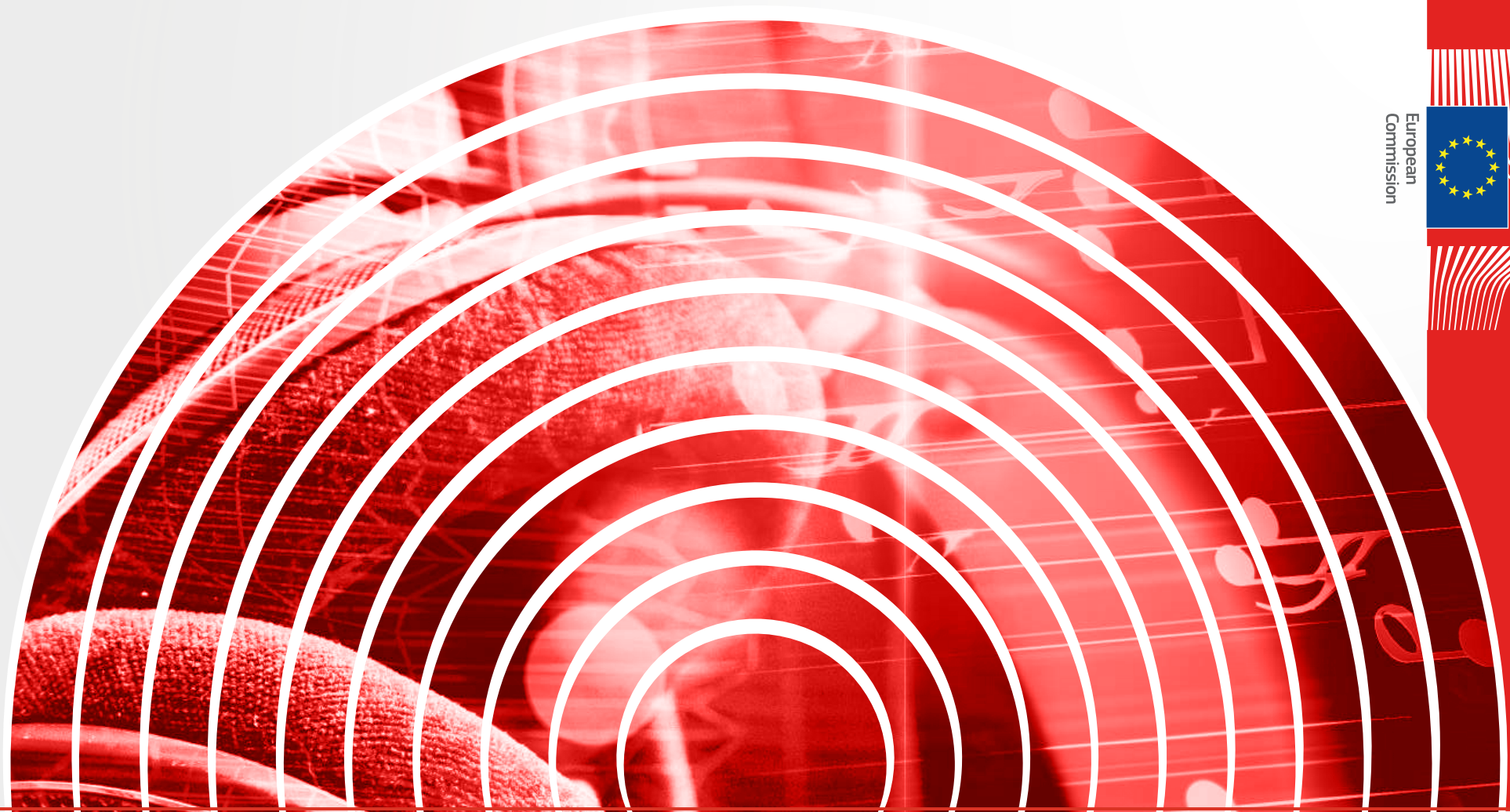
Towards new, sustainable digital**live** performance practices in **Higher Music Education**



European Commission

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1. Towards new, sustainable digitaLive performance practices in Higher Music Education

A fascinating project has come to an end, and it is now time to look back and evaluate the meetings, training activities, conferences, and multiplier events of the last three years.

Participating teachers, students, researchers, technicians and other institution colleagues from five universities: Conservatorio di Musica Alessandro Scarlatti Palermo, Ionian University, Koninklijk Conservatorium Brussel, Yasar University, Malmö Academy of Music, shared their knowledge, exchanged trainers and students, participated in joint workshops and, by experimenting with the latest digital techno-logiies, opened new doors and pointed to new innovative approaches, where their local specificities are not replaced by, but reinforced and incorporated into, the global goals and strategies for music education and practice.

Warmly welcome to join our journey!

2. Introduction

In the following chapters we go through different stages of the project development, activities and outcomes; reflect on the process and results; evaluate the impact on the individual institutions; and finally we propose the guidelines for a Cyber and distant performance Training LAB based on the concluding LTTA2 (Learning, Training & Teaching Activities) in Malmö, where all the threads described in the initial activities come together as a possible model and proposal for best future practice. The digital turn appeared to be inevitable, but it will not replace the teaching and practicing of live music. Processes of digitization in higher musical learning through development and use of new digital technology can enhance and reshape music making and music performance. At the same time, music performance and music making offer immense creative and aesthetic potential to the develo-ment of new digital technology, as long as the processes are informed by practitioners' perspectives, emerging in and through musical practice(s).

2.1 About the Musense project and the Guidelines (PR4)

The Musense project was initiated as a visionary collaborative platform connecting six European music institutions with the aim to understand, cope with and embrace the digital turn in music performance and education. Approaching the final stages of the project, we look back at our exciting journey comprising projects, workshops, training activities, meetings, conferences and performances that create a trajectory of results lining up to this final document of guidelines on new models and best practices.

At the outset of the project, we envisioned an outcome that would allow targeted groups to establish a new attitude towards the performance event and the audience. As stated at the outset, Musense wanted to approach digital technologies not just as a simple additional communication systems but would highlight how and in which way the introduction of technology could transform the music experience and the tradi-tionnal aesthetic (Technology and music performance in the age of mechanical repro-duction Frederickson 1989). Teachers, staff, and students would rethink their active position in engaging the "remote" general public (or a wider audience, or non-specialists) as part of their curricula and artistic performance, radically changing the relation skills-performance-audience.

In Musense, the dynamic and enduring interaction between skills and cyber performance would become the crucial future of the new digital creative and didactic model. In the global structure of the project, these guidelines are defined as Project Result 4 (PR4). The aim of (PR4) is to summarize and understand new models and best

practices building on the accumulated knowledge manifested in two first publications (PR1 & PR2) created by the Musense team. The Guideline document is a summary of the main themes and topics that emerged during the project. It includes stories from individual researchers who were active in the project. The guidelines aim to highlight the main discoveries, results and events of the project, as well as ideas and themes for future research and new approaches.

Moreover, the structure of the document can serve as a navigation tool describing the project results from different angles and perspectives, allowing the reader to engage with the material via several different paths, either from the general perspective of Musense, or from the point of view of the individual partner institutions, or finally by following the stories and conclusions of the individual researchers. All three perspectives are interwoven in a spider web of links and references and therefore regularly intersect, shedding new light on relevant projects, conferences, workshops and concerts generated during the Musense project.

2.2 Activities 2022-2024

The activities are described in reverse order, starting from the most recent activities towards the past events.

Musense's results in the creative and educational world - Final Conference (Multiplier Event 3)

The Musense project's Final Conference (Multiplier Event 3) took place in Palermo on November 25th to 27th 2024.

Learning Teaching Training Activities in Digital Learning and Cyber Performance - LTTA2

LTTA2 took place in Malmö February 25-29, 2024. The focus was new learning strategies and methods in digital learning for music students in higher musical education (HME), such as innovative IT models, cyber and distance performance techniques and strategies.

Musense Project Multiplier Event: Embedding IT and Cyber in music training and performance

Within the scope of MUSENSE Project, the event "Embedding IT and Cyber in music training and performance" was organized by the Ionian University in Corfu, Greece, on 06-07 October 2023 at the Ionian Academy in Corfu as both an online and offline event.

Musense Conference "Cyber and digital as new perspectives in music performance"

The Musense Project was designed to accomplish two equally significant goals or purposes. This conference was co-organised by researcher Nuno Cernadas on 3rd-6th May 2023.

Musense Project 1st Multiplier Event on AEC's January Newsletter

In its January (2023) newsletter, the Association Européenne des Conservatoires, Académies de Musique et Musikhochschulen (AEC) published an article about the Musense Project 1st Multiplier Event .Read the article on AEC's website.

"New frontiers in music performance": Musense project multiplier event (Yaşar University, 12-13 December 2022)

Within the scope of MUSENSE Project "New Frontiers in Music Performance" was organized by Yasar University on 12 and 13 December 2022 at Yasar University Selçuk Yasar Campus as both an online and offline event. Materials & videos from the Multiplier event "New frontiers in music performance" (12-13 December 2022)

Musense Project presentation during the 49th AEC Annual Congress 2022

Dr. Payam Susanni and Nuno Cernadas inform representatives of Higher Music Education Institutions of the 49th AEC Annual Congress (9th November 2022) about the Musense Project.

Musense Second Transnational Project Meeting (Malmö Academy of Music)

The Musense Second Transnational Project Meeting was hosted in Malmö Academy of Music between September 5th and 6th 2022.

MUSENSE Kick Off Meeting (Conservatorio di Musica "Alessandro Scarlatti" Palermo.

The Kickoff Meeting of the Musense Project between the 13th and the 15th of May 2022 was held in presence at the 'Alessandro Scarlatti' Conservatory of Music in Palermo.

2.3 Project results: overview and links to publications

Here below follows an overview over the four project reports, PR 1-4.

PR1 State of the Art (The Musense Project in Context)

This is the first publication of the Musense team and presents initial research, support materials, examples of models and best practices in innovative forms of cyber and distance performances, reviews new technologies during and after the pandemic and describes the relationship of Musense to the 2030 Agenda (Sustainable Development Goals).

PR 2 Repository

PR2 is represented by an online available sharing repository containing all results, service, analysis, outputs resources and tools to facilitate the implementation of innovative teaching and learning methods based on cyber and distance performing practices. The repository was implemented and is sustained by Erasmushogschool, Brussels and Ionian University. Appropriate folders were created considering that the taxonomy will impact users, making it important to create a folder structure that is both well organized and user friendly.

The basic data structure for the Musense repository is comprised of five main entities:

1. **Use cases**
2. **Technologies**
3. **Complex structures**
4. **Publications**
5. **Authors**

PR3 Music Creation in the Age of Digital Transformation Handbook

The Musense project has developed a course module consisting of 12 lessons in a fourteen-week course that covers the most essential materials of four main areas of concern.

The first – **Digitalization** – deals with the meaning of cyberspace and artificial intelligence. It demonstrates how we are informed and reshaped by them as well as what we can do to thrive in this new environment.

The second – **Creative Destruction and New Opportunities** – describes how digitalization has affected the world of music and introduced the entirely new concepts of the cyber stage and cyber performance.

The third area – **AI Tools** – is perhaps the most music- specific as it covers the present state of the creative industries, presents music-specific design thinking, and provides a detailed breakdown of AI tools that can be used for all stages of music creation and production.

The fourth and final part – **AI Ethical Issues** – explores the fundamental elements of human ethics and how these relate to the use of artificial intelligence in creation of any original content, be it musical or scholarly.

PR4 Towards new, sustainable digitaLIVE performance practices in Higher Music Education

PR4 is conceived as the final GUIDELINES Lab Training publication, gathering experiences in developing and using hands-on in virtual or remote performances. After each training activity, the organizing partner institution made a report in which the ideas that emerged were further developed. These are represented through the current guidelines document include:

1) a **summary** of the whole project (with contributions and reflections from all partner institutions) and

2) an **activity report of LTTA2** which brought together all institutions participating in workshops, lectures, roundtables, and music jam sessions which demonstrated new learning strategies and methods of digital learning for music students in Higher Music Education (HME), such as innovative IT models, cyber and distance performance techniques and strategies.

3) a **concluding discussion/reflection** part with some ideas for guidelines for implications of digital tools in HME.

3. Voices from Partner institutions

In this section, teachers and researchers from the participating partner institutions share their individual reflections and experiences of the Musense project collaboration.

3.1 Conservatorio di Musica Alessandro Scarlatti Palermo

3.1.1 People

Some thoughts on Musense from the project coordinator Raffaele Longo

As is always the case in international cooperation actions, the composition of the consortium represents the most delicate and strategic element in the entire life cycle of a project. And MUSENSE was no exception: among the project's success factors were, without a shadow of a doubt, the undisputed prestige and international authority of the six institutions that animated the partnership.

Words would not suffice to praise the absolute quality, professionalism, and enthusiasm of the teams of the individual institutions of the consortium; rather, what I would like to emphasise here is the harmony and harmonious and extraordinarily collaborative climate that was established between the project's protagonists during its three-year duration. There were two reasons that guided my decision to focus on the six institutions: previous collaborations and the consolidated human, as well as professional, relationships between all the project actors. The criterion of representation and geographical coverage completed the picture. As luck would have it, the past performances and success stories that had already seen the project teams at work came from such disparate regions: from Sweden's Lund University to Turkey's Yasar University, from Greece's Ionian University to Belgium's AEC and KCB, to Italy's lead Conservatory of Palermo, a composite, effervescent and brilliant geographical horizon was undoubtedly the real added value for the qualitative achievement of the expected and planned results.

The atmosphere of vibrant participation and the feeling of tireless and harmonious collaboration reached some equally significant 'peaks'. Thoughts immediately turn to the day of the kick-off meeting in Palermo, marked by the enthusiasm of all the collea-gues (to come together and start working together again), the challenges that would have been expected (the cyber dimension of performance and the role of advanced technologies in the impact on music), and the unshakeable certainty of achieving - albeit with the natural difficulties of a particularly ambitious and, for this reason,bumpy path - the set results. Just as one cannot forget the moment of training in the field, in particular that reserved for the students of the six partners who in Malmo were the real protagonists of particularly advan-ced actions, pages of a little great history in the performing arts. Out of rhetoric, I can state, as project manager, that I had the honour and pleasure of coordinating one of the best teams I have ever worked with. Also for this reason, the final project event was not an end, but only the beginning of a story yet to be written within the forthcoming 'MUSENSE 2'.

3.1.2 Main topics in Palermo in the framework of the MUSENSE project

Co-creative Role of the Audience in Performances: A Paradigm Shift Driven by Digital Tools (By Michelangelo Galeati & Raffaele Longo)

Traditionally, audiences have been regarded as passive observers who absorb artistic creations without actively participating in the creative process. In recent years, how-ever, advances in digital tools, artificial intelligence (AI), and extended reality (XR) have radically reshaped this model of spectatorship. Contemporary performance practices now increasingly invite the audience to co-create, thereby blurring the lines between performer and spectator. This shift is supported by broader cultural trends that embrace interactivity, democratization, and shared ownership of creative works (Conner, 2013; Hansen, 2015; Wlazel, 2021).

In the past, most audience involvement was limited to physically attending performan-ces and passively engaging with the artist's vision. However, participatory and inter-active theatre forms, immersive performances, and digital art installations now high-light the importance of the audience as an integral part of the creative process. Within this environment, digital technologies such as social media platforms, streaming servi-ces, and interactive software have emerged as vital catalysts in elevating audience engagement. These tools facilitate real-time dialogue, user-generated content, and global connectivity, thus revolutionizing the ways in which performances are concei-ved, delivered, and experienced (Radbourne et al., 2013; Reuband, 2021).

Several specific examples demonstrate how the use of digital platforms has reduced barriers between the audience and the performing arts. The 3e Scène project by the Paris Opera, for instance, provides an entirely digital creative platform that uses

contemporary language to make opera more accessible and engaging. This online initiative addresses the elitist perception sometimes associated with traditional opera houses and offers a more approachable avenue for experiencing the art form (Marvin, 2013). Another noteworthy illustration is the Theatre Talks method in Central Denmark Region, which invites audiences to discuss performances after viewing. This structured approach fosters a sense of community and a deeper understanding of the performance experience (Hansen, 2015). Interactive elements have similarly shaped how museums present their collections; many institutions now incorporate touch screens, augmented reality, and other digital features that encourage visitors to explore and personalize their engagement with art and artifacts.

Social media platforms have proved instrumental in enabling audiences to interact directly with performers, share personal interpretations, and influence narratives during live events (Wlazel, 2021). Interactive performance methods have expanded considerably, thanks in part to technologies that allow audiences to shape the trajectory of a show in real time. One such approach involves the use of mobile devices and dedicated apps for interactive voting. Spectators are invited to cast votes on plot decisions, character actions, or even how a performance might end. By granting the audience this direct influence over the unfolding narrative, each show becomes unpredictable and unique. In one scenario, a detective play might prompt viewers to choose which suspect the investigator should interview next, while a dance piece could let audiences decide the sequence of choreographic sections. This level of participation not only enhances engagement but also invites audiences to become co-creators of the live event.

Beyond voting, live feedback and social media interaction are increasingly central to performances. Artists can solicit real-time reactions through platforms such as Twitter or through specialized apps, incorporating the input they receive immediately into the narrative. A comedian, for example, might request audience comments on a newly tested joke and use these insights to adjust the material on the spot. Similarly, a theatre company could employ a live chat feature during a play, gauging the audience's sentiment and tailoring the onstage dialogue or pacing accordingly. This immediate interplay between creator and spectator underscores the dynamic nature of contemporary performances, wherein narrative structure can be reshaped in response to audience sentiment.

Crowdsourcing offers another layer of participatory experience by inviting audiences to share content—whether text, images, or videos—that can be woven into the production itself. In a theatre setting, spectators might be asked to submit personal stories or anecdotes, which are then integrated into the playwright's dialogue, thus broadening the creative source material. In music, a performer could use audience-submitted words or imagery as the impetus for on-the-spot improvisation. By incorpo-

rating audience contributions in these ways, artists transform a conventional one-way presentation into a collective storytelling process, heightening the sense of shared authorship. Emerging technologies such as augmented reality (AR) and virtual reality (VR) add yet another dimension to audience participation. These tools can generate immersive, interactive environments that blur the boundaries between fiction and the real world, allowing spectators to engage with characters and even steer the outcome of narrative events within a virtual space. For instance, an AR performance might instruct audience members to use their smartphones to see virtual figures superimposed onto the phy-sical setting, interact with them, and make choices that influence the plot. By seam-lessly melding the tangible and the digital realms, AR and VR open up possibilities for performances that not only offer a deeper sense of immersion but also invite audience members to become active collaborators in shaping the artistic experience (Radbourne et al., 2013).

These practices also have connections with marketing processes: rather than passively witnessing a finished product, users actively collaborate with creators by providing feedback through surveys, social media channels, and in-person workshops (Content Marketing Institute [CMI], n.d.; Openfield, n.d.). Such contributions can influence any type of decision, refine content, and deepen the sense of collective ownership of the creative endeavor. When audience segments are carefully identified, and when clear objectives are in place, digital tools like Google Drive or specialized feedback platforms facilitate seamless collaboration, further enhancing the audience's co-creative role.

This shift from represents a significant cultural change. By harnessing digital platforms, prosumers challenge traditional gatekeeping roles in the media, thereby contributing to a more diverse, inclusive, and community-driven creative landscape (Journalism University, n.d.). They expect interactivity and are accustomed to sharing their own work or interpretations, which in turn reshapes how creators measure success. Instead of relying solely on numerical data such as views, creators increasingly focus on metrics that reveal deeper engagement, such as comments, shares, and usergenerated content (Journalism University, n.d.). Consequently, the relationship between content creators and audiences has become less hierarchical and more dialogic.

In an environment where audiences seek a sense of ownership and influence over creative works, content creators and institutions face both challenges and opportunities. Traditional "top-down" methods of distributing content must adapt to meet the public's growing appetite for participatory experiences. An array of innovative engagement methods, including live-streamed events with real-time audience feedback or immersive installations incorporating augmented reality, demonstrates the potential of harnessing emerging technologies to foster interactive, co-creative performances (SSRC, n.d.).

Future directions suggest an even greater emphasis on these collaborative, technology-enabled practices. As cultural institutions shift from content providers to facilitators, audiences will continue to redefine how they interact with and contribute to the arts. This democratized approach not only enriches artistic expression but also broadens cultural participation, ensuring a more inclusive representation of varied perspectives (Politesi, n.d.; ResearchGate, n.d.). Many observers predict that continuous advances in digital tools, AI, and XR will give rise to further experimentation, potentially transforming performances into dynamic platforms where creation and reception converge in real time.

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3.2 Koninklijk Conservatorium Brussel

The Koninklijk Conservatorium Brussel, the School of Arts of the Erasmushogeschool Brussel, aims to achieve artistic excellence by focusing on four pillars: Music, Musical Arts, Education, and Research. Its programmes in Music (composition, conducting, music writing, voice and instrument; classical, jazz and historically informed), Musical and the Educational Programmes in the Arts are embedded in the Erasmushogeschool Brussel, and in the cultu-ral landscape of Brussels, the multicultural capital of Flanders, of Belgium and Europe.

KCB provides an artistic breeding ground for current and future generations of musi-cians and stage artists. With its first-rate artistic education, it develops students' artistic persona-lities, their knowledge and practice, their reflection and expertise. Its musi-cians and stage artists contribute to society as responsible, creative and entrepre-neurial citizens. KCB depends on, but also supports, the artistic and pedagogical excellence and expertise of its teachers, who are themselves active and creative mem-bers of the artistic community and wider society. KCB is a conservatoire and a labora-tory of music. It bears, preserves, studies and passes its rich musical tradition from the past over the present into the future. In a stimulating and critical manner, it is perma-nently supplementing, renewing and rejuvenating this process. Creativity is present in all kinds of musical periods and forms, from insight to performance, from improvisa-tion to composition, from experiment to creation.

With approximately 700 enrolled students, and offering degrees in the fields of music, educational programmes in the arts, and musical, KCB is a hospitable artistic home opening its musical doors and windows to society and its diversity. It is in permanent dialogue and interaction with the cultural and artistic field, national as well as interna-tional, not shying away from challenges or diversity. After the challenges of the twen-tieth century, it is confronting those of the twenty-first century.

The Music programme offers a bachelor's, a master's, and a postgraduate degree. The bachelor's and master's programmes comprise 24 trajectories, bundled into five majors. Together with the Vrije Universiteit Brussel, it offers a PhD in the Arts diploma.

3.2.1 People – Individual narratives

Nuno Cernadas, Assistant Piano Professor, KCB International Projects Coordinator

Musense is an international project of great relevance to the Koninklijk Conservatorium Brussel. Not only did it explore topics of fundamental importance to the understanding of the place of art in a world where AI is emerging as a formidable force in shaping reality, but it was able to put together a formidable consortium. Musense's partners all brought a great breath of experience, marked by their specific geographic and cultural circumstances. As a result of a formidable collaborative atmosphere and a highly competent, skilled, but friendly working environment potentiated by its project manager, Musense's is a fantastic model for endeavor of collaboration, collective exploration and learning.

A personal highlight of the project was the training event hosted in Malmö by the Academy of Music (LTTA2), which brought together students and teachers from each partner institu-tion and therefore from all around Europe. This was a tremendously exciting event whose effects still resonate in the minds of all that have participated. Students got to work together in collective presentations, learned from their European colleagues about their experiences and their current artistic preoccupations, shared knowledge, built relationships and networks, and returned with their minds buzzing with exciting ideas.

Musense has also produced highly valuable project results and outcomes. The two documents that resulted from PR1 ("State of the Art: The Musense project in context") and PR3 ("Music Creation in the Age of Digital Transformation") are significant milestones in capturing both the current landscape and in pointing ways in which Music HEI can prepare their students for the future. Musense's PR2, an online repository for the showcasing of the intersection of music and the cyberspace, will prove to be, I am confident, a valuable tool in cataloging and presenting artworks, technology, organizations, and persons related to contemporary music and art making.

A holistic outlook regarding the building of competencies, musical and otherwise, which can prepare young musicians to the insertion in a highly competitive job market is highly necessary for a modern music HEI. Musense has been instrumental in this effort. The Koninklijk Conservatorium Brussel is proud to have been a partner of this project.

3.2.2 Main project in Brussels related to the MUSENSE project

Although having a long and rich tradition in higher music education, the Koninklijk Conservatorium Brussel (KCB), the School of Arts of the Erasmushogeschool Brussel, remains very attentive to societal progress, and aims to train its students not only to be complete musicians but also to be actors in said progress. To this effect, the Koninklijk Conservatorium has a deep commitment to offer a diverse music curriculum with a modern gaze. The KCB has met the cultural landscape of the present and the future not only with a continued renewal of the music practice itself (by creating, for example, a Bachelor and Master degree in Live Electronics), but also with the development of research projects at a PhD level that explore questions of performance, creation and the ever-changing relationships between composers-performers-public. The development of digital tools and platforms related to blended learning and their potential to enhance music education has also been one of the Conservatory's focuses, as exemplified by a 2017-2020 research project that implemented a blended learning approach to rhythm and intonation within our student community (named Explore, Burn, Perform: Blended Learning for Rhythm & Intonation). The development of digital, entrepreneurial and technological skills specifically targeted to young music professionals, skills which are increasingly essential in building a sustainable career, is also one of the current priorities of the KCB.

The exploration of new paradigms and opportunities at the intersection between music performance/pedagogy and the digital cyberspace is one of KCB's current preoccupations, reflecting its positioning as a modern music HEI. This is exemplified by KCB's involvement in the Erasmus+ KA220 project Musense, as well as in VIETMUS, a capacity building project bringing together a consortium of European and Vietnamese partners, both funded by the European Commission.

Today's substantial challenges need to be approached with a positive, open-minded, forward-thinking attitude. It is with this spirit that the Koninklijk Conservatorium positions itself, as it prepares its students for the challenges and opportunities of the future.

3.2.3 Future plans

Understanding that the training of musicians should incorporate a plethora of other skills besides the main musical competencies, and that those skills, be it communication, technological skills, digital proficiency, understanding of AI, will be increasingly important in their career prospects in a highly digitized and competitive job land-

scape, the Koninklijk Conser-vatorium Brussel makes a continuous effort for modernizing its offered programs and to adapt it to the present demands.

The Koninklijk Conservatorium Brussel is very attentive to the development of music as an artform, but also to the evolution of music performance in the broader cultural sector. The immergence of digital, and especially of cyber and AI, is exponentially accelerating the rate of change in these sectors. It is therefore vital that creative actors as well as academia and Music HEI have an active role in shaping what the music industry of the future will look like, and that they prepare their students for the inevitable changes of this upcoming reality. As the landscape is rapidly evolving and the paradigms are constantly changing and being reshaped, KCB acknowledges that awareness of these tendencies is of the utmost impor-tance to train the performing musician of the future. Thus, and parallel to Bachelor and Master programs it offers in Music and Technology, KCB is a partner in several European Commission funded projects, namely NS4NA, In Media Stat Virtus, Musense and VIETMUS, which explore topics such as the intersection between the cyberspace and music performance, distance performance and digital competencies, and digital music pedagogy. The expertise gathered in these projects, benefiting from highly skilled consortia, are of great value to KCB and to its continued artistic and pedagogic role.

A holistic, future-looking approach to the training of musicians and artists presents a new approach to a highly specialized training environment, provided traditionally by music conservatoires. This new approach can therefore point to new paths to training which would foster higher inclusion along art manifestations and technological implementation. Besides excellence in musical competencies, KCB is invested in providing its students with a wide ranging and encompassing skillset and artistic proficiency in order for them to be able to give expression to a wide creative scope. Like so many other industries and many other jobs, the musician of the future will likely necessitate a higher variety and polyvalent profile, and a higher understanding and proficiency in multimedia, interdisciplinarity and techno-logy. The outcomes of the project will certainly foster these aspects and will point future paths to the training of musicians, in an increasingly globalized and digitized world.

3.3 Malmö Academy of Music, Lund University

The Malmö Academy of Music is a Swedish educational and research institution, training musicians and music teachers. The programs can be divided into three groups:

- Musician and church musician programs
- Music teacher programs
- Pedagogical advanced training programs

At Malmö Academy of Music, research is conducted within the framework of two research topics: Artistic Research in Music and Music Education. The research is based on artistic knowledge practices as well as different social and scientific fields. Malmö Academy of Music belongs to the Faculty of Fine and Performing Arts, which is one of eight faculties at Lund university.

3.3.1 People

Peter Spisský – PhD in Music, lecturer baroque violin - my background

As a freelance baroque violinist, teacher and artistic researcher, my professional life takes place in a traditional classical music environment. Besides regularly returning to common canon pieces such as *Matthew passion* or *Four seasons* concertos, I also rediscover forgotten pieces or composers, or sometimes participate in a cross-over project, where the baroque ensemble meets musicians from other genres (folk music, jazz) or musicians from other musical cultures and traditions.

My pedagogical and artistic activities are interwoven with my research in historical performance practice. I received my PhD in 2017 with the thesis "Ups and Downs, Violin bowing as gesture", where I investigate and apply gestural elements of body movement and dance in violin playing.

Until the pandemic hit the world in 2020, I used digital platforms only sporadically in my artistic and pedagogical activities. Video recording and video analysis was a central methodological tool in my PhD project, but it was limited to documentation and demonstration purposes. When the concert halls and music schools closed in February 2020, online teaching was a necessary and useful alternative to face-to-face teaching. The existing equipment, such as the zoom, video camera and high-quality microphone, served its purpose satisfactorily while we waited for the pandemic to subside. The technology available was not sufficient for performing arts, as it did not allow for synchronized musical interaction, so my life as a performing artist had to be put on hold. As weeks turned into months, the need to use digital platforms increased.

It was in the autumn of 2021, during the long-lasting attempts to resume normal musical life, that Raffaele Longo contacted me with an invitation to participate in the MuSense project. This was certainly an interesting turn of events. At that time, I was at a crossroads. The frustration was twofold: while I missed my previous life of concerts, recordings and teaching, I realized that what we thought was a temporary pause in the digital option is in fact not going to go away, and we need to rethink the new paradigm of music making.

I was skeptical about the idea that the digital alternative would replace live music making. Trained as a classical violinist, I grew up in a generation where craftsmanship and artistry were based on and integrated with acoustics, instrument technology, sound concepts and musical interaction. I was already suspicious of the digital idiom that became a dominant factor in the musical discourse influenced by the record industry. The contradiction between the live concert experience in a concert hall and recording was a ubiquitous topic of heated debate during my studies in the 1990s.

I was very happy to be part of the Musense project and to join several prominent music institutions. At the same time, I felt the need to maintain my critical voice against the indiscriminate zeal for technology in music practice. While accepting and embracing the new digital paradigm, I intended to stand on the barricades and defend the spirit of live music making. The quality of a microphone and the vast technological possibilities can capture and enhance - but not replace - the sound of my violin.

My reflections on projects/workshops during MUSENSE project

A HIP player going 'digital' is an intriguing paradox. As an expert in historically informed performance practice, I strive for historical authenticity and use 'old' historical instruments. And suddenly I am standing with my baroque violin in the middle of the latest digital technology and connected via LoLa with my HIP colleagues in another part of Europe!

The challenge is to retain the essential elements of historical performance practice while utilizing the latest digital technologies. The LoLa system workshops (described in more detail below in section 3.3.2) served as an experimental platform to challenge and problematize not only the technology, but also our traditional habits and methods of music performance and pedagogy.

Takeaways, inspirations, memories, dialogues, and conversations with colleagues

After a few initial meetings online, we finally met in Palermo at our kick-off meeting 13-15 May 2022. We started working on the first tasks at the beginning of the year, focusing on collecting materials and information on the state of digital technologies and practices in each institution, resulting in PR1 (project outcome one) publication State of the Art: The Musense Project in Context (PR1).

It became immediately clear at this first live meeting that the constellation of the research team showed a huge potential to address and fulfil the mission of the Musense project. Although a large part of the results and activities were achieved and

carried out online, the live meetings added an extra dimension to the project: dialogues, exchange of experiences, joint cultural events and activities.

The overlap of personal experiences and the objectives of our common project increased the insights and deeper understanding of the current situation in a polyphony of different perspectives. I remember our inspiring conversations and friendly debates at the dinner table in Palermo in May 2022. Topics ranged from digital platforms to personal stories and anecdotes. Nuno's recent Scriabin concert turned the conversation to a comparison of Richter's and Horowitz's virtuosic piano technique, while my memories of playing with Gustav Mahler's Youth Orchestra arked a debate with Raffaele about Claudio Abbado and conducting techniques. It was reassuring that although the digital paradigm was the focus of the project, music will always be at the centre of interest.

While the first meeting in Palermo involved only a small number of delegates, the following series of events, training activities and conferences increased the number of participants. For the second and last LTTA2 (Learning Teaching Training Activities in Digital Learning and Cyber Performance - LTTA2 (Feb 25-29, 2024) we had the pleasure to welcome all partner institutions to Malmö. The large group of sixty participants consisted of teachers, researchers, lecturers, PhD students and students. This was an event where all the activities and objectives of the project came together in a demonstration of the accumulated knowledge in an inspiring interplay of lectures, workshops, art installations and music-making jam sessions. The Week in Malmö has shown how new and innovative ideas and practices can emerge from a vibrant meeting place of different cultures, generations, competences, and skills.

Sara Wilén, PhD in Music, Senior lecturer artistic research/improvisation- My musical background

I am a classical singer with a master's degree in singing from the performance program at Malmö Academy of Music (MAM) in 2003, after studies at Operastudio 67 in Stockholm. Over the years, I have performed classical opera roles in Swedish opera institutions and ensembles, and leading parts in several contemporary Swedish operas, as well as with Swedish symphony orchestras, in oratorios and chamber music. I hold a specific interest in improvisation as artistic tool for classical singers.

In 2007, I together with six singers and a pianist founded the professional, free ensemble Operaimprovisatörerna (the Opera Improvisers) in Stockholm. This year, the ensemble celebrates 18 years, with more than 200 performances and 15 opera pro-ductions, performed all over Sweden. As member of the ensemble, I have desig-ned, led, and performed in a number of opera productions, where singers and instrumental-ists together

create emerging operas live, without prepared scores, librettos or synopses or classical music styles, by the use of different music and stage performance improvisation methods, in dialogue with the Western Art Music traditions and styles. Over the years, the ensemble has collaborated with several agents in the classical fields, such as choirs, symphony orchestras, light designers, and composers.

In October 2017 I received my PhD in artistic research at the Academy of Music in Malmö, with the thesis *Singing in Action: An inquiry into the creative working processes and practices of classical and contemporary vocal improvisation* (Wilén, 2017).

My background and research perspectives: intermedial aspects of cyber performance of opera improvisation

Already early in my PhD studies, around 2010, I became aware of the complex inter-medial and artistic aspects of representing and performing music by use of digital media and digital tools. One of the core objectives of my research was to develop ways of investigating and articulating how the emergent operas were created in the moment in terms of artistic and interactional /communicative processes and methods spontaneously used and developed by the improvisers in action. This led me to exploring new digital paths of documenting, analyzing as well as communicating and mediating my findings.

During my presentations to PhD colleagues and researchers, I noted how vital the audience's preconceptions are as active co-creators of a digital content. When I presented documentations of my research in seminars and conferences, I noted the call for contextualization of the genre opera improvisation as such for the audience to conceive what I was working on in my research. When presenting even the briefest video examples from the research and performance practice to describe opera improvisation as genre, I noted how the recordings "work" were evaluated aesthetically in comparison with either opera/WAM repertoire work performance or con-temporary/modernist musical improvisation. However, as artistic practice, opera improvisation doesn't correlate aesthetically as work of art with either of these two (Jalhed & Wilén, 2024). Through these experiences during the PhD studies, I concluded that these experiences in fact formed a vital part of the research result itself.

Consequently, what, and how do documentations and communicate research results remained a core issue throughout the PhD project, for aesthetic as well as technical reasons. This also informed the question of the format of the dissertation. Only written text could obviously not "catch" the processes that I researched through, in and on (Zaddach, 2023), and DVD's were going out of fashion. This led me to conduct a stimulated recall interview study (Haglund, 2003; Wilén, 2017) and to develop the IAM

(Interaction Analysis Method) for analyzing and communicating ways of conceiving opera improvisation video material as emergent group creativity processes. As a result, I created the dissertation as a PDF and a web page, with links to annotated videos with the use of IAM coding by text and color overlay, created with Premiere Pro.

Reflection on the use of digital tools and cyber performance in HME teaching

I currently work as course leader in the reflecting part of the degree projects in music in the performance program at MAM. Since 2005, I teach in operatic performance, opera improvisation and artistic research methods in opera and classical singing programs and at Malmö Opera Academy/MAM since 2018. I also work as supervisor, teacher, and examiner in degree projects and artistic research education in music. Since I am mostly working with students in the classical (or WAM) music field in Sweden, my experiences are mostly relating to the classical music field here.

Apart from my work as researcher and teacher at MAM, I hold a position as faculty coordinator for the Unit for Educational Services at Lund university, EFU. EFU is a unit that organize, administrate, and teach students and teachers about the use of digital tools and GAI for learning and teaching at the Lund university.

The experiences and insights regarding the use of digital tools for analyzing, performing and mediating artistic research and artistic practice from the PhD project have highly influenced my modes of teaching and coordinating activities regarding digital tools in higher music education. Keeping the artistic performance perspectives in focus for the classical performer, while giving opportunities for artistic development using digital tools is a core aspect of my teaching and research. These insights have become more informed during the Musense project.

In my experience, there is a variety of approaches to using digital tools/cyber performance among HME teachers, depending on the musical genre as well as musical instrument/area of practice. Teaching students in higher education in music requires the teacher to be expert in the field from artistic and instrumental perspectives, requiring many years of professional music studies and professional practice. The readiness of taking on new digital challenges in terms of software and how to implement them on a high level seem to vary, depending on whether digital tools are common in the music practice at hand, or not.

In the classical field, the preferences of using and applying digital and GAI tools as a HME teacher seem to be somewhat lower than in music fields where digital tools form a more central part of the creative music practice. On the other hand, the use of video

and audio recording in instrumental practice is common in the everyday life of young performers in HME. Recording lessons and performances and listening to them to analyze artistic and technical results and identifying new ways forward. These methods have also proven useful for students as qualitative research methods such as auto ethnography in other HME courses, such as part of independent degree projects on bachelor and master levels.

Perhaps needless to say, using digital interfaces and tools as creative medium is more common in music practices including digital tools as part of the creative work, such as music production, digital composition, where the practitioners actively and continuously develop their digital learning and use of new tools as part of the artistic work. When it comes to classical music practitioners, considerably fewer have an interest in using digital tools as creative medium per se. Instead, classical music students as well as their teachers, often use digital tools such as recording devices for documentation and qualitative analysis in the instrumental/musical development, for instance by recording and evaluating their playing in lessons, master classes and performances.

Teachers and students in the WAM genres of HME are primarily not dependent on digital tools for creating music as in other genres, such as pop music. They rather use digital tools for developing their analogue skills as IRL stage performers. However, as course leader in degree projects and doctoral supervisor, I see live oral presentation intertwined with multimedia such as power point, video/audio presentation as ways of acquiring digital skills for HME performers to present and perform their own artistic research projects and results. It's a useful way of achieving digital skills and to offer new digital interfaces for audiences, where multimedia formats and offers a high potential for the performers to communicate new aspects on artistic and creative processes aspects of music learning, performance, and research. Since we work with video documentation of the lecture recitals, these work processes provide a good starting point for students who also wish to explore digital tools for cyber performance.

In my own experience as performing researcher in music, the LoLa project has provided very valuable artistic and educational experiences for teaching and learning in HME in the field of *cyberformance*. My definition of this concept is based on the definition presented in the PR1 report (Susanni et al, 2023):

> … a live performance that utilizes internet technologies to bring remote performers together in real-time, for remote and/or proximal audiences. (p. 5)

One of the most valuable learnings is an experience from the first LoLa sessions in opera improvisation on October 4, 2023, where we tried out different positionings of screens and cameras. My main take away from this session is how important it is for classical performers to 'dare to' be active in the process of technical set up, and to trust themselves and their own artistic experiences and hunches of how the set ups work. Small differences in the set up for a technician may offer great change in the performer's creative agency in cyber-formance. In this way, the LoLa project sessions can be seen as creative cyberperformative interfaces, where the artistic and musical perspectives were offered a high impact on the technical set up, resulting in a use of live streaming equipment as a creative medium for classical performers. This in turn shows how digital tools for cyberformance such as LoLa can be useful in and through the process of digitization in HME, about all of the four aspects outlined by the Artemis Project (European Association for Music in Schools, n.d.*)* above. Small changes in the technical set up implied the potential for classical performers to explore the tool as creative medium both in the artistic processes and in the creation of aesthetic products and interfaces for audiences. Working with live streaming sessions in this way offer great opportunities from experiential to practical processes of knowledge and skills production (Heron, 1996) for HME students (as well as teachers) to develop new digital skills in processes of digital teaching and learning (European Association for Music in Schools (n.d.*)*.

Looking back at the trajectory of the LoLa project facilitated by the Musense context, and its possible implications for the development of the present and future HME design at Malmö Academy of Music, I am very happy to being part of developing a new model for digitized HME development in the performance program in our institution.

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3.3.2 Main topics and workshops in Malmö in the context of the MUSENSE project

LoLa installation, tests, and workshops Malmö Academy of Music, 2022-2024

LOLA in the house

The arrival of the LoLa system at the Music Academy was accompanied by huge expectations. In the days of the pandemic, teaching and making music online caused frustration stemming from the shortcomings of the available technology. The effectiveness of teacher guidance through gestures, voice, and real-time commentary was lost and replaced by "after-the-fact" comments and annotations. Instead of energetic influences and impulses during play, the transfer of knowledge became dependent on the teacher's ability to verbalize and, ultimately, on the students' ability to receive and apply feedback.

When the MuSense project launched in January 2022, the Music Academy's LoLa system was still in boxes, waiting to be installed. The collaboration with the MuSense project led to a renewed interest by the Academy to implement the LoLa system as an accessible tool for teachers, researchers, and artists to expand their activities and embrace the digital dimension of music communication. Despite high expectations, there was some skepticism; even if the latency problem is solved, will LOLA be able to offer a sufficient substitute for 'face-to-face' direct musical communication?

Delays to begin with

Installing the LoLa system at the Malmö School of Music turned out to be more complicated than we first thought. The basic installation and initial technical tests in December 2022 were promising, so we have set the first online tests for February 2023. Due to technical problems (one of them was simply getting through the firewall, as Lund University has a very high level and rigorous security procedures), we had our first technical test with Sibelius Academy in May 2023.

The first LOLA tests with technicians

On the 9th of May it was finally time for the test. After such a long wait to finally meet LoLa, we entered the room with high expectations. There she was, LoLa, slightly less impressive than what our imaginations had built up during the spring: a computer screen, a box, a couple of microphones and speakers.

In his notes from the test, Dr Spissky wrote:

> I sat there for two hours watching the test, it was exciting! Played a bit on my violin accompanied by hand claps from the technician in Helsinki. Any time delays in the interaction should probably be attributed to the rhythmic ability of the technician, LoLa seemed to be on the mark... As I understood it, they came up with some important improvements in the settings (Peter Spissky, LoLa notes, 9/5 2023).

The first LOLA tests with two Baroque ensembles, 14th of September 2023

Our initial test with Tallinn Academy of Music on the 14th of September 2023. The setting comprised two groups (each consisting of three violinists) connected online rehears and test LoLa. The repertoire includes short and simple dance movements by Telemann. The choice of dance movements allows an ideal aural reference both for musicians and technicians to test the latency in the musical interaction.

Participants

Malmö Academy of Music - mobile LoLa studio
Peter Spisský (baroque violin teacher) with two violin students
Dragan Buvac – music production teacher at Malmö Academy
Zakarias Lindhammar – technician at Malmö Academy
Sara Wilén – researcher/observer

Estonian Academy of Music, Tallinn - LoLA studio
Meelis Orgse (baroque violin teacher) with two violin students
Nikita Shishkov, technician

Repertoire:

Telemann' s *Les Nations* (the first two movement 1. Les Allemandes ancients 2. Allemandes modernes

Rebel's *Les Caracères de la danse*

Volume and balance between the two groups - positions of the microphones

The expressive movements of the violinists support the timing and enhance the gestural quality of the sound. These movements do not change the overall sound image in a room. This is more problematic when a static microphone captures and transmits the sound. The energetic bodily swing to the side can increase the sound pattern in the room, while the same pattern, when turned away from the microphone, is perceived as decreasing in volume on the other side of the LoLa. This can lead to misunderstandings in dynamics and phrasing across the LoLa.

Combining live musicians in the room with a sound via loudspeakers

The good bland of the sound in a group of violinists is achieved by flexibility of each player to adjust volume and quality of the sound in the momentum. The speed and pressure of the bow on the string are two basic criteria of the bland. The amount of bow speed and pressure depend heavily on the room's acoustic. Adjusting is achieved

by combination of visual and auditory control. Across LoLa, the elements of acoustics are altered. In fact, there is a “digital” acoustics in addition to the two “real” acoustics (one in Tallinn one in Malmö). In these conditions, the adjustment of the bland proved to be problematic.

Benefit of the doubt for ‘not-togetherness': technical or musical issue?

There were several occasions when discussions on musical timing and direction between the two groups were interrupted by technicians who suspected that the problem might be of a technical nature. Simple quantitative tests were regularly done while playing some simple looping patterns. Some of the ‘musical mishaps’ could indeed be defined as increased temporary latency in the LoLa system. However, some of the mishaps could not be blamed on LoLa and the problem of coordination between groups was solved with a musical idea.

The visual cues between the two groups

Delay in music creation is not only a problem for online performances. The distance between some musicians in a chamber music group can be several metres, which means that auditory coordination can be deceptive, especially in a church. In extreme acoustics, you have to rely solely on the visual cues, contrary to what you hear. In our LoLa test, we realised that the visual contact was impeded by an obvious delay on the screen. The test of playing by ear only versus with visual coordination showed that while the audio is well coordinated, the visual digital signal is slightly delayed. This is

the opposite strategy compared to the acoustics of the church, where the visual communication is more precise than the auditory.

Playing with LoLa – opera improvisation sessions, 4 October 2023

Participants

Malmö Academy of Music - mobile LoLa studio
Sara Wilén, mezzo-soprano
Jonatan Sersam, piano
Dragan Buvac, music production
Zakarias Lindhammar, technician

Sibelius Academy – LoLa studio
Mia Heikkinen, soprano
Keijo Lahtinen, technician

Firstly, the genre opera improvisation is described here to provide an artistic perspective on the sessions described below. Opera improvisation is a genre where singers and instrumentalists create music, words and (musico-)dramatic action in the moment, by using the concept of play (Wilén, 2017). The performers are inspired by musico-dramatic idioms and performative traditions from Western classical and contemporary art music. There is no prepared, composed music, nor prepared music materials, but the emerging musico-dramatic content is shaped through the performers' creative dialogues in the live interaction. A core feature of opera improvisation is that the audience is invited to suggest ideas for the performance content (Wilén, 2017; Wilén, 2019).

In the sessions on October 4, three opera improvisers participated. Since the LoLa technology at Malmö Academy of Music is mobile and not built in one specific studio, it was set up in one of the concert halls for acoustic performance. Dr Sara Wilén, opera singer and Jonatan Sersam, pianist and composer participated from a concert hall in Malmö Academy of Music, Sweden, and Mia Heikkinen, opera singer and PhD candidate in opera improvisation, participated from the LoLa studio at Sibelius Academy in Helsinki, Finland. In the session, the trio experimented with recitatives, arias and duet formats in musical styles inspired by Mozart/early Romanticism as well as contemporary opera.

Every time the LoLa equipment was set up at Malmö Academy for the different sessions, there were small changes in how the cameras were arranged in relation to the screen. During the sessions, the singers noted how small changes could have a great impact on the visual interaction between the singers. As opera improviser, a performer constantly oscillates between different performative positions and perspectives (Wilén, 2017; 2019), from individual dramatic interaction in a scene to the narratical and dramaturgical structure of an emergent opera improvisation scene. This "oscillative readiness" made it possible for the improvisers to explore a variety of inner and outer perspectives during the sessions. As opera improvisation is created in the moment, it offered great opportunities for open, non-prepared visual and musical interaction, which in turn offered possibilities to try out different set ups and solutions and evaluate how it affected the emergent musico-dramatic content of the improvised scenes. For instance, the singers could explore different ways of interacting visually/ dramatically - with and through - the digital tools, and together with the pianist create joint, musico-dramatic space, while at the same time evaluating how those "cyberformative" sceneries worked from a narrative and audience perspective. The participating colleague and technical project leader Dragan Buvaç could follow the process as an outer eye, providing valuable suggestions for the emerging content, as well as enriching perspectives and continuous feed-back on how the classical performers experimented with the affordances (Tullberg, 2022) of the LoLa technology.

Position of the microphones

The opera improvisers experienced that musical interaction worked very well though the LoLa system, as the audial intentions were transmitted as clearly as all three were in the same physical space. After some tryouts, some adjustments and adaptations were carried out in Malmö, regarding the singer's movements into a certain area as well as repositioning the microphones as close to the LoLa screen as possible. After the adjustments, the improvisers were somewhat surprised to note that the interaction with the pianist worked extremely well for singers on both sides of the Baltic Sea, since the LoLa sound had almost no latency at all. In this way, the trio became aware that the singers mostly used listening and musical cues when interacting with the pianist, co-creating the emerging musical content.

During the session, the pianist Jonatan Sersam noted that the LoLa speakers in the concert hall in Malmö were placed to the left of the screen wh ere the Finnish singer, Mia Heikkinen, was presented. Sersam noted that it would be easier for the pianist if the speakers projecting Heikkinen's voice were placed more closely to her visual appearance on the screen, so that the LoLa image and sound, i.e. all the duplex streamed visual and acoustic "information" in the concert hall in Malmö came from the same direction. It was noted that the opera performers didn't react on the cyber acoustics in the same way as the LoLa baroque ensembles did. This is probably due to that the singers' movements are core features of opera improvisation performance as well as staged opera performance interactions. Therefore, the acoustics always present a high variation of the projections of the voices, depending on the singers' everchanging positions and directions on stage.

Cyberoperatic interaction - camera and visual cues between the two groups

In opera improvisation as well as in opera repertoire performance, the visual aspects are vital for the interaction between the singers. At first, the singers needed to adjust to perceiving themselves on a screen beside the screen of the colleague. It became apparent that adjusting one's own movements while improvising in a scene, calls for a certain kind of "doubling" visual mindset, since the image of oneself on the screen is mirrored, while the presentation of the colleague is not.

In the session, the improvisers also noted how the horizontal and vertical placing of the cameras played an important role for the cyberoperatic interaction, and how dependent the singers are of what is possible to perceive visually of the colleague on the screen. In the LoLa studio at the Sibelius Academy, the camera was placed in the middle, with a clear focus on Heikkinen, who was right in front of Wilén on the screen.

At first, the camera and the screen in Malmö were placed on the left side. This initially caused some complications until it was moved more into the middle, straight in front of the Malmö duo. It was also noted that the height of the camera highly affected the performing area for the singers. The LoLa camera in Malmö was placed lower than in the Sibelius studio, where it's placed in the ceiling. Therefore, Therefore, Wilén had to adjust her area of movement in order not to go out of the picture.

The pianist noted that he was used to watching the singers in the room when he plays. During the LoLa performance, it was quite complex to diverge the visual attention between one singer in the same room and one singer on a screen further away.

Sersam noted that this led to him choosing to focus mostly on the listening instead, interacting with the musical intentions of the singers. For future LoLa sessions, Sersam suggested the potential use of multiple screens for the pianist, where both the singer participating via the LoLa system and the singer in the same performance space as him could be projected. This would facilitate for the pianist to maintain the same mode of visual direction and attention to the participating singers while playing.

Conclusions

Our participation in the MuSense project has dynamically increased interest in exploring new digital technologies. The initial LoLa workshops focused on testing various system parameters. The project with sessions with the two LoLa test groups have provided valuable insights of the needs for specific plans and set ups for LoLa cyberformance within different stage performance formats, such as concert performance, opera performance, and well as different music genres. A vital notion is that the technical set up needs to be explored form a performer's perspective, with space for musico-artistic epxplorations of the technical affordances and what creative affordances that may offer the musical performers, to present sustainable cyber/digital solutions. In other words, a live duplex streaming equipment such as the LoLa system offers a new instrumental extended technique, which can provide many different artistic possibilities depending on the physical space(s) where it is set up.

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3.3.3 Main future goals for cyber performance development at Malmö Academy of Music

High quality Audio & Video transmission - Teacher/Student/Masterclass

Digital competence development in LoLa performance for teachers and other staff

- Development and sharing of set up of plans
- Collaborative artistic development and research
- Competence supply of highest level of teachers
- Remote concert and performance collaborations with other HME/stage performance institutions
- Digitization implementations in the performance program by use of the models MAM LoLa model and the advice for digitization developed by the Musense Malmö team further discussed under 4.2.

LoLa workshop at LTTA2 in Malmö – February 2024

In February 2024, Malmö Academy hosted the 2nd and final *Learning Teaching Training Activities* event, welcoming over fifty delegates from all six participant institutions.

LTTA2 in Malmö focused on new learning strategies and methods in digital learning for music students in higher musical education (HME), such as innovative IT models, cyber and distance performance techniques and strategies. The program consisted of lectures, workshops, performances and seminars with international researchers, teachers and stage performance artists from the participating music academies.

There were four main themes distributed over five days, covering manifolded aspects of music education and performance in the digital transformation (see section 4.1.3)

1. Composition
2. Cyber performance /streaming
3. AI
4. Musical Interpretation

3.4 Ionian University

3.4.1 People – Individual narratives

Ioannis Toulis

I am Professor of Violoncello and Viola da gamba at the *Department* of Music Studies, Ionian University. I had the basic digital skills before Musense and I was capable to use IT to deal with the duties of my academic responsibilities.

The Erasmus+ MUSENSE project (MUSic higher EducatioN meetS the cyber dimension) offered to me valuable opportunities for to enhance my skill sets by integrating modern technology and innovative practices into my teaching and research. Here are several ways this program helped me:

Digital Pedagogical Skills

- E-learning Methodologies: I have learnt to design and deliver courses using online platforms, making music education more accessible and interactive.
- Blended Learning Models: The program equips educators with tools to combine traditional classroom instruction with digital resources for an enriched learning experience.

Integration of Cyber Tools in Music Education

- Music Technology Applications: Training in using digital tools like DAWs (Digital Audio Workstations), music notation software, and virtual instruments for teaching and composition.
- Virtual and Augmented Reality: Exposure to immersive technologies that can simulate concert halls, orchestras, or other environments for experiential learning.

Cultural and International Exchange

- Networking Opportunities: Collaboration with international peers through MUSENSE opens up avenues to share best practices and explore diverse pedagogical approaches.
- Cross-Cultural Skills: Working within a multicultural framework enhances the ability to understand and teach music in a global context.

Student-Centered Learning Approaches

- The program provided training on using digital tools to create interactive and engaging content, fostering a more student-centric learning environment.
- Professors learned to assess and adapt to the digital competencies of their students, ensuring the effective delivery of course material.

3.4.2 Main projects in Ionian University connected to MUSENSE

Memorable moments

First, the coordination of the MUSense project multiplier event **"**Embedding IT and Cyber in music training and performance", on 6-7 October 2023 in Ionian University, Corfu, Greece – and online. This international conference on technology and music performance addressed inter-disciplinarity and trans-disciplinarity in music, augmented reality, multimedia technologies and distance & cyber performance both as new skills for music students and as entrepreneurial opportunities for the creative industries. The event included several interesting presentations and discussions of the MUSense's project results. A training activity entitled: "Design thinking method to exploit innovative ideas in music training through distance" was also provided to participants.

Second, the participation to the LTTA2 in Malmö on Feb 25-29, 2024 the Inter Arts Center, Malmö, Red Room, Black Room, Seminar Room. This conference focused on new learning strategies and methods in digital learning for music students in higher musical education (HME), such as innovative IT models, cyber and distance performance techniques and strategies. The program consisted of lectures, workshops, performances and seminars with international researchers, teachers and stage performance artists from the participating music academies. Within this LTTA2, several case studies of cyber performance in musicians took place that bring together students and academic staff from different contexts.

3.4.3 Future plans in Ionian University

The Erasmus+ MUSENSE project, with its focus on integrating music education and the cyber dimension, opens the door to numerous plans and initiatives in the future that can build on its foundation. Below is an analysis of potential future plans that could arise from this project:

Development of Specialized Curricula

- Cyber Musicology: Creating new courses or degree programs that focus on the intersection of music, technology, and digital tools.
- Digital Performance Arts: Expanding curricula to include performance techniques using VR/AR, AI-driven instruments, and other emerging technologies.
- Music Data Science: Introducing modules that teach students how to analyze music patterns, trends, and audience behavior using big data and AI.

Establishment of Research Centers and Labs

- Digital Music Innovation Labs: Setting up dedicated facilities where researchers and students can experiment with new technologies for composition, performance, and analysis.
- Interdisciplinary Research Hubs: Collaborating with other departments (e.g., computer science, engineering, media studies) to conduct cutting-edge research on topics like AI-generated music, acoustic simulations, and digital ethnomusicology.

Integration of AI and Machine Learning

- AI-Enhanced Composition Tools: Developing AI-driven platforms that assist students and professionals in composing, arranging, and analyzing music.
- Machine Learning in Music Education: Creating adaptive learning systems that tailor lessons based on individual student performance and progress.

Preservation and Promotion of Cultural Heritage

- Digital Archives of Traditional Music: Leveraging the cyber dimension to digitize and preserve traditional and indigenous music.
- Virtual Cultural Exchanges: Hosting online events where students and educators explore the music of various cultures through immersive technologies.

Creation of Cyber Music Competitions and Festivals

- Digital Music Contests: Organizing competitions where participants use innovative tools to compose or perform music.
- Virtual Music Festivals: Hosting immersive, global music events where participants and audiences engage via VR or online platforms.

3.5 Yasar University

3.5.1 People – Individual narratives

Payam Susanni - SOME THOUGHTS ON MUSENSE PROJECT

Ever since Raffaele, our wonderful Project Manager told me about the idea of MUSENSE and the possible partners, I got very excited. Once the project was passed and got the grant, we had the first kick off meeting in Malmö to meet all the partners and immediately connected and started to work and produce.

I have been involved in different multidisciplinary music related European funded projects before. During the years of each project there are always different issues both good and bad. Challenges and crises and unforgettable memories and experiences make each and every single one of these Projects unique.

Musense was a very enjoyable trip all along. The contrasting geographical locations of the partner institutions such as Turkey, from Minor Asia, Sicily which is surrounded by Tyrrhenian, Ionian and Mediterranean Seas, Corfu Island, also in the Ionian Sea, Sweden, as our one and only Nordic Partner and Belgium, from the North western part of Europe, we created a beautiful exotic mixture both the teachers and students from each of these institutions.

The student training session in Malmö, Sweden was a special event for me. Students left the intensive week with new and strong friendships and stimulating sessions and workshops on digital transformation, new music experiences and more.

We close this wonderful project before 2025 however Musense course will be for everyone. The website has all the necessary information for those who are interested to learn more.

Hoping to see you in the second version of Musense in 2025!

3.5.2 Main projects in connection to MUSENSE and future plans

Online Course Content Development for MuSense Project

As part of the MuSense project, we have structured the developed course content into an online format, which is now ready to be offered as an elective course within our university's institutional core course pool. Additionally, this course can be made available as an open course on our university's web platform for those who wish to participate in a Massive Open Online Course (MOOC) format.

For this purpose, we are happy to provide the necessary codes for course registration and access setup to be integrated into your website. To give you a better understanding of the course structure, you can access the course content using the demo credentials I've shared below:

Course Site: https://sakai.Yasar.edu.tr/
Username: musense
Password: MuSense2024

Should you require further assistance or additional information, please do not hesitate to reach out.

4. Guidelines for a Cyber and distant performance Training LAB

The Musense project has demonstrated that digital technology can be a useful refuge in pandemic emergencies, but it can also create a new paradigm for music communi-cation by activating audiences with new ways of experiencing music performances. The project has opened up new possibilities and collaborative interfaces as forum for international relation building on academic levels, between teachers, researchers, students and technicians.

PR4 is conceived as the final GUIDELINES Lab Training publication gathering experiences in developing and using hands-on in virtual or remote performances. After each training activity, the organizing partner institution made a report in which the ideas that emerged were further developed. These are represented through various outputs available at the Musense webpage. These outcomes were then integrated into the final project guidelines (PR4) as "Guidelines for a Cyber and distant performance Training LAB".

The current guidelines document includes:

(1) a summary of the whole project with contributions and reflections from all partner institutions. (2-3)

(2) an activity report of LTTA2 which brought together all institutions participating in workshops, lectures, roundtables, and music jam sessions; which demonstrated new learning strategies and methods of digital learning for music students in Higher Music Education (HME), such as innovative IT models, cyber and distance perfor-mance techniques and strategies. (3.3.1; 4.1)

(3) A concluding reflective discussion of the work in the project and potential ways forward. In the work with the Musense project, the Malmö team have identified some central themes, perspectives and aspects, that may be of use when designing future models for competence development and teaching in HME cyber performan-ce and digitization. These will be further discussed below in dialogue with experien-ces and notions from the Musense project and relevant HME research literature. (4.2)

4.1 Learning Teaching Training Activities 2 (LTTA2) in digital learning and cyber performance

LTTA2 in Malmö was arranged by the Musense team from Malmö: lecturer Dragan Buvaç, PhD in Music and violinist Peter Spisský and PhD in music and opera singer Sara Wilén. The activities focused new learning strategies and methods in digital/ cyber learning and performance for music students in higher musical education (HME), such as innovative IT models, cyber and distance performance techniques and strategies. The program consisted of lectures, workshops, performances and seminars with international researchers, teachers, and stage performance artists from the participating music academies and faculties, in accordance with the call for presentations sent out by the Malmö team in December 2023. In all around fifty delegates; students, researchers and teachers from all the five participating academies took part of the LTTA sessions. Moreover, two PhD candidates, one senior lecturer in Music from Malmö Academy of Music and a project leader of an international cyber music project from the Faculty of Fine and Performing Arts in Malmö, joined our sessions with pre-sentations of their music projects, focusing AI/digital/cyber aspects of their music making and research.

4.1.1 Inter Arts Center - the premises.

Inter Arts Center (IAC) is a part of the Faculty of Fine and Performing Arts at Lund University. It is an infrastructure for artistic research, cross-disciplinary art and research education. It was established in 2010 and is currently located in an old factory at Bergsgatan, in the heart of Malmö. The center offers very advanced technical and digital facilities and staff for artistic performance, research, teaching and development. For the LTTA venue, the Musense team had booked three main premises, the Red Room, the Black Room and the Seminar Room. In order to welcome the participants, a multimedia exhibition, featuring a variety of artistic /research/ projects and practices previously carried out at IAC was presented in the venue area. Coffee (and Friday lunch) was served in the central café/research platform, which served as a meeting point with IAX on site exhibitions and space for group workshops during the week.

The activities were scheduled from 9.15 AM -5 PM (Monday-Thursday) and 9.15 AM-4 PM (Friday). On the final hour of each day, there was time for live music sessions for the participating students and teachers. The content of the LTTA2 venue was arranged around four main themes, with concluding discussions and oral/written/digital evaluations on Friday afternoon.

- Monday February 25th COMPOSITION
- Tuesday February 26th: DUPLEX CYBER PERFORMANCE
- Wednesday February 27th NEW STREAMING/AI
- Thursday February 28th INTERPRETATION
- Friday February 29th RECAP & SUMMING UP

In accordance with the objectives of the Musense project, the LTTA2 themes highlight the rich spectrum of musical/cyber/digital, artistic and pedagogical aspects of the presentations, performances, and workshops, from mediating and interactive (duplex cyber performance, new streaming, AI) as well as content and practice perspectives (composition, interpretation). The students were encouraged to bring their instruments to the venue, to interact on acoustic musical as well as digital levels during the week. Each day consisted of two longer sessions in accordance to the theme at hand. The training sessions, workshops, and hands-on try-outs were incorporated in most of the lectures and presentations. The importance of live music making was highlighted by daily jam sessions led by each institution alternatively, including sessions on historical performance practice, improvisation, composition, traditional folk music and more.

These live music sessions highly contributed to the overall form of the week in Malmö, by creating new international music relations between students, teachers and researchers, mirroring and echoing the lectures and providing the context, material and inspiration to presenters.

4.1.2 Monday February 25th COMPOSITION

On the arrival, the participating students and teachers were presented with the program and a presentation of the participating lecturers and workshop leaders. After an introduction coffee in the cafeteria, everyone gathered in the Red Room, where Professor Hans Hellsten, headmaster of Malmö Academy of Music, inaugurated the venue, by welcoming everyone to Sweden/Malmö and the LTTA. The activities started with a presentation workshop, where students and teachers got acquainted with each other. Dr Peter Spisský, baroque violin, then presented a folksong, *Schiarazula Marazula*, which became the main musical theme for the student live music sessions during the week.

Jam sessions at LTTA2

The importance of live music making was emphasized through daily **jam sessions,** led alternately by each participating institution, including sessions on historical performance practice, improvisation, composition, traditional folk music, etc. These live music

sessions contributed strongly to the overall shape of the week in Malmö by creating new international contacts between students, teachers and researchers, as well as by thematically reflecting the lectures and providing inspiration to the presenters. Jam sessions lasted 45 minutes each morning, preceded lectures and workshops, and often continued in the evening after the official program of the day. One of the highlights was a joint gathering of students from Turkey and Greece who spontaneously arranged and improvised to a melody based on both traditions. The performances

were sung in both languages and used alternating accompaniments integrating the two traditions.

Giuseppe Vasapolli My process of Sonification and Self Generative music composition for visual media as a film composer.

Film Composer, Pianist, PhD in Composition

Conservatory of Music "Alessandro Scarlatti" Palermo

Dr Vasapolli presented his research methods on cyber composition in scoring for films. Using *data sonification* as a method for creating sounds out of moving images, by extracting data from a video using three methods:

- "**centroid blobs**" as a mode of identifying clusters of in terms of geometric features of pixels in a video by the use of software such as Ableton Live. Vasappolli has worked on converting it into a musical piece (circles-phd.weebly.com, n,d.) with the goal of creating a synesthetic approach between video and sound, creating relations between what you see and hear. The material created could be further developed by the composer.
- **"pixel mosaic"**, where the screen was divided into 40 columns. Each column was given a specific harmonic content and the colors of the video were converted into black and white with corresponding sounds to each pixel in the video by the use of its luma value level (the brighter the color, the louder the dynamics).
- **"pixels to luma"**, creating algorithms of sound by the use of the movements in the video.

Dr Vasapolli concluded that as the algorithms cannot decide or choose sounds from an aesthetic perspective, this essential part of the compositional process is (still) left to the human composer. Hence, the methods can be seen as valuable tools for creating new palettes and sonic landscapes, for the composer to have as a point of departure in their work.

After the presentation part, Dr Vasapolli opened for a discussion together with the students. In the concluding workshop part, Dr Vasapoli invited students to make *real-time sonification with live in live improvisation* on piano and cello, by giving musical body to the dramatic development, or the action, of a certain film clip to the videos on the spot. In his feed-back to students, Vasapolli noted the importance of a first, rhythmic reaction to get started with communicating improvised musical expression to the dramatic action in the video.

Luca Piovesan - The compositional black box: how an accordion plus an electronic apparatus can shape distributed creative processes

Music Technology Professor, PhD Researcher

Koninklijk Conservatorium Brussel

PhD student Piovesan presented his work on collaboration techniques in contemporary music, using extended techniques with accordion describing his work with use of

pedals. The presentation, intersected with questions from and discussions with the student audience, included concrete information on artistic/technical set ups as well as a score of music performed.

After a brief orientation on his experiences of musical work processes in the contemporary professional music world, Dr Piovesan reflected upon the relations between score, interpretation, and performance in relation to music philosopher Lydia Goehr's writings on the social and aesthetic norms and relations between the inter-preter's and the composer's positions and roles in the music world in the context at hand. Piovesan contextualized his artistic research findings giving several artistic examples from his technical-musical experiences of using extended techniques to design collaboration music projects with composers, thereby problematizing and challenging the performative norms of the contemporary music world.

4.1.3 Tuesday February 26th DUPLEX CYBER PERFORMANCE

Dr Raffaele Longo, project leader - Musense project presentation

Dr Longo made a presentation of the Musense project, giving an overview of its objectives, purposes, methods and goals.

Dragan Buvaç. - LoLa Live! Cyber performance in practice - prologue

Lecturer in Media Production, Malmö Academy of Music/ Lund University (MAM/LU)

Lecturer Buvaç made an introductory presentation to the following LoLa live laborations, addressing issues of how the Low Latency AV duplex streaming system was initiated by Conservatorio di Musica Giuseppe Tartini/GARR in Trieste in 2005. This international system was developed by Géant to use a fast academic network for high quality video and audio transmissions, for online cyber use in music such as master classes, live performances and other collaborative artistic research and development work. The network is available in several countries in Europe, USA, Japan, Hong Kong, Australia and South America.

Bertrand Chavarria-Aldrete - Plastic extension of music

Guitarist, composer and visual artist

PhD student in Music, Malmö Academy of Music

PhD candidate Bertrand Chavarria-Aldrete presented his multimedia on-site exhibition at the Inter Art Center, curated by the candidate and Margot Edström (IAC) for the LTTA2 event.

From the candidate's IAC presentation:

Plastic Extension of Music is as a new form of interpretation beyond the canonical performance, translation, synesthesia or musical analysis. An artistic intervention in music performance, that is a physical or visual extension in space, taking the instrumental interpretation (praxis) of a musical work as a poietic process preceding a plasticity of the artistic object that emerges in space originated from the music and the interpreter.

Plastic extension considers the musical performance as an incompleteness that creates a recollection and awareness of the different elements and codes issued from the score, the musical performance and the interaction with the instrument, to extend with the same hands, the ideas, practice and deconstructed embodied knowledge on different medias issued from other art worlds, as metaphorical vehicles to create new models of music interpretation and plastic visual.

LoLa Live! Cyber performance in practice – Opera improvisation workshop at LTTA2

Sara Wilén mezzo soprano, senior lecturer in artistic research/improvisation, MAM/LU
Mia Heikkinen soprano, PhD student in artistic research/opera improvisation, Sibelius Academy
Jonatan Sersam pianist, composer, teacher Malmö Academy of Music

The LTTA participants were invited into the Black Room at Inter Arts Center, where the LoLa technology had been installed for the event. Dr Sara Wilén gave a brief introducetion to the workshop together with pianist Jonatan Sersam and PhD student Mia Heikkinen who participated live from the LoLa streaming studio at Sibelius Academy in Helsinki. In the introduction, the performers explained how they perceived each other through respective screens and speakers.

The singers and the pianist used the artistic methods of opera improvisation, creating classical and contemporary vocal and dramatic scenes live by co-creating emergent music, text and dramatic action in dialogue with live suggestions and reactions from the LTTA participants, without any previously prepared scores or other musicodramatic materials (Wilén, 2017; 2019). As an opera improvisation scene is created in the moment, the LTTA2 participators could instantly follow and evaluate the musical and artistic cyber affordances of the duplex streaming system on several levels: the emergent musicodramatic material improvised by the performers and how the participant suggestions and reactions instantly affected the operatic scenes in the duplex performance experience; Wilén and Sersam performing live in the same room as them, and Heikkinen performing together with them online, on the screen. How the improvisers used the visual and audial affordances of the duplex streaming system to create and vary the performative spaces of the improvisations by deconstructing the relations between the operatic scene as a physical place and as dramatic space. Even though the two singers performed on two different opera scenes, in two different countries across the Baltic Sea, communicating via screens and speakers, the audience experienced the dramatic space as one.

As previously experienced in the Musense LoLa sessions at MAM in October 2023, the performers were aware that the audio was conceived without latency, while the video had some latency. Wilén in Malmö chose to interact with Heikkinen mainly depending on the aural communication and focused her visual contact with the participators in

the Black Room at IAC. This framed the musical and dramatic setting of the two improvised opera scenes, which will be further described below.

The first musical improvisation (*White*, durata 3,25) performed in English, started from the word "white", a suggestion from a participant in the room. When the improvisation starts, the singers look at each other on the screens, i.e. Heikkinen looking versus the participants in the Black Room while Wilén is looking on the screen with her back half turned to the participants in the same room.

The second improvised scene (The church in Palermo, durata 7,21) was in the opera improvisation format, where Heikkinen and Wilén related to each other in a joint dramatic space (Wilén, 2017) while being in different physical places. In this improvisation, Sersam, Wilén and Heikkinen made intertextual and interperformative connections (Wilén, 2017; 2019) to Western opera repertoire styles and musical formats as well rhetorical connections to the present session participants by the use of different languages such as English, Italian and French, to connect in the Black box in Malmö, with session participants from Italy and Belgium.

Baroque LoLa workshop at LTTA2

The second LoLa session was led by Dr Peter Spisský, Baroque violinist and lecturer at the Malmö Academy of Music. Minna Kangas, concertmaster of the Finnish Baroque Orchestra and Senior Lecturer at the Sibelius Academy, participated from Helsinki. With another violinist in the room, Gyrid Fossgreen, a violin student at MAM, spontaneous comparisons of live and online musical communication were possible.In his introduction, Peter Spisský presented the basic principles of historical performance style based on knowledge of dance structures (Spisský, 2017) and drawing on concepts of embodied music cognition (Leman, 2008).

Musical communication based on bodily gestures (Godøy, Leman, ed. 2010) is challenged in remote music performance. Using Baroque dance repertoire, where not only coordination but also the physical expression of different dance characters depends on spontaneous interaction between the musicians' body movements, constitutes a useful tool for testing LoLa techniques.

In this session the following objectives were tested:

- Synchronization of playing
- Delay and anticipation
- Musical and technical togetherness
- Changing the part & leading role
- Comparison of playing "in the room" and playing "in-between the rooms"
- Examples and discussion

The issue of synchronization was addressed from both a technical and a performance perspective. Although the technicians declared that they were using the highest quality technology, the difference in communication between musicians in the same room and LoLa was obvious. The visual communication through the screen is impaired by a small delay. The size of the screen also causes difficulties. A smaller screen may be better synchronized but is too small for an actual peripheral connection between the musicians. Larger screens, while increasing the angle of visual contact, also increase the delay. Playing on the visual cues thus becomes problematic.

Musense audience members interacted with questions, suggestions and ideas for the future. The general lessons learnt were both technical and musical. LoLa can definitely be used for rehearsals and teaching activities. The visual aspect needs to be addressed by developing more synchronized big screens. As the musical interaction between the two violinists in Malmö and Helsinki improved, one must also ask whether it is necessary to develop new skills in our music education to meet the challenges. New platforms require new ways of adapting our own music making. Incorporating LoLa and other online systems into regular curricula will improve both students' digital skills and their musical flexibility.

Godøy, R. I. and Leman, M. (Ed.). (2010). *Musical Gestures. Sound, Movement, and Meaning*. New York: Routledge.

Leman, M. (2008). *Embodied Music Cognition and Mediation Technology*. Cambridge.

Spisský, P. (2017). *Ups and Downs, Violin Bowing as Gesture*. Dissertation. Lund University

Felicita Brusoni- Electric Voice Toolbox: a model of co-creation for extended singer and live electronics

Soprano, vocal performer

PhD candidate in Music, Malmö Academy of Music

Felicita Brusoni contextualized her artistic research practice as classic-ally trained soprano engaged in contemporary music practice , problematizing con-cepts of extended vocal techniques, with score examples from modernist late 20th century vocal repertoire by Berberian, Globokar, Berio and Apergis. Brusoni's research project, *A voice beyond the edge*, is carried out in a number of vocal case studies following a multimodal research model exploring new processes of collaborative and co-creative forms including aspects and perspectives from voice science, performance studies and cultural perspectives as well as new music tools and media. She continued to problematize semiotic aspects of how the common use of concepts such as exten-ded singing objectify the practice, suggesting a different concept where the performer is the active artistic-technical agent, *the extended singer*. Brusoni presented two ex-tended singer practice case studies, carried out in collaboration with Andrea Agostini in 2022-23. *Dull Catastrophes and Love Songs* (2022) gave rise to research issues such as a potential interpreter's musical background and competence, the (un?)necessity of notation and the dialectic relation between producer and performer. The second example, *The electric toolbox* (2023) was presented from a cyber performance perspective, with a live vocal performance presentation, featuring the technical voice and live electronic innovations developed in the project by the use of Max/MPS patches, such as *drumz, convolved, microcanon, harm* and *reson.*

4.1.4 Wednesday February 27th NEW STREAMING/AI

Jesper Larsson - Lund University Digital Interactive Concert Hall, LUDICH

Expert, Project leader

The Faculty of Fine and Performing Arts, Lund University

Jesper Larsson gave an introduction to his presentation, talking about his background as leader of a number of Swedish stage performance institutions over the years. Larsson is assigned project manager of the project LUDICH (Lund University Inter Concert Hall) at the Faculty of Fine and Performing Arts, Lund University. LUDICH is a collaboration between six of the faculties at Lund University:

- Fine and Performing Arts
- Engineering
- Economics and management
- Law
- Humanities and theology
- Social sciences

along with the city of Malmö and Helsingborg, the Region Skåne and other public organizations together with number of international companies in the fields of sound design, streaming and AI technology. The idea of the project is to "democratize the experience" of live streamed classical concert performances for audiences by innovative digital techniques where audience members can design their own "take" on a performance, by individual and customized tailoring and "co-producing" performances communicated though digital streams from cameras and sound set ups. The project also plans to find ways of integrating digitized social interfaces where the audience can connect to each other. In the project, some technical workshop sessions and workshop conferences have been conducted, including recordings of an academic symphony orchestra. In the project, students at the six engaged faculties in Lund University are encouraged to work with their student essays where they explore different aspects of the new music performance production mode. After the presentation, In the following student-presenter dialogue, critical and problematizing perspectives on potential future use of AI in digitized public experiences were discussed.

Yasin Özarslan - Digital Transformation: How AI reshapes us?

Professor, Director of Open and Distance Learning Research Centre, Yasar University.

Dr Yasin Özarslan presented his multifaceted technical background as researcher and education leader as professor in Educational Technology at Yasar University with a doctorate in Distance Education, apart from degrees in Organizational Management and Electrical and Electronics Engineering. He is also research professor in Learning Technologies, Open and Distance Learning, Learning & Experience Design and Digital Transformation in Education at the Department of New Media and Communication.

Dr Özarslan defined AI as automatic reasoning based on association in a specific amount of data by detecting patterns and automated decisions in instruction and processes. He continued by widening the conception into an umbrella concept (Regona et al, 2022) including for instance:

- Knowledge based systems
- Computer vision
- Robotics
- Natural language processing
- Automated planning and scheduling
- Optimization
- Machine Learning

giving inspiring video examples from media sources such as *The Economist* as well as discussing relevant questions such as

- Can AI be creative?
- Are AI-powered design tools the future of design or a threat?

The video materials featured researchers and performers such as Marcus Du Sautoy, professor in mathematics at the University of Oxford, who compared the Ai development with the camera as innovation, pointing to the potential of AI "kicking us out of thinking like machines" into more creative, human thinking. The role of the AI data

curator was pointed out as a highly potential creative role in the future. The performer Holly Herndon was featured in a video, showing how she has created an online digital art performance project, with digital version of her artistic persona, the "digital twin" Holly+. Any user could create musico-visual, digital Holly+material by the use of machine learning and GAI. Another video gave numerous examples of how AI can be used creatively by any user in

- free image and art apps such as Leonardo.ai and runwayml.com
- the language translater video app heygen.com
- the music app musicfy.lol what creates instrument music productions from recordings of the voice
- ai speech synthesis that can change your voice into another voice, such as ilevenlabs.io
- face swap in gifs in misgif-app
- creating a digital version of oneself in chat.open.com

Paolo Susanni - Zen and the Art of AI Ethics

Music Teacher, Yaşar University.

Paolo Susanni started by problematizing the videos shown by Özarslan, setting them in a wider context. Before the session, Susanni had distributed a file with questions problematizing the use of GAI from moral and ethical perspectives to discuss with the students:

Questionnaire.

1) Do you consider stealing a good or bad thing? Why?

2) Do you remember how you learned that stealing was either a good or bad thing? Please list the sources you can remember.

3) If your parent, sibling or best friend were dying from a terrible disease and you could save them by stealing the last remaining medication from a dispensary, would you. Why?

4) Are you mostly or completely driven to constantly improve yourself? How?

5) Have you ever used ChatGPT or any other AI app to do create a piece of written content that you could have researched and written but did not?

6) Do you think that creating a bot based on solid personal and ethical parameters and charging it continuous content creation is acceptable i.e. automating personal function?

7) In terms of what you believe truth to be, which of the views on truth do you most identify with?

- Realist view: Truth is objective reality that exists outside of human perceptions and beliefs.
- Relativist or Anti realist view: Truth can vary depending on the criteria or standards we use to evaluate it.
- Constructivist view: Truth is seen as a product of human thought and interaction and is influenced by culture, society and history.
- Pragmatist view: Truth should be evaluated according to it's usefulness or effectiveness in achieving goals or solving problems.
- Pluralist view: There is no single, all-encompassing way to determine truth.

Hedvig Jalhed - Deus in machina - Integrating artificial intelligence into new music drama

Senior Lecturer in Artistic Research in Music with Specialization in Music Drama, Malmö Academy of Music.

Director Inter Arts Center, Faculty of Fine and Performing Arts, Lund University.

Dr Jalhed presented one of her artistic research opera productions, *The Prophecies*, an immersive opera premiered in Halmstad by her ensemble Operation Opera in 2022 and performed in Sweden 2022-2023. It was a "one-on-one" performance, where the audience member booked a time to meet an oracle (an opera singer) who performed AI generated librettos, i.e. prophecies, based on questions from the audience member to precomposed music. In the presentation, Jalhed gave multiple video examples from the ensemble's artistic research production performances.

See Jalhed's abstract for the presentation below:

"Driven by the observation that human performance always has combined and been contrasted with technological elements in opera, an artistic research project was conducted 2022–23 to probe into the possibilities of creating an operatic work that integrated artificial intelligence (AI). The idea was not to replace the human performers with AI, but to set up an expanded agentive system with a trained AI-agent as an interacting part in connection to both artists and visitors. The immersive and interactive opera was based on the concept of a singing seeress equivalent to the Delphic oracle in contact with higher realms and was set up as a one-to-one micro-opera. The dynamic input from the AI agent prompted the sung responses to individual visitors' questions and affected both aesthetic choices and cognitive processes.

Documentation and user experiences were collected for analysis and further elaboration. The project gave rise to future research ques-tions in relation to memorized and improvised opera, as well as the roles of humans and machines in operatic art. In this presentation, the ensemble's work process and the concept design are in focus."

4.1.5 Thursday February 28th INTERPRETATION

Nuno Cernadas - A modern approach to the performance of Scriabin. Let there be light! The creation of an informed colored-light performance of Alexander Scriabin's late piano sonatas

Assistant Piano Professor, KCB International Projects Coordinator,

Koninklijk Conservatorium Brussel

Cernadas presented his artistic research education project, focusing the piano music of the Russian composer Alexander Scriabin, especially his late period (1910-14), when Scriabin developed a personal philosophy highly influenced by the teachings of Helena Blavatsky, including theosophy, mysticism and solipsism that had an immense impact on his music. Scriabin developed new approached to musical harmony by the use of octatonic and whole-tone sets, around the "mystic chord" (c, f#, bb, e, a, d). Drawing on the works by scientists and artists such as Isaac Newton, Louis Bertrand Castel and Hilma af Klint, he developed a "light organ" where the notes in a scale are related to visible colours, or fractals of light. In this way, a synaesthetic "musico-light" performance format was developed, incorporating visual light elements corresponding to the notes in the "light scale", as a way to heighten the transfigurative capacity of the music. Cernadas described the work with the "translation" of harmonic analyses of Scriabin's musical scores into colors, inspired by the light organ developed for his orchestral work Prometheus (opus 60). Cernadas described and motivated his work with creating a system with midi triggers of colour/light cues scores for the music. The presentation was intersected with images, video and a concluding live performance of

Scirabin's music, with lights projected on the projector tarp behind the grand piano in the Red Room.

> Its ethereal, impalpable, 'immaterial' nature, makes colored light a specially fitting artistic medium for the performance of Scriabin, whose music shares many of these same qualities. Color and light contribute to the "sacralization" of the performance act, and helps to contextualize Scriabin's late music as creative ritual towards spiritual refinement.
>
> (Cernadas, powerpoint presentation, p. 39, 28/8 2024)

In a questionnaire about the session, students noted how Cernadas' use of lights in his performance of Scriabin's works added deeper (syn)aesthetic qualities to their experiences of the performance, as compared to traditional concert performance.

Showcase KCB Students

Six music technology students from Koninklijk Conservatorium Brussel made 15-minute presentations of their musical and artistic work, combining oral presentation and the use of multimedia.

Minas Emmanouil Sound engineering techniques to improve the performance of instruments and live electronics via streaming platforms

Assistant Professor, Ionian University

The seminar focused on the application of effective sound techniques to improve the quality of streamed sound to provide the audience with an enhanced and immersive experience. The focus of the presentation was technical solutions for optimizing the potentials for a qualitative immersive sound experience for the audience as well as the performer perspective, collaborating with other musicians remotely. Emmanouil started out by contextualizing cyber performance practice with a brief historical background, starting with technologies transmitting opera via telephone cables such as the téatrophone by Clément Ader in Paris 1881 (possibly the first stereo system), the dynamo phone/telharmonium developed by Thaddeus Cahill in USA 1896 and the first telephone transmittance of an opera performance conducted in Stockholm in 1887.

Emmanouil outlined structural and technical prerequisites for distant performance (from presentation, p. 9):

- Analogue audio gear (mics, speakers, headphones, etc.)
- Digital audio hardware and software
- High speed broadband internet
- Streaming platforms specially designed for music applications

According to Emmanouil, there is a risk that technical aspects of today's live streaming applications may significantly affect the quality of sound transmitted between cyber performance participants, thereby altering the "message" of the performed music. He suggested utilizing binaural and ambisonics technologies to design 3D audio streams in accordance with several scenarios and demands to create more sustainable immersive experiences for participants and audience. He noted a diversity of sound sources and aspects that need to be considered in order for a streamed performance to (from presentation, p. 10):

- audio captured by microphones (from acoustic instruments, vocals, objects and more)
- audio output from electronic instruments or audio devices (FX processors, recorders, and more)
- audio generated by using software
- the physical or artificial performance "space"/room (spatial audio capture, mixing and streaming)

Emmanouil noted the importance of not relying solely on the built-in audio hardware of a computer, due to the risk of having the digital signals distorted by for instance noisy preamps, low-quality mics, AD/DA converters and/or high latency, depending on the device. Emmanouil went on to address issues related to practicing live electronics via streaming platforms, with the goal of easily rehearsing and performing electronic music with others over the internet. He made a highly detailed and hands-on presentation of practical factors to consider regarding technical setups, equipment such as headphones, design and placing of microphones, acoustics, latency and software streaming platforms. Emmanouil emphasized the affordances of 3D sound though binaural stereo headphones and its capacity to create immersive sound experiences, by utilizing spatial characteristics of sound as a compositional (narrative) tool and mixing with binaural panning. He continued by presenting 3D stream by simplified ambisonics, a mathematical technique for setting up channels for recording, mixing and playing 3D, 360-degree audio, developed by Michael Gerson, UK, in the 1970s. Emmanouil recommended the IEM AllRAD plug-in and gave a sound example of a 360 degree recording of the string quartet piece Crisantemi by Puccini. He concluded by giving more detailed technical and musical examples of sound system setups with ambisonic microphones for a high-quality cyber music performance and audience experience.

4.1.6 Friday February 29th RECAP & SUMMING UP

Naoum Mylonas - Design thinking method to exploit innovative ideas in music training through distance

Assistant Professor, PhD in Entrepreneurship

Department of Tourism, Ionian University

Here follows a slightly edited version of Dr Mylonas' own summary of his presentation:

I provided a seminar entitled "Design thinking method to exploit innovative ideas in music training through distance" on 29th February 2024 in the LTTA 2 Malmo 25-29 February 2024 in the framework of the Erasmus Plus MUsense Project. This seminar took place at 10:15-13:00 (CET). My seminar was articulated on 3 sections.

1st section, A The Nature of Entrepreneurship in Creative and Cultural Industries (CCIs)

"I analyzed the roots and the meaning of the term Creative Industries and I discussed also the nature of entrepreneurship in this field. In turn, more specifically I analyzed the entrepreneurship in the music industries, by showing five (5) representative music startups cases in the last decades."

Dr Mylonas described creative and cultural industry entrepreneurs as music startup as sharing characteristics such as a combination of intentions to "produce something aesthetic" (presentation, p. 7) and develop their creativity, combining entrepreneurial and artistic orientations in music startups "using the latest technology to innovate the

way we listen, distribute, create, and understand music" (presentation, p. 10). Mylonas pointed to how digital platforms have facilitated for creators to find easier ways to reach out by showcasing their art, finding suppliers, and selling to new and established audiences, worldwide (Stavrianidi & Constantelou, 2022). presentation, p. 9). Dr Mylonas gave examples of music startups, such as Vampr (founded in 2024), One of (launched in 2020), Riyaz (launched in 2019) and Audius (founded in 2018).

2nd section, B Defining and searching innovation

"In this section I elaborated the issue of innovation by clarifying the difference between innovation, creativity, and invention. Innovation Process was also analyzed. Design thinking was selected as an interesting tool for participants to understand a creative process to find innovative ideas to solve existing problems in specific markets through empathizing, ideating and testing. In the end, I analyzed the Business Model Canvas deeply, developed by Alexander Osterwalder, which is a popular business framework to analyze an entrepreneurial innovation and to create a business."

..

3rd section, C

"In this section, I gave overall 50 minutes to the participants within groups of five (5) people to find initially an entrepreneurial innovation in the music industry by using Design Thinking Process. Then, they created the business model for this entrepreneurrial innovation by using the business model canvas template. Five (5) business models were created by the participants. At the end of the 3rd section, all participants presented their business models in a Pitching Session. During the elaboration of the ideas and the business models I played the role of the mentor."

Evaluations

During Friday lunch and the following afternoon, the participating students made online and paper evaluations of the LTTA2 sessions conducted by the Musense partner institutions, arranged by each institution respectively.

By the end of the afternoon, the Musense partner teaching and research team had a joint evaluation meeting, led by Dr Longo, discussing the experiences and evaluations from the LTTA2 sessions. The meeting also included detailing the time planning for the final year of the project, as well as structuring the upcoming work with the course module, Music Creation in the Age of Digital Transformation Handbook, PR3, led by the partners form Yasar University.

4.2 Concluding thoughts - finding new paths and facing new crossroads

In the work in the Musense project, the interpretation of the concept "cyber" as presented in PR1 has proven to be highly valuable: an "umbrella concept, under which every aspect of digital reality can be covered" (Susanni et al, 2021, 25). Moreover, the definition of "cyber-formance" (Susanni et al, 2021, p. 5) has been very relevant, inviting a multitude of perspectives and techniques: "*Cyberformance is a live performance that utilizes internet technologies to bring remote performers together in real-time, for remote and/or proximal audiences". (ibid)*

These conceptualizations have allowed for a rich variety of digital and cyber performance themes, approaches, methods, and practices to be explored during the Musense project activities.

4.2.1 State of the cyberArt in HME

In the workshop *Facing the Present: Digitisation Scenarios in Higher Music Education* in Palermo on November 26, 2024, group leader Sandrine Desmurs presented results of the AEC "ARTEMIS" working group on Digitization (European Association for Music in Schools (n.d.). In her presentation, Desmurs highlighted four "pillars", or aspects vital for creating a "new digital mindset" for digital learning in HME, here presented somewhat edited by the Malmö team:

1. Digital as creative medium
2. Digital skills for musicians
3. Digital interfaces for audiences
4. Digital teaching and learning

These aspects correlate very well with some of the most central objectives of the Musense project as outlined in PR1:

> Mindful of the importance of the social element in music performance as well as the risks for online seclusion, MUSense aims to create forms of cyber performance and distance learning which promote sociability and personal interaction, especially between performers and audiences, which are crucial for mental health and for a sense of true participation in social and cultural life. (Susanni et al, 2023, p. 51).

In learning a satisfying amount about digital and cyber performance tools to be able to teach them on expert levels, it is probably today's HME teachers and researchers who have the farthest way to go, rather than their students. According to Desmurs, in the inquiries from the Artemis project (European Association for Music in Schools (n.d.) containing student and teacher surveys as well as interviews. It was noted that most of the responding students conceived digital technology as vital and valuable to their creative development. As much as 80% of the students learn new digital skills through self-training and peer to peer learning. However, when asked whether they conceived that their HME teachers embraced the digitization, considerably few agreed.

According to thematic analyses of the anonymous answers[1] of the exit ticket survey conducted with the Musense partner institutions by the Malmö team in October 2024, the following aspects were identified as central nodes and themes in the Musense project explorations (Buvaç, Spisský and Wilén, power point presentation in Palermo, 25 November 2024):

- New concepts and new definitions for cyber performance and a digital paradigm
- Relations, collaboration and partnerships
- Inspiration and engagement
- Better knowledge and skills development
- Ideas for structural change in curriculum and institutional development
- Challenges in curriculum and institutional development

[1] Analyses conducted by the Malmö team as well as by BING Copilot in November 2024.

The Malmö PR4's best digital practice guidelines have manifested themselves at the last LTTA2 meeting, which was designed as a training lab, intertwining lectures, discussions, musical jamming and workshop sessions. Different approaches and areas came together in a fruitful exchange of ideas and a practical workshop. The remaining barriers between the remote digital platforms and the traditional music performance platforms were reflected on and redefined in a creative atmosphere of dialogues and experiments, which were evaluated by the participating students. As a result of the experiences from the LTTA1 and LTTA2 sessions, along with other Musense activities, the partner institutions later developed their individual contributions to the Musense course module, presented in the PR3.

These multifaceted, collaborative work methods offer an interface for a broad spectrum of individual, creative and critical perspectives, reflections and perceptions over different trajectories of time. Elmgren & Henriksson (2010) emphasize reflection and interaction with others as central activities in higher learning. It is important that the reflection takes place both individually and in groups, and preferably in different formats, such as representation, conversation and writing. This applies to skills: doing something, or "knowing how" (p. 28, writers' italics), are linked to the application of knowledge in certain concrete contexts. In order for not only students – but indeed also for the HME teachers and researchers - to develop what in the Swedish Higher Education Act and Higher Education Ordinance are called knowledge, understanding, skills, abilities and attitudes (Elmgren & Henriksson, 2010; Heron, 1997) on new digital and cyber performance tools in music.

These work modes go well in hand with Hannula's (2005) two central metaphors for describing artistic research practice*:*

i) A multitude of methods
ii) A democracy of diverse experiences

In this way teachers and researchers, together with the students, worked in the LTTA sessions in a method design that provided new interfaces for development well in line with the description of artistic knowledge building and artistic research, proposed by Borgdorff, 2006:

> Art practice – both the art object and the creative process – embodies situated, tacit knowledge that can be revealed and articulated by means of experimentation and interpretation. (Borgdorff, 2006, s. 18, writer's italics).

Offering open web-based material for competence development among teachers in music is a guideline methodology used by other researchers in the music field. In their article *Digital competencies in classical music teaching: From a Critical view to the Systematization of Digital Resource* published in Journal of Contemporary Music Art and Technology, Lekovic and Nikolic (2024) present a collection of digital resources for helping music teachers to navigate on the web, with the aim to encourage an increased use of digital tools in music practice. They point to a fear among music teachers that digitized learning might question, or even take over from older values in musical practice, while the same teachers also may require of themselves to achieve mastery in the use of digital tools to be able to include them in their teaching at all. Lekovic and Nikolic argue that this severe take on the music teacher's role doesn't necessarily have to be the case. They rather see the digital tools as new facilitators of the existing music teaching practice (2024, p. 45). This goes well in hand with the European Framework for Digital Competence of Educators (European Commission, 2019), suggesting a curious, critical, reflective mindset for teachers to acquire a set of digital skills relevant to their own field.

In the research project *Digital technologies in classical music*, carried out 2022-2026, Dr. Denise Petzold and Jorge Lozano Diaz Granados from Maastricht University (n.d.) underline the importance of keeping the musico-artistic perspective in focus in HME development They underline the centrality of keeping the artistic /performer perspective in focus in the work with digitality in the classical music field, rather than focusing mere audience perspectives and outreach:

> Instead of seeing the digital as remaining extraneous to the music, then, we ask what we can learn when practitioners are given the space and incentive to explore the digital as a constitutive, constructive part of their everyday work and practice. From there on, we might be able to propose innovations for the practice that emerge from digitality in a meaningful way and closely connect to the actors, practitioners, and organisations of classical music. This will not only deepen our understanding of the role of specific technologies within the practice, but also provide a more nuanced and multifaceted understanding of digitality in the context of classical music. (Maastricht University, n.d., n.p.)

4.2.2 Collaborative creative models for learning through cyberformance

The MAM LoLa model described above is an artistic research-based project design for collaborative digitized HME development, developed at Malmö Academy of Music during the Musense project 2022-2024. In his outline of a use of the concept affordances that addresses the interaction between music practitioner and musical instrument, Tullberg (2022), inspired by Gib-son (1979/2015), describes affordances in music as part of a situated understanding of cognition in combination with the situated, environmental conditions of the music per-formance practice. This includes institutional framings as well as aesthetic aspects, and the role of the music genre in society. According to Tullberg, first-person accounts from researchers-musicians using qualitative methods in collaborative studies as highly relevant for expanding the knowledge on music instrumental practice. For teachers to be able to teach others of new, digital tools for performance and musical practice, it is very valuable to put oneself into the performer and the learner situation with the new tools. As music practitioner, the teacher/researcher can experience, investigate, and learn from the creative possibilities and challenges offered by the new tools and technologies, together with the students in joint explorations. Such first-person accounts have the potential to inform our understand-ding of perceptual and cognitive processes, hard to access from a third-person perspective. Collaborative research on and through musical practice, such as co-operative inquiry can contribute by exploring the diversity of experiences that exist even within a group of musicians playing the same instrument and working within the same genre. (Tullberg, 2022, n.p.)

As noted above, the MAM LoLa project has indeed offered new artistic-creative understandings of the potentials of digitized and cyber performance tools for classical musical performers. The LoLA project processes have kept the artistic/musical per-spectives central in the evaluations and analyses. In this way, the classical performers investigated cyber performance as creative medium and musical interface, as well the potential of a digital arena for public performances and new entrepreneurial values. Hence the WAM LoLa project model offers an artistic research-based project design for developing new teaching and learning models in digitized learning in classical HME,

As manifested in and through the LTTA2 activities above (see 4.1), creative and entrepreneurial as well as other digital skills for cyberformance and digitization are of vital importance to HME students, as well as teachers, researchers and other actors in the field of HME. The Musense project delivers multifaceted results, aiming to facilitate inspirational, situated individual, and thus sustainable paths for developing creative, entrepreneurial as well as other digital skills in, or, and through, teaching and learning in cyberformance and digitization in Higher Music Education:

- PR1 State of the Art, Music Performance in Context
- PR2 Shared Online Repository and Musense website
- PR3 Music Creation in the Age of Digital Transformation Handbook
- PR4 Towards new, sustainable digitaLive practices in Higher Music Education.

In all, the Musense project results contribute to the potential for development in concerning all the four "pillars" outlined by the international Artemis project (European Association for Music in Schools (n.d) as presented by Desmurs in Palermo during the final Musense dissemination event in November 2025 (see 4.2.1 above).

Finally, the team would like to suggest some guiding advice for developing new affordances in digital and cyber performance skills for teachers and students in HME. These guiding advices are inspired by the overall experiences from the Musense project, research literature in this report and Rachel Forsyth, HE developer at (Esaiasson, 2024; Lund University, n.d.).

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4. 3 Some DigitaLive Guiding Advice

1. Investigate what digital/cyber performance tools are available in your environment, for instance at the Musense website.
2. Try the tools! Choose and explore them yourself, in your own pace, with curiosity!
3. Look for information about how you may use digital tools and software, such as GAI as a teacher in your institution.
4. Search for open webinars on cyber performance and GAI in music and higher teaching.
5. Search for information from your institution, with regards to syllabus and university/ academy policies.
6. Arrange joint experiments, explorations and discussions with students, colleagues, and fellows.
7. Let it mature naturally! If applicable, take your time to let the new insights and skills "grow on you" for a while.
8. Check that the software you are planning to use is approved and possibly facilitated by the institution, and freely available for all students, if needed.
9. Review the course content, teaching methods and course/examination information.
10. Articulate clear student instructions and offer guides on the software for learning and examination before course start where needed.
11. Design a small-scale pilot project/session, document it and evaluate the result in dialogue with your students, peers, and fellows.
12. If applicable, implement the new software/technology into the course design, planning, and course activities!

The Musense team wishes you

all the best of luck and many inspiring moments,

navigating through the future

digitaLive

cyberspace(s)!