Digitization for an Ethnographic Musical Instrument Collection

Adilia Yip

Keywords:
Digitization, Co-creation, Musical instrument collection, Digital replica, Congolese manza xylophone.

ABSTRACT:

The article discusses the co-design and co-creation of digital tools for re-sounding a colonial musical instrument collection, exploring how music technology supports decolonization and enriches curatorial narratives. In *ReSoXy: Re-Sounding the Xylophone Collections of RMCA* (2023–2026), the project aims to rediscover and revitalize the sounds and performance practices of the *manza* xylophone, a declined musical heritage of the Azande. With contributions from musicians, instrument makers and ICT experts, *ReSoXy* developed various virtual and MIDI instruments to emulate the *manza* listening and playing experiences. These tools are the agencies of co-creation and knowledge sharing, as they enable online collaboration with musicians –particularly in northern DRC – to create new music compositions for the declining *manza* culture, and foster dialogues on intangible cultural heritage preservation. The article reflects on the results of digitization of a museum musical collection, and to promote the decentralization of heritage research.

L'articolo discute la co-progettazione e la co-creazione di strumenti digitali per ridare voce a una collezione di strumenti musicali coloniali, esplorando il modo in cui la tecnologia musicale supporta la decolonizzazione e arricchisce le narrazioni curatoriali. In *ReSoXy: Re-Sounding the Xylophone Collections* of RMCA (2023–2026), il progetto mira a riscoprire e rivitalizzare i suoni e le pratiche esecutive dello xilofono *manza*, un patrimonio musicale in declino degli Azande. Con il contributo di musicisti, costruttori di strumenti ed esperti ICT, *ReSoXy* ha sviluppato diversi strumenti virtuali e MIDI per emulare le esperienze di ascolto e di esecuzione del *manza*. Questi strumenti costituiscono dei dispositivi di co-creazione e condivisione della conoscenza, poiché consentono la collaborazione online con musicisti – in particolare nel nord della RDC – per creare nuove composizioni musicali dedicate alla cultura *manza* in declino e favorire il dialogo sulla salvaguardia del patrimonio culturale immateriale. L'articolo riflette sui risultati della digitalizzazione di una collezione musicale museale e promuove il decentramento della ricerca sul patrimonio culturale.

Opening Picture:

Figure 1: The manza xylophone of Azande chief Guga in Guma (Bondo), MO.0.0.14308. RMCA Tervuren. Photo J.-M. Vandyck.

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Deep within the archives of the Royal Museum for Central Africa in Tervuren (RMCA/ Africa Museum) lies a vast and largely forgotten musical heritage – over 9,000 musical objects, more than 37,000 sound recordings, photographs, metadata, ethnographical reports, and so on. The research project *ReSoXy: Re-Sounding the Xylophone Collections of RMCA* (2023-26) brings new focus to *manza*, a wooden, portable xylophone constructed in ten keys made in padouk wood (*pterocarpus*) and ten calabash resonators, mounted onto a fixed structure of a main board and small bridge boards laid between the keys. The *manza* xylophones were owned and performed by the chiefs of Azande clans and chiefdoms along the Uele River in the north of Belgian Congo (now: the Democratic Republic of Congo), the Azande regions like Yakoma, Guma (Bondo), Bili, Bambesa, Poko, Doruma, Niangara, and Dakwa.[1] Symbolizing the prestige power of the chiefs and notables, *manza* were performed in court rituals like enthronement and mourning of the death of a chief.

Collected over a century ago, the first instrument of the *manza* collection was acquired in 1907, and preserved in the Belgian Congo Museum, the former institution of RMCA (Fig. 1). Inaugurated in 1910, the museum was an inception of the *Colonial Section* of the 1897 Brussels World's Fair, which had attracted over one million visitors. Following this success, King Leopold II had decided to move this section to a new building called the "Palace of the Colonies" in Tervuren, situated on the outskirts of Brussels. The museum was the King's propaganda tool to promote his colonial project, hoping to attract investors, and gain popularity and support from the Belgian people. The section's galleries contained stuffed animals, geological specimens, foodstuffs, and ethnographic and artistic objects from the Congo, including musical instruments. A human zoo was also set up in the park to exhibit Congolese people during the exhibition. Until today, the institution served as both a museum and a scientific research centre (Fig. 2).

Against the backdrop of colonization and the legacy of an ethnographical museum, *ReSoXy*'s main goal is to rediscover and revitalize the sounds and performance practices of the muted musical objects[2] to reflect on the roles and meanings of a declined and declining cultural heritage through sound digitization and co-creation. Despite its prominence, the glory of *manza* was short-lived in the 20th century. The decline of the *manza* can be attributed to various social, political and cultural changes. Many precolonial musical traditions were discontinued and forgotten due to the abolition of patrimonial political powers,[3] globalization and commercialization of music, and differential access to wealth, technology and educational training.[4] The spread of Catholicism and migration have reshaped the cultural tradition and caused the marginalization of instruments.[5] In the recent visit to Kisangani, the biggest city in the northern region of DRC, in June 2024, our interviews show that the memory of *manza* has faded since the last few decades, as well as, apparently, the loss of *manza* musicians who could have sustained the repertoire, and the skills of performing and building the instruments. *ReSoXy* aims to *bring*

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Fig. 1: The manza xylophone of Azande chief Guga in Guma (Bondo), MO.0.0.14308. RMCA Tervuren. Photo J.-M. Vandyck.

Fig. 2: Royal Museum for Central Africa (RMCA), RMCA Tervuren.

back the sound and practice of *manza* that were disrupted, fragmented and erased to its stakeholders and communities through an interdisciplinary methodology of digitisation, co-creation and participatory action research. The project explores how music technology can enhance decolonization efforts and curatorial narratives, while investigates the potential of digital repatriation for intangible cultural heritage. In this context, digital repatriation refers not merely to the circulation of digital materials, but to the facilitation of access, agency, and creative engagement with displaced musical heritage.

Situated at the crosspoint of scientific, decolonial, curatorial, artistic and outreach goals, *ReSoXy* develops digital and virtual instruments to assist the analysis of the endangered *manza* practice and sound, fostering dialogues, reflections and knowledge sharing with the cultural stakeholders and communities. On the one hand, grounded on mu-

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sic analysis and ethnomusicology, the project investigates endangered *manza* techniques and practices and reveals the colonial gaze embedded in scientific literature and colonial archives through the analysis and experimentation with the digital instrument replicas. Colonial acquisition and research practices often omitted or manipulated the identities, subjectivities and direct voices of communities, reinforcing Eurocentric and racial biases of the colonial expeditors, scientists and curators. For instance, Olga Boone (1936) imposed a standard model to summarize the diverse and incommensurable zig-zag tuning systems of the RMCA *manza* collection of twenty-six instruments. The *Diamang* collections in Angola were acquired with inappropriate intentions, coercion, and misinterpretation.[6] Not all early recordings were made openly with apparent community consent. Some were gathered under what would now be considered ethically questionable, and those sacred songs would not normally be heard out of their ceremonial context or by the uninitiated,[7] and collection objects might have exclusive cultural and social meanings.[8]

On the other hand, the digital tools and platforms are designed for the participation, dissemination and valorisation of the collections, as well as open access of research data that is restricted to the scientific communities. The instrument replicas are the agencies of sustainability, accessibility, and social impact, reconnecting the muted museum objects and archive recordings with a broad targeted participant group – African, diaspora and international musicians, co-researchers and museum audience – in creative collaborations and interactive outreach activities. The museum objects and recordings should not simply be accessed and listened to – and only by scholars – but also re-incorporated into the living, contemporary cultures of the communities where the ownership is rooted.[9] The digital tools and platforms in *ReSoXy* ideally enable us to reenact, represent and relearn the embodied playing techniques, and initiate creative projects with musicians in Africa and the diaspora to reengage and reimagine the sound of *manza* in contemporary music practices.

Sound sampling sessions

To serve both lines of investigation, the preeminent task of *ReSoXy* was to sample each sound of the *manza* xylophone keyboard. High fidelity sound samples are crucial to the making of digital and virtual instruments. The main purpose is to capture the tones – the fundamentals and partials – of the xylophones as realistic, and as faithful to the natural timbres as possible, so that the research team can postulate the listening and playing experience of these original museum musical objects, while the participating musicians can use these sound samples for writing new music for the *manza* in the upcoming research tasks of co-creation. That said, scientific data obtained by past RMCA music research are deemed inadequate for creative and outreach activities, as they obscure the potential to facilitate and communicate hands-on instrumental skills within the efforts of reconnecting, relearning and reimagining the musical objects

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with diverse stakeholders and participants.

In the colonial times museum collections were acquired, preserved and studied as ethnographical objects rather than musical objects, thereby detaching them from their primary roles and functions of sound production and musical performance. As a result, the sonic material of the instruments – timbres, acoustics and performance practices – are largely absent from the museum literature and database. For instance, *Les Xylophones du Congo Belge* by Olga Boone (1936) focused solely on the pitch frequency measurements (in hertz) of 108 xylophones, in order to support studies of classification and geographical distribution of ethnic entities through musical instrument collections.[10] Boone's research team did not record the sound of the instruments, nor their musical patterns. Only a limited amount of field recordings and video footage[11] were collected during the colonial expeditions in the end of 20th century, and almost nothing was produced by colonial administrations who had contributed to the acquisition of a major part of the RMCA *manza* collection in the 1930's.

With the assistance of sound artist and producer Aiko Devriendt (Fig. 3), we recorded the instruments in four dynamic layers (soft, medium-soft, medium-loud, and loud) at a sample rate of 48,000 Hz and 24-bit resolution in WAV format. Multiple stereo recording techniques were employed to capture both direct sound and resonance, allowing the sampling process to preserve spatial, timbral, and dynamic nuances relevant to performance analysis.[12]

Fig. 3: Aiko Devriendt sat up the microphones in recording session, June 2023 in RMCA. Photo Adilia Yip.

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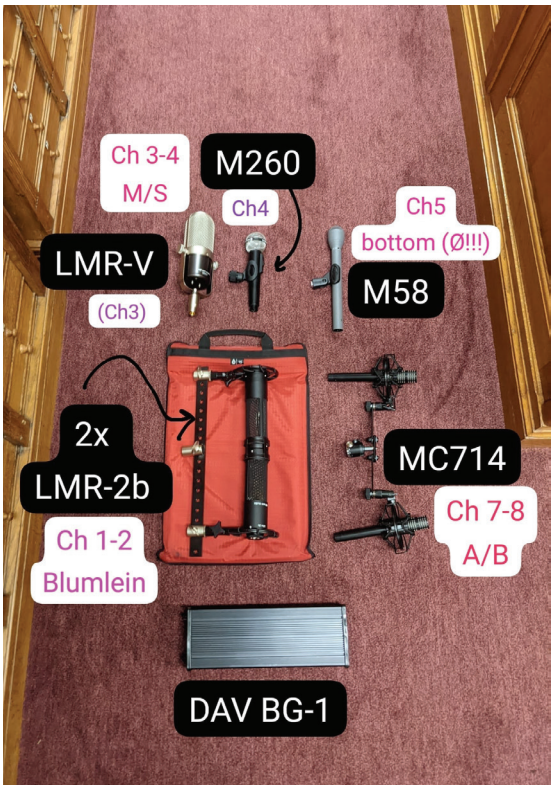

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Five different types of microphones, including M260, M58, MC714, LMR-2b, and LMR-V (Fig. 4)[13] were positioned at various angles around the *manza* according to each microphone's acoustic characteristics and function. The xylophones were played using three different types of mallets (hard rubber, soft rubber, and the original rubber mallets from the collection) to produce a range of timbres and articulations on the *manza* keyboards. Variations of the mallets' hardness, materials, and shapes resulted in different acoustic textures and tonal fundamentals. Beyond the acoustic fidelity, the sound sampling process functioned as a critical research intervention. By foregrounding timbre, resonance, and dynamic articulation – elements largely absent from colonial documentation – the recordings enable forms of musical knowledge that cannot be recovered through pitch measurements or object descriptions alone.

Physical interface

Subsequently, the digitization process continued with the development of various interfaces to playback the *manza* sound samples and to visualize the instruments' embodied gestures and planes of movement. The choice of interfaces, whether physical or virtual, was determined by the project goals and the work packages planned for different stages of the project. The physical *manza* replica was primarily selected for the ethnomusicological and music-analytical line of investigation. This design – also referred to as a MIDI *manza* or a digital musical instrument – enables the reconstruction of traditional *manza* playing techniques and hands-on instrumental skills, with reference to historical photographs of *manza* musicians (Fig. 5) and archival sound recordings of live performances. The analysis confirmed that the musician holds two mallets in each hand and strikes two wooden keys simultaneously (i.e., octave pairs). For *manza* MO.0.0.14308, the left hand plays the octave pairs of C, A#, G, and the right hand plays G, F, C# (Fig. 6a and b). The movement planes[14] of the *manza* is symmetrical, shared equally between the left and right hand, where the left hand strikes the left half of the keyboard, and the right hand strikes the part on the right.[15] The physical replica thus operates not merely as a playback device, but as a heuristic tool for recovering embodied musical knowledge that cannot be inferred from systematic analysis or pitch frequency measurement alone.[16]

Between October 2023 and September 2024, *ReSoXy* invited master's student Oren Ronen to design

Fig. 4: Different microphones used in the recording session. Photo Adilia Yip.

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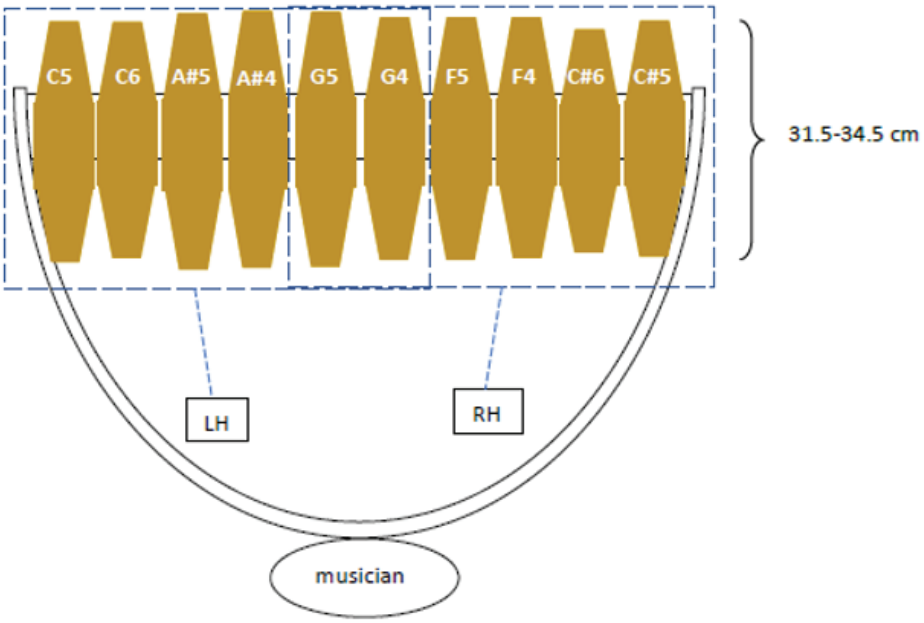
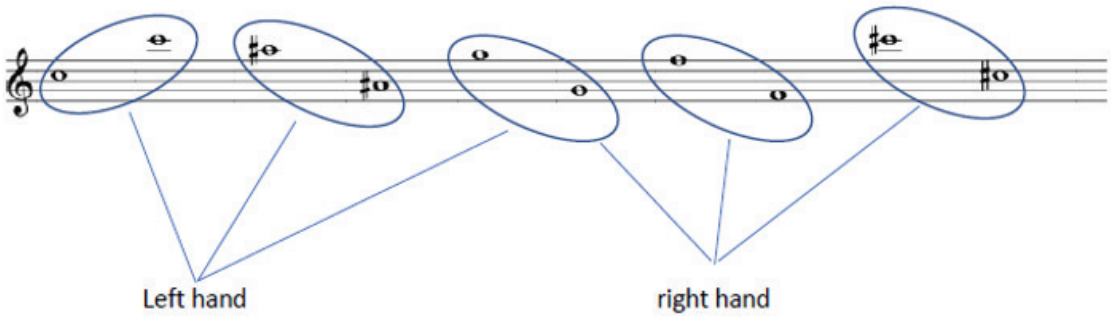


6a

Fig. 5: Chief Senza and his brother Kanga playing the manza at Bili. RMCA archive EP.0.0.14694.



6b

Fig. 6a-6b: Conceptualizations of the movement planes of manza MO.0.0.14308. Yip 2023.

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the digital system for the MIDI *manza*, under the guidance of professor Marcelo Wanderley from the Department of Music Technology at McGill University in Montreal, Canada (Fig. 7a and 7b). The MIDI *manza* employs a simplified wooden keyboard that imitates the physical shape and dimensions of the original instruments. As the natural sonority of the wooden keys are replaced by the playback of sound samples, it is unnecessary to add the resonators to the MIDI *manza*, or to shave the wooden keys to adjust the natural pitch of the material itself. The physical interface consists of ten thin wooden boards to represent the ten wooden keys of a *manza* xylophone. Each wooden key is installed with a piezo element, a transducer (sensor) that converts mechanical stress (pressure and vibration) into electrical voltage (electric signals). The ten piezo elements – one for each key of the *manza* keyboard – are connected to an *Arduino Mega 2560* microcontroller to trigger the playback of sound samples (i.e., ten sound samples recorded in four dynamic layers) via a *Pure Data* script running on a laptop. In this way, the MIDI *manza* can playback the sound samples of the entire museum collection of twenty-six instruments. This is an important feature, as each *manza* exhibits a distinct tuning, while adhering to a common set of tuning principles that are observed in the music analysis of *ReSoXy*. Furthermore, the team has also designed a physical frame structure that is low-budget, portable, and lightweight that can be stored in a handcarry-sized luggage for easy travel to performances, workshops, and presentations. The ten wooden keys are mounted onto a frame made of simple recyclable materials, such as plywood, PVC tubes, Velcro tape, recycled foam[17] and flannel cloth, which can be easily assembled and detached. With this design, the team aims to bring the physical replica to the source communities and fieldwork in DRC for knowledge sharing and co-creation of both sound and practice of the *manza* collection.[18] Each wooden key is installed with a piezo element, a transducer (sensor) that converts mechanical stress (pressure and vibration) into electrical voltage (electric signals). The ten piezo elements – one for each key of the *manza* keyboard – are connected to an Arduino Mega 2560 microcontroller to trigger the playback of sound samples (i.e., ten sound samples in four dynamic layers) via a Pure Data script running on a laptop. In this way, the MIDI *manza* is able to playback the sound samples of the entire *manza* collection of twenty-six instruments. This is an important feature, as each *manza* exhibits a distinct tuning, despite adhering to a common set of tuning principles that are observed in the music analysis of *ReSoXy*.

The application of physical instrument replicas in embodiment analysis also exists in earlier African musical instruments research investigations. As remarked by Wachsmann, the importance of studying the human experience of playing an instrument is to reveal *their experiencing*, a person's programs for sensing, thinking or dreaming.[19] Blacking has played a similar model of Nyamulera notched flute of Uganda (also the recordings) that is preserved by The International Library of African Music (ILAM) to postulate the instrument organology and the playing techniques of eight tunes of

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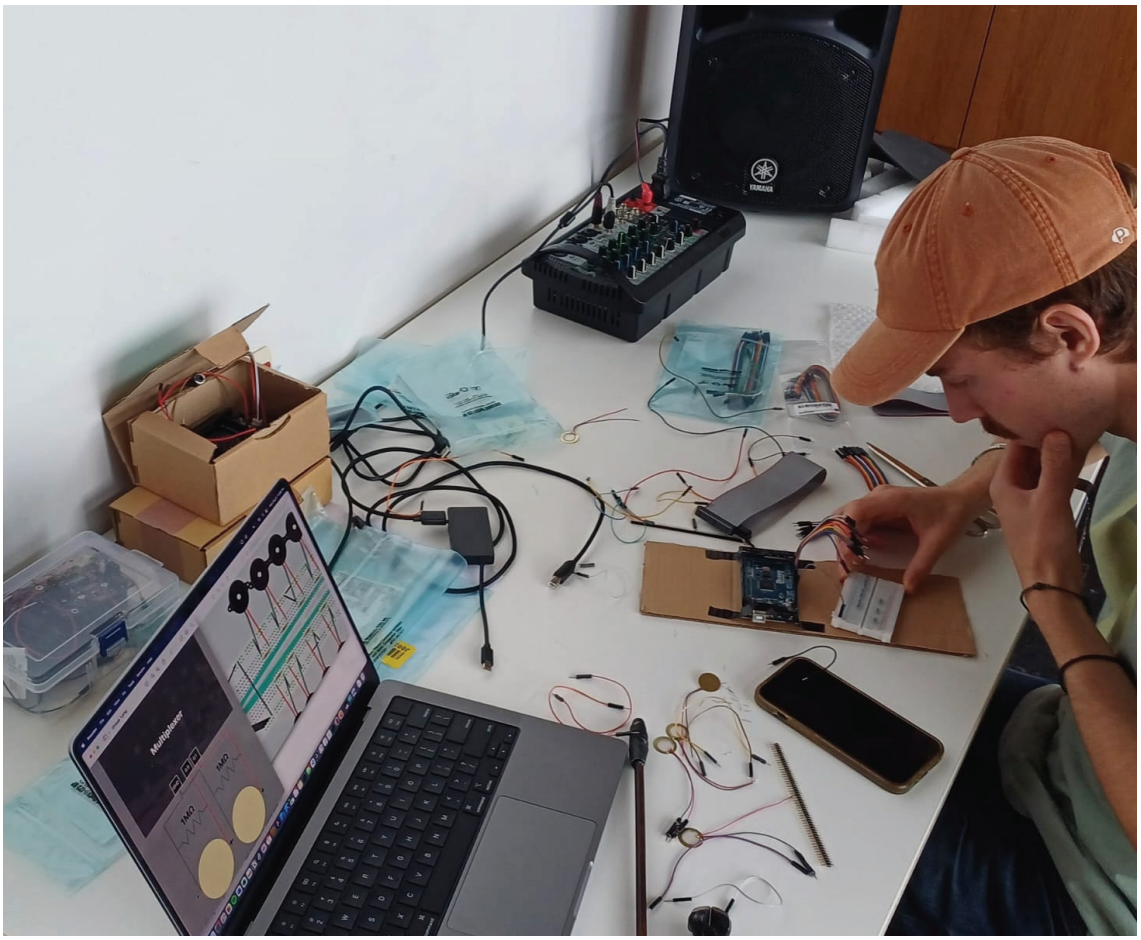

7b

Fig. 7a-7b: The wooden keys and Arduino microcontroller. Oren Ronen working on the MIDI manza. Photo Adilia Yip.

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the Butembo Nyamulera flute from north-eastern Belgian Congo.[20] For postulating the conception of musical scales and tuning systems of xylophone musicians in Central African Republic, researchers have modified the tuning of a synthesizer and extended the keys with wooden boards to simulate the original instruments and musical scales, thus, xylophone musicians were invited to justify the correctness of the tunings.[21] In the analysis on the kalimba tunes from Nsenga, a Bantu-speaking people of south-eastern Zambia, Blacking concluded that the instrument doesn't seem to have musical patterns common to different melodies; but when the fingerings and rhythm are compared, some recurring patterns of fingerings appear, inextricably linked to different patterns of polyrhythm.[22]

Virtual interface/ web application

Nevertheless, the MIDI *manza* remains dependent on the physical presence of both the researcher and the instrument itself, which limits the sustainability and accessibility of the collections and archives due to geographical distance and transportation constraints. While the material structure of the MIDI *manza* facilitates hands-on and embodied music experience, the research team was seeking alternative digital approaches that could improve the project's dissemination and social impact. Another concern related to the question of legitimate ownership of museum objects. In the temporary exhibition *ReThinking Collections* (2024), the curators aimed to emphasize that the ultimate goals of digitization are the dissemination and repatriation of intangible cultural heritage and Indigenous knowledge systems associated with a declining yet prominent traditional African instrument, rather than conveying the wrong impression that the museum claims ownership over the musical object, its construction and performance practices. The team was seeking for a refreshed and interactive approach to promote the musical knowledge and skills of *manza* that lies beyond the common knowledge of most museum visitors. In addition, these designs should also acknowledge that digital interfaces embed curatorial values that are related to ownership, accessibility, and the ethical circulation of cultural knowledge. For instance, we studied some existing website applications like the *Gamelan Numérique* developed by the Philharmonie de Paris,[23] and different commercial smartphone applications for piano and guitar developed for learners of different ages.

Therefore, *ReSoXy* has brought these ideas to the ICT service[24] of RMCA to develop a *virtual manza*, and the result is an application using JavaScript and HTML5 codes that is playable on a touchscreen device that is almost the same size as the *manza* xylophone MO.0.0.14308. Additionally, the collection management photographer was asked to take new high-resolution, realistic photographs of the *manza* keyboards from a top-down perspective, with particular attention paid to reproduce the accurate colors and proportion of the instruments in these images. Resonators were deliberately excluded from these images, as the movement plane is defined solely by the keyboard surface. Sound samples were then mapped to the

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corresponding image areas of each wooden key. Multiple sound samples are triggered during playback when more than one key is touched, reflecting the fact that the *manza* is typically played with two to four mallets simultaneously. Not only reading about the instrument and examining the object inside the glass exhibition showcase, visitors can thus interact with the instrument virtually through the touchscreen. A short animation play-along video was created to demonstrate the basic techniques of playing the *manza*. This animation was based on the research team's analysis of the archive recordings of the same instrument (Fig. 8).

To further support the goals of sustainability and accessibility, the *virtual manza* was subsequently transformed into a web-based application compatible with laptops and touchscreen mobile devices (Fig. 9). The website reuses the JavaScript and HTML5 codes developed for the *virtual manza* exhibition touchscreen, which is fully supported by web browsers. Although the team considered developing an iOS/Android application for the *virtual manza*, the team preferred a web-based solution due to its simpler implementation, broader cross-device accessibility, and lower development and maintenance demands. The application requires only 2 to 3 MB of disk space, consumes minimal system resources (e.g. RAM and CPU), and ensures a sustainable and lightweight front-end framework for online dissemination, particularly in regions with limited internet bandwidth. Maintenance of the *virtual manza* web application is also minimal. As long as JavaScript remains supported by web browsers, the only required maintenance will concern the web server, such as security updates and backups, which will be handled by the museum's ICT service. The decision to prioritize a lightweight, web-based interface articulates a framework in which technological design, curatorial ethics, and artistic practice are inseparable.

Hence, the virtual *manza* web appli-

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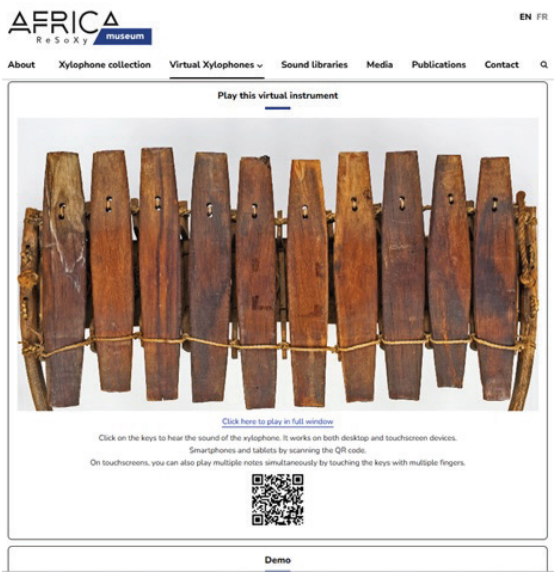

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Fig. 8: The touchscreen virtual manza (ReThinking Collections 2024, RMCA). Photo Adilia Yip.

Fig. 9: Website of ReSoXy, https://resoxy.africamuseum.be/.

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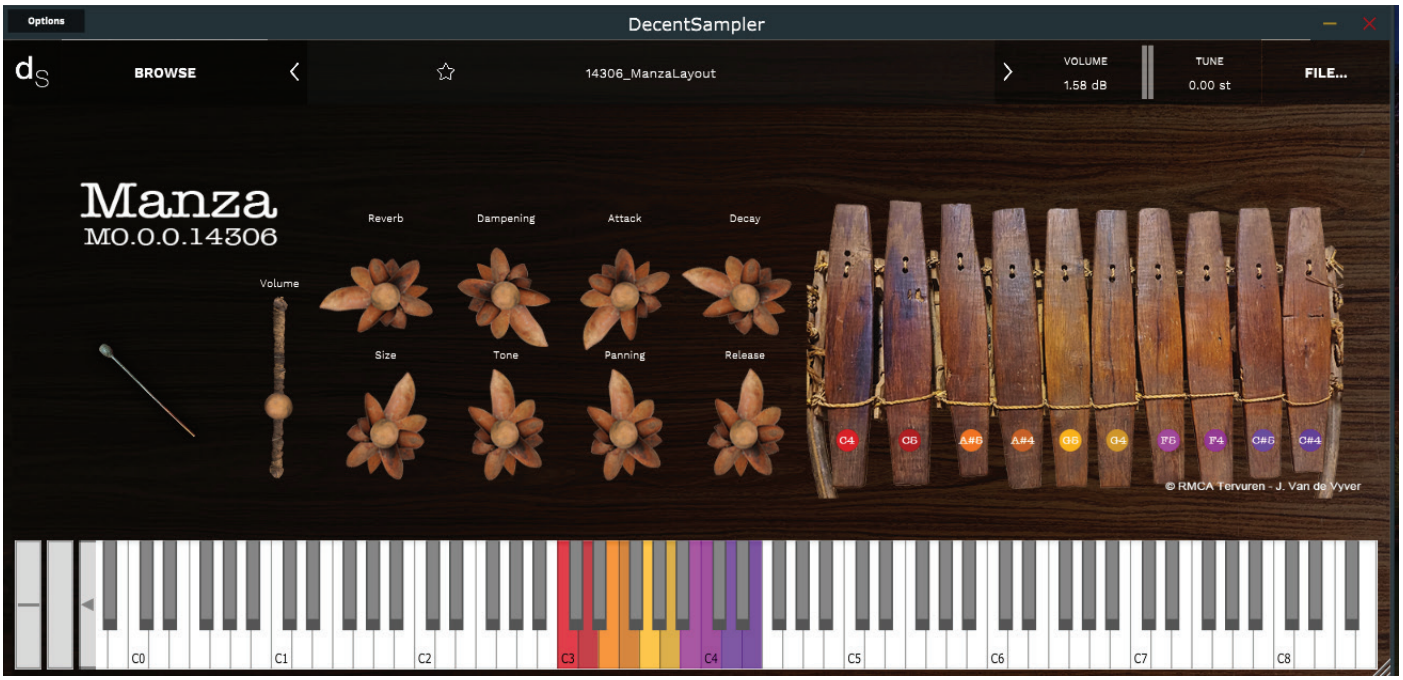

Fig. 10:
VST plugin.

cation serves as a central feature of the *ReSoXy* project website, complementing its role as an open-access platform that provides access to archival data, photographs, sound recordings, and related research publications. With the help of a student internship,[25] the team created a concise, and engaging short introductory video explaining the history of *manza*, as well as its construction, music theory, and performance techniques in accessible and non-specialist terms.[26] For local museum visitors, the research team has additionally developed a sound installation[27] featuring multiple *virtual manzas*, created by connecting three to four tablets or smartphones to a simple PA system. This configuration enables participants to collectively create music through interaction with the installation. Website visitors can download *manza* sound samples for use in their own creative projects. These samples are organized into separate .zip folders, each forming a sound library for a different *manza*. After a few months of development, the website has successfully reached 2448 visits and downloads in January to December 2025.

To facilitate professional music creativity, the student internship has also developed a VST plugin (virtual studio technology) – a virtual instrument that operates inside the DAW (digital audio workstations)[28] – based on the open-source Decent Sampler template.[29] Through this adaptation, the *manza* sound samples and images are transformed into a virtual instrument that supports professional music production, and serves as a powerful tool for electronic music creation. As with the sound library, the VST plugin has been uploaded to the project website, accompanied by a clear instruction explaining the download and installation processes. Then, the VST plugin was sent to musicians in Africa for the creation of new music tracks and an online album. This initiative effectively extends the transmission of the "manza"'s sound and practices beyond geographical distances. These

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audiovisual creative outcomes produced using the VST plugin (Fig. 10) and sound libraries are published on the project website and the project's official YouTube channel.[30] The research team hopes that these videos will inspire broader experimentation with the instrument's sounds and performance techniques. Together, digital repatriation, co-creation, and the reconfiguration of the museum contact zone form the conceptual framework through which *ReSoXy* reflects on a broader commitment to accessibility and decentralization, using technological solutions that would promote infrastructural and economic inclusions.

Co-creation

Drawing on Clifford's notion of the museum as a *contact zone*, *ReSoXy* approaches digitization and co-creation as means to reconfigure historically asymmetrical encounters between institutions and source communities. With the collections stored in the ex-colonizer's depots and glass exhibition showcases for about a century, returning objects to their homeland will not restore their original functions and practices, but likely, a mere relocation to other "cabinets of curiosities".[31] In echo to Basu and Modest, returning the musical recordings, digitization, nor the physical musical objects and photographs would have been sufficient for the restoration and revival of the intangible knowledge systems. It is necessary to create a forum to bring together different stakeholders and interlocutors in an attempt to foster constructive dialogue and interchange,[32] and to aim at the repatriation goals of reconciliation, sustainability and equity.[33] *ReSoXy* aims to create an alternative museum contact zone,[34] a collateral interactive zone of *re-centering*[35] to democratize the curatorial control,[36] and open new creative and exchange opportunities for the collections.

In *ReSoXy*, co-creation denotes collaborative artistic and research processes in which musicians participate as co-authors of sound, meaning, and interpretation rather than as informants or end users. Aiming to foster a decentralized approach to reflect and recreate the meanings and roles of the disrupted musical cultures through musical and creative activities, to configure *a different same* for the captured musical objects,[37] co-creation is potentially the channel of sharing the narratives and *story-ing* of the stakeholder participants,[38] affirming the modes and practices of music creativity that are generated by the young generations for the collections, and indigenous knowledge systems that have been marginalized by the dominant Western cultural canons. The project team sends out the high-fidelity sound samples and various interfaces to musicians to reimagine and revive the disrupted transmission and continuation of *manza*. We seek answers for the following research questions through co-creation: How can digitisation re-connect the collections and the original owners and stakeholders, and what are the artistic results? What are the sound and performance of *manza* after decades of fragmentation, disruption and oblivion? In addition to decolonizing the museum collection, the co-creation partnerships aim to evaluate the functionality of the virtual and digital devices.

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Since spring 2025, *ReSoXy* has invited two African musicians to develop projects using the digital devices and platforms. From our existing contacts, we engaged Adon Geel from Makhanda (Grahamstown), South Africa,[39] and Chris Mec Mr Tshongo Le Magnifique from Kisangani, DRC, and is currently active in Kampala, Uganda and Dar Es Salaam, Tanzania. Both musicians began their creative processes by experimenting with the web application, sound libraries, and VST plugins provided online by the *ReSoXy* research team. With different artistic backgrounds, visions, and skills, they created compositions and multimedia contents that reflect themes of Pan-Africanism as well as social and youth-related issues. Issues of museum collections were also discussed during the interviews. The resulting compositions revealed distinct musical designs, emotions, styles, and modes of presentation.

Adon Geel

With a background in sound technology, Adon Geel is a freeform producer and cultural practitioner affiliated with music organization Black Power Station in Makhanda, South Africa. The project was sponsored by the artist in residence program *AFRIMUS of RMCA* as the first test case on co-creation with African musicians using the digital tools of the museum musical collections. Geel's practice is central to sonic ethnography, in which his musical influences are rooted in indigenous music during his upbringing, and later, expanded through exposure to hip-hop and immersion in other genres such as jazz, soul, bossa nova, samba, highlife, and Afrobeat. Because hip-hop often involves sampling, he became drawn to the original sources of these sounds, which led to the development of his broad musical interests. He engages deeply with sound sources, seeking to understand their cultural contexts and the communities from which they originate.

From his previous work in sound repatriation projects involving endangered sounds and musical recordings from the ILAM archive (International Library of African Music), he argues that musicians and researchers have the responsibility to interrogate archival narratives, historical contexts, and acquisition practices, and to clarify the original messages African ancestors sought to convey through these recordings and collections. That said, as the chiefs and their courts no longer exist, the project has difficulties to find an authoritative body who knows and preserves the *manza* culture, nor the reconstruction of its original musical forms. Geel's creative and decolonial processes were guided intrinsically by the tonalities and archive recordings of the *manza*. On one hand, his goal was to create a space of exchange that works with *manza*'s specific sonic textures and elements in ways that complemented his personal sonic interpretation and the participating musicians' improvisations; on the other hand, the composition is a space of exchange among different Bantu cultures, languages, and musical instruments. His idea of decolonizing the *manza* collection is mainly about reinitiating the musical creativity of the instrument, and to disseminate its sounds and practice through performing the composition with his bandmates and in front of public audiences.

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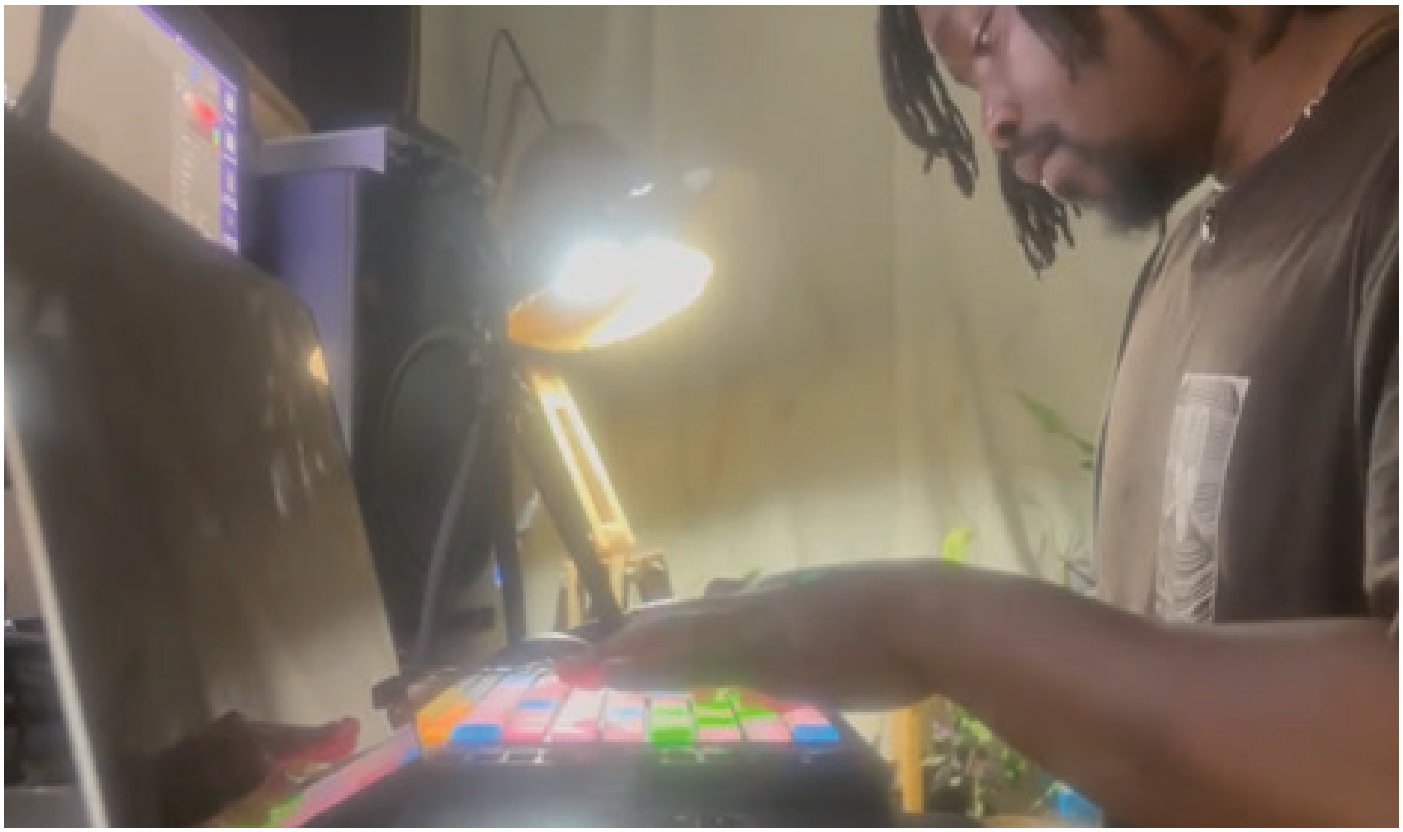

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Fig. 11: Adon Geel experimenting the manza sound samples with the 64-pad controller. Photo Adon Geel.

In June 2025, Geel has completed a five-minute music track entitled *Bantu Socializing: People Together* and a short video documentary explaining his inspirations and the creative process.[40] The composition symbolizes a melting pot of cultures and celebrates the Pan-African ideology of diverse ethnicities coming together as *one* Africa. Geel integrated multiple musical styles, including jazz, hip-hop, R&B, and soul, drawing inspiration from artists such as Robert Glasper and Kokoroko. Geel blended several languages, the Xhosa and Zulu languages of his own background and the Azande languages, rooted in the Bantu tradition. Despite the *manza* sound samples, he also incorporated the sounds of *uhubu*, a Xhosa musical bow, spoken audio, and Western instruments such as saxophone and bass guitar.[41]

Bantu Socializing was created by the sampled sound library manza MO.0.0.14308, and later, the VST plugin for further musical creativity. Geel gave us very positive reactions about his experience of using both applications, and the download and installation processes also went smooth. With the sound library, Geel could modulate, re-tune and add sound effects to the original *manza* tones at ease using his DAW (Ableton) and the 64-pad MIDI controller (Fig. 11). He appreciates the VST plugin design for the possibility to playing and writing music for the non-Western instrument and tones using a MIDI piano keyboard, which is a feature incompatible with the presets of most MIDI instruments and virtual applications. The graphical representation and arrangement of the VST plugin emulate the bodily experience of playing the unique *manza* keyboard of five pairs of octave intervals. With these equipment and applications, Geel integrated the original *man-*

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za tones of MO.0.0.14308 with the Western instruments in *Bantu Socializing*. On the one hand, he created a solo improvisation using the original *manza* tones; on the other hand, he adapted the *manza* sound samples to the Western equal-tempered tuning[42] to compose the main melodic theme recurred throughout the composition, which supports the improvisations and dialogues played by jazz musicians. In the future, Geel wants to continue the project with a live performance of his band that is made up of saxophone, trumpet, bass, drums, and synthesizer.

Chris Mec Mr Tshongo Le Magnifique

Born and raised in Kisangani, DRC in 1996, Tshongo is a multi-talented young rapper, singer, songwriter, drummer, DJ trainer, and event organizer. His music journey began in a church choir at the age of 7, where he first discovered the healing power of music and the deep connection between rhythm and emotion. By the age of 12, he was battling in the streets – not with fists, but with words – channelling his energy into breakdancing and freestyle rap, influenced by rappers like Eminem. In May 2013, Tshongo moved to Uganda and joined the Hakuna Kulala collective, which brought him to the heart of East Africa's underground music revolution, and become a regular artist and event organize for the Nyege Nyege Festival since 2017. Now based between Kampala (Uganda) and Dar es Salaam (Tanzania), he was invited to perform in festivals, clubs, and grassroots community shows across East Africa. Through his work as a DJ trainer, Tshongo is dedicated to empowering the young generation of musicians, especially youth from marginalized communities.

ReSoXy has first commissioned Tshongo to create a composition using the *manza* VST plugin. Entitled *Yoka*,[43] meaning listen, hear, or understand, is a Lingala related word used in East African Bantu languages, often appearing in Congolese music. Written in Lingala, the song expresses the unfortunate life of a young man. The lyrics are based on a letter written by one of Tshongo's friends before his death. Born in Bondo and raised in Kisangani, the friend died young after drinking a ritual substance. In the letter, he expressed regret over his actions, explaining that he came from a poor family and did *some wrong things* to improve the situation, which ultimately ended tragically. By adapting this letter into song, Tshongo commemorates his friend while also highlighting the social challenges faced by youth in northern DRC. Since Tshongo's main work is not electronic music production, he often collaborates with music producers. For *Yoka*, he worked with Beni Beats Music Studio in Dar es Salaam, Tanzania, and together they downloaded and installed the VST plugin. The process was not smooth at first due to confusion about opening the VST plugin in the DAW, but the issue was quickly resolved after we checked the installation steps together in a video call and used the correct functions and directories of the DAW. They enjoyed using the VST plugin, as it is easy to follow the arrangement of the *manza* keyboard and improvise music with a sense of the *manza*'s

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instrument shape through playing the MIDI piano and the laptop.

Yoka inspired Tshongo to continue his research by working with young musicians in his hometown of Kisangani. In August 2025, he proposed to *ReSoXy* an extension of his solo project. He wants to support the principles of *ReSoXy* and the dissemination of the *manza* digital tools, seeing them as the agencies of promoting his community's cultural heritage and foster healing. Tshongo wants to bring *manza* to local young musicians and create a lasting, socially impactful album that would raise awareness of the tradition. The second phase of the collaboration took place in October 2025, when Tshongo returned to Kisangani to work with eight young musicians aged 25 to 38, including five performers (singers and rappers) and three studio producers from Bomci Records. Tshongo developed the beats and overall musical ideas for six tracks and invited the singers to record the vocal parts. He then asked the producers to compose the *manza* parts using the *manza* VST plugin, as they are more experienced in electronic music production and Tshongo had already worked with the plugin for *Yoka*. The producers learned the basic principles of *manza* from the *ReSoXy* website, and Tshongo communicated his ideas by demonstrating them through a smartphone mallet-percussion app. Tshongo organized six creative and recording sessions with the group over a three-week period in October, followed by a release concert at the end of his trip. Due to the complications while crossing the Uganda-DRC border Tshongo was forced to spend extra time to seek alternative transportation routes through Bunya and Lake Albert. Therefore, the project is currently in the post-production stage. It is expected to be uploaded to Bandcamp in late summer 2026.

The project has launched a short-written interview with six out of eight participants in the project. In general, the interviewees seemed to know quite little about their traditional music and cultural practices but showed concerns over losing their traditional musical instruments and recordings to European museums, and they are interested in re-owning these materials. All of them claimed that European museums, mainly in Belgium and France, are preserving their traditional instruments, and they would like to get them back as these are part of their cultural heritage. Unfortunately, due to the short-written format of the interviews, I am unable to ask further about their ideas of repatriation.

However, the responses concerning traditional musical instruments revealed some confusion regarding the use of terms and the cultural origins of these instruments. The *djembe* and *balafon* appear to be well known among the interviewees; nevertheless, these instruments originated in West Africa, and their connection to traditional music in northern Congo is likely to be limited. Further investigations into the presence and usage of these instruments and related terms in northern Congo would be necessary to clarify the situation. In addition, none of the interviewees mentioned the *kpaningbo* xylophone, and only two participants referred to the *manza*. The *kpaningbo* is an instru-

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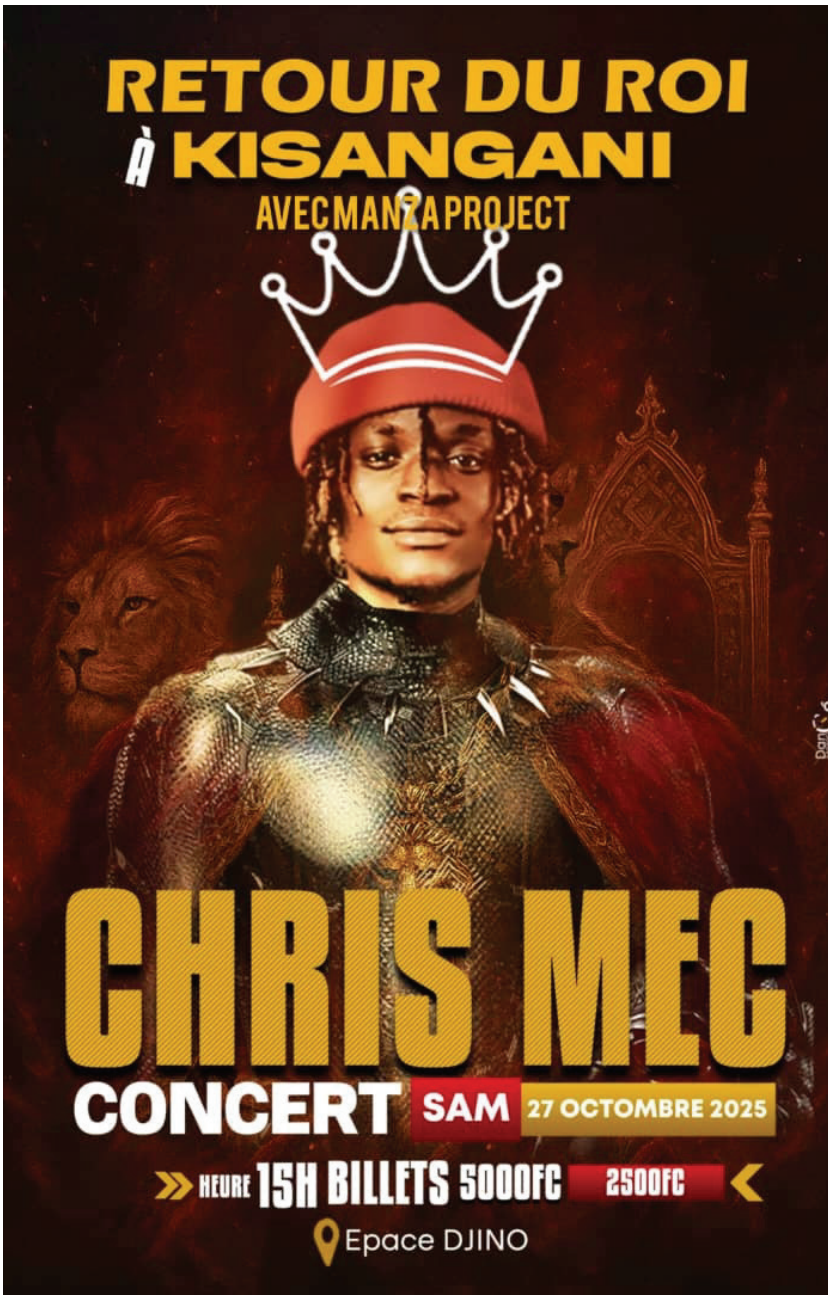
ment of the Azande people, consisting of multiple loose wooden logs or boards with between five and fifteen keys, and it is still commonly used in Kisangani and among Azande communities today. Most interviewees were familiar with the *madimba* and *ngoma*, which did not originate in the northern region around Kisangani but are traditionally associated with peoples from the Kasaï and Katanga regions of the Democratic Republic of the Congo (DRC).

Apparently, the interviewees' primary interests and professional focuses lie in Western popular music styles, instruments, and digital music applications. Apart from playing Western popular genres with guitar, rap and singing, some of the interviewees can play a traditional instrument, like *tam-tam* (wooden slit drum) and *likembe* (lamellophone), and some others have heard about *madimb*a (xylophone) and *ngoma* (membrane drum). Most of them learned music through church activities, artist collectives, or family members and siblings. This situation reflects a combination of sociopolitical developments, including migration, modernization, Western cultural influence, and Pan-Africanism. The interviews also exposed weaknesses in the education and transmission of cultural heritage in the region, highlighting the need to improve both the teaching of traditional music and general awareness of it among younger generations (Fig. 12 and 13).



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Conclusions

In a nut shell, *ReSoXy* has engaged with the *manza* collections of RMCA not merely as historical artifacts, but as a living sonic knowledge that was disrupted by colonial acquisition, racial biases, and archival silencing. By combining sound sampling, digital instruments design, ethnomusicological analysis, and participatory co-creation, the project repositions museum collections as sites of dialogue, experimentation, and ethical responsibility. The development of physical, virtual, and web-based interfaces demonstrates how music technology can support sustainability, accessibility, and critical reflection, while reconnecting the cultural practices with local communities. Rather than proposing digitization as a form of restitution in itself, *ReSoXy* emphasizes the necessity of social processes – collaboration, listening, and creative exchange – in the transmission of intangible cultural heritage of the music collections and archives. Through co-creation with musicians and communities across geographical distances, the project opens a decentralized *contact zone* in which new meanings, sounds, and narratives can emerge. In this way, *ReSoXy* suggests that the future of museum sound collections lies not in preservation alone, but in their capacity to be revived, reconnected, and reimagined within contemporary cultural life.

Fig. 12: Poster of Tshongo's concert in Kisangani, October 2025.

Fig. 13: Beni experimenting with the VST plugin. Photo Chris Mec Tshongo.

Credits

Special thanks to Aiko Devriendt, Oren Ronen, YiXuan Lyu, Adon Geel, Chris Mec Tshongo, and Mathieu Driessen for their contributions. Besides, ReSoXy would like to thank the institutional support from the Royal Museum for Central Africa (RMCA) and its ICT, collection management, and musicology teams. The project was supported financially by BELSPO Brainbe 2.0 and the Royal Conservatoire Antwerp.

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Endnotes:

1 Boone 1936; Mumbanza 2016, p. 73. The term *manza* is commonly known as the name of a Ubangian language spoken by the Mandja people of the Central African Republic, as well as the name of the ethnic group itself.

2 Sachs 1939, cited in Pollens 1989, p. 590; Petitjean 2025; Hoyt 2024.

3 Linwood 1995, p. 198-199; Kahunde 2012, p. 200.

4 Seeger 2018.

5 Yip, Ramirez 2026.

6 Porto 1999; Valentim 2019.

7 Gray 1997.

8 Kahunde 2012, p. 202.

9 Madiba 2021.

10 Sciot 2018.

11 The sound archive DEKKMMA of RMCA preserves only fourteen audio recordings performed by two manza ensembles of Chief Guga in Bondo (Guma), and Chief Senza in Bili respectively. Both were recorded by Armand Hutereau in 1912 on wax cylinders, since the recordings of Chief Senza were mostly in bad quality and damaged.

12 Channel 1-2 is a set-up of Blumlein pair, whose two bi-directional microphones are at right angles to one another in close proximity, capturing a stereo image of the sound source with added ambience captured from the rear of the recording space. Channel 3-4 forms the Mid/Side (M/S) technique, with the cardioid (Mid) facing the sound source for center information and the figure-8 (Side) microphone perpendicular to it (90 degrees) to capture side ambience. Channel 5 captures the resonance at the bottom side of the instrument. Channel 7-8 is an A/B (Spaced Pair) technique that is spaced apart to capture a wide stereo image of the complete instrument and the tonal differences between the left and right side of the keyboard. This information was obtained from Aiko Devriendt, and website https://rode.com/en-be/about/news-info/stereo-microphone-techniques (accessed on 19/06/2026).

13 The DAV BG-1 in the photo is a microphone amplifier to improve the recording quality.

14 Coessens 2019. The concept of movement and spatial plane was coined by Kathleen Coessens to illustrate and compare the movement approaches of pianist and cellist.

15 Yip 2023.

16 A demonstration video of a *manza* pattern using the physical interface is available on the ReSoXy project website: https://resoxy.africamuseum.be/en/xylophone-collection/MO.0.0.14308 (accessed on 29/01/2026).

17 The foam is added to the PVC tubes to absorb the excessive vibration while striking the wooden keys to trigger the piezo elements for generating the playback sound. A thin rubber layer is also stuck on the surface of the wooden keys to dampen the natural sound produced by striking on these wooden keys.

18 Due to the political instability, health concerns and budget, we hope the fieldwork in DRC can resume in 2026.

19 Wachsmann 1982, p. 198.

20 Blacking 1955.

21 Voisin 1994.

22 Blacking 1961.

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23 https://pad.philharmoniedeparis.fr/gamelan.aspx?_lg=fr-FR (accessed on 19/06/2026).

24 Information and Communication Technology.

25 YiXuan Lyu was a student of the Asia-Europe curatorship postgraduate program at the University of Antwerp in academic year 2024-2025, who has also received training in graphic design and animation.

26 The video is available in French and English on YouTube Channel: https://www.youtube.com/@TheManzaXylophoneProject (accessed on 19/06/2026).

27 The sound installation was presented in the sound art festival *La Semaine Du Son. Oor* in January 2026 at the Musical Instruments Museum, Brussels; the jam session workshop *Echoes of the Ancients* took place in April 2025 at RMCA.

28 Some examples of DAWs are Reaper, Ableton Live, or FL Studio.

29 https://www.decentsamples.com/ (accessed on 19/06/2026).

30 The copyright issues of sharing, downloading and accessing the materials will be in consultation with the reproduction department of RMCA. Project team will also consult elders and communities during co-creation and ethnography work packages.

31 Pretorius 2022.

32 Basu, Modest 2015.

33 Restitution Belgium 2021. Ethical principles for the management and restitution of colonial collections in Belgium. https://restitutionbelgium.be/en/report (accessed on 19/06/2026).

34 Clifford 1997; Mader 2022.

35 Mbembe 2015.

36 Pierroux, Bäckström, Brenna, et al. 2020.

37 Njami 2018.

38 Mackinlay 2016.

39 The project was sponsored by the artist in residence program *AFRIMUS* of *RMCA*.

40 The documentary: https://youtu.be/6x1qCMZH5N4 (accessed on 19/06/2026).

41 The Uhubu sound samples and spoken audio are sampled from the ILAM sound archive and YouTube videos. The saxophone was played by Siyabulela Mfuku, and bass guitar by Bulelani Mfuku.

42 In Western music, a scale system called twelve-tone, or equal-temperament is commonly endorsed. This is in contrast to the scale of *manza*, a unique system of five pairs of octave intervals.

43 The music video of *Yoka* https://youtu.be/lejl1JrTbYE (accessed on 06/07/2026).

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