European Royal residences

REPÚBLICA PORTUGUESA
CULTURA

PATRIMÓNIO CULTURAL
Direção-Geral do Património Cultural

PNMAFRA

Technical meeting

Mechanical Objects

4-5 April 2019

Palácio Nacional de Mafra, Portugal

List of the presentations

- "The stylistic evolution of the English longcase clock of the XVIIth and XVIIIth centuries. Mafra's clocks", Luís Couto Soares, ancient clocks restorer at the National Palace of Mafra
- "Overview of the mechanical objects of the Palace of Versailles: furniture and clocks. State and problematic", Elisabeth Caude, curator, Palace of Versailles
- "The great astronomical clock by Passemant: « a miracle of science»", Hélène Delalex, curator, Palace of Versailles
- "Clocks in the State Hermitage Museum", Mikhail Guryev, Head of Clock and Musical Machine Restoration, State Hermitage Museum
- "Measure and decorate. The clocks' collection of the Royal Palace of Turin", Lorenza Santa, curator, Royal Museums of Turin
- "Horloges de Mafra" – Clocks of Mafra, clockmaker, François Simon-Fustier
- "Eighteenth-century clocks from the Palace on the Isle in Łazienki", Aneta Czarnecka, curator of art collection, Royal Lazienki Museum
- "A brief overview of the collection of clocks, watches and other mechanisms in the Moscow Kremlin Museums", Ekaterina Shcherbina, senior researcher, Moscow Kremlin Museums
- "An overview of the mechanical objects from collections of the Peterhof State Museum Reserve", Anna Shulgat, curator of collections, Peterhof State Museum-Reserve
- "The Chinese mechanical toys, end of the XVIIth – beginning of the XVIIIth c., from the collections of Peter the Great and Catherine the Great", Maria Menshikova, senior research fellow, curator of Chinese decorative arts, State Hermitage Museum
- "In search of the best way to make the oldest form of "music preserves" available to visitors", Silke Kiesant, curator for clocks and musical instruments, Prussian Palaces and Gardens Foundation Berlin-Brandenburg

- "The preservation of musical instruments collection in Patrimonio Nacional", Lorena Robredo García, conservator of musical instruments and decorative textiles, Património Nacional

---

This meeting gathered 26 participants. The opening of the meeting has been done by Mário Pereira, director of the National Palace of Mafra and Isabel Yglesias, technician superior.

The first day, a technical visit of the clocks and carillons of the Palácio Nacional de Mafra has been organized to study the restoration works which have been done. Indeed since 2001, the carillons do not work anymore. They have been restored and they have sounded again in 2020.

The stylistic evolution of the English longcase clock of the XVIIth and XVIIIth centuries. Mafra's clocks, Luis Couto Soares, Palacio Nacional de Mafra, Portugal

Introduction on English longcase clocks

It is thought that the long case may have been derived from the lantern clock, with an added case to protect the pendulum and also for a more aesthetic presentation. With scientific innovations and fashion evolution, longcase clocks evolved with time. We can quote two major modifications:

- The introduction of the "pendulum" → in the middle of XVIIth century, pendulums were introduced, which increased the time measurement accuracy and the autonomy of the clock. The first pendulums were too big and had such wide swings that it could not be fitted within a case. Then technical devopments allowing clockmakers to use longer pendulums, which had slower "beats" and were more accurate. Moreover, it was not necessary anymore to wind up the clock every day. The clock could work for one week, one month or even one year.

- The introduction of a second clock hand → The 1st English longcase clock had only one hand; an hour hand. The increased accuracy of the clocks motivated the addition of the minute hand. When second hand appears, it was very difficult to understand information for people about hours. Everyone used to use only one hand.

English clock-making industry has been very influenced by French Huguenots who emigrates from 1685 with the revocation of the Edict of Nantes. Before the immigration, the case of the clock were

in oak. With the French immigration in England, English furniture gains a lots and start using vernis, other woods and technics. Clocks became more sophisticated with marquetry, dials in bronze and engraved, etc. Along XVIIth century, complexity of marquetry is bigger and we found different kinds of clocks.

Most longcase clocks were made from circa. 1660 to 1860. For me, the Golden age of the longcase making is the last quarter of the XVIIth and first quarter of the XVIIIth century. Then, I find that there is a decrease in quality and in beauty.

Thomas Tompion (XVIIth century): may well be described as the father of British clockmaking. He offered a longcase clock in the pump room at Bath. This clock worked for one month. He introduced for the first time the dial in an arch instead of a square. It allows to give space to add a lot of things: moon phases, calendar, advertising, etc

Joseph Knibb: Some rare clocks use a form of striking known as "Roman Striking" (invented by J. Knibb) in which a large bell or lower tone is sounded to represent "five", and a small bell or high tone is sounded to represent "one". For example, four o'clock would be sounded as a high tone followed by a low tone, whereas the hour of eleven o'clock would be sounded by two low tones followed by a high tone. The purpose is to conserve the power of the striking train. For example, "VII" would be a total of three strikes instead of seven, and "XII" would be four strikes instead of twelve. The idea was very intelligent but the perception of the public was not good. People don't understand the system so this type of clocks is very rare and so, very valuable today.

The clocks in the National Palace of Mafra

The clocks in the Palace of Mafra are around 1730's according the names engraved and their types. Artists, work-makers wrote their name behind the dials. These dials could be real masterpieces with a lot of decorations, information, etc. But it is important to note that the case itself is very important even if the "case-makers" worked for the "clock-makers". The quality of the case can make the difference.

Regarding some dials' restoration/

- Silvered dials: necessity to clean the dust and to re-silver when we restore a "classic silvered dials"
- Painted dials: (All longcase clocks had brass dials, until the introduction of the painted dial around 1770 which had a big success because the silvered dials go darker with time). We found dials with painted hunting scene. The problem is that the paintings lost quality with

time and it is not easy to restore them. We can not only clean them as the "classical" not painted dial. Sometimes, we note that previous restorations on some dials were very bad.

"Overview of the mechanical objects of the Palace of Versailles: furniture and clocks. State and problematic" Elisabeth Caude, Palace of Versailles, France

It is important to remember that science and mechanics are centers of interest of French sovereigns. Some years ago, Beatrix Saule, former director of the Palace of Versailles, realized an exhibition called "Science in Versailles". That is to say the importance of this field in Versailles. Science is a visible sign of power, wealth. It is also the sign of Enlightenment. Thus, we know that Louis XIV liked clocks with automatons and was ready to buy very expensive clocks (i.e: "*Pendule du Génie de l'horlogerie*" for 4 000 pounds). Louis XV was also very interested by clocks and we can evoke the "Cabinet des Pendules" in the King's Private Apartment where it was possible to find various types of clocks. (This cabinet is became the "Cabinet de la Pendule" with the famous astronomical clock by Passemant). Louis XVI was passionate about locksmith.

Number of clocks in the collection of Versailles: 160
→ 70 are in storage, 60 are exhibited to the public in which 7 to their original places and 20 are in deposit.

It is important to note that there are a big variety of clocks:

- Different time: XVIIIth century, XIXth century, empire time, etc
- Different watchmakers: Antide Janvier, Jean-Antoine Lépine, Antoine Wolf, Joseph-Léonard Roque
- Different types: neoclassical, Boulle, Rocaille style, etc
- Different functions and different aspects: small clocks vs monumental clocks, clocks with complex mechanism, clocks associated to a piece of furniture, clocks associating several functions as time function, musical function and light function

This diversity and all the clocks' different aspects (marquetry, scientific mechanisms, etc) necessarily raise problems during restoration.

Some examples of clocks and mechanical objects in Versailles

- **Clocks with exceptional mechanisms/**
  The *Astronomical clock* by Passemant (see detailed presentation by Hélène Delalex) and the "*Pendule de la création du monde*" which is now at Le Louvre. The "*Pendule de la création du monde*" was presented in 1754 at Louis XV. Ordered by the governor of Pondicherry as a gift, the clock has never been offered and it subsequently entered the national collections. This clock has a great importance in terms of art history. This clock has been the subject of a fundamental restoration in terms of gilded bronze, the analysis of its mechanism or the level of its gilded wood structure.

- **Clocks with automatons/**
  The "*Louis XIV's clock*", delivered in 1706 for the King 'Apartments in Versailles but listed in the general inventory of Crown furniture in 1729. This clock has been transformed around 1763 (replacement of Boulle marquetry of copper and ebony by veneer of exotic woods) so we have a "distorted vision" compared to the original version. The mechanism is visible through the glass. In the XVIIIth century, we wanted to show, to make visible the mechanism. Above the dial, two cupids strike stamps then the central doors open and the King appears. From the clouds comes Fame to crown the King as the sun emerges.

- **The barometers/**
  The "*baromètre du Dauphin*" ordered for the future King Louis XVI or the "*Baromètre de Louis XV*" then "*Baromètre de Louis XVI*" ordered in 1772 by Papillon de la Ferté. The King wanted a high quality barometer in his private apartment. Delivered after the death of Louis XV in 1775, the barometer was placed in the clock room (Cabinet de la Pendule), in front of the clock of Passement; then he went to the so-called "Salle à manger dite des retours de chasse" (hunting returns dining room), where he is now on display. Versailles also has in its collection all the barometers of the 1st Empire, in the Trianon Palaces.

Some problematics and subjects about the care of mechanical objects

Restitution/
There is a problem linked to the restitution of historical state. At the Palace of Versailles, except for some masterpieces, a lot of pieces were dispersed during Revolution. Consequently, the right clocks are not often at the good place. Sometimes it is possible to buy them again but often we have to proceed by equivalence. It is the example of "*Pendule au Génie de Mars*" which is today at

Versailles while this clock was originally made for Fontainebleau. This clock is an almost exact equivalence of the clock that was previously in Versailles.

Restoration/

The restoration requires a multidisciplinary work. The clocks have been made by different work-makers. The dials were made by enamellers, the boxes by bronziers, etc. So now, when we have to restore these masterpieces, it is necessary to have different restorers in front of us, different specialists to understand all the different mechanisms, all the different parts of the clocks. We noted that during the XIXth and XXth, the restoration of these clocks were not made by specialists. They did not understand the movements of the different pieces and they did not know the "good gesture" for restoration. For each part of the clock (box, dial, clock mechanism, etc), it is absolutely necessary to have the right expert. Consequently it's seems for me necessary to have a group of restorers and a group of conservators working together.

Study case in Versailles: the watchmaker/

At the Palace of Versailles, we have a specific contract with a watchmaker for several years. This person have to maintain all the clocks exhibited in the Palace. However, it is important to mention that this watchmaker is not authorized to make the big restauration. All his little interventions should be noted in a book in order to have a follow up. This will to maintain these clocks in the Palaces is also destined to the public. It appeared the last years that it was important to create an atmosphere in the apartments. The sounds of the rings and of the clock hands are important in the visit experience of the public. It gives live, as lights. The watchmaker of Versailles comes once a week to wind up the clocks. Thus the visitors see that the clocks are always on time.

The great astronomical clock by Passemant "a miracle of science", Hélène Delalex, Palace of Versailles, France

Introduction and history

Realization of the clock:

- Claude-Siméon Passemant (receives the title of "King's engineer" and not "watchmaker" after having conceived some automatons at Court)
- Louis Dauthiau
- the Bronziers Caffieri

The great astronomical clock by Passemant is an iconic work of the Palace of Versailles. It is an artistic, scientific and mechanic masterpiece. Passemant spent eight years developing the calculations and designing the gear train. Twelve years have been necessary to Dauthiau to create the mechanism. This mechanism has been presented to the Royal Academy of Sciences in 1749. Behind the globe there is the mention "invented by Passemant and executed by Dauthiau". It testifies that it is above all a scientific masterpiece. The clock has a certificate attesting the extraordinary precision of the mechanism.

Then, the entire clock has been presented to the King (presentation equivalent today to Nobel Prize). Louis XV himself chooses the model of the box in bronze realized by Caffieri. The arrival of the clock in Versailles is a real event. The duc of Luynes wrote in his *Mémoires* that "this clock is a miracle of science". The clock has not been sold during Revolution as it was a testimony of the French Genius. A lot of copies have been made during the XIXth century.

Exploring the mechanism

We have a look of the mechanism through the 3 glass doors. The mechanism is organized in 4 blocks:

- **Astronomical globe and planetary system**
  At the top of the clock there is a crystal sphere indicating the evolution of the 6 planets (according the state of knowledge of the mid-XVIIIth century). We find the zodiac signs, the revolution of the moon around the earth, equinoxes and solstices. To note that movements of the planetary system are free of the clocks movements. Consequently, it is possible to rotate by hand to see the position of the planets, the zodiac signs, etc, at a given time.
- **The clock system**
  The system has 4 clocks hand: the solar hour, the medium time, the minutes and the seconds. The amplitude of the pendulum's oscillation is strong. The Pendulum can be used as natural thermometer because is made of steel and copper.
- **Rings system**
  They are 3 bells. One for the hours, one for the half hour and one for the quarter hour
- **Calendar**
  There is a complete calendar with the days, months and years until 9999. The bissextile years are also visible.

We can highlight the beauty of the mechanism. Only 1 020 pieces are activing all the mechanisms. Its complexity is not visible. Apparently, when someone looks the mechanism through the glasses, it seems very simple, very natural. It has been quoted by the watchmakers of the century.

Restoration

There were 3 important restorations in History. The last one was made after the World War II (the clock was hidden in center of France).

The project of restoration is foreseen in several phases:

- **Remove dust and clean the crystal glob and the planetary system**
  The crystal globe is composed of 2 spheres in glass of Murano. The bronze is dirty and the mechanical system is dusty. There are some abrasive surfaces.
- **Restoration of the bronzes**
  The question is to know if we have to disassemble or not the different element. It's also conceivable to use electronic approaches.
- **Restoration of the clocks**
  Some clock hands have to be replaced because there is a friction with the other clock hands.
- **Re-engagement of the astronomical system**
  The system doesn't work today in order to not damage the entire system.
- **Modelling and scanning the mechanism**
  It is essential to take advantage of new technologies. It is a way to have a record and to better understand the mechanism. It is also better to explain this masterpiece to the public. A 360° degree capture has been already realized. The next step is to show the interior of the clock, the mechanism.

Clocks in the State Hermitage Museum, Mikhail Guryev, State Hermitage Museum, Russia

General Information about the collection

- State Hermitage Museum: one of the largest museum in the world → around 3 million items in collections. Over 2 000 people working there, including some clocks peoples
- Number of clocks: between 2 000 and 3 000 clocks
- Clocks exhibited: around 50 clocks (not space enough)
- Clocks collection: from XVIth to XXth century. A big part is from XVIIIth to the beginning of XXth century.
- Management: There is not a specific "clock curator", neither an "clock deposit", "clock department". The Hermitage is especially an art museum and the clocks are distributed between the different departments. Long case clocks are managed by the furniture

department, clocks with diamonds, golded are managed by the Treasure's department and are often exhibited, etc.

- Big variety of clocks: French, English, German, Swiss clocks. Grand and miniature, shaped into the dome of heaven or a small bird, with six clock hands or a mechanical orchestra inside, etc

Some reflections about restoration and maintenance of clocks in Hermitage

- The Laboratory for Scientific Restoration of Timepieces and Musical Mechanisms was established in 1994 and aims to study, restore and maintain the Museum's collection of timepieces and musical instruments.
- Many experts and professionals must be involved in the restoration. Clocks have always been high-tech products as their manufacture involved dozens of different specialists: musicians, bronzers, cabinetmakers, jewellers, enamellers, etc. Therefore, a good restoration must involve a large number of specialists both in the museum and outside.
- It is important to be aware that restoration's project can be long. In Hermitage, it took 10 years to complete the restoration of the Shtrasser's big clock which is the biggest in Russia that has a mechanic organ.
- In Hermitage, we try to follow traditional methods of manufacturing. We have to preserve the traditional mechanical clocks technics
- In case of broken pieces, we can replace them but each new piece is marked. We put a Hermitage "stamp" on the piece. It is a way for future restorers to know the origin of the modification.
- Visitors like to watch the mechanisms of the clocks and other mechanical objects. The crowd around the famous "*peacock clock*" testifies it.
  Video You Tube: https://www.youtube.com/watch?v=ilPlVRoUl_8

Measure and decorate. The clocks' collection of the Royal Palace of Turin, Lorenza Santa, Musei Reali di Torino, Italy

Text provided by Lorenza Santa. See the Power Point presentation to see the pictures (Pic) evoked in the text.

My speech, concerning the clocks' collection of the Royal Palace, focuses on two main aspects: history and conservation. Since I'm not a specialist of clocks' mechanism, first of all my main intention is to know the history of these precious artworks for finding the best manner to preserve them for future. For studying the clocks in the Royal Palace we have an essential starting point: the catalogue of the exhibition "Clocks in furniture of the Royal Palace of Turin and Savoia Residences" (Pic 3). This exhibition was organized in Turin in 1988-1989 and, in that occasion, art-historians and experts studied the clocks of palaces, castles and villas of Savoia Family in and around Turin (they analysed more than 200 clocks). In the archives, they studied documents as letters, payments, and inventories in order to consider acquisitions, clock makers' names and rooms in which these objects were put. For that exhibition also many restorers worked on cases and mechanisms, so it was the first important occasion to consider properly this part of our cultural heritage.

Discussing about clocks of a royal residence means obviously considering interior design. Clocks are complex objects, made by a case, a dial, a mechanism, a basement, with different functions and aspects:

- First of all, measuring time, announcing the hours of day and night with sound. In the past, royal residences' apartments had a soft sound in the background, a sound that sometimes today they don't have anymore.
- Secondly, clocks are objects to be loved and collected, regarding the personal taste of the King, Queen, Prince, nobleman at Court (for example on the right of this portrait of Polissena of Assia Sardinia's queen, we can see a clock on the table) (Pic 4). Clocks were often chosen and bought by the dynasty under the indications of the Royal Architect. In the Savoia court the architect Filippo Juvarra (died in Madrid in 1736 where he went to work for that Royal Palace) introduced the taste for a global decoration, closely linked to architecture and to the structure of the building. He directly called painters, sculptors, cabinet-makers, artisans and sometimes he made sketches for clocks, as we can see in this drawing in the Metropolitan Museum of Art in New York. The teaching of Juvarra (Pic 6) with his global decoration (he projected for example the Chinese Cabinet de toilette for the Queen) influenced the following royal architect Benedetto Alfieri. He worked a lot in the Royal Theatre of Turin and in the Royal Palace renewed the Gallery (Pic. 7). For clocks he

specifically employed the sculptor Francesco Ladatte, author of a wonderful clock for this Gallery that we will discuss shortly.

- Thirdly, clocks are also furnishings related to the obiects put on show around: consoles, tables, fixed objects such as mirrors and fireplaces. In the Royal Palace there are several mantel clocks on fireplace and pendule à cartel (wall clocks) dated from 1735 to 1780, sometimes still visible in their original arrangement.

Therefore clocks are together practical objects and artworks, they measure time and together decorate interior spaces.

The history of time's measure in the Royal Palace starts with the construction of the building, around 1650's (the Palace is a barocco palace started in that period). We know that during the 17th century there was an interior sundial (meridiana) in the big and impressive Hall of the Swiss Guards. On the left corner of the central window overlooking the south there is a vertical slot in the wall of about 30 cm (Pic. 9). The ray of the sun was reflected on the floor where, during the XVIIth century, runs a meridian line for hours and zodiac. Today the line doesn't exit, because the floor was rebuilt in white and green marble. We don't have specific documents or drawings about the line, but we are working with the University in order to offer again a temporary line during the solstice. Infact the hole is preserved in the south wall and at midday it is possible to see the light of the sun, as indicated in the image. At that first period we can link also the existence of a room on the first floor called "The Room of Time" (Pic 10). In the middle of this amazing ceiling in carved and gilded wood, it was painted a clock with an Italian motto "a suo tempo". That decoration is unfortunately lost, but anyway that name has been transmitted till now and still today we can admire a wonderful "pendule à placard", the most important clock of our collection that we will see soon.

In general, we can say that for the first periods there are few documents about Savoia and clocks. In 1738, during the kingdom of Charles Emanuel III clock-makers created a corporation (in Italian università) with specific rules for opening new shops and new atelier.

The Royal Palace has not ancient clocks, I mean dated back to the XVIIth century, but documents mention repairs and the existence of a lost silver clock, considered as a jewel, once put in the alcove room with a little equestrian statue of the duke Charles Emanuel I. Nowadays the collection is composed by clocks of XVIIIth and XIXth centuries, with a prevailing aspect: a strong French influence. This is not surprising: the region of Piedmont borders France, the Kingdom of Savoia incorporated territories beyond the Alps (the ancient capital city was Chambéry), there were also many marriages with French princesses (Giovanna Battista Savoia Nemours, Anna of Orléans) and

the French model was spread all over Europe, for its elegance and prestige. So the main part of our collection is made by French clocks.

Overview of the clocks in Musei Reali di Torino

- Pic 12: One of the most ancient clock is the one signed by the atelier of Nicolas Hanet at the beginning of the XVIIIth century in wood, brass, gilt bronze with a case in André Charles Boulle style. However it was a following purchase for Sabauda Gallery and in the origins it wasn't in the Palace, but today it is part of the collection of Royal Museums. We know that during the 18th century, a century in which cases à la Boulle and in Louis XV style were widespread, in the royal apartments there were these clocks:
- Pic. 13, clock in chiseled bronze and wood with eagle on the top (Pic. 13), mithological Pictures (Nesso and Deianira), signed Louis Mynuel from Paris, in a late Luis XIV style. It sounded hours and half an hours.
- Pic. 15, a rocaille mantel clock by Michel Leveque. Two puttos measuring the world in the lower part
- Pic. 16, others rocaille clocks with rich leaves for decorating a fireplace by Robèrt and, on the right, a dial with refined clock hands by Chastel et Lianna, not far from Meissonier motifs.

At present some clocks are in their original position:

- Pic. 17, a rocaille pendule a cartel in the Chinese cabinet de toilette by Luis Mynuel, gilt bronze, with eagle in the upper part, leaves, a crane in the lower part holding a stone, simbolising the struggle against Sleep.
- Pic. 18, in Miniatures cabinet, another cartel attributed to Francesco Ladatte from Turin for the King Charles Emanuel III, 1760, Pic. 18, with puttos, stars, zodiac, personification of Time. The mechanism is not original, and it is due to the famous Honoré Pons (1827), who went often to industrial exhibitions. Pic. 19, And again, in the Daniel's gallery, a clock put on a 19th century basement, with a boar and a deer, the goddess Diana with the bow attributed to Ladatte. The enamelled dial was replaced, the anchor escapement is preserved and it has a spring system. This mantel clock is part of a parure with a pair of candelabras, decorated with hunting themes.
- Pic. 20, Francesco Ladatte was the bronze sculptor who created also decorations on furnishings (for examples on the amazing libraries by the cabinet maker Pietro Piffetti).
  Pic. 21, The King of Sardinia Vittorio Amedeo III employed him for the cartel in the Room of Time, mentioned before, around 1775. Here he celebrates the victory of truth over the Time. The decoration is complex, with Sun of Truth, Pic. 22 the military glory, the world, books,

puttos. Vittorio Amedeo III commissioned this masterpiece under the influence of Frederick II of Prussia and from the ideas of Age of Enlightenment. Pic. 23, For this reason, he wanted the representations of truth and time, looking to a famous cartel by Cressent now in the Wallace Collection in London Pic. 24.

- For richness and elegance of the chiselled work, this is not only the case of a clock, but a masterpiece of bronze sculptor, Pic. 26 not far from other clocks with personifications such as the Avignon Clock by Pierre Gouthière. The mechanism of our clock could be French or swiss, with verge escapement. It could strike half an hour and quarter.
- Pic. 27, And, at the end of the XVIIIth century, date back this French neoclassical table clock, with elegant chiselled pine cone.

But for the dynasty troubled times were coming. From 1798 the French revolutionary army occupied Piedmont and with Napoleon the Royal Palace turned its name in Imperial Palace. Many artworks were transferred in France and French clocks arrived for decorating the Imperial Apartment. For examples here we can see:

- Pic. 28, mantel clock in Empire style, by the outstanding Parisian bronze founder and gilder of the early nineteenth century Pierre Philippe Thomire, and Ravrio, bought from Maison Lepaute in Paris, 1804, marble and bronze with Flora and Zefirus with garlands, a well known subject used also for service table in biscuit. Again by Thomire is the Tersicore clock, Pic. 29, holding a lyre that is the actual case of the clock, she is one of the nine Muses, the goddesses of music, song and dance, often reproduced (This allegorical model was very popular in Napoleonic times). It has a movement with anchor escapement and silk suspension. Enamel dial with Roman numerals for the hours and Arabic numerals for the quarters, is signed Manière à Paris. So looking to these examples, we can say that Savoia dynasty was updated in furnishings.
- Pic 30, the gilt metal worker Andrè Ravrio made in 1804 Ebe, with the eagle of Jupiter, bought in Paris for decorating the Napoleon's Apartment. This mantel clock has not lost its original location because today it is still put on the fireplace of the Queen's bedroom, which was used by Napoleon as his private bedroom.
- Pic 31, another mantel clock with French mechanism, with eagle, sphinx and curtains. Defeated Napoleon, as in other European countries, also in the Kingdom of Sardinia the dynasty came back again. For readorning his rooms Victor Emanuel I bought several clocks and, from 1815, he employed Carlo Martina of Turin, nominated *horloger du roi*. Martina was used to buy French clocks for Savoia's residences.
- Pic 32, Here we can see his little mantel clock called also "boudoir clock", on the top there is a violet, the inscription "à moi", an octagonal basement with butterflies, quivers, arrows,

bow. Maybe it was for a woman. Pic. 33, The dial is signed by Martina; Pic. 33, the mechanism is French, Pic. 34-35 (there are only the initial letters MN), we can see the wheels behind the dial, the anchor escapement.

However in the history of the Royal Palace the year 1831 marks an important change. The prince Charles Albert became the new King of Sardinia and, for renewing the Palace, he employed the architect and designer Pelagio Palagi. He brought at the Court the neoclassical and new-greek style. He rearranged the rooms (first of all the Throne Room and the council room where the King signed the first constitutional law in 1848) and documents mention a lot of purchases from the horlogers et marchand d'art Musy and sons of Turin. So, Martina was replaced by them. They had an atelier which bought clocks abroad, resold and repaired them in Turin for 8 generations. They were also jewellers, coming from France and a quarter of all the clocks in the Palace has their signature on dial.

- Pic. 39, From Musy, Charles Albert bought clocks in Louis Philippe style, creating a homogenous group with roman Pictures: Pic. 41, Germanico (with a snake around the dial.) It was bought exactly for this room, mechanism by Douillon and Fidèle Cochon, anchor escapement), Pic. 43 Pompeo (on an high basement), Bruto, Pic. 44 Spartacus (Vittoz produced the bronze case), inspired by antiquity as shows this monumental case, Pic. 45, with the sitting Stenebea and Bellerofonte. Pic. 46, The dial is signed Musy and the clock is on the fireplace on the right in the neoclassical Ball room.
- Pic. 47, Not neoclassical, but new rocaille is instead the clock with the scene of Venus' birth with sea horses and dolphins: it was bought for the Alcove room, where it is nowadays.
- Pic. 48, According to the tradition Charles Albert gave to the queen Maria Teresa of Habsburg a special present: this automat, a clock with a carillon showing a little temple on a flight of steps. A Chinese man is playing at a table. Unfortunately we don't have documents about the author (inside there is a signature made by pen Frères Rochat), but it is possible that the automat could be arrived from Colorno's Reggia, so probably it wasn't produced for Savoia Family. Today it is preserved in the storages, but we are planning to restore it and put it on show for visitors. The experts involved in the clocks' exhibition in 1988 wrote in the catalogue that the mechanism opens the two doors of the temple, Pic. 49, the man moves his hands showing and hiding a little ball, at the same time a birds' music sounds and, when it finishes, the automat closes the doors. This is a very rare object that could have a similar only in the Imperial Palace in Beijing.

Finally, for the XIXth century we have to consider the revival's period during the Kingdom of Vittorio Emanuele II, first king of Italy, Pic. 49. The influence of Second Empire and the taste of the Empress Eugenia lead to eclectic furnishings in a new XVIIIth century, new rocaille, new Louis XVI, very well documented also in universal and industrial exhibitions. Here we can see some examples of this.

- Pic 50: In the storages there is this new-gothic mantel clock in marble and bronze, with two horsemen Pichting.
- Pic. 51, Then, a typical eclectic clock as this, with a mechanism by Vincenti for the monumental case dedicated to science, Pic. 51 with the globe and a pantheon of scientists: Tolomeo, Copernico, Galileo and Newton.
- Pic. 53, Again Vincenti produced the mechanism for this case in wood, brass and motherpearl, with silk suspension.
- Pic. 54, A clock with an anchor escapement, with a decorative vase in black porcelain. Probably it was part of a parure with 2 candlesticks, now in Palazzo Pitti in Florence. About in the same period, Savoia Family bought also this new-rocaille mantel clock with leaves and a general influence from Ladatte clock, Pic 55. As in other clocks, the dial indicates hours in Roman numerals and minutes in Arabic numerals. It has a Brocot suspension with spring system.
- Pic. 56, A parure is still visible in the Royal Palace, with Imari porcelain, Pic 57. The mechanism is signed Vincenti Medaille d'Argent 1855.
- Pic. 58, another eclectic mantel clock (1850 c., mechanism by Hottot, the clock was resold by the Italian Molfino who signed the dial).
- Pic. 59, To this last period belongs also a particular clock, called "world clock" by Ignazio Villa. Now it is in the storages, but we want to transfer it in the Apartment in order to be seen by our visitors. It was made in 1861 in wood and iron, with the coat of arms on the top, an octagonal central part with the dial. It indicates hour, day, month; in the middle of the painted world map there is the South Pole. Villa lived in Florence and he was an inventor, an architect and sculptor, interested in geography and astronomy.

This overview has to consider briefly also not precious clocks, made in series, for common use in servant's areas or in the court's offices. They are called "box clocks", in varnished wood (sometimes with chinese motifs), with an handle for being easily moved from one room to another. Pic. 61

So, as we have seen, the main part of our collection is made by French clocks mentioned in documents as "pendule de Paris", with spring system, put on fireplace, consoles or shelves, with round dial. They were kept under lost glass bells and normally with a high basement in order to give more visibility to the object, which was often put beetween two candlesticks and in dialogue with a mirror behind and furnishings all around.

In conclusion, I would like to say something about clocks' conservation.
At present our clocks are both on show in the Royal Apartment and in storages (here we can see them outside and inside wardrobes, Pic. 63–64, where they are packed with a copy of the page taken from the catalogue of the exhibition mentioned at the beginning). They are no longer kept in working order, so our projects for future are:

- Making an inventory check, updating their actual position through the Palace and control better if they could suffer damages by humidity and temperature, installing some data logger.
- Opening the storages to visitors with special tours
- Starting a conservation plan with clock experts for mechanism and restorers for cases (for clocks in the Royal Apartments). They could make a regular dusting, reducing the metal's oxidation using purified water, brush cleaning, repairing broken elements. For wooden cases, they could make the treatment against woodworm and work on possible varnish bad condition. If possible, professional experts could finally repair mechanism, lubricate them, considering springs and broken parts, adjust the tick and wind the clock.

So we want to start a regular maintenance plan, in order to take care of our clock's safety for their best long-term preservation.

Clocks of Mafra, François Simon-Fustier, External expert, France

I am the fourth generation of watchmakers in the family. My great-grandfather created in 1906 a workshop where he was repairing watches, clocks and sewing machines. My grandfather continued and his son, my father, took over the activity. He began to restore building clocks. When I was a little boy, he brought me to the bell towers, so I became clockmaker too in 1978 and I graduated three years after. In 1997, I transferred the workshop to Lyon, and named it "Horloger de la Croix-Rousse", the name of the old district twinned with Montmartre in Paris. As I trained apprentices and hired them, the building became too small and we moved to Caluire. Always hidden, without a showcase and by appointment only.

Today the FSF group brings together three entities. Sébastien is in charge of Chronosvision, which realizes 3D modeling of antic clocks movements. Robin, my student for 10 years, is now head of the workshop of l'Horloger de la Croix Rousse. For my part I coordinate the whole team and develop the communication and training component within FSF Institute.

In 1720, Law, then minister of finances, tasks the English Sully and the French Le Roy to audit the French horology. Le Roy creates a horizontal clock, revolutionary because built differently and with fewer parts so more economical. The drawings and explanations are added to the encyclopaedia written by Diderot and D'Alembert. To demonstrate the interest of 3D modelling in antique horology, we decided to make it our proof of concept. By modelling it we realized that the drawings in the encyclopaedia were wrong: for example the number of teeth were different, some parts couldn't be taken apart… Thanks to this work we obtained a first client in the Castle of Vaux-le-Vicomte: Restoration and basic cultural background

After that, which hosted for countless years the French National School for Horology. In 1910, its director Charles Poncet designed and built the first building clock running on electricity. So, for the first time we created two Interactive terminals to introduce the public to the clock, its operation and the history of its creation.
For Mafra the project was different: the two clocks had no corresponding drawings. So we decided a new way of work.

- First, I take measure of each part in the clock and name and label each piece. I use 6 different colors to identify the pieces, according to its place in the mechanism
- In France, Sébastien makes the 3D modeling. He creates the library of pieces and after the virtual assembly.
- And I go back to Mafra with the disassembly tutorial

Now we can locate on screen a piece of the clock by typing its code or name into the search engine.

And I hope that we will develop video for cultural mediation, to the public who can't or doesn't want to climb the tower to see your fabulous old clocks

Eighteenth-century clocks in the Palace on the Isle at the Łazienki, Aneta Czarnecka, The Royal Łazienki Museum in Warsaw, Poland

Text provided by Aneta Czarnecka

This presentation concerns two eighteenth-century clocks, which are examples of mechanical objects, in the collections of the Royal Łazienki Museum. Both clocks underwent full conservation treatment in 2013. At that time five clocks exhibited in the interiors of the Palace on the Isle underwent conservation and restoration work, the aim of which was not only to restore the clocks to their former appearance but also the mechanisms which made them work.

Chronos clock

The first of the objects to be presented is a rotational clock, the main part of which consists of a sculptural Picture. Both the sculpture and clock mechanism were probably made before 1782, although we do not know the exact year. The 1795 royal inventory confirms that it stood in the Antechamber to the King's Study in the Palace on the Isle, where it still stands to this day. King Stanisław August specially commissioned the clock from the Italian sculptor, Giacomo Monaldi (1733–1798). He was a close associate of André Le Brun (1737–1811) who was court sculptor to Stanisław August. This French sculptor, whom Madame Geoffrin had recommended to the king, most probably made the model for the Picture of Chronos, which was then sculpted by Monaldi. While the clock's mechanism was most probably made by Franciszek Adam Gugenmus (1740–1820)—the son of a renowned family of clockmakers in Warsaw—who from 1775 was principal clockmaker to the court of King Stanisław August. The Gugenmus family most probably came from Bavaria. Very few of their timepieces have been preserved in Polish collections.

The sculpture, which comprises the base of the clock, is made of white marble and depicts Chronos, the personification of time. Here, Chronos, father of time, is shown as a naked, bearded old man holding the celestial sphere (the sky) on his shoulders.
The celestial sphere is an element made of thin copper sheeting, polychromed and gilded. Painted with dark blue enamel which is ornamented with stars painted gold.

The clock's mechanism is concealed within the sphere which consists of two hemispheres. The clock face itself, made of gilded copper sheeting, consists of a wide band encircling the celestial sphere. The naked god of Time holds a harvesting scythe made of gilded bronze in his right hand. The scythe serves as the clock hand and the tip of the blade points to the hours and minutes marked on the rotating band.

The clock's mechanism, concealed within the sphere, makes the band, marked with the hours and minutes, rotate. The mechanism consists of the so-called Graham (or dead beat) escapement created by George Graham in around 1715. This type of escapement provided superior accuracy and timekeeping. It was an eight-day movement and so struck the hour for eight days before it needed to be rewound. The conservation work made it possible to restore the mechanism to full working order. The mechanism can be wound up and regulated by removing the sphere from Chronos' shoulders.

Analogies – Sculptures in the Knights' Hall at the Royal Castle in Warsaw/
The clock with Chronos is not the only object depicting this subject which was made for King Stanisław August. A statue of Chronos, which repeats many of the small details, the arrangement of

the Łazienki sculpture, but on a much larger scale, is an important part of the furnishings in the Knights' Hall at the Royal Castle in Warsaw (the official residence of Polish kings, and therefore also of Stanisław August). This hall is richly ornamented with an important iconographic scheme and ideological message devised by the king himself. His intention was to honour Poles who had served their fatherland and to remind us of the most important moments in Polish history. The statue of Chronos in the castle is also a clock. Both statues were made by the same artists.

Prototype / source of inspiration – arrangement of the Picture of Chronos holding up the celestial sphere (the sky)

The clock has a very interesting form – a combination of a rather large marble sculpture and a clock. In the XVIIIth century rotational clocks had a representative character. The clock mechanisms were usually a pretext for encasing them within a rich and decorative exterior which drew people's admiration.

One of four marble statues of satyrs dating from the 2nd century CE served as the prototype for the Picture of Chronos. These four statues supported the bowl of a fountain which used to be at the Villa Albani in Rome. These Pictures are now on display in the Louvre. The fountain at the Villa Albani was also known from Piranesi's engravings.

The depiction of a muscular man holding a sphere with stars also refers to the tradition of representations of Atlas holding up the sky.

Stanisław August's collection included a reduced plaster copy of one of the satyrs which held up the bowl of the fountain at the Villa Albani. His collections also contained prints of Piranesi's engravings showing a view of the fountain, as well as inventory drawings of the villa itself.

In the XVIIIth century, compositions with satyrs holding burdens on their shoulders were imitated in various forms.

It turns out that such an arrangement, and form – a man depicted contrapposto, holding up a great weight – was also used in other XVIIIth century clocks. Here are some examples of French clocks made by Antide Janvier.

- Astronomical clock with Hercules holding a movable armillary sphere, Antide Janvier (1751–1835), Paris, c. 1795, private collection
- Attributed to Antide Janvier – clock with three atlantes holding up a sphere – globe.

Other examples of the use of this motif testifying to its popularity are:

- Plaster model of Atlas cast in 1769 in Sèvres after a design by Jean-Jacques Bachelier – for the Dauphin's wedding ceremony in 1770.

- Two globes, heaven and earth, held by a Picture of Atlas, dating from 1777, purchased for Louis XVI's private library at Versailles.

Conservation/

The clock underwent conservation treatment twice: first in 1974 when the sculpture broke into several pieces and the 'case' of the clock itself suffered a lot of minor damage. The sphere concealing the mechanism was deformed. The greatest damage occurred on the edges of the two hemispheres and was significant enough to prevent the clock from working and the band, constituting the clock face from rotating. Furthermore, the paint layer on the sphere suffered many losses and scratches to the surface. The mechanism of the clock was in good condition but did not work properly. It was very dirty and the clock key was missing.

The clock underwent conservation a second time, which was completed at the end of 2013. During the latter work, the clock was restored to its former glory and regained all its aesthetic values. The clock mechanism was also repaired and made workable. Missing elements were re-made, such as: the pendulum; clock key; strike hammer; the shafts of the hands, etc.

The blade of the scythe and the scythe itself were also repositioned, so that it could serve its purpose as the clock hand and point to the right place on the band encircling the sphere.

Clock with singing bird, 1780

The second clock I would like to present is one with a singing bird. Like the Chronos clock, it was made at the end of the XVIIIth century. However, it was not in the king's collections but was a gift from a private individual. It has been in the Museum's collections since 1998.

The clock is combined with a musical box in the form of a birdcage. This type of clock is called a hall clock because it was designated for hanging in a vestibule (antechamber). The clock face, located on the underside of the birdcage, was visible when entering the interior and looking upwards. The birdcage has additional supports—feet in the shape of birds' talons holding small orbs—thus enabling the clock to stand on a flat surface. The clock now hangs in the King's Dressing Room in the Palace on the Isle, but it is not wound up.

No makers' marks or signatures were found during conservation work, when the entire clock was dismantled and all the elements were cleaned. However, it can be assumed to be the work of the Swiss company Jaquet-Droz & Leschot.

Firm of clockmakers: Jaquet-Droz & Leschot/

It was established in the 2nd half of the XVIIIth century and specialized in making and selling luxury clocks with movements enhanced with music and automata, as well as other complicated devices. It also made mechanical singing-bird movements, and the birdcages were particularly sought-after.

The founders of the firm were clockmakers and mechanicals: Pierre Jaquet-Droz, who came from La Chaux-de-Fonds (one of the most important watchmaking towns where such skills were enhanced), and his son Henri-Louis and Jean-Frédéric Leschot, a gifted mechanician, pupil and collaborator of Pierre, who became a partner in the firm in 1782.

Pierre Jaquet-Droz, who was exceptionally gifted and had many ideas, enhanced the clock mechanisms and worked on miniaturizing them so that they could be enclosed within the smallest spaces. He was also the pioneer of musical boxes with singing birds. In around 1752 he made the first movement with a singing bird.

The Swiss firm was renowned for the production and sale of humanoid automata, which is small dolls, imitating people, animated by clockwork mechanisms which were concealed within their bodies. These automata were also able to imitate human activities precisely, such as writing, drawing, and playing an instrument. The first public exhibition of these automata was held in 1774 in La Chaux-de-Fonds – and was intended to entice people to buy other pieces made by the firm: clocks, musical boxes and singing birds. These were also very popular in Europe and worldwide, and were also sold in China with great success.

Attribution/

Only two-thirds of the firm's output is signed, thus making it difficult to confirm their authenticity. As in the case of the clock under discussion, many of the firm's products can be identified solely based on a comparison with other similar objects: their appearance, the type of mechanisms and technical solutions that were used.

In the case of products made by Jaquet-Droz, apart from the best known examples, it is also difficult to ascertain when a given piece was made and which of these splendid clockmakers was the craftsman who made it. It is assumed that the birdcage, taking its size and type of mechanism into consideration, may be the work of Pierre Jaquet-Droz.

The Łazienki clock does not seem to differ much from other birdcages dating from the end of the XVIIIth century. As examples, I shall show a few other pieces which are believed to be the work of Jaquet-Droz.

Let us look at the details/

Inside the birdcage, on a perch resting on two parallel supports is a stuffed bird - a bullfinch. The bird moves after starting the musical box movement. The ornamental fretwork cage was made from gilt bronze with chased and cast elements. The bottom part, which conceals the clock mechanism, was ornamented with plaquettes painted with genre scenes on a porcelain ground. One of the medallions contains a keyhole for winding the musical box. The painted plaquettes are decorated with an ornamental gilt bronze border. The border consists of an ornament reminiscent of cymatium moulding decorated with leaves and reeds. The birdcage's rich decoration is complemented by two vases surmounted with flames, which are located in niches in the corners of the birdcage. The interior of the cage contains two supports and a perch on which the bird is seated, as well as the mechanism which operates the movement of its wings, tail and beak.

Let us take a look at how the mechanism operates/

Singing birds were not veritable automata. The birds used in musical boxes - in snuff boxes, in birdcages - did not contain built-in mechanisms which animated them, as in the case of humanoid automata. These mechanisms were placed on the outside and only drove the repetitive motions of the bird. The clock mechanism in the lower part of the birdcage is combined with a musical box movement. This causes the musical box to work when the clock strikes a full hour. The clock mechanism, was made of brass and equipped with a verge (or crown wheel) escapement. Historically it is the oldest type of escapement and was not very accurate at timekeeping.

Birdcages were an important element in the evolution of musical mechanisms. They were designed to reproduce bird song as faithfully as possible. The invention of solutions which allowed the smallest possible mechanisms reproducing music and imitating bird song as naturally as possible combined with the movement of the bird, flapping its wings, opening its beak, and turning around, are attributed to Jaquet-Droz, Leschot and his associate in Geneva, Jacob Frisard.

The solution consisted in placing a *serinette* in the construction—which operated thanks to small bellows which supplied air via a wind chest to a whistle (piston flute) of variable pitch which produced the bird song; the movement was controlled by a set of cut cams.

Problems associated with its conservation/

Before undergoing conservation work in 2013, the clock did not work and was very dirty. It had not been used for many years. I would like to talk about some of the work carried out to restore it to working order.

During the conservation work every single element was dismantled and cleaned, the losses in the gilding and enamel were filled as was the upper section of the bird's beak. The mechanism which

started the clock was also restored to full working order as were the musical box and the stuffed bullfinch.

The animation of the bird gave rise to the most problems. All the mechanical elements of the musical box, and clock, the clock face and hands were mounted by the clockmaker. One of the problems encountered was synchronizing the mechanism of the musical box with the bird so that once the musical box had been started the bird would move, flap its wings and tail and open its beak. After several attempts it worked. The right type of wire was needed and it had to be mounted in the supports holding up the perch on which the bird is seated.

Summary

From my point of view, it is important to exhibit this type of mechanical object which has been restored to full working order in historic interiors. But how should these interesting features and how they work be shown, while also taking into account the safety of the object itself. This raises the question of how often can such a mechanism be put into operation?

Particular attention should also be paid to drawing up detailed historical documentation of similar objects before conservation work is undertaken. Specialists should compare the housing of the mechanisms and their operation with other similar objects which could facilitate their repair, and also help confirm their authenticity and time of execution.

Some questions are important for me as:

- How should such objects, and the way in which they operate, which is of key importance, be displayed.
- How often can they be started up? Should they work all the time?
- How often should there be public viewings to show people how they work.

Perhaps a good solution would be a film showing how they function? These films could be shown on the website of a given institution of museum, or even at the exhibition itself?

A brief overview of the collection of clocks, watches and other mechanisms in the Moscow Kremlin Museums, Ekaterina Shcherbina, Moscow Kremlin Museums, Russia

General Information about the collection

- Number: around 200 objects
- Period: from XVIth to XXth century
- Big variety of clocks: table clocks, automatism clocks, pocket watches, etc. Clocks made by French, English, German masters, etc. Geneve mechanisms are mounted into cases made in Istanbul,etc. The collection Contains a significant number of ancient mechanism, based on the old treasures of the Russian Tsars.
- Location: A big part of this collection is in storages and does not work. The other ones are on display. Generally, the clocks in exhibition do not work BUT they could.

The first Kremlin clock dates from 1404 and was made by a monk. It is the "ancestor" of the Chiming Clock of the Spasskaya Tower which is still today one of the symbols of the Moscow Kremlin. By the end of the XVIth century, 3 towers of the Kremlin were equipped with clocks (the Trinity towers).

Management of the collections: Several people are working on this collection. It is different curators according the period clocks. The curator in charge of the XVIth century clocks will not take care of the XXth century clocks. Moreover, there are also 5 / 6 artcraft workers which can work on this collection.

Detailed information about the collection

XVIth – XVIIth centuries/

The clocks and watches became collectables. The pocket watches are considered as expensive, as luxury accessories. Among one of the most important object of this period, we can quote the "*Bacchus table clock*" representing an Elephant pulling a chariot where sat Bacchus. It is assumed that the clock was given to Tsar Ivan the Terrible, because it is known that at the end of the XVIth century the clock was in the Palace of Facets during the reception of foreign ambassadors. We found also many French pocket watches. Among them, there is a silver watch realized around XVIth on which we can found the portrait of the French king François Ist and his second wife, Eleanor of Austria. The clock mechanism is quite good but it cannot be activated. Some clocks and watches of this period belong to the head of church. Some elements referring to religion can be seen in the design of the cases.

XVIIIth - early XIXth century/

The artworks of the XVIIIth - early XIXth century represent all European art styles of this period and include several memorial exhibits. The mechanisms of these items are not very complex, but the watchcases are very expensive, fashionable and refined artworks of chased gold with semiprecious stones and diamonds, decorated with tortoise-shell. By the end of XVIIIth century, miniatures are fashionable. We can quote the example of a watch including a miniature theatre.

One of the masterpiece of this time is "*The Temple of Glory*" which is on display in the Armory Chamber of Moscow Kremlin. The remarkable 2, 5 meters high clock in the form of an ancient temple with mechanical organ that could perform 13 different pieces was created in Moscow by prominent English engineer Michael Medox between 1793 and 1806 for Catherine the Great. Unfortunately, the mechanism is not working anymore.

The XVIIIth - early XIXth century is also the time of the precision in time measure. They are a lot of many crucial improvements in watch mechanisms. This "precision in time measure" is illustrated by three rare watches, created at the Breguet's firm. All the mechanisms are known only in one exemplar. Their construction with several pointers is very complicated.

Late XIXth - early XXth century

This period comprises exemplars of typical artistic products of different well know companies. One of the latest masterpieces is a "mysterious" time piece of Cartier.

An overview of the mechanical objects from collections of the Peterhof State Museums Reserve, Anna Shulgat, Peterhof State Museum-Reserve, Russia

I will focus on two items of our collections:

Electric static generator/

The Oranienbaum collection has many mechanical items like Cartel clocks, mantel clocks, English longcase clocks, etc. One of the most important is the electric static generator. This type of machine has been invented during the XVIIIth century. It transforms mechanical energy into electrical energy. This transformation is realized through the friction of two materials. Here the friction is realized by leather cushions and electricity is collected by metal combs. Some drawings of the XVII^{lth} – XIXth illustrate how the electric static generator worked and testify of the interest of royalty and nobility in scientific experiences.

Clock from Chinese bedchamber in the Chinese Palace/

The clock is present in the inventory in 1860. It has an octagonal form, a black case and we found some decoration as flowers in mosaic, the symbol of the Mars planet. The clock decoration is realized in *pietra dura* technic. Similar clocks can be seen in the collection of the Victoria and Albert Museum in London. The clock seems to have been done in St Petersbourg but its creator is still an open question.

The Chinese mechanical toys, end of the XVIIth – beginning of the XVIIIth c., from the collections of Peter the Great and Catherine the Great, Maria Menshikova, State Hermitage Museum, Russia

The Chinese mechanical toys 'collection is a quite unique collection in Europe.

About the State Hermitage Museum and the collections

In 1703, Peter the Great founds the city of Saint Petersburg. He wanted to glorify the city, to make a city open to Europe and European culture. He created the 1st Russian museum: the Kunstkamera. He gave pieces of his own treasure to create the collections of the museum. After his death, the Kunstkamera collections were dispersed to newly established imperial museums as the Winter Palace (today part of the Hermitage) or the summer residences of the Tsars as Oranienbaum where Catherine the Great established the "small court".

About the Chinese mechanical toys collection

Here we are talking about the collection of Chinese automatons. There is a common border between Russia and China. There were a lot exchanges between the 2 countries during the reign of Peter the Great which mean there were diplomatic gifts.

In the 90's, we began to work about these specific Chinese toys (origins, how they work, etc). We have several toys as for example:

- A Dutch man on a horse
- The Chinese goddess of immortality sitting on the phoenix.
- A Woman holding the vessel and raising her hand

These toys have very strange figures, mythical figures, and Chinese figures. They are made of ivory. Everything seems gilded, silvered, enamelled but after a check, we discovered that the toys are generally in metal and that only the external decorations are made in precious metal. Each piece has wheels on the bottom which can be activated by turning a key but after some

research we discovered that there are also small springs. It was the "secret" to make them work. When they work, these objects can make a lot of movements. They go in circle on a table, the heads and arms of people are moving, etc.

One of the problems for this collection is the lack of information about these objects. Through the XXth century, all the archives have been mixed up. Sometimes there is no document at all. Hopefully, Peter the Great, when he founded the Kunstkamera, ordered that each object should be painted. Consequently, it exists around 2 000 drawings of objects in which around 300 drawings of Chinese toys. Moreover, there is a written document (1743-1744) which help to know more about these Chinese toys. Indeed, Catherine the Great wanted to know what there were in the Kunstkamera and what can be taken for the "small Court" in Oranienbaum. Consequently, it exists a list of objects with their description. Thus we can found the description of the toy representing a Dutch man on a horse on this list.

When we work, sometimes we found the object / the pieces of the toy first and then we are looking for the description. Sometimes it is the opposite. We first found the drawing and then, the pieces.

The "movable ship", one of the most fascinating toys

It is a movable ship in ivory and amber. According the archives, he was moved after death of Peter the Great from Kunstkamera. All the Pictures are supposed to move. My suggestion about how it arrives to us is that the Emperor of China, Kāngxī, refused it as diplomatic gift and sent it back in Russia. The Kangxi Emperor had quite intensive contacts with the Europeans and was open to European Science, interested by clocks and mechanisms. He invited Jesuits to his court and at the beginning of the XVIIIth century China began to produce their own mechanisms. So it is why we suppose that they reject a lot of diplomatic gifts. It was also the case of the famous peacock of the Hermitage which was, originally, a gift.

In search of the best way to make the oldest form of "music preserves" available to visitors, Silke Kiesant, Prussian Palaces and Gardens Foundation Berlin-Brandenburg, Germany

Notes of lecture manuscript provided by Silke Kiesant. See the Power Point presentation to see the Pictures evoked in the text.

Preliminary remark: historical elevator, New Palace, Potsdam

Pictures 2 and 3

- Hydraulic passenger elevator in the North wing of the New Palace built in 1903 by manufacturer: Carl Flohr AG, Berlin
- lifting height: approx. 14 m over three floors
- In 2015 the University of Applied Sciences Potsdam compiled an analysis and developed a concept for the preservation of historical monuments
- hydraulic lifting mechanism typically for the turn of end of XIXth to the XXth century → in that time, this mechanism was regarded as the safest passenger transport principle in Europe, as a fall was impossible
- water is used as the driving energy
- further developments in power and speed displaced this technology, so that only a few systems have survived throughout Germany.
- the recommissioning is very intensive in terms of costs and at the same time brings hardly any improvements for the building
- therefore, a pure conservation of the system with a corresponding presentation and explanation appears to be the most sensible variant of use

General information about the collection of clocks and musical instruments

Pictures 4-5

- today 19 musical instruments, above all keyboard instruments and 2 flutes by Johann Joachim Quantz from the property of King Friedrich II. of Prussia
- a lot of war losses
- on display: 11 musical instruments, among them 2 harpsichords by Michael Mietke (around 1700) and 2 fortepianos by Gottfried Silbermann (dated 1746 and 1747)
- 1990: double-manual harpsichords (black one) was restored for playing!

- while the New Palace-instrument was restored for playing in 1938 (but total damage of the bottom in/after WWII) the Sanssouci- Silbermann-fortepiano was restored in 1970 for playing and in the 1990ies copied for a concert hall in Potsdam (Musikfestspiele Potsdam)
- because of so many inquiries from restorers, instrument makers, scientists or musicians especially for these 4 musical instruments → meanwhile we came to a general decision: These instruments are no longer played!
- this decision is often criticized
- contrary to a Musical Instrument Museum, which does this within the context of special guided tours and with the special treatment by restorers, we have no extra trained restorers to observe permanent playing
- not playing and conservation: the only chance to keep the instruments in good condition!

Picture 6

My main focus of this presentation: clock collection

- after 1945 approximately 140 clocks and fragments have been preserved → most of them from the time of King Friedrich II and Friedrich Wilhelm II of Prussia
- not all on display
- of course: highlight for visitors at special times or every hour for example

Until about 10 years ago, we employed a clockmaker who wound most clocks in the palaces weekly and repaired them if necessary. In some palaces also the local personal, guides or caretaker, set the clocks in function. BUT: sometimes it happened that they "overwound" them, the mechanism was badly damaged. Since the clockmaker colleague retired we no longer have such an expert, so it is very elaborately and costly to keep the clocks

Today: our metal restorers take care of the clocks, but they have no time for winding them. For every clock restoration we have to make a request for tenders. Afterwards we give the order to freelance clock restorers, who are more and more difficult to find. We ask them for references concerning similar objects and make enquiries in other museums. Meanwhile we have a small circle of clock restorers whom we trust. We have to realize following conflict: metal restorers have a different approach than clockmakers:

Clockmaker/

- the function of a clock in the foreground
- to replace pieces of the mechanic is normal and necessary for the function

Metal restorer/

- want to hold as much original substance as possible
- if mechanical pieces were changed and replaced by new parts the originality suffers, original traces of tools and making are lost
- to reduce the effort and the danger of damages respectively the losses of original substance, the restorers decided against clock winding

Overview about the clocks on display in the Prussian palaces (concentration on musical clocks!)

Picture 7

- 18 of our clocks have a musical mechanism (for some clocks the mechanism is lost or partly lost)
- 11 of these 18 music clocks are on display, but none of which is shown in function since around 10 years
- among them are real rarities, like this Potsdam clock with harp mechanism

Picture 8: or these two by the Potsdam court clockmaker J. R. Fischer (ca. 1770)
Picture 9: French with carillon by J. P. Latz and J. Biesta (1754)
Picture 10: French or Swiss with flute or carillon
Picture 11: Swiss or/and Berlin with flute mechanism. On the photo, the clock restorer Ian D. Fowler, tests here the flute mechanism (2011). Our next restauration project → discussion of didactic possibilities
Picture 12: famous clock by David Roentgen with cymbal by Peter Kinzing, Neuwied

Didactic possibilities

Picture 13

- How to make sounds audible or to make the mechanic visible for visitors?
- How to explain visitors why we don't wind the clocks?

1st example: French pendule with complications and carillon/
Pictures 14 to 19

- *Picture 15*: Picture of the clock before restauration: case in 1986 and mechanism in 2003 (clock was in the Soviet Union 1945-58)
- bought by King Friedrich II. of Prussia probably from the property of a French nobel person as "antiquity" (so called "Pompadour"-clock)
- special highlight for Friedrich II.: music (clocks)

- already after the death of Friedrich II. his successor Friedrich Wilhelm II. of Prussia brought the pendule to his Marble palace in the New garden in Potsdam
- at the king's request, a new neoclassical pedestal was made, which was lost after 1945
- after restoration 2005 several ways of presentation were tried, at least with the help of an approximated stand with parts of photographs of the original to harmonize with the neoclassical style of the room
- *Picture 18:* hiding transformer → gave us the chance to integrate technical equippement
- *Picture 19*: MP 3 player with loudspeaker, operated by remote control. Clock triggers at stored times (every half hour).
  - ➔ after an idea by Jürgen Huber, Senior Furniture Conservator at the Wallace Collection in LondonI visited him: He even combined the real clock mechanism with the electronic way to play the melody by MP 3 device

2nd example: Astronomical clock with flute mechanism/

Pictures 20 to 22

- Court clockmaker Johann Christian Möllinger
- Astronomical clock with flute mechanism = technical highlight of Berlin clockmaking, 1791, with a lot of astronomical complications
- flute work plays a morning melody at sunrise and an evening melody at sunset – exactly timed
- restorated in 2003
- like example 1 the MP 3 player is placed at the bottom of the clock case (not visible here), also with remote control

3rd example: clock with flute mechanism/

Pictures 23 to 27

- clock with flute mechanism extra ordered by King Friedrich II. for this room: antechamber of his apartment in the New Palace in Potsdam
- 1769 this clock was mentioned and admired in a Berlin newspaper
- the mechanism with wooden barrel. 26 wooden pipes and bellows from goatskin (2006 restored)
- A short film has been made (not finished, still in process!)

Reagrding the film → shows here 2 important points:

<u>1.the main part of a new project to make the mechanism visible for visitors</u>

- aim: little film – ca. 3 min. – showing the room, clock as a part of room's decoration (putti above the clock, putti with musical instruments at the wainscot, supraporte)

- atmosphere, noises, steps of winding, duration of beginning and ending of a music piece, moving wheels, barrel, listening to flutes…

2. the limit of a spontaneous project:

- the sound recording was made in the New Palace on March, the 18th 2019. After the winter, the room was at 6 to 8 degrees Celsius.
- that experience shows that wooden flutes, bellows and windchests are influenced by climate changes.
- quality of the music can be very different.
- recommendation of the clock restorer handling the restoration work in 2006 was to wind the movement once a month to keep the leather supple.
- But – as I explained at the beginning – this is not possible because of the personnel situation.

➔ our conclusion: we need another sound recording – in summer – to give a better impression of the music!

- Then not only visible but also an audible example of the oldest music records!
- Beginning and reference of a research project to collect music examples from mechanical clocks since XVIIIth cent. -> especially Berlin music clocks!
(in cooperation with several other Museums in Berlin: Kunstgewerbemuseum SMB PK, Stiftung Stadtmuseum Berlin, Musikinstrumentenmuseum SMB PK)

The preservation of musical instruments collection in Patrimonio Nacional, Lorena Robredo García, Património Nacional, Spain

About the collection of Patrimonio Nacional and the instruments

State of collection: Nearly 400 instruments
Over 40 of them have an exceptional value. The instruments are from XVIth century to XXth century. The majority are from the XIXth and XXth century

A lot of instruments have been lost through the centuries but those we have are remarkable, have a great value (from technic, decoration, etc). These instruments are still in the collection today thanks to the interest of Kings. "Stradivarius Quartet" are the most famous instruments in the Patrimonio Nacional collection.

In this presentation, the focus will be done on another group of instrument: the keyboard instrument family (especially the pipe organ). There are the instruments with more mechanical necessities.

Lot of the instruments have not been played for long time. So how the restoration should be? Do we try to restore the sound and to make the instrument playable again? Or do we only preserve the instrument itself from damages? It is one of the most important questions in the restoration of the musical instruments. Moreover, for some instruments like pipe organs, it is important to remember that they have a real function. Pipe organs are important liturgy.

Some examples of instrument at Patrimonio Nacional

- **"Realejo"** (portative organ of Juan I - currently at the Santa Clara Real monastery): This organ has been made by Flemish Masters. It is a portative organ which is arrived in Spain in the XVth century (most of the portative organs in Europe have been created in the XVIth century). It is one of the oldest preserved.

- **The "Virginal**" (currently at the Santa Clara Real monastery): The Virginal is a plucked string keyboard instrument along with the spinet and harpsichord, although smaller, which spread from 1500 to the Netherlands. Its strings ran in parallel or diagonal, as is this case. This "Virginal" is decorated with wall papers and it seems that it is the first time that we come across wallpaper decoration

- **The pipe organ at the Royal Palace of Madrid (Órgano Bosch):** The designer of this organ is the famous architect Ventura Rodriguez. It was one of the most important pipe organ in the late XVIIIth century. The organ is unique in Spain, not only for its high quality but also as it survived the remodelling that occurred during the XIXth century. It is today one of the most great musical treasure of Hispanic musical heritage.

Study case: The "pianoforte of Juan del Marmol"

It is a very interesting piece, from an historical point of view but also from the restoration point of view. From an historical point of view it's interesting because it exists some doubts about the date of this instrument. The decoration seems to represent the coronation of Charles VII in Naples (future Charles III in Spain) in 1734 but the 1st pianoforte was built around 1750. The hypothesis is that they reused elements from older instruments to build the pianoforte. Perhaps the keyboards belong to a harpsicord. Juan del Marmol was very famous and had the favor of Charles III. He made several trips in London to improve his knowledges.

About its restoration/

The Pianoforte has been silent for 300 years. Its restoration implies several actions. If we want that the instrument sound again there is several steps:

1 → Insert a system allowing the keys to return to their original positions after being pressed
2 → Reparation of the soundboard (to fill the cracks) It means that the soundboard must be transformed. However, it is important to remember than when we touch the soundboard, we are touching the sound of the instrument itself
3 → Replace some pieces in leather and felt

Consequently, with these different steps, the sound which will be obtain after restoration will not be the original sound of the instrument

Problematics of this restoration plan/

This instrument is, for now, destined to be exhibited in the future Museum of Royal Collections in Madrid. So, for me, in charge of the project, it is not necessary that the Pianoforte sounds again. But discussions are open. What to do in such cases? Do we restore only the instrument as a piece of furniture? Or do we restore also the Pianoforte as a musical instrument which has to be playable although the original sound will be lost?

In private collections in Spain, they choose often to make the instrument playable again. The CIMCIM (International Committee of Museums and Collections of Instruments and Music) has established guidelines for restoration work on what they call "historic musical instruments retired from active service ". These guidelines have arisen from a specific vision. Every instrument is built to be played. Once incorporated into a public collection it is a passive object. But at the same time it has become part of the collective memory. Above all, the CIMCIM guidelines respect the object as evidence of an earlier or different culture, a musical practice and a construction tradition.

For me, I would opt for limited action. I would conserve the historic details, restore the pianoforte in itself but not make it playable again because:

- Future position of the object (in a museum): So it is not necessary that the instrument play again.
- Necessity to preserve original state of the instrument: because in the future we can find better method to restore it
- Respect of the function of the instrument: The sound of the instruments is the reason why they are made. The reconstruction of sound is often an illusion (no record) and the original sound is lost with restoration.