Science Europe Scientific Advisory Committee (SAC)

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"Building a Scientific Narrative on Impact and Societal Value of Science"

Unexpected impact of acoustics on European cultural identity

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#SEimpact

Overview

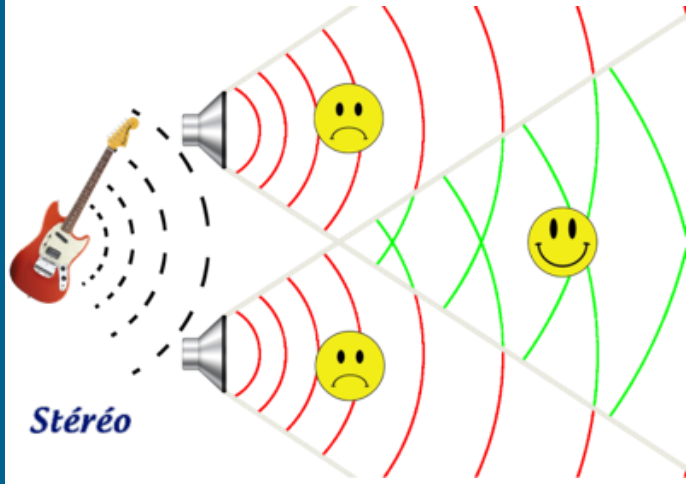
- What is 3D-audio?
- 3D-audio emerges from “play ground”
- Reaching audiences

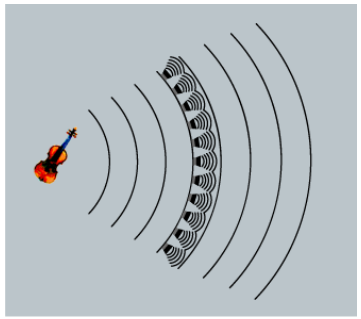
- Impact on science, art and society
- Outcome of the Science and Art “play ground”
- The “play ground” model: a guarantee for serendipity

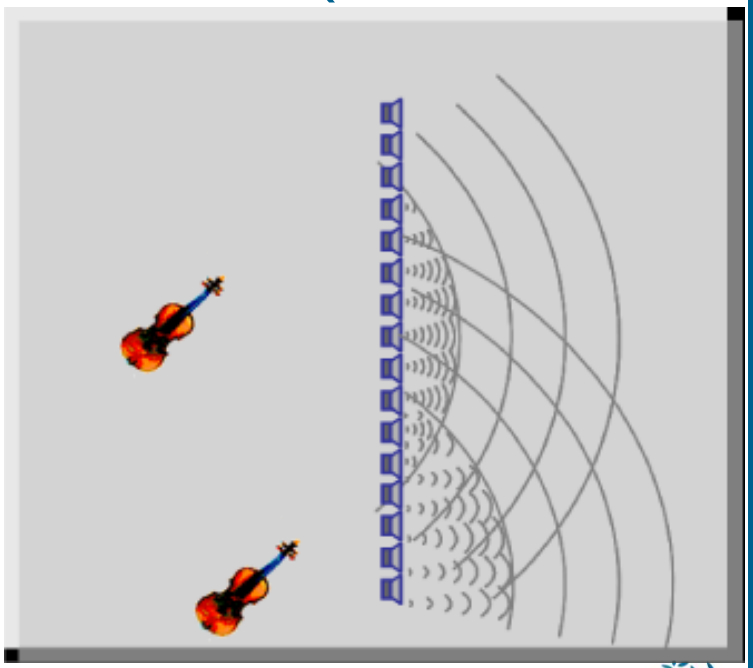
- Impact on Europe’s “Leonardo da Vinci” identity
- Key message

What is 3D-audio?

- 3D-audio starts from a mathematical curiosity in the 1980ies. It is gradually becoming a reality thanks to applications in arts and creative industries (music, multimedia, sound design)







3D-audio emerges from the “play ground”

- 3D-audio has been gradually embedded in a European **tradition of art-tech innovation** (the “**play-ground**”):
  - 1960ies: in electroacoustic music (e.g. spatialisation with loudspeaker orchestras)
  - 1980ies: computer music (digital sound synthesis)
  - 2000: musical content technologies (MIR, e-commerce)
  - 2016: embodied interactions with music (motion capture, body area networks, IoT technology)

Reaching audiences

- The story of **3D-audio rendering** development:
  - 1988: first idea by A.J. Berkhout at Delft University.
  - 2001-2003: CARROUSO EU-IST project
  - IOSONO developed at Fraunhofer and TU Ilmenau
  - Recently, IOSONO acquired by BARCO
- How **to tell audiences** what 3D-audio is:
  - In order to tell what 3D-audio is, one needs artistic content
  - Art is a necessity to give a sense to this technique
  - A world première of a 3D-audio rendering system in Berlin in 2009 involved a real-time performance of an organ piece by O. Messian played in the Cologne Cathedral

Impact on Science, Art and Society

- 3D-audio generates new activities:
  - In **SCIENCE**: to control audio objects in space we need multimedia systems that can predict the effect of human goal-directed actions in space
  - In **ART:** 3D-audio will innovate the way in which artists will spatialise their **expression with sound** and popularise it to attract large audiences
  - In SOCIETY: 3D-audio will create a creative industry and creative market, with new concert halls, new home audio installations, sounds for electronic cars... so that spatial sounds become a natural part of the habits of people in society

Outcome of the Science & Art “play ground”

- The SCIENCE & ART “play ground” involves a logic of discovery that stimulates serendipity
  - **Playground** = **work context and background**, where science and art integrate, also provided by infrastructures (e.g. labs, incubators)
  - **Serendipity** = **unexpected findings**
- Single high-impact outcomes (like 3D-audio) from the “play ground” are difficult to predict.
- The outcome is an agent for new impact on society on a broad scale, such as the creative industry (manufacturing of, and content for, multimedia systems)
- The success of high-impact outcomes depends on the “play ground”

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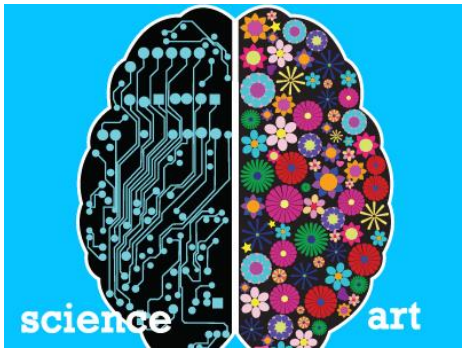
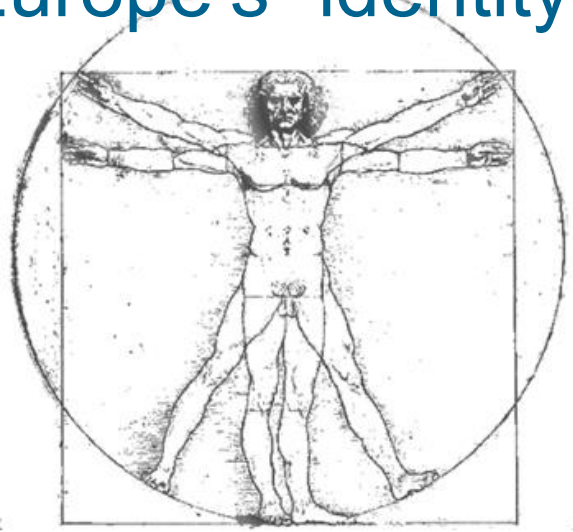
The “play ground” model: a guarantee for serendipity

SCIENCE and ART “play ground”



impact on society

Europe’s “identity”



Creative industry

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Impact on Europe's "Leonardo da Vinci" identity

- "*As a child I got inspired by Leonardo da Vinci's universal aspirations in art and science. This **motivated** me to become scientist, painter, and musician!*" (M. Leman)
- SCIENCE and ART create Europe's "Leonardo da Vinci"-identity, which stands **for innovative, creative, humanistic and open expressive interactions**. New artistic expression forms are touting hallmarks of this identity and **inspire people**
- "**Identity**" helps people to mirror themselves into an ideal, and that's why it is an **attractive brand**, to be regarded as an asset
- The 3D-audio example illustrates how fundamental science may drive the innovation of new artistic expressions and the idea of **further exploration of the human interaction with multimedia machines**

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KEY MESSAGE

- The 3D-audio story illustrates how an outcome of the SCIENCE and ART “play ground” can have a long-term unexpected impact on:
  - Europe’s manufactory-industry for multimedia systems
  - Europe’s artistic expression forms
  - Europe’s identity => creating values and inspirations for young people
- Need to support the “S&A play ground” with investment and resourses because it facilitates serendipity (the unexpected positive outcomes)