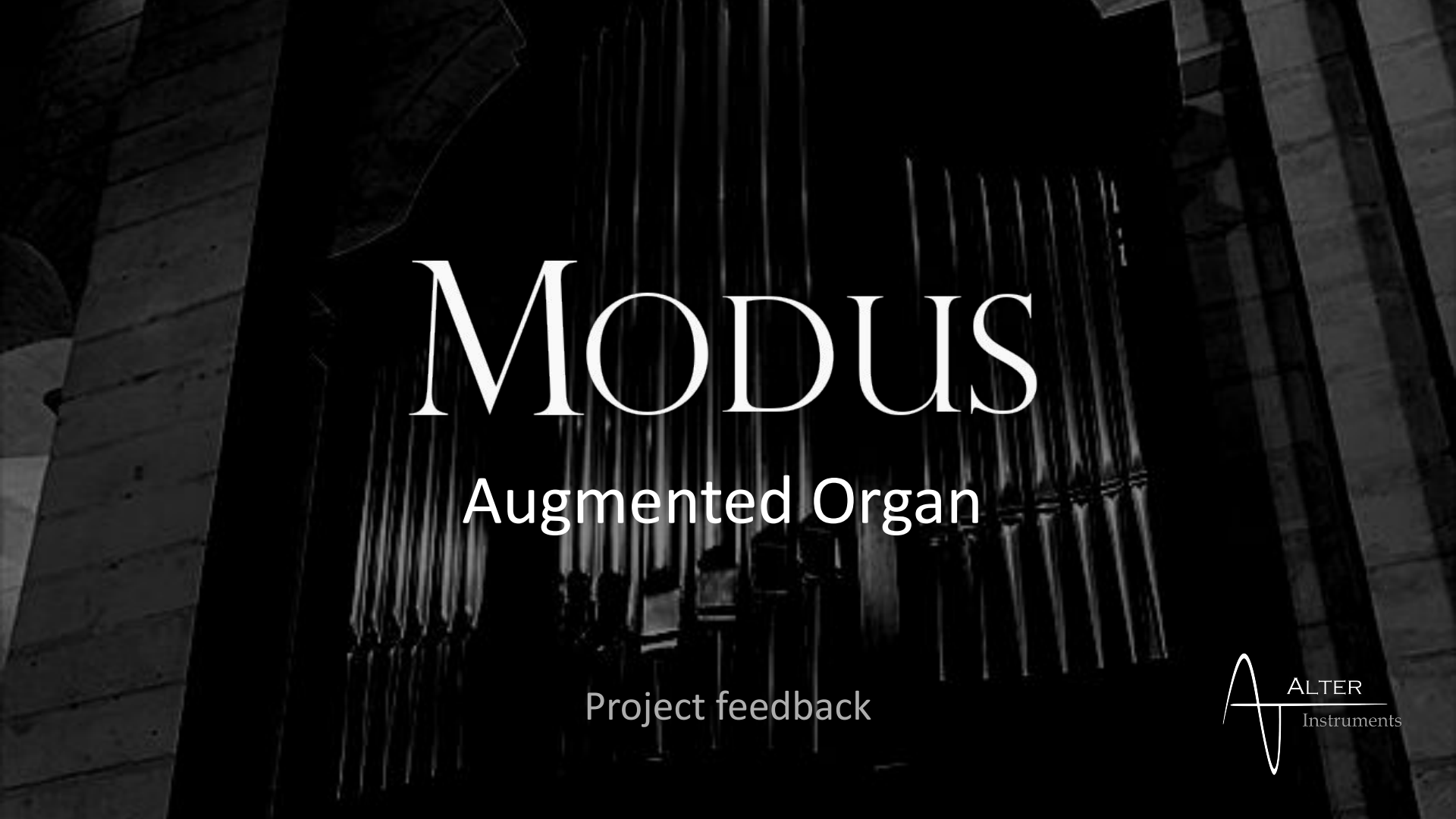

MODUS
Augmented Organ
Project feedback
ALTER
Instruments

The Project

The *Modus - Augmented Organ* project consists in realizing a digital augmentation extension for the pipe organ.

This extension consists of physical modules for capturing, managing and playing sound, all based on an audio signal processing software program.

The idea was initially proposed by organist Jean-Christophe Revel. The organ console of the Saint-Orens church in Auch, France, which served as support for this project, will soon be replaced by a window console conforming to the original. It was in the context of this operation that Jean-Christophe Revel had the idea of adding a real-time sound transformation module that the performer could manage independently.

The Modus project is realized in collaboration with the *Association des Amis des Orgues du Pays d'Auch* and with organ maker Jean Daldosso, in charge of the construction of the future organ console.

ALTER Instruments

Association des Amis des Orgues du Pays d'Auch et de la Lomagne Gersoise

Soutenu par
MINISTÈRE DE LA CULTURE
Liberté
Égalité
Fraternité

Centre national de la musique

The Modus project is supported by the French Ministry of Culture (Innovative Digital Services 2022) and by the Centre national de la musique (Support to innovation).

Why augment the organ?

What is an augmented organ?

The term “augmented” is inspired by *augmented reality*: the addition of a virtual layer to reality. In the case of the organ - as with other musical instruments - the augmentation consists of adding new sound possibilities to the existing instrument.

The pipe organ, the king of instruments for its richness of sound, is also the most complex acoustic instrument. Over time, organ builders have proposed ever more innovative solutions to increase the possibilities offered by the instrument.

The **manual coupling system**, which allows several manuals to be played from one, appeared during the 15th century.

With the **expression pedal**, the organist can reduce the sound intensity of the stops by opening or closing pivoting shutters (early 18th century).

The **crescendo pedal**, which appeared in the 19th century, progressively activates stops, creating crescendo / diminuendo effects.

Adding new sounds is consistent with the evolution of the organ, and one could even say that the organ is already an augmented instrument in itself. What could be more natural than using the latest technologies available to go even further!

Why add electronics to an acoustic organ?

Digital technologies bring two main possibilities for augmentation. These intervene at different times in the sound creation process and thus offer complementary functionalities.

Acting on the sound creation:

Digital MIDI controls can be installed on an organ to allow very precise and complex control of the wind, pipe by pipe, varying for example:
- the intensity of the wind
- the duration of a note
- the delay before the note is activated

This is an enrichment of sound creation modes. The electronics intervene prior to the sound production, and the produced sound remains purely acoustic.

“Hyperorgans” provide new accesses to sound creation.

Transforming the sound produced by the instrument:

The sound of the organ is captured using microphones, then processed digitally and immediately diffused via speakers. The transformation occurs after the initial sound production. The acoustic sound remains present and is accompanied by the transformed sound.

This type of augmentation is generally carried out by a team of professionals with expertise in sound technologies (sound engineers, etc.) as part of one-off installations.

The **Modus** is part of this second approach: post-processing of acoustic sound. However, unlike in pre-existing solutions, digital processing is managed directly by the organist.

The Modus

With the Modus, the organist has access to a wide range of audio processors. The real-time audio processing can be fixed or carried out continuously and while playing. In addition, it is possible to trigger audio files.

The Modus adapts to already written works, paving the way for the exploitation of existing repertoire.

A few examples of available effects:

rhythm – delays, loops, echo
pitch – harmonizer
timbre – filters, flanger
space – reverb, panoramics

Some excerpts:
https://youtu.be/RwF_KYoYnIA

Within each effect, the performer has the freedom to act on one or more parameters, or to combine them at will to obtain unique processings.

Transformations of the sound signal can be accessed directly by the performer via two interfaces: a set of processing pedals and a touch screen. This ease of access ensures great freedom of expression and the ability to improvise with the effects.

A stand-alone version of the software allows composers to prepare their set-ups remotely when they cannot physically access the organ.

Two versions of the Modus are currently under development:

- *an extension fully and permanently integrated into the console*
- *a mobile version whose physical modules are arranged around the console*

It is the mobile version that was tested as part of this project.

The parts of the Modus

MAIN TOWER

Heart of the Modus.

Contains the audio processing hardware, electronic connections, touch screen.

TOUCH SCREEN

Selection and management of configurations.

Visual feedback.

MONITOR SPEAKERS

Optional.

Allow the organist to hear the resulting sound from the hall. Possible to listen through headphones as well.

SOUND PROCESSING PEDALS

Real-time control of effects.

May be freely assigned to one or more audio processors.

The parts of the Modus

INTERNAL MICROPHONES

Inside the Great and Swell divisions: individual control over each division.

EXTERNAL MICROPHONES

Recording of the performances and output for the monitor speakers / headphones.

Here in stereo.

MAIN LOUDSPEAKERS

Diffusion of processed sound. Here in stereo.

The sound blends naturally with the acoustic sound of the organ.

The number of microphones and loudspeakers is variable according to the venue, the organ, and specific requirements. In this mobile version, the sound management hardware and touchscreen are integrated into a tower to be placed next to the console. In the fully integrated version of the Modus, these elements and the pedals are built directly into the console.

Conditions of experimentation

Experimentation with the Modus took place within the framework of cultural events organized by the *Association des Amis des Orgues du Pays d'Auch*. These events provided an opportunity to validate our approach to organ augmentation, to verify the proper functioning of the Modus, and to gather feedback from the audience and performers.

PLACE	Saint-Orens Church, Auch, France	
DATES	17-18 September 2022 6 July - 13 August 2023	
ORGAN	Year Organ builders Stops Manuals Pedalboard Transmission Stop action	~1845 Poirier - Lieberknecht 18 2 18 notes Mechanical Mechanical

European Heritage Days 2022

Test of the concept and basis for prototyping the Modus.

Evening dedicated to composer John Cage's *As Slow As Possible*, with augmented organ, dance, painting and photography. Live electronic version of the work by Jean-Christophe Revel.

Public presentation of the Modus project and the organ console restoration project. Performances of works from the mixed music repertoire and improvisations.

Festival *Claviers en Pays d'Auch, l'été !*
Edition 2023

Concerts with the Modus every Saturday morning (*Préludes du marché*) from July to mid-August and on Sunday August 13th evening (*Auditions de l'été*).

Organist residencies of varying lengths.

Performers work independently.

Impacted audiences

Direct users

- local organists
- invited artists
- students in organ classes
- composers

Indirect users

- the audience of a concert

A survey was carried out with these two audiences after the prototype presentations in Auch.

DATE OF THE SURVEY	23 August - 17 October 2023
RESPONDENTS	7 performers
TIME OF WORKING WITH THE MODUS	2 hours - 6 weeks
AGE DISTRIBUTION	23 - 71 years

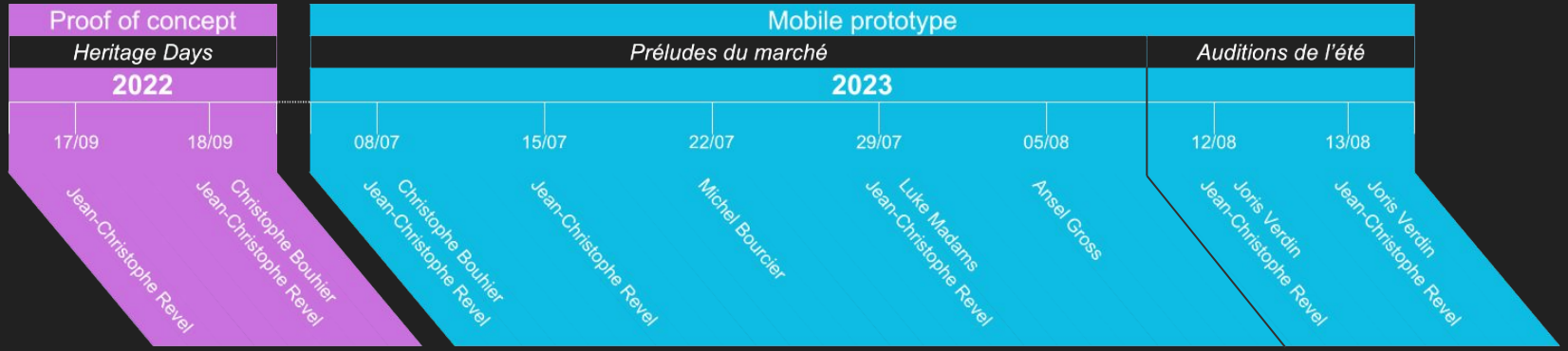
The respondents included 6 organists and one pianist who was discovering the organ for the first time. All had a concert profile and regularly played contemporary music.

DATE OF THE SURVEY	12 August 2023
CONCERT ATTENDANCE	40 persons
RESPONDENTS	16 (40%)

The audience was made up of people of all ages, but only adults were surveyed. We consider this population to be representative of the audience as a whole.

Use of the Modus

The project gave rise to 9 public events, including 2 in the autumn of 2022 and 7 in the summer of 2023.



Performed works

During these public events, 9 improvisations and 25 written pieces were performed and recorded with the Modus, some of them several times.

The electronic part consisted of:

- *sound files* in 3 works
- *real-time audio processing* in 29 works
- *a combination of both* in 2 works.

Premieres	Improvisations	Transcriptions	Arrangements
2	9	15	8

Such extensive use of electronics in organ music was made possible by the long-term availability of the tool and autonomous access to sound processing.

Performers in residence had free access to the organ and Modus at their convenience.

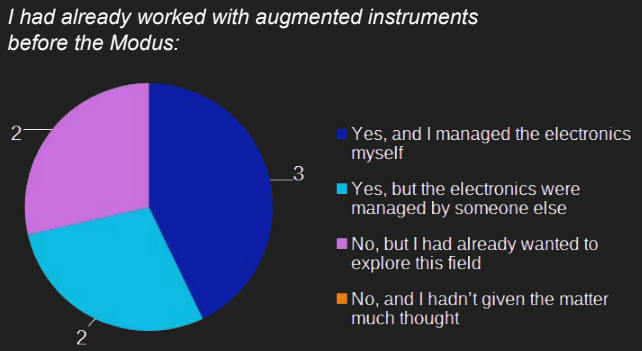
Direct users

Experience with augmented instruments

The performers who worked with the Modus had varied degrees of previous experience with augmented instruments.

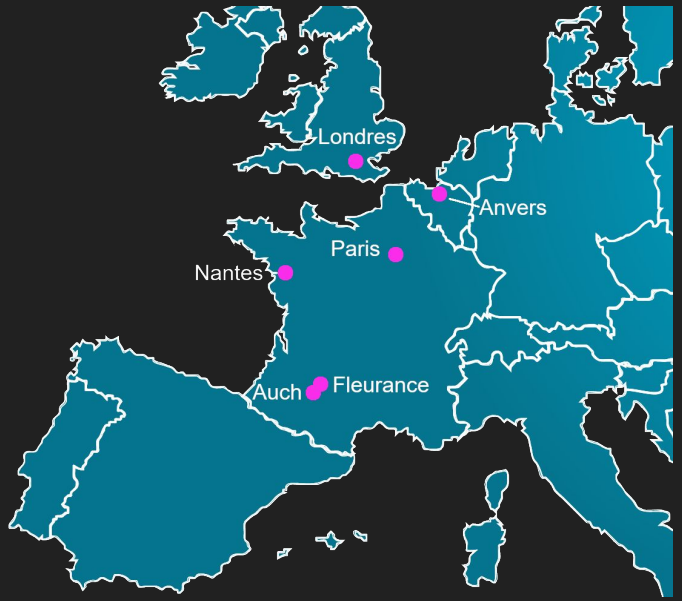
2 of them had never worked with electronics before, while 3 had managed the electronic part of the works themselves.

For some performers, the Modus was their first experience with an augmented instrument.



It's worth noting, however, that all the people interviewed had at least been interested in mixed music before coming to work with the Modus, and therefore had a certain openness and curiosity about the possibilities offered by digital processing.

Geographical origin of the performers



Experimentation within the framework of the *Claviers en Pays d'Auch, l'été !* festival has introduced the Modus to both local organists and national and international performers. With the aim of making the Modus as widely known as possible, this initial phase represents a very good start.

Induced use

Indirect users

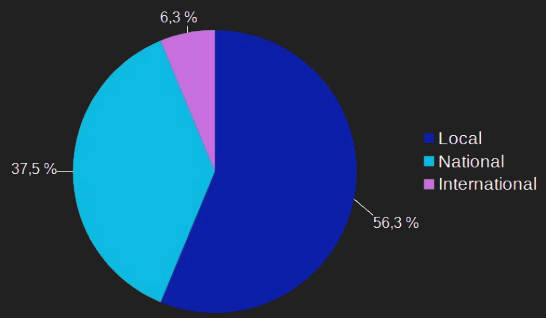
Attendance to the events

Average attendance at the various events was 30 people, except for the concert on August 13, which had a much higher attendance of around 130 people.

As part of the mediation process, the public was invited to come up to the organ loft to see and possibly try the Modus at the end of the concerts and presentations.

On average, 5 people seized this opportunity per event.

Origin of the audience



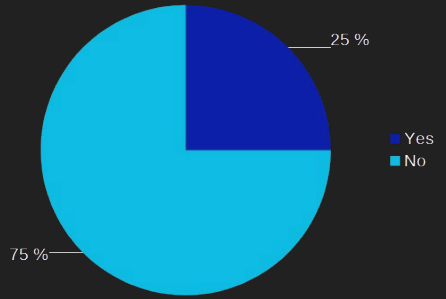
The majority of spectators were locals, which seems quite natural. However, some people came from further away. The concert took place during the tourist season and attracted people visiting Auch.

Audience engagement

A quarter of those questioned are returning audiences, which a priori reflects a positive appreciation of the music heard. On the other hand, the fact that three-quarters were first-time attendees means that the audience is renewing itself, which is also a good indicator. The augmented organ was able to arouse the audience's curiosity.

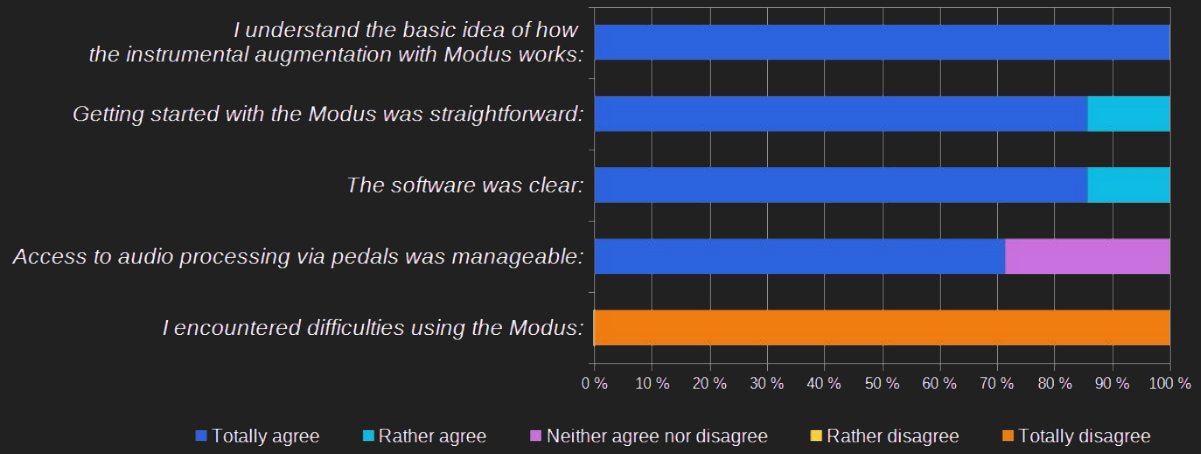
Unsurprisingly, those who return are mainly locals, although there are also a few tourists.

I had already attended the Saturday morning concerts this summer:



Mastery of the tool

The main objective of the project was to develop a solution for organ augmentation that could be used by the performer in complete autonomy. This presupposes that the tool is accessible both from a physical point of view (available over time, manageable control of processing pedals, listening quality, management of configurations through the touch screen) and from the point of view of intelligibility (understanding of the installation path: capture - processing - diffusion, clarity of the gesture/effect causal link, quickly operationable, clarity of the interface for building configurations).



"Very well thought-out workflow."

"As with anything, however, a learning process is necessary. ***The main difficulty is psychological: apprehension.*** *"*

"Getting to grips with it obviously requires a significant investment, if you compare it to an organist getting to grips with a new organ, even a large one."

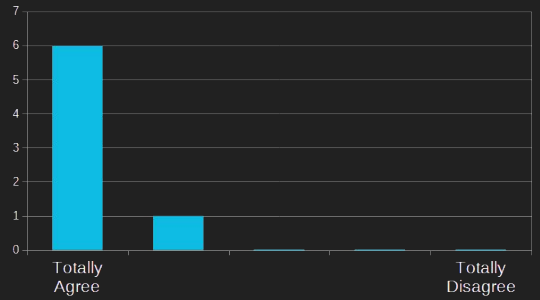
"Overall access to the pedal controls is manageable, without being entirely transparent to the pedalboard/manual."

Users did not report any particular difficulties when using the Modus. Overall, the feedback regarding handling and working with the tool is rather encouraging, despite some reservations regarding the management of the pedals. Note that it is not so much the control of the pedals themselves that represents a challenge, but rather the access to the combination mechanisms. This aspect will be improved in future versions of the Modus.

Perception of the effects

The electronics were perceptible

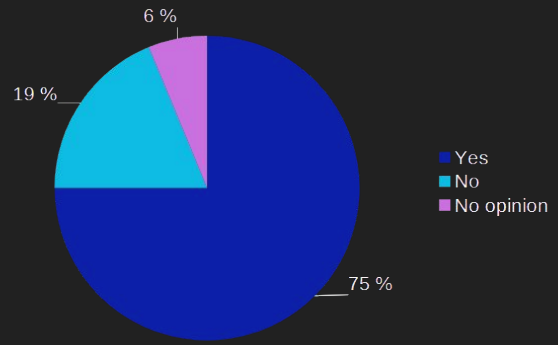
According to direct users:



"In the sound rendering, perfectly perceptible."

"Very perceptible even. The organist must know how to balance acoustic/electroacoustic sounds."

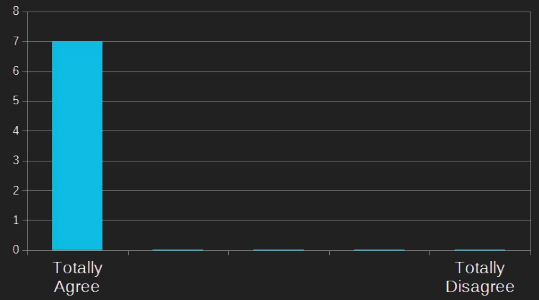
According to indirect users:



100 %

of the users considered that the suggested processors (effects) were **relevant**.

The quality of the resulting sound of the electronics was adequate



"The sound quality of the electronics seems to me to be very neat."

"I would even say more, it was perfect, without hiss or distortion."

Note

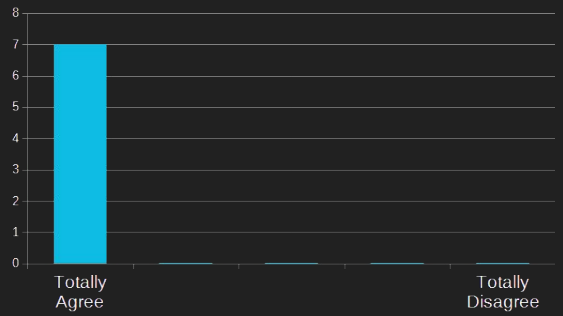
The question of the perceptibility of electronics initially aimed to evaluate the relevance of the digital processings implemented and to ensure that the Modus brought real enrichment to the organ, on the assumption that given the space (a highly reverberant church) and the possibilities already offered by the instrument, certain effects might not be very interesting. However, as some performers have pointed out, the goal is not necessarily always to be able to distinguish electronic sounds, but on the contrary, the desired effect may be a total fusion of sound sources.

Perceived relevance

To ensure that the Modus is not a one-off installation but can be deployed on other organs, it is important that both performers and the audience are in favor of the distribution of the product. The responses to the surveys are positive for both direct and indirect users.

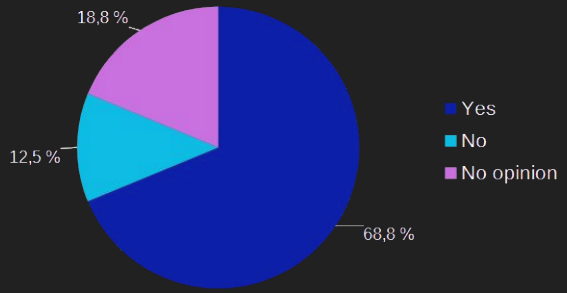
Adding digital transformations to a traditional organ is relevant

According to direct users:



"This is one of the areas of research for contemporary organ building (the others being, in particular, the key/pipe connection, sensitive touch and work on the wind). The advantage of the Modus is that it can be installed on all existing organs."

According to indirect users:



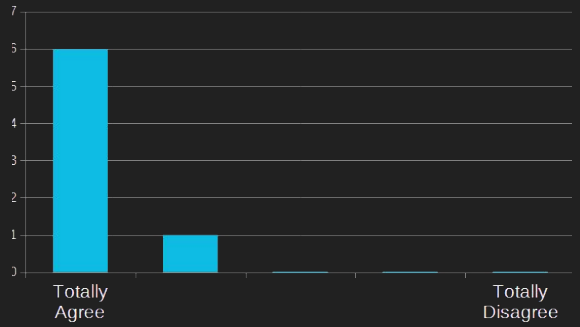
"Why not ! Yes, I am completely in favor of an improvement, a renovation, a modernization... It's always useful."

"Totally."

"Yes, I find that super interesting."

"Yes yes, you have to live with the times, a little bit."

It is relevant to propose the Modus for other organs.



"To be tried out as soon as possible."

"The Modus could be adapted to any instrument."

Evaluation of the experience

Both direct and indirect users enjoyed the adventure.

According to direct users, the experience with the Modus was...

100 %

of the direct users would like to continue working with the augmented organ.

"It was a great experience and really expanded my horizons as a composer and performer. I would love to work with it again."

"A very convincing and fun experience."

"Absolutely, it's the future of this instrument."

"The Modus opens up exciting fields of experimentation for improvisation and composition."

What the audience thinks

"I enjoyed it very much"

"A pleasant discovery"

"It's a pretty interesting experience"

"I'm in for a treat!"

Strengths and weaknesses

The surveys as well as the discussions with the performers during the project highlighted the strengths and limits of the Modus. The criticisms made of the Modus go hand in hand with the development proposals listed further on: the limits of possible digital processings, the learning time required and the discomfort caused by the processing pedals.

STRENGTHS

Easy recording of performances

"Fun"

Quick to get started

"A true breeding ground of potential energy and ideas. A great tool for improvisation."

Autonomy

"Easy to handle and use"

"The technical quality of the production is undeniable, at the best state-of-the-art level in computer music."

"Simplicity and efficiency"

"The quality and reliability of the software, perfectly thought out and produced"

Ergonomy

Available repertoire

WEAKNESSES

"To choose is to give up, therefore any system limits the infinite possibilities of augmentation."

The processing pedals complicate the access to combination mechanisms

"The sound is sometimes too "digital" and therefore aggressive as soon as you push the treble a little in the EQ."

"As with anything, a learning process is necessary."

A closed system: currently does not allow the use of external modules

Potential barriers to use

Cultural barriers	Sound processing little encountered in organ music in general	We need to promote the potential of digital sound transformations through cultural initiatives, discovery sessions and the sharing of concert recordings. At the same time, the repertoire needs to be enhanced and developed.
Psychological barriers	Apprehension about managing processing pedals	As with any instrument, a learning time is indeed necessary to get used to the gestures. However, experimentation in the context of this project has shown that the control of the pedals can be mastered very quickly.
	Use of a new IT tool	You don't need any special computer skills or experience with mixed music to work with the Modus. The best way to understand the Modus, as with any classical instrument, is to simply listen to the resulting sound.
	Concerns about the preservation of the instrument	The installation of the Modus is carried out with strict respect for the organ, either in its mobile version which does not involve any alteration of the organ, or integrated into the console while respecting the historical structure of the instrument. Naturally, the Modus in no way prevents classic use of the instrument.
Technical barriers	Possibility of installation limited by the layout of the organ	The layout and location of the organ could notably limit the possibility of adding a row of processing pedals. It will then be necessary to think about alternative control interfaces or adapt those that exist, for example by reducing the number of pedals or by settling for management by the touch screen.

Perspectives

Development suggestions

As part of the survey, users suggested some ideas for developing the Modus. These propositions mainly concerned the addition of new sound processings, and some hardware adjustments.

Effects

*"**Open up as many processing possibilities as possible** (e.g. time stretch, microtones, etc.)."*

*"Work on an **extensive gallery of effects**."*

*"**Add a "LOFI" effect** to alter the "aggressive treble" effect, a flanger would be welcome, as well as an LFO-type modulation assignable to tune and filter, as desired, which would allow slightly more varied processing than a vibrato."*

Hardware

*"Propose a **version that can be adapted to all types of organs**."*

*"Consider **other types of controllers** than continuous potentiometers on pedals: selectors, manual potentiometers, new interfaces."*

*"**Increasing the size/number of loudspeakers** for the electronic elements would make the experience even better for the audience."*

The addition of new digital processings is indeed one of the next steps. This will open up even more possibilities and enable us to adapt even more works from the repertoire for the Modus.

As for the hardware proposals, these are also well integrated into our longer-term plans.

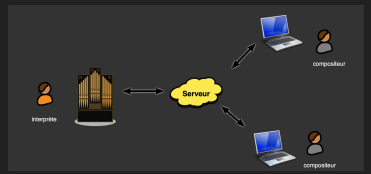
Perspectives

The next steps

Integrated version

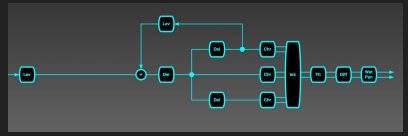
A fully integrated version of the Modus will be permanently installed at the Saint-Orens church in Auch in 2024. It will be produced in collaboration with the organbuilder Jean Daldosso. The components will be built directly into the new console. The Saint-Orens organ will thus be the first organ permanently augmented with digital processing.

Exchange server



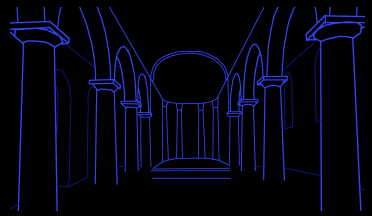
We are currently developing a server that will enable users to easily share their configurations between different Moduses or Sampos, as well as share or download audio recordings of their performances.

More effects



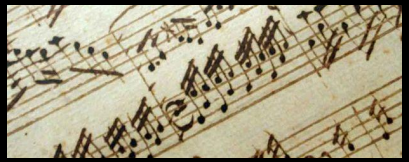
To offer a greater diversity of audio processings, we are working on a modular version of the software which results in the possibility of exchanging the algorithm used and therefore the types of available processors and effects.

Spatialization



By default, the processed sound is stereophonic, the initial idea being to bring the acoustic and electronic sound sources as close together as possible. However, a spatialized installation could also be achieved by adding speakers in the room to create effects of movement of sound masses.

Repertoire



In order to promote the use of Modus, we are working on the development of the musical repertoire. This includes original works, arrangements and transcriptions. In addition to the repertoire of works, we will be producing tutorials and resources to make it easier to get started with the Modus.

Adjustable pedalboard

In the future, the aim is to build a structure adjustable in height and inclination, which would adapt more easily to the pedal configuration of each organ and thus be more generic.

Tests on other organs

It seems essential to us to continue experimenting with the Modus on different organs in order to validate the concept more generally and to seek solutions that can be adapted as simply as possible to different hardware configurations.

New uses

The use of the Modus is not intended to be limited to contemporary music concerts. The aim is for the augmented organ to be used in a variety of contexts: interdisciplinary performances, installations, pedagogy, contemporary masses...

Thanks to the performers who threw themselves in the adventure

MODUS

Jean-Christophe Revel

Joris Verdin

Michel Bourcier

Ansel Gross

Christophe d'Alessandro

Christophe Bouhier

Luke Madams

www.alterinstruments.com