Report on the application of the tool for assets evaluation on pilot areas and prioritization of interventions

Deliverable D.T1.2.2

Activity A.T1.2 Set up of methodology for the evaluation of cultural assets and prioritization of securing & salvaging interventions

The case of Idrija mercury mine

Slovenian Forestry Institute and Idrija Mercury Heritage Management Centre

Dates of workshops in Idrija (Slovenia): 7. Nov. and 11. Dec. 2019

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Executive summary

This document provides a template for reporting on the test of the valuation tool previously designed and to be tested in all (5) pilot areas of the project CHEERS. Its structure follows sections of the tool provided in a spreadsheet format, which was designed to help PPs in preparing and organizing the input data (defining hazard scenarios, selecting assets/object of cultural heritage), mapping of stakeholders and documenting the outcomes of group valuation (assigning weights for individual types of values and scoring values for each asset/object of cultural heritage). The report however has an additional section entirely devoted to assessment of the test. The application form (hereafter AF) suggests that the SWOT (strengths, weaknesses, opportunities and threats) approach is suitable. A more detailed information on how to apply it is provided in the last chapter of this template.

Pilot area

Municipality of Idrija holds plentiful assets of cultural heritage due to its rich history, especially in mercury mining, which has deeply shaped the community and the environment. From the start of the 16th century onwards, mining has been a key economic activity involving much of the local people. It has provided the living of many and in the course of development garnered several impressive manmade constructions like the main mine entrance building ('Šelštev s prizivnico') and artefacts of predominantly technical/engineering origin. Latter refer mostly to mining tools and didactic objects aimed to present different aspects of mercury mining. There are indeed other objects/buildings related to mining history of Idrija as water dams, built water canals, smelting plant, water pump. etc, however the mine is the central element.

After the closing of the mine in early 90s due to restrictions on use and complete ban on mining of mercury in Europe, a part of the mine and some of its auxiliary technical infrastructure was gradually transformed into a museum. The entrance into the mine was redesigned with a welcome desk, a presentation room with an educational video being as a paramount element to introduce visitors into the history of the mine, and the mercury display, which is model of visual down-scaled representation of the amount of mercury that had been extracted during the active period of the mine. Apart from historic and evidential importance of the mine there is also economic aspects, which cannot be ignored. Guided tours into the mine bring a substantial number of tourists in Idrija and its surroundings that created income opportunities for local business.

Those facts indicate overall importance of the mine to the local community, which is likely to put substantial effort into the safeguarding it against various threats among like natural hazards. Earthquakes, floods, landslides and fire are noteworthy in the area due to several reasons. Steep terrains with considerable heterogeneity in elevation, relatively deep soils, abundant precipitation and a well-spread network of mine tunnels and shafts create environment convenient for first three types of hazards. In addition, fire itself is typical for mines, where naturally occuring flammable gases are common. All those threats combined present a great risk which is to be minimized as much as possible. CHEERS targets such cases and aims to provide practical tools to mitigate such risks. The evaluation tool ATTACH, which was designed upon already available know-how and specific requirements of the Alpine space is such tool that the consortium not only operationalized but also tested in five pilot areas. The design of the tool is described in more detail in deliverable D.T1.2.1 *Concept and tool for cultural assets evaluation.*

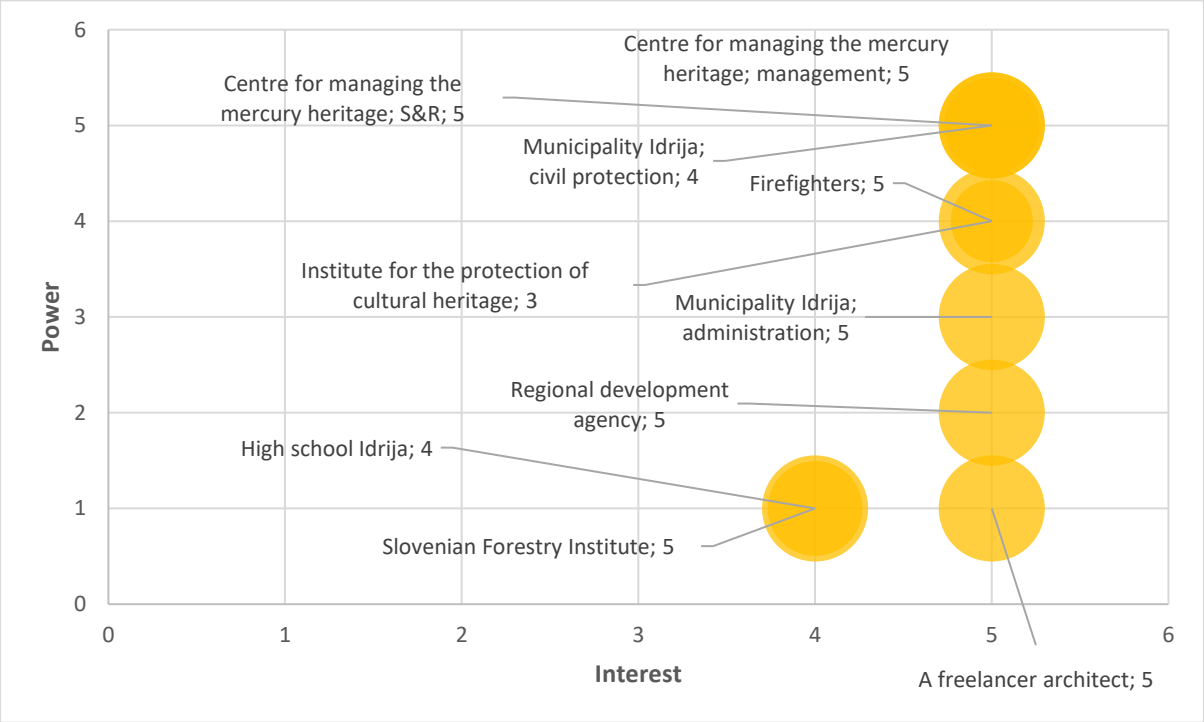
This document is to provide detailed information on the testing of the ATTACH tool on the case of Antonijev mine road and its auxiliary infrastructure. Specific cultural heritage assets which served as pilot elements for the test are described in detail in chapter 'Cultural heritage being evaluated'.

Managing stakeholders

The first step was to identify relevant stakeholders and to do that SFI and CUDHg had a brainstorming meeting early in November of 2019. First, a draft list of all potentially relevant stakeholders was created. Then we have revised it and omit all of those with a combination of very low interest in ATTACH and low power of introducing changes. A pre-mapping of stakeholders was done. The final list had approximately 20 people, which we afterwards invited to the workshop. Due to several reasons about half responded and indicated they were available, thus we designed two separate workshops, so that we could re-invite those not available for the first test. Overall, the test was completed in two half-day workshops, one on 7th of November and one on 11th of December 2019. Altogether, 15 stakeholders completed the test of the tool – 10 attended the first and 5 the second

workshop. Main organizers, one person from SFI and one from CUDHg are not included as they did not test the tool but manage the event – present the project, the tool, gave instruction and so forth.

After each workshop we mapped stakeholders according to three dimensions suggested within the D.T1.2.1 – interest, power and attitude. As mentioned previously some type of pre-mapping was done in the process of stakeholders' selection, however the final mapping could be done after having personal contact with the stakeholders and exchanging ideas about the ATTACH and how they see its potential implementation. The final graphical representation of stakeholders' mapping is given below.



Graph 1: Graphical representation of stakeholders' mapping according to their interest in topic of cultural heritage and natural disasters (x-axis), power to implement changes of current system of cultural heritage evaluation (y-axis), and their attitude towards introducing innovative evaluation approaches in cultural heritage management (the larger the circle, higher the support – the value is on right-hand side beside the indication of the organization).

We have mapped stakeholders according to the organisation they work in and field of work. Thus, we have separated attendees from the Centre for managing the mercury heritage into the 'management' and 'S&R' (safety and rescue service), and the Municipality of Idrija into 'administration' and 'civil protection' part. Working in different fields although in the same organisation brings different levels of power, interest and possibly support and so we decided to account for that.

In general, we have managed to involve an ample number of stakeholders with strong interest and a few with a considerable level of power to implement changes. Majority of them also indicated solid support for implementing innovative evaluation approach ATTACH except of the Institute for the protection of cultural heritage, which had showed a certain level of reluctance, however still being generally positive.

Designing hazard scenarios

After reviewing documentation on past hazard events in the mercury mine in Idrija and consultation with safety/protection staff of the mine we decided to design a fire hazard scenario. It seemed most plausible and also highly risky in terms of how much of cultural heritage assets it would jeopardize. Apart from water intrusion fire is the only hazard addressed in more detail in the Protection and rescue plan of the mine. The plan also suggests two possible fire hazard scenarios, one describing possible development in the upper part of the mine (the entrance building and the first mine level), while the second covers fire event on lower levels of the mine. Considering the fact that majority of cultural heritage assets is located in the upper section of the mine, we decided to focus on the first scenario only. This scenario predicts break out of o fire due to ignition of flammable gases in the upper level of the mine, which gradually progresses upwards, passes the cast iron entrance doors and captures the entrance building. A simple schematic of the mine is given below.

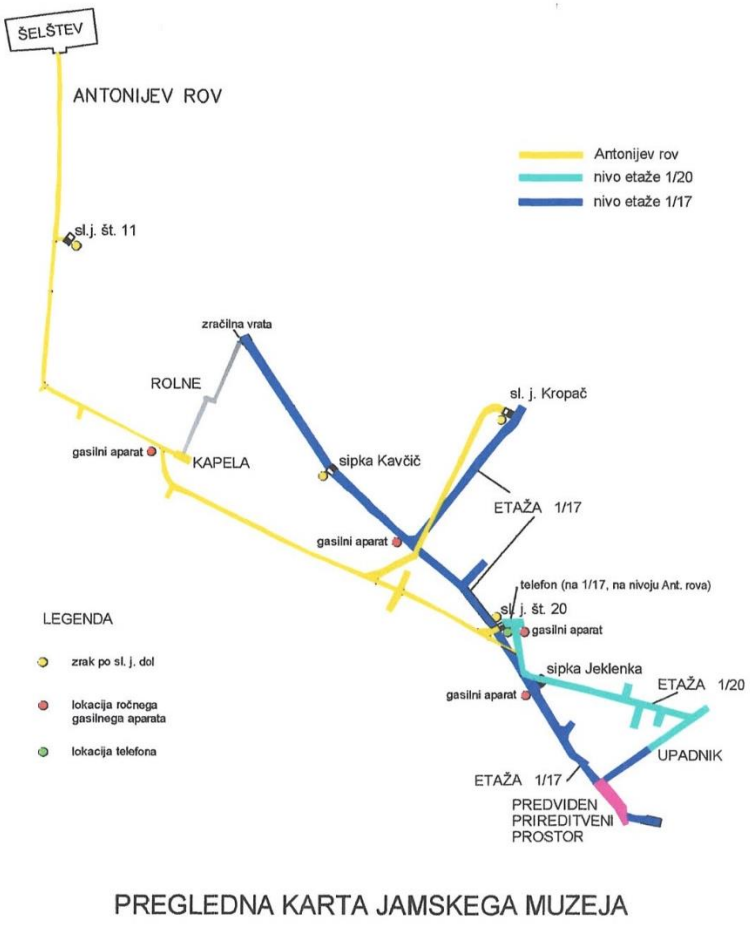


Figure 1: Schematic of the mine, with indication of different levels (the upper level is in yellow) and fire extinguisher (red dots).

The second part of designing scenarios considers assessing the exposure of cultural heritage assets. The protection and rescue plan does not elaborate on the intensity of the fire in detail and not on the detailed extent of fire as well, thus we had to consult the managers of the mine and identify the assets potentially exposed to fire. The initial list of cultural heritage assets was produced.

Cultural heritage being evaluated

The list of the assets of cultural heritage which was letter on evaluated in the test of the tool holds eight (8) items, one building and seven objects (table below).

Table 1: The list of cultural heritage assets included in the test of the evaluation tool ATTACH with short description of each asset and general indication of vulnerability of each asset if fire scenario would actually occur.

The name of the asset	Description	Indication of vulnerability
The summon room 'Šelštva'	The call room on the right side, is nowadays in use as the lecture room, the projection room and visitors' collection point before entering the pit.	The wooden parts of which the call room is mostly made, would probably be completely destroyed.
Mercury display	The modern sculpture (author: Marko Pirih) symbolises discovery of mercury. According to legend, mercury was discovered in Idrija in around 1490 by a tubmaker as he was soaking a wooden bucket in the stream. An unknown, glittery substance found its way into his bucket, and this substance turned out to be mercury.	The electronic system of the sculpture would be destroyed, mercury would evaporate into environment
Ore cart	The ore transport mine cart "trugca" is being preserved, secured and presented as an important monument of Idrija mining technical heritage with exceptional universal values. It is a part of the CUDHg mining collection. Visitors can view it within the permanent museum display Anthony's Main Road. It is a part of the presentation that represents the entire story of mining in the Idrija Mercury Mine.	The wooden part of the cart would probably be completely destroyed, while the iron frame and the wheels might be slightly smeared but not severely damaged.
Mining telephone	The medium-size, metal pit telephone is vertically mounted and consists of five parts. The housing consists of three parts. There is a circuit in the biggest bottom part. There is a dynamo for signal generation in the middle part and a rotating handle connected with the dynamo on the opposite side of the receiver. The upper part is a protective cover. The other two parts are a telephone cord and a receiver.	The plastic part of the pit telephone would probably be completely destroyed, while the iron frame and other iron parts might be slightly smeared but not severely damaged.
Mining detonator	The electric detonator is composed of a square metal housing and a cover. The electromechanism is mounted in the housing. Buttons for triggering the explosion are on the cover (pressing the button will generate electricity, which runs to the clamps or the conductor). On the side of the housing, two conductors are mounted, on which the conductive mining wire is attached, which connects the lighters with the explosives in the mining field.	The plastic part of the electric detonator and additional wires would probably be completely destroyed, while the iron frame and other iron parts might be slightly smeared but not severely damaged.
Drilling machine CRAELIUS XC 42	The Craelius drilling set served for research drilling and detection of mineralisation areas on the main levels and levels of the Idrija ore deposit. Obtaining the core during research drilling was particularly	Drilling set is made of iron and there would be no severe damages caused by the fire.

	challenging in the poor rocky conditions which occur in Idrija.	
Theodolite on a wooden stand	A theodolite consists of a wooden base with a triangular stand. Under the stand, there are footscrews and a horizontal circle with an angular division, which allows measurements of horizontal angles from 0° or 360°. The top part consists of a binocular with bracket and a supporting axle. This part also contains a vertical circle with an angular division, which allows measurements of vertical angles from -90° or 90° or zenith distances from 0° to 180°.	The wooden, glass and plastic parts of theodolite would probably be completely destroyed, while the iron frame and other iron parts might be slightly smeared but not severely damaged.
Clay mannequins of miners	All clay mannequins of miners are work of an academic sculptor Boni Čeh and represents different mining work through the years.	All mannequins of miners are made of clay and dressed in original miner's dresses (hats, helmets, shirts, trousers, boots) and equipped with original self-protective devices and therefore would be completely destroyed in a fire.

All assets were presented to the attendees of both workshops in a standard way by indicating:

- location of the asset in the mine,
- state they are in in terms of being original, refurbished or replicated,
- management regime in terms of maintenance and monitoring,
- vulnerability aspect by illustrating potential damage on the asset.

After the presentation attendees were asked to complete the test evaluation.

The evaluation

The evaluation process was completed via two separate workshops, held in the premises of Cerkljanska development agency in town of Idrija:

- one on 7th of November 2019 with 10 attendees and two presenters/instructors, and
- one on 11th of December 2019 with 5 attendees and two presenters/instructors.

In the beginning of each workshop project CHEERS was presented, followed by the description of each asset/building of cultural heritage. After this the evaluation methodology of ATTACH was explained in detail, especially focusing on characteristics of AHP and how it is to be used via the web application to define relative weights, details of different types of values and the geometric scoring scale.

Defining the weights

Each attendee has made 21 pair-wise comparisons and scaled importance of each type of value relative to other types on a 1-9 Saaty scale. Comparisons were aggregated via n-balanced approach and are given in the table below.

Table 2: Results of the weighting of individual types of values done by attendees of both workshops

Type of value	Weight [%]
Evidential	26,9
Historic	22,5
Aesthetic and artistic	6,7
Communal	12,9
Economic	3,0
In-use/fruition	9,0
Scientific/educational	7,5

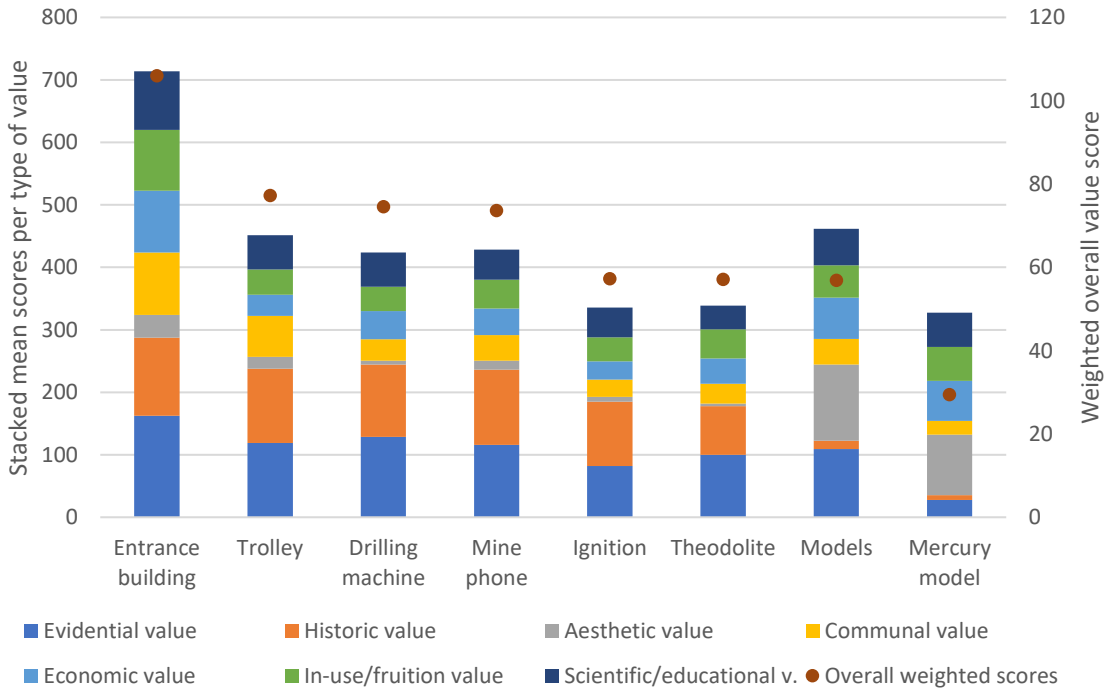
Evidential and historic values have both been assigned by far the highest weights, followed by communal and at the end by economic attached with the lowest value. However, the distribution of values is secondary in the test as the main goal was to assess the performance of attach. Several issues were highlighted by attendees during the test:

- evidential and historic value overlap in their definitions and it was hard for attendees to distinguish between them,
- making 21 pair-wise comparisons can be quite demanding and might require several attempts to achieve a desirable consistency,
- knowing the object/asset being evaluated can have a significant effect on the weighting process and this needs to be acknowledged,
- coming from different sector might affect the results as well, as those being closely related to conservation and management of cultural heritage tend to put higher weights to historical, evidential and communal types of values.

One of suggestions made by attendees was also to integrate the weighting application into the spreadsheet format file so that they would not need to skip from one application to the next.

Scoring the values

The outcomes of scoring values indicated very clearly that the entrance building has the highest priority, followed the trolley, drilling machine and the mine phone, all relatively close in scoring. Next, ignition, theodolite and the miners' models are again very close in priorities, whereas the mercury model received the lowest overall score, which is also significantly lower than its score-wise closest assets.



Graph 2: Distribution of value scoring for eight cultural assets of the Idrija Mine in two-fold representation; mean scoring for individual types of values (left axis; stacked bars), and weighted overall scoring (right axis; dots).

Looking at the distribution of scoring among types of values. A quite clear pattern is that, again, evidential and historic values garner high scores with the first six assets, while aesthetic value was attributed with high scores for models and the mercury model. Both were scored very low in historic value. High scores for evidential value are also characteristic for models. Relating to a specific evaluation outcome for morels, a relatively high sum of mean scorings and low overall weighted score is due to high scoring on aesthetic value, which has a low weight and that lowers the overall score. Following the issue of aesthetic value, it was scored by far lowest among all types of value for the first six assets. However, the models, as for the entrance building were given relatively high scores on economic value, which was weighted at very low in general. Thus, the two assets seem to be important for potential of generating income.

During the scoring attendees' observations were:

- the 7-level geometric progression-based scoring scale is non-intuitive and hard to comprehend – a linear would be more appropriate,
- the initial presentation of individual assets can have a significant affect on scoring, especially if the presenter would highlight specific attributes more in case of some assets and less for others,
- the overall design of the evaluation approach seems to be reasonable and well grounded.

Assessing the test outcomes

The table bellow lists factors of all four aspects of SWOT for testing of ATTACH in the case of Idrija mercury mine cultural heritage. Majority of factors were discussed with the attendees right after both workshops while the rest were added by SFI and CUDHg.

In the following section (mis-)matches among these elements are elaborated in more detail so that strategies for overcoming challenges of implementing ATTACH could be possible.

	SWOT analysis template	
	Positive	Negative
Internal	Strengths	Weaknesses
	- professionally and scientifically grounded methodological approach - very easy to adapt to larger/smaller sets of assets being evaluated and/or different scoring scale - 'open-source' format makes it easy to refit it to different analytical settings - relatively easy to comprehend by end-users (quick learning process) - it is user friendly (expressed by attendees of the workshop) - does not require extensive human or material resources to be implemented	- user needs to switch between the AHP web tool and scoring spreadsheet file - not the most comprehendible geometric progression-based scoring scale - potential for biases in both weighting and scoring as a result of people's previous knowledge/preferences, etc. - a pre-defined set of seven value types can affect the evaluation - the concept of predetermined weighting and scoring omits potentially additional aspects of evaluation which might be important in some cases
External	Opportunities	Threats
	- for the reason that tourism is a very lucrative sector in the Alps and that much of it depends on cultural heritage, its protection seems reasonable; in combination with climate change and increasing threat of natural disasters this urgency is even more critical - need for innovative evaluation approaches was pinpointed also by relevant national experts from the Institute for the protection of cultural heritage of Slovenia - CHEERS consortium offers a network of experts with rich experience needed to further develop the tool and connections to relevant professionals for distributing information on the tool	- there might be reluctance over purely quantitative evaluation approaches over mixed qualitative/quantitative - the limited duration of CHEERS might not secure enough time to refine the tool enough to get a competitive advantage over other tools already available - the tool was designed (theoretical underpinnings endorsed from already available approaches and then adjusted to needs of Alpine space) by an organisation not being previously involved in cultural heritage management, which might hamper the chances of being widely accepted - currently we are not sure how receptive civil protection systems are to accommodate this tool within the current arrangement

Identifying (mis-)matches among SWOT element and highlighting strategies for their improvement

After identifying factors of SWOT for Idrija mercury mine testing the matches among them were analysed to see how strengths and opportunities could be leveraged to overcome weaknesses and threats. The upper table was split into four 'quadrants' and analysed for dependencies:

- Strengths/Opportunities (SO): if those match it is ideal as this indicates a fit between tool's potentials and external competitive opportunities. One can further explore opportunities and leverage strengths to mitigate weakness in other areas (WO).

There is a **need for innovative tools** by which cultural heritage can be evaluated and the outcomes used for actions in natural hazards emergencies and CHEERS can offer that. Moreover, CHEERS has provided a tool, which is to the best of consortium's knowledge accustomed to Alpine specifics.

- Weaknesses/Opportunities (WO): this relative dependence can help you to choose an optimal trade-off between investing to turn weakness into strengths and to abandon weaknesses.

High interest of national experts might be capitalized to fine tune the concept of the ATTACH tool to modulate the tool further so that it might accommodate an additional qualitative aspect. It might also be the case that additional collaboration would highlight the need to alter the system of value types. Both issues need **further testing**.

- Strengths/Threats (ST): options for transforming external threats into opportunities by changing affecting the political/professional field of natural hazards and cultural heritage, or simply to focus on more promising opportunities.

As ATTACH is fairly simple in design and open-source it can be quickly modified to meet specific requirements. **Flexibility of ATTACH** is an aspect which need to be highlighted when presenting it to policy makers and decision takers in the fields of cultural heritage and natural hazards. Flexibility also increases the chances of ATTACH being incorporated into various national-level civil protection systems.

- Weaknesses/threats (WT): if these two match consistently the product is critically problematic. In fact, pairing external threats with internal weaknesses can highlight the most serious issues. We might need to think how to redesign it completely.

The last weakness on the list and the first threat match, which is a critical issue and needs to be addressed in collaboration with the stakeholders. Use of project's network set up within activity A.T1.3 would enable efficient communication and producing suggestions on how to overcome this.

One of major threats – limited time left for CHEERS consortium to work together – might jeopardize the refinement of ATTACH and additional testing with different scoring scales or modified list of value types. This could result in a tool not suitable for a wider group of end-users. In fact, predetermined system of weighting and scoring might be a limitation, but ATTACH's flexibility enables fairly quick adaptions. This is one of the most promising features of the tool.