

Chaos I (Tinguely, 1974)

Weighing Perceived Values of Tinguely's Sculptures Against Technically Advanced Conservation

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Weighing Perceived Values of Tinguely's Sculptures Against Technically Advanced Conservation

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Abstract

Empa and Museum Tinguely's continuing collaboration inspired us to understand the aspects of Jean Tinguely's art that stakeholders value, Empa's anti-wear coating, and the impact the coating will have on stakeholders. We conducted interviews and surveys and discovered that Museum Tinguely is equipped to rectify misinformed restorations. Survey results confirmed that the coating would uphold the values we identified. Therefore, we recommended that Empa commit resources to adjust the anti-wear coating to work with Tinguely's sculptures and that Museum Tinguely involve external stakeholders in risky restoration projects. We also recommended Museum Tinguely develop reference criteria for restoration and Empa improve the documentation procedure we developed for further research.

Executive Summary

Introduction

Swiss artist Jean Tinguely constructed kinetic sculptures which onlookers found relatable for the human qualities they exhibited. His sculptures represent an influential and controversial art form and should be conserved. However, his sculptures have degraded over time, and their



Figure 1. *Heureka* sculpture by Jean Tinguely (Roland, 2010)

kinetic nature causes restorers to concentrate on restoration, rather than conservation, of the sculptures (Igra, 2017; “Jean Tinguely,” 2004). Museum Tinguely’s restoration projects face the complexities of the interaction between viewers and sculptures, and restorers must consider their impact on the many stakeholders of Tinguely’s art. In addition, Tinguely disliked displaying his art in traditional museums (Tinguely & Suter, 2015). Given that most restorations are carried out in museums, this creates a conflict.

The Laboratory for Nanoscale Materials Science at Empa collaborated with Museum Tinguely on the conservation of Tinguely’s sculptures. Empa offered to develop an anti-wear coating for the sculptures, modeled after another of their stick-slip coatings. They expect this new material to prevent further mechanical

degradation of his kinetic works and to not interrupt their acoustically important characteristics.

Museum Tinguely and Empa wanted to understand what stakeholders value in Jean Tinguely’s artwork. Further, our sponsors wished to identify any consequences associated with changes in the sculptures’ visual or acoustic characteristics. The goal of this project was to understand what stakeholders value in Jean Tinguely’s art, and to determine how the proposed intervention may impact stakeholders and their values. We designed the following objectives to achieve this goal:

1. Identify aspects of Jean Tinguely's art that stakeholders value
2. Determine the expected effects and consequences of the proposed intervention
3. Discover the ways in which the proposed intervention aligns with stakeholders’ values and the ways in which it conflicts

Our research will inform our sponsors of the social implications of pursuing Empa’s proposed intervention.

Methodology

We identified museum visitors, museum curators, and Empa researchers as stakeholders for our project. We desired to understand which traits of Jean Tinguely’s sculptures these groups valued. To better judge the expected effects and consequences of the proposed intervention, we needed to understand what stakeholders valued in Jean Tinguely’s art. Our primary method of data collection included interviews with stakeholders, but we also distributed surveys to visitors at Museum Tinguely. The surveys investigated which adjectives the visitors would use to

describe the sculptures, and further measured the importance of noise to the experience and the sculptures themselves.

To more accurately gauge the relative importance of the particular sound produced by the sculptures, we engaged participants in a separate side-by-side comparison. We showed participants both an original recording, and another with the audio distorted. We asked those subjects which of the two sounds they preferred and which corresponded best to the video to determine whether the changes in the recordings affected them differently. Their responses suggested that small changes in sound did not substantially alter their experience of the sculpture.

To fully understand the effects of Empa’s proposed intervention, we conducted structured interviews with Museum Tinguely staff members. The interviewees were selected to provide both a technical and a cultural perspective on Tinguely’s work. We also wanted to learn how the proposed intervention aligned with the various stakeholders’ interests.

Findings

We discovered that many people relate personally to Jean Tinguely’s artwork and legacy. Consequently, we needed to consider that Tinguely had inspired a broad group of stakeholders. We spoke with one museum visitor who felt personally and emotionally connected to Tinguely’s sculptures. Tinguely left such an impression that after the visitor saw the machines move on television, he “made it a goal to come to [Museum Tinguely] one day” (museum visitor, personal communication, September 8, 2017). This visitor embodied Tinguely’s wish for people to connect personally to his art. Though this man is a museum visitor, he may represent a larger group of stakeholders who have seen Tinguely’s works but have not sought them in Museum Tinguely.

Additionally, we found the movements and sounds of Tinguely’s sculptures reveal their essential meaning. Jean-Marc Gaillard and Olivia Mooser, two restorers at the museum, contended in interviews that without the sound and movement, uninformed visitors would find Tinguely’s sculptures difficult to understand. In our survey, visitors to the museum agreed that the sound produced by the sculptures is important to the museum experience and serves as an important part of

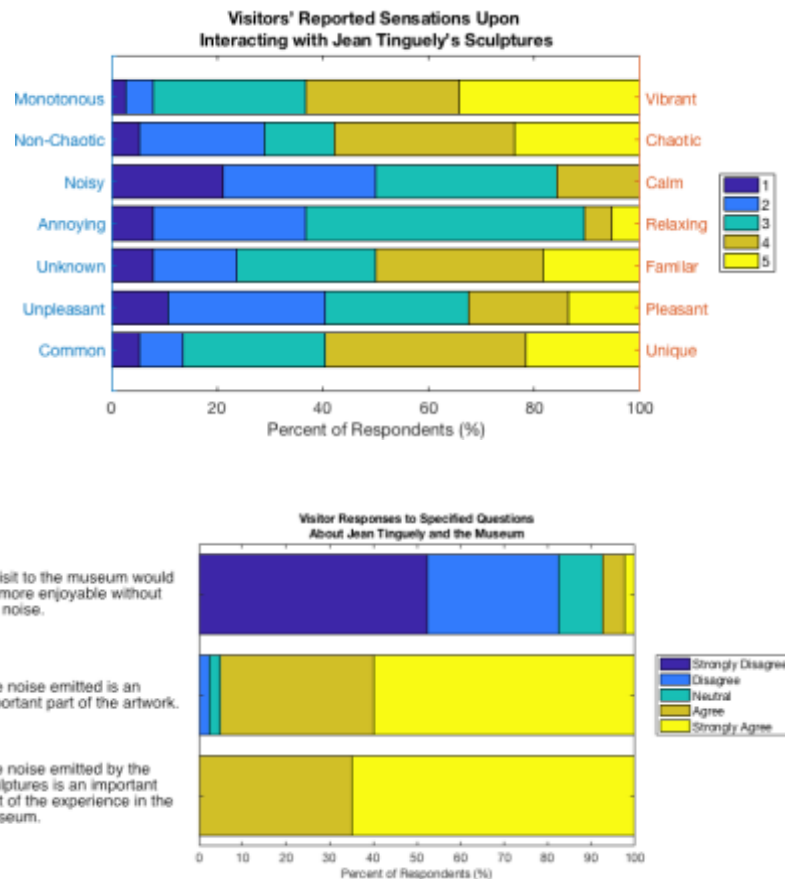


Figure 2. Museum Tinguely survey results

the artwork, while also generally denying that the museum would be more enjoyable without the noise. These results directly showed that visitors think the noise produced by the sculptures was important to both the artwork and the experience of the artwork, which matches Tinguely’s intent for the sound to convey meaning.

The restorers at museum Tinguely are experts on his works. Their familiarity with the sculptures in the museum empowers them to judge the restorative needs of each sculpture. Although general decision-making models for restoration projects exist, Museum Tinguely does not implement them in the restoration of Jean Tinguely's sculptures. In the long term, the museum intends to establish a “center of competence” for Tinguely’s artworks. This center would unite museums and associations invested in his art to develop common guidelines to standardize the restoration process.

Our interviews further revealed that restorers at Museum Tinguely lack the time, resources and legal license to pursue all the projects they felt would best fulfill Tinguely’s vision. Museum Tinguely has neither the time nor the resources to attempt every restoration proposal. Jean-Marc Gaillard thought that frequent fireworks and street vendors would embody Tinguely’s character better than the existing upscale bistro (J. Gaillard, personal communication, September 13, 2017). Despite employing interns with specialized skills to pursue projects, their resources limit their capacity to attempt restoration projects.

In discussions with Museum Tinguely staff, we investigated their existing documentation on the sculptures. Andres Pardey, Vice-Director of Museum Tinguely, recounted in his interview that the museum has an extensive collection of documentation and replacement parts for each sculpture (A. Pardey, personal communication, September 14, 2017). This archive insures against the inherent risk of restoration projects by housing material that would enable the reversal of the restoration if needed.

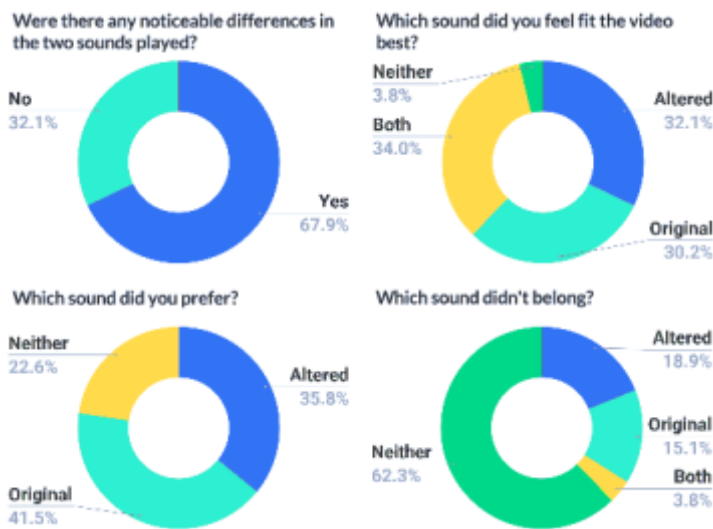


Figure 3. Side-by-side audio-visual survey results

We asked stakeholders about their expectations for the anti-wear coating. Pardey stated that he did not expect the anti-wear coating to influence the visitor experience. He further expressed that a slight change would not change the overall “feeling” of the sculpture (A. Pardey, personal communication, September 14, 2017). Our side-by-side comparison test, though it features a few limitations, generally confirmed Pardey’s statement. The test indicated that a slight change in the acoustic output of a sculpture can still maintain the overall spirit of the art as long as the movement is unaffected.

Based on these findings, we recommended that:

- Museum Tinguely involve the community in the decision-making process in some form.
- Restorers at Museum Tinguely develop a set of criteria for the restoration of the kinetic sculptures.

- Restorers and Empa use our documentation procedure as a stepping stone in the restoration process and research.
- Empa continue researching and testing effective ways of restoring kinetic art, especially the anti-wear coating.

We are pleased to offer our findings and recommendations to Empa and Museum Tinguely, and are honored to have assisted these two organizations on their conservation project.

Acknowledgments

This project is the result of several organizations joining together to work towards a common goal. Our team wishes to recognize the support we received throughout our project.

We would first like to thank Empa for sponsoring our project and for their continued involvement in our work. In particular, we thank Dr. Rowena Crockett and the team from the Laboratory for Nanoscale Materials Science for their guidance, and the Acoustics department for providing us with audio equipment to document Tinguely's work.

We would also like to thank the staff at Museum Tinguely for accommodating our project in their already busy schedule. Special thanks go to Dr. Andres Pardey and Annja Müller-Alsbach for speaking with us about the museum, and to Jean-Marc Gaillard and Olivia Mooser for helping us with the documentation of the artwork. The time they spent with us was invaluable and we very much appreciate the time they spent with us.

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Authorship

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Chapter 1: Introduction

A Formula I car crashes, the impact fracturing it into a hundred pieces. Resolutely, a man tears the fragments from the air, deftly welding them onto a motorized metal structure. In actuality, Jean Tinguely wielded his boundless energy to realize this artwork, dubbed *Pit Stop*, along with many more works. Some of his works met with a fiery demise in front of an astonished audience. He constructed kinetic sculptures which onlookers found relatable for the human qualities they exhibited. His sculptures incorporated found objects, each a unified whole that moved and interacted with visitors. These departures from traditional art forms challenged industrialized society, which Tinguely saw as wastefully productive. As such, his sculptures embodied the scraps of society. The sporadic motion of the sculptures and the peculiar sounds they produced intrigued audience members, who perceived the contraptions as individuals rather than spiritless machines. His sculptures represent an influential and controversial art form that warrants conservation, and their degradation has made conservation difficult (Igra, 2017; “Jean Tinguely,” 2004). Thus, instead of preventing predictable damage and degradation, experts have focused on restoration. As we discuss in chapter 2, the very acts of exhibition and restoration pose conflicts with Tinguely’s wishes and complicate the preservation and maintenance of his artworks, as he disliked displaying his art in traditional museums (Tinguely & Suter, 2015).

The Laboratory for Nanoscale Materials Science at Empa recently started collaborating with Museum Tinguely on the conservation of Tinguely’s sculptures. Empa offered to develop an anti-wear coating for the sculptures, modeled after a stick-slip coating designed for other uses. They expect this new material to prevent further mechanical degradation of his kinetic works and to safeguard their acoustically important characteristics. As the proposed intervention did not exist during Tinguely’s lifetime, he could not sanction its application to his sculptures.

Given the dynamic nature of Jean Tinguely’s artworks, we wanted to explore what stakeholders value in them. Moreover, our sponsors wished to identify any consequences associated with changes in the sculpture’s visual or acoustic characteristics. The goal of this project was to understand what stakeholders value in Jean Tinguely’s art and to determine how the proposed intervention could impact stakeholders and their values. We designed the following objectives to achieve this goal:

1. Identify aspects of Jean Tinguely's art that stakeholders value
2. Determine the expected effects and consequences of the proposed intervention
3. Discover the ways in which the proposed intervention aligns with stakeholders’ values and the ways in which it conflicts

Our research informed our sponsors of the social implications of pursuing Empa’s proposed intervention.

We discovered several key findings as a result of our research. We identified a strong sense of sentimentality towards Jean Tinguely’s sculptures for peripheral stakeholders. In addition, we found Museum Tinguely individually assessed the needs of each sculpture, and their extensive archives enable them to reverse inaccurate restorations. Based on these findings, we recommended Museum Tinguely engage stakeholders in any risky restoration efforts, particularly Empa’s anti-wear coating.

Chapter 2. Background

Even for experienced conservators, art conservation is an arduous exercise in continuous re-evaluation (Velandia, 2005). Jean Tinguely's sculptures pose several challenges to the people and organizations maintaining his artwork. This chapter provides background on the preservation of Tinguely's animated sculptures and the possible ethical dilemmas of working with his art. We examine the artistic significance of Jean Tinguely's sculptures. The subsequent section establishes Museum Tinguely and Empa's conservation problem. Finally, we present three major themes in art conservation case studies. These studies explore the artist's role in conservation and restoration, technology and conservation, and the importance of decision-making models.

2.1 Jean Tinguely: His Art and His Legacy

Jean Tinguely lived through his art. He expressed movement, sound, and playfulness through his machines. Under his guidance, these machines developed personalities and human-like characteristics, which he hoped would inspire people to perceive the labors of life in a new way. Moreover, his art depicted freedom and contradiction: ugliness as beauty, destruction as creation, and chaos as natural order. He portrays these themes in a way that links impermanent art with human mortality. He hoped his art would help reflect the idiosyncrasies of life better than a hyperrealist painting.

Tinguely believed time was precious and that one should “forget hours, seconds, and minutes. Accept instability. Live in Time. Be static—with movement” (Chau, 2014, p. 400). He explored the topic of destruction as creation through several exhibitions that lasted mere minutes. In one such event, he collaborated on a found-object sculpture and exhibition, *Homage to New York*, which burst into flames and destroyed itself (Chau, 2014; Kleiner, 2013). The destruction of his machines, he hoped, would remind viewers of their mortality and inspire in them a sense of urgency.



Figure 4. *Homage to New York*, 1960 (Wolff, 2011)

Tinguely's self-destructing works made headlines, yet he did not want all of his machines to experience the same fate. Indeed, he repeatedly repaired his works as they aged and broke down (A. Müller-Alsbach, personal communication, September 14, 2017). He did not prioritize the maintenance of the exact look or sound when a part wore down, but rather repaired his machines with the goal of keeping them vibrant and alive. The repairs focused not merely on their physical, kinetic expression of individuality, but also on the maintenance of their voice and the unique sounds they produced (Hummelen & Zijlmans, 1999, p. 30). One series of sculptures, dubbed *Meta-Harmonies*, united mechanics and sound in machines that produced proto-music. The creaks and squeaks did not harmonize or follow an established melody, but nevertheless provided a visual-acoustic spectacle. As Tinguely said, "my contraptions do not make music. . . . I sometimes build sound mixing machines to mix sounds and then let the sounds go, give them their freedom" (Müller-Alsbach et al., 2016, para. 2). Those erratic sounds evoke a diverse range of emotions from spectators. Another work, *Gismo*, underwent significant changes both before and after he sold it to Stedelijk Museum Amsterdam. Its relatively flimsy construction contributed to its personality, but it demanded significant maintenance. As a result of failures in handling and storage, its neck snapped, its axles became misaligned, and it lost many acoustically important parts. Tinguely maintained the machine to preserve its animated personality, yet in doing so he slightly changed the particulars of its movement and sound (A. Müller-Alsbach, personal communication, September 14, 2017).

Jean Tinguely disliked the traditional museum format, and once said that "there are prisons for thieves, and museums for artists" (Tinguely & Suter, 2015, para. 1). In 1988, he transformed a 3000 square meter empty factory into an "anti-museum": a combination of a workshop, a theater stage, and an exhibition venue. This new venue featured unpredictable hours of operation, perplexing terms of admission, and a constantly changing environment (Tinguely & Suter, 2015, para. 1).

When Tinguely's wife, Niki de Saint Phalle, offered to help him set up a foundation, he declined. Tinguely entrusted the property and moral rights of his sculptures to his wife (Niki Charitable Foundation, 2017). Niki de Saint Phalle was passionate about sharing his works with the world, and wrote that "the survival of your work was an obsession for me. By keeping your work alive, I was keeping you alive" (de Saint Phalle, 2012). Five years after his death she donated fifty-three of his sculptures and over ninety drawings to the Roche Centenary Foundation. The foundation dedicated a museum to preserve his legacy and many of his remaining creations. Although her intentions for the museum were commendable, they still deviated from Tinguely's original wishes for housing his work in an anti-museum.

The museum allows the machines to run with the original concept of the pedals Jean Tinguely installed in most of his sculptures. The pedals control the sculptures, and cause them to spring to life when pressed. The pedals have an important modulating effect on the collection as a whole: "if all the machines were to come alive simultaneously, the museum would sound like the engine room of an old battleship" (Riding, 1996, p. C14). The pedals let visitors activate the sculptures and leaves them otherwise dormant. This slows the rate at which they experience mechanical wear, and extends their lifespan. Despite this, the sculptures still experience wear, and the museum needs to address their deterioration.

Today, Jean Tinguely would be "shocked" to see his machines still running, but also proud (J. Gaillard, personal communication, September 13, 2017). Hummelen and Zijlmans claimed that he wanted everything to move even if it broke down, and would restore sculptures to achieve that end (1999). While the artist has the freedom to make changes to his art, the

conservator does not have that artistic license. The Code of Ethics from the Professional Guidelines adopted by European Confederation of Conservator-Restorers' Organisations supports this notion, as it stipulates that the conservator-restorer should avoid unnecessary treatment, and any interventions must be consistent with the particular heritage of the work (E.C.C.O. professional guidelines (II), 2003). This limitation receives further support from similar codes of ethics around the world (Canadian Association for Conservation of Cultural Property, 2000; VeRes code of ethics, 2004; Code of ethics and guidelines for practice, 1994). Intervention strategies affect a conservator's work because if Jean Tinguely's works are changed in any way, the conservator is responsible. Restorers must keep in mind that making the machine work "better" is not necessarily the end goal (Jennifer, 2016).

2.2 Museum Tinguely's Problem

Works of art face issues of conservation, and some art more than others. Tinguely's art undergoes significant mechanical wear through normal operation. As such, Museum Tinguely encounters the problem of different components wearing down and altering the overall personality and behavior of the sculptures as perceived by the stakeholders. Empa, an organization that conducts materials and technology research, was recently engaged by Museum Tinguely to investigate possible remedies to the degradation of Jean Tinguely's sculptures. Scientists at Empa developed a special anti-wear coating that may serve to both reduce some types of wear while preserving the unique sound personality of the sculptures. The proposal to apply this coating to the sculptures necessarily introduces a restoration technique that will change their longevity and functionality.

2.3 Case Studies in Preservation

All art preservation aims to "hand on to the future the best of the past" (Insall, 2017). Conservators must weigh numerous factors before choosing an intervention strategy. When the artist creates an artwork, they imbue the artwork with personal meaning. The preservation of the artwork entails the considerate preservation of the meaning itself, which may reside in cultural, historic, or aesthetic properties (Larson & Podany, 2017). Three themes feature prominently in the conservation of modern art. Technological advancements enable more historically accurate conservation projects. Artists define the meaning of their artwork, which determines the focus of a preservation strategy. Decision-making models reconcile numerous factors, including technical feasibility and artistic meaning, to direct preservation efforts.

Lamarque defines a set of related terminology in the field of art preservation: conservation, restoration, reversibility, and documentation (2016). Where conservation prevents expected damage and degradation, restoration repairs existing damage or degradation. Documentation captures meaningful details of artworks that enables reversibility by allowing future restorers to enact faithful restoration and conservation proposals. DiNoia identified three primary types of conservation: retirement, replication, and maintenance (2016). She described "retirement" as removing artwork from exhibition to avoid further environmental or mechanical wear, "replication" as a complete reproduction of the artwork, and "maintenance" as the use of different conservation techniques to maintain both material and conceptual aspects of artwork (2016).

The documentation of various attributes and factors for the purpose of art preservation carries an important caveat: many of the factors and attributes that matter in modern art are subjective. Regarding the kinetic sculptures of Gerhard von Graevenitz, Lang notes that the

viewer's mood largely determines their perception of the agreeability (2002, p. 4). The value in Tinguely's art may similarly vary from viewer to viewer. This introduces undesirable nondeterminism into the process of documenting both artists' relatively fragile sculptures. This nondeterminism makes the faithful restoration and conservation of their sculptures imperfect.

Case studies: The artist drives the conservation

As discussed previously, conservation efforts must abide by the artist's wishes and attempt to preserve the meaning the artist imbued in the art. In contemporary art, artists may ascribe meaning to arbitrary properties, including material, location, smell, or origin. Maintaining the authenticity of such a work requires understanding those meanings in order to best maintain them. Some components may have a unique meaning that proves impossible to perfectly replace.

Sculptor Tony Cragg constructed works with a wide range of recognizable objects, such as bricks, plastic, old sponges, and pieces of driftwood. He intentionally allowed his creations to break, rot, and shrivel until they decomposed entirely. This decay became an integral part of the meaning of his sculptures. Cragg claimed that he constructed his sculptures from rubbish, and argued that arbitrary rubbish should replace decayed components (Hummelen & Zijlmans, 1999). This perspective may differ from other artists, such as painters, whose art expresses mastery of technique and color. Cragg further argues that his progression in his own style and expression eventually makes him view his art from a new perspective (Hummelen & Zijlmans, 1999, p. 81). He therefore believes that he cannot comment on artworks made by his past self; as such, his opinion should be considered only as valuable as any of the conservators involved in a project (Hummelen & Zijlmans, 1999, p. 81). Cragg adds that the restorer should aim to restore the spirit and characteristics of the art piece instead of trying to create an exact copy of a single version of that artwork. His comments show that different artists may have wildly varying desires for restoration, and that each attempt to preserve an artwork must work off of an understanding of the artist in question. In general, artists retain the moral right to alter their own artwork as they see fit, but in the hands of conservators the overall appearance should remain intact (Hummelen & Zijlmans, 1999, p. 88). While the artist retains the moral right to make changes, those changes may alter the expression of the original artwork. Indeed, Cragg argues that he is unqualified to inform efforts to restore his earlier works, as his present perspective may be irrelevant or misleading.

Case studies: Technological advances improve and complicate conservation

Technological progress often makes previously unfathomable restorations possible, but in the process prompts novel ethical considerations.

The Uffizi Gallery in Florence, Italy, holds what remains of the Tribuna, a 16th-century octagonal room that once housed some of the most notable masterpieces of its time (Lusiardi, 2017). Due to concerns of degradation from environmental exposure, the Gallery no longer opens the room to the public. Instead, they continue to maintain the artwork, and have separately digitized the room and its artwork to support a multimedia exhibition that provides similar access without the environmental risk. The digitization of the works is a form of replication, and, similar to most types of replication, it raises concerns about the authenticity about the materials used. However, the exhibit does not claim to fully represent the original works. The three-dimensional models and images do not deceive the public, and still provide important access to the historical works.

Restorers working on a stained glass window in the York Minster Cathedral (figure 5) leveraged new materials and tools to undo a past restoration and restore the window to a closer approximation of its original state (Lamarque, 2016). Indeed, the technological improvements enabled higher retention of the original material, and of the original artistic appearance, preserving both the material and conceptual aspects of the artwork. The prior restoration had been hindered by incomplete historical documentation on the artwork, and by the materials and tools of the time.

These two case studies show different ways in which technology improves restoration and conservation. While the cathedral case study showed an improvement on the prior restoration, it begs a more complete analysis of the factors that go into a thoughtful conservation.



Figure 5. *The Great East Window, 4f, The Fourth Vial* - pre-restoration on left, post-restoration on right (Lamarque, 2016)

Case studies: Decision-making models inform conservation

Multiple conservation strategies may apply to a given artwork. Conservators and restorers must weigh many factors before deciding on a strategy. Decision-making models, such as the ones formalized in *Modern art : Who cares?* (Hummelen & Zijlmans, 1999) and *Whose decision is it?* (Marçal et al, 2013), bring structure and procedure to an otherwise subjective judgement call. The relative weights of each factor play into the final decision, yet that judgement call may not give sufficient weight to crucial factors. The decision-making models aim to help restorers.

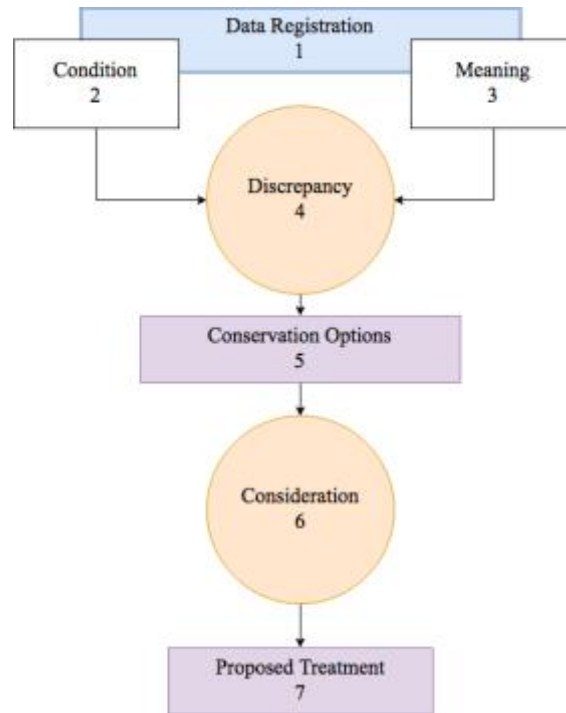


Figure 6. Interpretation of a decision making model for a given conservation project (Hummelen & Zijlmans, 1999)

Tribuna, for instance, posed a number of problems for conservators at the Uffizi Gallery (Lusiardi, 2017). Instead of choosing a single conservation strategy, they chose multiple: partial digital replication to provide continued access to the conceptual component of the artwork, and ongoing maintenance to preserve the conceptual and material components of the artwork.



Figure 7. Three-dimensional virtual viewing of a sculpture (Lusiardi, 2017)

2.4 Background Summary

Whereas many museums contain static artworks, Museum Tinguely houses dynamic sculptures that move and produce sound. Additionally, Jean Tinguely expressed an intent to let his sculptures deteriorate. As such, the museum faces unique technical and ethical barriers as they pursue different strategies for conserving Jean Tinguely's works.

Chapter 3: Methodology

The goal of this project was to understand what stakeholders value in Jean Tinguely's art, and to determine how the proposed intervention will impact stakeholders and their values. In pursuit of this goal, we designed the following objectives:

1. Identify aspects of Jean Tinguely's art that stakeholders value
2. Determine the expected effects and consequences of the proposed intervention
3. Discover the ways in which the proposed intervention aligns and conflicts with stakeholders' values

This chapter outlines the strategies we used to accomplish our objectives.

Objective 1: Identify aspects of Jean Tinguely's art that stakeholders value

We identified museum visitors, museum curators, and Empa researchers as stakeholders for the project. We wanted to learn which traits of Jean Tinguely's sculptures these groups valued. Tinguely's artwork expresses lifelike qualities, and evokes emotion through its expression of sound and movement. The continued degradation of his sculptures impacts stakeholders in various ways, and any interventions taken to mitigate the degradation would further impact the stakeholders. For instance, some sculptures have degraded to the extent that museums cannot exhibit them (R. Crockett, personal communication, Aug 24, 2017), making visitors unable to view them, and scholars unable to directly study them. To better judge the expected effects and consequences of the proposed intervention, we needed to understand what stakeholders valued in Jean Tinguely's art.

The exploration of values that individuals attribute to artworks does not lend itself well to a survey format—we did not want to limit responses to a multiple-choice questionnaire. Instead, we focused primarily on interviews as they did not restrict responses, but rather invited a thorough exploration of the topic via conversation. Our interview questions focused in part on the stakeholders' values, and in part on specific conservation strategies the stakeholders planned to deploy. In particular, we hoped to compare the potential outcomes of the strategies with the sculpture-attributed values. As such, our questions varied between stakeholders as each group had a different relationship to the project.

Empa produced a set of surveys, based on our proposed survey, in English, German, French, and Italian. We distributed these surveys to visitors at the museum on Friday, September 8, 2017, as the museum tends to have more visitors later in the week. Available in Appendix A, the surveys graded basic emotional responses to the museum experience with a simple Likert scale, and further measured the importance of noise to the experience and the sculptures themselves.

In surveys and interviews, visitors self-report their expected values and interests. To more accurately gauge the relative importance of the particular sound produced by the sculptures, we engaged visitors in a side-by-side comparison. Using video recordings of Tinguely's sculpture *Matrac*, we showed participants both the original recording, and the same video recording with distorted audio. We asked the participants to comment on the two sounds to determine whether the changes in the recordings affected them differently. Their responses suggested whether the particular sound was essential to the presentation of the sculptures.

Objective 2: Determine the expected effects and consequences of the proposed intervention

We needed to fully understand the effects of Empa's proposed intervention. We conducted structured interviews with Museum Tinguely staff members and Empa researchers as our primary investigation method (Appendix B). The interviewees were selected to provide both a technical and a cultural perspective on Tinguely's work. In addition to a standard set of questions for all interviews, we also asked specific questions that were relevant to each group of stakeholders. We looked for specific responses to our questions that commented on the positive and negative consequences of the intervention, such as "slow the deterioration" or "improve visitor experience by allowing sculptures to run more frequently." We combined our findings from these interviews to inform our final objective.

Objective 3: Discover the ways in which the proposed intervention aligns and conflicts with stakeholders' values

While the proposed intervention has the potential to alter the acoustic effects of Tinguely's sculptures, it also stands to change the very way in which people interact with the sculptures. We wanted to determine how the proposed intervention aligned with the various stakeholders' interests. We addressed this objective through further interviews with stakeholders.

Chapter 4: Findings

The deterioration of Jean Tinguely's kinetic sculptures led Museum Tinguely to perform ongoing maintenance. Researchers at Empa saw this as an opportunity to implement their anti-wear coating. We designed this project to understand aspects of Tinguely's art that stakeholders value and to determine how the proposed intervention will impact stakeholders and their values. In pursuit of this goal, we determined the expected effects and consequences of the proposed intervention, and discovered how the intervention complies with these values. This project supported the researchers at Empa by establishing the broad significance of Tinguely's sculptures, and by showing that the application of their coating, based on certain assumptions, should be consistent with visitor values. We executed our methodology and learned the following:

1. Tinguely's sculptures hold significant personal and sentimental value for a broad group of stakeholders.
2. The meaning of Tinguely's sculptures depends on their expression of movement and sound.
3. Museum Tinguely has not established a decision-making model to drive conservation and instead makes case-by-case decisions and judgment calls.
4. Rules and available resources limit the ability for restorers at Museum Tinguely to fulfill Jean Tinguely's vision.
5. Museum Tinguely has archives of reference material that provide necessary documentation and reversibility.
6. Key stakeholders expect Empa's anti-wear coating will not interfere with the expression of meaning in Tinguely's artworks.

Finding 1: Tinguely's sculptures hold significant personal and sentimental value for a broad group of stakeholders.

In our first objective, we investigated which aspects of Tinguely's sculptures the stakeholders found valuable. We determined little about particular values themselves, and instead discovered that many people personally relate to Jean Tinguely's artwork and legacy. We described peripheral stakeholders as people with a strong connection to Tinguely who primarily saw his artwork during Tinguely's era, instead of in Museums. Tinguely's art evokes strong sentiment for a large group of stakeholders. Consequently, we needed to consider that Tinguely had inspired a broad group of stakeholders. This group experienced his energy, yet did not derive this inspiration from any museum visit after his passing.

We spoke with one museum visitor who felt personally and emotionally connected to Tinguely's sculptures. This visitor found that one of Tinguely's sculptures, *Grosse Méta-Maxi-Maxi-Utopia* (figure 8) and its large wheels and drive belts reminded him of his childhood growing up on a grain farm. Tinguely left a lasting impression on this visitor, and he recounted seeing Jean Tinguely move materials through the streets. Tinguely left such an impression that after the visitor saw the machines move on television, he "made it a goal to come to [Museum Tinguely] one day" (museum visitor, personal communication, September 8, 2017). This visitor embodied Tinguely's wish for people to personally relate to his art.

Though this man is a single museum visitor, he may represent a group of peripheral stakeholders who saw Tinguely's works but have not sought them in museums. Restorer Olivia Mooser claimed that growing up, every child knew of Tinguely's machines. Due to Switzerland's small geographic size, an artist as inspirational as Tinguely stood out to people in

their everyday lives (O. Mooser, personal communication, September 12, 2017). A woman we met in our travels recounted her experience watching Tinguely's machines on television and how she thought of them as inspiring works. Such an account makes her part of the peripheral group of stakeholders. These people value Tinguely's artwork in some way, and this makes them stakeholders in his artwork and related conservation or restoration projects.

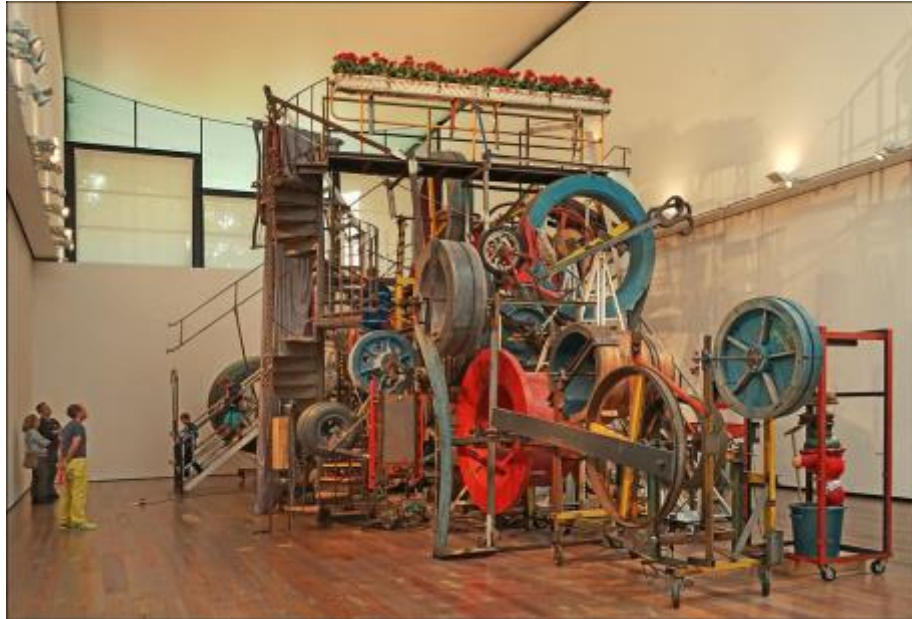


Figure 8. *Grosse Méta-Maxi-Maxi-Utopia* (1987) (Dalbéra, 2016)

In addition to realizing that many peripheral stakeholders value Tinguely's artworks, we discovered that some stakeholders have deep emotional connections to Tinguely and his artwork. Jean-Marc Gaillard gave insight into who Tinguely was as a person, as an artist, and the legacy he left behind. Gaillard knew Tinguely as a kind-hearted man, but Tinguely always felt stressed because he knew his life was too short to finish everything. Tinguely sent Gaillard to different workshops two weeks at a time, all over the world, to speed the process of building the sculptures. Gaillard dedicated his life by taking responsibility for the upkeep of the sculptures by searching for replacement parts. Gaillard reflected that "I must always get myself back in that moment and say that [Tinguely] is gone" (J. Gaillard, personal communication, September 13, 2017). Gaillard came to the realization that he has to be the one to keep the sculptures moving and alive. Gaillard's deeper connection to the machines is reminiscent of Tinguely's own adoration of his works. Gaillard views the sculptures as his own children, and the museum as his living room (J. Gaillard, personal communication, September 13, 2017).

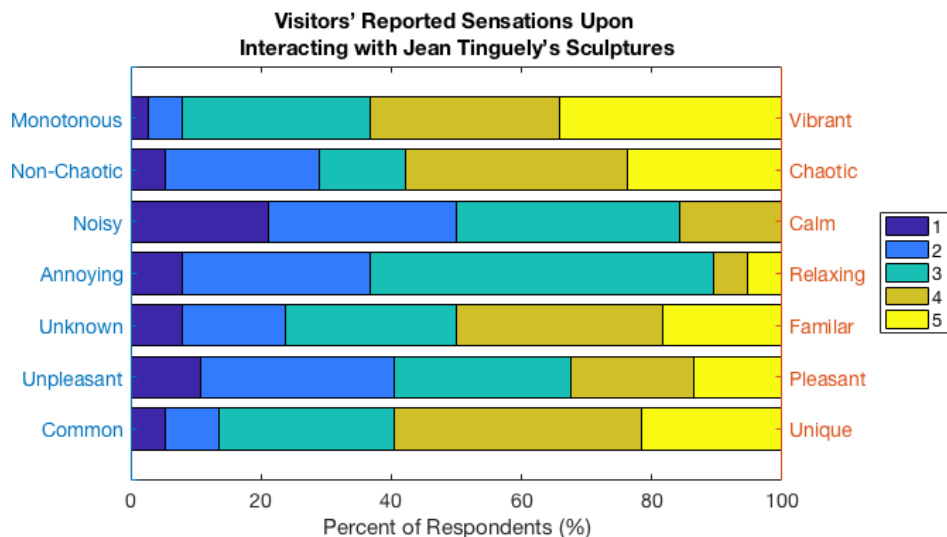
Finding 2: The meaning of Tinguely's sculptures depends on their expression of movement and sound.

The movements and sounds of Tinguely's sculptures reveal their essential meaning. Gaillard and Mooser, in interviews, contended that without the sound and movement, uninformed visitors would find Tinguely's sculptures difficult to understand. Visitors to the museum agreed that the sound produced by the sculptures is important to both the museum

experience and serves as an important part of the artwork, while also generally denying that the museum would be more enjoyable without noise.

Gaillard claimed that Tinguely’s kinetic sculptures demonstrated more complexity than other famous works, such as Van Gogh’s paintings (J. Gaillard, personal communication, September 13, 2017). He further noted that people who witnessed Tinguely’s explanation of his works better understand their meaning, especially the meaning imparted by the movement and sound—the movement and sound thus capture his energy better than their other properties. Moreover, the movement and sound form the personality of the sculptures, which generates a playful atmosphere. If the sculptures ceased to move, they would lose their personalities and their primary modes of expression. Gaillard suggested that the complete breakdown of Tinguely’s machines would force stakeholders to relive his death, and imagined that Basel would “rumble” in response (J. Gaillard, personal communication, September 13, 2017). Mooser also agreed, noting that, “when [the sculptures] stop, it is not an art museum, but then a history museum,” and that visitors would not fully understand the sculptures without their movements (O. Mooser, personal communication, September 12, 2017). Andres Pardey concurred, and noted that Tinguely’s “work has its materiality, its movement, and. . . sound—the sound is very important” (A. Pardey, personal communication, September 14, 2017). The stakeholders we interviewed at Museum Tinguely all agree: movement and sound are instrumental to the sculptures’ meaning.

Our survey results further supported the importance of movement and sound to the expression of meaning in the sculptures. All respondents agreed that “the noise emitted by the sculptures is an important part of the experience in the museum,” and a full 65% strongly agreed. Additionally, thirty-eight of the forty respondents agreed or strongly agreed that “the noise emitted is an important part of the artwork,” and 83% disagreed with the statement that “a visit to the museum would be more enjoyable without the noise.” These results, presented in figure 9, directly showed that visitors think the noise produced by the sculptures is important to both the artwork and the experience of the artwork. Therefore, the experiences of these two restorers, as well as the visitor survey responses, demonstrated the importance of sound and movement to the expression of meaning in Tinguely’s art.



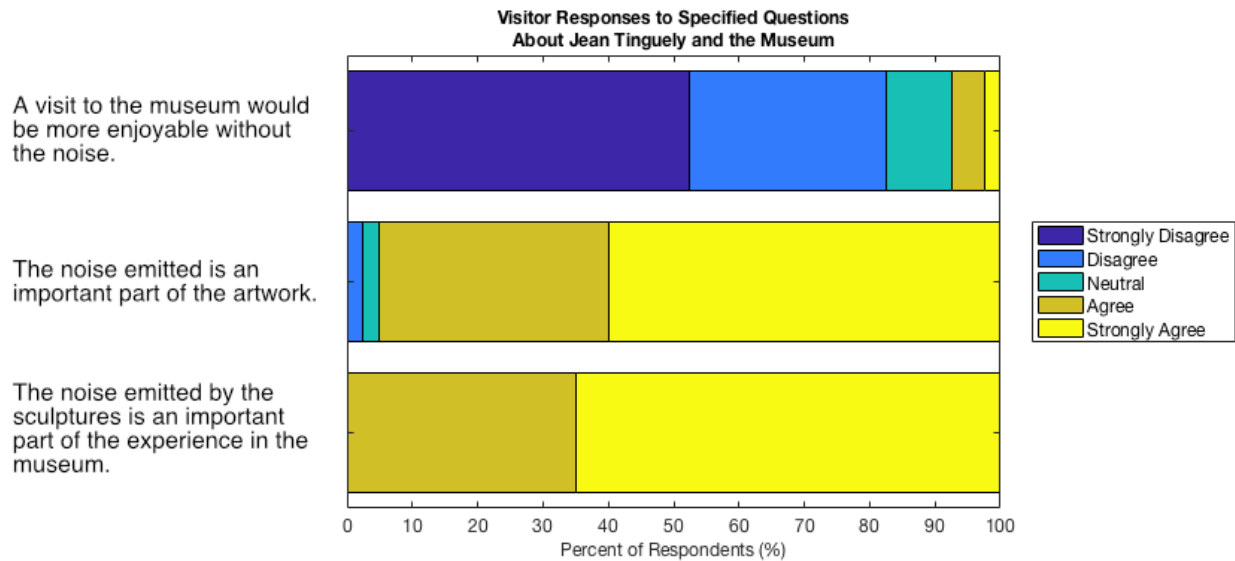


Figure 9. Graphical representation of survey results

Finding 3: Museum Tinguely has not established a decision-making model to drive conservation and instead makes case-by-case decisions and judgment calls.

The restorers at Museum Tinguely are experts on his works; they are intimately familiar with all of the sculptures housed in the museum, which empowers them to judge the restorative needs of each sculpture. The two members of the restoration team daily work to preserve each sculpture individually, addressing issues of wear and degradation as they appear (O. Mooser, personal communication, September 12, 2017). Although general decision-making models for restoration projects exist, Museum Tinguely does not implement them in the restoration of Jean Tinguely's sculptures. The dynamism of Tinguely's works, and the restorers' tight schedules underlie the museum's preference toward case-by-case judgment calls. In turn, this expedites the museum's ability to approve specialized restoration projects for skilled interns.

Long-term, the museum intends to establish a "center of competence" for Tinguely's artworks. This center would unite museums and associations invested in his art to develop common guidelines to standardize the restoration process. According to Mooser, this would be a stepping stone for the development of concrete standards in the restoration of Jean Tinguely's works. If the general consensus is established for this set of standards, Tinguely's sculptures will have the opportunity to be characterized and easier to document for the future (O. Mooser, personal communication, September 12, 2017).

Finding 4: Rules and available resources limit the ability for restorers at Museum Tinguely to fulfill Jean Tinguely's vision.

Our interviews revealed that restorers at Museum Tinguely lack the time, resources, and legal license to pursue all the projects they felt would best fulfill Tinguely's vision. According to Andres Pardey, there are many restoration projects they would like to act on. Their budget largely determines which projects they attempt (A. Pardey, personal communication, September 14, 2017). Part of this budget includes hiring more people to help with their work. Gaillard and Mooser are the only restorers that work full-time at museum. Even with hiring interns to perform special projects, their efforts can only focus on so many projects at a time.

Beyond preservation, the restorers felt that the museum itself conflicts with Tinguely's desire for the display of his sculptures, in that it distances visitors from the sculptures and reduces the sculptures' ability to express themselves. Jean-Marc Gaillard spoke to us in detail regarding Tinguely's vision for an "anti-museum":

An anti-museum is a completely different way to look at a museum. [Jean Tinguely] wanted the opposite way: to allow people to touch his sculpture. It would be cool to do an exhibition for a few weeks. If alive today he would have fireworks going off and the restaurant would have street vendors cooking [food]. (personal communication, September 13, 2017)

Gaillard also described both his and Tinguely's desire for people to prove their genuine interest in the anti-museum by begging for entry. Gaillard recounted Tinguely's vision for the anti-museum's entrance, which reflected that desire: "there [would be] this woman by the door painting her nails and you would ask if you could buy a ticket to get in. She would say she has no time. Then she would insult you a little bit, say she does not like your haircut and maybe. . . maybe let you in," (J. Gaillard, personal communication, September 13, 2017). Gaillard lamented that Tinguely had not completed his anti-museum before he died, and claimed that it would be "not possible" to build it today. He noted that most modern museums have white walls, whereas Tinguely would paint the walls "blacker [than] black" and would play with overhead lighting to accentuate his sculptures with shadow (J. Gaillard, personal communication, September 13, 2017). In particular, Gaillard pointed out that the museum must forbid visitors from touching the art, yet Tinguely wanted visitors to connect physically with his living works. We did not pursue the subject further and did not fully understand his reasons for dismissing the potential for such a museum today. In our discussion with Olivia Mooser, she likewise expressed interest in having an exhibition that would have held true to Tinguely's anti-museum.

Finding 5: Museum Tinguely has archives of reference material that provide necessary documentation and reversibility.

We investigated documentation previously collected by Museum Tinguely. Andres Pardey informed us that the museum has an extensive collection of information and material from each sculpture. Every piece of artwork, he claimed, had a box to hold items pertaining to that particular sculpture. This included documentation, from Tinguely's drawings to photos and videos, and materials including new replacement parts, and old worn down parts. The materials they collect, Pardey explained, vary between sculptures. For example, if a certain piece of art frequently wears out a particular belt, then the museum would stock that belt in the appropriate archive box to ensure they have a replacement when it inevitably fails.

The archive also exists to guarantee reversibility of any restoration process, whether by the museum or by a third party. The staff may review the documentation to confirm that a restoration complies with the sculptures prior aesthetic qualities. They might examine the documentation to imitate the type and color of a lost bell, or to verify that a replacement part follows the same trajectory as the old part.

The restorers could also reference the archive to assess the authenticity of an artwork restored by a third party. Annja Müller-Alsbach explained that the archive has proved useful in this regard, but that it has several shortcomings due to lack of documentation prior to their acquisition of some of the sculptures. In the case of Tinguely's *Méta-Harmonie I*, parts of the sculpture were restored by a private collector before being added to the collection at Museum Tinguely. The sculpture incorporates a violin and bow, but the bridge of the instrument is missing. Due to the absence of this small part, the violin does not produce noise. Since there

were no prior efforts to document the sculpture before its arrival at the museum, the restoration staff is at an impasse: did Jean Tinguely design the machine without the bridge, or did the bridge fall off and the violin should really be making noise? Based on this lack of documentation, the restorers involved had chosen to not find a replacement bridge for the sculpture.



Figure 10. Violin found on *Méta-Harmonie I* (Weidacher, 2016)

The archive is thus meant to prevent any similar confusion for restorers both now and in the future. Once the museum has adopted this thorough documentation as a standard, changes from the application of a coating pose less risk to the sculptures. Museum Tinguely will be prepared to revert the sculptures back to their authentic forms, should the coating fail to achieve its purpose.

Finding 6: Key stakeholders expect Empa’s anti-wear coating will not interfere with the expression of meaning in Tinguely’s artworks.

In pursuit of our second objective, we asked stakeholders about their expectations for the anti-wear coating. Vice-Director Pardey stated that he did not expect the anti-wear coating to influence the visitor experience. He further expressed that even if the coating does change the sound slightly, it would not change the overall “feeling” of the sculpture (A. Pardey, personal communication, September 14, 2017). As Vice-Director, Pardey oversees Museum Tinguely’s collection of sculptures and works with the restorers to triage and plan restoration and conservation projects. The decision-makers thus expected the coating to minimally affect how viewers perceive the sculpture while upholding longevity of the artwork.

One of our surveys confirmed Pardey’s statement to be generally true. We asked survey participants to watch two videos of the sculpture *Matrac*, one with the original sound and one with the audio altered. As shown in figure 11, the results indicate listeners mostly could not discern a difference between the two audio samples. The survey controlled against bias by presenting the videos in random order, and similarly presented the answers to questions in

random order. This supports Pardey’s claim that the coating will minimally impact viewers’ perception of the sculptures, by suggesting that a slight change in the acoustic output of a sculpture can still maintain the overall spirit of the art provided it does not affect the movement.

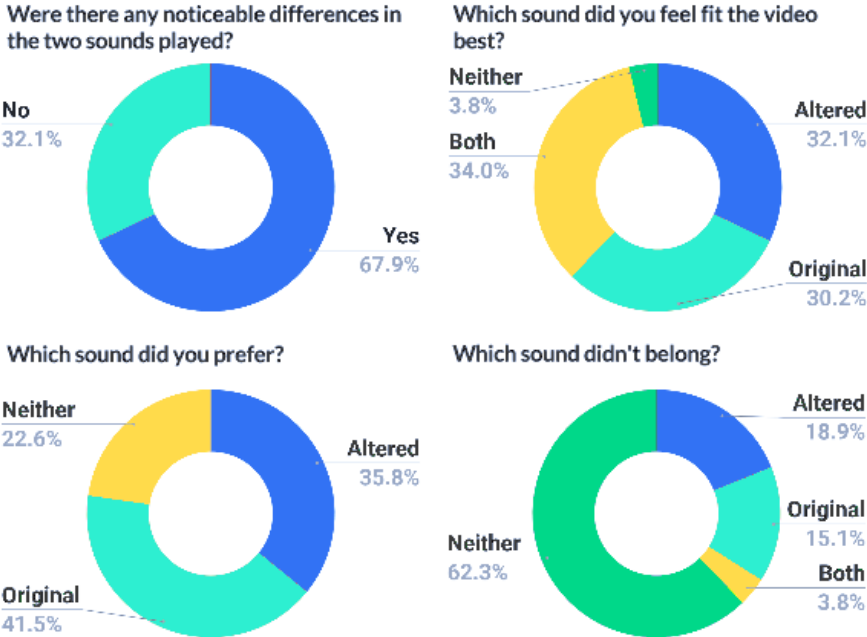


Figure 11. Results from audio-visual comparison survey

Conclusion

We executed our methodology and have extrapolated these findings. They encapsulate the most salient results of the data gathered and inform our recommendations in the next chapter.

Chapter 5: Recommendations

Our investigation identified a need for guidelines to support restorers and conservators when working with Jean Tinguely's sculptures. Many factors complicate the restoration of Tinguely's sculptures. First, the presence of many stakeholders makes the decision-making process involved in restoration more difficult. Second, complications that arise in the work due to the sculptures' kinetic and acoustic nature increases the burden on conservators. Finally, the prominent tone of Jean Tinguely's comments on restoration demands a greater degree of sensitivity from the restorers and conservators in that process. We propose recommendations that address these complications, and which may guide conservators and restorers when working on Jean Tinguely's sculptures.

On behalf of Museum Tinguely, restorers Jean-Marc Gaillard and Olivia Mooser have considered putting together a "center of competence" (O. Mooser, personal communication, September 12, 2017). In this center, collectors and museum owners of Tinguely's sculptures would work in collaboration with restorers to develop a set of standards for the restoration of the works. These standards would provide clear guidance for maintaining Tinguely's sculptures. Conservators at the Stedelijk Museum who work specifically with *Gismo* introduced new tools to assess the restoration needs and ethical considerations of kinetic sculptures. They organized a committee consisting of experts from relevant disciplines to perform a strength/weakness analysis to gain insight on the conservation issues. These experts included metal restorers and construction restorers, who understood the tools, clocks, motors, and the limitations of materials. As part of this collaboration, they developed restoration techniques that, if implemented, would reinforce the sculpture without sacrificing its overall aesthetic and authenticity (Hummelen & Zijlmans, 1999). These goals and ideas overlap significantly with our recommendations in the restoration procedures and how our research may serve as inspiration for their own future establishments on Jean Tinguely's sculptures.

In general, guidelines for restoration and conservation depend on the reversibility of the technique and documentation before and after the application. The artwork should first be considered as a whole; only afterward may the work be considered for intervention (Hummelen & Zijlmans, 1999). Restorations must make all reasonable effort to avoid perceptible changes to the sculpture, although—depending on the sculpture—individual parts may be replaced. The American Institute for Conservation has set forth a "Code of Ethics," which goes into further detail:

The "Principle of Reversibility" is one of the factors which establish our unique intent to project our work into the distant future. Conservators have an obligation to assure to the best of their ability that the condition of an object remain unchanged long after treatment is completed. Knowledge of how conservation materials age, how they interact with the object, and how the object responds to its environment is therefore necessary to fulfill this obligation. (Appelbaum, 1987)

Restoration procedures include cleaning, disassembly, internal consolidation of structural weakness, changes in the original materials, repairs and reassembly and additions, all of which depend on reversibility to insure against their inherent risk. The most drastic restoration treatments are aesthetic additions that are largely cosmetic, such as protective coatings and fillings. This technique must have the highest requirements of reversibility due to the potential risks of damaging the structural integrity of the sculpture (Appelbaum, 1987). These extreme changes may deceive the viewers and misrepresent the sculpture, thereby changing their

interpretation of the work. In order to preserve all aspects of the sculpture, video and sound recordings must be made before any restoration has taken place (Hummelen & Zijlmans, 1999).

In comparison to the restoration processes of most artworks, Jean Tinguely's sculptures demand a wide range of considerations that require a different set of standards. Through our investigation, we found that Tinguely's sculptures and their meaning resonated with a broad group of stakeholders. In order to move forward in restoring the sculptures, these stakeholders should be included in the decision-making process. **We recommend that Museum Tinguely involve the local community in the decision-making process in some way.** This opportunity for public feedback will allow people the freedom to voice their concerns with the restoration of Jean Tinguely's sculptures. For instance, the museum could hold an open conference about the conservation and restoration of Jean Tinguely's sculptures. Restorers could also hold events at the museum with more information sessions, where the museum could introduce and enlighten visitors of the ongoing difficulties of restoring Jean Tinguely's sculptures. These events may encourage interested parties to participate and share their personal experiences or memories of Tinguely. As a supplement to this, Museum Tinguely could add a separate, permanent exhibit that details specific issues with the conservation and restoration of his artwork. Several visitors in our surveys expressed frustration in having to wait for a sculpture to run. Therefore, visitors may benefit from understanding the strategies the museum has deployed to conserve the artworks, especially the pedal cooldown period. There is sentimental value in Tinguely's sculptures and discussing this value may help restorers strike a balance between the various factors that influence restorations.

Due to their kinetic and acoustic nature, Jean Tinguely's sculptures demand constant maintenance. This complication burdens restorers with repairing or mitigating damage to allow the machine to run for visitors. **We recommend that the restorers at Museum Tinguely develop a set of guidelines for the restoration of the kinetic sculptures.** This guideline could help make objective decisions based on the effects of the proposed intervention instead of individual judgement calls. These criteria would serve as a tool for weighing the merits of a given course of action. Restorers would decide on the important properties of the sculpture, and set up the criteria from there. For example, if the restorers decide the aesthetics are important to Tinguely's vision, any proposed intervention must take that into consideration. These criteria would give a general standard for all sculptures when they break down, which might allow for more consistent restoration processes. On the other hand, the criteria would need to allow enough flexibility to avoid overly restricting restorers and to protect stakeholders' values.

We have found little prior documentation regarding the changes made to the sculptures by both Jean Tinguely and conservators. Tinguely felt he did not have the time to document the changes he made to his sculptures when they broke down. His focus was to keep his sculptures moving, making sounds, and staying alive (A. Müller-Alsbach, personal communication, September 14, 2017). In addition to the interviews and surveys we conducted at the museum, we worked in conjunction with Empa to document the current state of the sculptures (Appendix C). To this end, we developed a procedure to give reproducible audio-visual data for each sculpture we examined. **We recommend that restorers and Empa use our procedure for documenting audio-visual properties of the sculptures as a starting point towards more research.** A thorough and complete documentation of the sculptures would ensure that future restorations have a well-defined target, rather than vague goals from incomplete documentation. In the future, it will be important to be able to look back and determine the changes that have occurred, either by human hands or by time, and to reverse them. Before any restoration effort is attempted, steps

should be taken to make sure a full documentation of the sculpture has been obtained using the same methods we developed.

Empa's existing research in nanoscale materials, and its myriad of applications, indicate that other materials may likewise help conserve kinetic art. **We recommend that Empa continue researching and testing effective ways to restore kinetic art, including the anti-wear coating.** We have not found substantial established precedents for the restoration of kinetic art, highlighting the need for a rapid validation of coatings applied to the art. Coatings may introduce cosmetic changes to sculptures, or pose a more fundamental risk to the structure. Research should explore whether or not the coating could cause small changes in appearance, and whether or not those differences would damage the overall experience of the artwork. This could be done in a similar fashion to our side-by-side comparison of two videos of *Matrac*. More research in this field may increase adoption of the coating among restorers.

Jean Tinguely's sculptures have affected audiences in Basel and internationally. The continued effort maintaining his sculptures speaks to the importance of Tinguely and his artworks to the art community, and to his enduring legacy. Further research and development of restoration techniques will lead to a more informed exploration of his work. Jean Tinguely is an artist whose work pushes the boundaries of art restoration, and whose art impacts entire communities.

Chapter 6: Conclusion

The goal of this project was to understand what stakeholders value in Jean Tinguely's art and to determine how Empa's proposed intervention would impact stakeholders and their values. Our research identified that more people are emotionally invested in Tinguely's artwork than was previously recognized. We also identified a need for guidelines regarding the conservation and restoration of Tinguely's kinetic works. Empa and Museum Tinguely may draw on our research to further understand the complexities involved in their collaborative restoration project.

We identified several limitations of our project. Art preservation comprises a broad field that requires significant time to fully investigate. Additional research is needed to discover all the relevant topics in the field. Further work should seek to build a broader foundation of knowledge to corroborate our findings. Many of our findings build on four interviews; a greater pool of stakeholder responses would strengthen these findings. Language barriers and time constraints left us unable to interview visitors; future research should seek broader opinions from visitors and peripheral stakeholders. Future study of technically advanced conservation of Tinguely's sculptures would benefit from addressing these limitations.

Our investigation of Jean Tinguely and the restoration of his art shed light on important ethical considerations in the realm of art conservation. We are pleased to offer our findings and recommendations to Empa and Museum Tinguely, and are honored to have assisted these two organizations on their conservation project.

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Appendices

Appendix A. Empa - Museum Tinguely Survey

Evaluation of the Acoustics and Motion of Tinguely's Art




Visual and Acoustic Characterization of The Tinguely Sculptures

Students from the Worcester Polytechnic Institute, Massachusetts, will be present in the Museum Tinguely between 29 August and 29 September. They are in Switzerland as guests of the Empa in Dübendorf. Images and sounds of selected sculptures will be recorded in order to document the current state of the works.

This flyer contains a questionnaire, which we ask you to complete and return to the students or to hand in at the reception when you leave the museum.

In addition, the students will question the museum's visitors about their experiences with the works of art. The aim is to characterize the sculptures in their current form allowing future changes to be identified. This study is part of a larger Empa project, which aims to find a long-term solution for wear on the Tinguely sculptures.

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Questionnaire

1. Please describe the noises made by the Tinguely sculptures by circling one answer per row. 1 indicates that the adjective on the left is the most representative and 5 indicates that the adjective on the right is the most representative. 3 indicates that neither adjective applies.

unpleasant	1	2	3	4	5	pleasant
unknown	1	2	3	4	5	familiar
common	1	2	3	4	5	unique
annoying	1	2	3	4	5	relaxing
noisy	1	2	3	4	5	calm
non-chaotic	1	2	3	4	5	chaotic
monotonous	1	2	3	4	5	vibrant

2. Do you agree or disagree with the following statements, please tick the appropriate box.

The noise emitted by the sculptures is an important part of the experience in the museum

1 strongly disagree	2 disagree	3 undecided	4 agree	5 strongly agree
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The noise emitted is an important part of the artwork

1 strongly disagree	2 disagree	3 undecided	4 agree	5 strongly agree
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A visit to the museum would be more enjoyable without the noise

1 strongly disagree	2 disagree	3 undecided	4 agree	5 strongly agree
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3. Please provide the following information:

Gender:

- female
 male
 other

Age group:

- 0-8 25-40
 9-16 40-65
 17-25 >65

4. Please provide any comments you might have concerning the Museum Tinguely.

Appendix B. Interview Questions

Sample Interview Points to hit (Museum Staff)

1. What do you enjoy most about working at museum Tinguely?
2. What makes Tinguely's art special, in your view?
3. How would the community benefit from the preservation of Jean Tinguely's work?
4. How would the community be affected if Jean Tinguely's sculptures were to stop moving?
5. How do you see the museum functioning in the future?
6. Have you noticed any changes in the sculptures in the time you have worked here?
7. Do you think Jean Tinguely would have enjoyed seeing his work preserved?
8. In your view, how will the museum benefit from the preservation of Tinguely's sculptures?
 - a. Will the anti-wear coating affect the visitor's experiences with the sculptures?
 - b. Will the anti-wear coating affect your person experiences with the sculptures?
 - c. How might it permanently or temporarily alter the sculptures?
9. How does applying this coating compare to replacing worn-down components wholesale?
10. Does thoughtful conservation of artwork require preserving artistic integrity and artistic meaning?
11. On the contrary, does a structural and mechanical preservation of an artwork's original form constitute conservation?

Sample Interview points to hit (Museum Restorers)

1. You have worked closely with Jean Tinguely, we would like to hear more about who he was as a person and what it was like to work with him.
2. Can you tell us more about Jean Tinguely's view on the anti-museum?
3. How would you envision an anti-museum today or in the future?
4. What were Jean Tinguely's views on restoration of his works?
5. What restoration techniques or strategies have you used or do you currently use at the museum?
6. With regards to the acoustics, what kind of restoration procedures have you conducted that irreversibly changed the workings of the sculpture?
7. How would the community be affected if Jean Tinguely's sculptures were to stop moving?
8. In your view, how will the museum benefit from the preservation of Tinguely's sculptures?
9. How would the community be affected if Jean Tinguely's sculptures were to stop moving?
10. Does thoughtful conservation of artwork require preserving artistic integrity and artistic meaning?

Sample Interview Points to hit (Empa)

1. Why did you become interested in working with Museum Tinguely on reducing the wear of Tinguely's machines?
2. Have you ever restored art?
3. In your view, how will the museum benefit from the preservation of Tinguely's sculptures?

- a. Will the anti-wear coating affect the visitor's' experiences with the sculptures?
 - b. Will the anti-wear coating affect your person experiences with the sculptures?
 - c. How might it permanently or temporarily alter the sculptures?
4. How does applying this coating compare to replacing worn-down components wholesale?
 5. Does thoughtful conservation of artwork require preserving artistic integrity and artistic meaning?
 6. On the contrary, does a structural and mechanical preservation of an artwork's original form constitute conservation?

Interview Points to hit (Visitors)

1. What is your favorite aspect(s) of his sculptures?

2. Least favorite?

Background:

His sculptures are aging and falling apart due to wear and friction. There have been proposed interventions to keep his sculptures functioning as normal.

1. What aspect of Jean Tinguely's art is worth preserving?
2. Would you be satisfied with a digital or physical replica of one of Tinguely's sculptures?
3. Should Jean Tinguely's art be preserved if he meant for it to degrade?

Appendix C. Procedure for Audio-Visual Documentation of the Sculptures

The procedure for taking video recordings of each sculpture will be as follows:

1. Set up all instruments being used in a standard orientation
2. Mark where all equipment is relative to the sculpture, noting approximate distances, heights, and directions
3. Record desired video/sound
4. Name the recording under the following format: yyyy-mm-dd-sculpturename-nameofdevice-#
5. Repeat for however many recordings are necessary for that sculpture
6. When recordings are done, extract and store the files on computer

Procedure for audio setup:

1. Per sculpture basis
2. Calibrate mics
3. Document what equipment used and how they were connected
4. Measurements
 - a. Height relative to a defined base for the sculpture
 - b. Manhattan distance
 - c. Define coordinate system and cardinal direction
 - d. Draw diagram of all measurements
 - e. Take a picture of orientation that describes in a visual way
5. Claps indicate recording has started
6. Push button to start sculpture
7. End recording
8. Perform two to three tests

Flaws

- Rooms will never be completely quiet, due to the acoustics of the room and changing environment
- We did not have the expertise or equipment to measure the acoustics of the room itself
- Did not have appropriate measuring tools for the distances, which limited accuracy of positioning