

THE COLISÉE

The complete acoustic mission of the hall Environmental acoustic mission

Context

The Colisée Grand Paris is a new cultural and sports complex with 2 halls: an asymmetrical multifunctional hall with 7,000 seats, which can operate both in Zenith configuration (live performance) and Arena configuration (sport), and a 3,000-seat Omnisports. This cultural complex is part of a new district for which it was necessary to determine in advance the different sound environments in the future state of completion to avoid nuisances.

Methodology

Tisseyre + Associés has 40 years of experience in the 3D modeling of acoustic phenomena, both on the scale of a hall and its environment. Indeed, 3D modeling from the project's first stages allows anticipating the acoustic solutions to integrate them into the architecture and considering with finesse all the architectural details to incorporate them into the acoustic performance of the hall fully. Starting from the observation that the hall's acoustics are essential for its architecture, we have developed a joint working methodology with the architect.

The complete acoustic mission of the hall

Thanks to our 3D model center, we can collaborate from the design phase with the architect to integrate the room's acoustic performance into the architecture. Therefore, our work does not focus on the dimensioning of posterior solutions of acoustic absorbers to attenuate reverberations' effects. Acoustic performance integration into the hall's architecture has led us to offer tailor-made solutions for the multi-purpose halls adapted to the needs and architect's demands.

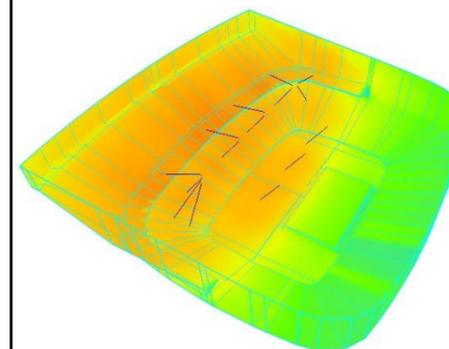
Environmental acoustic mission

The BIMAE® is an essential work support for close collaboration with architects and urban planners at all project stages. By modeling the sound evolution during a day of transport routes and human activities, our tool checks the acoustic balance between these different sound sources to avoid the nuisances of the halls in operation on their environment on the one hand, and transport routes on the Colisée on the other hand. In addition, the joint study of the internal (shows) and external (reception of the public) functions of the Colisée, and the 3D visualization of the sound propagation at the foot, in front and around a building allows to anticipate, optimize and integrate the acoustic solutions within the project's architecture. We have developed a virtual acoustic laboratory control procedure regarding its complex coverage with photovoltaic panels.

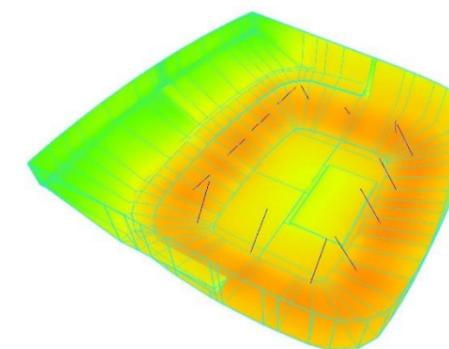


TECHNICAL INFORMATION.

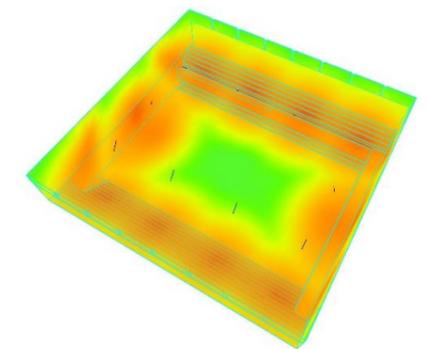
LOCATION. Tremblay-en-France (France)
CAPACITY. 7,000 et 3,000 people for 19,000 m²
BUDGET. € 74,000,000
MISSIONS. The complete acoustic mission of the hall; Environmental acoustic mission
ARCHITECT. DVVD Architecture
COMPANY. Legendre
CLIENT. Paris Terres d'envol
TIMETABLE. Ongoing works



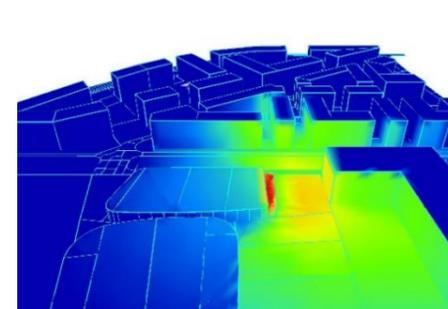
Large hall intelligibility in performance formation



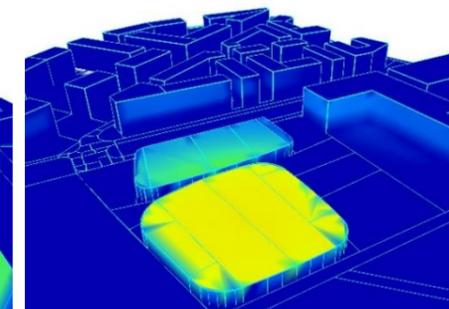
Large room intelligibility in arena formation



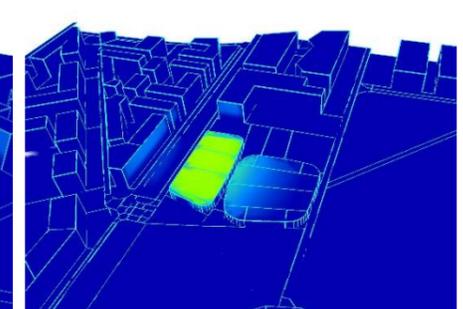
Intelligibility sports hall (gymnasium)



Sound impact of public reception on the urban planning of the Colisée



Sound impact of the multipurpose hall in operation on its urban planning



Sound impact of the sports hall in operation on its urban planning

LEÏLA MEZIAN FOUNDATION

Environmental acoustic mission The complete acoustic mission of the museum Auditorium acoustics and sound system

Context

The Leïla Mezian Foundation aims to bring together more than 2,000 pieces of Moroccan art collected by the doctor.

Methodology

Tisseyre + Associés has 40 years of experience in architectural and environmental acoustics. Thirty years ago, anticipating the shift to digital and 3D visualization, we developed tools and methods for 3D models for rooms and 4D for the environment. Instead of using the sound ray firing technique, which does not consider architectural details or urban acoustic porosity, we use the finite element mesh technique. This technique makes it possible to study acoustic phenomena in real 3D (rather than extended 2D) by considering architectural details from the design phase. Based on the observation that the acoustics of a building or its environment are structuring for its architecture and urban planning, we have developed a methodology for joint work with the architect and urban planner.

Environmental acoustic mission

Thanks to BIMAE®, we modeled the soundscape in the future state of completion, considering the noise of transport and human activities. Our modeling is not based on measurements but on a database and a statistical approach (Urbanistic Noise Map®), allowing us not to depend on the intrinsic variability of soundscapes. Thus, we can collaborate with the architect from the design phase to offer him acoustic insulation solutions integrated into the project's architecture.

The complete acoustic mission of the museum

Thanks to our 3D model tool for spaces in operation, Intelligibility®, we can collaborate from the design phase with the architect to integrate acoustic solutions into the architecture of the museum rooms. For the Leïla Mezian Foundation, we have proposed tailor-made acoustic solutions to ensure that the guided tours remain intelligible for the visitors benefiting from them while ensuring that they do not disturb the visit of other users.

Auditorium acoustics and sound system

Thanks to our 3D model tool for Hall Acoustics® rooms, we can collaborate from the design phase with the architect to integrate the room's acoustic performance of the room into the architecture. Our work, therefore, does not focus on the dimensioning of posterior solutions of acoustic absorbers to attenuate the effects of reverberations. We work with the architect on the choice of shapes, sound system, and materials used so that the sound is distributed evenly and intelligibility is optimal throughout the auditorium.



TECHNICAL INFORMATION.

LOCATION. Casablanca (Morocco)

SURFACE. 7,000 m²

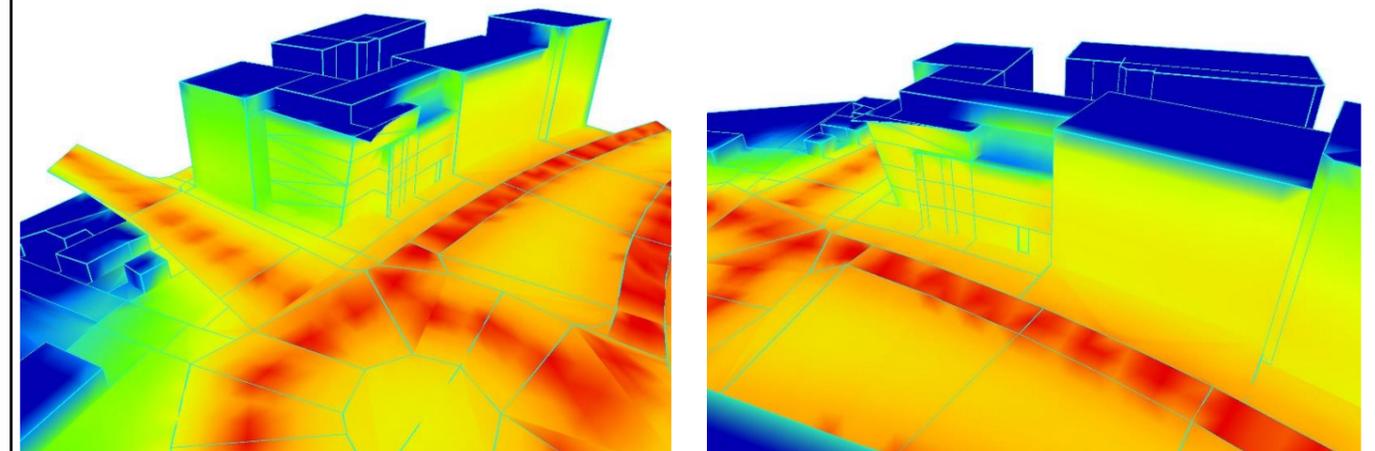
BUDGET. € 40,000,000 (excl.VAT)

MISSIONS. Environmental acoustic mission; The complete acoustic mission of the museum; Auditorium acoustics and sound system

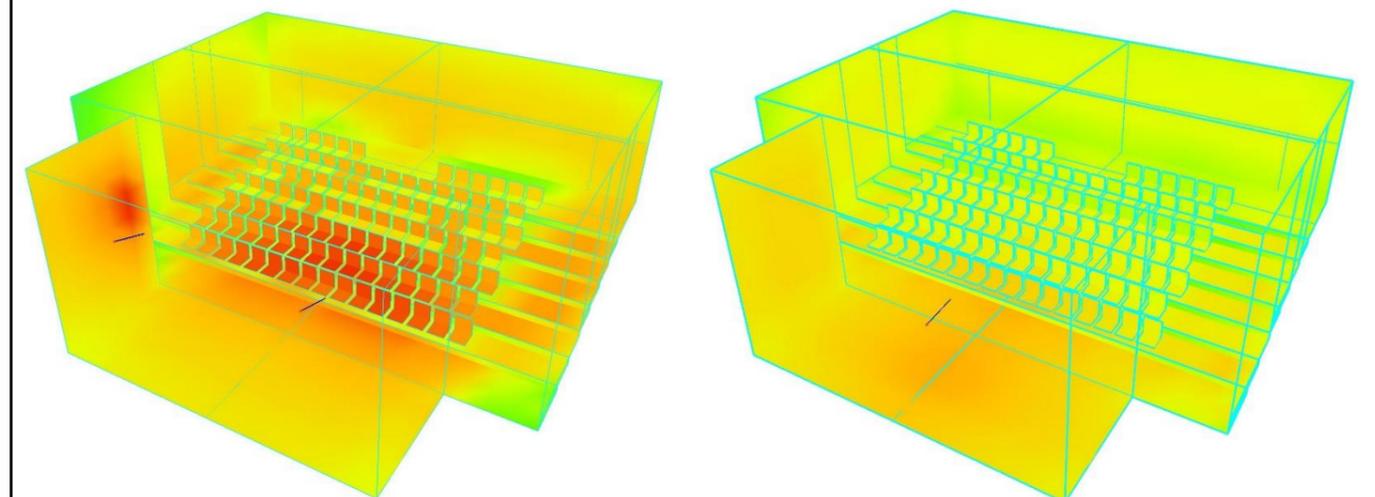
ARCHITECT. Ouafaa Boutenache; Kengo Kuma Associates

CLIENT. Private Bank of Africa

TIMETABLE. Construction in progress, delivery scheduled for 2024



Sound impacts of transport noise on the foundation



Intelligibility of the auditorium by sound system

Auditorium intelligibility per speaker (natural voice)

BEIRUT CONCERT HALL

The complete acoustic mission of the hall Tailor-made acoustic solutions

Context

This cultural complex will house, in the heart of Beirut, a performance hall with 1,200 seats and a music conservatory for 1,500 students.

Methodology

Tisseyre + Associés has 40 years of experience in the acoustics of performance halls, its core business originally. 30 years ago, anticipating the digital revolution and 3D visualization, we developed a tool for 3D models of performance halls: Hall Acoustics®. Instead of using the sound ray shooting technique, which does not consider the architectural details, we use the finite element mesh technique, which allows these details to be modeled with finesse to integrate them into the acoustic performance fully from its conception.

The complete acoustic mission of the hall

Thanks to our 3D modeling tool, Hall Acoustics®, we can collaborate with the architect from the design phase to integrate the acoustic performance of the hall into the architecture. Therefore, our work does not focus on the dimensioning of acoustic absorbers' posterior solutions to attenuate the reverberations effects. We work with the architect on the choice of shapes and materials used to optimize the reverberations to contribute to the acoustic performance of the hall, which can be summarized to:

- Loudness, clarity, and definition. The sound should be loud, clear, and precise.
- Sound envelopment of all spectators. The people in the room feel like they are part of the show: the sound envelops them.

As part of this project, we accompanied the architect in the very design of the hall to make it a high-acoustic performance concert hall.

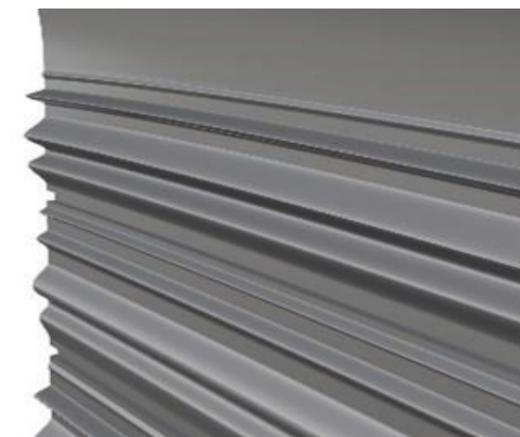
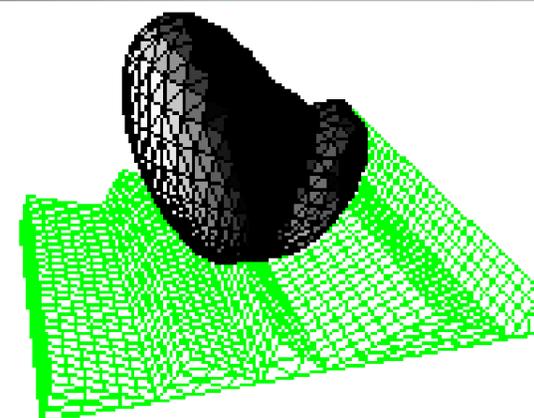
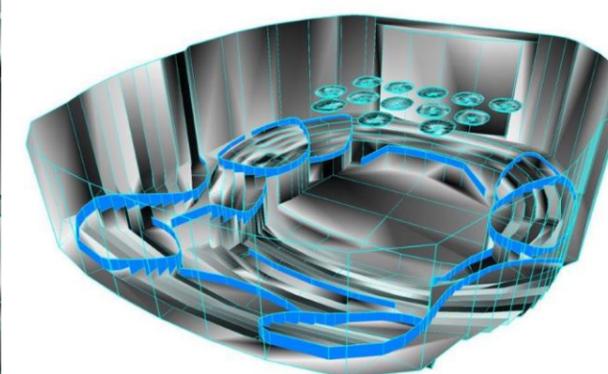
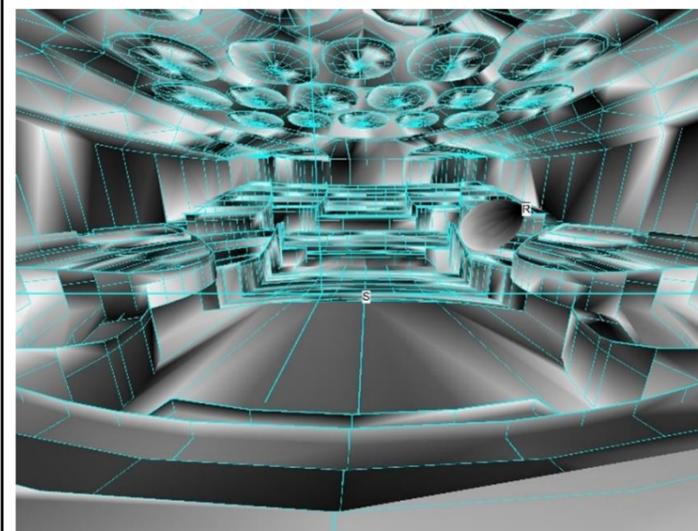
Tailor-made acoustic solutions

The acoustic performance integration in the performance hall has led us to offer tailor-made solutions. In particular, we drew, together with the architect, the design details of the reflectors on the ceiling in the orchestral zone. Their shapes and dimensions are calculated so that the reflections of the sound waves are redirected in the precise directions and thus participate in the optimal acoustic response of the hall. Using Hall Acoustic®, we worked on the acoustic reflection lobes, together with the architect, by modeling the shapes of the wooden wall treatment of the hall, their curvatures, and their inclinations on the contours of each wall. All this work leads to mastering the temporal balance of near and late sound reflections, guaranteeing the Lev acoustic envelopment.



TECHNICAL INFORMATION.

LOCATION. Beirut (Lebanon)
CAPACITY. 1,200 seats in the main concert hall + 350 seats (small hall)
BUDGET. € 200 000 000 (excl. VAT)
MISSIONS. The complete acoustic mission of the hall; Tailor-made acoustic solutions
ARCHITECT. IPPR
CLIENT. Lebanese government
TIMETABLE. Ongoing works



KING ABDULAZIZ CENTER FOR KNOWLEDGE AND WORLD CULTURE

The acoustics of the conference room Tailor-made acoustic solutions for the museum

Context

This cultural center with grandiose architecture hosts a wide range of activities to fit into the local and national cultural landscape. It includes a museum, conference and cinema rooms, exhibition halls, an auditorium, and a library.

Methodology

Tisseyre + Associés has 40 years of experience in 3D modeling acoustic phenomena in halls and spaces in operation. Indeed, 3D modeling from the first stages of the projects allows firstly to anticipate the acoustic solutions to integrate them into the architecture. Secondly, it fully integrates all architectural details into the hall's acoustic performance with finesse. Starting from the observation that the hall's acoustics are essential for its architecture, we have developed a joint working methodology with the architect, all the more necessary as the architecture is out of the ordinary.

The acoustics of the conference room

Thanks to our 3D modeling tool, Hall Acoustics®, we can collaborate with the architect from the design phase to integrate the acoustic performance of the hall into the architecture. Our work, therefore, does not focus on the dimensioning of posterior solutions of acoustic absorbers to attenuate reverberation's effects. We work with the architect on the choice of shapes, sound system, and materials used so that the sound is distributed evenly and intelligibility is optimal throughout the conference room. Moreover, thanks to our digital acoustic laboratory, we have developed various tailor-made insulation and absorption materials to correspond to the hall's aesthetics and extraordinary dimensions. Moreover, since hearing and sight work synchronously, we have developed a sound system to ensure that sound and visual images overlap perfectly.

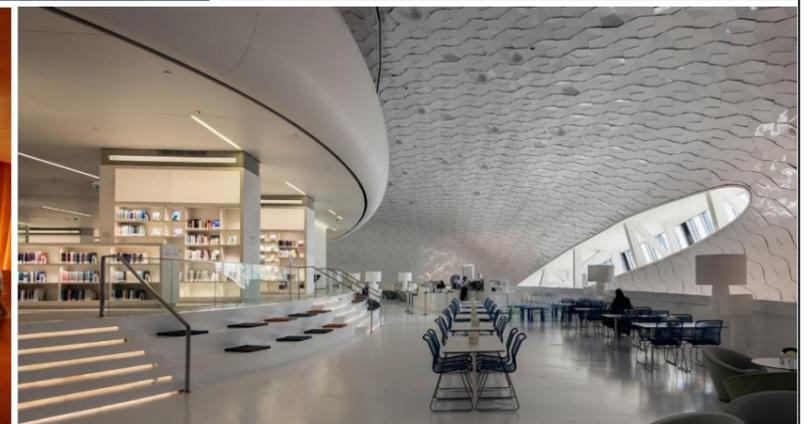
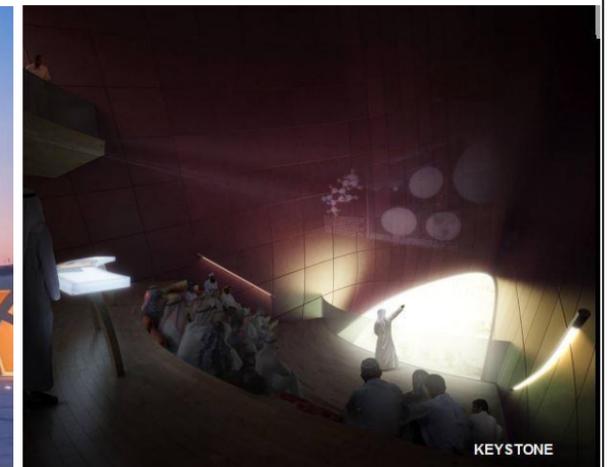
Tailor-made acoustic solutions for the museum

Thanks to our 3D model tool for spaces in operation, Intelligibility®, we can collaborate from the design phase with the architect to integrate acoustic solutions into the hall's architecture. Given the complexity of the volumes, we have proposed tailor-made acoustic solutions adapted to the uses and requests of the architects. The 3D models constituted a real working support in collaboration with the architect to jointly choose the integrated acoustic solutions' shapes, aspects, and colors to control the occupied premises' sound environments while guaranteeing speech intelligibility.



TECHNICAL INFORMATION.

LOCATION. Dhahran (Saudi Arabia)
SURFACE. 100,000 m²
BUDGET. € 300,000,000 (excl. VAT)
MISSIONS. The acoustics of the conference room; Tailor-made acoustic solutions for the museum
ARCHITECT. Snohetta ; OGER International
CLIENT. Saudi Aramco
TIMETABLE. Delivered in 2021



QUAI DES SAVOIRS

The complete acoustic mission of the hall Multimedia mission

Context

The Quai des Savoirs is a cultural complex dedicated to science, technology, and contemporary creation. This complex includes interactive exhibition rooms, a multi-purpose space, a set of radio and television recording studios (with post-editing management), and offices.

Methodology

Tisseyre + Associés has 40 years of experience in the acoustics of performance halls, its core business at the origin. 30 years ago, anticipating the digital revolution and 3D visualization, we developed a tool for 3D models of performance halls: Hall Acoustics®. Instead of using the sound ray shooting technique that can't consider architectural details, we use the finite element mesh technique, which allows these details to be modeled with finesse. Thanks to this innovative technique, we fully integrate architectural details into the hall's acoustic performance at each project step. Starting from the observation that the hall's acoustics are essential for its architecture, we have developed a joint working methodology with the architect.

The complete acoustic mission of the hall

Thanks to our 3D modeling tool, Hall Acoustics®, we can collaborate with the architect from the design phase to integrate the acoustic performance of the hall into the architecture. Therefore, our work does not focus on the dimensioning of acoustic absorbers' posterior solutions to attenuate the reverberations effects. We work with the architect on the choice of shapes and materials used to optimize the reverberations to contribute to the acoustic performance of the hall. To meet the architectural requirements and the multi-use function of the hall, we have developed tailor-made acoustic solutions:

- Low temperature radiant ceiling system to control the heat and carbon balance.
- Integrated and directed sound system to superimpose sound and visual images.

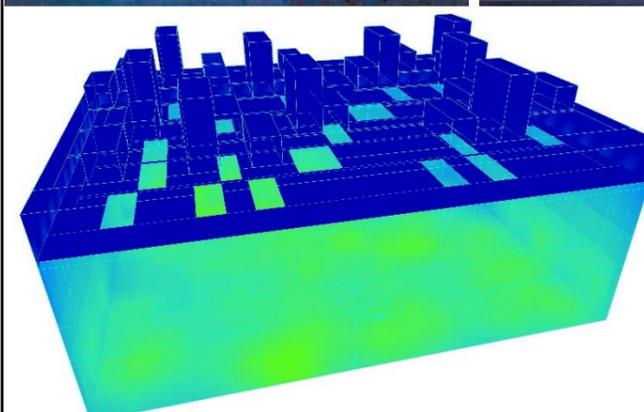
Multimedia mission

The exhibition halls receive a certain number of animations (provided by a speaker with a natural voice or by interactive terminals). Then, avoiding activities' sound superposition matters so that no activity disturbs the neighboring activities. Thanks to Intelligibility®, our 3D model of the sound spaces in operation, we have ensured the sound atmosphere consistency with the uses. By working on the sound equipment and the acoustic furniture, we have been able to control the different animations' sound atmospheres so that the visitors can move from one animation to another without embarrassment.

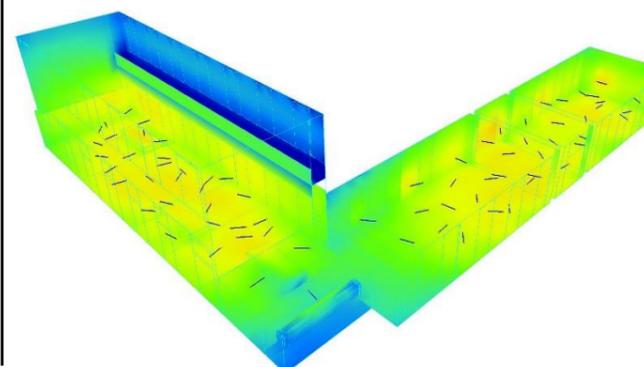


TECHNICAL INFORMATION.

LOCATION. Toulouse (France)
SURFACE. 10,000 m²
BUDGET. € 18,000,000 (excl. VAT)
MISSIONS. Mission acoustique complète de la salle ; Mission multimédia
ARCHITECT. SCAU
CLIENT. City of Toulouse
TIMETABLE. Delivered in 2017



Hall acoustics in exhibition configuration



Museum hall acoustics in operation

