the Tatra Museum every year. Timber buildings are sometimes severely damaged by fires. Several large villas designed by Stanisław Witkiewicz burned down over the years; around the start of the 21st Century, a small shrine burned down in Bystre, Zakopane. Detailed survey documentation prepared years prior by a Kraków's architecture student enabled its precise reconstruction.

## RESEARCH METHODOLOGY

The methodology for teaching building surveying is changing. The traditional method of preparing building survey documentation in the form of manual drawings on notes that are later copied to tracing paper was used for several decades. In relation to the 1980s and 1990s, the use of laser rangefinders to measure distances has become relatively common. Likewise, after the manual preparation of notes, the final drawings are made with digital graphics software [8]. Since the 1990s, students of the FA-CUT have been taught to operate AutoCAD and later ArchiCAD software [9]. At present, building surveys can be performed by specialist companies with tachymetry and photogrammetry or laser scanners. Companies that specialise in building surveying also use the latest in self-levelling laser devices. High-precision measurements can be obtained with a tachymeter and dedicated software [10]. One of the strengths of this method is the fast pace at which the point cloud is recorded by a laser scanner, but using such equipment requires experience because laser beams can reflect off random objects and the outcome can be distorted.

Conservators from the University of Toruń who specialise in electronic building surveying methods wrote in 2007: *Some instances of building survey documentation prepared using laser scanning are characterised by a complete lack of structural system identification, which highly restricts or even eliminates their utility in the conservation process* [11]. It was thus believed that the traditional surveying method based on measurements and drawings, which is much more time-consuming than modern approaches, allows those who perform the survey to better acquaint themselves with the building and allows its structural system to be identified. Building survey documentation created with measurements and drawings also included carpentry joints.

In Kraków, studies on the use of digital techniques in the process of building surveying, design and preparing the architectural documentation of historical buildings have been performed at Kraków's technical universities since the 1990s. Existing technologies were used and applied and new ones were developed and tested in practical applications [12].

Material was obtained with photogrammetric or photographic cameras, both analogue and digital, and VSD digital autographs were constructed. Modern building surveying methods include the application of unmanned aerial vehicles and thermovision cameras, in addition to digital 3D drawings. All this depends on the historical value of the building surveyed and the means of developers and those who commission the documentation. Future Bachelors of Engineering majoring in architecture must learn all methods: both the traditional, manual methods and contemporary electronic ones, as a part of the teaching at the Faculty of Architecture.

In 2020, as a result of the coronavirus pandemic and mandatory remote learning, summer building surveying training could not take place in multi-person groups. As of 12 March, students were staying at home, often several hundred kilometres away from Kraków. Only about 20 percent of students who lived in Kraków remained and could participate in building surveying training following the standard formula. Others had to choose the subjects of their training from among buildings located in their home towns or cities. After the subjects' approval by tutors, they typically surveyed small buildings, mainly using traditional methods. They were in on-line contact with tutors who supervised the training.

## SURVEY

In November and at the start of December 2020, a survey was performed among the FA-CUT students concerning their familiarity with the timber architecture of Zakopane. Students of all years were asked to answer several questions. A total of 325 responses were collected, with first-year students giving the highest number of responses (i.e. first- and second-cycle first-year students).

Table 1: Survey results.

Item no.	Questions	Responses			
		Year of study Number of students	Yes	No	Do not know
1.	Do you plan to use the traditional methods of preparing building survey during your practical training for the History of Polish Architecture module?	I = 132	120	2	10
		II = 132	121	3	8
		III = 74	69	1	4
		IV = 31	26	4	1
		V = 35	35	0	0
2.	Do you think that Stanisław Witkiewicz's famous projects and other historic villas from the turn of the 20th Century in Zakopane should be protected and restored to their original state?	I	113	1	18
		II	126	0	6
		III	71	0	3
		IV	29	0	2
		V	34	1	0
3.	Would you like to have your building survey training take place in Zakopane or the Podtatrze region?	I	106	26	0
		II	105	27	0
		III	58	16	0
		IV	24	7	0
		V	-	-	-
4.	Do you think that student-made building surveys of historical timber architecture in Zakopane and the Podtatrze region can be used to rebuild or repair buildings?	I	75	4	53
		II	71	4	57
		III	54	5	15
		IV	22	3	6
		V	18	3	14

## SURVEY RESULTS

In their responses, the students who participated in the survey largely expressed an opinion that familiarity with different building surveying methods - both the traditional method based on measurements and drawings and contemporary methods supported by digital tools - is useful in practising architecture. They also expressed their interest in the timber architectural heritage of the Podtatrze region, including the wooden monuments of Zakopane and buildings designed by Stanislaw Witkiewicz, which - as stated by the respondents - should be protected and restored to their original state. The students also expressed an opinion that building survey documentation prepared by architecture students can contribute to revitalisation efforts.

## CONCLUSIONS

The ways and methods of preparing an inventory of an object is a highly important skill for any future architect. In the professional work of an architect, drawing up an inventory of architectural objects is a common task. Each building must be inventoried if it is to be renovated or adapted to new functions, not only the historic ones. Before the technical acceptance of the building for use, the construction law also requires an as-built inventory. The methods by which the inventory will be made can be either the traditional methods or the modern techniques and tools.

A survey questionnaire among FA-CUT students confirms that awareness is widespread of the need to master the ability to develop an inventory of architectural objects. The students also expressed the conviction that inventories of architectural objects can contribute to the preservation, maintenance and consolidation of architectural heritage.

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## BIOGRAPHY



Professor Ewa Węclawowicz-Gyurkovich, DSc, PhD Arch., graduated with an MSc degree from the Faculty of Architecture at Cracow University of Technology (FA-CUT), Kraków, Poland in 1972, and commenced her employment at this University. In 1990, she defended her PhD dissertation, was conferred with the degree of DSc in Technical Sciences: Architecture and Urban Planning, in June 2012, and was granted the title of full Professor in 2014. Her scientific interests and work pertain predominantly to the aesthetics of the most recent Polish and world's architecture. She is interested in transformations, shaping, and trends in the architecture of the past 30 years and its contact with the historical tissue of European cities. Mainly to this subject matter, she has devoted over 120 reviewed publications in scientific journals and books worldwide, and is the author of three monographs. She has participated in numerous international scientific conferences in Europe, during which she delivered more than 80

presentations. Throughout her work at the University, she has combined her scientific and teaching activities with creative work. She is the author and co-author of 89 designs and projects, recently of stained glass windows, in Poland, Ukraine, Japan and Hobart, Tasmania. In the period 1999-2005, she fulfilled the function of a Deputy Dean for Teaching at the FA-CUT, in two terms of office. During her teaching work at the FA-CUT, she was engaged in international co-operation, conducting lectures and workshops for students in English; she organised scientific trips for students to Italy, Germany, France and Holland. For 15 years, she co-ordinated student exchanges with the South West School of Architecture at the University of Plymouth, UK, which, in 1996, resulted in an invitation to apply for an accreditation of the FA-CUT by the Royal Institute of British Architects (RIBA). Starting from 1999, graduates from this Faculty receive two diplomas: a Polish one and an English one (RIBA 1 and RIBA 2). Since 1974, she has been a member of the Society of Polish Architects, Kraków Branch, DOCOMOMO, and since 2011 the Association of Monuments Conservators, as well as the Committee of Urban Planning and Architecture, Branch of the Polish Academy of Sciences in Kraków, and ICOMOS. She has received numerous awards and distinctions for her teaching, scientific and organisational activities, including the Minister's Award, the Silver Medal of Gloria Artis, the Gold Badge of the Minister of Culture and Arts for her care over monuments, the Gold Cross of Merits, the Rector's Medal and Awards, the Honorary and Gold Badge of the Cracow University of Technology, Medals of the Dean of the Faculty of Architecture; and the Bronze Badge of the Society of Polish Architects.