Field Recording and Soundscape

Sound (Art & Technology)

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Course info

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I. Environmental Sound and Musique Concrète

Early experimental electronic music

Institutional and government-supported establishments played a crucial role in fostering the aesthetic discussion about *musique concrète* (Pierre Schaeffer) and *elektronische Musik* (Meyer-Eppler) in the 1950s:

- Studio für Elektronische Musik (WDR)
- Groupe de recherches musicales (GRM)
- Radiophonic Workshop (BBC)

Studer professional tape recorder, 1969 | Photo: RFWilmut, 2013 | Wikimedia Commons | CC BY-SA 3.0

Musique concrète

Composing with recorded sounds rather than traditional musical notes, pioneered by French composer Pierre Schaeffer.

- use of recorded natural sounds as raw material
- sounds are altered using tape music techniques like splicing, looping, pitch-shifting, reversing, and layering

→ *Replaced traditional notation and instruments, and redefined the relationship between composer, sound, and performance.*

Luc Ferrari (1929 – 2005)

French composer of Italian heritage and a pioneer in musique concrète and electroacoustic music.

- Amassing a large archive of recorded sound (interior and exterior)
- Creating environmental soundscapes, *anecdotal sound*

Presque rien No. 1
'Le Lever du jour au bord de la mer'

Condensation of a one-day recording on a Yugoslavian beach into a 21-minute composition.

- Montage after musical principles
- Expanding the timescale of musique concrète
- Shifting background and foreground relationships

Example Nr 1 (Audio):

Excerpt from *Presque rien No. 1 - Le Lever du jour au bord de la mer* (1970) by Luc Ferrari

▶ Play excerpt

Expanding musical materials

Together with technological developments, Mid-century avant-garde composers turned toward environmental sounds, noise, and everyday acoustic phenomena as musical material.

- **Luigi Russolo (1913):** Orchestration of industrial and urban sounds
- **Pierre Schaeffer (1948):** Blurring the lines between "music" and "noise"
- **John Cage (1952):** *4'33"* - Ambient sound as compositional material
- **Luc Ferrari (1960s-70s):** Environmental sound as musical subject
- **R. Murray Schafer (1977):** Established *soundscape* as analytical framework

→ *Schafer systematizes environmental listening into analytical framework*

II. Soundscape Theory

Soundscape

R. Murray Schafer (1933-2021): Canadian composer who coined the term in *The Tuning of the World* (1977)

Etymology: Neologism modeled after *landscape* (sound + landscape)

Definitions:

- **Oxford:** A musical composition consisting of a texture of sounds; the sounds which form an auditory environment
- **Merriam-Webster:** A mélange of musical and sometimes nonmusical sounds

Earlier uses of "soundscape"

Before Schafer's theoretical framework:

- **Richard Buckminster Fuller (1966)** - First documented use
- **Michael Southworth (1969)** - Urban planning context

Previously used poetically to describe surrounding sonic environments, but without systematic theoretical foundation.

→ *Schafer transformed it from poetic metaphor into analytical concept*

Origins of acoustic ecology

Noise contamination due to the development of new technologies and processes in the age of post-industrial society.

- Increase in mobility (air and car traffic)
- Machines in the world of work

Soundscape studies

Also referred to as *soundscape ecology* or *acoustic ecology*.

Interdisciplinary approach:

- Between science, society, and art
- Basis for *acoustic design*
- Examines interactions between humans, nature, and technology

Key shift: Moves beyond noise control to treat sound as a **resource** rather than waste product

Intention

Shaping the social, psychological and aesthetic quality of an acoustic environment.

- Evaluation of new sounds
- Elimination or containment of certain sounds
- Preservation of certain sounds
- Current compositional approaches in music

World Soundscape Project (1969-present)

Schafer's research team at Simon Fraser University systematically recorded and analyzed acoustic environments worldwide, establishing field recording as scientific methodology and compositional practice.

- 1969-70: Foundation, early publications
- 1973: Vancouver study, cross-Canada tour
- 1975: European five-village research (300+ recordings)
- 1977: *The Tuning of the World* published
- 1978: *Handbook for Acoustic Ecology* (Barry Truax)
- 1993: World Forum for Acoustic Ecology founded

The WSP group at SFU, 1973 L to R: R. M. Schafer, Bruce Davis, Peter Huse, Barry Truax, Howard Broomfield, Hildegard Westerkamp | Photo: Simon Fraser University Archives | Source: Barry Truax, WSP website | Educational use

Schafer's soundscape concept

Paradigm shift: The world as a macrocosmic musical composition where we are simultaneously performers, audience, and composers.

Primary meaning: Acoustic characteristics of geographical, physical, ecological conditions

- Nature, culture, religion create specific ambient sounds
- Interaction between humans and acoustic environment
- Constitution of place's sonic identity

Listening as analytical practice

Soundscape analysis requires trained, conscious listening that moves from passive hearing to active attention.

Schafer's approach:

- **Ear cleaning:** Exercises to remove perceptual habits and noise
- **Clairaudience:** Developing clear, discriminating hearing
- Goal: Transform everyday acoustic experience into analytical awareness

Listening modes in electroacoustic music

Acousmatic (Schaeffer):

- Darkened space, invisible sources
- Reduced listening focuses on internal sonic qualities

Soundscape (Schafer/Truax):

- Environmental sounds remain recognizable
- Contextual listening engages associations

Cycles of the natural soundscape, British Columbia | R. Murray Schafer, The Tuning of the World (1977), p. 229 | © Destiny Books | Educational fair use

> …Behold the new orchestra! The sonic universe!
>
> — *R. Murray Schafer, "Yes, but Is It Music?" in* The New Soundscape: A Handbook for the Modern Music Teacher.

Soundscape elements

Natural sounds: Water, wind, animals, insects

Human activity:

- Rural: Agriculture, livestock, hunting
- Urban: Church bells, handicrafts, street vendors
- Industrial: Machines, factories, traffic
- Electronic: Telephone, radio, computer

Keynote, signal, soundmark

Analytical framework:

- **Keynotes** define place character
- **Signals** structure time and communication
- **Soundmarks** create cultural identity

Understanding these elements enables:

- Documenting soundscapes systematically
- Identifying sounds worth preserving
- Designing acoustic interventions

Cup or Faces paradox (visual analogy) | Original: User:Guam, 2005 | SVG: Bryan Derksen, 2007 | Wikimedia Commons | CC BY-SA 3.0 / GFDL

Keynote

Background sounds, often not consciously perceived:

- Highway noise, traffic hum
- Wind, rain, ocean waves
- Insect and animal sounds
- Electrical hum, ventilation systems

→ *Forms the sonic foundation of a place*

▶ Play example

Audio example: Rain | Barry Truax, Handbook for Acoustic Ecology | World Soundscape Project, Simon Fraser University | Educational fair use

Signal

Foreground sounds with specific information content:

- Warning devices: Bells, whistles, sirens
- Communication: Telephone, doorbells
- Temporal markers: Church bells, factory whistles

→ *Demands conscious attention*

▶ Play example

Audio example: Cathedral bell, Salzburg, Austria | Barry Truax, Handbook for Acoustic Ecology | World Soundscape Project, SFU | Educational fair use

Soundmark

Unique sounds with cultural/historical significance:

- Specific church bell patterns
- Traditional street vendor calls
- Characteristic industrial sounds (blacksmith, mill)

→ *Sonic landmarks worth preserving*

Hi-Fi und Lo-Fi

Analogous to the signal-to-noise ratio, the figure-ground relationship between *signal* and *key note* varies in strength, indicating the level of clarity or masking present.

Hi-Fi: Rural	Lo-Fi: Urban
differentiated	undifferentiated
quiet	loud
wide	narrow

Audio Comparison:

Hi-Fi (Rural) vs Lo-Fi (Urban) Soundscapes

▶ Rural soundscape (Hi-Fi)

▶ Urban soundscape (Lo-Fi)

Audio examples: Rural vs. urban soundscapes (Hi-Fi/Lo-Fi comparison) | Barry Truax, Handbook for Acoustic Ecology | World Soundscape Project, SFU | Educational fair use

Rhythm and tempo

Soundscapes are organized into temporal patterns ranging from micro-level vibrations to macro-level seasonal cycles:

- Rhythms of activity
- Circadian rhythm (day-night)
- Seasons
- Biological rhythms like heartbeat, breathing
- Mechanical tempo of machines (trains)

▶ Play example

Audio example: Blacksmith, Bissingen, Germany | Barry Truax, Handbook for Acoustic Ecology | World Soundscape Project, SFU | Educational fair use

Schizophonia

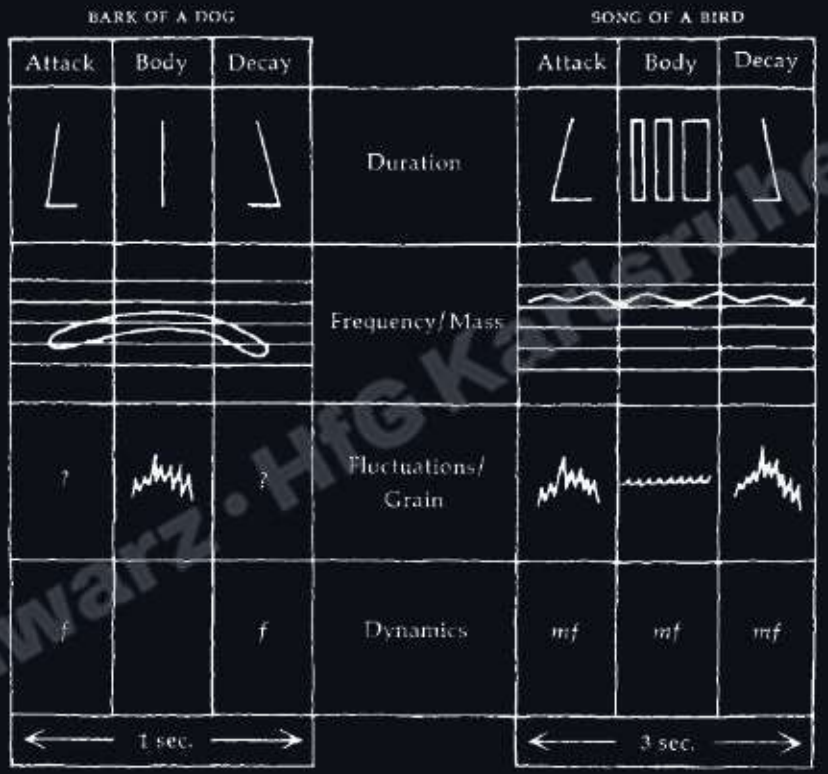
The separation between natural sound production and electroacoustic reproduction.

- Synthetic soundscapes
- Unnatural distance
- Background music (Muzak) as example

Analyzing sound events

Schafer's analytical framework:

- **Notation:** Envelope, pitch, fluctuation, dynamics
- **Classification:** Physical, psychoacoustic, semantic characteristics
- **Perception:** Figure-ground relationships
- **Morphology:** Material transformations over time
- **Symbolism:** Cultural meanings and associations



Sound event analysis framework | R. Murray Schafer, The Tuning of the World (1977), p. 138 | © Destiny Books | Educational fair use

Acoustic design

Schafer defines acoustic design as the positive quest to organize the soundscape to stimulate aesthetic satisfaction.

Approach:

- Preservation of *soundmarks* (culturally significant sounds)
- Avoidance of unwanted *noise*
- Critical examination of soundscape as a social task

Schafer's Approach - Summary

Methodology:

- Bridges scientific discipline and artistic imagination
- Combines physical measurements with perceptual analysis
- Uses historical accounts and social surveys

Classification system based on:

- Physical characteristics (frequency, amplitude, duration)
- Referential/aesthetic aspects (symbolic meanings, beauty, appropriateness)

→ *Goal: Restore balance to the global soundscape*

III. Critical Perspectives

Criticism: The use of the term "soundscape"

Critical issues:

- Disconnected from Schafer's original framework
- Applied generically to "nearly any sonic phenomenon"
- Frequently misapplied and redefined

→ *"Indispensable and elusive, provocative and limited" (Kelman 2010)*

Criticism: Hi-Fi and Lo-Fi distinction

Schafer's value judgments:

- Preference for rural sounds and natural environments
- Implied hostility towards technology and urban soundscapes
- Binary opposition between "desired" and "undesired" sounds

Critiques (Kelman 2010, Helmreich 2010, Arkette 2004):

- Pastoral/romantic conception idealizes rural quietude
- Urban prejudice against mechanical and electric sounds
- Sometimes overemphasis on acoustic dimension

- **Objectifies sound** rather than treating it as experiential (Ingold 2007, Helmreich 2010)
- Irony: Crafted using technologies Schafer criticized

IV. Soundscape Composition

Soundscape and spatial sound

Soundscape composition explores the spatial nature of environmental sound through different listening modes.

Listening modes:

- **Scenic:** Foreground-midground-background organization
- **Spherical:** 360° surround, listener enveloped
- **Immersive:** "Wrapped" in sound (headphones, reverberant spaces)
- **Binaural:** Localization via interaural time/level differences

Documentation enables composition

World Soundscape Project's archiving work:

- Directed listener's attention to sonic environments
- Revealed aesthetic component of environmental sounds
- Fostered critical listening and breaking perceptual routines

→ *This awareness led to compositional practices using environmental sound as artistic material.*

Soundscape composition

> The soundscape composition is a form of electroacoustic music, characterized by the presence of recognizable environmental sounds and contexts, the purpose being to invoke the listener's associations, memories, and imagination related to the soundscape.

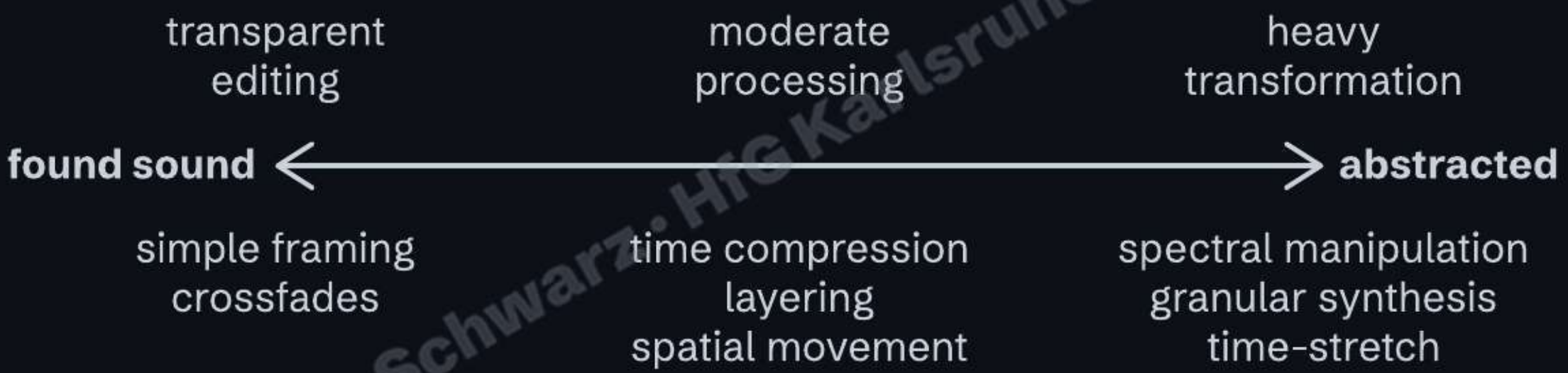
— Barry Truax

Soundscape composition concepts

- Source material remains recognizable
- Invokes listener's and composer's knowledge of environmental/psychological context
- Heightens awareness rather than exploiting environment
- Reveals alternative roles of individual within surroundings
- Enhances understanding and influences everyday perceptual habits

→ *Environmental, abstract, and artificial sonic environments are understood as artistic material.*

Continuum of compositional intervention



Listener experience

Modes of spatial/temporal engagement:

- **Fixed perspective:** Listener positioned in place, experiencing time flow
- **Moving perspective:** Listener taken on a journey through connected spaces
- **Variable perspective:** Listener navigates discontinuous, imaginary spaces

→ *Each perspective creates different relationships between listener and soundscape.*

Hildegard Westerkamp

German-Canadian composer and sound ecologist (* 1946)

- Member of the World Soundscape Project
- Editor of Soundscape Newsletter (1991–1995)
- Composer, radio producer, and educator

Selected works: *A Walk Through the City* (1981), *Harbour Symphony* (1986), *Kits Beach Soundwalk* (1989), *Beneath the Forest Floor* (1992)

Combines field recordings with spoken commentary, creating "soundwalks" that guide listener attention.

Example (Audio):

Excerpt from *Kits Beach Soundwalk* (1989) by Hildegard Westerkamp

▶ Play excerpt

Excerpt from Kits Beach Soundwalk (1989) by Hildegard Westerkamp | © empreintes DIGITALes / SOCAN | Educational fair use

Barry Truax

Canadian composer, theorist, and acoustic ecologist (* 1947)

- Member and director of the World Soundscape Project
- Author, *Handbook for Acoustic Ecology* (1978)
- Pioneer of real-time granular synthesis

Selected works: *Riverrun* (1986), *Wings of Nike* (1987), *Pacific* (1990), *Soundscape Vancouver* (1996)

Combines recognizable field recordings with granular transformation, balancing soundscape identity and timbral exploration.

Example (Audio):

Excerpt from *Pacific* (1990) by Barry Truax

▶ Play excerpt

Excerpt from Pacific (1990) by Barry Truax | © Cambridge Street Records | Educational fair use

Representative composers

Contemporary composers:

- Natasha Barrett (* 1972) - Ambisonic spatial composition
- Chris Watson (* 1953) - Wildlife and natural soundscapes
- Jana Winderen (* 1965) - Underwater and Arctic recordings
- Annea Lockwood (* 1939) - River and environmental sound maps
- Francisco López (* 1964) - Deep listening and field recording

Related figures:

- Brian Eno (* 1948) - Ambient music

V. Field Recording Techniques

Field recording techniques

Capturing environmental sound requires and understanding of the acoustic environments including:

- Appropriate microphone selection
- Stereo and spatial recording methods
- Specialized equipment for specific contexts


MixPre-6

Microphones for field recording

- **Dynamic:** Robust, no power needed
- **Condenser:** High sensitivity, phantom power required
- **Electret:** Affordable condenser variant

Specialized types:

- **Hydrophones:** Underwater (piezoelectric) - marine life, shipping
- **Contact mics:** Structure-borne vibration - wood, metal, stone
- **Parabolic:** Directional long-distance (30-100m) - wildlife
- **EMF:** Electromagnetic fields - power lines, computers, transformers

Hydrophone recordings

Jana Winderen (* 1965) - Norwegian artist with background in marine biology

- Uses hydrophones to record underwater soundscapes (Arctic, oceans, glaciers)
- Reveals "invisible but audible" marine ecosystems
- Notable work: *Energy Field* (2010) - Barents Sea, Greenland, Norwegian fjords

▶ Play excerpt

Excerpt from Energy Field (2010) by Jana Winderen | © Touch Records | Educational fair use

Digital recorders

Portable recorder requirements:

- High-quality preamps, phantom power
- Long battery life, weather-resistant

Common models:

- **Zoom H4n/H5/H6:** Affordable, XLR inputs, interchangeable capsules
- **Sound Devices MixPre:** Professional preamps

Stereo recording techniques

- **A-B (spaced pair):** Time difference, omnidirectional, wide image
- **X-Y (coincident pair):** Intensity difference, cardioid, precise localization
- **ORTF:** Combined time + intensity, balanced
- **M/S (Mid-Side):** Adjustable stereo width, mono-compatible, versatile

Binaural recording

3D spatial recording for headphone listening:

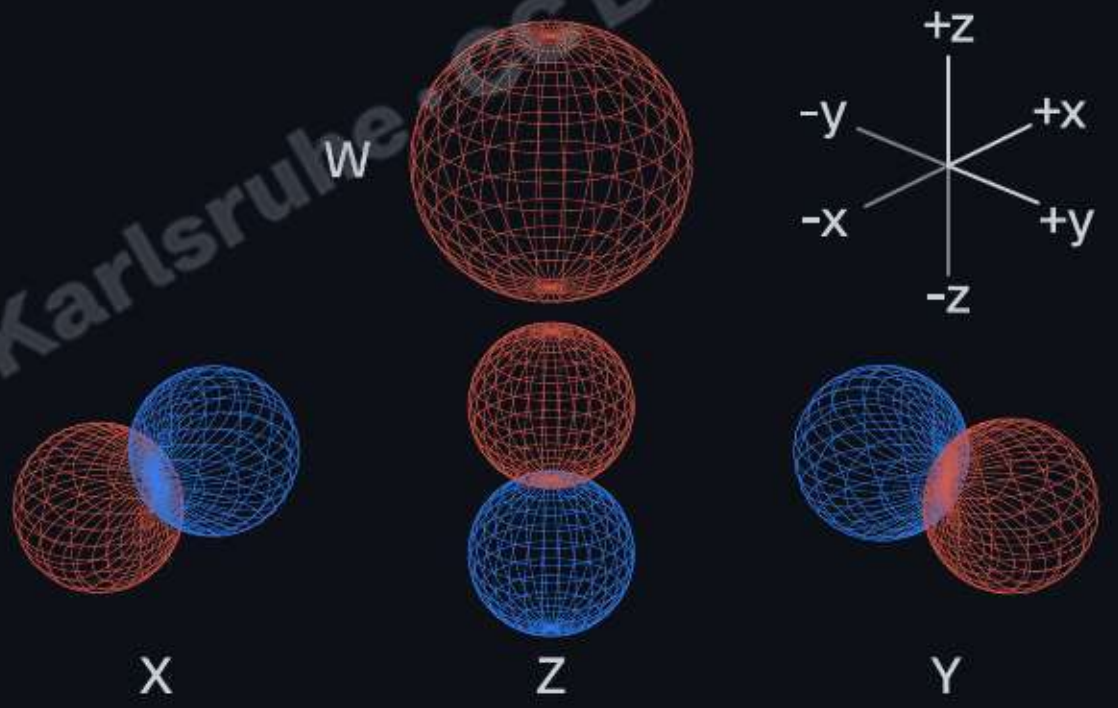
- Dummy head with microphones in ear canals
- Captures interaural time difference (ITD) and level difference (ILD)
- Head-related transfer function (HRTF) preserved
- Natural spatial perception on headphones

Artificial binaural: Software processing can create binaural from stereo/ambisonic

Ambisonics

360° sound field recording (Michael Gerzon, 1970s):

- Horizontal + vertical capture, decodes to any speaker setup
- **First-order B-format:** W (omni) + X, Y, Z (figure-8 patterns)
- **Higher-order (HOA):** 9+ channels for improved spatial resolution



Ambisonic microphone | Photo: Lorenz Schwarz, 2025 | CC BY 4.0

Ambisonic recording workflow

Common microphones:

- **Zoom H3-VR:** Consumer recorder with built-in decoding
- **Sennheiser AMBEO VR Mic:** First-order, tetrahedral array
- **Eigenmike:** 32-channel HOA (research/high-end)

Production workflow:

1. A-format (raw capsules) → B-format (W, X, Y, Z)
2. Spatialization in DAW (Spat/Max, Panoramix, IEM plugins)
3. Decode to speaker array or binaural for headphones

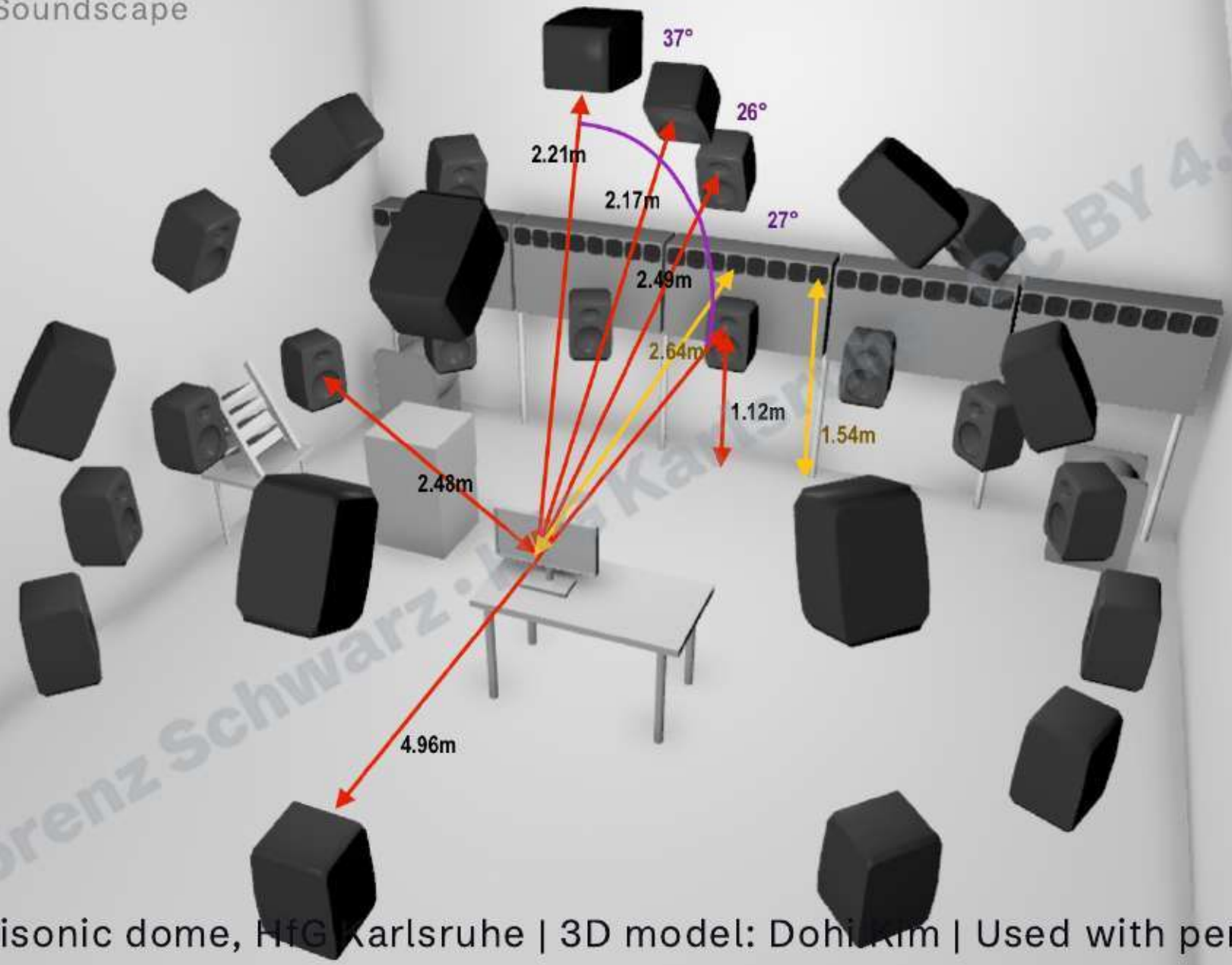
Ambisonic playback

Hemispherical speaker arrays:

- Full-sphere spatial reproduction (horizontal + height)
- Multiple elevation layers
- Immersive audience positioning

Notable venues:

- **ZKM Klangdom (Karlsruhe):** 43-channel dome
- **Room 311 (HfG Karlsruhe):** Teaching/research dome



Room 311 ambisonic dome, HfG Karlsruhe | 3D model: Dohi Kim | Used with permission

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