BLUSPACE STANDARD GUIDELINES

This document is intended for artists, artist managers, music producers, sound engineers, or other creators and experience designers who are considering the creation of a Bubble, in collaboration with BluBubbles. A separate white paper with greater technical detail and recording methodology will be made available for greenlighted projects.

A Bubble is a limited numbered edition audio creation which offers a truthful representation of the artist’s original intent, incorporating the L-ISA Immersive Hyperreal Sound signature as specified in the BluSpace standard.

The BluSpace standard is a set of technical specifications that guarantee a truthful reproduction of digital signals and acoustic waves from their original points of emission to the listener playback environment. The following aspects of the audio chain are covered:

1. Capture recommendations using recording techniques favoring proximity microphones for instruments and vocals;
2. Object-based mixing with L-ISA technology and its spatial positioning tools;
3. Reproduction format that satisfies the “Immersive Hyperreal Sound” threshold requirements;
4. Playback system performance;
5. Acoustic properties of the listening space.

I - CAPTURE SPECIFICATIONS

In order to take full advantage of the object-based mixing capabilities of LISA and achieve astonishing results in terms of localisation and immersion, it is important to adopt the following guidelines and best practices during capture.

Choose

- Proximity microphones as the main source of capture;
- Digital microphones for improved performance for off-axis response, dynamic range, sensitivity, THD, SPL;
- Microphone placement which maximizes isolation between instruments through microphones with cardioid pattern (bidirectional or hyper cardioid for specific situations);
- Acoustic panels to increase separation between loud instruments;
- A recording location with tamed early reflections such as recording studios, large performing arts centers (as opposed to small theatres where early reflections can be very present);
- Room microphones only for low frequency content and for situations in which proximity microphones do not provide satisfactory results with respect to the sound source.

Note: ambient microphones can be summed with the audio objects that need this bass response smoothing (mostly double bass) and a low pass filter should be set so that these positioned microphones don’t alter the instruments localization.
For the special cases of philharmonic orchestra or grand piano recordings, refer to Appendix for configuration recommendations and capture techniques.

**Avoid**

- Room microphones as they do not provide the precision and flexibility required with object-based mixing techniques;
- Mic tree techniques which do not provide an acceptable level of source separation and spatial resolution for BluSpace requirements;
- Early reflections often created in classical auditoria or smaller venues.

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**Audio Files delivery to a BluSpace certified mixing studio**

Multitrack sessions destined to be mixed in BluSpace should adhere to the following guidelines:

- ProTools, Reaper or Nuendo sessions preferred;
- Sampling rate 96kHz;
- .wav or .bwf format, minimum 24-bit resolution;
- Mono or stereo tracks only;
- Tracks named by the instrument name and microphone type;
- For small ensembles, the multitrack session should contain a minimum of one spot microphone per instrument for each audio track.
The L-ISA palette of tools enables mixing that achieves sonic Hyperrealism, a term inspired by the visual arts movement that started in the 1970s, which is a genre of painting and sculpture resembling a high-resolution photograph. L-ISA Controller software is an object-based mixing platform which offers a range of tools to recreate a sonic space with the utmost fidelity. Artists have the freedom to reproduce or reimagine the physical reality, designing a sonic space much in the way a painter would render a personal vision of a landscape.

The “Immersive Hyperreal Sound” sonic signature provided by the BluSpace standard provides a level of precision, localisation, and intimacy never achieved before in the history of the recording arts. In recent years, recording quality has been “levelled down” for the purpose of portability and convenience by mass market common denominators such as mobile phones, car audio, or portable speakers.

The mixing engineer is invited to follow specific guidelines in order to create a BluSpace certified mix, through the L-ISA Controller mixing software:

- Use the pan and elevation parameters to freely position an object in the panorama, with minimal lateral interaction with other objects.
- Use the width parameter to make objects sound bigger or reduce the sense of pinpointing objects, blending them better into the overall soundscape.
- Use the distance parameter to create depth and naturally tame proximity effects from any neighbouring sources that are perceived as too prominent.
- Use the room engine to blend the dry sound of proximity microphones into a common space without altering the localization of each sound object. Furthermore, the engine takes the complexity of the loudspeaker configuration into account, ensuring precedence of direct sound vs. late energy.
- Pay attention to objects frequency and dynamics control to guarantee a good frequency and amplitude behavior;
- Consider spatial (hyper)realism by expanding the physical dimensions of solo instruments.
3 - REPRODUCTION FORMAT

In search of absolute authenticity, BluSpace revisits the fundamentals of musical reproduction by ensuring that playback fully restitutes the richly layered, multidimensional techniques of modern professional recording. As a result, the listener can now enjoy the exact same sound experience as the musical producer, an orchestra conductor, or a musician playing with an ensemble.

A primary focus of the BluSpace standard is the unrivalled degree of detail in the musical scenes it can reproduce. Years of research and development at L-Acoustics have defined an optimal 360° spatial resolution for the listener that matches the abilities of human hearing. As in real life, a listener immersed in BluSpace content can accurately perceive the localisation of sound sources to within a few degrees. The system configuration to achieve this is as follows:

- The main loudspeaker system provides frontal resolution of 15 degrees and 30-degree rear resolution, which requires 18 speakers on the horizontal plane. As a guideline, the elevation of the main system should be such that the vertical deviation between the listener and HF drivers does not exceed 15 degrees, and is not obstructed by physical obstacles.
- A minimum of 5 height loudspeakers (three at the front, two at the back) can be added as an option.
- The system should provide enough subwoofers to comply with frequency contour and dynamic range requirements described in the next section.
- For in-wall systems, front and back subwoofer arrays should be deployed to perform active low frequency room correction.

4 - PLAYBACK SYSTEM PERFORMANCE

The BluSpace standard recreates the concert experience at home, delivering the full dynamics of a live experience. Whether a classical concert or a rock show, musical content can be faithfully reproduced with tremendous power and SPL capability, across the full audio spectrum.
**Playback engine**
- The system should be capable of playing high resolution audio files (24bit / 96kHz).

**Power**
- The system should be able to reproduce up to 128dB SPL rms, 140dB peak maximum SPL at the sweet spot measured with a 12dB crest factor pink noise.
- Each amplification channel should provide 1000W with all channels driven for more than 200ms.
- Each amplification channel should offer a flat frequency response (+/- 0.25dB) between 20Hz and 20kHz.
- Amplification should be Class-D.

**Frequency response**
- 15 Hz – 20 kHz calibrated bandwidth;
- 20dB low frequency contour to match the live concert and cinematic experiences.

**Coverage and radiation pattern**
- Every loudspeaker should offer a minimum horizontal directivity of 100 degrees, without any irregularities in the off-axis frequency response.
- For in-wall systems, if the space is larger than 100 square meters (1076 square feet), vertical directivity should be less than 30 degrees, with no irregularities in the off-axis frequency response.
- For in-wall systems, SPL variations (1kHz-10kHz range) should be less than 6dB across the entire listening area.

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**5 - ACOUSTIC PROPERTIES OF THE LISTENING SPACE**

The control of acoustics properties in a listening space is paramount to a good audio experience. The BluSpace standard covers two types of systems:

- Close-proximity systems (such as Island by L-Acoustics Creations);
- In-wall or free-standing systems (such as Ocean by L-Acoustics Creations).

A major benefit from close-proximity systems is their independence from average room acoustics: they can be positioned in a living space environment where interior design considerations usually matter more than acoustic treatment. Care should nonetheless be taken in ensuring that the room provides a balanced RT (reverberation time) across all audible octave-wide frequency bands, with no audible ringing.

For in-wall systems, a target RT of 0.4 seconds should be reached, (+/- 0.1 seconds) across all audible octave-wide frequency bands, with no audible ringing. Acoustic treatment should be evenly spread across the walls and ceiling, with a mix of diffusing and absorbing elements.

For systems with a projector screen, the screen should be acoustically transparent with less than 2dB acoustic losses at 2k-20kHz.