

**ERASMUS+ Project “Online Choirs: How to carry out virtual choir  
rehearsals with the help of digital tools”**

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**R3.3: Development and refinement of principles for increasing technology acceptance  
and fostering interaction in online choir rehearsals**

**Authors:**

Janine Hacker

Markus Rohregger

Eva-Maria Leeb

Heike Henning

Alexander Carôt

Susanne Häfner



## **Abstract**

This document R3.3 is part of Work Package (WP) 3 (Design and refinement of technology solutions and principles to carry out online choir rehearsals) of the ERASMUS+ Project “Online Choirs: How to carry out virtual choir rehearsals with the help of digital tools”.

The activities in WP3 developed principles for conducting online choral rehearsals by considering technological, choral pedagogical and socio-technical aspects. The results of WP3, e.g. the identified best practices and challenges as well as the requirement profiles of choirs interested in online rehearsals, guided the development of the technological solution and the principles in this WP.

This document R3.3 presents principles for increasing technology acceptance and promoting (social) interaction in online choral rehearsals. First, it describes factors that influence technology acceptance in online choral rehearsals (R3.3.1). It then presents principles for increasing technology acceptance (R3.3.2) and promoting social interaction in online rehearsals (R3.3.3). The final section discusses how these principles can be adapted to the needs of different choirs.

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## 1 Introduction

The state of the art analysis conducted in Work Package (WP) 2 of this project showed that technology-related challenges (such as lack of equipment and lack of functionality of technology solutions), challenges related to people's (digital) skills, as well as negative attitudes towards technology-mediated singing are major barriers to the adoption of technology solutions for group singing.

Against this background, principles for increasing technology acceptance and promoting (social) interaction in online choral rehearsals were designed, implemented, and evaluated in the various rehearsal phases of the ERASMUS+ Choir@Home Online Laboratory Choir. Overall, the principles developed aim to ensure a positive user experience from a technology perspective, facilitate seamless communication, provide comprehensive support and guidance before and during the rehearsal phase, and promote an inclusive, collaborative, and fun atmosphere for online rehearsals.

In its various rehearsal phases, the ERASMUS+ Choir@Home Online Laboratory Choir mainly used a combination of the low-latency software Soundjack (running on a hardware component called "Fast Music Box") and the videoconferencing software Zoom. The principles presented in this document were developed and tested under the specific conditions of this solution and can be expected to work best for choirs using similar technology solutions. However, an attempt has been made to derive general principles and recommendations that may be useful for online choral rehearsals that rely on other technology solutions, including rehearsals using videoconferencing systems.

This document R3.3 presents the developed principles. First, section 2 describes factors that influence technology acceptance in online choral rehearsals (R3.3.1). Principles for increasing technology acceptance (R3.3.2), including measures before and during the rehearsal period, are described in section 3. Section 4 presents measures for promoting social interaction in online rehearsals (R3.3.3), including managing an online choir, managing online rehearsals, principles for promoting a sense of belonging and social interaction, and recommendations for conducting online performances. The final section discusses how to adapt these principles to the needs of different choirs.

## 2 Factors influencing technology acceptance in online choir rehearsals (R3.3.1)

As part of WP2 of this project, a comprehensive analysis of the factors influencing the acceptance and use of technology solutions for online group singing was conducted, based on a literature review (WP2.3) and a survey of choir conductors and singers (WP2.4). Factors related to *people* refer to attitudes toward using a system of TAM and user satisfaction and net benefits of the IS Success Model. Factors associated with tasks and roles can be related to the perceived usefulness of the TAM and the net benefits of the IS Success Model (as in influencing the tasks of individuals).

Table 1 gives an overview of the identified drivers and barriers/challenges, which have been classified according to the elements of socio-technical systems (Bostrom & Heinen, 1977). Applied to the context of online group singing, the four elements can be described as follows:

- **Physical system:** Technology solution for online group singing, e.g. low-latency software or video-conferencing solution or a combination of both as well as the necessary hardware (e.g. audio interface) and equipment (e.g. microphone and headphones); technological infrastructure (e.g. internet connection); facilities at home (e.g. room for singing)
- **Task:** Tasks of the conductor (e.g. leading the rehearsal); tasks of the singers (singing together, learning)
- **People:** behaviour and skills of the singers; conductor(s); support (e.g. technician, sound engineer)
- **Structure:** e.g. a choir as well as roles, responsibilities, hierarchies in a choir

As shown in Factors related to *people* refer to attitudes toward using a system of TAM and user satisfaction and net benefits of the IS Success Model. Factors associated with tasks and roles can be related to the perceived usefulness of the TAM and the net benefits of the IS Success Model (as in influencing the tasks of individuals).

Table 1, the review of the literature and analysis of the survey data has generally revealed more barriers and challenges than drivers to the adoption of technology solutions for online group singing. With regard to the *technology solution* used, factors influencing adoption and acceptance relate to the availability and quality of equipment, the (quality of) features of the system used, as well as its performance and ease of use. Factors related to the *users* of the system, i.e. the singers and conductors, are mainly related to (digital) skills and attitudinal aspects. Factors related to *task* and *structure* are not actual barriers, but rather describe changes and potential challenges for different users of the system when engaging in online group singing. Specifically, the digitalization of group singing changes existing tasks and creates new tasks and roles that perform those tasks.

Related to theories in the IS discipline used to study and explain the adoption and use of IS, factors related to the *physical system* relate to the variable perceived ease of use of the Technology Acceptance Model (TAM) (Davis, 1989) and system quality and user satisfaction of the IS Success Model (DeLone & McLean, 2003, 2022). Factors related to *people* refer to attitudes toward using a system of TAM and user satisfaction and net benefits of the IS Success Model. Factors associated with tasks and roles can be related to the perceived usefulness of the TAM and the net benefits of the IS Success Model (as in influencing the tasks of individuals).

Table 1: Overview of drivers, barriers and challenges of online group singing from a socio-technical perspective

	<b>Drivers</b>	<b>Barriers and challenges</b>
<b>Physical system / Technology</b>	<ul style="list-style-type: none"> <li>▪ Availability of equipment and infrastructure (such as stable Internet access) (Morgan-Ellis, 2021)</li> <li>▪ Low-threshold technology solution (Carlson &amp; Hanna-Weir, 2021)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Availability and quality of general infrastructure, e.g. good and stable Internet connection (Morgan-Ellis, 2021)</li> <li>▪ Lack of equipment and differences in equipment between users</li> <li>▪ Technical problems during rehearsals (e.g. problems, poor sound quality) (Morgan-Ellis, 2021)</li> <li>▪ Features of technology solution do not (fully) meet users' needs and expectations (video-conferencing solutions: not possible to sing together; low-latency software: e.g. limited possibility to rehearse dynamics of a piece) (Youngblood et al., 2021)</li> <li>▪ Increased effort (e.g. need for soundcheck before rehearsal) (Carlson &amp; Hanna-Weir, 2021)</li> </ul>
<b>People</b>	<ul style="list-style-type: none"> <li>▪ Positive attitude and openness</li> <li>▪ Ability to read music and learn a part independently (Paparo, 2021)</li> <li>▪ Language skills (Paparo, 2021)</li> <li>▪ Digital skills (Morgan-Ellis, 2021)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Lack of digital skills and technical expertise (especially with low-latency software) (Morgan-Ellis, 2021)</li> <li>▪ Feelings of technology overload and digital distraction</li> <li>▪ Lack of motivation and discipline</li> <li>▪ Perception that online group singing is less enjoyable than in-person singing because the experience differs from in-person singing (especially the lack of social and musical interaction and the lack of physical presence) (Daley, 2022; Lee et al., 2022; Martinec, 2020; Morgan-Ellis, 2021; Youngblood et al., 2021)</li> </ul>
<b>Task</b>		<ul style="list-style-type: none"> <li>▪ Conductor's role and tasks change (new task: e.g., managing technology; changed task: need for new approaches to giving feedback) (Carlson &amp; Hanna-Weir, 2021)</li> </ul>

		<ul style="list-style-type: none"> <li>▪ Singers' role and tasks change (new task: e.g., managing technology; changed task: singing alone at home rather than in a group) (Svalina &amp; Ristivojević, 2022; Youngblood et al., 2021)</li> <li>▪ Additional task: setting up and maintaining technology (especially when using low-latency software) (Carlson &amp; Hanna-Weir, 2021)</li> </ul>
<b>Structure</b>		<ul style="list-style-type: none"> <li>▪ New role: Technical support / sound engineer</li> <li>▪ Singers must take over more individual responsibility</li> <li>▪ Role of the conductor becomes more prominent (mediating between the singers)</li> </ul>

In this project, measures to increase and strengthen technology adoption and acceptance (section 3) will focus on the following aspects:

- Ensure that singers and conductors have high-quality equipment and use software that effectively supports online group singing, thereby ensuring high system quality, positively influencing perceived usefulness, and contributing to positive attitudes and satisfaction.
- Fully support users in familiarizing and learning to use the technology solution prior to the start of the rehearsal phase, thereby ensuring high service quality and positively influencing the perceived ease of use.
- Provide effective support to users during testing when they experience problems or have questions, thereby ensuring high quality of service and positively impacting perceived ease of use.
- Ensuring that the rehearsals run smoothly (e.g., explaining to users how to avoid disruptions) and supporting them with special exercises to make them aware of and learn new tasks, thereby promoting a positive user experience and use benefits.

Measures to promote (social) interaction in online group singing (section 4), in addition to improving social interaction, should also improve technology acceptance and adoption by ensuring that rehearsals run smoothly from a choir management perspective and are perceived by participants as personal, enjoyable, and fun.

### **3 Principles to increase technology acceptance from the viewpoint of choir members and choral conductors (R3.3.2)**

The following sections describe principles and measures for increasing technology acceptance that were designed, implemented, and evaluated in various rehearsal phases of the Choir@Home Online Laboratory Choir. Section 0 describes measures before the start of the rehearsal phase, while section 3.2 presents measures for the rehearsal phase.

These measures aim to improve the user experience of the choir members and the conductor by ensuring that they are well equipped and supported. This includes facilitating seamless communication, providing comprehensive guidance, and offering personalized assistance to accommodate varying levels of technical expertise. Ultimately, the goal is to create a supportive, inclusive, and technically accessible environment for all participants, minimize technical challenges, and foster a collaborative atmosphere.

#### **3.1 Preparatory information, support, and tests before the start of the online rehearsals**

**Assist choir members and the conductor with equipment needs:** Recommendations for equipment needs (possibly in different price categories) provide guidance, especially for participants with less technical expertise. If equipment is purchased for a larger group, the price may be lower. If many people have the same equipment, it may be easier to provide technical support.

**Communicate technical requirements clearly and timely:** Information about technical requirements should be provided in advance to avoid overwhelming participants.

**Provide clear and detailed instructions on how to set up and use the technology:** Sharing comprehensive information (e.g., via email) ensures that participants are well informed, can clarify any questions before attending, and feel prepared and confident.

**Schedule a technical pretest and offer individual assistance if needed:** A technical pretest allows participants to familiarize themselves with the technology. Individual appointments with a technician to set up and test equipment are an effective way to provide personalized assistance, especially for users with less technical expertise.

**Manage expectations regarding online group singing:** Communicate openly about the limitations of the technology and manage expectations for problem resolution.

**Use a supportive communication style and cater to different levels of technical expertise:** Aim to allay fears by providing reassurance and support, especially for those with limited technical expertise. Provide additional support as needed.

### **3.2 Measures and support during the online rehearsal phase**

**Schedule a sound check before every rehearsal:** Open the session 15 minutes before rehearsal for a sound check to ensure equipment is working properly.

**Provide real-time technical support:** Participants should be able to report technical problems without disrupting the rehearsal (e.g., via chat) and receive prompt assistance.

**Encourage peer support:** Foster a collaborative environment where participants help each other by sharing tips and experiences.

**Make the support process transparent:** Especially for larger groups, it is recommended to implement a ticket system to track problems and their solutions.

## 4 Principles to foster (social) interaction in online choir rehearsals (R3.3.3)

The principles described in this chapter aim at promoting (social) interaction in online choirs. They have been designed, implemented and evaluated in different rehearsal phases of the Choir@Home Online Laboratory Choir.

The principles described in this section deal with the management of an online choir, management tasks during an online rehearsal, the creation of a group spirit and the promotion of social interaction, as well as management-related and social aspects of online performances. As the "backbone" of an online choir, choir management and especially internal communication have proven to be important in creating a positive and pleasant atmosphere, which is the basis for an engaged membership and friendly social interaction. Special measures to help choir members get to know each other and interact with each other focus on directly enabling social interaction. Finally, collaborative performances are a highlight for any online choir and can enhance the social connections between choir members.

### 4.1 Managing an online choir

The management of an (online) choir and good internal communication were important factors for a pleasant atmosphere and a supportive environment, as well as for smooth rehearsals in the Choir@Home Online Laboratory Choir. The measures described below deal with communication, information and file sharing, administrative issues and choir discipline. Overall, the measures aim to ensure that choir members are well supported and informed, to create a cohesive and collaborative environment, and to foster a positive and inclusive atmosphere. They also seek to mitigate the limitations of the online environment, such as the lack of direct and rich forms of interaction. For example, asynchronous and regular communication (e.g., email) can help to keep in touch and create a sense of presence in an online choir.

#### **Establish a team with clearly defined roles to handle musical, technical, and administrative tasks:**

It is recommended that a team be formed consisting of the choir conductor, choir management, and technical administration and support. The tasks of these roles in terms of support outside and during rehearsals should be clearly coordinated and delineated. In particular, the choir conductor should be relieved of the burden of solving technical problems, for example, and be able to concentrate on the musical work.

**Use multiple communication channels:** Use different means of communication (e.g., an app and email) during the rehearsal period to accommodate different preferences and levels of technical expertise and to ensure a complete exchange of information. For example, an app or cloud solution can support file sharing and rehearsal organization, while email is appropriate for sending more detailed information. Clearly communicate the purpose of each channel.

**Send regular emails:** For example, send well-structured and comprehensive weekly emails that include summaries, reflections, instructions, and reminders. Such information can help participants better understand the current status of a choir project and direct their self-study efforts.

**Collect, review, and incorporate feedback from participants:** Ask participants to participate in regular surveys, review survey comments before each rehearsal, and actively incorporate survey feedback into subsequent rehearsals to show participants that their input is valued. Surveys provide an opportunity for all participants to express their opinions (including those who may be more introverted or shy in a technology-mediated environment), and discussing and incorporating participants' feedback is important to show that their voices are heard.

**Use a friendly and respectful communication style:** Online settings are less suited for transmitting and perceiving implicit cues, making misunderstandings and conflicts more likely. Therefore, a friendly, positive, and respectful tone should be maintained in all communications to create a positive and supportive atmosphere.

**Provide participants with a basic set of netiquette rules:** Start with minimal rules and observe attendee behavior to introduce additional rules as needed.

## 4.2 Managing an online rehearsal

Especially for singers with no prior experience in online group singing, online rehearsals can be challenging at first. Choir members must learn to navigate and sing with a technological solution, possibly deal with technical problems, and experience a rehearsal situation that is different from the in-person experience, both musically and socially. The practices described below are designed to create a productive, engaging, supportive, and enjoyable rehearsal experience.

**Instruct participants how to avoid disruptions:** Explain to participants that background noise and unwanted comments can disrupt the rehearsal. This can be particularly disruptive in online choir rehearsals, where everyone hears every sound directly through their headphones and may have to tolerate a certain level of noise caused by technical problems that cannot be completely avoided. Participants should be informed about how to mute themselves and encouraged to stay calm and use the chat for support, spontaneous questions, or to say hello or goodbye if they arrive late or leave early.

**Open the "rehearsal room" early:** Open the online meeting 15 minutes before the rehearsal starts to allow for sound checks and informal interaction among choir members.

**Strive to create a warm and personal atmosphere:** Use features of the technology solution being used (such as a customized waiting room with the online choir's logo or image) and greet choir members by name as they enter the session to create a welcoming environment.

**Ensure effective choir leadership:** To ensure well-structured and focused rehearsal work, the conductor should communicate with clear and supportive instructions and provide honest and friendly feedback to the choir members. At the same time, the conductor should be patient and motivating, using an appreciative and humorous communication style.

**Ensure language inclusiveness:** Conduct rehearsals in the primary language of most participants, but translate key points into English for international members. Use captioning (e.g., in Zoom) for real-time language translation to support non-native speakers.

### 4.3 Developing a group feeling and fostering a sense of belonging

The state-of-the-art analysis of this project showed that choir members often feel that social aspects suffer during online rehearsals. The principles described in this section are intended to help members of newly formed online choirs get to know each other and to foster a sense of belonging.

**Organize pre-rehearsal introductions:** Share information with descriptive information (e.g., nationality, age, gender, choral experience) to introduce choir members, e.g. during the technical pretest.

**Organize icebreaker activities:** Play interactive games to help choir members get to know each other (e.g., sharing personal facts). Such activities are meant to encourage casual conversations about personal interests to build social dynamics and group feeling over time.

**Develop and promote team spirit:** Organize section rehearsals with smaller groups to encourage and facilitate better interaction and develop group spirit within sections. Use features of the technology solution (such as virtual backgrounds in Zoom that indicate vocal parts) to help identify individuals and create a sense of subgroup identity.

**Make sure new members feel included:** Pay special attention to integrating new members, especially in projects with a mix of existing and new participants, so that they feel socially connected.

### 4.4 Establishing and promoting social interaction

The practices described in this section are designed to promote social interaction in online choral rehearsals by allowing time for and offering social activities, as well as by using a variety of communication channels and platforms. These practices can help create a balanced and engaging online rehearsal experience that fosters both musical progress and social connections.

**Balance musical and social goals:** Focus on learning pieces and achieving concert readiness while leaving room for organic social interaction.

**Be aware of the different (social) needs of participants and be inclusive:** Participating in online rehearsals may be a viable option for participants who are shy or suffer from (anxiety) disorders, allowing them to benefit from the positive aspects of group singing while remaining in their own safe space. Others may want to skip social activities after a long day in front of a computer screen. Therefore, participants should be allowed to engage in social interaction according to their preferences (e.g., turn off the camera for those who prefer less interaction). Also, people who cannot participate through the main communication channel should be allowed to participate passively or mutedly.

**Encourage use of the camera:** Being able to interact visually with fellow participants can help to enhance social presence and interpersonal connections. Encourage participants to keep their cameras on to see each other's engagement, concentration, and emotions.

**Enable natural verbal communication:** In addition to its superior ability to support collaborative singing compared to videoconferencing software, low-latency software allows for spontaneous interaction without the need to mute and unmute, allowing for natural communication and awareness of cues such as breathing and laughter. The use of low-latency software is therefore recommended to promote natural verbal communication and social interaction.

**Allow time for informal conversation before, during, and after rehearsals:** Include an arrival time for members who arrive early to greet each other and socialize informally. Include breaks during rehearsals for choir members to relax, stretch, and socialize. Organize social activities, such as "choir beer" after rehearsals, where members can chat and socialize informally.

**Plan dedicated social activities:** Plan special social activities such as quizzes and games to encourage interaction and engagement.

**Use innovative technology solutions and features to achieve social goals:** Explore innovative platforms (e.g., virtual worlds) for social activities that allow participants to move around and engage in one-on-one or small-group conversations. Leverage features of the technology solution being used to encourage interaction (e.g., the polling feature in Zoom).

**Celebrate successes:** At the end of the rehearsal period, hold a release party to celebrate the group's accomplishments.

#### **4.5 Bringing the online choir to the virtual stage**

A performance gives an online choir something to work toward, whether the goal is to produce a virtual choir video or to distribute a live performance. The measures described below can help create smooth, engaging, and well-organized performances while using the technology to foster group spirit and individual expression.

**Carefully organize and manage performances:** Provide choir members with comprehensive and timely information about technical, musical, and other performance requirements. For live performances, include technical tests, warm-ups, and dress rehearsals to ensure smooth performances.

**Prefer live group performances:** Even when producing a virtual choir video, it is recommended that choir members be able to perform together as a group to avoid feelings of isolation when singing alone at home and to foster a group spirit. When using low-latency software, individual voice recording features should be implemented to ensure high-quality audio and allow for editing.

**Create a unified look:** Ask choir members to wear coordinated outfits (e.g., black with red, green, or gold accessories) and use themed virtual backgrounds to create a group spirit and protect privacy.

**Allow room for individual contributions:** Brainstorm ideas with choir members to create a performance and invite them to make individual contributions, such as creating short videos to be included in a virtual choir video, to encourage individual expression and group identity.

**Pay attention to the specific requirements of hybrid events:** Manage the complexity of hybrid events by ensuring clear communication and prompt resolution of technical issues. Provide opportunities for participants to feel part of the event, even if they are performing remotely.

**Organise a concert tour:** Touring online is much easier than touring in the physical world. Organise live concerts and virtual "concert tours" to provide performance opportunities and build group cohesion.

## 5 Principles for increasing technology acceptance and interaction in online rehearsals according to different choir requirement profiles

From a socio-technical perspective, the characteristics listed in **Error! Not a valid bookmark self-reference.** were identified as relevant for distinguishing different types of choirs based on the literature review, analysis of survey data, and discussions in the project team (Activities A2.2 - A2.5).

Table 2: Characteristics of choirs relevant from a socio-technical perspective

Characteristic	Brief description
<b>Founding year</b>	e.g. (New) online choir, (existing) in-person choir
<b>Availability of digital skills</b>	Extent to which the conductor and members of the choir have digital competence, e.g. are able to communicate and collaborate using digital media (Vuorikari et al., 2022).
<b>Attitude towards technology</b>	The extent to which the conductor and members of the choir feel about using and learning technology (Mupaikwa & Bwalya, 2023).
<b>Diversity of choir members</b>	Extent to which choir members vary concerning sociodemographic characteristics, such as age and native language
<b>Objectives of the choir</b>	The goals or set of goals of a choir and how they are prioritized (e.g. musical vs. social goals).
<b>Desired rehearsal mode</b>	E.g. online only, hybrid
<b>Desired performance format</b>	E.g. virtual choir video, hybrid concert

The following sections describe how different characteristics of choirs (From a socio-technical perspective, the characteristics listed in **Error! Not a valid bookmark self-reference.** were identified as relevant for distinguishing different types of choirs based on the literature review, analysis of survey data, and discussions in the project team (Activities A2.2 - A2.5).

Table 2) may influence the organization and execution of an online choir project. Based on the principles presented in section 3 and section 4, recommendations are made on how the choirs can be appropriately supported in each case.

The attribute *founding year* describes the extent to which a choir is an established group, a recently formed group, or a new (not yet established) choir. It is assumed that choirs with a long-standing group of members have established processes, habits, and routines. The idea of an online project may be met with skepticism if there are already tried and tested processes and formats that work well. In order to generate support for the idea and to promote (technology) acceptance at an early stage, it is recommended to have an open exchange about the opportunities and risks of an online choir project. If the

choir decides to go ahead with an online project, the choir can either buy the necessary equipment or support choir members in purchasing equipment. In contrast, a newly formed choir has more uncertainty about its members, their attitudes, and their skills. To gain insight into these aspects, the choir's leadership could ask members to fill out a survey that includes questions about people's (digital) skills, attitudes, etc. when they register for the choir. Based on these findings, a decision can be made as to whether an online choir project is desirable and feasible, and what technological solution might be appropriate.

The attribute *availability of digital skills* describes the extent to which choir members and the conductor have digital skills, including, for example, the ability to communicate and collaborate using digital technology, the creation of digital content, problem-solving skills, and safety skills (Vuorikari et al., 2022). The level of digital competence of a group of singers will determine the extent to which singers will need support in setting up and using a technology solution, and whether a particular technology solution is feasible for a group of singers. For a large choir with singers who are, on average, less digitally literate, a technology solution with a low-latency component may be difficult and/or resource-intensive to use successfully. In comparison, a technology solution with a low-latency component could be used successfully by a (smaller) group of singers with, on average, good digital skills. People with good digital skills will be able to solve some problems themselves and will also be better able to implement technical advice.

The attribute *attitude towards technology* refers to how people feel about using and learning technology (Mupaikwa & Bwalya, 2023). In the context of this project, interest in and openness to using technology and curiosity were often mentioned as motivations for participating in the Online Laboratory Choir. For a choir with singers who on average have a positive attitude towards using technology, it will probably be easier to initiate an online choir project (even if digital skills are low). On the other hand, a choir with members who on average have a negative attitude towards technology will be less suitable for an online choir project. Especially because of the physical and social experiences associated with in-person group singing, it can be very difficult to convince people with negative attitudes to try technology-enabled singing.

A choir's members may vary in various socio-demographic characteristics, including age, cultural background, and native language. An online choir with singers distributed internationally may have a very *diverse* membership, but even a local choir with members of different ages, professional backgrounds, etc. may be very heterogeneous. The level of diversity in a choir is likely to influence the way it needs to be managed. For example, a choir with a high level of heterogeneity may require a higher level of communication to ensure that the needs of different choir members are being met. In an online choir project, even more communication is likely to be needed because of the need to integrate members technologically and because nonverbal cues are more difficult to perceive in an online environment.

In terms of the *objectives of a choir*, a simplified distinction can be made between musical and social goals. Most amateur choirs have both musical and social goals, but choirs may have different priorities, and these may change over time. When implementing an online project, choirs with a strong emphasis on social goals are recommended to carry out activities to establish and promote social interaction on a regular basis, while choirs that value musical over social goals will likely require fewer social activities.

In terms of desired rehearsal mode, there are in-person only, online only, synchronous hybrid rehearsals, and alternating in-person and online rehearsals. Hybrid rehearsal modes have an inclusive potential, for example, allowing individuals with family or work obligations to participate in rehearsals from home. At the same time, hybrid formats tend to be more complex to organize and manage. Online-only choirs may need more measures focused on creating a sense of community, as the rich face-to-face interaction is completely missing.

In terms of performance mode, virtual choir videos and hybrid live performances are two common formats. Virtual choir videos require more effort in the production phase, while hybrid (live) concerts bring more uncertainty and complexity. Different performance formats may require the purchase / rental of additional software / hardware and services.

Table 3 shows how the principles described in section 3 and section 4 can be adapted to the needs of different choirs by comparing a local and established choir with a newly formed international online choir.

Table 3: Recommendations for exemplary choirs

Aspect	Local choir that (partially) rehearses online	International online choir
<b>Preparatory information, support, and tests before the start of the online rehearsals</b>	<ul style="list-style-type: none"> <li>▪ Open exchange about opportunities and possible challenges of online choir rehearsals</li> <li>▪ Joint purchase of equipment</li> </ul>	<ul style="list-style-type: none"> <li>▪ Query digital competences</li> <li>▪ Query motives for choral singing</li> <li>▪ Query languages</li> <li>▪ Consider time zones when planning rehearsals</li> </ul>
<b>Measures and support during the online rehearsal phase</b>	<ul style="list-style-type: none"> <li>▪ Active support for choir members with little technical expertise</li> </ul>	<ul style="list-style-type: none"> <li>▪ Consider different quality of infrastructure / equipment if necessary</li> </ul>
<b>Managing an online choir</b>	<ul style="list-style-type: none"> <li>▪ Increased level of communication compared to the face-to-face situation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Multilingual emails; summarising important points (e.g. agreements)</li> </ul>
<b>Managing an online rehearsal</b>	<ul style="list-style-type: none"> <li>▪ Sensitise choir conductors to new tasks / changed role (e.g. give more feedback)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Determine rehearsal language, use of subtitles</li> </ul>
<b>Developing a group feeling and fostering a sense of belonging</b>	<ul style="list-style-type: none"> <li>▪ Targeted onboarding of new choir members</li> <li>▪ Encourage new contacts through e.g. random breakout rooms</li> <li>▪ Reach out to former choir members</li> </ul>	<ul style="list-style-type: none"> <li>▪ Address choir members by name</li> <li>▪ Icebreaker games</li> </ul>
<b>Establishing and promoting social interaction</b>	<ul style="list-style-type: none"> <li>▪ „try out "new" social activities and technical tools</li> </ul>	<ul style="list-style-type: none"> <li>▪ Organising social activities in which members can reveal something about themselves</li> </ul>
<b>Bringing the online choir to the virtual stage</b>	<ul style="list-style-type: none"> <li>▪ Try out hybrid performance formats (e.g. with a partner choir)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Rather start simple (e.g. virtual choir video) and then increase complexity</li> </ul>

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