

Handbook

of typical historic technologies
of fortress constructions

**Saving of European Cultural Heritage
Fortified Monuments in Central Europe**

**Result of transnational cooperation in the project FORTE CULTURA
to capitalise fortified cultural heritage for sustainable development
and competitiveness of cities and regions**

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1 Contribution of the Transnational Cooperation Project FORTE CULTURA to the Valorisation of Traditional Knowledge and Expertise



1

- 1.1 About FORTE CULTURA Project
- 1.2 Valorisation of Traditional Knowledge and Expertise for Protection of Fortified Heritage
- 1.3 Strategic Focus

1.1

About FORTE CULTURA Project

The aim of the FORTE CULTURA project was capitalisation of fortified cultural heritage for sustainable development of cities and regions. The project was implemented through the Central Europe Programme and co-financed by the European Regional Development Fund. The duration of the project was from September 2012 to December 2014.

Important aims of the transnational cooperation were following:

- Capitalising and market implementation of fortified heritage for economic growth of cities and regions,
- Strengthening effects of fortified heritage for urban, rural, cultural and social development,
- Creation of CE-culture route for capitalising of fortified heritage,
- Valorisation of traditional knowledge and expertise for protection of fortified heritage.

You can learn more about the project at the web site:

<http://www.forte-cultura-project.eu/>

1.2

Valorisation of Traditional Knowledge and Expertises for Protection of Fortified Heritage

Main topics:

- Problems and needs
- Identification and experimentation of construction technologies
- Trans-national exchange of knowledge and expertises

Development Group

Responsible institution:

- Institute for the Protection of Cultural Heritage of Slovenia

Assisting institution:

- Ad Pirum Institute, Slovenia

Assistants:

- Town Hall Kostrzyn nad Odra
- Austrian State Archive
- Salzburg's Palaces and Castles Management
- Humboldt-University at Berlin
- Thuringian Institut for Advanced Studies and Education reg.ass.
- ECCOFORT reg.ass.
- 'Fort Monostor' Military Cultural Center Komarom
- Province of Verona

1.3

Strategic Focus

Author: Hartmut Röder

The Principles of the Central Europe Programme for “Capitalising of Cultural Heritage”

The Central Europe Programme 2007-2014 determined the political and economical strategy for the project FORTE CULTURA: the Development of instruments and procedures to “Capitalise the cultural Heritage”, especially the fortified cultural heritage.

Strategic Focus of the Valorisation of Traditional Knowledge and Expertise and General Contribution to the Project Results

Saving and using traditional knowledge, expertises and technologies for conservation of fortress monuments, organising trans-national experience exchange and research, creating new capacities for knowledge saving, initiatives for heritage protection

The project FORTE CULTURA contributed the capitalising-strategy with elaboration of effective and innovative Valorisation of traditional knowledge and expertise for protection of fortified heritage by identification and experimentation historic construction technologies, organising trans-national exchange of knowledge and expertises and enhancing Protection of fortified heritage with European Heritage Label.

General Objectives of the Working Programme

The historical fortress architecture is based on a variety of complicated, traditional constructional measures and specific handicraft methods. This very important historical knowledge for the protection of fortified monuments is going to be lost due to technical progress. However it is urgently required for the redevelopment and maintenance of monuments.

Steered by the special profiled Slovenian National Institute for Protection of Cultural Heritage,

as well as by the Humboldt-University of Berlin and other project partners, a new quality of knowledge content, knowledge saving and trans-national transfer of expertises in the field of traditional/historical construction technologies, handicraft methods and materials was to be achieved.

The first step in a transnational working method analysed the problems and needs in this fields in the Central Europe countries and regions, especially supported with a deficit analysis from national monument institute IPCH Slovenia. The study laid the ground for following concrete research and local pilot experiments to generate new expertises, for the identification of historic technologies, handicrafts for fortress conservation and effective monument protection, like technical study Kostrzyn, the experiences from Salzburg and the guideline for nature protection in fortress monuments. The knowledge progress will be transnational evaluated during workshop.

In another activity the transnational exchange of knowledge and expertises was organised on the basis of a developed concept, followed by expert meetings and especially with the development of a transnational research and monitoring programme to observe and save traditional knowledge in Central Europe and to ensure the joint monitoring of knowledge progress and implementation in education. Transnational Workshop and Training Session, organised in Ljubljana in May 2014, supported their implementation.

2 Conservationist Basis



2

2.1 Conservation Plan as the Basic Document for Conservationist Activities

2.1

Conservation Plan as the Basic Document for Conservationist Activities

Authors:

Matej Zupančič, architect - conservationist

Mateja Kavčič, architect - conservationist

Boris Deanovič, architect - conservationist

Responsible institution:

- Institute for the Protection of Cultural Heritage of Slovenia

Introduction

On the official FORTE CULTURA meeting “Trans-national Training Session - best practice of traditional knowledge” held in Ljubljana on May 2014 it was decided that the Conservation Plan, as designed by the Institute for the protection of Cultural Heritage of Slovenia, shall be endorsed by FORTE CULTURA as a recommended tool, serving as a basic starting point of the conservation process. The decision was made because conservation management plans are already considered an inevitable part of an application for the World Heritage List.

What is Conservation Plan?

Conservation plan is a document designed by a prescribed uniform method in order to help preserving architectural and other material heritage. It explains why the heritage is an important legacy, what is its significance and provides guidelines for maintenance, repairs and management.¹

Conservation plan should have a holistic view of the monument and all its components. It should contain all the information we need to preserve our common heritage.

Conservation plan consists of four chapters:

- understanding heritage,
- assessing cultural significance,
- assessing vulnerability of heritage,
- developing policies.

Conservation Plan should be prepared by a common method for all types of heritage. In cases where the heritage scale is large or extensive a conservation plan can be extended with a description of its components and / or conservation restoration projects.



WP6 manager, Mr Matej Zupančič presenting the Conservation Plan at the WP6 Ljubljana Conference, May 27 and 28, 2014.

How do we Prepare the Conservation Plan?

A. Understanding Heritage

In the first part of a conservation plan a general awareness about heritage needs to be upgraded to understanding of heritage: understanding development, comparisons with similar examples, and its values. Understanding of heritage deepens with the studying materials and researches.² This is the basis for the assessment of its cultural significance (evaluation).

Data collection includes:

- Extract from the Central Register of immovable heritage, decree declaring the monument (protection regime),
- Description of the types of heritage, which are considered, such as: cultural landscape, urban heritage, architectural heritage, garden architecture, technical heritage, archaeology, objects, living heritage, etc ...
- Research of the available resources: vintage blueprints, graphic, photographic documentation, oral sources, ...
- Comparison with similar heritage,
- An indication of deficiencies in information on heritage,
- Analysis of changes over the time and current use,
- Analysis of current and future management.³

B. Assessment of Cultural Significance

The assessment of cultural heritage significance is the second part of the conservation plan. It plays a key role in decision making process regarding the way of preserving the heritage. Cultural heritage significance must affect all decisions about its future (from daily maintenance to long-term management).

Cultural heritage significance is assessed by the evaluation procedure which investigates the combination of heritage values, based on its history, aesthetics, social role, and more. Heritage is valued by using historical⁴, aesthetic⁵, scientific⁶, social or other criteria.

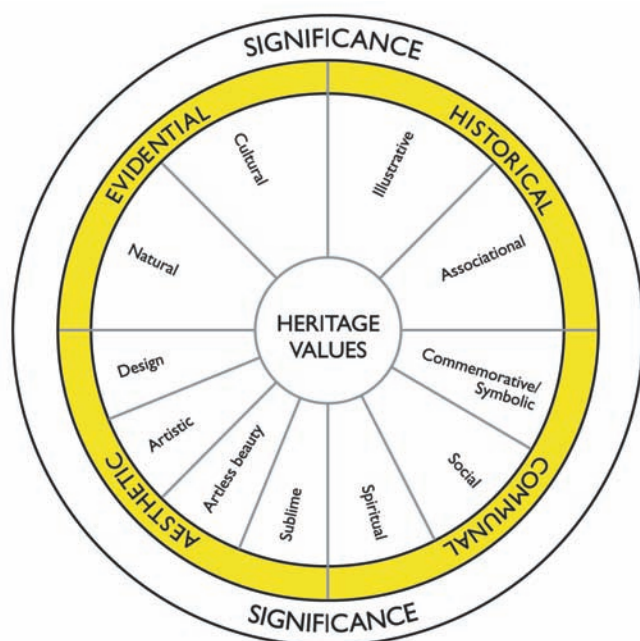
The criteria are not unique, so they can be added or supplemented by other criteria when it is needed to deepen an understanding of heritage. They are determined on the specific characteristics of heritage. The use of other criteria should be justified.

Cultural significance of heritage can be determined by placement, use, memory, perception, materials, documents, and its related creations. Most heritage has several different cultural meanings and all of them need to be addressed through an interdisciplinary approach and through comparison with similar cases.

Assessment of cultural heritage significance are concise conclusions, which summarize its values:

- assessment of historical significance,
- assessment of aesthetic significance,
- assessment of scientific significance,
- assessment of social significance, etc.,
- overall assessment of cultural significance.

-
- 1 *Each heritage needs Conservation plan, regardless of the events and circumstances relating with it. Each heritage needs to be at least maintained regularly and for that reason it is necessary to know its cultural significance, to avoid damages.*
 - 2 *As much as possible researches should be carried out at this stage (archaeological research, probing, architectural images, ...). If there are insufficient funds for such research, other information should contain enough information for responsible decision-making.*
 - 3 *A survey of heritage should not be a monographic study, but to summarizing information, which are crucial for its evaluation. A longer discussion can be produced as an annex to the document. The same is applies in complex cases (such as landscape, urban heritage, ...), where it is necessary to understand the individual components. In these cases for better understand the sense, it is reasonably to combine the same type of information.*
 - 4 *The criteria of the historical values is associated with past people, events, experiences and aspects of the life.*
 - 5 *The criteria of the aesthetic values contain all aspects of sensory perception. Valuation can be made for forms, colours, textures, smells and sounds and others related with heritage and its use.*
 - 6 *The criteria of scientific values provide evidence of the development of the science, engineering, technology and scientific thought and its impact on the development of society.*
-



Overall assessment of cultural significance is concise and convincing synthesis of all addressed significances. It must take into account all aspects, without unjustified emphasis on individual values or elements of heritage at the expense of others. The goal is to be as objective as possible.

The transparency presentation of assessment of the cultural significance needs to be transparent and clear. In order to do that levels of significance are defined and graphically illustrated (in a table or plan) for the heritage in general and its individual parts. Five levels of cultural significance are used (extreme, high, medium, low grade and disruptive / meaningless). In this way there is a clear distinction between the outstanding components of the heritage (which must not be altered or even lose) and those of lesser importance (where changes are permitted).⁷

C. Vulnerability of the Heritage

Heritage can be vulnerable for a variety of reasons, such as natural and other disasters, inconsistent legislation, uncoordinated planning, land use

conflict, non-expert handling. Cultural heritage significance needs an assessment of potential threats which are not immediate.

On the other hand heritage can be directly threatened by climatic and environmental impact, improper handling, human intervention or factors that cause damage to the material and thereby reducing or even destruct its cultural significance.

By understanding how heritage cultural significance is vulnerable can directly influence its future. Vulnerability assessment of identified cultural significance, established on the basis of the condition of heritage and cultural significance level, as well as all factors that can lead to reduction of significance or even loss of heritage. Vulnerability of the heritage needs to be presented and documented in two parts:

- Overall vulnerability of heritage
- Endangerment (immediate threat) of the heritage.

D. Developing Policies

The fourth part of the Conservation Plan shall define policies for the preservation of the heritage. Policies derive from identified assessments of cultural significance and its vulnerability. Policies are in the form of rules which are not proposing final solution, but are rather a basis for decision process on further destiny of heritage.⁸ The policies should define general principles of the protection of heritage, methods of conservation of protected values, guide the development and changes of heritage.

General baseline policies that relate to the heritage conservation should provide:

general principles according to the recognized cultural heritage significance, which ensures the preservation of the integrity of cultural significance, relationship to the authenticity, integrity, sustainable development.

Policies that define maintenance of identified values:

- ⁷ In all cases, where it is estimated, that some parts of the heritage have no significant value, or even diminish its importance, it is necessary to explain the reasons for such an assessment. If we do not evaluate all components of the heritage, this could lead to accidentally overlooked or even destroy important elements of the heritage.
- ⁸ Policies must take into account the circumstances which affect the future of the heritage, as the owner needs, available resources, external restrictions, the state of the materials and must derived from the recognized values and their vulnerability.

- Emergency interventions and urgent maintenance work arising from the assessment of vulnerability and immediate threats to heritage,
- Additional research and projects (conservation and restoration project management plan ...),
- Temporary restoration and minimal conservation restoration work, which are necessary for the preservation of cultural significance.

Policies for the development, alterations and modifications:

- Changes that are compatible with the maintenance of cultural significance, such as changes in structural elements, materials, uses, contents, relocation of individual parts and others,
- Measures taken when additional discoveries about heritage are found,
- Implementation of the Conservation Plan,
- Management and control mechanisms.







E. Heritage Elements Survey and Conservation - Restoration Project

The first part of Conservation Plan is the basic document dealing with preservation. In cases where heritage is complex and consists of many different parts or is made of many different materials, a Conservation Plan can be upgraded with a separate, more precise document. "Heritage Elements Survey" which in more detail shows significance, vulnerability and policies for smaller defined parts of heritage. Individual components (which can be either elements of architecture, individual rooms, works of art of particular interest, etc..) are documented in detail, the importance of risks and policies that are specifically related to are described too.

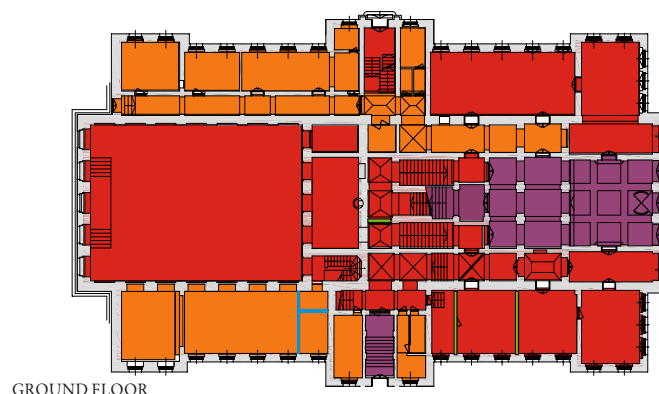
Another document should be added where there is a clear intention to do extensive changes on heritage or implement conservation - restoration work. A "Conservation - Restoration Project" defines the different materials used in heritage, the state of materials through investigation and defined conservation - restoration works, clearly divided into individual technologies.

How to use Conservation Plan?

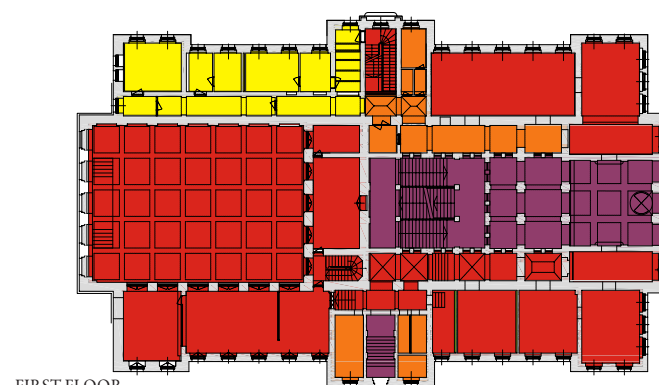
In the case of proposed changes or interventions to heritage a Conservation Plan can be quickly and

02-2	Heritage Elements Survey
Ljubljana - NARODNA GALERIJA EŠD: 347	LEGEND  Extreme significance  High significance  Medium significance  Low significance  Without significance  Disruptive

LEVELS OF CULTURAL SIGNIFICANCE



GROUND FLOOR



FIRST FLOOR

easily reviewed too see if the proposed changes have any negative impact on heritage. Based on the policies of Conservation Plan other administrative documents such as Cultural protection conditions and Heritage consent are released.

Conservation Plan provides clear policies for routine maintenance, repair, minimal conservation - restoration interventions and survey.

Conservation Plan is the basis for the production of complementary documentation, such as projects - management plan, conservation - restoration project, urban designs, project of construction works, etc ...

Conservation Plan is not a static document. It has to be updated and supplemented according to new context and knowledge. It is recommended that revision of the Conservation Plan is carried out every five years, or sooner if changes are introduced.

Conclusion

Conservation Plan should be a simple, concise document which clearly states “What do we have?” “What is its significance?” “Why is it vulnerable?” and “What should we do with it?”. Slovenian conservation profession has made the preparation of a Conservation plan prescribed in the Law on the protection of cultural heritage. The form of a Conservation plan is prescribed and explained by the Rules of the Conservation plan. The aim of preparing these legal documents was to establish unified methodology of production of Conservation Plans for all types of heritage.

Key issues need to be solved by Conservation Plan are as follows:

- Assessing the cultural significance of the heritage (*What do I have?*),
- Methods to preserve cultural significance (*How to interfere?*),
- Methods of using the heritage (*How to use?*).

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3 Problems and Needs in the Field of Traditional Knowledge and Expertise in Regards to Fortress Reconstruction Technologies



3

3.1 Deficit Analysis of Traditional Knowledge, Needs and Consequences for the Organisation of the Future Transnational Co-operation

3.1

Deficit Analysis of Traditional Knowledge, Needs and Consequences for the Organisation of the Future Transnational Co-operation

Author:	Content
<i>Aleksander J. Potočnik</i> , architect - conservationist	3.1.1 Introduction
Consultants:	3.1.2 Conservation Project Example
<i>Anton Marn</i> , architect - conservationist	I Geostrategic Position
<i>Matej Zupančič</i> , architect - conservationist	II History of the Castle
	III An Initiative for Partial Reconstruction
	IV Conservation Plan
	V Architectural Plan
Responsible institutions:	VI Execution of the Reconstruction
- Institute for the Protection of Cultural Heritage of Slovenia	VII The Use of Reconstructed Object
- Ass. Institution: Ad Pirum, Slovenia	VII A Conclusion
Assistants:	3.1.3 Deficits on the Local Level and some Possible Solutions
- Town Hall Kostrzyn nad Odra	I Deficits
- Austrian State Archive	II Possible Solutions
- Salzburg's Palaces and Castles Management	III An Observation
- Humboldt-University at Berlin	
- Thuringian Institut for Advanced Studies and Education reg.ass.	3.1.4 Deficits on the Transnational Level
- ECCOFORT reg.ass.	I Fragmentation
- 'Fort Monostor' Military Cultural Center Komárom	II European Unification as a Factor of Rationalisation
- Province of Verona	
	3.1.5 Obstacles to Even Treatment and Applications of Traditional Knowledge within the Partner Countries
	I Common Theoretical Basis
	II Knowledge Storing
	III Terminology
	IV Legislation
	V Monument and Nature Protection
	VI Expert Literature
	VII Exchange of Good and Bad Practices
	VIII Defining New Functions for Fortification Heritage
	IX Materials Usage
	X Traditional Technologies
	XI Education for Traditional Technologies
	3.1.6 Summary

3.1.1 Introduction

When talking about traditional knowledge, traditional constructions and traditional techniques, it is impossible to describe it taken out of context, the context in this case being reconstruction, renovation and revitalisation of fortification heritage.

As it turns out the approach to reconstruction, renovation and revitalisation of fortification heritage varies from country to country. Within the same country we can also observe some significant changes to approach to reconstruction, renovation and revitalisation of fortification heritage with the passage of time. These changes, either inside one nation within a time span or between different countries can be mainly attributed to conservation doctrine (or an absence of one). It is the conservation doctrine that determines the degree of respect towards the preexisting architectural structures and therefore also the role and the importance of traditional techniques and materials or a disregard for them.

The so-called modernistic approach characteristic for the twentieth century and best paraphrased in famous principle as defined by Louis Sullivan: "Form follows function" demanded "sincerity" even when intervening into historic structures. Any interventions, regardless of the character of the object and its historic origins and value, should mirror the time in which they have occurred and materials and technologies used in this time. According to this doctrine to build today with the aim of making the structure appear as it had appeared in some other historic period, would be "a lie", even if it is reconstructed by using original techniques and materials. The new structure must therefore be clearly discernible from the old.

This principle was and still is responsible for many modernistic interventions, executed in style and with technologies that differ drastically from those of the original structure. The fact that differences between interventions and original structures are not just permitted, but even demand and commanded, enables individual architects to "rise above" mere reconstruction of historic buildings and to give their "own personal mark". As a consequence such interventions - pieces of the inserted architecture - usually represent a stark contrast to a historic fabric of the original structure. But since they are still an integral part of the old structure they affect historic structure as a whole.

In some cases this doctrine has withstood the test of times. When handled by able architects with so-

phisticated feel for the original structure and capacity to create new without contradicting the old, some important surplus values have been achieved. In case of castle architecture the examples of Viollet le Duc in Carcassonne and Jožef Plečnik in Prague castle are startling. But the big question is if such an approach can really be relied upon as a general rule in the world where big talents are an exemption to mediocrity rather than a rule and where individual author's reputation and self-confidence are not always based on a merit.

The other most common approach is the one that respects the existing structure, settings and historical circumstances that have caused the erection, maintenance and growth of the architectural heritage in question. This approach places sustainability of the revitalisation above the artistic expressiveness of an individual undertaking the restoration. It builds on thorough research that considers both socio-historic circumstances that have prompted the construction of the particular type of building and material environment that necessitated the use of certain types of material and building techniques. The basic guidelines of this approach have been compiled on the Athens Conference organised in 1931 by International Museums Office and later published in the Venice Charter of 1964. They were later detailed in international documents such as Declaration of Amsterdam of 1975, the Washington Charter of 1987 and most importantly the Burra Charter of 1981. The later was compiled by the Australian chapter of ICOMOS, an "international non-government organisation that promotes the study of the theory, methodology and technology of conservation applied to monuments, historic areas and sites" (J.K. Gillon) as an organisation that continues the work of the above mentioned International Museums Office.

It is this approach that values the knowledge of traditional materials and construction techniques, but it also this approach that warns us from considering them as separate, insulated topics. Just as the original construction of an individual object of architectural heritage came into existence due to the specific set of circumstances, from social, political and economic environment to the available materials and level of technological knowledge and skills, so too the traditional knowledge, materials and construction techniques must be analysed within the frames of buildings characteristics, historical and envisaged further use. In order for the revitalisation to succeed the application of traditional techniques on its own is not enough. A certain purpose for which

the building was constructed dictated both the design of the building and materials and techniques used to construct it. In order to determine the most suitable future usage of the object the conservationist must therefore first analyse the circumstances that have led to its conception and construction. The sustainability of the renovation depends to a large degree on the compatibility of the existing structure with the envisaged new function. The lesser will there be the discrepancy with the original function, the lesser will there be the need for radical interventions and consequently the lesser need to introduce techniques different from original ones. This will in turn preserve the originality of all the important cultural-historic categories: the historic design value, the visual testimony value and the symbolic value. On such a basis the use of traditional knowledge, materials and techniques is not only a matter of principle, but also of feasibility.

It is this second conservationist approach that we have used as the foundation of our analysis. The document designed to provide the basis for such an approach is a Conservation plan. It is therefore inevitable that we concentrate on Conservation plan and consider our FORTE CULTURA output 6.1.4. as one of the tools providing the material needed to draw up a viable conservation plan. We shall demonstrate this interdependence between the conservation approach with its most typical tools and the use of traditional knowledge, materials and techniques.

3.1.2 Conservation Project Example

A very good example which can serve to illustrate issues involved into a conservation project of which the use of traditional knowledge, materials and materials and techniques were an essential part is the partial restoration of the Škofja Loka (Bischofslack) castle. The planning and the execution of the project uncovered a rather typical array of question that must be addressed beforehand or solved during such a project.

I GEOSTRATEGIC POSITION

The Ljubljana Gap is the single passage connecting Central Europe with Northern Italy that is passable by multitudes which defines it as the only available passage for migrating peoples and invading

armies (The exceptional character of Hanibal's passage over the Alps is an exception that confirms this definition). It can be defined as the area between the Alps and the Adriatic Sea. It is however not a single valley but a network of valleys and low mountain passes. The principle corridor was one defined in Roman times as the one Aquileia – Castra - Aemona – Celeia – Petovio or in the modern times Venice – Trieste – Ljubljana – Maribor and/or Aemona – Siscia – Constantinople or Ljubljana – Zagreb – Belgrade – Istanbul. This main corridor had in the times when infrastructure consisted of simple horse track two equal parallels: northern and southern one. The city of Škofja Loka is located at the strategic point where the corridor leaves Ljubljana Basin and enters two valleys. The city and its castle are situated inside the confluence of the two rivers coming from both valleys. They were therefore controlling both entries. But even more. With the one-time extensions of city walls across both of the rivers they were also blocking both routes, thus forming a valley enclosure (in fact two valleys enclosure).

II HISTORY OF THE CASTLE

Since they were part of the Roman defensive system *Claustra Alpium Iuliarum* the Roman defences were constructed further inside the valleys. But considering the described strategic position it seems only logical that the place was settled and fortified very early in the middle ages. In 973 emperor Otto II granted the estate to the bishops of Freising (hence the name *Bischofslack*). The present day castle is first mentioned in 1215. But another castle higher on the hill above the city surely existed before that date. This upper castle was destroyed by the earthquake in 1511 which caused the transfer of all administrative and defensive functions to all the "lower" castle (the one that is the subject of this report). Bishops of Freising hold the status of Princes of the Holy Roman Empire. Even though Škofja Loka was not their principal estate, the architecture of the castle nevertheless mirrored both its strategic position and the elevated status of its masters. The city itself was formed in 13. Century and walled in the 14th century. The most important sieges include one of 1457 by Duke Jan Vitovec, who conquered and burned the town, Ottoman siege of 1476. The city was also a target of peasant uprisings 1488, 1492, and 1515. In 1511 Škofja Loka was destroyed by an earthquake, but soon rebuilt through the efforts of Bishop Phillip.

The takeover of the castle by the state in 1803 also marked the end of Bishop's rule. The castle was used as the seat of administration. The imperial government sold the castle in 1870. After being owned by two private owners the castle was in 1890 purchased by order of St. Ursula. The nuns reconstructed the castle to serve as a school. According to their wishes and against protests of contemporary conservationists architect Wilhelm Treu ordered in 1892 the destruction of the donjon (the keep) and a construction of a passageway (enclosed staircase) between the castle and the monastery situated at the foot of the hill. The bell tower was also enlarged. This interventions closed the former access to the castle through its North-eastern tower. While the nuns had a direct access via staircase, the general public was to use the access leading to the castle outside the former city walls. During the First World War the castle was used as a hospital. After the war the nuns continued their educational activities, but were expelled by German army in 1941. After the second world war the castle served as a POW camp and prison. In 1959 the castle was taken over by the municipality. Soon afterwards the regional museum (Loški muzej) moved in. The castle is still used by the museum.

III AN INITIATIVE FOR PARTIAL RECONSTRUCTION

In 2006 the owner, the Community of Škofja Loka commissioned a project of reconstruction of the North Eastern tower that included the former, medieval entrance to the castle.

The motives for this were:

- Opening of the castle towards the city – reestablishment of direct communication between the city and the castle.
- Returning the content characteristic for a castle to the castle.
- Returning to an extent the fortification appearance that was completely covered by the intervention of 1892.
- Acquiring some new, representative spaces for the castle, the Museum and the city.

IV CONSERVATION PLAN

In this first planning phase the example could be used as a case study for a good practices example. The cooperation between the owner, the conservationist

and the planer (architect) was a model one. A solid conservationist research was undertaken, the Conservation plan drawn up and a quality architectural plan made in accordance with the conservation plan.

Within the research phase some probes, defined by the conservationist, were made. Apart from older construction elements such as walls, openings, gutters and also pavement of the original access road, the research located many important medieval and renaissance fortification elements, such as crenels and merlons, loopholes, casemates, drawbridge mechanism and other attributes of artistic and historic heritage.

The analysis for the Conservation Plan and The Conservation Plan itself determined that the most problematic phase in the history of the castle was the reconstruction of 1892 that transformed the castle into the monastery school.

The significant changes included:

- Change of function, (a fortification changed into a school) which in this case meant enforcing a new function that the building was never planned for.
- Change of size and organisation of spaces (to accommodate the change of function).
- Change of construction (change of construction systems that included the statics).
- Change of visual architectural appearance of the building (a fortification took over an appearance of a civil building).
- Diminishing of the architectural value of the building within the frame of landscape.

The examples of concrete works undertaken to change the castle into a school are walling in of crenels and merlons, loopholes, casemates and drawbridge, opening of windows also on the spots where they never existed before, levelling of the floors, changing of the volumes of the building and most notably, the removal of the donjon (keep) as the oldest and most notable fortification element. All this dramatically altered the appearance of the building and it's character.

V ARCHITECTURAL PLAN

The cooperation between the conservationist and architectural team was marked by full mutual confidence and as a result the architectural plan envisaged:

- To present to the best possible degree the fortification character (in architectural and art-historical sense) and



Loka Castle seen from the east, before the reconstruction of the eastern facade.

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Loka castle seen from the west. The keep (donjon) and western curtain wall were demolished during the 1892 reconstruction that saw castle being used as school.

© Ad Pirum Institute



Remnants of the medieval approach to the NE tower with former main entry into the castle.

© Ad Pirum Institute

- To acquire - on behalf of the castle, Museum and the city - some new, representative spaces.

The principles followed in designing were those recognised by the UNESCO as the basic principles of heritage preservation:

- Preservation of the original purpose of the building,
- Preservation of the basic construction characteristics of the building,
- Preservation of characteristics of architectural design and
- Preservation of visual testimonial value of the building.

As mentioned the cooperation was in this case a model one, but let us quote some problems that are occurring very often within this phase:

- The conservationists and planners (architects) don't share their views and platforms, so instead of a cooperation a rivalry occurs that results in forced rather than well thought solutions.
- The planners are faced with irrational demands by the conservationists.
- A character of public tenders is such that considers the price as a decisive factor, which results in commissioning of someone that is not competent in the field of architectural heritage and consequently favours conventional (modern) solution on the account of solutions closer to traditional techniques, used for construction of the given object.
- The planners strive to design a project that would give their personal mark on the account of achievements of the previous generations.
- Irrational legislation that automatically recognises formal qualifications, even thou the planner in question displays neither taste, affinity or creative competency in the field.

VI EXECUTION OF THE RECONSTRUCTION

As opposed to the planning phase the execution phase proved to be highly problematic. In general the following two causes for that can be determined:

- Any works on a public object (an object owned by a state or a local community) public tender is compulsory and of all the selection factors for the tender the price is by far the most important and in fact decisive one.
- The time available for the project is limited, either by the tender regulations or by the length of

political mandate of the people responsible for the object in question.

VI.i The Direct Consequences of Present Demands of a Public Tender

The consequences of the present demands made mandatory by the legislation that regulates public tenders are easy to determine.

They are:

- A contractor winning the tender may have offered the lowest price, but despite his formal qualifications lacks the competence (the knowledge of traditional techniques) needed to undertake quality restoration).
- Due to the submitted low price he is not in a position to engage adequately competent subcontractors (craftsmen skilled in traditional techniques such as carpenter, blacksmith, stone-carver, bricklayer, ...).
- The contractor therefore champions conventional (modern) solutions which are both in character and technology used far from similar, while
- The investor, faced by such a pressure from the contractor, usually backs the contractor since meeting the deadlines (either tender's deadline or the end of investor's political mandate) is for him (or her) more important than the quality of the reconstruction.

VI.ii Objective Obstacles

Some of the obstacles encountered when attempting a reconstruction by using traditional knowledge and techniques may be consequences of given circumstances such as:

- The absence of original materials. Especially when it comes to the fortification heritage materials that were originally used and usually produced on the location or within its vicinity are no longer produced at the location. Both solutions, the re-opening of production or importing materials from another, more distant sources, are costly and therefore not compatible with the characteristics of the public tender.
- The absence of traditional knowledge. The drive to modernisation has caused many schools educating in traditional techniques to be closed. People with needed knowledge are therefore rare and therefore costly to engage, or no longer exist.

In our concrete example the mentioned problems resulted in the following visible shortcomings that



Unearthing of the remnants of the drawbridge and the medieval pavement.

© Ad Pirum Institute

alert every competent visitor to the fact that the restoration was not carried out in a way that would restore the authentic situation (which basically means that the restoration skipped the use of traditional materials and techniques):

- A steel tube was used for fence of the reconstructed access to the NE tower, giving the fence an appearance of being built in the middle of the twentieth century rather than in middle ages.
- Industrially produced rather than forged chain was used for a drawbridge.
- Industrial, thermopane windows were built in instead of those hand made of oak.

VII THE USE OF RECONSTRUCTED OBJECT

In the last phase that shall see the reconstructed object taking on its envisaged new function a new problem was outlined: the divergence between the owner and the administrator of the object.

The municipality of Škofja Loka as the owner and Loški Muzej as the user and administrator of the object don't share the vision about the future use of the castle.

There is certain rational explanation for that: the museum centres on the region rather than the castle itself. In fact it was relocated to the after 1959. By then the castle has already completely lost its fortification character. Besides, the staff of the museum strives to preserve the concept of the founder of the original museum collection.

There is therefore no direct link to castle's past, neither through the common history of the object and the institution it's housing, nor when it comes to the content of the museum.

As a consequence the museum persist in using the old, far side entry rather than the access in the NE tower that is closer to the city.

VIII A CONCLUSION

Since most of the goals were achieved, it can be said that the project was successful in the following categories:

- Urban planning: yes, with the reconstruction of the NE tower the value of the object within the broader landscape had certainly increased.
- Visual testimonial value: yes, with the reconstruction of the tower its visual testimonial value has also increased.

- Presentation of old castle (fortification) content: yes, it was achieved to an extent.

- New presentational spaces for the castle, the Museum and the City: yes within the spaces of the NE tower the city acquired a new art gallery and a hall for conferences or small concerts.

- Conditions for further development in the same direction: yes, the project was carried out in a way that leaves open possibilities for further upgrading.

- Reestablishment of direct communication between the city and the castle: no, while the new entry has been completed as far as the construction work goes, it was never put in use.

This last point illustrates the need of all the participants to share the vision and goals. In this particular case the administrator (the Museum) never accepted the ideas that were leading the owner (the Municipality) to commission and execute the project. The Museum retained its concept and with it the entry from the far side, the draw bridge mechanism soon broke down due to an unauthorised use and was never repaired. The entry through the NE tower therefore remains closed. Because of that the ultimate goals of the project remain unfulfilled.

3.1.3

Deficits on the Local Level and some Possible Solutions

I DEFICITS

Thanks to the quoted example of the Škofja Loka castle /the reconstruction of the NE tower) and the data from other similar projects undertaken by and made available by the Institute for the Protection of Cultural Heritage of Slovenia and Ad Pirum Institute we can determine some of the most common deficits in the field of traditional Knowledge in the local proportions.

1. Public ownership and need to adhere to the policy of public tenders with public tenders dictating the lowest price as the basic criteria.

2. Public ownership and need to adhere to the policy of public tenders with public tenders dictating the time in which the project is to be executed. As a consequence either planning, or the execution or both are rushed. Rather than envisaged by thorough planning the problems are dealt with as they occur and often in an improvised manner.



The access to the NE tower before the reconstruction.

© Ad Pirum Institute



The access to the NE tower after the reconstruction.

© Ad Pirum Institute



The drawbridge area before the reconstruction.

© Ad Pirum Institute



The reconstructed drawbridge.

© Ad Pirum Institute

3. Public ownership and need to adhere to the policy of public tenders with public tenders regulations favouring the contractors with formal skills (but lacking knowledge of traditional skills) over those with traditional (but not formally recognised) skills.

4. Absence of traditional materials.

5. Absence of people skilled in the use of traditional materials and techniques.

While the first three points are of clearly local character and are presently still best dealt with locally (within one nation), the last two points clearly

direct to transnational solutions that will be addressed later.

II POSSIBLE SOLUTIONS

There are couple of possibilities to remedy the existing shortcomings:

1. A well thought out (rather than partial) planning that includes Conservation/restoration plan as its starting. In this context Conservation Plan is par-

ticularly important since it determines the traditional materials and techniques that represent the value which needs to be preserved. It therefore determines which concrete works are to be undertaken by which (explicitly skilled) workers in which traditional techniques. A proven record of actual traditional skills rather than formal education (in presently conventional techniques) shall serve as a reference. Also, such planning shall include a set of workable guidelines providing for a successful “step by step” completion of the project.

2. When it comes to objects of great historic and cultural value only authorised contractors with proper training should be allowed to participate. Since on national levels there is a notable shortage of such contractors with appropriate traditional skills, establishment of European list of such contractors.

3. Same goes for materials. A research carried out within the FORTE CULTURA project clearly indicates that when it comes to sources of original, usually local materials used in construction of fortifications no longer exist. Same goes for skills needed for producing such materials. Transnational exchange of the data of production of materials that can within the tolerable differences replace the original ones would therefore be very beneficial.

4. What is needed is a consensus regarding the support of preserving traditional knowledge, which means support to informing about traditional knowledge and to schooling in traditional skills and techniques.

5. Schools and workshops providing competence in traditional techniques shall be preserved even if the contemporary needs on the construction market don't fully justify their preservation.

6. While the regulative is necessary it should be less formalistic in a sense that the real merit (in this case the actual competence in traditional techniques, even if the individual is an autodidact) shall prevail over formal education (when not including actual competence in traditional techniques).

7. On the other hand there shall be established a mechanism that would recognise the actual skills (regardless of a formal education) and therefore enable such contractors to participate in public tenders.

III AN OBSERVATION

To conclude this part let us quote an interesting observation. During their activity in the last decade experts of the Institute for the Protection of Cultural

Heritage of Slovenia and Ad Pirum Institute have arrived to an interesting conclusion that the least of the problem represents finding the investor willing to carry out quality reconstruction (or restoration or renovation). There are in fact investors that are willing to undertake such renovations, but have problems finding properly skilled contractor.

3.1.4 Deficits on the Transnational Level

Analysing the given example we have in the first part arrived to an overview of the deficits when it comes to the traditional knowledge on a national level. One would assume that they can be generalised and applied to all project partner's countries across the board. But that would mean to oversimplify the issues. On an international level the circumstances become much more complicate and the reasons for that can be summed into two major premises:

I FRAGMENTATION

The same political diversity and dynamics of history that have resulted in construction of magnificent and richly versatile fortification heritage have also resulted in fragmented pools of knowledge, dispersed throughout different European nations.

II EUROPEAN UNIFICATION AS A FACTOR OF RATIONALISATION

With the emergence of the EU the communications between the individual European nations has been considerably enhanced and in some cases even made possible for the very first time in decades. But the velocity and degree of these developments differs from nation to nation. The progress is certainly most visible in the field of commerce and legislation. But it is notably slow in the field that is also otherwise, at least on the national and local level, quite neglected (here it is interesting to observe that, as opposed to the most of individual nations and local communities, the EU was very quick to recognise historic, cultural and economic value of the fortification heritage).

This is not to say that in individual member nations the heritage protection in general and specifically the protection of fortification heritage is not considerably developed in individual countries.

Due to the rich architectural heritage and historical circumstances that often demanded its intensive reconstruction on a large scale (earthquakes, wars, ...) many European countries have developed monument protection services with a proven outstanding conservation records. In most cases fortification heritage was not the primary objective of these services (especially the fortification heritage created from about the year 1500 onwards, even though here too some countries have achieved notable results) it benefited greatly from the accumulated data and skills within individual national agencies, their specialised co-operators and subcontractors.

Having identified the diversity of the approaches to the preservation of fortification heritage we can proceed to define the main differences, reasons for them and their consequences, all of which we must take into account when discussing the need for transnational distribution of traditional knowledge and materials.

3.1.5 Obstacles to Even Treatment and Applications of Traditional Knowledge within the Partner Countries

On the basis of the existing experiences and knowledge within the Institute, with comparison of the data gathered through the activity of the WP6 (questionnaire, network meetings, specialised workshops (e.g. Berlin, 30.4.2013) and the analysis of the generally accessible data we were able not only to the mentioned premises but also to narrow down the issues influencing directly the treatment of the traditional knowledge (by that we mean regard or disregard for traditional knowledge, traditional materials and traditional techniques, cherishing of traditional knowledge, traditional materials and traditional techniques, adequate use of traditional knowledge, traditional materials and traditional techniques and proper preservation of traditional knowledge, traditional materials and traditional techniques) on two principal issues:

- Changes of the doctrine that sometimes favoured the use of traditional technologies while in other periods favoured the use of modern concepts (and consequently methods, technologies and materials.
- Political (administrative) and cultural (linguistic) isolation and historically conditioned self-sufficiency of national agencies and national environ-

ments that has thus far prevented the interchange of knowledge and exchange of experiences regarding both good and bad practices.

We have further defined some individual areas of problems or deficits that, when talking about traditional knowledge, traditional materials and traditional techniques, in most cases appear as a result of the quoted two issues:

1. Common Theoretical Basis
2. Knowledge Storing
3. Terminology
4. Legislation
5. Monument and Nature Protection
6. Expert Literature
7. Exchange of Good and Bad Practices
8. Defining New Functions for Fortification Heritage
9. Usage of Traditional Materials
10. Traditional Technologies
12. Tendencies of Knowledge of Traditional Technologies
11. Education for Traditional Technologies.

I COMMON THEORETICAL BASIS

Here we must first point out the general situation when it comes to preservation of cultural monuments and then a specific position of fortification heritage within the monument protection activities.

I.i Doctrinal Differences

Due to the rich architectural heritage and historical circumstances that often demanded its intensive reconstruction on a large scale (earthquakes, wars, ...) many European countries have developed monument protection services with a proven outstanding conservation records. Yet, both the degree of positive attitude toward the heritage and stringency in its preservation vary from country to country. In Poland where most of the architectural heritage of the highest symbolic value on the national level was systematically destroyed a maliciously precise reconstruction with the respect to the minute detail seemed necessary. We can detect similar approach the Czechs have taken when maintaining and restoring their medieval castles. On the other hand we have already mentioned the interpretative liberty that Viollet le Duc allowed himself when restoring medieval fortification heritage, thus paving way

for “quality creative upgrading” that can witness a glass pyramid in the courtyard of Louvre, Plecnik’s redesigning of the Prague castle or modern funicular ferrying visitors to the Salzburg castle. There is of course also a far end of this approach where new design is put in direct contrast and above the heritage architecture, which can be in part observed at Ljubljana Castle.

I.ii Question of Attitude

A special question is the valorisation of fortification heritage. This has been very much shaped by political developments in twentieth century. It could be generally said that in the aftermath of the Second World War ideas of peace and international cooperation have become prevailing while the notions like “conquering”, once closely related to concepts of “glory” and “honour” have become instead more closely related to concepts like “unnecessary blood-spilling”, “disregard for human lives” and plain violence. All this has notably affected also an attitude towards fortification heritage. Yet it would be misleading to generalise. Especially since the last couple of decades have brought a period of more sober consideration.

Let us view some examples. In France both earlier fortification heritage, personified by Vauban, and “modern” Maginot Line always managed to preserve positive connotation of national defence and pride and the only restriction to their preservation were dimensions and available funding. Similar can be said about England where colourful stories resulted very notable added value in the field of tourism. In Italy fortifications also never obtained particularly negative connotation, but remained somewhat overshadowed by the vast extent of other historic heritage.

At the other side of the spectrum are countries like Greece where fortifications like “White Tower” in Thessaloniki remains the symbol of Turkish oppression while other Turkish fortifications, some of them rather magnificent, have been left to decay for decades. In Czech Republic the magnificent fortifications that were wordy counterpart of the Maginot Line were for decades denied both their importance and their value as the construction achievement of the “bourgeois regime” and received due attention only during nineties. Very much the same happened in Slovenia where the Rupnik Line was virtually discovered in 1999 and where in the aftermath of the Second World War some of the medieval castles were burnt as the symbols of oppressive feudalism. In the field of fortifi-

cation architecture Austria can take pride in achievements of men like Archduke Maximilian and Conrad von Hötzendorf, yet the fear of possible restoration of the monarchy made the republic very cautious about all imperial heritage, including the fortifications. Only with the passing away of the last actual holder of the title, the Crown prince Otto von Habsburg in 2011 have this constraints faded away.

I.iii Present Diversity

We can therefore sum up that there exist no consensus regarding evaluation of the fortified heritage. It is characteristic for Europe that fortifications in different countries had different historic role, different symbolic role and that consequently in different countries there are different attitudes towards fortification heritage (UNESCO, SVET).

Just as there is no uniformity when it comes to architectural heritage in general, there exists within the project partners countries no uniform approach to conservationist renovation of the fortified heritage. In fact there are no identical conservation practices.

Partial reason for the persistence of this diversity (or disunity – depending on a point of view) is the lack of information exchange. There is no exchange of information of the existing knowledge. At least when it comes to planned and consistent exchange.

Similarly there is no exchange of planning practices. From our point of view it was noted that one of characteristics of different and isolated planning practices is a notable absence of a uniform (and as the proven record shows efficient) document such as the “conservation Plan”.

We strongly believe that adopting “Conservation Plan” as a uniform document in proceedings of fortification heritage restoration, a document that would define the role of traditional knowledge, materials and techniques thus enhancing their preservation and use, would be a great contribution on a part of FORTE CULTURA to fortification heritage preservation.

II KNOWLEDGE STORING

From the described example of Škofja Loka castle we have deducted that on the local level regulations considering public tenders represent the single most hindering factor for those qualified in traditional techniques to compete on the levelled basis with

entrepreneurs using conventional (modern) techniques. On transnational level, however, this is not a general problem, but rather the question where to find both traditional materials and people possessing traditional knowledge.

The survey carried out within WP6 of the FORTE CULTURA project indicates that on the sites there exist no longer neither the production of traditional materials, used at the time of original construction, nor people skilled in techniques needed to work traditional materials. Most of those responsible for reconstructions or renovations are therefore forced to search for contractors elsewhere. One would therefore tend to assume that there are already existing tools that would facilitate such search. Yet this is not the case.

In reality the situation is as follows:

- There exist no generally agreed to and/or generally accepted data base (strategic register) of the fortified heritage.
- There are no publicly available data about reconstruction of fortification.
- There exist no generally agreed to and/or generally accepted data base (strategic register) of traditional construction and adequate modern conservation techniques.

This is not to be mixed up with some other data banks storing information of fortifications in general. There are many institutions dealing with the theory of fortification constructions and their history, such as:

Fortress Study Group:

<http://www.fsgfort.com/>

or International Fortress Council:

<http://www.internationalfortresscouncil.org/>

But they remain on a theoretical level and are certainly not covering the reconstruction topics.

There are also some specialised organisations with their web sites covering specific issues, most notable and most useful among them being vocabularies:

<http://www.internationalfortresscouncil.org/mfd.html>

http://www.fortressby.com/index.php?option=com_content&task=view&id=63&Itemid=25&lang=english

<http://dmna.ny.gov/forts/glossary/glossary.htm>

But none of them covers in an organised manner the area of conservatorship and reconstruction. A common databank, offering the information about existence of traditional materials and traditional knowledge locations would therefore be beneficial for all the partners.

III TERMINOLOGY

When it comes to fortification studies on a transnational level the issue of communication becomes very acute. For any successful communication to be undertaken it is prerequisite that concepts and individual words and phrases are equally defined and understood by all participating parties. But there exist no uniform expert terminology neither when it comes to fortification architecture, neither when it comes to reconstruction and revitalisation of fortification heritage. In fact (as was concretely demonstrated during the FORTE CULTURA project) the inconsistency of terminology can cause a lot of communication noise and delay both theoretical research and conservation and revitalisation practices.

The reasons for such a situation are manifold, but can be traced back to characteristics of military planning that, in order to be successful, needed to operate under the veil of secrecy. "Exchange of experiences" was therefore not only discouraged but often even punishable.

There existed different fortification "schools" (e.g. French School, German School, Italian School) that beside their own concepts developed also their own terminology. The terminology, as well as the concepts themselves, was spreading along the lines of allegiances rather than generally, which also caused some islands of particular terminology, often unrelated to linguistic groups.

For the multi-ethnic nations it was characteristic that the military language would be the one of the prevailing ethnicity. For practical reasons multilingualism was never practiced in armies even if it was officially desirable for all the languages to be recognised (as was the case within the Austria-Hungary empire). This, combined with the above mentioned secrecy meant that many military expressions, including those related to fortifications, would never filter into the broader society of ethnicity other than the prevailing one. A first-hand experience in this regard is the example of Slovenia where authentic fortification terminology was virtually nonexistent,

except for the very fundamental expressions such as “fort”, “loophole” and “rampart”.

This said it has to be noted that some notable attempts to produce a reliable and qualified vocabulary have been made, for example a web based vocabulary:

A Dictionary of Military Architecture - Fortification and Field works from the Iron Age to the Eighteenth Century by Stephen Francis Wyley:

<http://www.angelfire.com/wy/svenskildbiter/madict.html>

or Glossary of terms by New York State Military Museum and Veterans Research Center

<http://dmna.ny.gov/forts/glossary/glossary.htm>

or an appendix to the book “The Medieval Fortress: Castles, Forts, And Walled Cities Of The Middle Ages” by Joe E. Kaufmann and Wanda Kaufmann.

However, none of the publications has the official character of a charter that has been reviewed and agreed to by an international and internationally recognised body of qualified experts, which could serve as a generally recognised standard. The discrepancies between different usage of expressions in different countries are therefore remaining.

IV LEGISLATION

There exist a huge problem of harmonisation of modern legislation and traditional technologies. We have already seen on the example of Škofja Loka how some rigid legalization can impede the utilisation of traditional knowledge and techniques: in that particular case a public tender regulation enables a contractor, who does not poses adequate traditional skills, but fulfils formal requirements to obtain the commission while disqualifying the one with adequate traditional skills only due to lack in fulfilment of formalities.

Another problem area is modern building regulations, mostly safety regulations, that often overrule conservationist regulations. Let us here quote a hypothetical example of a medieval tower that should, in order for the reconstruction to be approved and carried out legally, have added an outer fire staircase, constructed of approved fireproof material that relates in no way to the existing historic struc-

ture. Such a tower would comply with modern safety regulations, but would inevitably loose its visual testimonial value. We have chosen an extreme (and in reality quite unlikely) example in order to illustrate most clearly the described dilemma.

One of the characteristic conflict areas is earthquake safety legislation which is often prohibitive when it comes to the application of the traditional technologies in reconstruction of heritage objects. Some countries with rich heritage and long tradition of restoration have developed the ways of dealing with this problem whilst in others stiff legislation often impedes consistent use of traditional technologies and consequently decreases significantly the quality of undertaken restoration works. This at the same time hinders the preservation of traditional knowledge itself, discouraging schools to organise programs that in reality turn out not to be needed and discourages those choosing education to opt for professions that may result in knowledge regarded as “nostalgically romantic” rather than needed and important.

From transnational point of view an exchange of information and good practices examples shall benefit those nations with problems in this areas since it would put in touch the legislators and administrators, as well as the general public, with the ways in which these conflicting principles can be combined without compromising anyone of them.

V MONUMENT AND NATURE PROTECTION

In the last couple of decades the preservation of nature has become a very important issue. The spread of urban areas, the spread of agricultural areas with introduction of monocultures and irrigation and even climatic changes, all that has caused a significant shrinking of natural habitats for species that have either already been endangered or have become such in the mentioned process. On the other hand a process of demilitarisation, that was especially evident in Europe after the end of the Cold War, has made abandoned large areas previously used by the military, thus offering a refuge to many otherwise endangered species. The most notable cases are grasshoppers and bats, but there are many others, both plants and animals. This becomes a problem if such an area or a part of it becomes recognised as an important part of cultural heritage.

The reasons for the occurrence of the situation are usually:

- The remoteness of the given object of cultural heritage.
- The time that has lapsed between the abandonment of object's original usage and its recognition as an object of significant value.
- The time that has lapsed between object's recognition as an object of significant value and its renovation, and of course
- The lack of maintenance and even human presence within the object during that time.

Once the reconstruction of such object starts it is almost inevitable that there will occur a clash of interest. Namely, the services and agencies dealing with cultural heritage and nature protection have in most cases been separated (or were already at the onset established as independent services). In practice this may represent a problem since the goals of monument and nature protection may often be in a direct conflict. In cases where the two areas of activity were combined within the same institution there have usually been found some ways to combine skills in order to find solutions beneficial for both sides. However, as mentioned, the situation has been aggravated by separation of Monument and Nature protection agencies in most of the partner countries.

The problem of combined nature and monument protection is especially dire in the case of fortifications since:

- They may be of excessive size so that even in case when object is both administered and maintained the size prevents administrator from executing regular thorough maintenance such as weeding and lawn moving. This may lead to overgrowing of certain parts of fortifications and to consequent populating of this particular location with different species of which some could well be protected.
- As already described, many of the sites were abandoned for prolonged periods of time which can also result in them being populated by endangered species. The effect of some of this species, particularly plants with their roots, can be extremely destructive and their removal of vital importance for the preservation of the object.

VI EXPERT LITERATURE

We can divide the existing expert literature in two ways. Firstly there is:

- Original – contemporary (or archive) literature about fortifications and their construction and
- Modern, present day literature about fortifications and their construction and/or reconstruction (or renovation).

But from the point of preservation of traditional knowledge we must note another difference:

- Expert literature dealing with concept and history of fortifications and
- Expert literature dealing with construction and reconstruction techniques.

Original or archive literature is important whether it deals with questions of construction directly or not. Of course that literature that deals directly is, from a point of traditional knowledge, the most useful since it can be used as a direct relevant reference. But even that archive literature that isn't dealing directly with the construction techniques can be used as a reference as well. A list of craftsmen, for example, can be very telling about the skills and techniques used for the construction of the object. Same goes for the illustrations. Any illustration depicting the construction of the object is extremely telling about materials, skills and techniques that were originally used to erect the object.

Much more reserved attention has to be given to modern expert literature since one must consider:

- Its doctrinal framework and
- Its specific origin and its relevance for other environments and circumstances.

Thus said it has to be noted that there exist some very good expert literature covering the field of both construction and reconstruction of the object – as well as literature covering the questions of renovation and revitalisation. But across the board problem with most conservationist literature is its accessibility to the general public. That is true on both national and transnational level.

The situation is even worse when we look into a situation in the area of information technologies. In most cases there is no electronic access to the expert conservationist literature whatsoever. In this regard WP6 with its outputs can represent an important contribution to improving the situation on transnational level.



If left neglected, in Central Europe area the architectural monuments are soon overgrown by the vegetation. Above photo shows fort Chiusaforte, Italy, visited by the FSG (Fortress Study Group) tour in May 2008 before the renovation. © Ad Pirum Institute



*Fort Chiusaforte, Italy, after the renovation.
© Ad Pirum Institute*



*In the Mediterranean area fig trees are devastating for architectural heritage. A fig tree growing from a tower wall in Dvigrad, Croatia.
© Ad Pirum Institute*



*Two walls pushed apart by an oak tree. Dvigrad, Croatia.
© Ad Pirum Institute*

VII EXCHANGE OF GOOD AND BAD PRACTICES

A proverb that is probably as old as the History itself says that it is much better (or at least much cheaper) to learn from mistakes of others rather than your own. Relating the experiences is by far the most efficient way of preventing the same mistake to be repeated over and over again. Unfortunately, when it comes to conservation projects there are more than abundant examples witnessing about the lack of such communication.

The trouble is less acute within the national environment where more often than not the problems may originate in either the adopted doctrine or, as we have seen in the example of Škofja Loka castle, regulation that excludes those participants of the conservation process that are actually adequately qualified.

On transnational level, however, the main problem is the lack of opportunities for communication. There is practically no exchange about the examples of good practices (or bad practices) of fortification heritage reconstruction and revitalisation.

That conclusion is unfortunately applicable to any individual field of conservation. For example:

- There are no general available cases of good practices when it comes to application of new functions to fortified heritage.
- There exist no general available analysis of typical mistakes or shortcomings of conservation and revitalisation and
- There exist no case studies of examples of applications of over-destructive functions.

One particularly important observation is that there exist no common European agreement on the inclusion of the Conservation Plan as the basic conservationist document into the process of reconstruction and revitalisation. We have already mentioned the importance of Conservation Plan for efficient planning and execution of any given conservation project and, in the focus of this analysis, especially for efficient inclusion and use of traditional knowledge, materials and techniques.

We therefore believe that the adaptation of a Conservation Plan as standard Europe wide valid document would introduce a common standards that would also make exchange of ideas (by establishing common terminology and common comparative standards) contribute greatly to overcoming also the deficit in communications and exchange of good and bad practices.

VIII DEFINING NEW FUNCTIONS FOR FORTIFICATION HERITAGE

One of the particularly problematic areas of renovation of fortifications is finding appropriate new functions. The wrong choice of function can result in:

- Damage to the original construction due to the reconstruction works.
- Damage to the original construction due to an inappropriate new use.
- Damage to the construction due to the repeated (renewed) abandonment, as the chosen function proved to be inadequate and/or not feasible.

Determining of the new function is especially demanding in case of fortification architecture because of the specific character of the defensive buildings. The very essence of this architecture is far from other ones.

The fortification is utilitarian architecture characteristic by:

- Defensiveness (and adequate bulky construction).
- Symbolic meaning (and adequate appearance).

In practice (if we take a basic example) that means that the resistance of the walls against the projectiles (and consequent thickness of the walls) is much more important than a volume and illumination of dwelling quarters. The appearance of fortification is to convey a feeling of strength and evoke a feeling of awe rather than emotions such as enthusiasm and admiration. Fortifications therefore seldom lend themselves to a good use when there is expressed need for voluminous, well illuminated and well aired spaces. The example usually given to illustrate an inappropriate function of fortification is an aircraft museum in a casemated fort.

Equally irrational as giving an obviously inappropriate function to a reconstructed fortification is to reconstruct the fort for a function that underestimates the symbolic and cultural value of the fort and its potential as a tourism asset.

Yet, despite this very obvious problem of determining a proper new function to fortification heritage we have established that there exist no coherent method to analyse the possibilities of new usage or different alternative functions.

There is no possibility of safe storage of data, (as well as safe interchange or back-upping of the data)

There is no mutual understanding and/or comprehension between traditional techniques as such



The castle of Brežice is always full of life. Its sustenance is secured... © Ad Pirum Institute



An inability to find a proper function may well render funds invested into the reconstruction of the picturesque Pišce castle wasted. As seen on the photo below its doors remain closed for visitors, such as members of the FSG (Fortress Study Group) in 2008.

© Ad Pirum Institute

and their present time conservationist application.

In majority of areas and partner countries there is little general knowledge or general awareness of indigenous, authentic technologies.

IX MATERIALS USAGE

When talking of traditional materials we can discern four main deficit areas:

- The production of traditional materials.
- Skills needed for production of traditional materials with traditional techniques.
- Knowledge needed to plan the implementation of traditional materials using traditional techniques in reconstruction and
- Knowledge needed for the actual implementation of traditional materials with traditional techniques.

IX.i The Production of Traditional Materials

The survey undertaken among those fortifications administrators that are partners in the FORTE CULTURA project has clearly shown that not a single source of material originally used for the construction of the given object is still in use. This presents the planners of the reconstruction with an uneasy choice of either to organise the production anew, to find an alternative source of the original material or to determine the best possible replacement material. All of this possibilities have a common disadvantage of being comparatively much costly that the original construction itself. The use of alternative materials usually means a risk of compromising one of the aspects of reconstruction (constructional coherence, aesthetic value, symbolic value, ...). Alternative source of original materials (if it exists at all) is inevitably marked by high costs of transportation. But to organise a production on an original site anew does not mean only to establish anew all the needed infrastructure, but also to provide skilled labour, which brings us to the next problem:

IX.ii Skills Needed for Production of Traditional Materials with Traditional Techniques

As a rule with the conclusion of the production of a certain materials the knowledge needed for the production fades away within a generation. This is more acute when it comes to traditional materials and traditional techniques of their production since

there may have past some centuries since they were used the last. Sometimes local enthusiast may prove an exemption to the principle, but that is hardly a solid enough bases that could be used for a renewal of a serious production. While the surveyed project partners were not as determined about the absence of the skills needed for a production of traditional materials, we were nevertheless able to conclude that the situation is very much the same as when it comes to the sites where the original materials were produced - generally they no longer exist.

IX.iii Knowledge Needed to Plan the Implementation of Traditional Materials Using Traditional Techniques in Reconstruction

Even if there existed both the infrastructure and the skills to produce original materials that would be of little value if both the conservator and the planer (architect) wouldn't be aware of implementation. Even thou the situation may vary, in the areas known to us conservationists as a rule poses an adequate knowledge on a local level. But since neither materials nor skills can be always found locally (as described above) familiarity with the broader European environment may be decisive, yet it is more often than not deficient.

IX.iv Knowledge Needed for the Actual Implementation of Traditional Materials with Traditional Techniques

In our described example of the Loka castle we have indicated that local peculiarities when it comes to public tender regulations may prevent those properly skilled to apply for the engagement in the first place. But on the transnational level the problem is the very existence of such skilled personnel. Despite our attempts to obtain them, we were by the time of the conclusion of this report not provided by the official statistics illustrating the steady decline of both number and size of craft schools which were offering qualification in traditional techniques. We are therefore relying on anecdotal witnessing that an obvious decline has started in the sixties (from 1960 onwards) and has resulted in a large portion of the educational institutions conveying traditional knowledge disappearing all together. As a consequence such a knowledge has to be look for internationally, as is well illustrated by the engagement of Czech glass craftsmen in some of Slovenian conservation projects.

We can therefore sum up that not only the production of traditional materials itself has ceased a long time ago, but that due to the time elapsed since then the knowledge of production has in most cases been lost as well. As a consequence the conservationists and planers have to seek for them outside of the national boundaries.

But while a transnational approach is necessary if some of the conservation projects are to be executed on a desired (adequate) level, our analysis has shown that there is no coordinated, fragmented analysis of adequate technologies essential for conservationist approach on the basis of individual materials used in constructions. An overview of the sources of materials used in traditional construction techniques and of the craftsmen qualified in techniques needed for their production is clearly lacking.

X TRADITIONAL TECHNOLOGIES

In nineteen nineties an attempt to reconstruct in Julian Alps a section of the First World War battlefield was almost stalled by the accusation of inaccuracy. The critics pointed out that, since it was supplied from the sawmill, the wood used for covering trenches was of regular shapes rather than irregular one that was during the war chopped in the nearby forest. Even thou at the bottom the episode was a manifestation of a struggle for influence, it nevertheless brought to a light the question of accuracy. But since the traditional techniques can't really compete with conventional (modern) ones when it comes to a free market, it is a question that we need to address.

X.i New Versus Old

If there is one word that can describe well enough the difference between a traditional craftsman and a one of today, that word is "gadgets". Not just when it comes to traditional technologies used in reconstructions of historic objects like fortifications, modern technology enables men in general to undertake confidently any kind of craftsmanship without profound knowledge of materials or hardly learnt skills. Which explains why traditional knowledge has become obsolete.

The new, mechanised ways of craftsmanship:

- Don't require a prolonged training period,
- Use industrially pre-prepared materials,
- Use fabricated materials.

The result is higher efficiency mirrored in shorter time needed for completion of work and its lower price. Yet the authenticity of the roof construction of a keep, was it made of sawmill produced beams connected together by connection plates and steel screws, would be highly questionable.

In the described example of the Loka castle we have already seen that in the circumstances where the price is sole deciding factor this can annul all the efforts by conservationists and planers, but worse still it can be lethal to the very existence of traditional knowledge. True, the gravity of the problem varies from country to country. There are places where the value of traditional knowledge is recognised and valued, in other areas such knowledge is valued, but in practice limited only to souvenir making and historic re-enactments while elsewhere it is all together neglected. So here too, if the problems are to be overcome in the entire project area a transnational co-operation is necessary. In this regard we came to a conclusion that there exist no publicly available data about traditional technologies, providers of traditional technologies, education opportunities.

As a consequence of modernisation in construction field there is a notable problem of adequate education and training of traditional technologies providers. Also, because of the increase in efficiency brought by new tools, materials and techniques, there is, both when it comes to both the building industry and the “do-it-yourself” handymen, a considerable lack of awareness about the traditional technologies among general public. The situation isn’t improved by a strong public (media) promotion of modern technologies, while traditional technologies simply haven’t got the economical backing that would justify equally aggressive advertising campaigns.

Inside expert community the situation is of course better. Within the expert public there exist very high degree of awareness about the traditional technologies, but there too there are considerable shortcomings when it comes to the analysis of the application of traditional technologies in the conservation process.

X.ii Combining Old and New

Another specific question that a conservationist has to face is a degree to which it is either justifiable or even rational to combine traditional and conventional (modern) technologies. For example, while

it makes perfect sense to bring replacing materials from the same location that the original material had come from, but there is little sense in utilising the same modes of transport (e.g. ox driven cart rather than a truck) to ensure the quality of conservation. Unless of course this is a part of a promotional event related to fortification heritage.

To make decisions like this some competent expertise is needed on account of the conservationist and planer and contractor. In this regard some reference material would be very useful. But we must establish that there exist no in-depth analysis about justification of combining traditional and modern technologies in the conservation process.

XI EDUCATION FOR TRADITIONAL TECHNOLOGIES

As already mentioned ever since 1960’s there was a steady decline in both number and size of schools and educational programs qualifying in traditional knowledge. There is certain inevitable economic logic in this process. If the schools are to be responsive to the needs of construction industry they have to adopt their programs in accordance with current conventional technologies. On the other hand reconstruction projects don’t represent big enough share of production to make, from purely economic point of view, preservation of knowledge related to traditional technologies within the regular education process justified.

So there seem to remain two options for preservation of traditional knowledge:

- Budget based financing of educational programs on the basis of recognition of cultural importance of preservation of traditional techniques despite their seemingly unviable economic bases.
- Encouragement and recognition of skills obtained through informal process (often on volunteer, enthusiastic bases) in order to make them eligible for participation in reconstruction works.

When speaking of traditional techniques related educational programs that are seemingly unviable in economic sense, the word “seemingly” needs to be underlined. Let us remember our example of Škofja Loka castle and use it as a good illustration for this particular question. As said the restored medieval entry into a castle was actually never used as an entry. A new, more direct communication between the castle and the city (in fact the

original one) was therefore not established and the visit statistics of the Museum remained the same. In pure economy terms it was therefore justified to use cheaper industrial products (fence, windows, drawbridge chain) since using same products produced and installed on the basis of traditional technologies would appear to be unproductive waist of funds.

But let us presume another possible scenario. Let us presume that a properly reconstructed tower with a notable degree of authenticity, enriched with some period re-enactors making a spectacle of the use of the functioning drawbridge would attract new public. Let us also presume that the program related to architectural heritage would result in listing of the castle in programs of tour operators. The visitor's statistics would increase, making the investment in traditional techniques perfectly viable.

We don't need to look far to see that such a scenario is not just a fantasy. In this regard Bled castle is an example of good practice, not to mention the Salzburg castle, a partner in the FORTE CULTURA project.

However, for a success of such scenarios we need a general consensus about the long-term benefits of preservation of traditional techniques. Such a consensus shall in turn make possible the support of education, either through retention (or even new formation) of professional educational institution or programs aimed at perfecting and recognising informal skills.

But speaking of economic viability of education a role of transnational cooperation needs to be stressed. While a single nation may not sustain an educational institution on high enough level, the broader European space could. The first step in this direction would be a creation of European List of quality craftsmen, as well as a list of traditional materials sources.

3.1.6 Conclusion

We believe to have outlined all the main deficits and needs regarding traditional knowledge, traditional materials and traditional technologies on both local and transnational level. Let us conclude with some concrete proposals that could either as outputs of the WP6 of the FORTE CULTURA project or some general recommendation contribute to the policy of preservation of traditional knowledge.

Re 3.1.5-I Common Theoretical Basis

Even thou the diversity of views in this particular area is tolerable enough, a formation of an expert editorial body (a form of an international council) with the aim of unifying the basis where discrepancies exist, would be beneficial.

Re 3.1.5-II Knowledge Storing

An output 6.4. of the FORTE CULTURA project is designated to address this question.

Re 3.1.5-III Terminology

Formation of an expert editorial body (a form of an international council) with the aim of unifying the basis where discrepancies exist, is highly recommendable.

Re 3.1.5-IV Legislation

Addressing this question overpasses the competence of project partners, which does not mean that some of them cannot play an important role by giving initiatives and provide advice both in local environment and on the European level.

Re 3.1.5-V Monument and Nature Protection

This issue is addressed particularly within the WP6 of the FORTE CULTURA project by the Humboldt University.

Re 3.1.5-IV Expert Literature

Even translation of some of the splendid expert literature presently existing solely in national languages into English would notably improve the situation in this field.

Re 3.1.5-VII Exchange of Good and Bad Practices

This issue is to be addressed within the activity 6.3. of the FORTE CULTURA project.

Re 3.1.5-VIII Defining New Functions for Fortification Heritage

A proper choice of a new function for the restored fortification heritage object is one of the most decisive factors for a successful reconstruction, renovation or revitalisation. has been carried out. To define this as the main deficit would in certain areas be very much justified.

Re 3.1.5-IX Usage of Traditional Materials

Since there seem to be a general abandonment of the production of traditional (authentic) materials forming of the European list of available sources of authentic, traditional materials would be very beneficial.

Re 3.1.5-X Traditional Technologies

The rapid modernisation of building industry has caused not only the change of practices and the abandonment of traditional technologies, but also a lack of awareness and a problem in an attitude towards traditional technologies. Their promotion based on both on popularisation and expert argumentation of benefits of their implementation would be very beneficial.

Re 3.1.5-XI Education for Traditional Technologies

A consensus against further abandoning of official schooling and training in Traditional technologies is needed as well as a general support for craftsmen skilled in traditional techniques.

4 Contribution of the Transnational Cooperation Project FORTE CULTURA to the Valorisation of Traditional Knowledge and Expertise



4

- 4.1 Conception of the Transnational Knowledge Exchange
- 4.2 Implementation Strategy of the Trans-national Research and Monitoring Programme (TaCKeDat related activities)
- 4.3 Development and Installation of Databank of Traditional Knowledge (TaCKeDat)

4.1

Conception of the Transnational Knowledge Exchange

Authors:

Anton Marn, architect - conservationist

Matej Zupančič, architect - conservationist

Aleksander J. Potočnik, architect - conservationist

Responsible institutions:

- Institute for the Protection of Cultural Heritage of Slovenia
- Ad Pirum Institute, Slovenia

Content

4.1.1 Basis for Concept Evolution

4.1.2 Hardware Database Station

4.1.3 Structure of the Database

4.1.4 Documents Formats and Transfer Protocol

4.1.5 Accessibility of the Materials

4.1.6 Administration and Usage

4.1.7 Operational Plan

4.1.8 Concept of the Transnational Knowledge Exchange

4.1.1 Basis for Concept Evolution

Having familiarised themselves with the circumstances and communication practices between the FORTE CULTURA Project partners, the members of Slovenian National Institute for Protection of Cultural Heritage and Ad Pirum Institute have conceived the concept for a systematic collection and electronically registration of traditional knowledge and expertise, like reconstruction, restoration, monument protection on the following basis:

- The server on the ZVKDS (Slovenian National Institute for Protection of Cultural Heritage) can, with the allocation of (to be determined in the implementation phase) ensure the sufficient storage capacity and sufficient access efficiency for the database.

- The most commonly used and most reliable transfer protocol is FTP.

- The most universally used format combining both texts and pictorial (Graphic) material is a pdf format.

On this basis the following concept was proposed:

4.1.2 Hardware Database Station

The Databank of Restoration Technologies for Fortified Heritage shall be hosted at the server of the Slovenian National Institute for Protection of Cultural Heritage.

The allocated storage size is to be (to be determined in the implementation phase)

The access broadband capacity shall be: (to be determined in the implementation phase)

4.1.3 Structure of the Database

Considering that the main denotation of the techniques of reconstruction and restoration of protected monuments (including the fortified heritage) is material, the base level folders shall be organised by materials:



WP6 Workshop and Training Session in Ljubljana on May 27 and 28, 2014.

Photo: Ad Pirum Institute

-
- Earth,
 - Wood,
 - Clay - Brick
 - Stone,
 - Concrete and Armoured Concrete,
 - Metal.

The listing of Study Cases, Best Practices Examples and Knowledge and Expertise Accessibility shall be placed in the first sublevel (within the above mentioned main groups). They shall be organised by countries and/or regions.

The concrete pieces of Study Cases, Best Practices Examples and Knowledge and Expertise Accessibility shall be placed in a second sublevel and shall be organised by countries and/or regions.

4.1.4 Documents Formats and Transfer Protocol

Since “pdf” is universally used format, accessible to every single partner and capable of carrying text material as well as graphic materials with high enough level of reliability the Databank of Restoration Technologies for Fortified Heritage shall be formed of documents in the “pdf” format.

For the same reason (universal usage and universal ability of access) the “ftp” protocol has been chosen as the working protocol of supplying and disseminating of the collected data.

4.1.5 Accessibility of the Materials

Considering the character of the FORTE CULTURA project we presume that it is our common interest that all the collected data is accessible to the broadest possible public. The possibility of the viewing shall therefore be general. We suggest that the same goes for the downloading. The contributors must therefore agree that while their moral authorship will be recognised, their material authorship rights shall be waved in accordance with the CC (Creative Commons) standard.

4.1.6 Administration and Usage

Three main categories can be defined, when it comes to administrators and users of the Databank of Restoration Technologies for Fortified Heritage:

- Administrators,
- Privileged users (experts),
- General users.

Administrators have full access and ability to edit (organise) the Databank, to upload and erase the individual items and to reshape the structure of the Database.

Privileged users are to be experts authorised to upload the content, but not to edit the site. Whether they are to have the access to the entire Databank or just to its particular section(s) is yet to be determined.

General users will be able to view all the material in the Databank, but will not be authorised to upload and material. However, to enable the general public to participate in contributing data we suggest that the members of the general public are enabled to contribute, with their contribution being subject to submission to the Administrator.

4.1.7 Operational Plan

The test structure shall be done by the end of 2013 while the main goal of completing the Databank of Restoration Technologies for Fortified Heritage is April 2014.

Ljubljana, 21. 6. 2013

4.1.8 Concept of the Transnational Knowledge Exchange

What was needed for ensuring the transnational conservation knowledge exchange to function?

The answer seemed simple:

- 1
TO PUT IN PLACE AN ADEQUATE STRUCTURE
(a databank or a TaCKeDat®, as we have nicknamed it).
- 2
TO ENSURE A MECHANISM THAT WILL KEEP IT FUNCTION
Which is actually the output 6.3.3: Transnational research and monitoring programme knowledge saving CE-fortresses

TaCKeDat

But even while designing TaCKeDat® concept some questions have surfaced.
They could be summed up in two categories:

1. **COMPETENCE**
2. **MOTIVATION**

We believed that addressing these two categories was vital for the functioning of the TaCKeDat® in the long term.

Questions

To address two mentioned categories (competence and motivation) we needed to clear some basic questions such as:

- What is the purpose of the scheme?
- Who will be its contributors?
- And most importantly: Whom is it made for?
Who will be it's users?

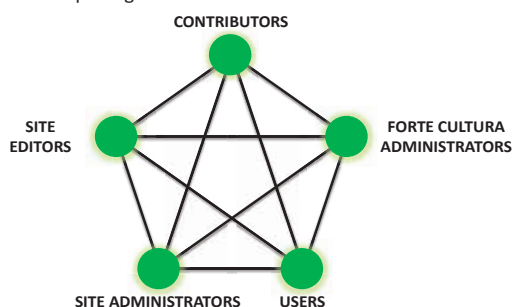
(all in order to make the transnational conservation knowledge exchange a living, functioning organism rather than just a paper scheme)

The first thought was that the basic structure explaining databanks creation and functioning is a rather simple one:

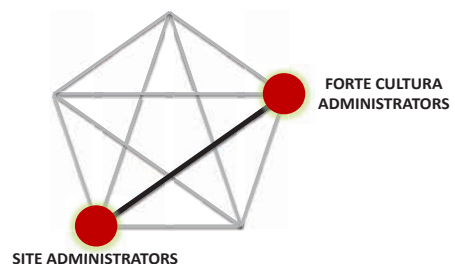


But this bipolar scheme proved far too simple.

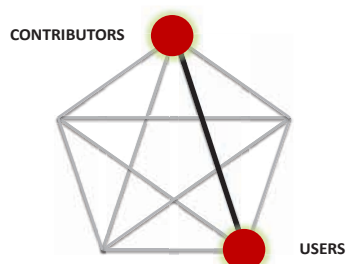
In fact the most suitable graphic scheme explaining level of complexity of the functioning of such a mechanism turned out to be a pentagonal scheme:



We can quickly conclude that not all of these elements are equally important in all phases.
For example: during the development of the TaCKeDat® structure, these two were more important:



But in the second phase other two elements and a level of their participation is determining effectiveness of the concept:



Two basic groups for effective functioning of the transnational conservation knowledge exchange are therefore:

CONTRIBUTORS

and

USERS

Let's have a closer look at the two!

9

Whom is TaCKeDat© devised for?
Who are its USERS?

Are they:

- ordinary people curious about conservation issues,
- owners/users of the fortification heritage,
- developers, master builders or contractors wanting to work in the field
- or conservationists (and/or other experts)?

And also: what's their command of English language?

The answers to this question determined both the content and the level on which the content is relayed.

10

When it comes to **CONTRIBUTORS** the question is similar, but with another dimension to it.

So questions like who shall be contributors of knowledge:

- Conservationists (and/or other experts)?
- People with hand-on experience (builders/contractors and other service providers)?

shall be joined by another question:

11

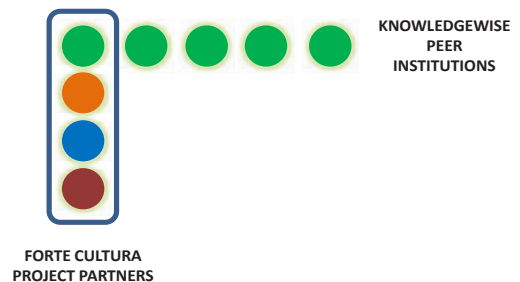
Are they **COMPETENT** to relay knowledge?

and

What is their **MOTIVATION** to pass on the knowledge they posses?

12

Addressing these questions we came to an interesting situation:



13

So how are we persuading those outside the project Forte Cultura to co-operate and to contribute?

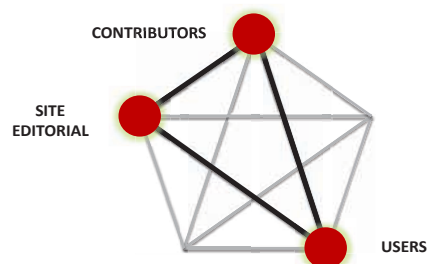
What is their **MOTIVATION** to participate?

Thus far the source of contributions were:

- Project partners themselves.
- Contributions gained through personal contacts.

14

Do we have this scheme functioning?



15

... assure relevant level of the TaCKeDat© content, which will bring it

REFERENCE STATUS,

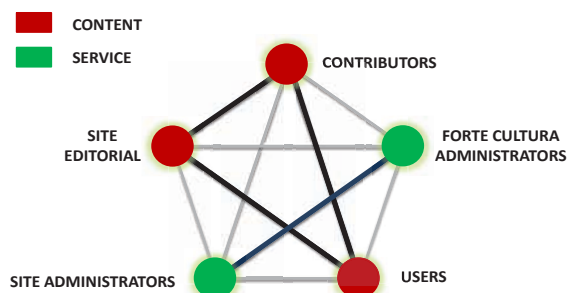
thus in turn providing

MOTIVATION

for the outer contributors.

16

In that way we will achieve the ideal working mode:



4.2

Implementation Strategy of the Trans-national Research and Monitoring Programme (TaCKeDat related activities)

Authors:

Matej Zupančič, architect - conservationist
Aleksander J. Potočnik, architect - conservationist
Anton Marn, architect - conservationist

Responsible institutions:

- Institute for the Protection of Cultural Heritage of Slovenia
- Ad Pirum Institute, Slovenia

Software solutions:

Arne d.o.o.

ARTICLE 1

As a contribution to the sustainability of the results of the FORTE CULTURA project, especially the TaCKeDat the RC ZVKDS pledges to keep providing the hosting space for the TaCKeDat database available also after December 31st 2014.

ARTICLE 2

FORTE CULTURA is appointing a 5 members WP6 Steering Committee of which three members are experts (a conservationist, an architect, an economist).

The WP6 Steering Committee will:

- Monitor the procedures of the WP6 and the functioning of the TaCKeDat database.
- Provide guidelines for the work of the TaCKeDat database.
- Name three Knowledge Keepers.
- Address important institutions in relation to the TaCKeDat database.
- Form the contact list and approve its expansion.

The modes of contacts and information exchange:

- Annual thematic conferences on different places,
- Electronic communications,
- Demonstration projects.

ARTICLE 3

WP6 Steering Committee appoints three Knowledge Keepers.

The Knowledge Keepers will:

- Represent the TaCKeDat database.
- Define most likely contributors and users such as:
 - state bodies,
 - scientific institutions,



Scene from the WP6 Workshop and Training Session in Ljubljana on May 27 and 28, 2014.

Photo: Ad Pirum Institute

- fortress cities and fortress management,
 - private experts and companies.
- Address important relevant institutions.
 - Encourage the co-operation of the important relevant institutions to contribute.
 - Inform the members of the about the current news and general development of the TaCKeDat database.
 - Maintain the database of members and subjects on the contact list.
 - Service the TaCKeDat database content.
 - Evaluate and filter the content of the TaCKeDat database.
 - Police contribution procedure.
 - Police outgoing procedure.

ARTICLE 4

In order for the Knowledge Keepers to fulfil their tasks in regards to the incoming contributions the following contribution procedure is to be followed:

1. Application of the contributor – this includes the acknowledgment of the Common Domain (CD) character of the TaCKeDat database. The contributors will indicate agreement with the option of free download of all the available materials under a provision that the acknowledgement of the source is assured.
2. An acceptance of certain obligations such as proof reading or language review.
3. Uploading of the contributors contribution to the interim databank – a one that is not available to the public but only to the Knowledge Keepers.
4. Selection: inspection, evaluation and approval of the Knowledge Keepers for contributions to be displayed – made publicly available.
5. Uploading – placing of contributions to the TaCKeDat database.

ARTICLE 4

In order for the Knowledge Keepers to fulfil their tasks in regards to the outgoing contributions we suggest the following usage procedure:

1. Registration / Acknowledgement of the TaCKeDat database user of the Common Domain (CD) character of the databank with the obligation to quote the source at every single application.

2. Free download of the content providing that the precondition described in the previous point is satisfactory fulfilled.

ARTICLE 6

In order to assure the running and development of the project (especially when it comes to TaCKeDat (databank) until FORTE CULTURA appoints the three permanent Keepers the three provisional Keepers are authorised.

Ljubljana, May 28, 2014



Scene from the WP6 Workshop and Training Session in Ljubljana on May 27 and 28, 2014.

Photo: Ad Pirum Institute

4.3

Development and Installation of Databank Traditional Knowledge (TaCKeDat)

Authors:

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Matej Zupančič, architect - conservationist
Anton Marn, architect - conservationist

Responsible institutions:

- Institute for the Protection of Cultural Heritage of Slovenia
- Ad Pirum Institute, Slovenia

Software solutions:

Arne d.o.o.

Development of electronic system (databank) for traditional knowledge and expertise about the fortified buildings and architecture in CE, definition of data transfer and public using rules, linking with other portals with information.

TaCKeDat is electronic databank of traditional knowledge and expertises utilised in fortified architecture. Presently it is located on the URL: <http://www.tackedat.eu>, pending permanent relocation to the server of the Institute for the Protection of Cultural Heritage of Slovenia (ZVKDS-IPCHS).

As new modern information pool it serves as an instrument to accumulate and to distribute information and knowledge Europe-wide via world-wide- web. As such represents the first centralised, trans-national electronic databank (electronic registration system) of original technologies, traditional handicrafts and materials used for the construction of historic fortress monuments in Central Europe. It creates a new knowledge pool and eliminates presently existing information deficit in the reconstruction and conservation of fortress heritage.

The databank collects historic documents, documentations of practised technologies, studies and experiments relating to fortress reconstruction, renovation and monument protection, descriptions of best practices and results of the transnational experience exchange. Its aim is to make them accessible to a wide range of users.

The genesis of the concept

The brief stated: "Development of electronic registration system (databank) for traditional knowledge and expertises about the fortified buildings and architecture in CE, definition of data transfer and public using rules, linking with other portals with information«

At first we believed that we were to establish a network of contacts with the peer institutions that would ensure the unobstructed flow of design-wise uniformed information based on the ground

of common interest and motivation. In November 2013 that attempt was cut short in its tracks and we faced a situation whereby we had to rely on a network of partners that were of a different expertise. In order to overcome that situation we designed two forms that were to help participants to arrive to the design-wise uniformed contributions to the planned databank. Those two forms were the so-called BCF (the Basic Contribution Form) that was to serve as a summary providing some basic details about the author(s) and the topic of the contribution. The SCF (the Secondary Contribution Form) was to provide a uniform structure of contribution and therefore to serve the authors as a guide in preparing contribution.

The first tests of the databank concept were run on a html basis. Once the concept was approved a team of professional information technologists was engaged to execute an SQL based databank. On the basis of the Basic Contribution Form (BSC) an interactive on-line form (the so called Contribution Interface) was designed, thus superseding the BSC that now became obsolete. On the other hand an instruction that the approach should be more flexible and that the broadest possible material is to be accepted, made the Secondary Contribution Form (SCF) unnecessary as well.

Detailed description of TaCKeDat as the core output of the WP6 of the Forte-Cultura project:

Its purpose is to enhance the digitalisation of knowledge and examples of expert practices and to enhance their trans-national exchange, to give efficient, wholesome and universally applicable overview of the different traditional techniques and to facilitate quick search for individuals or organisations in possession of qualified skills to implement these techniques.

The TaCKeDat is designed as an exquisite expert system, administered and guided by Steering Committee as a body of three competent, internationally recognised conservationist experts. They are responsible for the relevancy and exactness of the contributed material. Currently the Steering Committee is comprised by representatives of involved institutions: Humboldt University and Institute for the Protection of Cultural Heritage of Slovenia. New Steering Committee with a broader base of membership will be elected at the FORTE CULTURA Net-

work Meeting in Kostrzyn in December 2014.

To facilitate the access of broadest possible public to TaCKeDat and to make search for desired and relevant data as easy as possible the team composed of members of National Institute for the Protection of Cultural Heritage of Slovenia (ZVKDS-IPCHS) and Ad Pirum Institute has after thorough deliberations identified four basic search criteria:

- Author of the document
- Title of the document
- Building material
- Type of Object and
- Architectural element.

This search criteria are found on the basic search page of the web site. Another page is devoted to contributors participating in the project by submitting their material. The on-line form asks contributor to write basic data about contribution, thus providing key elements for later search of the submitted document.

Sustainability

To ensure the sustainability of the project the databank was in 2014 transferred to the web site of the Institute for the Protection of Cultural Heritage of Slovenia (ZVKDS-IPCHS) at the URL:

<http://www.tackedat.eu>

THE USE OF THE DATABANK

The “Home” page

The “Home” page of the TaCKeDat site offers some basic data of both FORTE CULTURA project and the TaCKeDat itself. Apart from the “Home” button that is constant feature, the three other navigation buttons on the home page are linking to:

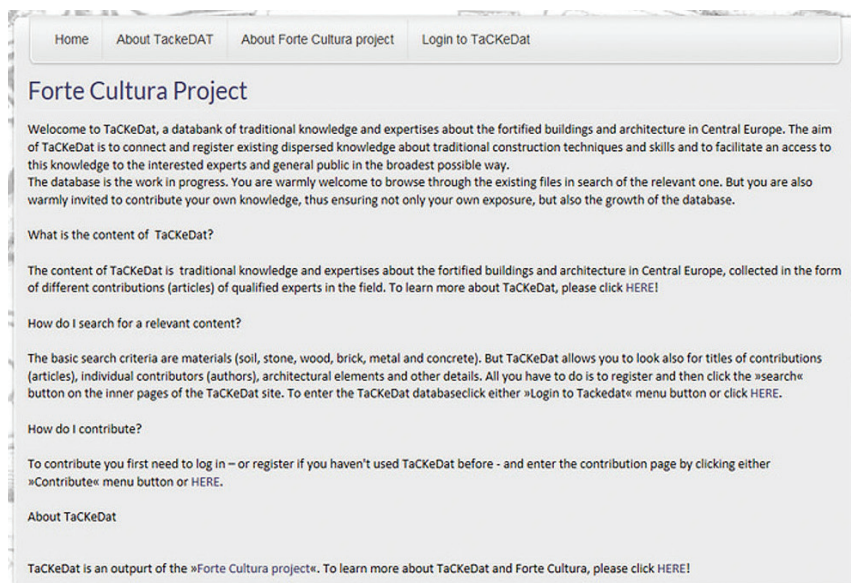
- “About TaCKeDat” – to some basic data about the databank itself,
- “About FORTE CULTURA Project” to more info about the project and ultimately to the project’s own site while
- “Login to TaCKeDat” enables you to enter the databank.

The Databank can be used freely, the only pre-requisite is registering. Registration serves on one side to provide some necessary feedback about the usage of the databank while on the other serves as a protective screening against an intentional or unintentional abuse. By registering users are also agreeing to Users Agreement, thus obliging themselves to credit authors of contributions as well as the TaCKeDat as the source.

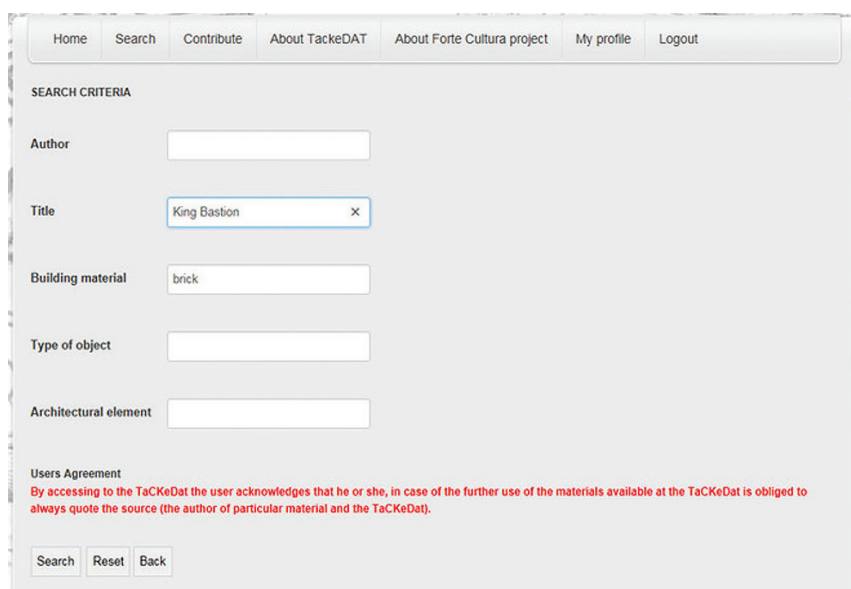
The “Search” page

The “Search” page is the interface enabling users to use the databank and to make a full advantage of it. As is seen on the illustrating screenshot the users can search for the desired topic according to five accepted criteria: 1.) author of the document, 2.) title of the document, 3.) building material, 4.) type of object and 5.) architectural element.

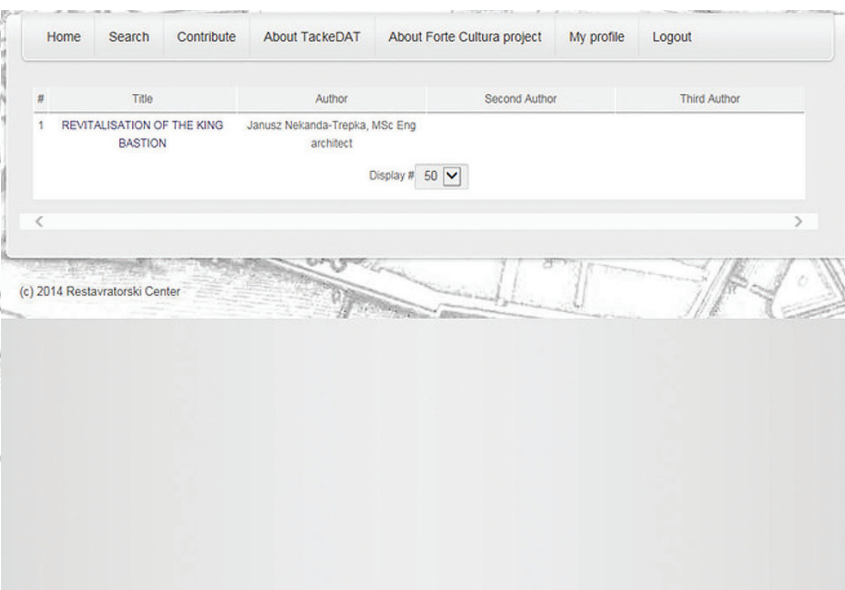
It suffices if only one field is filled-in, but in order to scale down the number of search results it is recommended to type-in as many criteria as are available. To remind users of their publications obligations the User Agreement is quoted in red at the bottom of the page. The search is initiated by pressing the “Search” button.



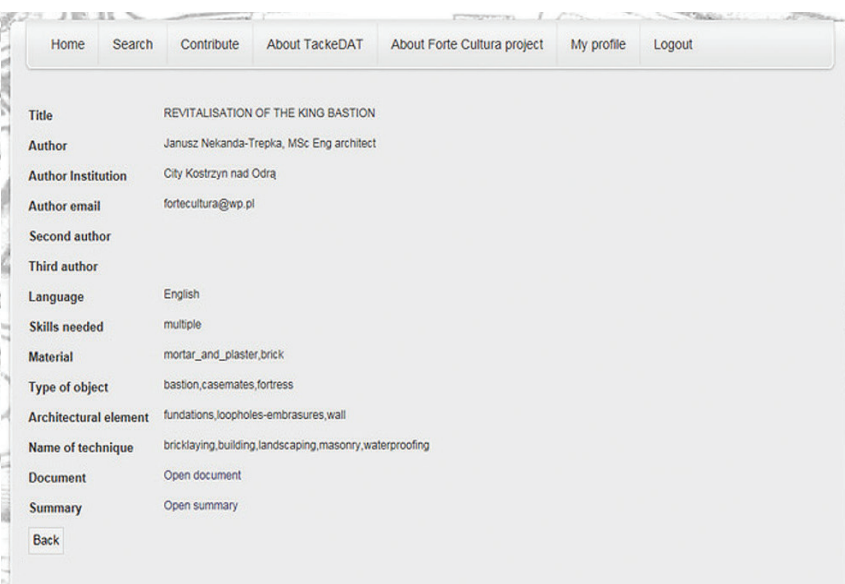
The look of the TaCKeDat Home Page.



The appearance of the “Search” page with two search details, “King bastion” as the Title and “brick” as the building material are typed-in.



A screenshot of the “Search Results” page with two search details, “Revitalisation of the King Bastion” as the Title and beside it the name of the author. To continue, the user has to click on interactive title of the contribution, in this case “Revitalisation of the King Bastion”.



A screenshot of the “Search Summary” page.

The “Search Result” page

This is the page that appears once the search is initiated by pressing the “Search” button on the “Search page”. The two details about the contribution that are displayed here are the title of the contribution and the author(s). We have initially envisaged more details, but tests showed that at this stage of search these two details were sufficient. To find out more about the contribution the user has to click on interactive title.

The “Search Summary” page.

By clicking on the title of the contribution the user arrives to the contribution’s summary. This is obtained before the upload of the contribution by filling-in an on-line form (based on the earlier BCF). This summary gives an overview of the criteria as well as a short summary. Unlike the contribution itself this summary is mandatory written in English language. By clicking the “Open Document” link the users accesses the contribution itself, presumably uploaded and stored in a PDF format.

The “Contribution” page.

In order to contribute relevant material to the TaCKeDat one has to start at the “Search” page and click the “Contribute” button of the menu bar. An on-line form appears. The contributor has to fill-in all the fields, including some in the drop-down menus. When it comes to the English language summary, this can be either typed-in into the lowest frame or uploaded as a Word file. At the end the contributor must acknowledge the copyright solutions and click the “Upload” button to actually upload the document.

The screenshot shows the 'Contribute' page of the TaCKeDat website. The navigation bar at the top includes links for Home, Search, Contribute, About TaCKeDAT, About Forte Cultura project, My profile, and Logout. The form contains the following fields:

- Title: A text input field.
- Building Material: A button labeled 'Click to select Building Materials!'
- Type Of Object: A button labeled 'Click to select Type of Object!'
- Architectural Element: A button labeled 'Click to select Architectural element!'
- Name of Technique: A button labeled 'Click to select Name of Technique!'
- Skills Needed: A text input field.
- Language of the uploaded data: A dropdown menu.
- Author Name: A text input field.
- Author Institution: A text input field.
- Author Email: A text input field.
- Add authors: A button labeled 'Click here to add more authors!'
- PDF Upload: A 'Choose File' button and a 'No file chosen' status.
- Summary: A large text area for the summary.

A screenshot of the »Contribution« page with an on-line form that serves to provide data for the »Search Summary« page.

The “Editor’s” page

To ensure the quality of the databank no contribution is automatically displayed to the public after it has been uploaded, but has to be checked by the editors first. Once it is established that the content is adequate the contribution is approved at the editor’s site and made publicly available.

The screenshot shows the 'Editor's' page of the TaCKeDat website. The navigation bar includes links for Home, Search, Contribute, Edit database, About TaCKeDAT, About Forte Cultura project, My profile, and Logout. Below the navigation bar, there is a search bar and a table of approved contributions.

#	checked	filed_by	responsible	date_of_filing	date_of_created	date_of_modified	Title	Material	Object type
1	<input type="checkbox"/>				2014-05-27 00:00:00	0000-00-00 00:00:00		wood	animal
2	<input type="checkbox"/>				2014-05-26 00:00:00	0000-00-00 00:00:00		stone	gate
3	<input type="checkbox"/>				2014-05-22 00:00:00	0000-00-00 00:00:00	Recovery Fort Santa Vito	stone,iron,steel,concrete	fortress
4	<input type="checkbox"/>				2014-05-25 00:00:00	0000-00-00 00:00:00	Consolidation of the Counting Paths of a Stone Wall	stone,mortar,plaster	residence
5	<input type="checkbox"/>				2014-05-25 00:00:00	0000-00-00 00:00:00	Restoration of a Rough Plaster with the Lime Facade Splash	stone	administration,animal,barracks,castle,church,courtyard,gate,headquarters,hospital
6	<input type="checkbox"/>				2014-05-25 00:00:00	0000-00-00 00:00:00	Fine Troweled Lime Plaster	stone	administration,animal,bakery,barracks,blockhouse,castle,church,courtyard,wall
7	<input type="checkbox"/>				2014-05-25 00:00:00	0000-00-00 00:00:00	Consolidation + restoration of the preserved lime plaster	stone	administration,animal,bakery,barracks,blockhouse,castle,church,courtyard,wall,fortress,gate,headquarters,ho
8	<input type="checkbox"/>				2014-05-25 00:00:00	0000-00-00 00:00:00	Lime Raggle on washed wall stone	stone,mortar,plaster	administration,animal,bakery,barracks,blockhouse,castle,church,courtyard,wall,fortress,gate,ho

A screenshot of the “Editor’s” page with a list of approved contributions.

5 Traditional and Conservationist Techniques



5

5.1 Traditional and Conservationist Techniques

4.3

Traditional and Conservationist Techniques

Authors:

Mateja Kavčič, architect - conservationist

Matej Zupančič, architect - conservationist

Responsible institution:

- Institute for the Protection of Cultural Heritage
of Slovenia

TRADITIONAL AND CONSERVATIONIST TECHNIQUES

In English language the word »Handbook« normally denotes a publication containing short and useful, often illustrated collection of descriptions and instructions that either help someone to use a certain device or to perform a certain task. It is therefore logical that on the onset of the FORTE CULTURA project the editorial team was planning to do that sort of publication. But there were different inputs and the role of collection of different types of knowledge was increasingly delegated to the TaCKeDat – a databank of traditional conservationist knowledge and technologies. So little by little this publication was acquiring a role of a overview while, as said, the mentioned material can be found on the TaCKeDat at the electronic address:

<http://www.tackedat.eu> .

We nevertheless felt obliged to publish here at least some examples of the collected material. This materials are therefore presented on the following pages.

Example 1

Consolidation of crumbling parts of a stone wall, wall openings and replacement of a singular missing stones.

Authors: Mateja Kavčič, Franci Andrejčič

Materials

1. **Sand:** gray grinded, from Štanjel quarry, granulation 0-4
2. **Hot construction mortar**



An example on the wall of the Markočič house in Štanjel – the damaged wall.

This type of mortar is suitable for construction and repair of walls. Part of lime is slaked only before the very use, hence the expression “hot mortar”. Once slaked, the mortar increases in volume about 3 folds. We freshly slake enough mortar to represent 1/3 of the entire quantity of the mortar. For the rest old, well stabilised slaked lime is used.

The sand must be added instantly. The ratio lime : sand is 1:3. Mortar has to be built-in while still hot.

Quick-lime producers:

- SIA Solkan, in PVC bags under the name “Apno za agrikulturno rabo” (Lime for agricultural use). It has to be dry, bags undamaged.
- Suhadolnik Janez, Podpeč pri Brezovici, Phone: +386 41 711 114

Industrial production – slaked lime:

- SIA Solkan
- IGM Zagorje
- SCT, industrija apna Kresnice



Slaking of a quick-lime.



Preparation of a hot mortar.

Traditional lime production:

- Suhadolnik Janez, Podpeč pri Brezovici, Phone: +386 41 711 114 (gsm)
- Svoljšak Andrej, Binkelj, Škofja Loka, Phone: +386 40 629 362 (gsm)
- Šoštar Maks, Selce 21, Nova Cerkev, Vojnik Phone: +386 3 577 45 66, +386 41 208 035 (gsm)
- Atelšek Franc, Savina 71, Ljubno, Phone: +386 41 324 340 (gsm)
- Turistično društvo Trenta (occasional burning for tourism purposes, check also local sources),
- Volčji Grad (the data not verified).

3. Stones of suitable shapes

The stones need to be readied. If possible the stones should be of a same source as the wall we are repairing. They are then carved into desired shapes, suitable for sizes of openings in the wall, corners and bases are built of bigger stones. The shapes of stones shall be rectangular, not round.

The remains of the stones shall be saved for filling the gaps. If the wall is demolished in its entire width, we build it in two layers, outer and inner one. Space between the two is gradually filled by small stones including the remnants and quicklime mortar.

The construction procedure:

1. Preparation of the Wal

The wall has to be cleaned. We use chisels or ax to remove concrete fillings, bad mortar and brick fillings. We sweep or blow away the sand away and water the wall so it soaks in the moisture.



Adjustment of the stones before they are built-in.

2. Construction

Prepared stones are inserted in a way that they lay on each other with their broad sides. We don't use them as a wrap or install them vertically from top to bottom. Excess mortar has to be regularly removed and attention shall be kept that all gaps are filled with it. The next layer can be plastered only when the mortar of the newly constructed part is dry.

A note: the instructions for the renovation of facades are published at the site:

<http://www.rescen.si/index.php?id=43>

(Metode in tehnologije/Tehnologije obnove stavbne dediščine/Štanjel)



Removal of possible concrete fillings.



Moistening of the wall.



Building – alignment of stones.



A sample of a repaired stone wall.

Example 2

Fine Troweled Lime Plaster

Authors: Mateja Kavčič, Franci Andrejčič,
ZVKDS-Restoration Centre

Materials

1. Sand

For the execution of the façade in fine troweled plaster or to carry out some repairs and supplemen-



A sample on the mortar of the facades of houses Pilat and Furlan in Štanjel.

tations of the original situation we need to choose an adequate colour and granulate of the sand very cautiously. It shall resemble the original as closely as possible. For this sample a mortar of the 0-4 granulate sand is prepared as the base and 0-2 sand sieved for the finishing layer. The Štanjel sand of the grey colour is chosen.

Sand shall contain no admixtures of clay or earth, there shall not be too much of dust (0). Before the use the sand shall be sieved to the desired granulation that needs to be diverse, that is with no single fraction prevailing over the others.

2. Glue

Slaked lime is made by slaking the quick-lime. Slaked lime shall be as old as possible and well laid-off – at least for 3 months, but better still for a year. But during that time it must not freeze. Before using it we check if it's clear enough and without some bigger lumps. In that case it needs to be sieved through 2mm sieve, depending on the fineness of the mortar.

Industrial production – slaked lime:

- SIA Solkan
- IGM Zagorje
- SCT, industrija apna Kresnice

Traditional lime production:

- Suhadolnik Janez, Podpeč pri Brezovici, Phone: +386 41 711 114 (gsm)
- Svoljšak Andrej, Binkelj, Škofja Loka, Phone: +386 40 629 362 (gsm)
- Šoštar Maks, Selce 21, Nova Cerkev, Vojnik, Phone: +386 3 577 45 66, +386 41 208 035 (gsm)
- Atelšek Franc, Savina 71, Ljubno, Phone: +386 41 324 340 (gsm)
- Turistično društvo Trenta (occasional burning for tourism purposes, check also local sources),
- Volčji grad (the data not verified).

3. Slaked lime mortar

Slaked lime mortar is used for completion of finishing and decorative elements. Usual ratio slaked-lime : sand = 1:2,5 or 1:3, but an experienced builder can adopt it in regard to his/hers needs. The thickness of the plaster is at most 1,5 cm or three fold thickness of the biggest grains in the mortar. A little water as possible is to be added. The finer the mortar (e.g. stucco marble), the more binder is to be used.



1. If there are lumps in the slaked lime we have to filter it.



2. Sieving of the sand to the desired granulation.



3. *Mortar made of slaked lime.*

The implementation procedure

1. Preparation of the Wal

We clean the wall, with a chisel or a hatchet we remove concrete fillings, bad mortar or brick fillers. We sweep or blow away dust and moister the wall so that the wall – both the mortar and the stones - absorbs the moisture.

2. Building

If there are bigger damages or collapsed parts we consolidate them as described in the sample 1.

3. Plastering

We always plaster to a m moisturised basis, but it needs to be moisturised so that the moisture is absorbed into the mortar and stones. There shall be no water remaining on the surface since this prevents adhesion. We can also use lime water.

We do the plastering in two layers. The sublayer is made of sand 0-4 with added slaked lime in ratio lime : sand = 1:3. Underlaying layer is applied by splashing and needs to dry at least one day. We evenly plaster the wall, then wait for at least a day to dry and then plaster the indents again. We repeat leveling until the underlayer is leveled with the rest of the façade. The finishing layer is applied in the even thickness of cca 3 mm. We apply the mortar with the trowel and plane it with wooden or PVC plank.

On the corridor there is a joint of fine plaster and the rough one of the hinder façade. The corner is to be formed precise and evenly, by hand, without using plank. The last layer shall be a splash that is easier to correct.



1. *Moistering of the basis.*



2. *Splashing the sublayer.*



3. *Applying and planning the fine plaster.*



4. Forming the corner without the use of plank.



5. A sample of fine troweled lime plaster, the façade of the house Furlan, Štanjel 8 (moistering during drying).

The success of the application depends on the quality of nurturing (slow solidifying process) and climatic conditions (temperature shall not drop below 7 or rise above 20 degrees C for at least 3 weeks). During the period of nurturing the plaster it has to be protected from rain, wind and sun with a cloth that can be, in case of unexpected change of the temperature, watered in order to adjust the micro-climate. While the plaster is drying we are moistening it additionally by even spraying, the best for that being lime water.

4. Painting

We paint the façade in lime paint, choosing the colour in accordance to the instructions of the ZVK-DS OE Nova Gorica.

A note: the instructions for the renovation of façades are published at the site:

<http://www.rescen.si/index.php?id=43>

(Metode in tehnologije/Tehnologije obnove stavbne dediščine/Štanjel)

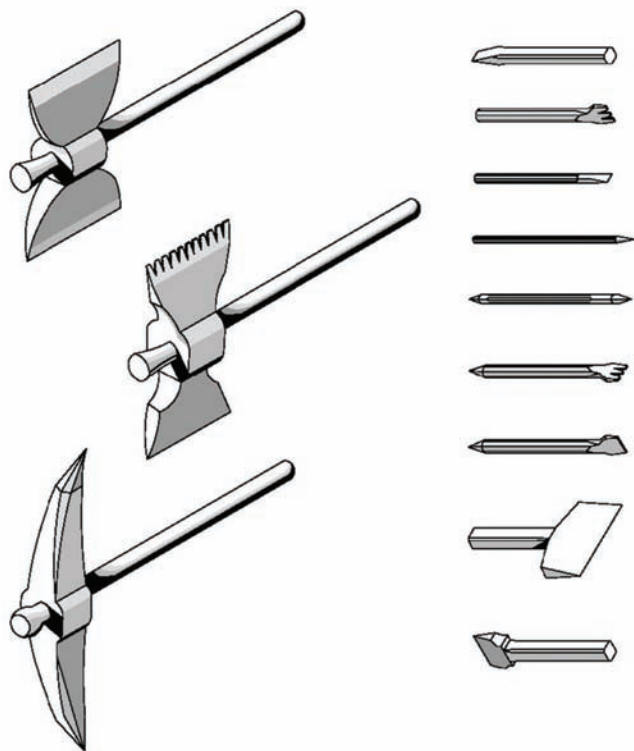
Example 3

The Craft of Stonemason

Authors: Prepared by TIAW Verlag, Erfurt,
Dr. Kati Langer

Tools

Stonemason (der Steinmetz) was one of the most important crafts during the construction of the Petersberg Citadel in the years 1665 and 1726.



Considering the material he worked with – the stone, good, solid tools were of the utmost importance. The stonemason tools were: tasts and divid-ers, angle, hatchets, toothed chisels, flat chisels, other chisels, pitching tool, hammer, dummy mal-let, punches, wooden masks, stone forceps, eagle pliers, hand trolley, two-wheeled long-bar trolley, trestle, straightedge.

Materials

Materials used for the construction of the Peters-berg Citadel were:

- local limestone,
- sandstone from Seeberg.

Working of the stone

The sandstone was quarried - separated from the rock mass with the striking bar, divided and shaped into blocks. Final appearance of the construction element depended on into square after breaking. Then the surface was roughly trimmed, carved. De- pending on the further processing a distinction be- tween sanded and polished surface or bush-ham- mered surface was achieved.



Various stone surface treatments. TIAW

Stonemason's signs

The signs carved by the stonemasons were used as instructions for positioning stones into planned position during construction. But they also had an- other important function. Every stonemason had his own sign and that helped to determine the amount of work carried out by each individual stonemason and consequently his payment.



Stonemasons' signs found on the walls of the Erfurt Cathedral. TIAW

Example 4

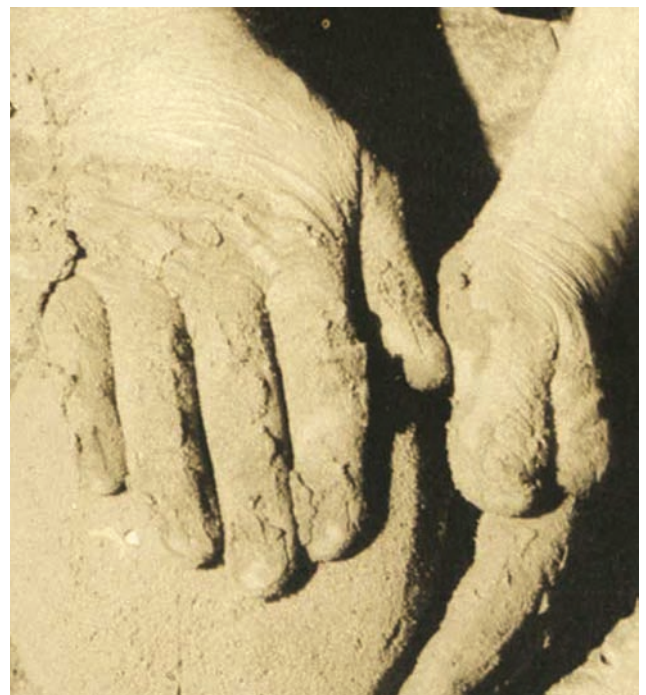
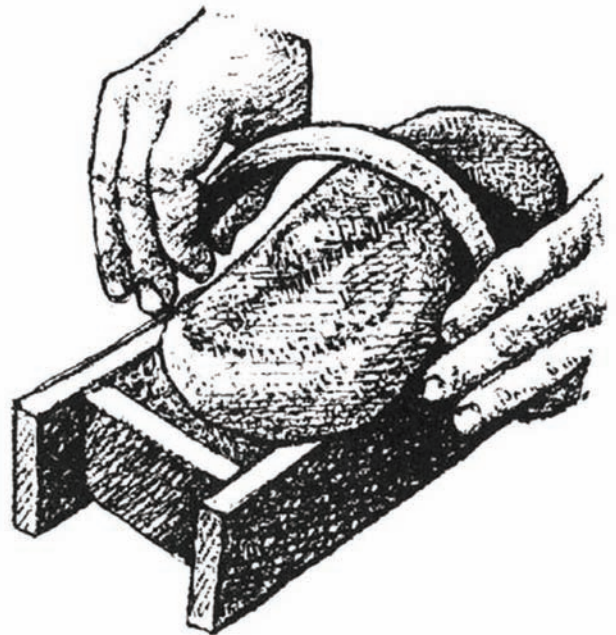
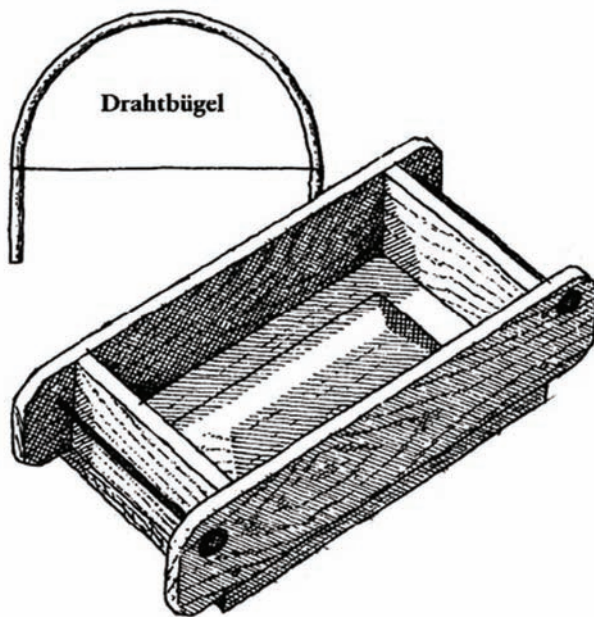
The Craft of a Brickmaker

Authors: Prepared by TIAW Verlag, Erfurt,
Dr. Kati Langer

Brickmaker (the Ziegler) was another important profession present at the construction of the Petersberg Citadel in Erfurt. His task was to produce bricks used to build barracks, magazines and other buildings within the fortress.

Tools used by a brickmaker

- wire cutter or moldboard
- mold or bricks form
- Loam and clay
- fuel (usually wood)



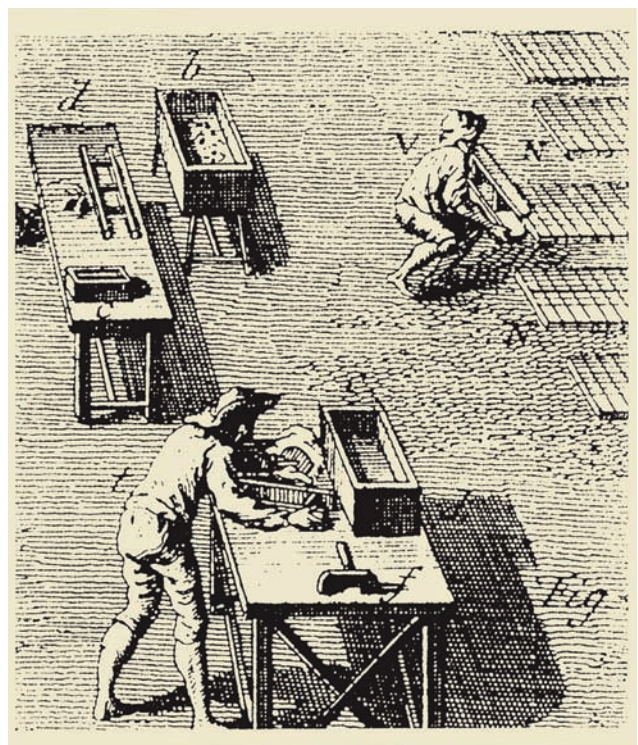
Production

The crude lump of clay was rolled in sand kneaded with hands and fingers. Then they pressed it firmly in sanded wooden molds. The excess clay was cut away with a wire cutter. The last brick made on a given working day (Feierabendziegel) was often provided with a personal character.

Once ready, the bricks were fired in the kiln for a few days, which was walled-in for this purpose. Brick-makers worked mostly as migrant workers and seldom remained near the clay pit when the field kilns were fired. Therefore the pre-dried raw blocks were stacked up according to a blueprint. The boisterous ducts were then filled with coal. The fire burnt out for several days from bottom to top through this field-type furnace. The degree to which the bricks were burnt dependent on their position, there was a notable difference between those at the centre or those at the edge of the furnace.



An example of a hand crafted roofing tile made at the end of the day (Feierabendziegel - evening celebration brick).



The image depicting production of bricks on molding tables in 18th century.

6 Identification of Historic Construction Technologies and Their Experimentation Within the Project FORTE CULTURA



6

- 6.1 Identification and Experimentation of Historic Construction Technologies
- 6.2 Exemplary Study and Technical Documentation for Fortress – Bastion King
- 6.3. Nature Protection in Fortress Monuments

6.1

Identification and Experimentation of Historic Construction

Technologies

THE USE OF MODERN TECHNOLOGIES FOR DOCUMENTING AND INTERPRETING CONFLICT LANDSCAPES. CASE STUDY OF THE BOVEC AREA (Posočje region, Slovenia)

Authors:

Uroš Košir 1
Dimitrij Mlekuž 2, 3
Matija Črešnar 2, 3

Responsible institution:

- 1 National Museum of Contemporary History
- 2 Institute for the Protection of Cultural Heritage,
Centre for Preventive Archaeology
- 3 University of Ljubljana, Faculty of Arts, Depart-
ment of Archaeology

Introduction

Recent technological advances in the field of archaeological prospection (remote sensing methods including airborne laser scanning, hyperspectral sensing and large scale geophysics) changed our perception of landscapes. A combination of various methods applied on large areas allows us to approach landscape as a whole and not only as isolated structures. This also allows a holistic understanding of the landscapes of conflict, which are not a group of isolated defensive structures, but rather a complex system of the traces of conflict with their own histories of formation, development and processes of change. Landscapes of conflict are often multi-temporal, they include features used, reused and modified in different periods, creating a complex palimpsest of traces (Carman 2013).

In contrast to the architectural and topographic surveys, which are concentrated on individual structures and their immediate surroundings, remote sensing methods are non-selective. They treat the whole landscape in the same way, allowing us to understand the relations between individual features and structures and their position within the wider landscape.

Particularly challenging for the research of conflict landscapes are remote and inaccessible areas, either densely wooded, located high in the mountains or considerably modified by modern interventions.

(Landscape) archaeology – together with other disciplines – can therefore importantly contribute to a holistic understanding of conflict landscapes. To demonstrate this integrative approach in an inaccessible landscape, we conducted a survey of the conflict landscape in the surroundings of Bovec (Soča valley, Slovenia) (Figs. 1–3).

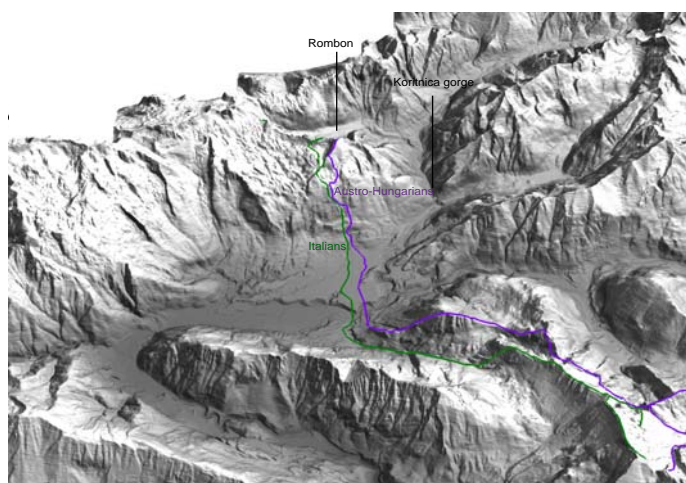


Figure 1. Bovec basin with the location of the Koritnica gorge and the frontline during WWI.

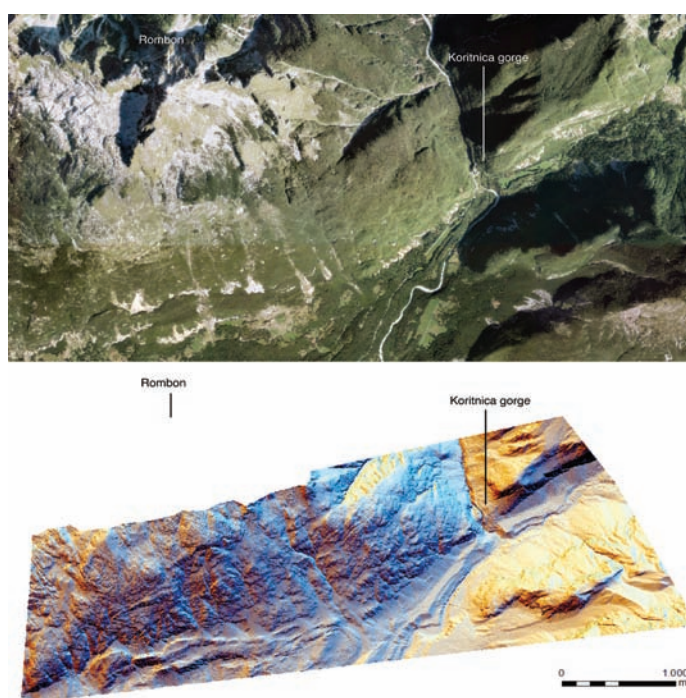


Figure 2. Aerial view and hillshaded image from high-resolution ALS topographic data of the study area.



Figure 3. Kluže fort and Fort Hermann from south-east (Photo: B. Štupar)

Brief historical background

The upper Soča valley, which includes the Bovec basin, is of a strategic importance as a transitional zone between the northern Adriatic and the Alps. Prehistoric and Roman finds along the route connecting the two areas suggest its importance in the past. The key strategic location on this route is the narrow Koritnica gorge, which lies between the slopes of Rombon and Izgora, just above Bovec in the direction of Predel Pass.

The first documented defensive structures date to the second half of the 15th century, when a Venetian fortification was built above the deep gorge as a defence against the Ottoman incursions (Simić 1998, 28). In 1509, it failed to fully perform its function in the first war between the Venetians and the Habsburgs. The latter had the fort rebuilt in stone and reinforced, which was financed by the crown-land of Carinthia. Until the end of the 18th century, this Kluže fort underwent several modifications. It was destroyed during the Napoleonic wars (Klavora 2000, 41; Simić 2005, 106). The present-day appearance of the fort dates to 1882, when a new road was also cut into the western bank above the Koritnica river (Klavora 2000, 47). The defence of this strategic area was improved with the 'upper' fort, called the Hermann fort, erected on a rocky ridge overlooking the gorge and completed in 1900 (Simić 2005, 139-141) (Fig. 3).

Both forts witnessed battles of WWI, but met different fates; the Hermann fort was destroyed during an artillery barrage in the first year of the conflict (Fig. 6), while the Italian artillery could not damage the Kluže fort (Simić 2005, 232-277). The conflict then shifted to Mt. Rombon above the Koritnica gorge.

Rombon was an important strategic location where Italian and Austro-Hungarian army fought between August 1915 and the end of October 1917. If the Italians captured the mountain, they could then break through to Predel Pass and all the way to Beljak (Villach) (Simić 1998, 62; Galić 2007, 19).

In the autumn of 1913, the Austro-Hungarian army started building an artillery observation post on Veliki vrh (1306m), which was finished in October 1914 (Simić 2005, 188) and represented one of the observation posts for the Kluže fort (Sperre Flitsch). During WWI, this location was known as Kota 1313 (Kote dreizehn dreizehn), which is still its name today (Simić 2005, 193). The complex was also part of the last Austro-Hungarian frontline, which would be used in the case of the Italians capturing Rombon.

Several pathways, trenches and building platforms were identified, including an artillery observation post (Beobachter) and a range measurement post (Distanzmesser) (Fig. 4).

Already at the onset of WWI, the Austro-Hungarian troops started building positions on Rombon. After the initial Italian conquest of Čuklja (1767m), the Austro-Hungarian positions were built from the peak of Rombon across a small summit of Mrtvaška glava (1583m) or Totenkuppe 1 (dead man's head) towards Ravelnik in the Bovec basin.

The Kluže fort was also used in WWII, when its appearance was once again partly altered. The Allied had the road widened and the bridge reconstructed, while the defence rampart with its entrance gate was removed.

Besides the two well-known forts, described in a monograph (Simić 2005), the surrounding mountain ridges also played an important role in all the conflicts, especially during WWI.

Lidar survey of Mt. Rombon and the Koritnica gorge

Airborne Laser Scanning (ALS or LiDAR, Light Detection and Ranging) is an active remote sensing technique, which records the surface of the Earth using laser scanning (Opitz 2012, 13). ALS allows very precise three-dimensional mapping of the surface of the Earth, producing high-resolution topographic data, even where the surface is obscured by forest or other vegetation. The level of detail on digital surface and terrain models produced from high-resolution lidar topographic data helps us enormously in the identification of past events that reworked and modified the landscape.

In our ALS survey, we covered a roughly 5km² large area of the south-eastern slopes of Rombon, the western slopes of Mt. Krnica, part of the Bavšica valley and the northern slopes of the Svinjak ridge. The main goal of the survey was to record the fortifications controlling the approach along the Koritnica river through the Koritnica gorge, but also to record the traces of conflicts in its surroundings, e.g. the WWI battlefield on Rombon (Fig. 2).

Koritnica gorge

Besides the Kluže fort on the eastern bank of the Koritnica river (Figs. 5–6), we observed several other

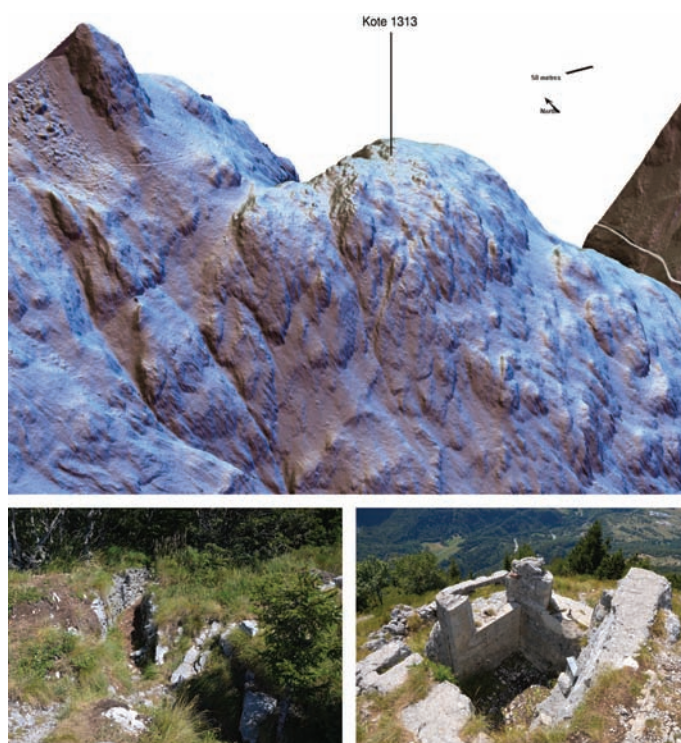


Figure 4. 3D view of Kota 1313 from high-resolution ALS topographic data (above) and photographs of chosen features on field (below).

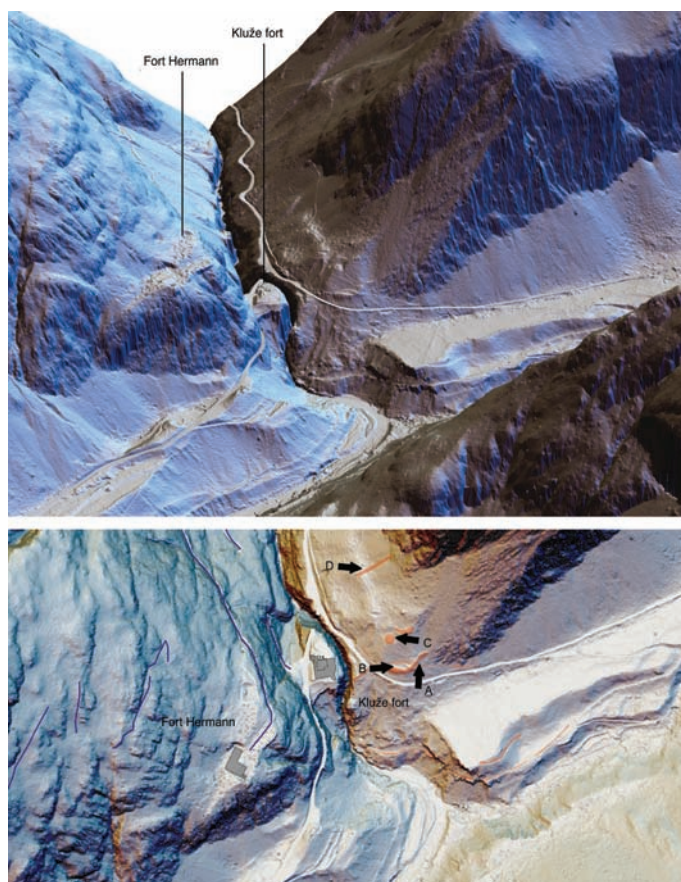


Figure 5. 3D view of the Koritnica gorge from high-resolution ALS topographic data (above) and features identified on results from high-resolution ALS topographic data.



Figure 6. Photographs of chosen features identified on results from high-resolution ALS topographic data in the Koritnica gorge.

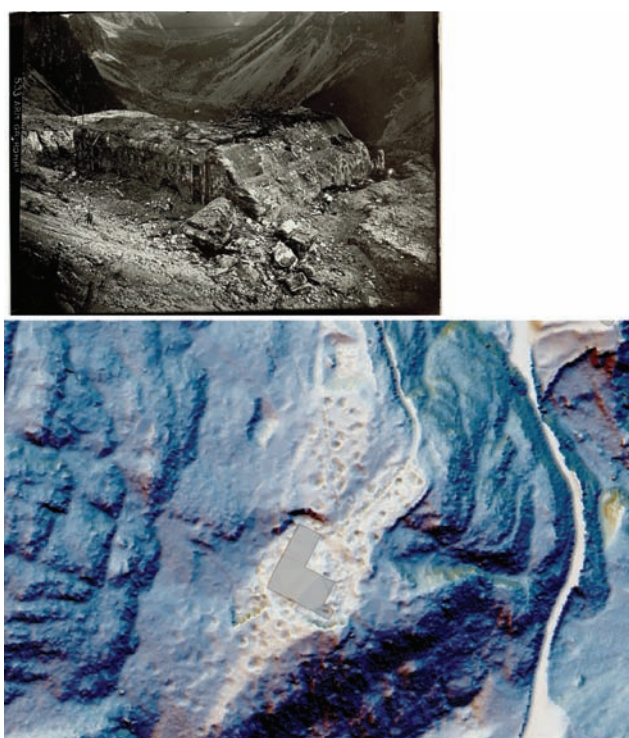


Figure 7. Fort Hermann and its immediate surroundings on an historic photograph and on images from high-resolution ALS topographic data.

features on the opposite bank, which lie in dense woodland and were, until now, hardly identified, let alone fully researched.

These remains consist of former roads, probably the remains of the 17th century roadblock, embanked terraces just above the modern road, stone rampart or remains of a wall rising up the ridge, as well as a ditched elevated circular plateau with terraces right above it to the north-east. Of much interest are also the three features formed by parallel ramparts and remains of stone walls (Figs. 5–6).

The west bank of the Koritnica river revealed numerous features. We traced a road cut into the rock, with a tunnel and caverns, that led from the valley and up the mountain. Around the Hermann fort, we could identify barracks, terraces and numerous craters, which evidence the heavy shelling of the fort in 1915 and 1916, until its abandonment in May 1916 (Fig. 7).

Great War battlefield on Mt. Rombon

Numerous remains of the WWI battlefield can still be observed on the slopes of Rombon. High-resolution ALS data allows us to identify the system of the fire and communication trenches, reaching almost up to 3m in depth and very well preserved. On the summit, a group of trenches built of stone and concrete, but also several machinegun posts in caverns and in the open survive. Caverns, usually located behind small ridges, can also be seen. Some of them were meant to accommodate soldiers; others were used to store ammunition or as machinegun posts. According to military maps, the Austro-Hungarian army had a great number of machineguns and also mortars on Mrtvaška glava. We could identify some rectangular entrenchments, which can be interpreted as machinegun or mortar posts (Fig. 8–9).

Due to the steep slopes south of the summit, individual positions or posts were not joined together, but mostly segmented. We can trace most of these positions on results of lidar scanning.

On the opposite side, the Italians controlled the Austro-Hungarian positions in the Bovec basin from the summit of Čuklja (1767m). The caverns and buildings are not so common on the southern slope of Čuklja, due to the exposure to enemy fire. A great number of caverns and building platforms are located under the cliffs of the western Čuklja slope. There was also an Italian hospital and a medical station, with small cemeteries in their vicinity. Building platforms and shell craters are also visible in some areas. Military pathways can be observed, leading from the hinterland to the frontline. The grassy Čuklja slopes show many shell craters. Most numerous features, however, are the communication and fire trenches, especially in the southern parts of Čuklja. The trenches are partially buried because of the erosion on the steep slopes. The exception is a long communication trench which was in some parts cut into solid rock (Fig. 8–9).

Conclusions

Our study combined desktop research of documentary sources, airborne laser scanning and ground truthing, i.e. topographic survey of features identified by remote sensing, which included photographing the structures and GPS/GNSS mapping of features (Fig. 10).

The great quantity of data that can be collected quickly and relatively cheaply with ALS has been

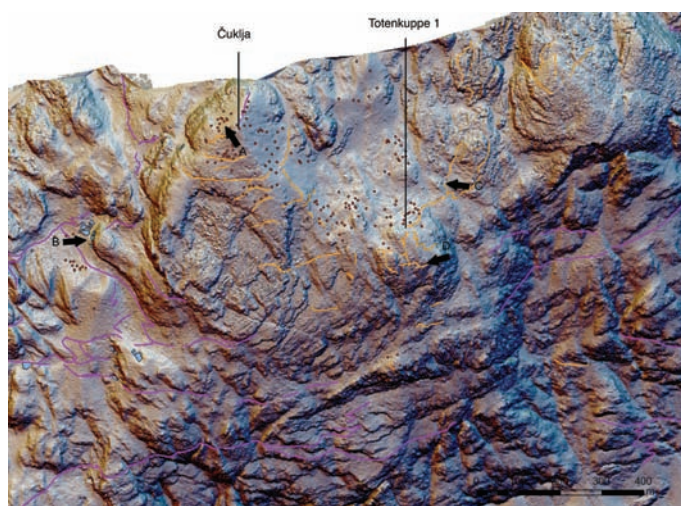


Figure 8. Rombon battlefield with trenches (orange), pathways (purple), shell craters (red) and building platforms (blue).

transformed into a new quality, a new way of observing landscape (Mlekuž 2013). ALS does not distinguish between sites and their environment, the landscape, but rather treats them as the same. It does not limit itself to 'significant' isolated features of the landscape and does not separate them from the landscape. All locations are fully incorporated into the surrounding area; their form, size, context and structure is the result of complex and lasting interactions with a changing landscape. In this way, fortifications, defensive structures and other traces of conflict can be understood as an integral part of a landscape. They are part of a landscape in the making and play a role in the landscape history. Lidar enables us to observe relations between defensive structures and features of the natural environment, as well as man-made structures such as houses, villages, terraces, roads, communications etc.

ALS, with its lack of selectiveness, enables us to observe the landscape as a whole. In this way, clearly visible features such as monumental fortifications are not privileged, but recorded with the same precision and resolution as features that are otherwise often overlooked such as bomb craters, paths, trenches etc.

These new data, however, should be interpreted only after being inspected on the field. This is especially important for the conflict landscapes in alpine regions, where a natural rock formation was a handy shelter and a linear break in the rock, clearly identifiable on a lidar scan, was not always used as a trench.

No set of data can offer enough information to be used on its own, though no data can be neglected. Data integration is thus the key for future research also when dealing with conflict landscapes.

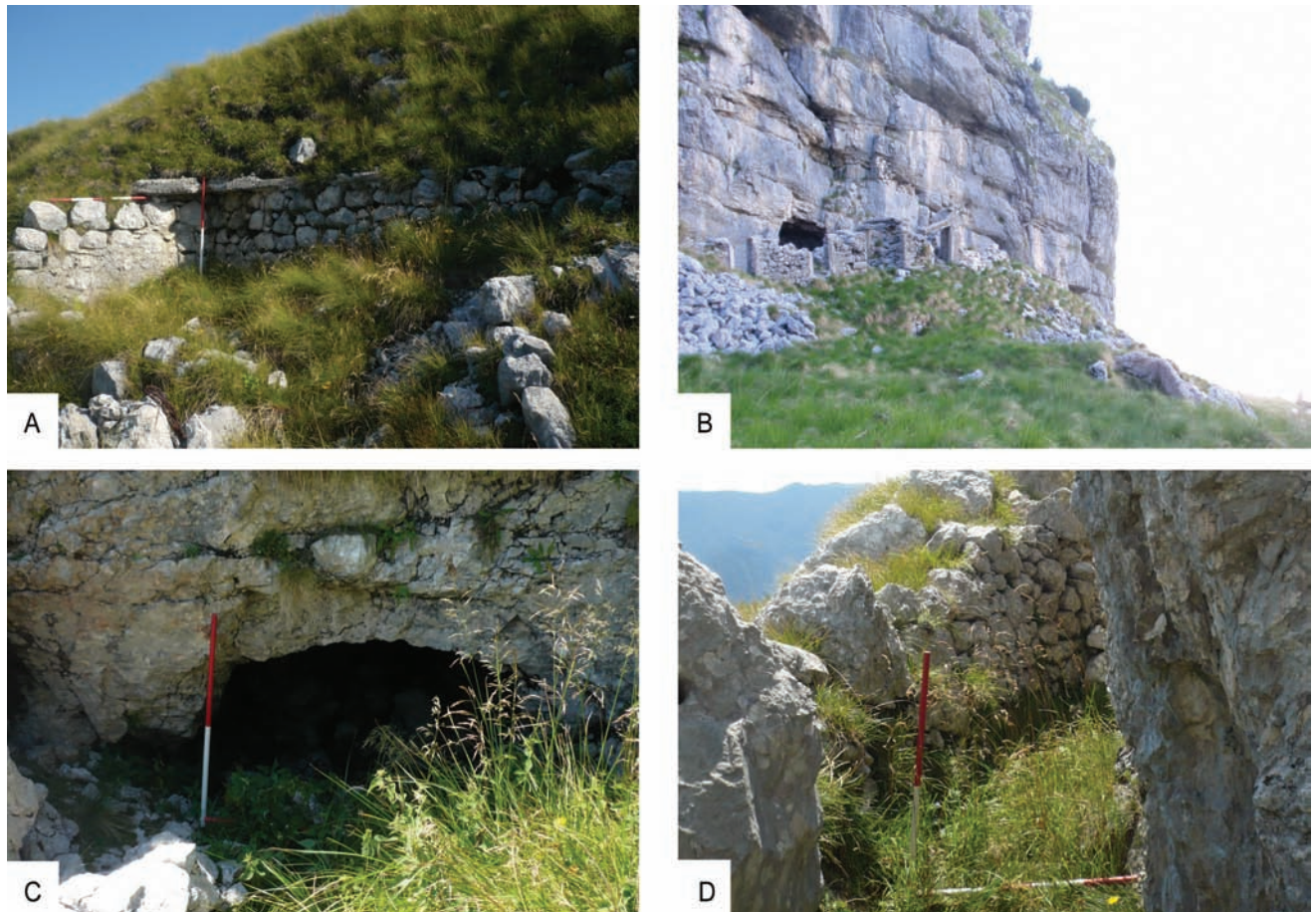


Figure 9. Photographs of chosen features identified on images from high-resolution ALS topographic data on the Rombon battlefield.

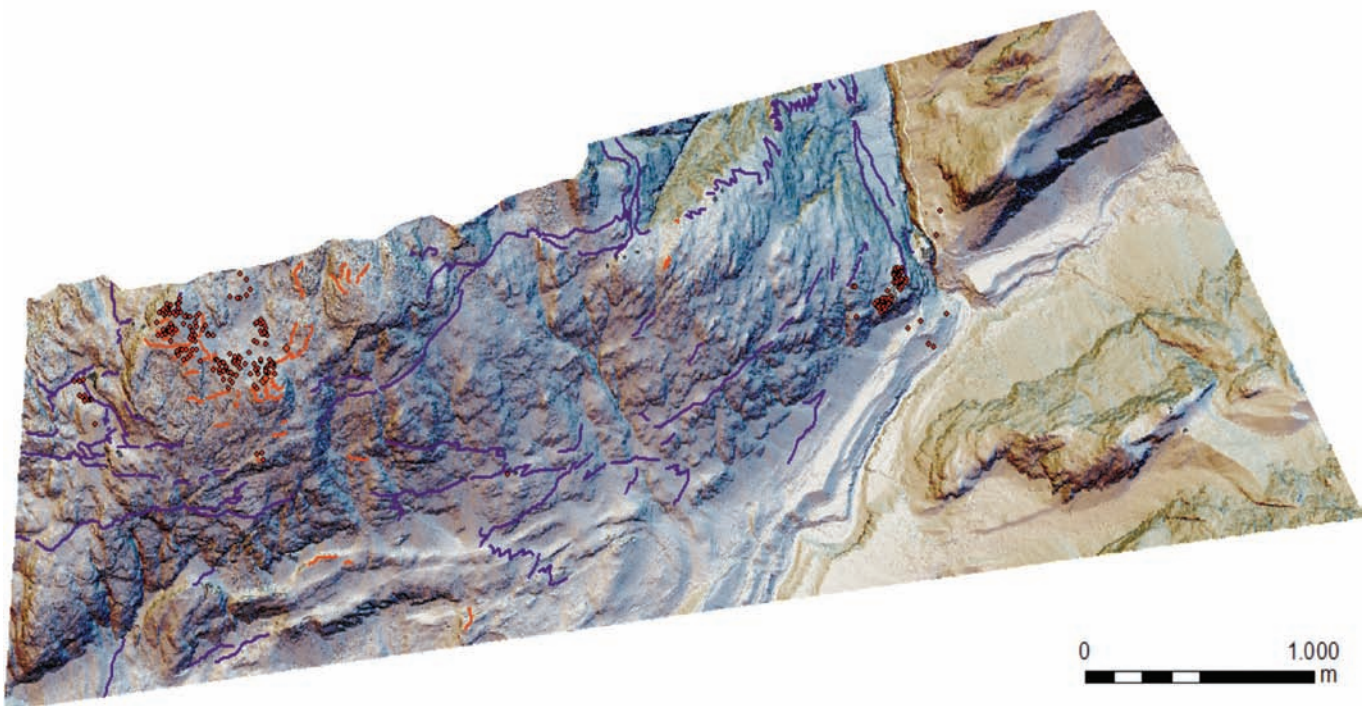


Figure 10. Map of the study area with integrated data from various sources.

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6.2

Exemplary Study and Technical Documentation for Fortress – Bastion King

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This is the extract of the study titled “Revitalisation of the King Bastion – a Part of the Kostrzyn Fortress – for Cultural Purposes”. The author of the original document is Mr Janus Nekanda-Trepka, MSc Eng architect. It was prepared for the project FORTE CULTURA in February 2014. The entire document can be found on the TaCKeDat web based databank:

<http://www.tackedat.eu>



Biuro Projektowo-Inżynierskie Sp. z o.o.

NAME OF THE INVESTMENT:	REVITALISATION OF THE KING BASTION – A PART OF THE KOSTRZYN FORTRESS – FOR CULTURAL PURPOSES	
ADDRESS:	Bastion King, Zespół Fortyfikacji Twierdzy Kostrzyn, plot No. 75/3, K. nad Odrą	
INVESTOR:	City Kostrzyn nad Odrą, Ul. Graniczna 2 66-470 Kostrzyn nad Odrą	
PHASE:	ARCHITECTURAL RESEARCH REPORT	28 February 2014
PREPARED BY:	Janusz Nekanda-Trepka, MSc Eng architect	

Documentation prepared for the project FORTE CULTURA Capitalizing of fortified cultural heritage for sustainable development and competitiveness of cities and regions' implemented through the CENTRAL EUROPE Programme co-financed by the ERDF.

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1



Cover of the study “Revitalisation of the King Bastion – a Part of the Kostrzyn Fortress – for Cultural Purposes”

Phase One

Architectural Research Report

In the first section the study gives some basic details about the fortress and the research:

The system of the military structures of the King Bastion in the modern fortress of Kostrzyn nad Odrą in the Lubuskie Region (Festung Küstrin in der Neumark), entered in the register of monuments under No. KOK – I – 81/76 on 2 November 1976, consisting of: the curtain from the Berlin Gate to the right flank of the King Bastion, the shoulder, fronts and the left flank with the remains of the shoulder and the curtain in the direction of the Brandenburg Bastion, cavalier with the level of storage rooms and shoulder casemates, posterns and gunpowder storage rooms.

The study was conducted in February 2014 on the basis of the decision of the Lubuskie Region Monuments Conservator, Branch in Gorzów Wlkp. No. ZNG. 5162.1.2013 of 14 February 2014, based on the architectural inventory in the scale of 1:100, prepared in 2013 on the basis of a 3D scan by the 3 Design Studio Gerard Wełniak from Leszno and the archival materials from the collection of the Kostrzyn Fortress Museum. In the absence of an indication of the level above the sea of ordinate 0.00 in the inventory, the level of 0.00 was adopted in the research description as interpolated from the situation and height backings as 22.50m a.s.l.

Contracting Authority: Town Hall Kostrzyn nad Odrą, ul. Kopernika 1; 66-470 Kostrzyn nad Odrą

In the second section Marcin Wichrowski, MSc gives detailed description of the different research works carried out from 1903 until the present day. Thanks to the separate research of Krzysztof Biskup and Daniel Burger the design of the bastion is attributed to the influences of Francesco Chiaramelli of Gandino (1559-1578) and Roch Guerini, the count of Linari (1578-1596).

In the next section Marcin Wichrowski, MSc gives a detailed description of the history of the fortress



Top layer of bricks (the face of the wall), covered with cement plaster with clear corrosion of bricks.



Top layer of bricks (the face of the wall), covered with cement plaster with clear corrosion of bricks.



View of biological corrosion of the wall bricks in the area of the moat.



View of the reinforced concrete band, partially offset by about 40cm.

and of the Bastion King. He claims the date of the beginning of the construction to be undisputed: 1537. In 1559 bastions King, Queen and Phillip are already quoted. The got it's final shape between years 1587-88 under master builder T. Marinotti. Between years 1662-67 the old breastworks were replaced with earthen ones. The supervisor was Dutch engineer Cornelis Ryckwaert. There followed small modifications that ended as late as in 1886 when then already outdated fort was de-classed. In 1938 it was completely decommissioned. In 1945 a battery of anti-aircraft guns were mounted on bastion King's terrace which was subsequently partially damaged by bombing. Later in 1945 a symbolic Red Army necropolis was constructed atop the bastion. Breastworks and traverses were removed in the process. In the years 2008-2009, the cemetery along with the statue was removed due to the poor state of the facility.

The fifth section by Janusz Nekada-Trepka, MSc Eng Architect describes in detail the conducted research. We shall here quote just the main points of the program. As mentioned, the original document with all the details is available within the TaCKeDat. The program of research consisted of:

1. Analysis of the conservation inventory of the facility.
2. Examinations of the wall, offset, vault and opening connections.
3. Performing brick measurements in the building structures separated by the lack of connections.
4. Examination of the structures of walls and their technical stratification.
5. Surface examination of the façade structures.
6. Analysis of the stratigraphy of backfills with the drilling and pit methods, obtaining information on the spatial development of the Bastion and separating the soil structures to be implemented within the framework of the revitalisation works. One geological and archaeological borehole is expected within the undeveloped area of the bastion, between the faces adjacent to the cavalier.
7. Surface examination of damaged structures – ruined structures, for reconstruction purposes and in order to conduct protective works.
8. Comparative analyses with the historical material and indication of further research directions during the revitalisation works.
9. Developing conservation guidelines and conclusions for the programme of conservation works within the revitalisation of the King Bastion.

There follows a very detailed room-to-room and level-to-level description of the condition of the object.

Section six is actually a conclusion of this part with the following recommendations:

On the basis of the conducted examinations, it is possible to indicate the directions of revaluation and use of the bastion structure as an exhibit of the Kostrzyn Fortress Museum. The external exhibition of the bastion requires an aesthetic unification of both the structural and ground parts. Apart from the cubature reconstruction of the left flank of the bastion, it is necessary to reconstruct the façades and the superstructure of the cavalier, as well as the earthworks of the terrace and the Berlin Gate curtain. It is necessary to consider the possibility of exhibition of the curtains with continuous light placed in the reconstructed crowning cornice of the fronts and façades of the cavalier.

No exhibits vulnerable to weather conditions should be placed in the interiors of the casemates, and it would be favourable to limit to the exposure of the building itself. One of the proposals is to preserve and complement fragments of the whitewash in the inside of the cavalier and to leave the casemates of the left shoulder in the face brick, with the emphasis on the visible parts of the façade,

which used to be exposed. It is also necessary to reconstruct the losses in the walls, created as a result of post-war robbery activity of treasure hunters and thieves of metal elements (removed steel doors). It is necessary to restore ceramic and brick floors at level -2.

It is recommended to apply discrete lighting, consistent with the climate, with the use of industrial luminaires. All the installations should be routed in the floors, as well as on the surfaces of walls and vaults, without covering and placing them in the forged structure. Preserving and exhibiting the "war gun-powder storage", it is necessary not only to preserve the usage patina, but also to make their usage indicative, e.g. by reproducing the lighting and ventilation system. The limited reconstruction of the left shoulder of the bastion allows for the implementation of full service for the visitors and the introduction of modern information elements in its partially preserved interiors.

In the section seven, titled »Stratigraphy« the authors identify eight construction phases of the fortress of Kostrzyn and gave the summary of each phase. As



View of the southern barge from the level of cavalier terrace.



View of a fragment of the curtain wall remains.



View of the wall remains of the southern barge.



View of a fragment of the curtain wall remains.

said, the entire text, including this description of construction phases is available on the TaCKeDat.

Part one concludes with section eight giving recommendations for the further research and with section nine with Conservation Guidelines and Conservation Works Programme Proposal. Here some concrete instructions are given, such as the following examples:

9.3.2. It is necessary to restore ceramic floors within the area of the cavalier with the recommended restoration of their original levels and materials in places where it is possible and justified in terms of use. In view of the state of the walls and vaults, it is allowed to locate the necessary installations and supporting elements under and on the floor. The existing entrance stairs should be covered with oak stair steps after the repair, in accordance with one preserved step. Complete and wall up 'robbery pits' and preserve the elements of metal hinges, handles the only preserved division anchor and fortress door which can be exhibited on site.

9.5.2. Ventilation: After performing the external pits, the historical installations ensuring the flow and suction of air, after checking the natural air flow, it is necessary to perform controlled shutters and baffles to achieve 1.5 times more extensive air exchange during the use of the premises 1 time more extensive air exchange when the premises are closed for the visitors. The heating of the rooms and tight closure of openings other than the external entrances and safety barriers is not provided for. Not applicable to the reconstructed parts of the left shoulder and the sanitary facilities for the personnel and the visitors.

9.5.3. Drainage: No plumbing installation is provided in the closed rooms. Not applicable to the reconstructed parts of the left shoulder and the sanitary facilities for the personnel and the visitors.

Phase Two

Technical Condition Assessment of the Król Bastion

This part of the study was prepared by Bartosz Januszewski, MSc Eng and Wojciech Witkowski, MSc Eng. It contains the following sections:

1. General data,
2. Basis for the study,
3. Subject matter and scope of the study,
4. Description of construction solutions,
5. Analysis and recommendations,
6. Overall assessment of the technical condition of the casemates.

After quoting the basic data the two authors in the first section also quote the following basis and sources for their study:

- Order from the architectural sector,
- Site inspection with detailed visual inspection, stocktaking, and own measurements,
- Photographic documentation,
- Documentation of research works 'Survey on the Terrace of the Król Bastion' of 21-22 January 2014.

The second section defines Subject Matter and Scope of the Study: The subject matter of the technical condition assessment shall be the structural elements of the Król Bastion, a group of modern age fortifications from the 16th to 19th century. The facility is located within the area of the Old Town in Kostrzyn nad Odrą, on its south-eastern edge, along the Oder River and preserved sections of the moat. The objective of the assessment is to show the technical condition of the facility in order to implement a construction project including the reconstruction of the south-western barge of the Król Bastion, restoration of earthen fortifications, the cavalier, and the renovation of the casemates. It is also connected with the renovation of the façade walls and their partial reconstruction. The repairs will also include the ceiling part of the casemates as well as the cavalier.

The third section gives a detailed description of the construction solutions. It starts with overall description of:

- Characteristics of the facility,
- Subsoil and
- Structure of the facility and its condition.

It then proceeds to give details about:

- External curtain walls from the side of the Oder River,
- Walls of the left (southern) barge,
- Casemates at level 1,
- Casemates at level 2 (cavalier) and
- Casemates at level -2 outside the cavalier part.

Section four is consisted of analysis and recommendations. After outlaying the general situation it states that at present, in order to remove the damage of the existing walls and ceilings of the Król Bastion, it is necessary to perform the following works:

- Removing all the vegetation growing on the bastion walls and vaults, destructively affecting the walls and ceilings.
- Cleaning the brick elements off lichen and efflorescence.
- Elimination of salt efflorescence on walls and ceiling vaults.
- Gaps and significant cracks should be fastened with stainless steel anchors or connect with a system of brick walls.
- Supplementing brick defects in heavily corroded place.
- Rebuilding the last layers of bricks of the damaged walls.
- Repair of the external curtain walls and the cavalier.
- Rebuilding, replacement of mortars, reinforcements, replacement of the whole cavalier face.
- Restoration of the soil embankment at the wall crown base.
- Reconstruction of soil embankments within the area of the bastion.
- Restoration of the cavalier terrace along with the implementation of the brick breastwork.
- Dismantling of the existing arched vault over the casemates (-2,15), and rebuilding it.
- Implementation of an arched ceiling of reinforced concrete in place of the left barge.
- Implementation of a new electrical system matching the functions of the facility.
- In order to observe a further digression of the facility, and during works, it is necessary to mount control benchmarks, as well as the indicators of crack opening.
- The wall foundations which will prove to be particularly weakened, should be filled with a stone reinforcing agent based on the extracts of silicic acid.



View of the vault of the casemates in the area of ventilation openings.



View of the cracked wall in the area of the arc reinforcing the wall of the casemates.



View of the casemates vault painted with tar.



View of filler wall structure.



View of damp cracks in the area of the casing.



View of the cracks in the walls and the vault over the entire width of the wall.

- Due to the likelihood of the occurrence of free space under the stairs, it is necessary to perform a pit in order to verify the structure and possibly strengthen the stairs.

There is also a cautionary note:

All the works must be carried out in detail, consistent with the programme of conservation work. Taking into account the condition of the facility, all the works must be performed with extreme caution.

Of all the conservationist works, suggested in the study and very relevant also for the WP6 of the FORTE CULTURA project we are here quoting one example (rest, as mentioned, is to be found on the TaCKeDat).

Repair of cracks and scratches of the brick wall:

Reinforcement:

- Before the reinforcement of the element, filling the cracks and scratches with special mineral mortar for bricks.

- Remove the plaster from the wall (at least 50cm on both sides of a cracks or scratches) if the plaster is present at a given section.

- Remove the mortar from the joints at the depth of 4-5cm (at least 2-3 joints over and under the crack).

- Thoroughly clean the welds and wall surfaces as well as corroded and damaged bricks.

- Joints should be filled with epoxy mortar.

- Push a threaded galvanised steel rod with a diameter of 6mm, protected additionally with anti-corrosion mortar, to the depth of 3-4 cm. It should be remembered that the rod should overlap at least 100 cm at each side of the crack/scratch.

- Joints in the bricks should be filled with a special grout for making joints in historical walls. Substrate preparation: The substrate must be bearing, clean. Stable and free from dirt and substances which lower its bond strength. (especially in the case of hand-formed bricks and with rustic appearance) Loose particles remaining on the surface will weaken the bond strength.

Section Five is an overall assessment of the technical condition of the casemates. It states:

Currently, the condition of the Król Bastion elements is in stable balance. In terms of its mechanical condition, and taking the aesthetic aspect into account, the facility requires structural repairs, as well

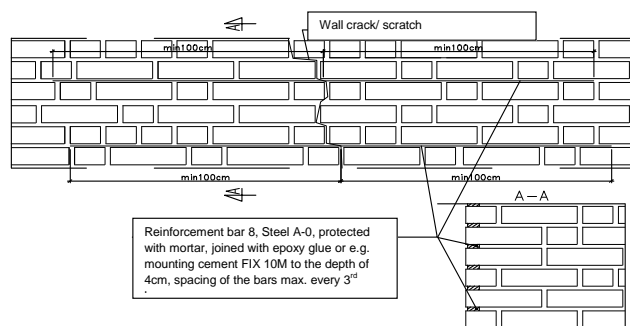
as further structural protection. Considering the historical value of the facility, the renovation and conservation works should be conducted under the supervision of a technologist conservator. Architectural and archaeological surveys should be conducted on a regular basis, which would allow us to determine the detailed guidelines for the repair of the facility. At the moment, the proposed works are assumed on the basis of the conducted site inspection. It is necessary to consider that after the implementation of open pits, the scope of the proposed works can be extended. Repair works covered by this study will significantly improve its technical condition and prevent further biological corrosion. Due to its historical background, bringing the facility to its original state requires full preventive conservation and repair.



View of the repaired vault at the front wall of the barge from the outside.

An example of conservationist instruction:

Masonry works at the walls



The reconstruction of the walls should be conducted on the basis of historical photograph or drawings to determine the original appearance of the facility and the slopes. Continuous elements, like cornices should be recreated with the use of a stored pattern. All brick mortars can be used in agreement with the conservator.

6.3

Nature Protection in Fortress Monuments

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Many fortifications in Europe, although they often differ from each other, do have one similarity: they serve as habitats and provide habitats for numerous amounts of species and ecological communities. The occurrence and abundance of species and communities in fortifications of all ages reflect in general their typical abundance in the surrounding landscape of the region. At the same time fortifications can host specific species and communities which are rare and atypical in the specific biogeographical context. Sometimes these species and communities even can be found because of the presence of the fortification. The causality for the abundance of specific species or communities in fortifications and of course in specific biogeographic regions is seldom easy to explain and is therefore a matter of scientific discussion.

Beside taking care about its natural heritage societies are confronted to take care about their cultural heritage, as a reminder of history and in reflection of their identification. Fortifications, although many centuries were influenced by them, often are not perceived as worth to protect, due to their inconvenient history. Protection efforts in these elements are not only confronted with this aspect, but as well with the size and dimension of these objects. In addition aspects of specific and general aspects of nature protection sometimes complicate the overall situation. As a result huge confrontations between lobby groups can occur, which mostly not end in a social optimum.

This article tries to give support to this handbook by providing basic principles towards nature protection in fortress monuments and tries to promote abstract understanding of this very practical day-by-day issue during reconstruction, maintenance and planning of those activities. This article is supported by more detailed information on this topic in a “Guideline for Nature Protection in Fortress Systems”, published as one result of the FORTE CULTURA project by the project partner Humboldt University at Berlin.

It is recommended by the author to use this article and as well the mentioned guideline as a start for trans disciplinary research and discussion among experts, which work on those issues on a practical but as well on a theoretical basis.

Structural aspects of the fortified cultural landscape

Mankind has changed from the very beginning of civilisation the natural landscape into a landscape, which is aimed to provide services and functions for the needs and requirements of the actual society. The erection of modern fortifications at a specific place was in most cases combined with a definition, formation and shaping of shooting ranges and other strategic areas. Examples of those combinations of short and medium range defensive functions and strategic fields of actions can be found almost everywhere. Here the fortress systems of Wroclaw (PL) or the whole New Dutch Waterline (NL) are such referenced multifunctional strategic landscapes. Even today many formerly indirectly linked buildings or erections of fortifications do exist and are integral parts of the landscape such as dykes, roads, channels, inundation fields, providing grounds, staging areas, firing ranges, field fortifications or even glacis. Many of them and as well the majority of their according fortifications have lost their primarily military functions and the origin of their erection has been forgotten. This “disarming of the landscape” stands in line with increasing urbanisation, accelerating industrialisation, demands for space and the overall change in warfare and weaponry. The transformation of former military related areas into civilian areas is in most cases unproblematic, especially if they have been intended to serve in dual use characteristics by their nature. This means in practical issues that structures have been reshaped, converted or persisted until today, but have lost one of their intended purposes. The latter holds true especially for hydro regulatory structures and their relevant area of influence. Protecting the fortified cultural landscape opens immediately questions of landscape management, territorial planning and which aspects of its military history should be protected, preserved and under which perspective. Urbanisation but as well the development of rural areas have in some case massively reshaped not only the cultural fortified landscape, and have given landscape new functions and objectives. A complete reconstruction and a restoration seems to be therefore difficult and of course questionable in most cases. Ecological aspects of biotope connectivity but as well aspects of low-carbon economy, recreation and spatial buffer zones especially around urban-industry complexes are re framing the perception of landscape functions since several years and offer new opportunities for spatial planning, also for the formerly fortified cultural landscape.

Ecological aspects of the fortified monument

The shift or even the loss of its functions for military purposes has caused in many modern fortifications in most cases a complete absence of regular maintenance of their architectural elements and their covered area. Due to reduced or even absent maintenance of structural elements secondary succession (the establishment of ecological communities following a certain area-specific line of development) occurs, which results in a biogeographic but as well anthropic influenced specific combination of fauna and flora.

Due to structural characteristics of fortifications several zonal and azonal habitats exist on a relative small area, where under natural conditions normally forest like habitats would develop, in Central Europe in most cases zonal variations of beech and oak forests, *Querco-Fagetea* (Oberdorfer). As well in many fortifications dry or semi-dry habitats on top of bastions and walls and in opposite, sometimes only some meters away, eutrophic ponds and swamp like habitats in ditches can be found, which serve as habitats for reptiles, amphibians, insects or birds. Sometimes as well fragments of former or native local phyto-associations or even remnants of intended vegetation patterns, like bushes or hedge rows of hawthorns, black locust or other trees occur, which were used once for defensive purposes. As well witnesses of former gardening activities can be found, such as old fruit tree varieties. Due to the broad abundance of walls as well associations and orders of *Asplenietea* (Oberdorfer), communities of rock and wall crevices, and or other analogue classes of rocky habitats occur, sometimes even in places where these by an absence of all artificial buildings would never occur, like in floodplains. In summary, all structural elements of fortifications serve as natural, substituting or as completely new habitats for many plant species, communities and related animals, of which some are clearly definable as being synanthrope. Some of these habitats, communities and species, which can be found in almost all European fortresses, are listed in the FFH directive 92/43/EEC as “of community interest” or even indicated with “priority”. This especially holds true for European bats. In addition, National regulations and the Birds directive 79/409/EEC extend theses appendices and related protective measures. Due to the still ongoing loss of species many semi-natural or semi-anthropic habitats, like modern fortifications, have been discovered

by nature protection agencies and organisations as suitable places for fulfilling above mentioned aspects of biodiversity protection.

The problem of nature and monument protection

The establishment of today's nature protection regulations, their laws and their objectives can be seen as an indirect result of an accelerating industrialisation. Since approximately one century negative effects of the industrialisation are more and more observable such as air and water pollution, loss of biotopes due to land use change, landscape cleaning and deforestation or open-cast mining projects. To compensate and counterbalance these effects, which result in the loss and extinction of species, decline of populations and the increase of threats to humans, was from the very beginning one aim of all nature protection efforts. Today's strict nature protection regulations are intended to preserve and to improve remaining biotopes and populations. Supplementary environmental protection regulations, which have been imposed in the last decades, are trying to reduce harmful effects of human activities and industrial processes, which would otherwise destroy the natural heritage.

Culture and its witnesses, such as fine arts and architecture, are human made heritage and expression of civilisation. They are the same time identity provider and identity expression and therefore an integral part of human mankind. The awareness of the transience of culture and its witnesses builds the foundation for all culture and monument protection regulations and is therefore comparable by its intention with nature protection efforts.

Existing nature conservation regulations of the European Union are fixing for its member states specific areas, measures, activities and indicators on a supranational level. In addition national regulations of red list species do exist as well. In contrast, regulations for monument protection do exist only on a national level, or even sublevels, like in Germany. The de-facto dominance of nature protection regulations causes in theory but as well in practical issues conflicts, if these monuments with their existing structural elements and covered areas have to be maintained, reconstructed or restored.

European Nature Protection aims and regulations

First attempts for crossborder nature protection inside of the European Union have led to the establishment of the Council directive on the conservation of wild birds 79/409/EEC (1). In this directive conservation measures acting against the decline of all (article 1) European wild birds are described, such as the "creation of protected areas, creation of biotopes, re-establishment of destroyed biotopes and the upkeep and management in accordance with the ecological needs of habitats inside and outside of the protected zones" (Article 3). In addition almost 200 bird species are listed in Annex I, for which special conservation measures have to be realised (Article 4).

In 1992 the European Council released its Flora Fauna Habitat (FFH) Directive 92/43/EEC (2). This directive had the aim to extend nature conservation efforts to all habitats and species, not only focussing on European wild birds. The main objective is to ensure biodiversity through the conservation of natural habitats and to reach a favourable conservation status for all wild species of flora and fauna. In several regular updated appendices specific areas and species of common interest or of specific interest (priority species) are listed. In Annex I actual (2014) 148 areas of common interest and 81 forest types are listed, of which 45 respective 27 are of specific interest. All EU member states are obliged to declare, protect and improve these areas, when they are suited within their country.

Specific nature protection, focussing on single species has to be implemented by all EU-member states. In Annex II of the FFH directive all species of common interest and also of specific interest are listed. The list contains in total almost 900 species in total. Annex IV lists all species in need for strict protection and includes also all species of priority interest of Annex II. To increase and guarantee effects of nature protection the FFH Directive demands the installation of a coherent network, called the NATURA2000 network, which includes as well all areas of the Birds directive 79/409/EEC.

In summary, all listed habitats and species have become since the publication of the directive of major relevance for all EU members. The EU directive has become over the years to a de-jure and a de-facto European nature protection law. It has listed in total more than 1000 species, which since then have to be protected, even if national regulations did not took them into account.

As well EU member states shall endeavour to improve the coherence (connectivity) of the NATURA2000 network, and include these aspects in spatial planning and as well all urban and rural development policies. The main aim is to reduce the isolation of communities and gene pools, which counteracts protection efforts. Features of the landscape, such as linear and continuous structures (dispersal corridors) and of steppingstones (habitat islands), which are essential for migration, dispersal and genetic exchange, shall be maintained or developed. (Article 3 & 10 FFH). This aspect of general nature protection means to improve ecological stability and is not restricted to specific sites or species. For the first time the need for maintenance and development of sites which are not declared “as reservation” was demanded – the ordinary nature have become of interest. This approach gives space for a new landscape development process, after decades of clearing and destruction of cultural and natural landscape elements.

The Pan-European Ecological Network (PEEN) is a direct result of the FFH-directive article 10 (see above), which specifically relates to land-use and spatial planning and a response to support the implementation the Convention on Biological Diversity (CBD). The PEEN includes the FFH and Birds directive areas and provides the basis for coordinated planning and action. “The pan-European ecological network addresses the development of an ecological network at a European level. It will consist of core areas, corridors and buffer zones. Restoration areas will be identified where they are considered necessary. The pan-European ecological network aims to conserve the full range of ecosystems, habitats, species and landscapes of European importance and to counteract the main causes for decline by creating the right spatial and environmental conditions.” (3)

The status of realisation and implementation of the aims and goals of the FFH directive is quite diverse inside the EU. The actual status of the NATURA2000 network of areas is in quite satisfying, because of the declaration of a vast amount of areas. The current situation of specific species is more diverse and in some cases quite dramatic. For some species a favourable conservation status is not reached and also for some the situation even got worse. Although EU member states have included the aims of the FFH and the Birds directives into their nature protection laws, too few have been done to improve the coherence of the network. The discrepancy between the aims and goals of specific nature protection and general nature protection was for a long time not recognised.

Objectives and approaches of nature protection in fortress monuments and in fortified cultural landscapes

Harmonising nature and monument protection objectives is a challenging goal, but stands in line with spatial and territorial planning objectives in most cases. The specific context of necessary monument protection and of local and regional potentials and configurations of the natural surrounding is difficult to observe, but serves as a basis for providing case specific recommendations and measures of nature protection in fortress systems. Therefore methodological approaches are recommended in this context. From the very beginning it has to be clarified which aspect of nature protection should be realised or is demanded – specific nature protection in contrast to general nature protection.

Many fortifications for example serve as habitats for communities and species of flora and fauna of stone walls and crevices. Specifically several species of lizards use these habitats, especially if crevices are not any more filled with mortar and additional vegetation covers stone or brick walls. The majority of European lizards are listed in Annex IV in the FFH-directive and are by that of common and of specific interest. If a reconstruction would fill these crevices, the majority of the habitat would get lost. As well the probability of direct lethal affecting is in this sense high and has to be avoided. Specifically the common wall lizard (*Podarcis muralis*) can be found on many artificial erections, such as fortifications, houses or even on rail roads. It can be stated that this species is synanthrope, but the reason for this observed occurrence is disputable. Anyhow, the common wall lizard is listed in Annex IV of the FFH directive and is told to be in need of strict protection. Any changes or destructions of settled habitats are with a high probability hard to achieve, especially in the periphery of their distribution range. In contrast, the IUCN Red List of Threatened Species (4) describes this species as being of least concern. Similar situations can be described for many species using the diversity European fortifications as habitats.

Specific nature protection deals with species, in some case as well with communities of interest or focus. Existing regulations like the FFH-directive, especially annex I, II and IV, or national regulations provide the basis of discussions, if structure threatening situations, which affect the existence of the monument, may also impose threats to visitors of

the cultural heritage and protected species or communities at the spot occur at the same time. Especially in this context, structural necessities of e.g. a stabilisation of walls are recommended to be distinguished from aesthetic wishes of monument protection. Examples where successful solutions have been found, e.g. if bats use casemates as habitat or certain protected plants settle walls, are existing in numerous cases in Europe. For those situations specific compensational measures, e.g. specific substituting habitats, can be negotiated and applied, but have to be realistic and applicable in the specific context. Also aspects of shifting works during reconstruction can be agreed and give at the same time space for natural resettlement of species and as well communities, sometimes even without extra compensational measures. As well it has to be clarified if concerned species or communities are by naturally circumstances scarce in the specific region, e.g. because their natural distribution pattern is fixed to a certain biogeographic region. Also nature protection organisations, such as NGOs and official bodies, have to be aware of a potential discrepancy between an existing and a theoretical need for specific protective measures of species and communities. In

most cases official lists are not suitable to reflect the local reality. Also the opposite may occur in some cases, but the argumentation for hindering or influencing a certain activity follows here other dialectic schemes and is in most cases oriented towards a general nature protection objective.

Habitat or community related aspects of specific nature protection are often combined with specific maintenance efforts. For example dry and semi-dry meadow habitats often demand extensive maintenance, but they have to be carried out on a regular basis such as Annex I FFH habitat types of natural grasslands (e.g. type 6120) but as well semi-natural grasslands (e.g. type 6240). The same is valid for many bushy habitats, to prevent their disappearance through the invasion of trees. This latter aspect, the absence of trees on bastions, is as well in most situations favourable pre-condition for preserving fortifications as a cultural heritage. Maintenance efforts of nature but as well of monument protection can be here more easily harmonised, and the specific development of a certain habitat type could be used for instance as a compensational measure. For instance results the development or the enhancement of a specific habitat often in a



Common wall lizard (Podarcis muralis) in Fort San Mattia, Verona (IT), January 2013, © V. Junghans

higher ecological value in the direct effected area and more species are benefitting from those conditions, than focussing solely on one or few species. Habitats which evolved by secondary succession, which are often found in fortress systems, can be stated as being naturally fragile and often even are incomplete in terms of species occurrence. As well it can be stated in most cases for habitats of secondary succession, that their development progress is not yet finished and even by a natural non-disturbance their remaining in the observed status-quo is questionable. Therefore in many fortifications describing habitats by phyto-sociological systems seems to misleading and should be used solely for orientation and site evaluation, e.g. to identify niches and spaces for habitat improvement.

General nature protection deals with overall aspects of ecological enhancement, as it is demanded by the PEEN and in article 10 of the FFH directive, in certain cases as well by national regulations. The risk of overestimating a site for its ecological relevance is always given especially if urban areas are focussed. Explanations for this can be found in high hemerobic degrees of urban settlements. The principal difference between specific and general approaches are, that ecological quality of a site for being suitable as stepstones and corridors within the PEEN is lower than participating areas in the NATURA2000 network. That's why in general all natural and semi-natural habitats are suitable for serving as stepstones or corridors. The concept of greenways and landscape corridors connecting functional spaces, such as they exist in the landscape but as well in urban context, is rediscovered as a tool of territorial planning. At the same time "free unplanned development of areas" e.g. through secondary succession in urban and rural contexts is recommended without following a new detailed master plan or controlled maintenance. By aesthetic reasons this is often not wanted, especially if bigger fortress monuments are transferred by landscape or urban planners into new park like structures, which have almost no ecological value. On the opposite similar approaches can enhance urban quality of life, if those areas can be used as a space for recreation of citizen.

Summary

Many possible positive results are thinkable, if up to date spatial planning, nature and monument protection consider European fortresses as spaces for solving many fundamental questions of society. Aims and objectives of these scientific spheres and practitioners are in most cases not very different but are, of course, in detail not the same. The overall enhancement of quality of life and environment and of course preserving the heritage can be seen as basic principles of all, which could guarantee fruitful discussion, if they are wanted.

7

Collection of Data about Best Practices in Fortress Maintenance, Technologies and Procedures for Preservation, Conservation, Restoration and Reconstruction in Relation to the Usage of Historical / Traditional Knowledge and Expertise



7

- 7.1 Conception of the Universal Fortification Heritage Data Collection
- 7.2 Dissemination of the Fortification Heritage Protection Related Knowledge Through the Organisation of Expert Excursion and Other Activities

7.1

Conception of the Universal Fortification Heritage Data Collection

REGISTRATION OF TRADITIONAL TECHNOLOGY, KNOWLEDGE

AND EXPERTISE FOR FORTRESS CONSTRUCTION

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- Ad Pirum Institute, Slovenia

Content:

1. Introduction
2. Expert Register Form
3. Separate »General Public Form«
4. The adjustment of the concept
5. Conclusion

1. Introduction

At the onset of the project partners arrived to a unanimous conclusion that as a starting point of their analysis and actions based on this analysis an effective system of registering traditional technologies, knowledge and expertise in fortress constructions is needed. But the first experiences brought about two important conclusions:

- To create a universal register form that would successfully facilitate needs in such a various fields as communications, urban planning, conservationist issues, economic sustainability and growth, tourism development etc. is an elusive goal since universality in a sense of establishing lowest common denominators comes, as a rule, on the account of details relevant and important within a single, separate field.
- That complexity of forms must be adopted to both competency of data providers and competency of users.

At a FORTE CULTURA Network Meeting on March 11 and 12, 2013 and at the FORTE CULTURA Expert Meeting on April 30, 2013, both organised at Humboldt University in Berlin, these experiences were discussed. It was concluded and agreed to that rather than universal questionnaire a separate questionnaires addressing specific needs of individual Work Packages shall be developed. So the Institute for Protection of Cultural Heritage of Slovenia and the Ad Pirum Institute proceeded to create a questionnaire that would serve as a vehicle for data gathering.

The starting premises were:

- That in certain areas fortification heritage still needs to be located, identified and evaluate.
- That often fortifications (of various periods) are not an isolated, individual occurrence but a part of a complex fortification system, combining different

man-made structures and man controlled or natural landscape features.

- That such forms should provide a base for a comprehensive register of fortified heritage itself, as well as of the traditional knowledge and expertise.
- That the forms shall enable both experts and general public to participate in the process of data collection and registering of fortification heritage.

The last premise resulted in creating and retaining two competency levels of forms. One devoted to collecting data from a general public and another one providing experts with a tool to not only identify but also evaluate the heritage in question.

Following the above premises we completed two form proposals:

- Expert Register Form consisting of five sections and
- General Public Register Form consisting of a single section.

Here follows their explanation:

2. EXPERT REGISTER FORM

2.1. The Concept

The form is designed to document the fortification heritage by starting from the basic element (that being either an independent individual defence or defence related object or a part of the major defensive structure) and finishing with the largest given frame of which the primary element is a part of. In this order the section of the form are meant to be filled in. However that means that they are marked in a reverse order. The element is marked E rather than A. The reason for that is the fact that most of the fortification heritage objects, even when experienced as a unique and single objects are in most cases part of a certain defensive system.

It shall represent a database for any further research or planning work on the object and/or correlated objects and when supplemented by the conservation plan as the highest expert document of object's evaluation and conservation guidelines it will represent the ultimate form of identification, evaluation and reconstruction guidelines document.

It is for this reason – the combination with conservation plan as an agreed-to standard European expert document, that classification was given the

highest attention in drawing up this Form proposal. But at the same time it was design in the way as to provide a sufficient historic, construction, legal and situation data to be useful even in cases when the conservation plan does not yet exist or has been lost for any given reason.

For all the mentioned reasons we firstly propose a change of the name. Instead of a title »Questionnaire« we propose a title: »Fortification Heritage Record Form«. We propose this name because the aim of the proposed form is not only to collect data necessary for the continuation of the project, but also to provide a platform which, when filled in, will represent the thorough enough documentation of the researched and documented objet(s) that it will be able to serve as the wholesome up-to date record of the object.

2.2 The Structure

The form is designed to document the fortification heritage by starting from the basic element (that being either an independent individual defence or defence related object or a part of the major defensive structure) and finishing with the largest given frame of which the primary element is a part of. In this order the section of the form are meant to be filled in. However that means that they are marked in a reverse order. The element is marked E rather than A. The reason for that is the fact that most of the fortification heritage objects, even when experienced as a unique and single objects are in most cases part of a certain defensive system.

Let me quote as an example for this the Metlika castle. On the first sight it looks like a typical fortified dwelling of individual feudal landlord (in this case baron Lenkovic), but in fact both its size and location were determined together with the Military Frontier (Mark) command in Graz since it represented an important part of the defensive network against the then neighbouring Ottomans.

On the other hand the section about the largest possible defensive form as a frame for the given object, defined here as a »strategic fortification system« is marked as A. The reason for that is simple. When more of the objects are documented the forms will be combined together to form a consistent documentation with a clear hierarchical structure: starting with the overall network or structure and then moving to it's individual elements.

Having in mind the different forms of fortification heritage in Central Europe we are proposing the following classification (and according titling of sections of the form):

- A – strategic fortification system
- B - Fortification System
- C - Complex Fort
- D - Simple Fort
- E - Single object

Explanation of categories:

E) Single object

Fortified Post

a fortified object composed of at most two interior spaces, organised either horizontally or vertically (in this case the number of the storeys can be also more than two)

Examples: watchtowers, pillboxes, Mortello towers, combat blocks, etc...

or service object (magazine, kitchen, latrine, etc,...).

Single object can be either an independent object or part of the bigger structures listed below.

D) Simple Fort

a fortification composed of primarily single major object with possible additions of architectural elements such as fence or palisade, watchtower, caponier and alike.

Examples: medieval castle - a keep with a wall containing the yard (e.g. Kolovrat castle), simple citadel, infantry casemate, a church protected by a wall, Alpine fort (e.g. Fort Herman), 1850's tower fort (e.g. Fort Bourguignon), etc...

C) Complex Fort

a self-contained fortification composed of more than one major object and including possible additions of architectural elements such as fence or palisade, curtain walls, bastion, watchtower, caponier and alike.

Examples: renaissance castles with more than one palace or inner and outer walls, complex citadels, baroque fortresses, XX century ouvrage, ...

B) Fortification System

(Here we must make a division between the two principles of the organisation of defence: continuous or punctual.)

Either an extensive fortification element encompassing inhabited areas and comprised of more architectural units) (continuous principle) or a group of individual forts organised in an interdependable system of defence (punctual principle).

Examples: medieval city walls with towers, baroque city defences with bastions, valley enclosures, (continuous principle), circles of detached forts around cities, fortification groups (centri di resistenza – Vallo Alpino) (punctual principle), etc...

A) Strategic fortification system

a network of castles and/or fortified churches and/or walled cities, a defence lines enclosing regions, XX century defence lines. Including landscape features (e.g. defensive forest) and infrastructure (incl. service settlements, e.g. craftsmen villages)

Examples: Great Wall of China, Hadrian's Wall, Claustra Alpium Iuliarum, the Habsburg Line, The Maginot Line, The Rupnik Line, vallo Alpino, etc...

Here too we must make division between the two principles of the organisation of defence: continuous or punctual.

3. Separate »General Public Form«

We didn't expect the laymen to study and understand the strategic formation of the defensive (military) areas and landscapes. It was therefore assumed that the form will be filled-in mostly by experts. But when it comes to discovering, locating and documenting the individual objects an enormous amount of expert's time and effort could be saved by giving a different groups of laymen such as hunters, forestry workers, farmers, fortification enthusiasts, holidaymakers, etc. ... an adequate tool to do the basic documentation.

It was for that reason that we have proposed another, separate form, which was in fact a simplified summary of sections E, D and C (but omitting expert questions). It was supposed to be simple enough to be successfully filled-in also by people without any fortification heritage related studies. It was also supposed to be readily available either on-line or easily printable or downloadable.

We have also envisaged that in the process of building the database all the gathered data shall be verified by experts. But especially in situations when many of the fortification heritage objects are even not yet known, this possibility for the laymen to report about the discovered objects was expected to be of a great value. Same were hopes for documenting the objects that are already known, but are to extensive to be documented by a single expert. Here too this simpler form was to help groups of semi-qualified people (such as students, scouts, enthusiasts, etc.) to carry out a sufficient documentation.

4. *The adjustment of the concept*

The concept of forms was tested by public on the workshop “Feasibility Study on Documentation of Fortifications” held at Medvedje brdo on May 17, 18 and 19, 2013. The forms were then tested within two workshops organized by Mestni muzej Idrija on April 10 and April 11, 2014.

The results of these tests were not entirely in an accordance with our intentions and expectations. As it turned out, even the simplified forms designed for the use by the broadest general public were properly filled only by those individuals that may have not been professionally trained, but were driven by personal interest and had already acquired some pre- knowledge earlier on. We therefore couldn’t regard them as typical representatives of the general public. In other cases it turned out that in order to achieve some usable results we had to pre-convey some basic knowledge, which means that we had to conduct some training if the data collecting was to be successful.

As a result the separate “General Public Form” was abandoned. At the same time section 0 was introduced as sort of a cover sheet containing on one hand the most basic data of the researched object and providing instructions as which section of the form was to be used in any given case.

5. *Conclusion*

The concept of forms presented in this publication (as an appendix) and devoted to data collection and exchange underwent many chances during its adaptation for the electronic media such as TaCKeDa. Consequently the contribution page of the TaCKeDat at the first glance bears little resemblance with the presented forms. Yet they were both the crucial development stage and an important interim product of the FORTE CULTURA project. They are being actively used for field data collection about fortified heritage and keep representing basis for a Register of Fortification Heritage – which could well be a result of a following similar project..



Zavod za varstvo kulturne dediščine Slovenije
Institute for the Protection of Cultural Heritage of Slovenia



FORTIFIED HERITAGE RECORD FORM

FORTE CULTURA

WP 6

The Historic and Traditional Technology,
Knowledge and Expertise,
Fortress Construction
Outputs: 6.1.5, 6.3.3



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EUROPEAN UNION
EUROPEAN REGIONAL
DEVELOPMENT FUND

0

FORTIFIED HERITAGE RECORD FORM

Basic Data

Details about the contributor (form filled-in by):

Name:
Organisation:
Address:
Phone:
E-mail:

Object (known or working name):
Location:
Address (if applicable):
Town or place:
Municipality:
Region / Province:
Country:

Basic identification

Please tick the appropriate box:

- ☐ Field fortifications (dogholes, dugouts, trenches, ramparts, palisades) - please go to Appendix 1
- ☐ Permanent fortifications - please choose one of the types listed belowlisted below

Exact identification

Please tick the appropriate box:

If the object is

- ☐ A - Strategic fortification system, please go to section A
- ☐ B - Fortification System, please go to section B
- ☐ C - Complex Fort or Fortified Monument, please go to section C
- ☐ D - Simple Fort or Fortified Monument, please go to section D
- ☐ E - Single object, please go to section E

For explanation of expressions please look at the back
of this page.

3

Forte Cultura - Fortified Heritage Record Form by Ad Pirum Institute

*the first two pages of the final version of the Fortified
Heritage Record Form. The entire form can be found at
the web page FORTE CULTURA.*

7.2

Dissemination of the Fortification Heritage Protection Related Knowledge Through the Organisation of Expert Excursion and Other Activities

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There were different forms of dissemination of project results envisaged, ranging from press releases, articles in the media and web site. The main dissemination effect is to stem from one of the core outputs, "The Databank of Traditional Knowledge and Technologies", abbreviated as TaCKeDat. The two conferences organised at the Institute of Cultural Heritage Protection of Slovenia in Ljubljana in November 2013 and in May 2014 were also open for public and reported about. But we also tested some other forms of dissemination of our results.

Most notable of these custom-planned attempts was an excursion organised for some of the leading European fortification experts in September 2013. Visiting places in Slovenia and NE Italy the excursion work two ways. While local fortification heritage was presented to the mentioned experts, some of the administrators of fortified objects, such as Idrija Museum managing the Idrija Castle (the museum is a custodian of the UNESCO listed site), Žužemberk Castle, Sevnica castle, the Bunkermuseum Wurzenpass in Austria and the city of Palmanova (which happened to be located in Italy).

Another form of dissemination was workshop titled "Feasibility study on Documentation of Fortifications" carried out on May 17 and 18, 2013 on Medvedje Brdo. While actually discovering previously unknown fortification objects a group of interested locals and some of the representatives of the broader interested public were introduced to locating, registering and documenting elements of fortification heritage.

The most non-conventional approach was surely the testing of the developed register forms during the workshop organised by the Mestni muzej Idrija on April 10 and April 11, 2014. Having obtained permission by the organisers to do so, we presented the forms and instructed participants how to use them, after which a test field-work was carried out. In this way we obtained some valuable feedback that helped us finalising the design of register forms while presenting at the same time a selected and therefore very interested target group with the aims of traditional technologies and results of the FORTE CULTURA project.



Work carried out during the "Feasibility study on Documentation of Fortifications", Locating previously unknown fortifications and fortification related objects, registering and documenting them. Medvedje Brdo, May 17 and 18, 2013.



Field-testing of the register forms during the workshop organised by the Mestni muzej Idrija on April 10 and April 11, 2014.

8 Evaluation and Lessons Learned



8

8.1 Evaluation and Lessons Learned

8.1

Evaluation and Lessons Learned

The aim of WP6 was to establish tools for efficient preservation and exchange of traditional knowledge and techniques of fortress construction and conservation. The final goal was to create a functioning electronic databank of traditional and conservationist knowledge and techniques that would be globally accessible on-line.

Since a considerable part of fortifications, especially when it comes to extensive heritage of the 20th century, but also some earlier systems such as Roman *Claustra Alpium Iuliarum* and others, still remains undiscovered and therefore unidentified and unevaluated, we also tried, within the WP6, to create a tool that would enable laymen, and not only experts, to participate in the process of data gathering.

We set-off from a noble premise that everybody expressing a keen interest shall, if given an opportunity and good enough tool, arrive to a satisfying result. However, even the communication between different project partners during the project, and especially during the testing of the register forms during the Idrija workshop, we had to arrive to the conclusion that this may not be the case.

As it turned out, even the simplified forms designed for the use by the broadest general public were properly filled only by those individuals that

may have not been professionally trained, but were driven by personal interest into acquiring themselves some pre-knowledge earlier on. We could therefore mark them as "amateur experts" rather than "laymen". In every other case it turned out that we had to convey some basic pre-knowledge, meaning that we had to conduct some training if the data collecting was to be successful.

Only by receiving this basic training did the participants acquire good enough competence to approach the identification and recording of fortification heritage. In reality this meant that by receiving basic training the participants became a sort of "semi-experts" capable of tackling not only simplified forms designed for "laypersons" (and therefore the broadest possible public), but also materials, designed for experts. So as the tests showed the design of special, simplified materials didn't fulfill the expectations since even when these simplified forms were used a considerable amount of time and efforts needed to be allocated for preparation work which mostly consisted of training of surveyors (data collectors).

Within WP6 we fulfilled all the designated goals. We created a set of universal forms for data collection which could, in case of continuation of this or similar project, serve as a basis for the establishment of a standardised European register of fortification heritage. We created a functioning databank of traditional and conservationist techniques and knowledge used in fortifications constructions (the TaCKeDat) and designed a program for guiding and monitoring. Conservation Plan, a document designed by the Institute of Cultural Heritage Protection of Slovenia, was endorsed by FORTE CULTURA partners as a starting document in planning of conservationist approach for protection of fortification heritage.

But we have also learned some lessons. The most notable of them considered a goal we set to ourselves during the undertaking of the FORTE CULTURA project: the inclusion of the broadest possible public into the identification and recording of the fortification heritage.

Here the lesson was that the expert tasks have to be carried out by experts. In this regard there could be no shortcuts.



Mr Karsten Grobe explaining the traditional way of producing wooden water supplying pipes, Petersberg Fortress, Erfurt, July 5, 2014.

9 Presentations of Institutions



9

- 9.1 Presentation of the Restoration Centre of the IPCHS
- 9.2 Presentation of the Ad Pirum Institute

9.1

Presentation of the Restoration Centre of the IPCHS



The restoration Centre is the that part of the Institute of the Protection of Cultural Heritage of Slovenia (IPCHS) which carries out demanding restoration work on monuments while constantly verifying and building on theoretical knowledge and setting quality standards of the work of restorers. It's most important duty is to seek and establish, in conjunction with representatives of State and various specialist institutions, ways of transferring this knowledge and these standards to people. Cultural heritage does not only belong to an institution, a region or nation, it is the property of the whole of humankind acquired in process of protecting and conserving heritage.

A special characteristic of the Restoration Centre is its capacity to organise complex conservation/restoration project conducted in accordance with the latest findings and strictest criteria. Every aspect of these project combines heritage.

Since in our interventions in architectural heritage we note above all shortage of crafts skills in the field of building, we have focused on additional education of future professionals in the building sphere in conjunction with Secondary School of Buildings, Geodesy and Economics in Ljubljana. The Planning Department and the Department for restoration of Stone are collaborating on the implementation of a supplementary training programme for stonecutters and builders, and we would like this program to expand to take in other professional profiles such as roofers, carpenters, painters, etc. For this reason we have also collaborated on the preparation of a National Vocational Qualification for professions in the restoration sphere.

Planning Department

Preparation of expert conservation-restoration work on built heritage is the basic mission of the planning department. By conserving built heritage, values of quality habitation, culture of living, construction methods utilizing natural materials, the historical and cultural development are being preserved as well. Hence, planning of interventions in such heritage follows these principles:

1. Planning of restoration projects must be thorough and given a great deal of thought.



2. Authenticity of all architectural elements must be retained.

3. Maintenance is better than repair as minimal interventions cause less loss of authenticity.

4. Use of procedures that allow for re-establishment of previous condition.

5. Use of traditional technologies and compatible materials.

Most of our time is spent in preparation of conservation plans which we see as a key element of the integrated approach to restoration. In cooperation with all departments of the Restoration centre, other offices of the Institute for the Protection of Cultural Heritage of Slovenia, and experts from specific spheres we plan those interventions in built heritage that are indispensable for its conservation.

We monitor interventions by managing and coordinating work, as well as providing supervision. Our activities have also expanded to build heritage research, resulting in a significant contribution to the understanding of the architectural development in Slovenia, instructions for conservation plan preparation, and large amounts of documentation. This documentation is stored in the department archive and includes a comprehensive list of projects and conservation plans, photo documentation, architectural measurements, and research and intervention reports.

We also organize thematic workshops for expert associates and everyone interested in heritage. Their main subjects are getting familiar with historical materials and technologies, and conservation plan preparation. As interventions in built heritage are the one area where the lost of traditional craft knowledge is felt particularly acutely, we are strong supporters, together with other departments, of additional training in building sector professions. Since it is our opinion that our knowledge and experience must be shared with the wider public, employees of the department give lectures at conferences at home and abroad, and publish in expert and popular periodicals.

Department for Stone and Stucco

Because of its durability, stone has always been entrusted with the hardest of tasks. As a construction element it was placed where strains are the greatest. Its durability led to it being used even in very adverse climate conditions. All this does not contribute significantly to short-term degradation, however in the long term stone monuments still start to lose their



recognisability which is often followed by their utter decay. Even worse, this degradation is accelerated by unprofessional interventions in monuments. This is a consequence of unfamiliarity with types of stone and their characteristics, as well as with causes and kinds of damage to it. As a result, the department for sculptures (works of plastic arts in stone) is entrusted with the responsibility of rescuing such heritage. This is not achieved merely by physical interventions in monuments but also by awareness-raising aimed at owners, managers, and users of heritage. In other words, we are responsible for the development and popularization of our profession.

The basic activities of the department are preparation of restoration programmes and projects, and execution of restoration interventions in cultural heritage objects made of stone. Interventions are undertaken primarily in immovable cultural heritage, mostly stone statues, sculptures, reliefs, and architectural mouldings. During preparation of restoration programmes or projects, materials, causes, and kinds of damage to monuments are identified with the assistance of the Natural Science Department and external associates. This serves as the basis for preparation of restoration programmes detailing the manner of disassembly and reassembly of monuments, methods of removal of secondary formations on stone surfaces, methods of repairing damage, and final preservation of monuments. The department provides training for stonemasons – restoration associates, organizes and holds workshops, and organizes presentations of modern materials and restoration methods utilized in restoration. It regularly employs students of restoration from the Academy of Fine Arts in its daily activities. Employees of the department also participate in boards of experts, as well as join forces and cooperate with foreign experts.

Department for Wood

Wooden polychromatic works of plastic arts represent a large part of our heritage as the group includes altars, pulpits, individual sculptures, stairways in sacral and secular buildings, etc. Luxurious polychromatic, gilded or silvered surfaces hide a very sensitive support medium beneath layers of chalk foundation – wood. This wood is the main culprit of degradation as it is very susceptible to any temperature change, and its shrinking, stretching and other changes cause the surface layers to crack, peel, and fall off. Conservationist-restorers of works of plastic arts deal with diverse

issues of various materials and phenomena, discovering causes of degradation and eliminating adverse factors. Original materials are preserved to the greatest extent possible. Techniques and technologies used in making works of art are identified so that appropriate conservation methods can be selected. We also upgrade and modernize traditional work techniques, and test and introduce new materials. Due to the large amount of work, we employ external associates, mainly students of restoration from the Ljubljana Academy of Fine Arts and Design, enabling them to become familiar with issues of wooden items and acquire practical experience, not only theoretical knowledge.

Wall Painting Department

The basic activity of the Wall Painting Department is conservation and presentation of wall paintings. They are generally associated with build heritage and found in churches, castles, palaces, houses, monasteries, etc.

Our work is mostly performed in the field but minor conservation-restoration interventions in wall paintings removed from buildings at risk are conducted in the studio.

We also organize and attend international conferences and discussions where we come in touch with the latest conclusions and research.

We introduce new methodologies and procedures associated with the modern approach to wall painting restoration. We also provide practical training for students of restoration by including them in our work.

Through articles, reports, presentations and lectures we inform the wider public of significant discoveries and successfully completed projects.

Easel Painting Department

Conservationists-restorers of this department spent their time rescuing movable cultural heritage on canvas and occasionally on other support media (pasteboard, metal, wood). This significant portion of Slovene art heritage is found in churches, monasteries, museums, national institutions, as well as in hands of private individuals.

The interdisciplinary approach is becoming prominent in our work. Natural science analyses confirm our assumptions about the technological composition of works of art being treated. This can, together

with art historical research, lead to integration or upgrading of existing conclusions.

The guiding principles in selection of appropriate conservation-restoration interventions on a work of art are always its technological composition, condition, and the environment where it is situated.

Staying abreast of innovations in conservation and restoration of canvas paintings is a requisite for the development of the profession. To this end we organize international and domestic workshops in collaboration with experts of other national institutions. Still, introduction of new techniques can only occur after careful reflexion and critical evaluation.

Natural Science Department

The Natural Science Department performs analyses of cultural heritage objects. We cooperate with conservationists-restorers from a variety of areas and institutions, and with owners of cultural heritage objects. Our tasks are identification of materials in cultural heritage objects; analysis of their changes; ascertaining the authenticity and original appearance of cultural heritage objects; analysis of impact of conservation and restoration interventions on cultural heritage objects, etc. To this end we employ an array of methods, both non-invasive and those entailing collection of (micro) samples. Our laboratory conducts X-ray radiography, ultraviolet, fluorescent, and infrared photography, optical microscopy, and infrared and Raman spectroscopy, as well as numerous other types of analysis in cooperation with laboratories of other institutions.

Documentation Department

Tasks of the Documentation Department are compiling, processing, and storing documentation on

conservation-restoration interventions and releasing information on them. Documentation comprises a photo archive, an archive of plans, and an archive of reports and studies on interventions in heritage. The photo archive includes black-and-white and color negatives, positives, slides, and digital images. The archive of plans includes technical designs of restoration interventions in built heritage, measurements, sketches, and drawings. The archive of reports and studies keeps all bound or loose material on restoration interventions since 1983. As conservation-restoration interventions are now camera recorded, a video archive is also being prepared.

Key references:

- Ljubljana – Robba Fountain, 2008
- Ljubljana – Opera house, 2007-2008
- Ljubljana – National gallery, 2012-2014
- Koper – Miraculous Crucifix, Church of St. Basus, 2008
- Ljubljana – Franciscan Church of the Annunciation, 2006
- Ljubljana – Illusionistic wall paintings by Quaglio – Church of St. Nicholas, 2008
- Sevnica – Lutheran cellar, 2010
- Brežice – Castle, 2010
- Ljubljana – Wall painting by Slavko Pengov, Parliament of the Republic of Slovenia, 2010
- Ljubljana – 182 years of lost painting of Pietro Liberi, St. Nicholas from 1664, Ljubljana Cathedral, 2005-2008
- Novo Mesto – Tintoretto, St. Nikolaj from the end of the 16th century, Cathedral of St. Nicholas, 2008-2009



9.2

Presentation of the Ad Pirum Institute



Field work: taking measurements for an Architectural research Study and a Conservation Plan.

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With the then Minister of Defence, Dr Ljubica Jelusič and the then Chief of the General Staff of Slovenian Army, General Alojz Štajner at the opening of the exhibition about Slovenian fortifications at the Ministry of Defence, June 23, 2009. © Ad Pirum Institute



Annual Fortress Study Group (FSG) excursion, May 2008.

© Ad Pirum Institute

Ad Pirum Institute is a small collective of people devoted to preservation of architectural heritage. It is also the only organisation within Slovenia that specialises on fortification heritage in particular.

Activities of the Ad Pirum Institute are numerous, but in one way or another they are all related to the preservation of cultural and especially architectural heritage. They range from direct work on objects to organisational and educational work and promotion of heritage protection through exhibitions, excursions, workshops, lectures and last but not least through publications.

Concrete Architectural Work

For years Ad Pirum Institute has been providing the Institute for the Protection of Cultural Heritage of Slovenia with services such as measurements and architectural research reports of some complex objects of cultural heritage, such as Pišce Castle, Bistra Monastery and Škofja Loka Castle. Another big client in this field is the City of Ljubljana with projects such as Rog factory, Švicerija (the Swiss House) and many residential houses.

Here we must also mention designing tasks. The most outstanding is the design of interiors and signage system for the Franja Hospital - a monument on European Heritage List, managed by the City Museum of Idrija that is also the custodian of the UNESCO World Heritage Site of Idrija Silver Mine. After the torrential flood had completely destroyed the monument of Franja Hospital, Ad Pirum Institute provided some documentation and participated in the reconstruction by supervising the reconstruction of interiors and furniture and by designing a new signage system.

Organisational and Educational Activities

Members of the Ad Pirum Institute were invited to prepare exhibitions, presentations and lectures for many occasions and venues, such as:

- The Municipality of Žiri, Logatec and Sežana (lectures and exhibitions about the history of Slovenian fortifications).

- The Ministry of defence of the Republic of Slovenia (an exhibition and a lecture about Slovenian fortification heritage for the Minister and the members of the General Staff).
- Slovenian Architecture Museum - now MAO – the Museum of Architecture and Design (an exhibition and a lecture about Slovenian fortification).
- National Museum of Contemporary History (long lasting co-operation with multiple exhibitions and lectures).
- Faculty of Architecture of the University of Ljubljana (exhibition).
- The City Museum of Idrija (lectures).
- The Kobarid Museum (electures, book presentations).
- Humboldt University, Berlin (a lecture at the FORTE CULTURA international expert meeting).
- Restoration Centre of the Institute for the Protection of Cultural Heritage of Slovenia (presentations within FORTE CULTURA project).
- Hemingway Society biennial conference in Venice, 2014 (presenting a paper).
- Primorska University – Turistica (presenting a paper at the Kamen-most international conference).

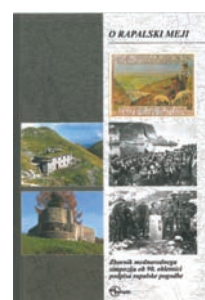
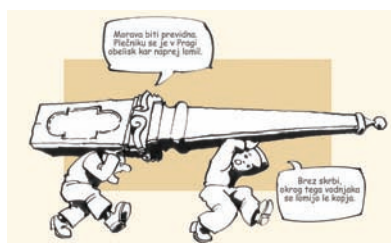
Ad Pirum Institute successfully organised numerous field workshops related to discovering, registering and documenting objects of fortification heritage, such as unknown forts of the Rupnik Line and Vallo Alpino.

We must also mention expert excursions. Of them two most important were a week long annual excursion of the British based international fortification heritage expert organisation the Fortress Study Group (FSG) in May, 2008 and also a week long pilot excursion for the FORTE CULTURA project in September 2013 led by Dr Hans-Rudolf Neumann.

Ad Pirum was either associate or full partner in transnational EU funded projects such as FORTE CULTURA (Central Europe) and Kamen-Most (Slovenia-Croatia).

Publishing

Publishing was one of the most significant activities of the Ad Pirum Institute when it comes to arising awareness about the value and significance of the fortification heritage. The books published by the Ad Pirum institute range from those for expert, such as "Arhitekturni postinformacijski sistem" by Dr Darko Likar, to those targeting the broadest possible public and even children.



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