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The King's Train Carriage

Approaching the Conservation
of Larger Working Objects

Kine Elandria Bjørnsdatter Haugmåne
INSTITUTE FOR ARCHAEOLOGY, CONSERVATION AND
HISTORY AT THE UNIVERSITY OF OSLO 2019

“This, milord, is my family's axe. We have owned it for almost nine hundred years, see. Of course, sometimes it needed a new blade. And sometimes it has required a new handle, new designs on the metalwork, a little refreshing of the ornamentation (. . .) but is this not the nine hundred-year-old axe of my family? And because it has changed gently over time, it is still a pretty good axe, y'know. pretty good.”

(Pratchett, 1999)

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Preface

During my teens I became part of the milieu surrounding what is likely the world's oldest still sailing schooner, Anna Rogde. (Sør-Troms Museum, 2014) The ship was built in 1868, one year before the famous Cutty Sark, and still takes to the sea on a regular basis due to the efforts and skills of dedicated volunteers. While Anna Rogde has since then become connected to Sør-Troms Museum, the ship's use and maintenance was at that time completely dependent on, and at the mercy of, her volunteer crew. As a member of her crew I got to experience first-hand the upsides and downsides to putting the old ship through continuous use. Including the many different opinions on which changes were acceptable or not in the name of keeping her in use. It was due to these experiences that I first developed an interest of what I later got to know as conservation ethics.

Later, during my bachelor, I started spending my summers working at a small crofter's cottage museum called Kjelvik. (Nordlandsmuseet) There I was introduced to another form of cultural history in active use. Like the ship, this farm had been protected from destruction through the efforts of volunteers, in this case the local historical society. By the time I began working there, the museum was run and maintained by Nordlandsmuseet and enjoyed official listed status due to its age and Sami connection. However, as is still the case today, the houses and their interior were owned by the historical society. This farm in the middle of nowhere was left mostly undisturbed when the last inhabitant died of old age. Despite the listed status of the museum, we as guides were encouraged to put its collection to use. During tours the guests were encouraged to try their hand at old crafts, feel the thickness of old clothing or the weight of an old tool, and at the end they were invited to sit down by the kitchen table with a cup of coffee for a chat.

Because of its remote placement it was more usual than not to only have a few visitors each day. This allowed us as guides to really immerse the guests in the experience. We would take them from room to room, from building to building, while telling the story of the farm and its inhabitants. For safety reasons we were always two people at work, and this allowed one of us to put the place to life, boiling coffee, knitting, spinning or similar, while the visitors were shown around. As a guide I got to experience how this intimate interaction with the place and its history gave the visitors pause and facilitated an emotional connection to the history the farm represented. Children, teenagers, parents, grandparents, locals and tourists alike were able to recognize something of themselves, and I got to see how this, more than

our traditional attire and memorized facts, opened them up to the understanding we were there to convey.

While studying for my master's degree, I was also working at the museum where the case study from this thesis is based. Urskog-Hølandsbanen, or "Tertitten" as it is known locally, is a steam railway museum where original locomotives and carriages are used to transport visitors along what remains of its original railway tracks. (Museene i Akershus) Just like in the first two examples, this is a museum where the meeting between visitor and collection is physical and intimate. It's also another museum where an actively involved group of museum friends function as an integral part of the museum's activities. In fact, it is almost impossible to imagine this museum surviving if these two factors were somehow eliminated. The form of use, and the presence of an active union of museum friends, also have a noticeable impact on the care and maintenance of the museum's rolling stock.

While working for Urskog-Hølandsbanen, I was approached by Eirik Kirstoffersen, who was then the director of the museum railway (now director of Norsk Jernbanemuseum). The museum has a number of railway carriages in active use. Due to the regular wear and tear to these carriages, damage to the interior seats had accumulated. He wanted someone to analyse the seats in one carriage compartment, and suggest possible treatment options as a basis for a future restoration effort. During the initial phases, it became apparent that a number of stakeholders were involved. This, along with the ethical challenges surrounding a historical carriage in such active use sparked my interest as a master student in conservation. This became the basis for this thesis.

As conservators, working collections challenges us to focus on different sides of the object's value than those we are used to maintaining. Often it also forces us to interact closely with a different set of stakeholders than those we encounter when working with regular museum objects. The hope is that this investigation can help illuminate the many aspects which need to be considered when navigating the intricate field of caring for cultural heritage in active use. While this thesis is specifically aimed at the circumstances and stakeholders surrounding a specific train carriage at a Norwegian railway museum, the general subject which is explored can be of interest within many areas of conservation. This thesis can hopefully serve as a useful template for others approaching similar care decisions with many stakeholders involved. Not only in the care of working objects in general, but also in other cases where the beliefs and best intentions of a conservator comes into conflict with the beliefs and best intentions of other stakeholders. A situation which can be found in most conservation treatments on some level or another.

Acknowledgements

I would like to thank Urskog-Hølandsbanen, the Museums in Akershus and the Norwegian Railway Museum for their welcoming attitude towards my project, and for all the aid and access I have been given throughout the process. I only hope I have been able to give them something of value in return. I would also like to thank the museum friends at Urskog-Hølandsbanen, who have shared their enthusiasm and knowledge with me every step of the way, and who filled in my initial lack of knowledge to the best of their abilities.

On a more personal note, I cannot publish this thesis without a nod towards the family and friends who have rallied around me, bridging the gaps where my own passion has faltered. I could not have done this without you. And to the advisor who has patiently watched me wade my way through my education, I can only say thank you for introducing me to the minefield of cultural heritage ethics. It certainly keeps me from getting bored.

1 Introduction

Conservation ethics is a field of study which aids us in making ethically sound judgements when dealing with cultural heritage. This thesis takes a deep dive into this field of ethics, specifically focusing on the meeting point between ethical ideals and practical situations. It takes a closer look at the conservation decision making process as it relates to larger working objects. The focus is on how the conservator's judgements, especially concerning the balance between revelation, investigation and preservation, is affected by the way these objects are presented to the public. It will also explore how different types of value are viewed and prioritized differently by different stakeholders.

Just as with other areas of ethics the applicability of idealised conservation ethics, as they appear in textbooks and codes, can only be truly tested when applied to practical situations. Therefore, this thesis is focused around a specific case study concerning the seat covers in a 19th century carriage from the museum railway Urskog-Hølandsbanen in Sørumsand, Norway. This carriage is a working object in active use, and the seat covers are considered part of its original material. As they have become severely deteriorated through use, the museum expressed a wish to improve the situation. This thesis follows the process from the initial condition survey until a final treatment suggestion was made.

1.1 Larger Objects in Use

The goal of preserving cultural heritage is to ensure that the objects in question remain available to current and future generations as sources of knowledge and reminders of the past. This is usually achieved through public access, active communication and scientific investigation. A large amount of cultural heritage consists of larger working objects, such as old houses and churches, trains and ships, as well as machinery and tools like motors and looms. These objects are connected to the preservation of immaterial heritage in an intrinsic manner. When they are used for their original purpose, the associated knowledge and experience is kept alive in a way which we usually only find in the case of living crafts and traditions, and this contributes to the preservation of associated oral or skill-based knowledge. However, this form of use also exposes the objects to high rates of deterioration, which in turn reduces the object's expected lifetime. (Pye, 2016)

1.2 Problem Statement

The conservation of working objects and collections is especially interesting from an ethical point of view. It pulls the connection between object and audience into focus and forces us to reflect upon the relationship between genuine understanding and material authenticity. It also requires a different approach to care and maintenance than what is usual for museum collections.

The conservation of working objects is a field where there has not yet been a lot of publishing and research, as can be illustrated by the lack of a specialist working group in ICOM-CC. The available material usually takes the form of specific case studies, and strategies created for individual museums, rather than general guidelines. The primary goal of this thesis is therefore to create a baseline for what the conservator needs to consider in order to make a well-founded conservation judgement when dealing with larger working objects.

Specifically, this thesis aims to answer the following research question:

- 1. How can we best approach the conservation of larger working objects?**
- 2. What more can be learned about this from the case study?**

1.3 Thesis Structure

Chapter two of this thesis will present the methods used as part of investigating this subject, as well as the goals and reasoning behind each method. Chapter three will present the conservation theory which forms the foundation for making conservation judgements, including the decision-making process and the ethical consideration which are relevant for conservators working with larger working objects.

The case study will be covered in chapters four through eight. The seats and their context will be presented in chapter four, along with gathered data concerning the use and storage situation. Chapter five explores the wide array of stakeholders and their opinions, while chapter six is concerned with the relevant ethics and laws as they apply to this specific case. The situation in its entirety will be debated in chapter seven, which aims to identify the treatment requirements. In chapter eight these will be used to evaluate several different treatment options, before a final treatment recommendation is made. Finally, a conclusion will be presented in chapter nine, and presented along with suggestions for further research.

2 Methodology

Several different methods were used during this project, in order to fulfil a wide range of objectives. In this chapter these methods and their aims will be presented.

2.1 Objectives

The first goal was to chart how the conservation of larger working objects should be approached, focusing on the ethical considerations. In order to do this, it was necessary to first identify the goals and ethics of conservation in general. Once this framework had been built any special considerations associated with larger working objects had to be identified and added to the structure. The methods during this process can be found in section 2.2.

In order to see how these theoretical findings can be affected by practical considerations the findings were then applied to a case study. As a part of the case study it became necessary to investigate the object and its context, focusing on the factors connected to its use. The methods associated with this process can be found in section 2.3. Figure 2-1 illustrates the wide array of information which needed to be gathered in order to evaluate the case study.

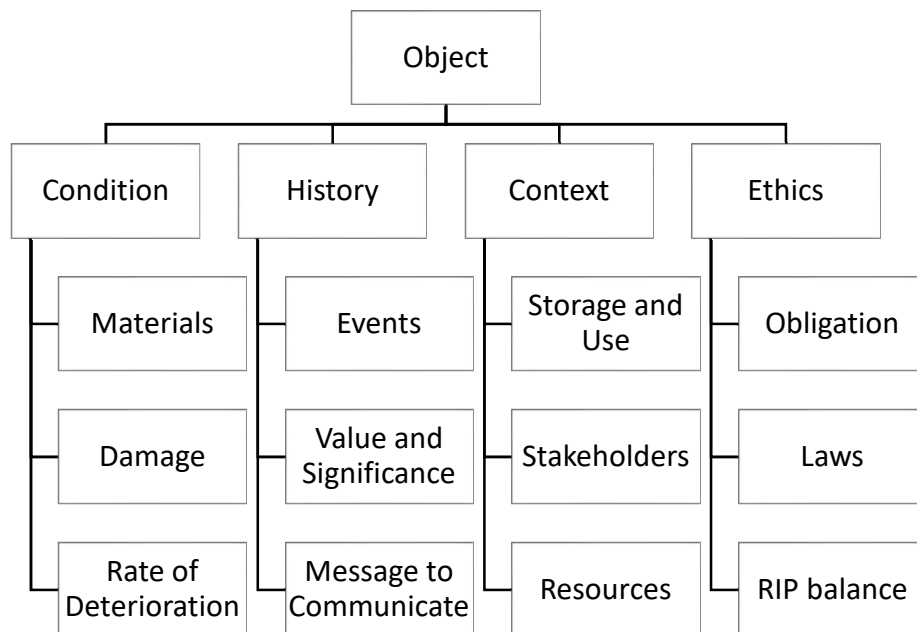


Figure 2-1: Information which needs to be gathered as part of the case study.

2.2 Conservation Theory

2.2.1 Conservation Ethics

In order to identify the theoretical ethics of conservation a literature study was carried out. Conservation textbooks, articles and ethical codes were sought out. Textbooks provide an over-view of the history and current status of conservation ethics, up to the date when they were published. These books are often written and used as introductory texts, and therefore provide a clear-cut overview of their subject. The information contained in these volumes is generally accepted to be true and seen as basic knowledge. However, while the content covers a broad array of subjects, the information is usually general and simplified. To gain more recent and in-depth knowledge of the field it is necessary to look at recently published articles. These are often the result of a specific case study or research project and far more narrowly focused. In addition, international organizations such as UNESCO, ICC and ICOM provide guidelines that have become central to conservation ethics. These ethical codes summarize the generally accepted ethical baselines, and as such they provide a valuable foundation for exploring the field of conversation ethics.

2.2.2 Working Objects and Collections

For the purpose of understanding current thought on the conservation of working objects, another literature study was carried out. The goal of this study was to identify how working objects are viewed in comparison to non-working objects, and how this difference affects the application of conservation ethics. While this subject is often touched upon in textbooks, and included in ethical codes, there have been very few articles published on the subject. Because of this museum manuals and fieldwork became important to understanding current practice in the field.

2.3 The Case Study

In the context of the case study it was necessary to understand the object itself, as well as its history and surroundings. It was also necessary to understand the how the seats were used, stored and maintained, and which resources would be available for a potential treatment. This included understanding the ownership situation and identifying the stakeholders. In addition to related laws, regulations, ethical codes, statutes and future visions for the museums. In order to find good treatment option, it was also useful to know what others had done in similar situations.

The seat's current condition and rate of deterioration was identified through three thorough registrations. Information about the physical conditions the seats are exposed to during use and storage was collected using dataloggers, visitor statistics and interviews with those involved with the carriage's use. The ownership situation and other legal conditions surrounding the carriage was collected from an archive search, interviews, and a literature study. The fieldwork and interviews helped chart the remaining network of stakeholders, resources and opinions that surround the carriage. These sources were also useful in charting the carriage's history. Through fieldwork, including contact with other Norwegian museum railways, an understanding of the Norwegian museum railway community was developed. This was valuable in identifying the stakeholders' interests, as well as examples of how others had approached similar situations in the past, especially as these previous treatments were rarely documented in writing.

As the cover material was well known from before, and no especially rapid deterioration was identified, it was unnecessary to identify the materials and their chemical makeup in detail. This might become necessary at a later point in time, but not for the purposes of this investigation. The seats are exposed to many different light, vibration and pollution conditions throughout the year. While these conditions no doubt effects the deterioration of the carriage, they were not included in this study. Temperature and humidity measurements were prioritized as they could be collected continuously, and rapid changes in relative humidity was a concern.

2.3.1 Registration

Information about the seats' current condition, and the current rate of deterioration, was collected through three separate condition registrations which were carried out in the space of one year. One at the beginning of the project (8th of July 2017) one at the beginning of the Christmas running season (2nd of December 2017), and one after the Christmas season (5th of June 2018). Due to the level of deterioration it was decided that the registration should be limited to damage which pierced the fabric layer of the seat covers. In order to record data in a consistent manner each seat was assigned a number, and each hole in the seat cover was assigned a letter, then each hole was measured along its major and minor axis with a measuring tape. This made it possible to track damage over time, either as the expansion of already existing holes, as new holes appeared, or as previously separate holes merged into one. In cases where two holes merged the new hole was measured as one unit and referred to with both letters combined. During each registration, the seats and each individual hole were documented photographically. The full dataset can be found in appendix A.

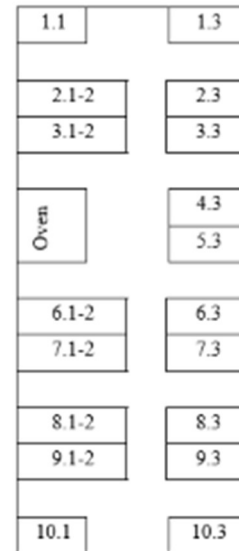


Figure 2-2: Layout of carriage, showing registration numbers.

This approach came with several possible error sources. As it was done manually and using a measuring tape, rather than a more exact instrument, human error was an issue. In



Figure 2-3: Photo from registration process
Photographer: Kine E. B. Haugmâne.

addition, frayed edges made it hard to define the exact beginnings and ends of the holes. While the holes were always measured in their longest extent horizontally and vertically, the irregular shapes also presented a challenge. In cases where loss happened in areas which didn't directly affect the vertical and horizontal spread of the hole this form of registration would not reflect the loss. Even so, this method allowed some insight into the extent and rate of deterioration.

2.3.2 Dataloggers

Two dataloggers of the Tiny Tag Ultra 2 type were used to track the changes in temperature and relative humidity that the seat covers were exposed to during use and storage. These devices are palm sized and battery operated, which made them easy to place in central locations without leaving them in public sight. They can also be left unattended for extended periods of time, only requiring occasional battery checks. Each unit measured temperature and relative humidity constantly and stored the resulting data in digital form. Once the measuring period had been completed, the data was extracted from the device using PC software.



Figure 2-4: One of the dataloggers as it appeared during use.
Photographer: Kine E. B. Haugmâne

They were placed on the 1st of March 2017 and collected on the 1st of January 2018. This allowed them to track summer, autumn, and winter conditions. Due to time constraints it was not possible to do a full year registration, but this time frame covers all the running seasons. It also covers the seasons with the most extreme temperatures, and the two highest-volume seasons in terms of visitor numbers. In addition, it covers one of the periods where the carriage is in storage between running seasons. One unit was placed inside the hall where the carriages were stored, and the other was placed inside the carriage itself. The first device, UHB1, was hung at head height in the middle of a shelving unit which runs along the long wall of the storage building. The purpose of this logger was to record the conditions inside the storage area, and to serve as a background reference line for the data collected by the



Figure 2-5: Placement of dataloggers in carriage and in storage hall.
Photographer: Kine E. B. Haugmâne

second datalogger. The other device, UHB2, was placed inside the carriage, hidden from view on the metal structure underneath a pair of seats, specifically 8,1-2 and 9-1,2. This location was chosen due to being near the centre of the carriage, but at the same time a fair distance from the oven which heats the carriage during use in the winter. The purpose of this logger was to document the conditions inside the carriage itself during storage and use. Small notes describing the purpose of the loggers were attached to each unit, in case someone uncovered them by accident.

2.3.3 Literature Study and Archive Search

A combined literature and archive study helped recreate the carriage's history. The museum railway had some information documented, and some was available from the national railway museum. Far more was found in a book written by museum friends and published by the foundation. A survey of the different legal documents related to the museum railway helped complete this picture, and identify the ownership structure, as well as the different stakeholder groups. Looking at the statutes and vision statements of the involved organizations made it possible to identify the stakeholders' goals and motivations. Reviewing the related management plans helped clarify this picture.

As all three museums are members of ICOM, the ICOM Code of Ethics served as an important source of ethics for this case. In addition, the Norwegian Cultural Heritage Act, provides the legal framework for the handling of most forms of cultural heritage in Norway, had to be considered. It became especially important when looking at the legal considerations surrounding the carriage, and the long-term effects of any conservation effort.

2.3.4 Interviews

A large amount of information in this case existed only in the form of personal memory and oral tradition. In order to gather this information about the carriage and its history, as well as the history and opinions of the different factions involved, three interviews were carried out. Each interview took about 1,5 hours and was recorded using an audio device. The interviews were then transcribed into text.

Since the research goal was qualitative rather than quantitative, with a small selection of interviewees, a semi-standardised interview approach was chosen. (Turner III, 2010, Kajornboon, 2005) A list of questions and subjects of interest was prepared in advance, each adapted to make the most of the interviewee's role and expertise. These guides formed a checklist around which the conversation could develop naturally. This made it possible to

ensure that some subjects were always covered, while at the same time allowing for a comfortable conversation style where the topics could be covered as they naturally arose. Impromptu changes to question formulation, changes to subject order and the addition of additional questions happened based in the answers received. The goal of this approach was to create a relaxed and conversational atmosphere which would feel comfortable for the interviewees, whilst also ensuring some predictability as to what kind of information the interview would produce.

The interviewees were chosen based on their positions within the stakeholder matrix, as well as their personal knowledge, experience and connection to the museum railway. They were also selected in order to ensure that the information they could provide would be as different and complementary as possible. The purpose was to ensure that as many viewpoints and stakeholders as possible were heard. The subjects covered included the history, use and storage of the object, as well as stakeholder opinions and interests. In addition, all the interviewees were asked about the relationships between stakeholders, as well as the resources available to the museum.

The information gathered through these interviews was used to supplement and clarify the information found via the archive and literature searches. The views expressed were also key to understanding the stakeholders' opinions and needs, which in turn formed part of the foundation for evaluating possible treatment options. These interviews also helped piece together the object's history, and the rationale behind how the carriage are currently used. and how they had been treated in the past.

2.3.5 Fieldwork

In order to get a deeper understanding of the museum railway's function and challenges, as well as the opinion of both staff and museum friends, significant amounts of time was spent at the museum. This time was spent talking with staff and museum friends, observing running days, observing the rolling stock and asking casual questions. Participation in a national museum railway conferences at The Norwegian Railway Museum also provided valuable information about shared challenges and opinions. Visits to museums with similar challenges were also carried out. The information gathered in this way largely underscored the information found in other sources, but also provided a far better insight into undocumented issues, such as stakeholder interests and related case-studies. It also provided a better understanding of the Norwegian museum railway community, and the internal relationships between individual groups.

3 Conservation Theory

In order to understand the conservation of working objects it is first necessary to understand how the conservator should approach cultural heritage artefacts in general, and how the conservation decision making process works. With this as a background it becomes easier to recognise issues which apply specifically to larger working objects, identify where the ethical reasoning is different, and become aware of any concepts and terms which might be especially relevant to the subject.

3.1 The Conservation Profession

3.1.1 History and Definitions

Conservation as a professional discipline can only really be said to trace back to 1888, when Friedrich Rathgen was appointed as head of the first chemical department at the Royal Museums of Berlin. (Caple, 2000b) Ten years later he published the first book dedicated to conservation in its entirety. (Rathgen, 1898) The first conservation organization, the ICC, was founded in 1950 by a group of expert conservation and restoration practitioners. It was followed in 1967 by the founding of a conservation under-group of ICOM, known as ICOM-CC (the International Council of Museums Conservation Committee), which was created by a small group of conservation professionals. (Hinz, 2016) Today ICOM-CC has over 2600 members worldwide, which makes it not only the largest international conservation organization, but also the largest committee of ICOM itself. (Hinz, 2016)

In 1984, ICOM-CC included ‘The Conservator Restorer: A Definition of the Profession’ within its code of ethics. It said that “The activity of the conservator restorer (conservation) consists of technical examination, preservation and conservation/restoration of cultural property”. (ICOM-CC, 1984). As mentioned within the text itself, it was hoped that this definition would help distinguish the profession from its closest relations, clarify training requirements, and ‘help the profession to achieve parity in status with disciplines such as those of the curator and archaeologist’. At the 17th Triennial Conference of ICOM-CC, in September 2014, a revised version of this definition was presented in the form of an interactive navigation map. (ICOM-CC, 2014) This map is named “Conservation: Who, What and Why?” and is useful as an overview and awareness tool. However, it can hardly be said to give a clear-cut definition of conservation as a profession and does in fact cite the 1984 definition itself.

The profession of conservator is still considered a relatively new star in the cultural heritage constellation, and the word itself has been used to describe several different activities and professions. Additionally, the word means different things in different languages. One example of this is French, where the word “conservateur” effectively means curator. (Pye, 2001a). In much the same way the title of “konservator” still holds no legal protection in Norway. It is used extensively as a work title for positions which require no official education within the professional field of conservation whatsoever. At the same time the title is also used for those whose position require a university level conservation education. This duality of usage only adds to the ongoing confusion, and it does little to improve the understanding of what a conservator is and how this professional can contribute in the museum. This was recently illustrated when Arts Council Norway translated Spectrum 4.0 to Norwegian in 2016, and felt it was necessary to clarify that the term “konservator” was used to refer to professionals with a conservation background.(Kulturrådet, 2016) As it has received widespread acceptance, the 1984 ICOM-CC definition will be followed in this thesis.

3.1.2 The Conservator’s Role

Because it is not yet fully recognised in the museum world, conservation is often confused with restoration. However, it differs from the latter in that restoration is primarily concerned with the function and appearance of an object, while conservation focuses on the significance and history of the object as well as its evidence value as part of our cultural heritage. (Clavir, 1998) (Friedländer, 1996) (Muñoz Viñas, 2005d, Oddy, 1994)

For the conservator, the main goal is to get as much knowledge out of the object as possible. This is done though aiming for to the triple goals of preservation, revelation and investigation.(Caple, 2000c) Revelation is the aim of making the object easier to understand, which leads to actions such as cleaning and restoration. Investigation is the aim of gaining information from or about the object, which leads to actions such as visual inspection and scientific analysis. Preservation is the aim of keeping the object from deteriorating, which leads to actions such as stabilization treatments and preventive conservation. Caple (2000c) presents these three aims as the outer points of a triangle and suggests that all conservation activities can be placed somewhere between the three. He also points out that any activity which aims at one of these goals will usually cause changes that have a negative effect on our ability to reach the others. This is known as the RIP balance. One of the key responsibilities of the conservator is to understand this trade-off and communicate it to other parties. It is also the conservator’s responsibility to carry out or over-see any treatments which are need.

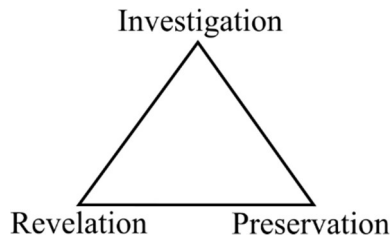


Figure 3-1: The RIP triangle as described by Caple.

3.1.3 Conservation Ethics

A conservator needs to be familiar with more than just the skills necessary to do the practical work. Caring for, and caring about, objects from the past is not enough. In order to be what we recognize as a professional conservator today they also have to have a fundamental understanding of the associated ethics.(Caple, 2000c)

While laws represent a mandatory minimum of ethical standards, most modern professions have developed ethical codes and norms which represent an additional layer of guidance and requirements for their field. Conservation is no different. (Schiessl, 1995) As mentioned before ICOM-CC published its first definition in 1984, which helped clarify the conservator’s responsibilities. (ICOM-CC, 1984) Between then and now, several other codes and definitions have been published, edited and redefined, as is only natural in field which is not only young but complex and continuously evolving. (E.C.C.O., 2002, E.C.C.O., 2003, E.C.C.O., 2004, UNESCO, 2017)

While some argue that these codes are mostly useful to newer practitioners, and only weigh up for a lack of practical experience, these codes are intended function as a guide for conservators at all levels, regardless of speciality and skill. (Keene, 1994) In fact, each of the existing associations expect their members to abide by their established ethical code. In most cases this is a stated prerequisite for continued membership in the organization.(ICOM, 2017) Applying these ethical codes in practice is a constant challenge as there are continuous trade-offs and practical limitations to what can be achieved. Caple states that “The judgements which a conservator has to make often revolve about the conflicting needs which these ethical aims create in practice.” (2000a) He then goes on to say that “The problem which emerges with many of the guiding ethical ideas of conservation is the extent to which any of them can realistically be applied in any given situation.” In other words, being able to adjust the theoretical ideals to a practical situation is central to ethical conservation practice.

It is the conservator's responsibility to act as a steward of the object. (Caple, 2000a) The concept of stewardship is the idea that the conservator and the museum only holds an object in trust. Ethically speaking the true owner is humanity as a whole.(ICOM, 2017) In cases where the museum or legal owner insists on doing things that go against the conservator's professional judgement, the conservator is therefore responsible for communicating these issues, and following their best judgement independent of institution's wishes. In extreme cases resignation can be the ultimate choice.

3.2 Working Objects

While the fundamental concepts of conservation ethics are mostly defined by now, each area of cultural heritage presents its own set of unique needs and challenges, and the ethics for these specialised fields are still in the process of being developed. Working objects is one of these fields. Even so, some general observations can be made.

3.2.1 Defining Working Objects

The way a museum decides to present the objects in its collection can have a major impact on how these objects are viewed and interpreted by the public. For many museums dealing with technical history this presents a major issue. Complicated technical artefacts can be difficult to understand when only seen from the outside. This is a problem which is only compounded when hard working machines like trains and engines are cleaned to a polish and placed on a pedestal. This form of presentation creates a misleading disconnect between the object itself and its original purpose.

“For many objects which were designed to be working objects the ‘context’ of an object is to be active (e.g. in motion). Similarly, for working objects, the ‘true nature’ of the object only become fully evident when it is working, thus the activity is informative. It is impossible to fully appreciate the nature of any musical instrument until it has been heard”. (Caple, 2000b)

Working objects are cultural history artefacts which are actively used to perform their original functions. Examples of working objects range from tiny musical boxes to printing presses, cars, industrial machinery, houses and museum railways. The common factor is that these objects are kept in use in order to communicate their function and associated history. This means that keeping these objects in working condition and available to the public takes on a higher level of priority. As a result of this the importance of aspects such as appearance,

functionality, public access and safety can end up carrying considerable weight in conservation assessments. We refer to these two sides as tangible and intangible heritage.

3.2.2 The Tangible and the Intangible

The tangible heritage is the material heritage, the items and everything else which can be touched. The tangible heritage is what the traditional museum's collection are made up from. However, according to the first part of the ICOM code of ethics, museums are also responsible for preserving the intangible aspects of cultural heritage. (ICOM, 2017) The intangible heritage is the immaterial heritage, such as knowledge, skills and beliefs. A kitchen stove can be preserved as a tangible part of our heritage, but if no-one preserves the intangible aspects, such as how to build it or how to cook, a significant part of our heritage is still lost. The function of the object, as well as the understanding which can be gained from experiencing the object in action, are connected to its intangible aspects.

3.2.3 Special Challenges

The ethical considerations surrounding the care of working collections stand out from conservation practice in general due to this high level of acceptance for wear and tear, and the special focus on maintaining the tangible heritage connected to the material objects. (Association of British Transport and Engineering Museums, 2018) This consideration is so widely accepted that the ICOM code of ethics notes that “special considerations can be made for certain working collections where the emphasis is on preserving cultural, scientific or technical process rather than the object, or where objects or specimens are assembled for regular handling and teaching purposes.” (ICOM, 2017) Unfortunately, even seemingly sturdy artefacts grow fragile over time. In practice this means that the function of an object can end up being considered more important than the physical material it is made from, up to and including the replacement of worn-down original parts in favour of well-functioning modern copies. This causes a constant conflict between the museum's responsibility for maintaining the tangible material of the object, and their obligation to provide understanding and maintain the intangible aspects. Because of this, conservators treating any working object must ensure that they have a crystal-clear understanding of what the museum wishes to convey by keeping the object in use.

3.3 Approaching an Object

According to Caple “it is essential that the conservator fully appreciates all aspects of the object as a historical document and aesthetic entity, prior to conservation (...)”(Caple, 2000d) While the term aesthetic entity is not otherwise used in this thesis it is closely related to the term intangible, and the basic premise is central to modern conservation ethics. Namely that before we decide how to care for any object, we need to understand it. In order to do this, the conservator first needs to gather as much information about the object as realistically possible.

3.3.1 Current Condition and History

First, the conservator needs to have a clear picture of the condition of the object. It is important to know what materials the object is made from, and if these materials are stable in their current condition. A rate of deterioration should also be established, or at the very least estimated. These things will let the conservator know if there is an acute need for a treatment or for changes in storage conditions. It also helps with predicting how the object is likely to react to a change in conditions, and if the object has any special needs that need to be met if the object is to be used or displayed.

Throughout its existence everything an object is exposed to affects it in some way. This means that the conservator needs to know what an object has been through in its past. Ceramics which have been found in sea water will contain salts which might crystallize over time and break the vessel apart, unless it is desalinated. Wood that has experienced a wide range of RH will be less sensitive to humidity than wood which has been kept in a more stable environment. Textiles and other organic materials might have been treated with poisons in order to preserve them. The object’s history can also trigger ethical considerations. If an object is broken it will usually seem natural to repair it, so that it becomes easier to understand for the viewer. However, if the object has been intentionally broken, then leaving it broken might be the best way to respect and present its history. In the same way a stain can be dirt obscuring an important surface, or a significant residue which can reveal important clues about the past. Due to dilemmas like these, knowing the object’s history is fundamental to making well considered and safe conservation decisions.

3.3.2 Use and Storage

In addition to knowing what the object has been through in the past, it is also necessary to identify what it is being exposed to in the present. There are many things which can lead to the deterioration of objects in storage or on display. Top among these are changes in temperature and humidity, light, pests and pollution.(Thomson, 1986) Whenever an object is handled, moved or displayed it is also at risk of wear and tear, as well as accidental damage. For working objects this is especially true. In some cases, it might even be necessary to replace whole parts of the object in order for it to maintain its function.

While some deterioration is unavoidable, identifying why the object is deteriorating makes it possible to reduce the rate of deterioration and avoid unnecessary risk. It is also useful to know which conditions new materials introduced through conservation efforts will have to endure.

3.3.3 Stakeholders

Stakeholders are individuals and groups who have connections to an object or a collection. This thesis uses a wide definition of stakeholders, which includes, but is not limited to, owners, cultural groups, religious groups, museums, individual museum professionals, volunteers, the local community and living descendants. Some of these stakeholders will have formal connections to the object, through ownership, contracts or law, while others have more informal connections. Dependent on the situation the latter category can still be quite influential. Volunteer staff at a museum which relies heavily on this resource, as is common at museums with larger working objects, would be an obvious example of this. Even though these stakeholders might have no formal influence they can have a great effect on public opinion and the smooth operation of the museum. This makes the stakeholders' opinions a necessary component of the conservator's considerations. A conservator must understand the stakeholder's priorities, and what the object means to them, in order to predict how they will react to a given course of action.

In a sense, the conservator can also be seen as a stakeholder. Just like the other stakeholders the conservator comes to the table with a set of expectations and value judgements of their own. Their practical and ethical training affect their conservation judgements, and there is always some degree of personal bias involved. Understanding and accounting for these biases is important in order to achieve a good professional outcome.

3.3.4 Value and Significance

Every object has a variety of different aspects which should to be considered when debating a conservation intervention. As part of providing an ethically sound conservation approach the conservator must acknowledge and consider all these factors. Otherwise there is a great risk that irreversible damage could be inflicted through an otherwise well-intended treatment. (Pye, 2001b) These aspects can usually be related to the values contained in the object, or the significance it holds for others.

In this context, value is considered to be objective reality as opposed to subjective judgement. (Muñoz Viñas, 2005a) Examples of values can be the aesthetic, documentative, religious, cultural, monetary, evidence, artistic etc. What makes an understanding of values important to the conservator is the fact that each possible conservation choice will help enhance some values at the cost of others. Even the decision to do nothing is highly weighted towards preserving some values while letting others slip away. As such it is closely connected to the RIP-balance.

At the same time all cultural history heritage holds significance for its stakeholders. As opposed to value, significance is highly subjective. (Pye, 2001a) Each stakeholder will see some aspects as significant, and others as less significant. Consider the British Crown jewels. To an Englishman they carry cultural, symbolic and historical significance. To a jewel-thief they mainly have monetary significance. These different kinds of significance can usually be related to a form of value. Historic value, source value, monetary value and so on. Which values these are will vary from stakeholder to stakeholder, and even from person to person and faction to faction within a stakeholder group. It will also define the stakeholder's motivations and provide the driving force behind their actions. In order to understand a stakeholder's motivations and concerns, it's important to understand which values the stakeholder prioritizes, and why. This can be especially challenging in cases where the perceived significance an object hold to important stakeholders is unaligned with the significance and values recognized by the museum.

What makes the understanding of significance important to the conservator is that the significance an object holds forms part of the foundation for why and how it should be preserved. (Clarke, 2003) Whether it be display, cleaning, testing or even repair, no path should ever be followed without the conservator having some idea of which values the object hold, and which significances it carries for those around it. While the conservator should always respect the significance an object holds for its stakeholders, it is also the conservator's

responsibility to understand the different forms of value it holds and communicate them when they seem to be ignored.

3.3.5 Other Relevant Concepts

During its history, the field of conservation has developed several concepts which have become central to its ethics. Some of these stand out as important when considering the conservation of larger working objects. The following terms are perhaps the most valuable tool-kit conservation as a discipline can supply to the practice of caring for these objects.

The conflict about what constitutes an object's **true nature** was the first major ethical controversy of conservation. The main challenge has been striking the balance between revelation and preservation. In other words, should an object be restored to its original appearance, revealing how it was intended to look at its creation, or should it merely be stabilized with all signs of its use and history intact? If the object is heavily restored it will be easier to understand for an observer, but all evidence of its history will be hidden or lost. If it is not restored it might leave the viewer with a false or even misleading impression of the role the object has played. (Muñoz Viñas, 2005a, Muñoz Viñas, 2005c, Caple, 2000a) So far the care of larger working objects has been tended towards the former, with a focus on restoration of former glory, while conservation of other museum objects has moved more and more towards the latter. Today this balancing act seems to be at the very centre of debate.

Authenticity is a related term which also tends to be somewhat subjective. The word can be used the context of appearance and experience, in which case we are talking about the visitor getting an historically accurate impression, which can be related to the value of revelation. At the same time there is also material authenticity and the use of authentic methods. In this case the term applies to how much of the original material is preserved, whether original techniques are used to maintain it, or the preservation of technical skills and know-how. (Jokilehto, 1986)

Both these usages are valid, but it is important to be aware of the difference when debating care and treatment options. The difficulties faced when dealing with authenticity and similar concepts, especially in co-operation with stakeholders, can be nicely illustrated by a statement made by a local politician in area where the case study is from.

“I am utterly convinced that this will become a brilliant kinder garden, and that it will be a building which is finer than what is there today, because it is more original, like the original building, and that has to be what is important for posterity, taking care of what is the most original.”

This was said in the context of a historic building being demolished in order to build a modern replica which would be better suited to modern use. While the new building could no doubt be created as an accurate replica, giving the users a highly authentic experience, this statement seems to reflect a somewhat questionable understanding of originality.

Reversibility is the idea that anything that any conservation treatment should be reversible. This concept emerged from the growing awareness that even seemingly ideal treatments might become unacceptable or have unintended consequences in the long term. Is a theoretical ideal which is rarely possible to apply in practice. (Muñoz Viñas, 2005b, Oddy, 1999, Smith, 1999) Even when dissolvable glues and similar materials are used, they will always leave some residues behind. Even so, it is acknowledged as a useful goal to aim for.

Minimum Intervention is an idea that grew out of this conflict between theory and practice. The principle behind this concept is to interfere with the object as little as necessary. (Ashley-Smith, 2018, Muñoz Viñas, 2005b) In cases where little is necessary, little should be done. However, in cases where a lot is necessary, a lot can and should be done. The idea is simply to be weary of unnecessary intrusions and avoid unnecessary risk.

The idea of **Visible Repairs** is that when a fill-ins and other repairs to the object become necessary, these should be done in such a way that they are distinguishable from the original material of the object. (Ashley-Smith, 1994, Vaccaro, 1996) The rule of thumb here is that this difference should be obvious at close visual inspection, but not necessarily recognizable at a distance.

The Black Box principle represents the outermost point of the preservation side of the RIP triangle. It consists of an imaginary storage box which you can put the object into and where it will be protected from all triggers of deterioration. In reality it represents doing everything possible to slow down the natural decay of the object. (Frost, 1994) However the black box solution has two major flaws. The first of these is entropy. No matter what you do, the object will eventually break down over time. The second flaw is lack of access. By permanently locking the object away you block any chance of revelation or investigation. The object might as well not exist. In order for the object to be useful, it has to be removed from its 'black box' conditions. (Bradley, 1994) The black box principle exists mainly to illustrate how complete protection is neither possible, nor an ideal solution.

3.4 Choosing a Treatment

3.4.1 Understanding the Problem

In most cases where a conservation effort is considered, this is because some problem has been recently recognized, or because sudden damage has occurred. It is also possible that the object is about to be displayed, lent out or used in some other way. In the case of working objects, the most common reason for objects needing special attention is maintenance and repair of worn out parts is. Before doing anything to the object it is important that the conservator understands what the problem is perceived to be, what they are expected to do about it. It is also the conservator's responsibility to communicate early on what can and can't realistically be done. Ensuring that there is a shared understanding, and clear communication, from the start is vital for avoiding misunderstandings and miscommunications further down the line. This also forms the primary foundation for identifying central treatment requirements and suitable treatment options.

3.4.2 Finding Treatment Requirements

Before choosing how to treat an object it is necessary to identify what the treatment is meant to achieve, as well as what needs to be avoided. Together, these factors will make up a set of treatment requirements. When trying to recognise these requirements, a good starting point is identifying the object's physical needs. Another important element is the opinions of the owner and others who are connected to the object. It is also important to have a proper overview of the resources which would be available, as well as any practical and ethical considerations which might apply.

In the case of working objects, it is also necessary to know what is required for the object to continue being used. In most cases laws and safety regulations will play a part in this. Working objects also tend to have highly active and involved communities of museum friends, as well as close emotional connections to the local community, both of which makes the network of opinions especially important to map. Quite often a lot of the intangible heritage connected to the object in question is also maintained by these museum friends, and this aspect will always be central to the care of larger working objects. Finally, the relevant ethical codes should be identified, and all of these requirements should be seen in the light of cultural heritage ethics. It will often be impossible to satisfy all these requirements, and some of the things will be more important than others, but the awareness will still help guide the process as it moves forward.

3.4.3 Finding Treatment Options

A good starting point for finding treatment options is listening to stakeholder expectations. These will be based on the knowledge each stakeholder has about the object, and this knowledge might lead to some unexpected solutions and revelations. This is especially true when it comes to museum friends and others with technical or historical knowledge about the object. Another good source of possible treatments is figuring out what others have done in similar situations, both at the museum in question and similar institutions, as well as what has been done to the object itself in the past. information, or even informal conversations

- What have others done
 - o Literature search
 - o Similar museums

3.4.4 Making a Recommendation

As with all conservation work it is important to understand not only the problem which has been experienced, but also the object itself and the context it is situated in. Once all the information has been gathered the treatment requirements can be used to assess the different treatment options in a systematic manner. This process can often highlight aspects which might not have been considered if a more direct approach had been used. However, such systematic approaches should always be coupled with the conservator's professional judgement, as there will always be elements which are not adequately reflected by the system alone. For these reasons it will always be useful for the conservator to discuss the potential choice of treatment with a colleagues and others with relevant insight before the final recommendation is made. Usually the best solution is a combination of elements from several of the original treatment options.

4 Case Study: The Object and its Context

In this chapter the case study will be presented. The goal of this chapter is to familiarise the reader with the seats and their carriage, as well as the museum railway where they are used. It will also present the use and storage conditions which they are exposed to, and the relevant data gathered through condition surveys and dataloggers.

4.1 The Museum Railway

Urskog-Hølandsbanen (UHB) is a museum railway located in Sørumsand, Akershus, Norway. (Museene i Akershus) This steam railway was originally a private company and is one of only three railways in Norway which were ever built with the narrow 750mm gauge tracks. These were Nestun-Osbanen (1894-1935), Urskog-Hølandsbanen (1896-1960), and Sultjelmabanen (1892-1972). Of these three, only Urskog-Hølandsbanen remains today. (Mjelva, 1996a) The first stretch of UHB, Urskogbanen, was opened in 1896 and was originally intended to transport timber products from the vast local forests to the national railway network. Within a short time, it became evident that in addition to its intended cargo, the train would also be called upon to carry the people who lived alongside the line. (Borgersen, 1996, Dahl, 1996) This is the part of the railway's history which is best represented today.

The railway was closed down on the 30th of June 1960. Fortunately, it was soon resurrected as a historic railway on the following year. This was a first in Norway, and only happened due to a small number of dedicated private individuals taking it upon themselves to make a difference. (Dahl, 1996, Borgersen, 1996) In the short time between the closing of the railway and its re-opening as a museum, much damage was done to the rails and rolling stock. Despite valiant efforts to save parts of the railway, most of the tracks were pulled up, and large portions of the rolling stock was lost, in some cases through being burned. (Mjelva, 1996b) The total length of tracks in use today comes in at about 3,59km, which makes it the shortest of the established museum railways in Norway. (Mjelva, 1996) On the 19th of February 1982, the Ministry of Climate and Environment listed the railway. This listing was based on a suggestion from the Norwegian Directorate for Cultural Heritage, based on §15 in the Cultural Heritage Law, and was the first time a railway was listed in Norway. (Klima- og miljødepartementet, 1978, Directorate for Cultural Heritage, 2017)

Today, UHB is a historic railway, which maintains both the tangible and intangible aspects of the local railway history, along with Norwegian railway history in general. The

museum focuses its efforts on keeping the railway and its associated knowledge alive through continuous use. As a result they have no standing exhibitions. The museum also has its own workshop, with the facilities necessary for maintaining and repairing their own locomotives and carriages. This workshop serves a triple function: it allows the museum to care for its own machines without relying on outside contractors, it creates a platform for teaching and maintaining the knowledge and immaterial heritage associated with the trains, and it makes it possible for the museum to take on work from other museum railways who don't have access to this kind of facility. A good example of the latter is the restoration of the "Svalbard" locomotive, which was carried out as a contracted project in 2016-2017. (Svalbards Miljøvernfond, 2017)

4.2 The Carriage

BCo3, colloquially referred to as the King's Carriage, is one of a pair which were built for UHB in 1898. They were ordered for the opening of Hølandsbanen, which was built in order to be combined with Urskogbanen to form the new Urskog-Hølandsbanen. A total of four new passenger carriages were ordered for the opening. Two of these were combined 2nd and 3rd class carriages, which were given the designations BCo3 and BCo4. The designation BC indicates that these carriages contained a second-class compartment (B) and a third-class compartment (C). The numbers indicated that these were the third and fourth passenger carriages at this railway. The seats focused on in this case study are located inside BCo3. When King Haakon VII visited the railway in 1909 he is said to have travelled in the 2nd class compartment of this carriage, which is how it got its nick name.

These carriages were more extravagant than the older BC carriages already owned by the railway, with more space for passengers, and fashionable skylight roofs. This kind of roof has a lifted section in the middle, with little vertical windowpanes which let the daylight in from above. The carriages were also covered in painted metal plates, as opposed to the earlier teak cladding. In 1924 these carriages were updated in the railway's own workshop, and the



Figure 4-1: BCo3 as it looks today.
Photographer: Dorian Moon



Figure 4-2: Co10 showing a skylight roof.
Photographer: Dorian Moon

skylight roofs were exchanged for simpler vaulted barrel roofs. According to oral tradition this was done due to the original roof type being prone to leaking.(Anonymous 1, 2018) The original oil lamps were also replaced with paraffin lamps at this time. In 1955-9156 these were in turn replaced with electric lighting. In October of 1959 the 2nd class compartment of BCo3 was turned into a mail compartment, and in but 1985 this compartment was returned to an approximation of its 1930's appearance by the UHB foundation.

BCo3 is today in use by Urskog-Hølandsbanen (UHB) in Sørumsand, while BCo4 was restored in 2011 by the Norwegian Railway Museum (NJM) and is today in use on their grounds in Hamar. (Norsk jernbanemuseum, 2018) All previous restorations been undertaken or lead by volunteers from the museum friends. Historically, this has been done with little or no guidance from conservation professionals, and it is incredibly important to bear in mind that without the efforts of these museum friends there would be no rolling stock or even museum railway left to maintain today. It is also important to note that no blueprints for this carriage type are known. (Stenersen, 2013)

4.3 The Seats

The seat covers in this case study were installed over what were originally wooden benches, as part of the general improvement effort in 1924. (Halling, 1996) They are therefore considered original material from the railway's professional lifetime, even if they were not part of the carriage when it was first delivered from the factory. The covers are made from a plastic material set on a textile canvas background, known as Pegamoid.(Anonymous 1, 2018) Also referred to as Eplugé.(Halling, 1996) This material is attached to the wooden benches with metal fastenings which have been installed with screws. The seats are also padded with a densely packed material made up from organic hair fibres. Today the seats



*Figure 4-3: Examples of the damage found on the seats.
Photographer: Kine E. B. Haugmâne*

have several holes and rifts, and in the worst affected areas the filling material has also disappeared. In short, they can be accurately described as heavily worn.

4.4 Use

UHB has no standing exhibition, nor any permanent exhibition area. Instead they rely almost completely on what is known as running days. These are days where the locomotives and carriages are in active use. The goal of this approach is to provide the visitors with the best possible understanding of the railway, while at the same time maintaining all the immaterial heritage connected to its use. The train has four departures every running day, with an hour and fifteen minutes between departure times. Each trip takes about 50 minutes, including twenty minutes for the visitors to stretch their legs and for the train to turn around at the end station. All five of the historical passenger carriages are in use every departure. Traditionally the railway has also offered charter rides for private parties, but this has recently been deemed to be financially unsound.

The activity year starts on the 17th of May, Norway's national day. In early June the museum dedicates week or two of running days to visiting schools and kindergartens. The summer season starts the Sunday after, and from then the train runs every Sunday until the end of August. After the summer season there is a gap in the museum's running schedule. The locomotives are drained, and the carriages are put back into storage until the Christmas season begins. The train then runs every Sunday in December, as well as New Years Eve itself. Due to the low outside temperatures at this time of year the woodburning stoves placed inside each carriage are used. They are lit in good time before the first departure and kept going for the entire day. After New Years Eve the rolling stock is put back into storage.

4.5 Temperature and Humidity

The data recorded by the dataloggers can be found in the graphs "UHB 1" and "UHB2". As can be expected, the temperature data correlates with the climate in Sørumsand, being warmer in the summer than during winter. However, it is generally warmer in the hall than outside, as it is partially heated. Interestingly, there are deep spikes in the December months. These spikes represent days when the hall doors have been opened. In most cases, this was due to the carriage being in use (typically on Sundays). The minimum temperature recorded was about 2 degrees. This is important to note, as the outside temperatures would have been well below freezing during winter months. The current storage conditions thus prevent the carriage from being exposed to freezing conditions while in storage. The maximum

temperature recorded was about 32 degrees Celsius (in June), and the higher temperatures recorded during the summer months is likely due to the greenhouse effect of the sun shining into the hall and carriage through the windows. Relative humidity varied greatly. A maximum of close to 80% relative humidity and a minimum of 20% relative humidity was observed. In addition, large variations within a single day (especially during December) was

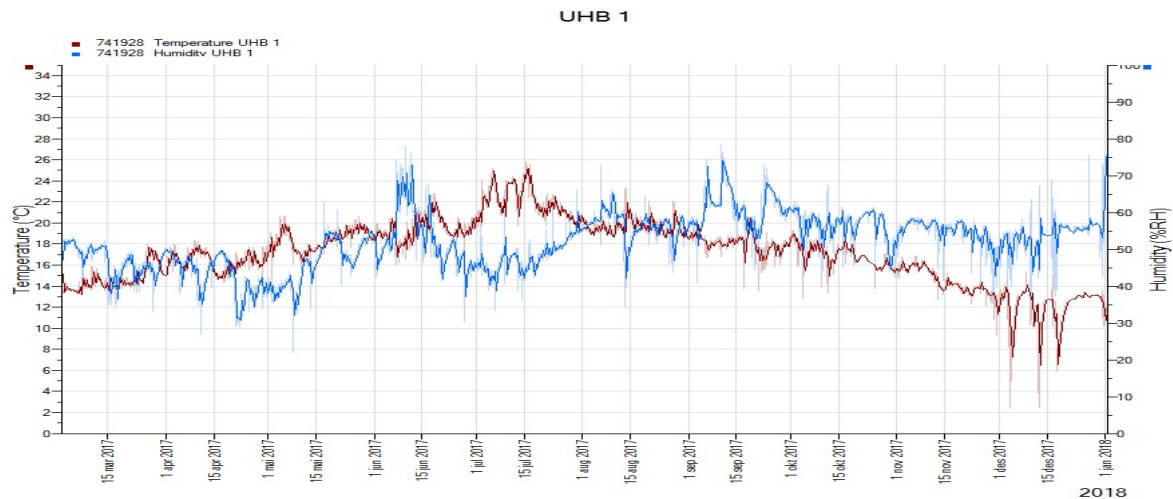


Figure 4-5: Humidity and temperature registered by the datalogger inside the storage hall.

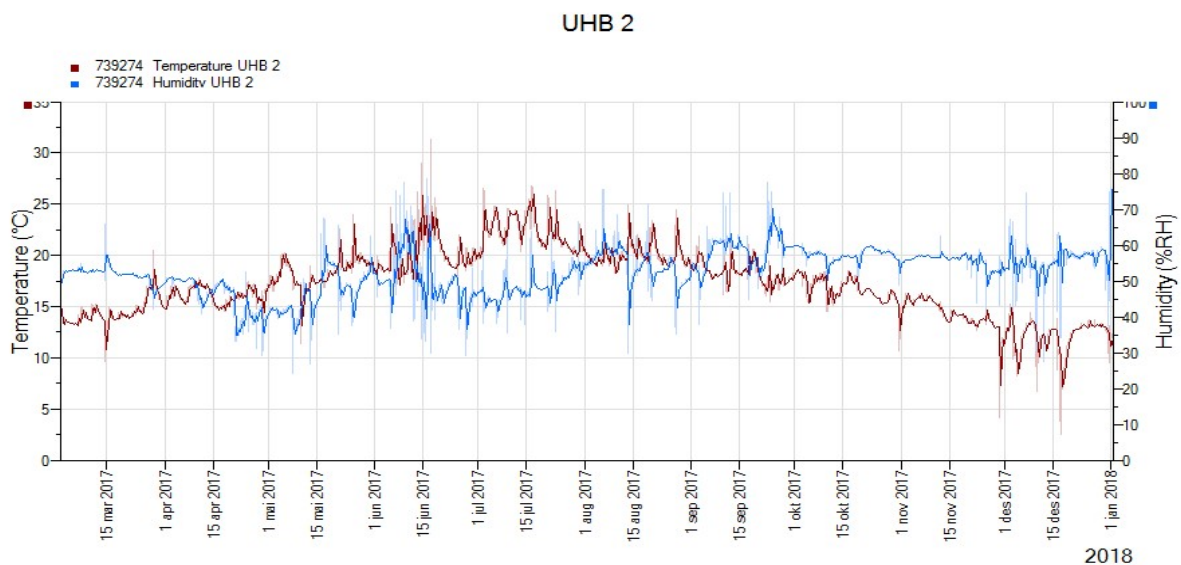


Figure 4-4: Humidity and temperature registered by the datalogger inside the carriage.

observed. Although no proof of condensation has been documented, this indicates a high possibility that condensation occurs. This hypothesis is supported by anecdotal evidence, but additional data would be required to confirm this.

Figure “UHB 1 og 2” shows the data from the two dataloggers in comparison. The data mostly follows the same pattern. One of the reasons for this is of course that when the carriage is in storage the internal conditions of the carriage are affected by the conditions

inside the storage hall. However, there are some interesting differences between the graphs. This is especially pronounced during the winter months and appears to correspond to the carriage being in use during the winter season. Both due to the carriage to the outside, and due to the stoves being lit during its use. Larger versions of all three graphs can be found in appendix B.

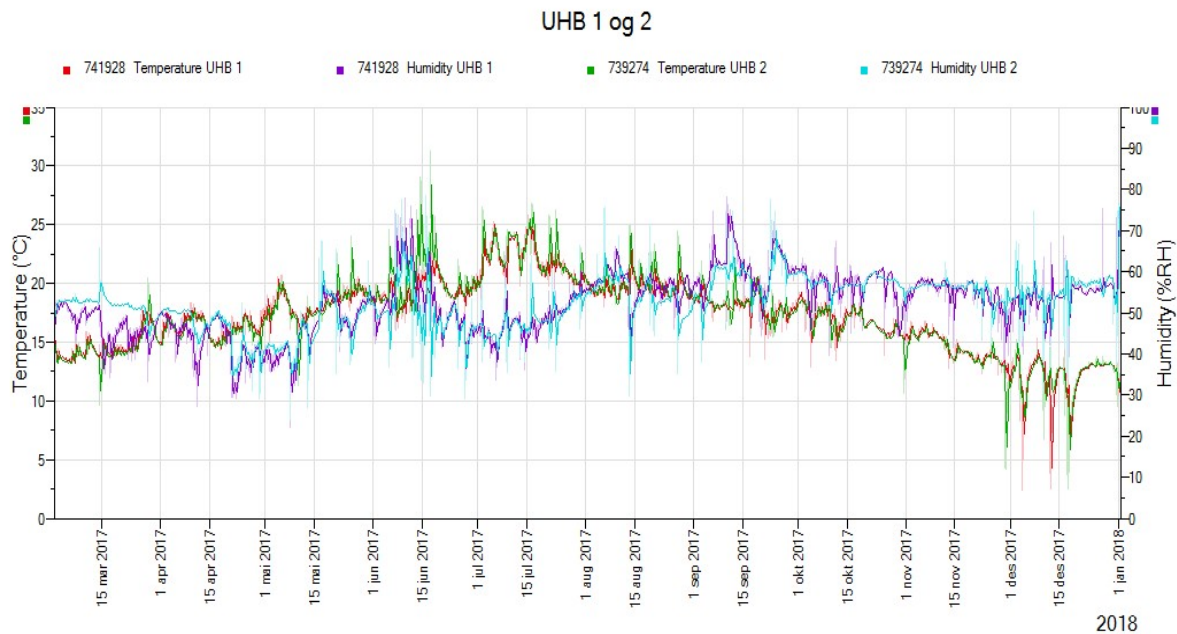


Figure 4-6: The data registered by UHB1 and UHB2 shown in comparison.

4.6 Current Condition and Rate of Deterioration

The most obvious metric is the number of holes registered in total. In cases where holes merged the original holes were counted individually. On the 8th of July 2017, there were 113 holes that pierced the fabric. This number increased to 127 by the 2nd of December 2017. Finally, by the 5th of June 2018, this number had increased to 141. This is a full 24,8% increase in just under one year of normal use. During this time the average size of the holes, as measured along their major axis did not change, but rather remained constant at approximately 3.3cm throughout the period. This means that the previous holes increased in

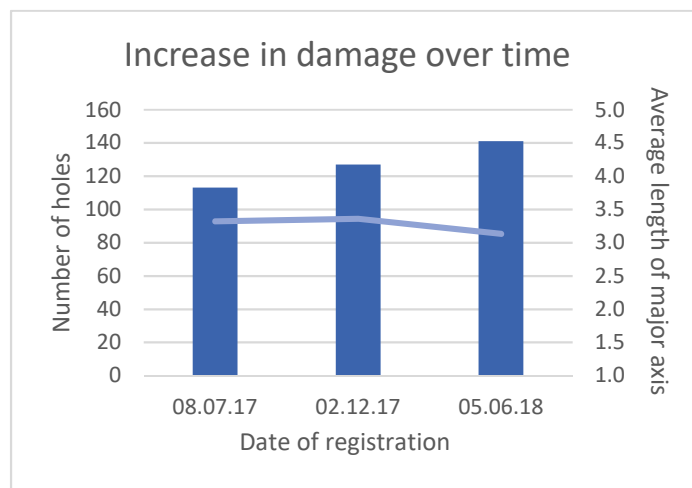


Figure 4-7: Number of holes and average length of major axis over time.

size fast enough to make up for the increase in of new and smaller holes.

It is also interesting to note that the location of seats seems to have an impact on the amount of damage suffered, both before and during the registration period. This is illustrated in figure 4-8. In this figure the number of holes at the beginning of the period is shown as the main number. The number of new holes created during the period is shown inside the parenthesis. Finally, the seats are colour-coded by the total number of holes at the end of the final registration. Seats with less than 5 holes are green, seats with between 5 and 9 holes are yellow and seats with 10 or more are red. It's seems clear that the seats furthest from the entrance have sustained the least damage. This is likely due to passengers entering the carriage from the other side of the compartment. It is also interesting to note that the double seats appear to sustain more damage than the single seats. This might be due to these seats being more popular with parents traveling with small children. It also seems that the seats on the right side of the carriage sustain less damage than the seats to the left. This might be due to all these seats being single, the oven being on the other side of the carriage, or even these seats being exposed to less light during use and storage. More data would be needed in order to fully explain this difference.

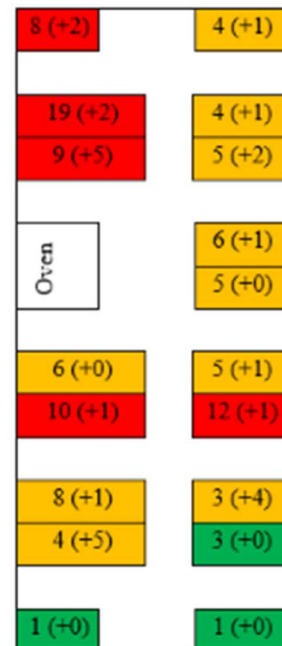


Figure 4-8: Holes per seat at first registration, with holes found later in parenthesis.

As the holes vary greatly in size and extent, it would be misleading to only compare the number of holes on each seat. Figure 4-9 shows the length of the largest hole on each seat, as measured along its major axis. Seats where the largest hole is smaller than 5cm are colour coded green, when the holes is between 5cm and 15cm it is coded yellow, holes between 15 and 30 are coded orange, while seats with larger holes are coded red. This representation shows a quite different story than the previous figure. Most of the larger numbers represent tears that extend along the side of the seats, where the fabric tends to crack. This effect does not seem to be correlated with the number of holes in each seat, underlining the importance of considering more than one metric.



Figure 4-10 shows the numbers of holes by size, as measured along the major axis, and how this changed over time. There are many more small holes than large ones.

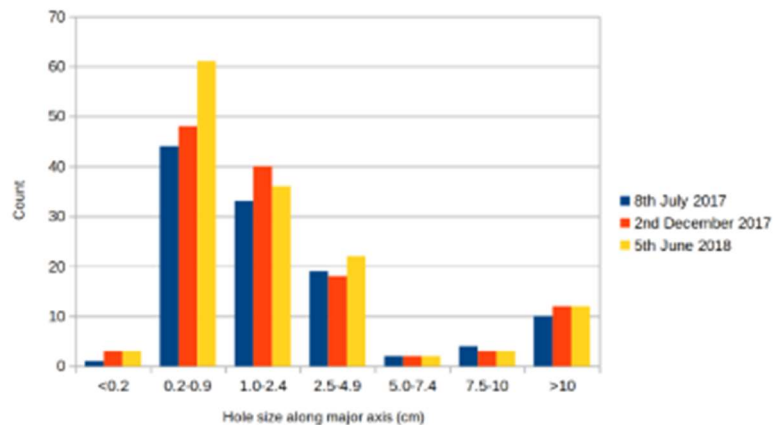


Figure 4-10: Number of holes of each size overtime, as measured along the major axis.

However, holes do not become smaller over time, and will increase in size unless treated. In some categories the number of holes goes down over time. For example, looking at holes larger than 10cm, the number has increased from 10 to 12 during the registration period. This is likely due to the existing holes growing larger, as well as previously separate holes merging as the damage expands. This is apparent from the corresponding decrease in the 7.5-10 category. This reduces the number of holes, while the actual severity of the damage clearly increases. It can also be seen that the number of holes smaller than 1.0cm increases sharply, from 45 to 64. This is due to new holes being formed during the period in question. Interestingly, in the 1.0 to 2.4 category, we see an increase from July 2017 to December 2017, which is followed by a

decline in June 2018. This change is due to holes that have migrated into the next category (2.5-4.9cm).

The holes, as measured along the minor axis, are shown in figure 4-11. This data is a bit harder to interpret, as what is considered the major and minor axis might change as the hole

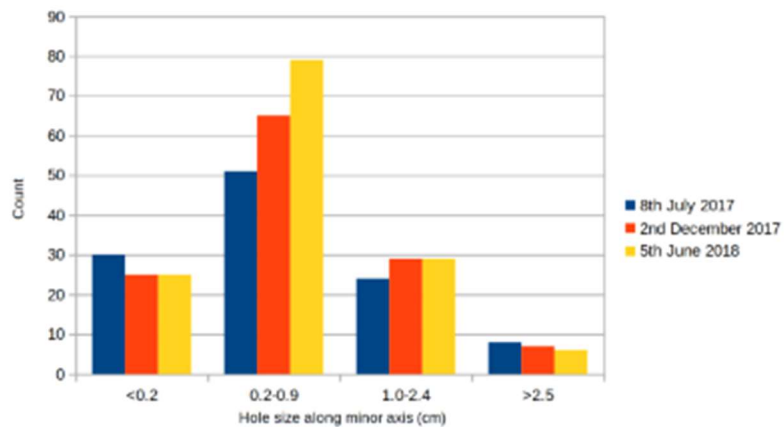


Figure 4-11: Numbers of holes of each size over time, as measured along the major axis.

changes shape. However, the length of the minor axis is a good indication of the significance of the hole. The category “<0.2cm” contains both very small holes and quite large rifts, such as the ones found along the sides of the seats. Rifts typically expands only along the major axis, with relatively little expansion along the minor axis. The largest category is the “0.2-0.9cm”, which contains few rifts, but a substantial number of smaller holes. Unlike rifts, these holes tend to expand along both the major and the minor axis.

The last two categories represent significant damage to the fabric and tells us that a large portion of the underlying material is exposed, which in practice means that the padding underneath the seat cover is exposed to deterioration and possibly lost. It is obvious from some of the larger holes that this form of loss is a significant part of the deterioration process. Unfortunately, the larger a hole gets the faster it is likely to expand.

6 Case Study: Stakeholders

In this chapter the wider context of the case study will be presented, focusing on the stakeholders who were identified in connection with the carriage and museum railway. The ownership situation will be explained, and the stakeholder opinion and influences identified.

6.1 The Museums

The museums are the most obvious stakeholders, so obvious that it can be easy to forget that they belong on the stakeholder list. There are three museums which are relevant in this case; Urskog-Hølandsbanen (UHB), the Museums in Akershus (MiA), and the Norwegian Railway Museum (Norsk Jernbanemuseum, referred to as NJM).

Norsk Jernbanemuseum is a state-owned entity which was originally created by NSB (Norske Statsbaner). It is financed and operated by the Norwegian Railway Directorate. NJM is the owner of the carriage in question, and in fact owns all the rolling stock at UHB. As with UHB, railway history, the associated immaterial knowledge, and the maintenance of that knowledge is important to NJM. In contrast to UHB they have responsibility for all railway history in Norway, which naturally gives them a wider focus and more general approach.

While they are closely connected it is important to separate between MiA and UHB. UHB is the museum railway, which uses the trains as part of their displays. MiA is the regional consolidated museum umbrella organization to which UHB belongs. Although UHB is a department within MiA, they also have their own set of goals which don't always align with the goals and needs of MiA as a whole. While MiA does have some collections that are owned by the organization itself, the ownership of any local collections usually remains with the local museum. (Museene i Akershus, 2016) During everyday work at the museum this separation seems self-evident, but it is interesting to note that this can be less obvious when dealing with legal matters. For instance, the legal agreement with NJM concerning the carriages and their care is not set up between UHB and NJM, but rather between NJM and MiA. (Stiftelsen Akershus fylkesmuseum and Stiftelsen Urskog-Hølandsbanen, 2004) According to the contract with NJM the cost associated with the maintenance and care of the carriage would fall on MiA. At the same time it is a stated goal that UHB should be self-sufficient in terms of funding, and it is unclear how this would affect the financing of a conservation effort.

6.2 The Museum Friends

The museum friends in this case are the members of Tertittens Venner, the membership organization for train enthusiasts which was created as a counterpart to the UHB foundation when this was founded. The museum friends have formal influence through their majority position in the UHB foundation board, where 4 out of the 7 seats are reserved for representatives elected by the friend's union general assembly. Additionally, this group has a great deal of informal influence through its active members.

These members are the ones who serve as train staff every time the train runs, doing everything from starting up the boilers to checking tickets and answering questions from visitors. As such they represent a great source of free labour for the museum, while also serving as the museum's face towards its visitors. A small group of members also participate in maintenance and reconstruction efforts. In practice a large portion of the immaterial heritage maintained by the museum actually resides with the museum friends.

The primary aim for the museum friends has always been to keep the train running. The motivation for individual members is usually being able to participate in this activity, but the volunteers are in no way a homogenous group. There exist large variations in opinion, and these views are often strongly expressed. However, when listening to these sentiments it is important to keep in mind that what is expressed loudest is not always the views shared by the largest number of members. Another important point is that the museum friends are not usually part of the local population, but rather train enthusiasts from the surrounding areas. Their defining feature as stakeholders is therefore their interest in the trains, not their interest in local history. This has a marked effect on their goals and priorities as stakeholders.

6.3 The Museum Railway Community

In addition to UHB there are several other historic railways in Norway, each with its own community of museum friends. There also exists an active national railway club "Norsk Jernbaneklubb" with approximately 5000 members. Together with many unaffiliated railway enthusiasts, these groups make up a thriving historic railway community. The members of this community want to preserve as many historical railways as possible and are also highly concerned with preserving the associated knowledge and skills. In addition to preserving the physical railway material, they are usually quite concerned with the authenticity of what is preserved. However, restorations are highly cherished, and a tattered appearance will be viewed as unprofessional. Formal and informal communication between the members of this

community is constant, and the museum's standing in this community has a noticeable effect on their access to volunteers, specialist skills and invitations to collaborative efforts. Railway enthusiasts also make great evangelists for the museum railways they respect, which increases their visitor numbers over time.

6.4 The Visitors

One of the primary purposes of the museum railway is to educate the public about railway history in general, and Urskog-Hølandsbanen in particular. Thus, the success of the museum is usually measured by the number of visitors. While visitors have no official say in how the museum is run, they have a significant impact on museum finances through ticket sales, visitor numbers and public standing. All these factors make the visitors an important stakeholder group.

Many of the visitors are local. The museum represents a local point of pride, and many locals will bring their long-distance guests. Due to the museum's young age, there's also a significant number of people who remember using the railway before it was closed down, and who wish to pass this experience on to their friends and descendants. The museum also facilitates special days dedicated to schools and kindergartens. These groups see taking the railway as an exciting experience, but also as a part of the children's education and their connection to their local history. Due to the speciality nature of the museum, a large portion of the visitors also come from further away. Families from surrounding areas will visit the museum because of the unique experience and the special events, and railway enthusiasts make a point out of visiting the railway if they're in the area. The museum also gets a mild drizzle of tourists, but to this date this group does not make up a significant percentage.

The visitors mainly aim to have a good experience, but the historical value of the railway is also appreciated. The railway's appearance is important, but most visitors are unable to tell the difference between original material and more recent changes and additions. However, when questions are asked authenticity is appreciated while later changes can lead to disappointment. It is worth noting that these questions are often directed at volunteers.

6.5 The Local Community

Having a good relationship with the local population in Sørumsand is quite essential to the smooth running of the museum. The railway has become an integral part of the local identity, and those living in the area have a very strong emotional connection to Tertitten. The local

population also has an interest in their history in general being presented, and how this is done. Despite this strong connection, the local population does not necessarily make up the greatest percentage of visitors throughout the year. It is therefore important to separate between the local population and the museum visitors as stakeholders.

The local community mainly have influence as visitors and through the municipality. The municipality, in turn, controls two seats on the board of the foundation. The locals also have a marked effect on local institutions and politicians. If the local population views the museum as an important and integral part of the local community, local institutions such as banks and companies sometimes provide the museum with significant donations in order to boost their own standing. History has also shown that how the museum is viewed can tip the scales when the museums needs are at odds with local projects and developments.

6.6 The General Public and Government

In this context, the general public encompasses everyone who does not fit into any of the previous stakeholder categories. It is possible for someone to be a stakeholder as part of the public, even though they are not even aware of the museum's existence. In a sense the stakeholder is humanity itself, including past and future generations, and its interests is humanity's interest in preserving its own tangible and intangible cultural heritage. Because the public as a group cannot speak for itself, it is the museum and conservator's responsibility that the public interest is taken into account. This responsibility is backed up both through national governments and law, and internationally through ICOM and other similar associations. Because the public is not a single entity there will arise situations where there is a conflict between different public interests. In this case study there are numerous stakeholders advocating for the active use of the carriage. For this reason, considering the general public's desire to preserve the carriage becomes especially important for the museum.

The Norwegian government represents the people of Norway. They do this through establishing and enforcing national rules and regulations and by controlling the museum's access to funding. It also follows up on legal issues and establishing a sense of what should take priority by using tools such as listing. The government also sets certain minimum standards related to health and safety, which affects such things as choosing a method and material for a conservation. The government's motivation as a stakeholder is to see that the museum follows the law, and that their work falls within the established expectations.

7 Case study: Ethics and Law

In this chapter we take a closer look at the relevant ethical codes and guidelines, as well as the stakeholders' own mission statements and statutes. We also have a look at the contracts and legal agreements involved, and how the Norwegian heritage law might affect the choice of treatment.

7.1 Cultural Heritage Management in Norway

In Norway the foundation of legal cultural heritage management is the Norwegian Cultural Heritage Act. (Klima- og miljødepartementet, 1978) This act allows for certain cultural heritage to be protected in a way akin to the English form known as listing. For reasons of clarity the term listing will be used to refer to this this form of protection in this thesis.

The law operates with two different kinds of protection, automatic listing and listing by order. Heritage which is automatically listed is protected by the law, independent of whether the state has been made aware of its existence or not. According to the law's §3, any measure that might damage, destroy, excavate, move, change, cover or in any other way unduly spoil the cultural heritage and its surrounding protection zone, or trigger any such event, is forbidden. §4 specifies which forms of cultural heritage is covered by this form of protection. The list is very specific, but in rough terms it can be said to cover all cultural heritage sites or items dating from any time up to the reformation, which is specified as the year 1537. Cultural heritage from 1537 and onward is not protected by automatic listing. There are a few exceptions to this rule, but none of them apply to our case.

In contrast to automatic listings, anything that is listed by order is specifically selected. Before getting listed, the cultural heritage in question undergoes a process of investigation, and it hold no special status until the final decision is made. An interesting aspect of listing by order is that this can only be done with buildings and sites. According to §15 permanent fixtures can be included, but only if this is done at the time of listing. In the year 2000, after much discussion and effort, §14a was added to the law, allowing for the listing of maritime vessels such as ships in the same manner as buildings and sites. The same rules regarding inventory and furniture applies here. This part of the law is especially interesting here because the tracks at UHB were listed as a site in 1982.(Directorate for Cultural Heritage, 2017) It could be argued that the locomotives, carriages and buildings are permanent fixtures, as was done at Rukanbanen in 2014. However, at UHB, these objects were not specified at the time of listing, and §15 explicitly states that this cannot be amended

at a later point in time. Norsk Jernbanemuseum and others are currently advocating for an extension to §14 intended to cover trains and all other historically or culturally significant transport vehicles, such as cars, buses and planes. If this clause goes through, it could potentially apply to the carriage in this case. For now, the best way to predict how this change would play out is to think of trains as land-ships.

7.2 Ethical Guidelines

Both NJM and MiA, and by extension UHB, are members of ICOM. This means that they are all bound by the ICOM Code of Ethics for Museums. Even if this had not been the case, the ICOM codes of ethics is an important ethical guideline for all professional conservators. According to the ICOM code of ethics, museums are not only responsible for tangible cultural heritage, but also for preserving the intangible aspects associated with it. (ICOM, 2017) In a working object museum the maintenance and dissemination of intangible knowledges comes at a high cost, through wear and tear to the tangible objects. In this case, running the train and using the carriage and seats for their intended purpose is part of communicating the railway experience and history. In recognition of this problem the ICOM code of ethics has special guidelines for dealing with working objects. Section 2.8 (“Working Collections”) in the code of ethics states:

“The collections policy may include special considerations for certain types of working collections where the emphasis is on preserving cultural, scientific, or technical process rather than the object, or where objects or specimens are assembled for regular handling and teaching purposes (see also 2.1).”

The code also addresses the museum’s responsibility as a custodian of the cultural heritage, and their obligation to consider the public interest in everything they do. This includes ensuring that their collections are documented and cared for in a professional way. It also calls for the museums to adopt and publish written collection policies that address how the objects are to be cared for and used. It also underlines the responsibility the museum has to contribute to research, education based on their collections.

7.3 Contracts and Agreements

In this case study the central contract is the loan agreement concerning the carriages placement at UHB. This agreement is set up between the Norwegian Railway Museum (NJM) and the Museums in Akershus (MiA), and was included in the appendix of the

agreement between MiA and the Foundation Urskog-Hølandsbanen. (Stiftelsen Akershus fylkesmuseum and Stiftelsen Urskog-Hølandsbanen, 2004)

According to this agreement the responsibility for maintenance and care of the carriages falls to MiA. This includes ensuring safe storage and display conditions, as well as any care and conservation work which might be needed. In fact, MiA is specifically charged with returning the material in the same condition as it was in when delivered. They are also economically responsible for any damage which might occur during the loan. It is also stipulated that any decisions about changes to the physical material, as well as potential conservation/restoration treatments, are to be taken by NJM in consultation with MiA. Once the decision is made, MiA is responsible for making sure the work is carried out. The agreement also states that for as long as they are in MiA's possession the carriages are only to be used at UHB, and makes it clear that NJM can end the agreement at any time for any reason and demand the immediate return of all the rolling stock. In this context it is worth noting that this contract concerns not only the carriage in question, but also the four other historic passenger carriages and all three steam locomotives used at UHB today.

7.4 Management plans

There exists no official management plan for the rolling stock at UHB. There is a management plan for Urskog-Hølandsbanen from 2003, but this plan is only concerned with the tracks. The locomotives, buildings and carriages were not listed, and are in fact not even mentioned. That being said, this management plan does state that the tracks serve two main functions. One of these is to serve as a foundation for the rolling stock. The other is to aid the secure steering of the trains. In other words, it is clearly assumed that the rolling stock will be available and in use.

This might not be as surprising as it sounds, when considering that the locomotives and passenger carriages are not actually owned by Urskog-Hølandsbanen. They are all owned by Norsk Jernbane Museum. This museum is currently developing a management plan of their own, and the carriages are mentioned here. (Norsk jernbanemuseum, 2018) The plan operates with two levels of priority. Level A is for "units with a high and independent conservation value". Level B is for "units with a conservation value which can supplement and complement train collections and environment and units with conservation value which shows variations or deviant embodiments of important carriage types." All the passenger carriages used at UHB and owned by NJM have been assigned level A. However, it is not yet

specified what this classification entails from a conservation point of view. The management plan is still a work in progress and no exact date of completion has been specified.

7.5 Statutes and Mission Statements

According to the UHB foundation statutes the foundation's goal is the preservation of tracks, rolling stock, buildings, items and memories from the UHB railway, as well as other 750mm rolling stock. It also aims to keep the museum railway in use, as well as maintaining the technical skills and knowledge necessary to restore and maintain it. (Akershus Fylkesmuseum, 2009)

According to MiA's foundation statutes the organization was founded in order to be an operational organization for its consolidated museum. The foundation is to be a research and educational institution with competence centres in relevant disciplines, serving as a resource centre and cooperative body for all cultural heritage in the county. It is also stated that all its departments should be available to the general public. (Museene i Akershus, 2016) MiA also reevaluates their strategy on a regular basis. For the period 2018-2021 their vision is to create meaningful experiences. Point 6 in this plan specifies that MiA preserves for the future and protects through use. (Museene i Akershus, 2018)

NJM is a government agency which is responsible for documenting Norway's railway history and its role in the Norwegian society over the years. It is their stated responsibility to communicate this history, promoting increased knowledge on the subject. The museum does this through maintaining a library and collection, as well as having their own technical workshops and supporting related projects financially. They also maintain an open-air-museum filled with authentic rolling stock, buildings and other railway paraphernalia. (Norsk jernbanemuseum, 2019)

8 Debating the Case Study

In this chapter the overall case study situation is summarized and considered, and two related cases are presented as examples of how others have handled similar situations. Based on this, a number of different treatments requirements are presented.

8.1 Understanding the Situation

The main problem in this case is the deteriorated condition of the seats. While the seats can still be used in their current condition, the impression they give these days is flawed. When the seat covers were first installed this was a major upgrade. According to Akerhus Blad, a local newspaper cited in *Banen og Bygda*, a group of three women entered the carriage with their third class tickets, then exited immediately while apologizing for having entered the second-class compartment. (Halling, 1996) This sense of luxury is completely lost with the seats in their current condition. The visual state of the seats is also what initiated the museums interest in exploring a conservation effort in the first place. In addition to the appearance problems the seats will continue to deteriorate through use, with continued loss of original material. It is generally acknowledged that the rate of deterioration will only accelerate over time, which means the deterioration is likely to accelerate rather than slow down. This is partly due to the visitors showing less respect to seats of a tattered appearance, and partly because existing damage exposes the underlying material. This is especially true for the stuffing held in place by the seat cover material.

The general stakeholder expectation is that the conservation process should leave the seats looking better. The assumption seems to be that the seat covers will be replaced with new material, and that the final result will give the visitors a better understanding of what the carriage was like during the railway's professional lifetime. Some stakeholders are also hoping that the conservator can find a new source of pegamoid, the material the covers are made from, as this material has gone out of production and is needed by many museums in similar situations.

8.2 Similar examples

It is also important to consider what others have done in similar situations. In this case we are lucky enough to have two examples which are highly similar to our own. One of these took place at Setesdalsbanen, while another happened at NJM. In fact, the relevant carriage at

NJM is the carriage which was delivered to UHB alongside the carriage in question. As such the way this carriage was cared for has direct consequences for the rarity value of BCo3.

In both cases the decision process was carried out locally, by personnel with a high level of competence within historic railways and railway history. Neither museum had a professional conservator available at the time. NJM is currently in the process of developing a conservation staff, and thus had no such professionals available at the time. While Vest-Agder Museum have a paintings conservator and a paper conservator on staff, neither of these are specifically involved in the maintenance of the rolling stock at Setesdalsbanen.

8.3 Finding Treatment Requirements

8.3.1 Physical Needs

The carriage is in active use both during summer and winter season and exposed to a wide range of temperatures, relative humidity and physical stress. The seats are also exposed to sunlight during use and storage, even if this is somewhat limited by having to pass through the windows of both the carriage and the storage hall. New materials introduced to the seats have to be able to handle these conditions. Due to the form of use the carriage experiences the new cover material should also be resistant to mud and snow, and preferably be easy to clean. This coincides well with the goal of finding a material which is similar to the original covers, as these have a water-resistant fake leather surface. It would also be preferable to find a material which has a similar texture to the material found on the least damaged seats. Because the seats appearance and comfort are a central part of the what the museum wishes to communicate these elements are vital. When the least worn out seats are compared to the most deteriorated ones it quickly becomes apparent that the covers were originally darker than they appear to be today. The darker shade should therefore be the one potential cover materials are compared to, except in the case of patching where the local shade should be matched.

8.3.2 Ethical Considerations

For the conservator the question of use becomes a balancing act between the professional goals of revelation and preservation. On one hand, keeping the carriage and seats in use will provide the visitor with a much better understanding of their function and the time period they came from. On the other hand, exposing the carriage and its interior to these conditions means it will deteriorate much faster than it would in storage or in a museum display.

Being able to see, hear and smell the train in motion, both from the outside and as a passenger along for the ride, makes it possible for the visitors to understand the railway and connect to it in a way which would never be possible if the train was in a stationary display situation. However, this kind of use causes a major reduction in its expected lifetime. Also, for the carriage to be kept in working condition it will become necessary to replace parts as they wear out. Maintaining the appearance of the carriage will also become important, as the visitors are to have an authentic experience and develop an accurate understanding of what riding on 2nd class used to be like. But for each part which is replaced or restored the material authenticity of the carriage is reduced. This affects the possibility of using the carriage as a material source for investigation in the future, and for each part which is replaced or restored the carriage becomes less original and is seen as less worthy of protection by the state. In other words, the value of providing an authentic experience must be constantly weighed against the value of material authenticity. The carriage should be accessible in some way or another to the public, but it is important to keep in mind that accessible does not have to equate to use, or anyone being able to wander in and out of the carriage or its storage hall at will. It simply means the carriage should be made available in some form that is reasonable for this given object. For instance, on request to those who wish to see it or use it as a basis for research.

However, there is another argument for repairing and keeping the carriage in use, namely preserving the immaterial cultural heritage connected to it. In order for the train to run a lot of knowledge and know-how has to be maintained and used. Everything from how to start up and use the steam engine safely, to how the tickets are made, stacked and stamped using the old press and ticket office. A lot of non-essential knowledge is also kept alive this way, such as the difference in colour on uniform buttons being different for station (gold) and train (silver) personnel. Some of this is information which could be communicated through displays and demonstrations at a traditional museum as well, but it would lose its purpose and context.

8.3.3 Stakeholder Opinions and Requirements

In addition to the RIP balance, it is also necessary to consider the wishes, rights and needs of the stakeholders. From the previous investigations a few absolute stakeholder requirements emerged. NJM must agree with any treatment before it can be carried out. In fact, while treatment decisions are to be made in consultation with MiA, the final say ultimately falls to NJM. The contract also states that MiA is responsible for ensuring that the carriage is stored

and exhibited under safe conditions, and that it can be returned in the same condition as it was in when first received. This means that NJM could decide that the current use and maintenance is not satisfactory, and that some form of conservation treatment or change in use needs to be carried out. If MiA do not comply with this responsibility, NJM can demand the return of all rolling stock lent to UHB with immediate effect. Any treatment carried out also has to be in line with the ICOM code of conduct as this is a stated requirement for continued membership in ICOM for all the museums involved.

The stakeholders all seem to agree that the carriage should be kept in active use. Even if no finished management plans for the carriage exists, this expectation is clearly stated both in the contract between NJM and MiA, and in the management plan which exist for the tracks and buildings at UHB. Keeping the railway and all its components in use is also a main component in the museum friends' and the foundation's motivations. In addition, it is an important source of income and visitor numbers for UHB, and a central component in the museum's approach to preservation and communication of the railway's history. It is also important for most of the stakeholders that experiencing the carriage and using its seats provides the visitors with an accurate understanding. It is important for both the museums, locals and the railway community that their part of the history is presented accurately. In order to provide something meaningful, the authenticity of the experience has to be a priority. However, there are some differences in opinion on how this can best be achieved.

From the museums and the conservator's point of view the preservation of original material is important. Both due to its evidence value, and because it adds to the carriage's material authenticity value. For the museum friends and other railway enthusiasts an authentic appearance, as can be achieved through restoration, tends to be the goal. They want to present and experience the carriage as it was meant to be. They usually value material authenticity as well but tends to view the object as a functional relic rather than a source for future research. Visitors tend to fall in between these two points of view, valuing the material authenticity value as well as the authentic experience. For visitors, comfort and convenience is also part of the equation, but a high level of authenticity of either kind is usually appreciated and can noticeably increase their acceptance of discomfort.

8.3.4 Resources and Limitations

The choice of treatment also depends on factors such as the financial and practical resources available. In this context the resources available come not only in the form of finances, but also in the sense of available manpower and expertise. Some treatments can be carried out at

low cost, and using volunteer manpower, while others will require specialists from within or outside of the museum staff. This consideration is especially important for UHB and MiA, as the loan agreement states that MiA is responsible for carrying out any treatment deemed necessary by NJM. It would be possible for the museum to apply for project money in order to finance the project, but otherwise the treatment costs would have to come out of the usual budgets. MiA does have a conservation unit, and a conservator has recently been hired to focus specifically on the needs of UHB and another local museum with larger working objects. There are also some members of the local UHB staff which have practical skills and knowledge that could be useful in a restoration process, as well as individuals among the museum friends who have specialist skills and know-how.

Because train tickets are a main component of the museum's income the train carriage needs to be available for use during the active seasons. While this might not be entirely possible, it should at the very least be a clear aim. While the carriage is not yet listed, this seems to be a result of quirks in the law rather than the carriage's historic value. This should be kept in mind when the treatment options are considered. Because both the covers and the seats beneath them are seen as original material, any treatment which might damage or remove parts of the seats has to be considered and carried out very carefully. The choice of solution, method and potential materials also needs to fall within the established HSE (Health, Safety and Environment) regulations.

8.4 Treatment Requirements

Before choosing what to do it is important to have a clear idea of what the goal is. In this case, the goal seems to be twofold. Maintaining the authentic experience of using the carriage and preserving the original material of the carriage. In some areas these two goals are in direct opposition. However, they are both equally important and achieving a satisfactory balance between the two is essential. For this to be achieved the possible treatments need to be carefully considered and compared. This can be done by identifying a set of treatment requirements. These are conditions of smaller or greater importance, which the options can be compared to. Based on the information which has been gathered, several important treatment requirements for this case can be listed.

The deterioration of the seats needs to be slowed down or stopped. This means that the original material of the seats must be protected somehow. At the same time the current condition of the seats needs to be improved, so that the impression they give visitors is as

accurate as possible. If the carriage is to be exposed to the dangers of continued use, the value of the understanding that this use imparts, and the value of the immaterial heritage that this use maintains, must outweigh the value which is lost through the deterioration and replacement of original material. Therefore, any treatment which might damage the original material, or which includes the replacement of such material, must be significantly beneficial to the goal of revelation.

Stakeholder opinions and expectations, along with their available resources and practical limitations, also need to be considered. Due to the conditions of the loan contract, NJM must agree to any treatment chosen and the resources to carry the treatment out must be within reach for MiA and UHB. The choice of treatment must also fall within the requirements set by the ICOM code of ethics, as this is a basic requirement for continued membership in the organization. The treatment must also comply with health, safety and environment standards set down in Norwegian law. In addition, the treatment should be acceptable to the board of the UHB foundation. Because of the close connection between the museum and the museum friends it is also important that the values of this group, and of the general museum railway community are respected. In the same way, the opinions and connections to the local community and other cultural stakeholders should be kept in mind.

9 Choosing a Treatment

Before a final treatment is chosen, several different treatment alternatives should be considered. These alternatives can be found by looking at such things as owner and stakeholder expectations, previous treatments carried out on the object, treatments carried out in similar cases or be based on the previous experiences of those involved in the process. In this case five main options have been identified. Namely doing nothing, changing the use and/or storage conditions, patching the covers, covering the covers in a new material, and replacing the material the covers are made from.

These options range on a scale from least intrusive to most intrusive. The alternatives can also be placed on a map between the goals of prevention, revelation and investigation. In the following, these treatment options and their variations will be compared to the treatment requirements arrived at in the previous chapter. The findings from this comparison will then form the basis for a final treatment recommendation.

9.1 Treatment Options

9.1.1 Option 1: Do Nothing

The option of doing nothing should always be taken into consideration. Just because something can be done, that does not mean that something should be done. It is possible to leave the seats alone for the time being, allowing the deterioration to progress as it is today. This way there is no risk of doing unintended

damage to the carriage, and the opportunity for a future conservation effort is left open, but the carriages will also continue to deteriorate at the present rate. It is possible to let the seats continue to deteriorate naturally, accepting the continued loss of original material and the carriage's deteriorating appearance as integral parts of the carriage's history and lifespan. However, this alternative does rely on understanding and accepting that the seat covers in the carriage will at some point no longer be able to serve in their current function.

Choosing not to interfere with the carriage or its use and storage conditions does not exclude the option of gathering further information. The deterioration processes which has caused the seats to be in their current condition will continue to take place. Monitoring this process over time can give a clearer picture of what causes the damage, and how the rate of deterioration can be slowed down. Together these two elements will make it possible to make



Figure 9-1: Doing nothing on the RIP-triangle.

a better decision about when and whether a potential conservation effort should be carried out, as well as identifying more useful preventive conservation options. In addition, this path would make it possible to spend more time researching and identifying suitable materials for this particular situation.

As explained earlier, even if no conservation effort is to be carried out, NJM still needs to agree with the decision. Should NJM agree that no intervention needs to be made at this point, the cost of continued monitoring of external and internal climate would require minimal effort and resources. Continued monitoring of deterioration and deterioration rates would require more effort, and better method should be developed. Even so, this is the least expensive option on the list. In a short-term perspective, it also runs a low risk of coming into conflict with the ICOM code of ethics, or HSE or museum standards. Long term, doing nothing to preserve the original material could come into conflict with the museum's responsibility to preserve the carriage for future generations, but this issue would be debatable as there is a special allowance for working objects in the guidelines.

Doing nothing now gives the museum more time to understand the problem, and further investigations could reveal information which is not available today. Uninterrupted use would also keep the carriage available to the public. It would allow the museum to continue communicating all the elements of the related history and intangible heritage in the same way they are doing today. There would be no improvement to the comfort, appearance or authenticity of the carriage, but neither of these elements would be immediately reduced. No original material would be removed, and no new material would be introduced, and thus this path would not get in the way of future research or treatments, and there is no risk of causing unexpected damage as part of an invasive treatment.

On the other hand, nothing would be done to slow the rate of deterioration. The condition of the seats will continue to deteriorate, and the situation which led to a treatment consideration in the first place will only get worse over time. The current tattered look of the seats also misrepresents the historic appearance and the sensation of luxury that people experienced when first traveling in this compartment after its initial upgrade. This deterioration could also make the carriage less likely to be considered for a potential listing over time.

9.1.2 Option 2: Changes in Use and Storage

It is possible to attempt to reduce the amount of damage to the carriage by changing the way the carriage is used and stored. Just as with the previous option, following this path would not require any change to the carriage



Figure 9-2: Changes in use and storage on the RIP-triangle.

or intrusion into the original material. Neither would any new material need to be introduced. This option comes with two main alternative approaches. One alternative is to change how the carriage and seats are used, and the other is to change how the carriage is stored. These two options can also be adjusted and combined in several different ways.

One alternative would be taking the carriage out of use completely. This would reduce the rate of deterioration and preserve the carriage for the future without the need for any intrusive conservation treatment. While the carriage would likely be better preserved for future generation and research efforts, it would do nothing to preserve the knowledge and skills necessary for keeping the carriage in working condition. In a long-term perspective, keeping the original material from deteriorating further would be helpful in arguing the carriage's claim to listed protection, but this might not be enough to out-weight the loss of arguments associated with the intangible heritage value. Taking it out of use would remove the museum's ability to communicate the history and intangible cultural heritage associated with it. It would also eliminate the connection between the carriage and the public. In addition, any use restriction placed on the seats in question would also affect the use of the associated 2nd class compartment. The tickets usually sold for this carriage would no longer be available, affecting the museum's capacity and income severely, as the carriage represents 52% of the available 2nd class seats, as well as 20% of the 3rd class seats on any given day.

Taking the carriage out of use would not break with the ICOM code of ethics, or general museum standards, but it would be in direct contradiction with most of the stakeholder requirements, including those of NJM. The loan agreement does not directly state that the carriage has to be in active use to be retained at UHB, but it appears to be an obvious expectation. If the carriage is taken out of use at UHB it should be assumed that NJM would demand the return of the carriage, and possibly put it back into use as part of their own railway exhibitions, under much the same conditions as before. It might even be exposed to a higher degree of use as part of NJM's own "Territten" railway. This would solve the problem of storage and maintenance but would also cause problems by reducing UHB's capacity and visitor numbers. Removing BCo3 from use would also have the side effect of increasing the

wear and tear on the other 4 carriages, which all have historic and documentary value of their own.

It would also be possible to reduce the rate of use or attempt to control the type of visitors who use the carriage. In theory adults and the elderly should cause less damage to the seats than teenagers and children. Simply reducing the use of the carriage would eliminate the possibility of NJM demanding its return but would come with challenges of its own. Another element that should be considered under this heading is the amount and type of cleaning that is carried out in and around the carriage, as this could potentially affect the rate of deterioration.

As far as storage goes there is little room for improvement under the current resource conditions. UHB only has access to three storage buildings for their rolling stock, including their active workshop. For practical reasons the workshop is mostly reserved for storage and maintenance of the railway's steam locomotives. Of the two other buildings, the hall where the carriage is usually stored is the one providing the best conditions. It's easier to access, has a certain level of climate control through heating, and is less affected by both airborne particle pollutants and pests due to the regular use and cleaning of the carriages. The other storage hall is further away, can only be accessed via railway, and has no temperature or pollutant control. Finding enough storage space for the rolling stock is a constant problem for the railway, and while a new storage building would be highly welcome, the cost of such a venture currently keeps this option well outside of the museum's reach.

9.1.3 Option 3: Patch the Existing Seat Covers

A more intrusive alternative would be to patch the holes in the seat covers. This would allow the museum to leave the original material in place, while at the same time improving both the stability of the material around the holes, and the general appearance of the covers. No matter which approach is used this

would be a major undertaking. Dependent on which approach is chosen, specialist expertise might also become necessary. The sheer number of holes, as well as the variation in size and location also means that this solution would require a lot of resources to carry out, and might even turn into a continuous process. Some of the holes might be too small to require patching straight away, but at the same time the data collected through the condition registrations

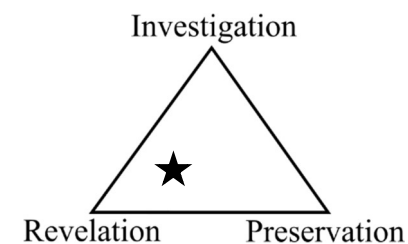


Figure 9-3: Patching on the RIP-triangle.

indicates that new holes would continue to appear over time, and that even the smaller holes are likely to expand unless patched.

There are three different ways in which the seat covers can be patched. Covering the holes with patches placed on the outside of the seat covers, inserting patches through the holes and attaching them to the inside of the fabric, and taking the covers off in order to patch the holes directly from the backside of the fabric. The first solution is the easiest to carry out. Once a suitable material and glue has been identified, the entire patching process can be carried out by the MiA conservators, or even by volunteers under the guidance of a conservation professional. No matter which fabric is used, these patches would likely be highly visible against the original material background.

Inserting the patches through the holes in order to attach them on the inside of the fabric would give a much tidier appearance, even using patches of a visually different material. However, this could only be carried out by an expert hand and is a far less cost-effective alternative. It would also leave the ragged edges of the holes exposed to further wear and tear. In addition, it would not be possible to insert patches through the smaller holes, and these would therefore either have to be left as they are or patched using a different technique. Whichever method is chosen there are also some areas where it would be necessary to temporarily remove the original fittings in order to access awkward areas along the edges.

A third alternative would be to remove the covers from the seats and attach the patches from the backside of the fabric. It would also be possible to cover the backside of the fabric completely in a supporting material. The appearance achieved would be close to that achieved by inserting patches through the holes. This method would be easier to carry out but would also require the removal and reattachment of all the original fittings. This process could be carried out by MiA's own conservator staff, or by volunteers under professional guidance. This approach is far more intrusive than the previous alternatives but looks better than the external patches while still being less time consuming than inserting patches through the holes. Applying individual patches would likely become a continuous process, while applying a material to the entire backside of the covers would only need to be done once.

Whichever approach is used it would be necessary to find a material for the patches which is not too dissimilar from the original material in appearance. It would also become important to identify the right kind of glue for the materials involved. If the patches are to be placed on the outside of the seats the visual and the tactile properties of the material becomes especially important. One possibility here would be to contact Setesdalsbanen and inquire as

to whether some of the original seat covers from their renovated carriage could be used for patches at UHB.

Patching the seats would make it possible to keep the carriage in continued use, thus making it available to the public. Patching the seats is a solution NJM is likely to agree to, especially considering the current state of the covers. In fact it could be argued that this falls within the responsibilities set forth for MiA in the loan agreement. Nevertheless, NJM would have to do their own assessment of the situation. Introducing new materials in order to patch and stabilize original material falls well within the ICOM Code of Ethics, and general museum standards. Especially for working objects. It should be left up to a conservator, preferably in consultation with those familiar with traditional railway materials, to identify fitting materials for patches, stuffing replacement, as well as a glue that could be safely used for the chosen approach.

The patching process itself could be carried out outside of the museum's active seasons. Depending on the method chosen the resource expenses could vary widely. It might even be necessary to rely on outside expertise. The likelihood of achieving an aesthetically pleasing result would likely be directly proportionate with the amount of resources delegated to the effort. While the new material would provide some degree of support for the fabric there is always a certain risk associated with introducing new materials, such as glue, to the context. The original material would also continue to be exposed to wear and tear.

Provided that the patching process is carried out by someone with the necessary expertise, the final result should be an improvement on the carriage's current aesthetic appearance and stability. It would also improve the seats comfort and aid the museum in their effort to communicate the carriage's original status. It could even be argued that this is a historically correct approach, and that the conservation effort would aid in preserving the skills associated with patching and repairs.

9.1.4 Option 4: Cover the Existing Seat Covers

It would also be possible to cover the current seat covers completely. This is an alternative that came into being during the investigation process. The idea is to fit the seats with a new set of seat covers, without removing the current covers first. The new covers will then serve as a barrier between the old covers and the user, while at the same time improving the appearance of the seats. In areas with missing stuffing a filler material which

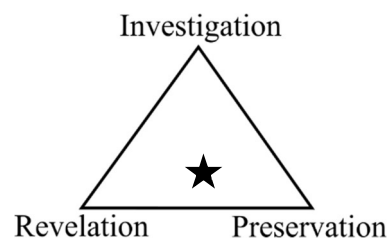


Figure 9-4: Covering the covers on the RIP-triangle.

can be easily distinguished from the original stuffing could then be used to avoid these damaged areas from being apparent on the visible surface. In this way the original covers could be kept in their original context, while at the same time being exposed to far less wear and tear.

This solution would make it possible to keep the carriage in its current use. The original covers would become invisible to the visiting public but would remain in place, while at the same time being protected from most of the wear and tear caused through use. The new layer could easily be replaced, for example due to being worn out, at a later point in time. The uniform and crisp appearance of the new covers would aid the visitors in understanding the impact of the original upgrade and aid the museum in their effort to communicate the associated history. Fitting entire new covers to the seats is likely to be a historically correct approach, and the process itself could help the museum discover, document and maintain the knowledge around how the seats are assembled.

The challenge of this option would be fitting the new material under the metal fittings and into other tight areas while leaving the old covers in place, so the new covers would have to be made in a thin but sturdy material. If the new material is too thick this might not be possible without creating visible gaps or replacing original screws. If the material is too thin, edges and gaps in the old covers might be noticeable through the new covers, damaging the desired visual effect. It would also be possible to use a transparent material such as plastic. In this case the original covers, as well as any damage, would still be visible. This would make it possible for the visitors to see what the seats used to look like, though likely at the cost of both comfort and the aesthetic impression of the carriage. Whichever material is used, it is important to consider how this new barrier will affect the atmosphere underneath the surface, where the original material would be situated. If the material is air and moisture proof, there might be a risk of moisture build-up between the layers. A professional conservator should be involved in the process of both choosing materials and fitting the covers in place. Assuming a good material can be found, this solution would likely increase the carriage's chances of being considered for listing in the future.

This would be a larger intrusion into the original material of the carriage than applying patches, as it would likely require the seats to be completely dismantled in order for the new covers to be fitted. However, it would provide the original covers with a greater level of protection than any of the other alternatives. The major upside to this approach is that the original material could be protected from wear and tear, while simultaneously being left in its original context. Producing and fitting entire new covers for the seats would require more

material than what would be necessary for patches, but due to the number of holes it might be a less time-consuming process. Despite being a more drastic solution, this alternative does follow ICOM's ethical requirements, as well as being acceptable by general museum standards. It is also likely that NJM would see this solution as acceptable.

9.1.5 Option 5: Replace the Seat Covers

The old seat covers are worn and falling apart, so replacing them with new ones seems the obvious solution from a utilitarian point of view and is a common approach in the historic railway community. Because of this, replacement was the first alternative to come up for consideration. The goal of this path is to retain the function and appearance of the object.

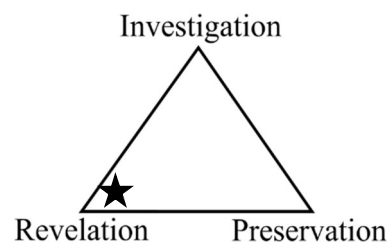


Figure 9-5: Replacing the covers on the RIP-triangle.

Replacing parts of working objects in order to ensure continued use and a better understanding of the object, is also viewed as acceptable according to ICOM's codes of ethics. It is likely that NJM would have more problems with the covers being replaced completely than with any effort to protect them in situ. This is based on the value of the covers as a resource for future research. This problem can be somewhat mitigated by keeping samples of the old covers after they have been removed. On the other hand, the process itself would add to the museum's efforts to preserve the intangible heritage around knowing how the seats are put together. In addition, replacing deteriorated seat covers in their entirety could be seen as a historically accurate approach. When one also considers NJM's own restoration of BCo4, it seems likely that NJM would agree to this approach. UHB and MiA also have stated interest in keeping the carriage in use, as well as in the seats being capable of communicating an accurate impression to the public. This might lead them to be more accepting of a restoration effort.

The process of replacing the seat covers would be the same as with covering the seats, with the seats being dismantled, the stuffing supplemented, and new cover material being installed. This method would keep the carriage accessible to the public, and in use. Though as with any method which requires the seats to be dismantled, it is possible that the process could end up affecting the carriage's availability dependent on when the work is carried out.

Replacing the seat covers would be intrusive, but it would require a limited amount of resources and specialized conservator knowledge compared to patching. This solution would allow the museum to restore the compartment to something approximating the appearance the

carriage had when the 3rd class compartment was newly upgraded. It would also provide the seats with a hard wearing and complete surface, which would stand up well to continued use. The new covers could be replaced at need, without triggering the considerations associated with original material. The main consideration in this case is which new material is chosen to replace the old covers. It is an acknowledged fact in the railway museum community that the material used to cover the seats originally, pegamoid, is no longer possible to source. For this reason, finding a fitting replacement material could turn out to be a challenge.

In the long-term perspective replacing the seat covers completely would affect the authenticity value of the carriage, and this might count against it in the case of a future listing effort. However, it would keep the carriage available to both current and future generations and allow it to be used without further concerns about deterioration through wear and tear on the covers.

9.2 Debating the Options

9.2.1 Considering the RIP balance

While leaving the seats the way they are is an option, it does nothing to improve the overall situation, and is only really a postponement of the conservation effort. It can easily be argued that the condition of the seat covers have no direct effect on the carriage's ability to function. At least for as long as the covers are in such a condition that passengers are still able to use the seats for their intended purpose. However, the seats will continue to deteriorate over time, and at some future point the covers will no longer be suitable for use. In some cases that point is very close, if not reached. In this case the only real reason to follow this path would be in order to wait for some future change which might affect the decision.

Of the presented alternatives, the option to take the carriage out of use completely seems to be the least acceptable. At first glance this appears to be the one where the carriage stands the greatest chance of being preserved, but when one considers the long-term effects on the carriage's storage situation this is not actually the case. In addition, it directly contradicts many of the stakeholders' requirements, including the intentions stated in the management plan of UHB and indirectly in the deposition contract between NJM and MiA, namely keeping the railway and rolling stock in use. It also removes a source of revenue for the museum and takes a piece of living history out of the public's reach. In short, taking the carriage out of use does not seem to be a viable option. Another acceptable reason to wait would be the hope that the high demand among museums for the material used in the seat

covers will eventually result in someone putting it back in production. That being said, there is no clear reason to believe that this will be the case. That being said, the idea of controlling which groups of users the carriage is exposed to might be worth taking into further consideration.

The possible change in Norwegian cultural heritage law, which would allow the carriage to be listed would be one such reason. The likelihood of this change occurring within the next ten to fifteen years is reasonably high. Because the rate of deterioration is relatively slow, waiting for this change could be an option. With that having been said, deterioration of this kind is known to accelerate over time, and any treatment carried out at this point would not necessarily affect the likelihood of the carriage being listed. In addition, listing might not have much effect on the overall situation. Since the carriage is owned by NJM it is considered state property, which means that the listed status alone would probably not make any additional resources available. Listed status will place even tighter restrictions on what can and cannot be done to the carriage, and this might cause more problems for the museum than it solves. On the other hand, listed status should make it easier to argue that this carriage requires better care, and thus a larger share of the already available pots. However, all the passenger carriages at UHB would be good candidates for listing, and thus the priority of this carriage among the others at UHB would probably not change.

If something is to be done with the seats, the least intrusive methods would be patching, or covering the covers with a new material. Both patching the covers and covering them would allow the original material to remain in the carriage, while still improving the appearance of the seats. These two approaches are also intrusive in different ways. Following either path would come with a set of risks and problems, which should all be carefully considered.

While the patches would cover and provide some support to the worst affected areas, it is likely that the glue used to fasten the patches would damage the surface underneath. Especially if they were ever to be removed. The covers would also be exposed to continued wear and tear through use. Patching from the inside would also leave the holes visible and edges of the holes exposed. Even if the patches were made from the old covers from Setesdalsbanen they would still be distinguishable from the background. However, the original covers would also remain visible and accessible to everyone.

Of the alternatives debated here covering the current seat covers with new cover material seems to represent the best RIP balance. Adding a new layer over the current covers would make it possible to achieve something approximating the same appearance as if the

covers were replaced completely, while at the same time protecting and retaining all the original material in situ. This goes far towards fulfilling the goals of both revelation and preservation, while at the same time accommodating the needs of any future investigation efforts. However, it does limit the choice of material, as the covers need to be both sturdy enough to handle wear and tear, while still thin enough to fit under the current fittings while still mimicking the original surface of the seats.

The final option would be to replace the seat-covers completely. This path would require the same level of intrusion, and in addition lead a major loss of original material. That having been said, this is the path which was followed in both the examples of similar situations. This makes sense when we take into consideration that both doing nothing taking the carriage out of use, have already been eliminated. Re-upholstering all the seats would achieve a uniform look for the entire compartment. It also helps the museums to convey as authentic an experience as possible to their visitors. While the surfaces of the seats would not remain the same, the sensation of being in a more luxurious compartment would be maintained. The new covers can also be made from a material highly resistant to wear and tear, and which could be replaced as needed without causing further loss of original material.

No matter which method is chosen, it should also be carefully considered whether all the seats in the compartment should be restored. While some of the seats are heavily damaged, others have been practically unaffected. This is especially true for seats 10,1 and 10,3. The argument for changing the covers on these seats would be solely based on wanting to present all the seats in the compartment with a uniform appearance. The argument for leaving them as they are would be to have them remain as available examples of what the seats were originally like. At the very least, any choice of new material should be based on the appearance of these seats.

9.2.2 Resources and Opinions

Doing nothing would cost the museums nothing at the current time, but the longer they wait the more damage will accumulate. Over time this could affect how they are viewed by the museum friends and the historic railway community in general, as well as the cost of any eventual treatment. It will also be increasingly likely that NJM will consider them to be in breach of the loan requirements set down in the contract.

As has been pointed out earlier, taking the carriage out of use would only change the carriage's storage conditions for the worse. It would also affect the museum's visitor numbers and income. The current storage conditions are as good as can be expected at a local museum,

and while it might be worthwhile to investigate the effects light and pollution have on the carriage it is unlikely that these aspects can be changed much under the current conditions.

If the seats are to be patched the museum would have to invest in both materials and expertise. It might be possible to use voluntary manpower for some of the work, but a skilled conservator should at the very least be managing and monitoring the process. While it might be possible to use donated material from Setesdalsbanen, this will only stretch so far. The seats currently have xxx holes. Even if only holes of a certain size are patched, any holes that aren't patched will continue to grow, and new ones will continue to appear. While the stakeholders are likely to agree to this method, it will be a continuous effort, which will leave a progressively worse looking result.

Covering the seats will require a lot of the same resources, but it is a process with a clear end. It also provides the covers with a fully covering layer of protection. The final result will be visually pleasing, and give a more accurate impression of what the carriage once looked like. On the other hand, the original material will no longer be visible nor easily accessible. None of the stakeholders are likely to have major problems with this approach, and it seems to fulfil the requirements of the loan agreement.

Replacing the covers completely would probably require about the same amount of work and resources, though it could possibly be carried out and managed without the constant involvement of a trained conservator. This could make it a cheaper option. Based on the similar examples this seems to be the most common approach. It is likely to be acceptable to most of the stakeholders. This probably includes NJM, but it should be noted that removing original material in order to achieve a better visual presentation only seems to get less acceptable in the professional museum community over time.

9.3 Recommendation

9.3.1 Treatment Recommendation

Fitting the seats with a second layer of seat covers, while leaving the original covers in place underneath, appears to be the best solution for this situation. This solution is dependent on the availability of a fitting cover material, but if such a material can be found this solution presents the best fulfilment of both RIP and stakeholder requirements. It is also a solution which should be within reach financially, and possible to carry out without within the museum's natural use and rest seasons, assuming enough time is set aside for planning and material sourcing before the physical process is carried out.

While covering the original material seems to be the best option, certain elements from the other alternatives should also be implemented. Namely, leaving some of the seats untreated and considering the possibility of affecting the public's interaction with the carriage. At least two of the seats, specifically 10,1 and 10,3, are in a very good condition compared to the rest. They are also placed in the part of the carriage which is least exposed to wear and tear. It would be possible to leave these seats untouched, as accessible examples of what the original material looked like in situ. The covers of these seats should also be used as a guideline when considering the visual and tactile properties of the new material. No matter if these seats are left as they are or not, the material necessary to cover them should be included in the original order. This will make it possible to cover them at a later point in time, if this should be deemed necessary, and still achieve a uniform appearance with the rest of the seats.

9.3.2 Treatment Process

The restoration will need to be carried out in several stages. During stage one the museum will need to delegate personnel and put together a specific plan for the restoration. Suitable materials for both the covers and the stuffing needs to be sourced, a budget and schedule should be produced, and the museum will need to decide who will be carrying it out. In order to make well founded judgements about the materials the seats will need to be inspected. One seat should be taken apart so that the material requirements and fitting process can be sufficiently understood. This stage will also form the basis for any necessary project applications. A conservation professional should be highly involved in the processes at this stage, and all considerations, decisions and expectations should be documented in writing.

In stage two the restoration treatment will begin. The materials decided on in part one of the process will need to be ordered. The seats will then need to be disassembled as far as necessary for the new covers to be installed. The old covers should be gently cleaned and dusted. Any parts of covers and stuffing which comes loose at this stage should be kept and labelled as potential test material for future investigations. It might be necessary to remove some covers completely so that these can be used as templates for cutting the new ones in the right shapes.

In stage three the new materials will be introduced. In any area where the stuffing has gone missing the area should be filled with the new stuffing material, so that the final surface will appear smooth and feel even to the touch. Where needed, the stuffing should be fastened to the old stuffing with a curved upholstery needle and thread. Introducing glues should be

avoided as far as possible. The material should then be fastened into place using the old fittings. The fitting process should be completed on one seat before the rest of the material and the other seats are touched, so that potential pitfalls and surprises to be uncovered at an early stage. This process should at the very least be supervised, if not carried out completely, by a restoration professional.

All actions taken in stages two and three, as well as the reasoning behind decisions made in part one, should be documented in the form of a conservation report. The process will need to be documented both visually and in writing. At the very least dated pictures will need to be taken of each seat before and after they are treated. Organizing this information, and finishing the report becomes stage four of the process.

Leaving these seats exposed has little purpose if the public is not informed about this feature of the carriage. For this reason, and because we know that increased knowledge and understanding among the public causes a decrease in overall damage, the museum should consider ways of informing its visitors about the historical aspects of the carriage. A restoration effort is usually found to be a good context for introducing such information to the public, as the public is already curious about what has been done. The information could take the form of verbal communication or written material. A pamphlet with information about all the railways carriages and locomotives might be a good long-term solution for communicating the railway's history and raising the visitors' level of understanding and respect.

10 Conclusion

10.1 Summary

The first goal of this thesis has been to identify a list of factors which a professional conservator would need to chart and understand in order to make sound conservation judgements in cases involving larger working objects. The factors which could be arrived at through a review of conservation theory and ethics were identified in chapter three. In chapters four through eight the findings arrived at in chapter three were applied to a practical case study. This was done in order to test the findings, and in order to identify any practical factors which would have been missed if the subject had been explored through theory alone. The full set of findings arrived at through this process is summarized in what follows.

10.2 Answering the Research Questions

10.2.1 How can we best approach the conservation of larger working objects?

What makes working objects so unique is not the way they are used, but rather their immense potential for communicating their associated history. This can be seen clearly in that ICOM's code of ethics makes a special exception for the care of working objects or collections, where the "emphasis is on preserving cultural, scientific or technical process rather than the object". (ICOM, 2017) In other words, when the focus is on the intangible as opposed to the tangible cultural heritage. In RIP-terms, we accept reduced material preservation, and a reduced possibility of scientific investigation, because we can facilitate an unusually high degree of understanding through revelation. Including the opportunity to preserve the associated intangible knowledge and skills. When considering how to care for these objects, this potential for communication of the preserved intangible heritage should therefore be in focus.

This does not mean that the outward appearance should be the one and only focus. In fact, for the object to continue to be a working object maintaining its function is far more important. What it does mean is that the conservation process should aim to facilitate a clear and accurate understanding of the object, especially when it is in use. Whenever possible the conservator should also make use of original techniques, as well as taking advantage of other kinds of knowledge or skill which has been preserved, as keeping this intangible heritage alive is part of the purpose of keeping the object in use. If it can be done safely, the application of these techniques should be documented and carried out in a public setting, or in another way which aids the preservation and passing on of this intangible heritage.

The conservator should always make sure they understand the physical state, history and context of the object before carrying out any conservation work. Identifying the stakeholders involved, as well as any relevant laws and documents connected to the object, is essential for understanding the situation. Understanding the inherent values of the object, as well as the significance it holds for those around it, is part of this process. With a working object it is also important to understand why the object is used, and what this use entails. The conservator needs to understand what the object is meant to communicate to its audience, and how its use facilitates the preservation of intangible heritage. Otherwise the conservator might carry out treatments which are either unsuitable for an object in use, or which unintentionally hinder the preservation of intangible aspects.

10.2.2 What was learned from the case study?

In addition to the elements arrived at through theory, a few other important factors were discovered through the case study and associated field work. It turned out that not only stakeholder opinions about the object, but also the relationships between the different stakeholder groups was important. This showed up in the shape of both formal and informal relations, such as contracts and commitments, friendship, past feuds or gentlemen's agreements. In practice, invisible relationships such as these had a major impact on how things were done in practice. This was especially well illustrated by the relationship between UHB and the museum friends. This group do not only have direct influence on the museum through their representatives on the board, they quite literally make the trains run. In practice the museum would not be able to function in its current form without the substantial amount of free work put in by the volunteer personnel. For this reason, their view of the museum and its maintenance of the rolling stock became essential. This is a situation which appears to be common at both museum railways and other working object museums in Norway.

In association with this, it became apparent that clear communication, as well as a mutual understanding of vocabulary and the museum staff's professional skills and responsibilities, was useful in avoiding conflicts caused by miscommunication and misunderstandings. It also became clear that reading contracts and understanding the theoretical intentions is not always enough to understand what the situation looks like in practice. This was especially clear when considering how the responsibilities for care and maintenance of the rolling stock at UHB was presented in documents, and how this was understood and carried out in practice. While these objects are often cared for by dedicated volunteers, or staff with relevant technical skills and experience, it became clear that these

custodians naturally enough have limited insight when it comes to the evidence value of original material, as well as the range of significance the objects holds for other stakeholder groups. This was also an area where they themselves expressed a wish for better guidance

10.3 Future work

10.3.1 Working objects

On the side of conservation ethics, it would be interesting to delve further into stakeholder opinions and the effects these have on museum practice and conservation decisions. This is especially interesting in the case of museums with an active and highly involved group of museum friends. Such as those usually found at museums with working collections. It would also be interesting to investigate how museum related vocabulary is understood and used differently by different stakeholders, and to which degree this causes misunderstandings and disagreements which wouldn't otherwise exist.

Finally, a closer look at the similarities between historic trains, ships and other veteran transport vehicles would be useful. This is especially interesting in Norway, considering the current advocacy for changing the law which would concern the government involvement and listing of these types of objects.

10.3.2 The Case Study

One of the first things that was expressed by the stakeholders in the case study was how common the problem of worn down pergamoid seats has become at museum railways and other museums concerned with the preservation of veteran vehicles. There is a strong interest in the possibility of putting this material back into production, or at the very least identifying a suitable replacement. Charting the actual proliferation of this material, and the practical possibility of getting it reproduced could turn out to be an interesting study of its own. The same goes for a deeper investigation into available replacement materials for both covers and stuffing. In addition, establishing database for examples of similar situations, including the rationale behind the choices made in each case, would be a highly welcome contribution. Another worthwhile project would be the development of a conservation guide for the Norwegian museum railway community. The interest in such a guide was expressed by several parties at the museum railway conference, and NJM expressed willingness to aid this process. It is hoped that this thesis can become part of the foundation for creating such a manual.

Appendix I

Objects		Registration 08.07.17		Registration 02.12.17		Registration 05.06.18	
Seat	Damage	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
1,1	A	0.6	0.5	0.8	0.5	0.6	0.5
	B	0.5	0.2	0.2	0.3	0.4	0.3
	C	0.3	0.2	0.3	0.3	0.3	0.2
	D	0.2	0.2	0.2	0.2	0.2	0.3
	E	1.5	1.5	1.6	1.5	1.5	1.5
	F	1.1	0.9	1.8	1.2	1.2	0.9
	G	0.0	16.5	0.0	23.3	0.0	16.5
	H	0.0	19.5	0.0	29.0	0.0	19.5
	I	0.0	0.0	0.0	0.0	0.4	0.2
	J	0.0	0.0	0.0	0.0	0.2	0.2
1,2	A	0.7	0.5	1.2	0.5	1.0	0.5
	B	0.8	0.4	1.0	0.5	1.1	0.4
	C	2.3	1.1	3.8	1.3	4.1	1.2
	D	0.0	9.5	0.0	21.0	0.0	0.5
	E	0.0	0.0	0.0	0.0	0.2	0.4
2,1-2	A	1.8	1.1	1.8	1.1	1.9	1.1
	B	0.0	0.8	0.8	0.4	0.3	0.8
	C	1.0	1.0	1.0	0.0	1.0	0.1
	D	0.9	1.0	0.9	0.6	1.0	1.0
	E	0.4	0.4	0.4	0.3	0.5	0.4
	F	0.5	0.5	0.4	0.5	0.5	0.5
	G	4.0	0.3	0.5	0.3	0.4	0.4
	H	0.0	9.0	0.0	9.5	9.1	0.3
	I	0.0	0.5	0.0	0.4	0.1	0.5
	J	0.0	1.4	0.0	1.3	0.1	1.4
	K	0.0	0.5	0.0	2.3	0.1	2.4
	L	0.0	2.4	0.0	2.4	0.2	2.4
	M	0.0	0.7	0.0	1.3	0.1	0.7
	N	0.0	6.5	0.4	7.4	0.4	6.5
	O	2.7	3.6	3.1	2.6	3.7	3.6
	P	0.0	4.0	0.5	4.5	0.7	4.3
	Q	0.0	4.5	0.5	4.7	0.6	4.6
	R	0.5	0.3	0.6	0.3	0.7	0.3
	S	0.6	0.3	0.6	0.3	0.6	0.3
	T	0.0	0.0	0.4	0.6	0.3	0.6
U	0.0	0.0	0.0	0.0	0.1	0.4	
2,3	A	5.0	5.5	4.0	5.5	4.5	5.3
	B	1.0	0.7	0.8	0.6	0.9	0.4

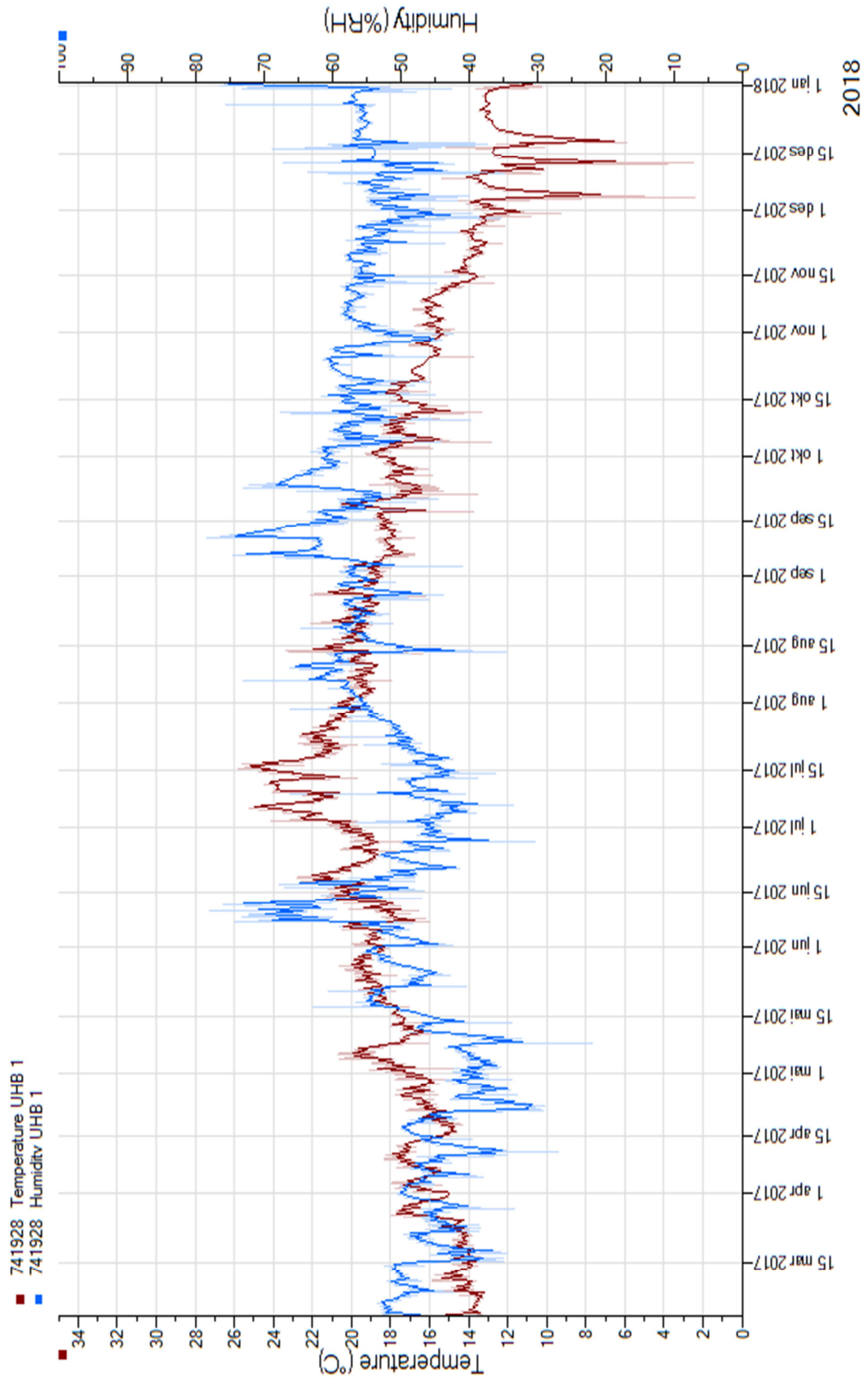
	C	2.5	0.8	2.3	0.8	2.8	0.8
	D	0.0	24.0	2.0	0.8	0.9	29.1
	E	0.0	0.0	0.7	0.5	0.8	0.7
3,1-2	A	3.3	10.0	3.9	10.3	3.1	10.0
	B	0.4	0.4	0.5	0.5	0.4	0.3
	C	0.3	0.4	0.4	0.4	0.4	0.3
	D	0.7	0.8	0.7	0.8	0.7	0.9
	E	4.7	1.7	4.6	2.0	4.9	2.1
	F	0.2	0.1	0.2	0.2	0.2	0.2
	G	0.7	0.4	0.7	0.4	0.7	0.4
	H	1.0	0.3	1.0	0.4	0.9	0.4
	I	2.5	2.5	2.4	2.4	2.9	2.2
	J	0.0	0.0	0.0	1.1	0.2	4.6
	K	0.0	0.0	0.1	0.1	0.1	0.2
	L	0.0	0.0	1.8	0.0	1.9	0.6
	M	0.0	0.0	0.0	0.0	0.4	0.6
	N	0.0	0.0	0.0	0.0	0.3	0.4
3,3	A	1.2	2.5	1.2	2.5	1.1	2.4
	B	0.7	0.0	0.8	0.2	0.6	0.1
	C	0.5	0.5	0.6	1.0	0.7	0.4
	D	0.5	1.0	0.6	1.0	0.3	0.9
	E	1.0	0.6	0.7	0.6	1.3	0.9
	F	0.0	0.0	0.7	0.7	0.3	0.4
	G	0.0	0.0	0.0	0.0	0.1	0.1
4,3	A	0.2	0.2	0.2	0.2	0.1	0.2
	B	0.7	0.3	0.8	0.2	0.7	0.3
	C	0.4	0.6	0.5	0.6	0.4	0.6
	D	0.2	0.3	0.1	0.2	0.2	0.5
	E	0.2	0.4	0.2	0.4	2.8	0.9
	F	2.5	2.7	2.2	2.0	0.2	0.2
	G	0.0	0.0	0.7	22.0	0.9	18.3
5,3	A	0.1	13.5	0.3	13.5	0.1	14.2
	B	8.0	0.2	0.8	0.2	8.0	0.2
	C	2.3	3.8	2.6	3.8	2.8	4.3
	D	1.5	0.2	1.2	0.3	4.3	0.9
	E	2.4	28.0	2.8	29.5	2.8	28.3
6,1-2	A	2.2	3.9	2.5	3.4	2.2	3.4
	B	1.1	1.0	1.1	1.0	1.0	1.0
	C	1.2	1.1	1.4	1.2	1.4	1.2
	D	0.9	3.1	1.1	3.5	0.9	3.1
	E	1.2	25.5	1.3	25.5	1.0	25.9
	F	1.1	1.0	1.4	1.0	1.5	0.9

6,3	A	1.7	3.9	1.8	4.0	1.7	3.9
	B	0.4	0.5	0.6	0.6	0.5	0.7
	C	2.5	1.4	2.5	1.8	3.3	1.9
	D	0.0	0.0	0.0	0.0	0.1	0.9
	E	8.4	0.3	x	x	x	x
	F	2.8	0.1	x	x	x	x
	E+F	x	x	0.2	13.1	11.5	0.2
	G	0.0	0.0	0.0	0.0	0.4	0.4
7,1-2	A	0.5	0.5	0.8	0.6	0.8	0.7
	B	0.7	0.7	0.9	0.8	0.9	0.8
	C	0.1	0.2	0.1	0.2	0.1	0.2
	D	0.1	1.2	0.1	1.3	0.1	1.4
	E	0.4	0.3	0.4	0.4	0.4	0.4
	F	2.2	0.2	2.6	0.3	2.9	0.8
	G	1.4	0.2	1.5	0.2	1.5	0.4
	H	2.2	1.4	2.2	1.5	2.2	1.5
	I	0.1	0.9	0.1	1.5	0.1	1.8
	J	0.1	0.2	0.1	0.5	0.1	0.4
	K	0.0	0.0	0.0	0.0	0.5	0.8
7,3	A	1.6	4.3	2.0	4.1	2.2	4.5
	B	0.2	0.1	0.4	0.2	0.3	0.2
	C	0.3	0.2	0.3	0.4	0.4	0.4
	D	2.9	1.6	2.7	1.5	3.6	1.8
	E	1.3	0.3	1.5	0.4	1.5	0.4
	F	1.4	2.1	1.5	2.5	1.6	2.6
	G	0.8	1.8	1.0	2.0	1.2	2.0
	H	0.4	0.2	0.6	0.4	1.2	3.6
	I	1.2	3.8	1.2	3.7	1.2	3.6
	J	0.8	0.4	0.9	0.4	1.0	0.4
	K	0.3	0.9	1.0	3.3	1.1	3.2
	L	0.5	0.1	0.8	0.2	0.5	0.2
	M	0.0	0.0	0.0	0.0	0.6	0.1
8,1-2	A	0.2	0.3	0.2	0.3	0.2	0.3
	B	1.1	0.2	1.1	0.2	1.0	0.2
	C	2.0	0.1	0.2	0.2	0.2	0.2
	D	0.1	0.1	0.2	0.1	0.2	0.2
	E	0.5	0.9	0.6	0.9	0.6	0.9
	F	0.5	1.1	0.5	1.1	0.4	0.8
	G	1.5	1.9	2.0	1.5	2.0	1.8
	H	0.0	17.6	0.7	17.7	0.9	17.8
	I	0.0	0.0	0.0	0.0	0.4	0.6
8,3	A	1.6	1.2	1.9	1.2	1.8	1.7

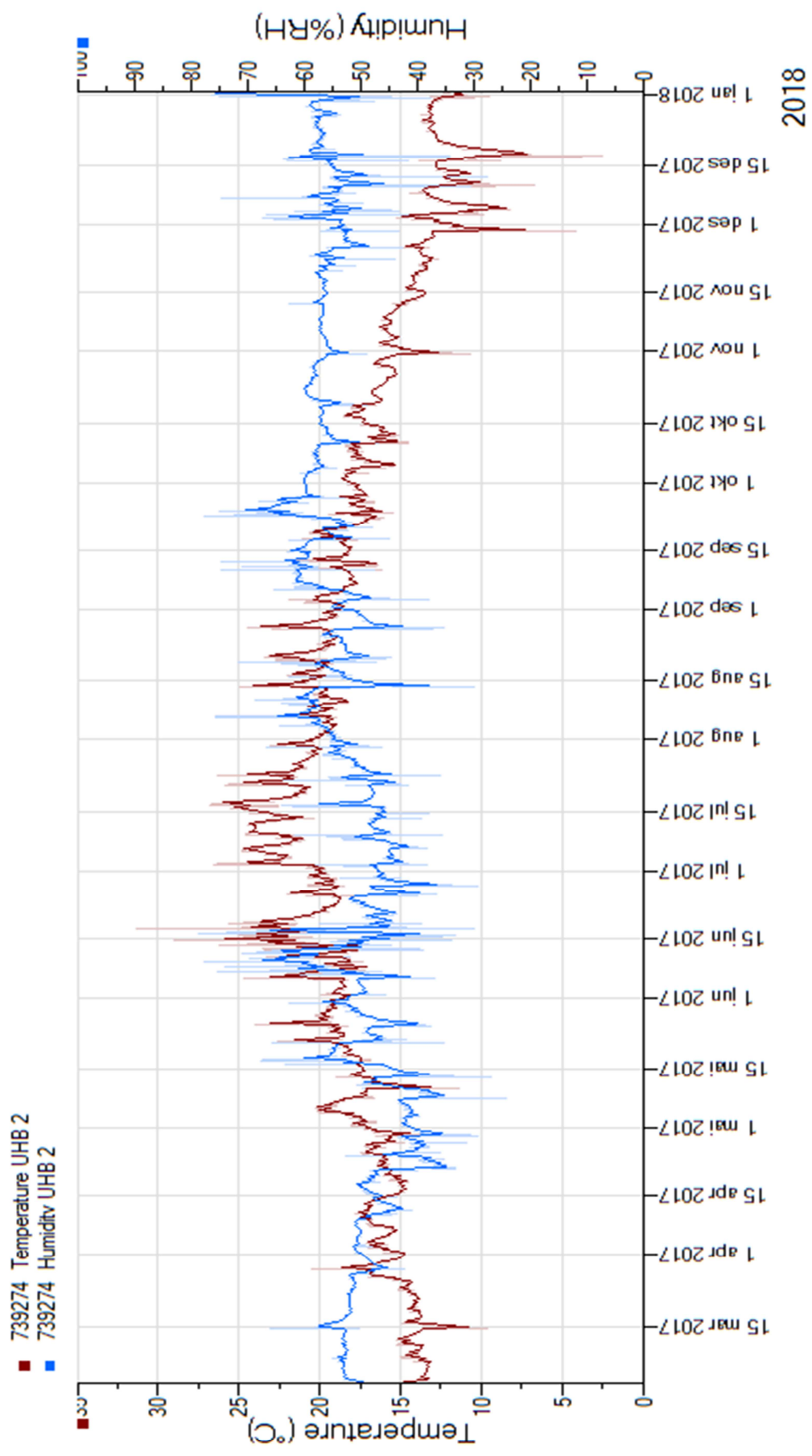
	B	0.5	3.4	0.7	3.6	0.6	3.5
	C	1.0	0.7	1.2	0.7	1.3	0.7
	D	0.0	0.0	0.1	0.1	0.1	0.1
	E	0.0	0.0	0.3	1.6	0.3	1.6
	F	0.0	0.0	0.1	0.6	0.8	0.1
	G	0.0	0.0	0.0	0.0	0.1	1.0
9,1-2	A	2.2	8.1	2.4	8.2	2.2	8.1
	B	1.8	1.5	1.7	1.5	1.8	1.5
	C	1.4	0.0	1.3	0.2	1.3	0.2
	D	2.5	28.5	2.5	28.2	2.8	39.1
	E	0.0	0.0	0.1	1.1	0.6	1.1
	F	0.0	0.0	0.2	0.1	0.2	0.1
	G	0.0	0.0	0.2	0.1	0.2	0.2
	H	0.0	0.0	0.1	0.1	0.1	0.1
	I	0.0	0.0	0.0	0.0	0.0	0.5
9,3	A	0.9	1.0	0.8	0.8	1.0	1.0
	B	1.4	1.1	1.2	1.4	1.2	1.3
	C	1.7	1.4	1.7	1.5	1.7	1.3
10,1	A	2.5	24.8	2.4	24.8	2.4	25.4
10,3	A	0.7	0.6	1.2	0.7	1.1	0.6

Appendix II

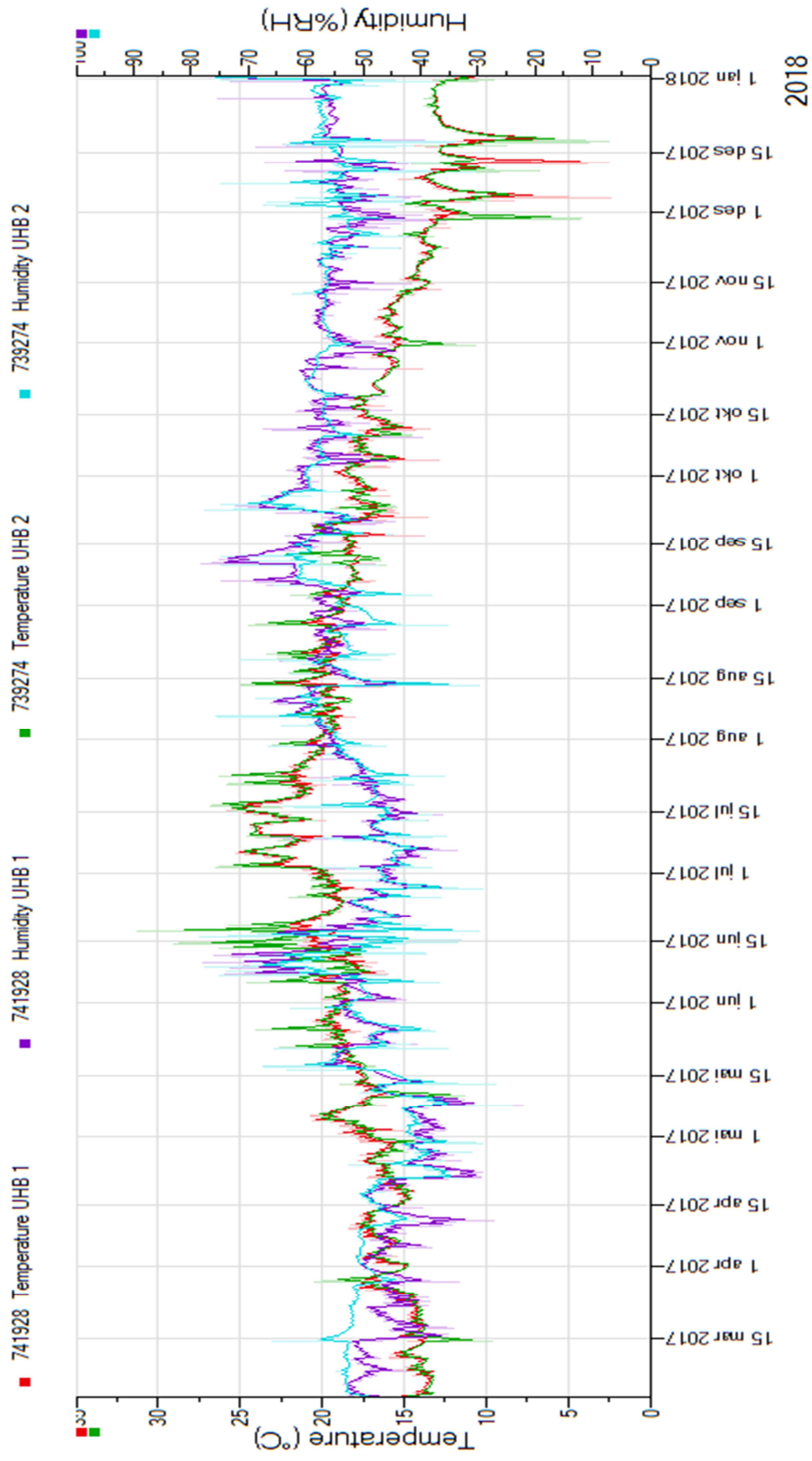
UHB 1



UHB 2



UHB 1 og 2



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