The Pipe Organ as a Site for Musical and Technological Innovation

City, University of London
Friday 6\textsuperscript{th} September 2024
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Organs in ‘The Light Ages’

Two of the liberal arts in the quadrivium of mathematical sciences were geometry and music, and joiners (fine carpenters) were well-paid workers. These joined forces to produce organs from classical times onwards.

Revisionist thinking about medieval technology since the work of Jean Gimpel has recently been amplified by a fascinating book about medieval astronomy by Seb Falk, published 2020. We have ‘borrowed’ its title for our proposed lecture, which is intended to be a summary study of what we now know about the advanced technology of British (and therefore NW-European) organs during the two hundred and fifty years before Reformation changes brought the English Latin church to an end in 1549, destroying practically all its musical documents and ushering in a 250-year era of cultural darkness.

Although much about the organs themselves inevitably remains unclear, our ground-breaking, detailed research over the past 12 years into the widely-surviving infrastructure of musical activity in over 900 English and Welsh (and some Breton) medieval churches has allowed us to discover where their organs were placed and therefore how they were used and who played them, as well as giving us strong indications of their sizes and the likely development of their technical characteristics, the proposed subject of our paper. In particular, it has made it possible to interpret documents relating to organs and related artefacts with much more clarity and precision than previously. The richness and wide extent of organ culture within the outstanding musical culture of the Latin rites and offices as practised in England and Wales is now much clearer. Our mix of music, archaeology and liturgy as well as a profound knowledge of organ design has allowed us to flesh out and test the various hypotheses which have arisen from our work.

Martin Renshaw
A professional singer since the age of nine, organ maker officially since 1967, Oxford graduate in English studies and writer, organ player and activist, and founder-trustee of Pipe Up for Pipe Organs, a charity set up in 2022 to champion organs against agents of destruction. Martin lives in France, with French citizenship, and in London and southern Tuscany, and has worked in nine European countries.

Dr Victoria Harding
A choir director and organist at the age of eleven, world-renowned physiotherapist and researcher/founder of the world’s first centre for the treatment of serious chronic pain at St Thomas’s Hospital, London. Victoria now champions trees and the environment in NW London, where she lives, as well as in southern Tuscany.

Our web-site, [www.soundsmedieval.org.uk](http://www.soundsmedieval.org.uk), contains a number of lectures, articles and other material, mostly drawn directly from our research. Our researches were supported for three years by the London Society of Antiquaries. Some results of it were published in a short book five years ago, now in its second edition; this is now being vastly amplified by two further substantial books in progress.
Bigger isn't Always Better—Pitting Innovation against Financial Constraint in Construction of New Pipe Organs

For centuries, organ builders and organists together have been seeking to build the ideal pipe organ. How now, competing with the immersive world of video games and online entertainment, will we keep future generations interested in the instrument? This paper does not seek to present a solution to the perfect organ; instead, it explores the variety of electronic innovation and the versatility of newer modern technology, combined with the organist's desire to fit as many ranks in a space as possible, while recognising the financial constraints upon new instruments. Additionally, it seeks to build upon historical innovations to propose unique ways to fill an organ chamber with an enthralling, accessible, and musically versatile instrument. Within the presentation shall be explored: the flexibility of small 20th century instruments by Arthur Harrison, the benefits and limitations of extension instruments such as those built by John Compton, the lessons the traditional pipe organ industry can learn from the world of theatre organs, and the space for innovation with 21st century technology. Most importantly, a compromise shall be sought between quality of construction and tone palette versus the excitement of unusual features and stops, noting the apparent mistakes of organ builders of the last century and aiming to set new instruments apart in a way that will ensure they stay relevant in this modern and fast-changing world.

Cassian Southwick

Cassian (they/them) is an organ technician and musician living and working in County Durham. They took two years as a cathedral organ scholar before joining Harrison & Harrison in 2022, and have been an organist for nearly 14 years. During this time, Cassian has gained a great passion for the instrument, as well as a broad knowledge of both modern organs and their historical counterparts. Working at H&H, they were exposed to a constant cycle of innovation and development. Cassian specialises in electrics and organ management systems, and hopes to use their experience as both an organist and orchestral musician to bring innovation to the field. In late May 2024, they joined Viscount Classical Organs as an organ engineer.
The notion of adding leather to the upper lip of an organ pipe is of unclear provenance, although it appears to date from the late nineteenth century. Within fifteen years it had spread to at least four organ building firms in the UK, as well as passing to the US, where it took on a rather different form. The fact that this technique was able to proliferate so quickly shows the degree of connection between organ builders in the early twentieth century, and their positive attitude towards innovation. Through the example of the firm of Harrison & Harrison in particular, it is possible to piece together the rationale for its use, adoption, and development. It is a story of pragmatism over ideology, with initial scepticism broken down into wholehearted endorsement. The technique began to drop out of fashion in the 1930s, and by the post-war period it was castigated by many in Britain as the next round of innovation began to sweep through the organ world.

Owen Woods

Owen is a PhD student in Organology at Northumbria University. He completed his Masters in Engineering at the University of Cambridge in 2012 and joined the organ building firm of Harrison & Harrison Ltd in 2015. He is now their Projects Manager, responsible for the management of their organ building work. Owen is a Trustee of the Galpin Society for the study of Musical Instruments and sits on the British Institute of Organ Studies Committee for the Listing of Historic Organs. He was awarded Chartered Engineer status in 2019 and the Terence Pamplin Award for Organology in 2023. His current research is on the tonal history of Harrison & Harrison organs. In a previous life, Owen recorded two critically acclaimed albums of traditional music.
Volumes of Air, from the Organ to the Orphéal to the Ocléal: Georges Cloetens’ Early-20th-Century Search to Collapse Space

If outside the organ world the experimental Brussels organ builder Georges Cloetens (1871–1949) is known today, then it tends to be as a footnote to the composer Maurice Ravel (1875–1937), who used a ‘luthéal’ grand piano by Cloetens in two compositions in the 1920s. The luthéal device (1919–23) is a mechanical attachment of four organ-like stops that bring different materials into contact with vibrating strings to modify their tone. More than a search for new sound colours, in his work Cloetens was investigating timbral boundaries and volumetric parameters, as evidenced by two earlier instruments exploring pipe resonance, his orphéal (1908–12), and ocléal (1921). Having previously explored alternate tunings of stops and simplifications to tracker actions, these mark a transition in his career from organ building and voicing to instrument invention.

“My success is due to my loyalty to the old mechanical organ,” Cloetens declared. In this paper I explore how the orphéal and ocléal are part of a compositional search to achieve more with less that both emerges and moves away from the organ: from architectural to portable. For organ builders, size and spatial acoustics are fundamental design considerations; inspired by the newfound principle of simultaneous signal transmission in wireless telegraphy, with his orphéal Cloetens sought to reduce the circuitry required for hundreds of pipes to just one—polyphonic—resonator, using a series of beating reeds. Where this keyboard instrument with its six-octave compass was described by a listener as “an orchestra in miniature” for the 15 timbres it was said to conjure (from strings to woodwind and brass), the ocléal was smaller still. “So compact that it could easily be carried under the arm,” “a glass case the size of a cigar box” yet containing the sub-bass frequency of the lowest 32ft C0 Cathedral pipe.

Elisabeth Salverda

Elisabeth is a doctoral researcher at LUCA Lemmens | KU Leuven, and member of the Music, Thought and Technology cluster at the Orpheus Institute in Ghent. Her PhD in the arts investigates the sound world, acoustic experimentation and timbral devices of organ builder and instrument inventor Georges (Josse) Cloetens (1871–1949) at the Musical Instruments Museum in Brussels, in tandem with her own experiments in sound and musical instrument making in the present-day. Her composition ‘Unmeasured prelude I, for organ and phantom hydraulics’ (2019) makes audible the original powering system of the 1877 Henry Willis & Sons organ at the Union Chapel (restored 2013). Publications include (as co-author): ‘Restoration and Reinvention. Reviving the Piano-viole’, *Galpin Society Journal* 72 (2019).
Over the last two decades substantial progress has been made in ensuring that there is a usable interface between users and IT systems. There are two elements. The User Experience (UX) is about the overall impression created by the application. User Interface Design (UI) looks at the individual elements that support the interaction. In terms of organ design, the user experience might include the ability to adjust the height of the organ bench and to have good quality lighting. The UI would consider the layout and design of the stop jambs and the ease of setting up combination pistons and sequencers.

More recently the specific requirements of neurodiverse users are now being taken into account. These include dyslexia (e.g. the readability of drawstops and tabs) and colour blindness. In the case of colour blindness using red labels for reed stops and green for couplers is unhelpful to the 10% of males with colour blindness.

With the development of sequencers, iPads for music desks and applications such as Hauptwerk where the setup and control is through a computer screen, organs are rapidly moving towards being computer applications.

As organs develop in terms of novel sound reproduction systems and the integration with applications such as synthesisers the interface design needs to be taken into account at the outset of the design or redesign of an organ. In parallel composers will wish to take these facilities into account. The outcomes could be that brilliant musicians may find that they are being excluded from benefiting from these developments because they cannot cope with the user interfaces.

The aim of this paper is to raise the importance of the design of player/instrument interfaces which to date have not been included in established guidelines for consoles.

**Martin White**

Martin is a peripatetic organist and a consultant information scientist. He has been involved in user experience and user interface design projects for over thirty years. He has a particular interest in the impact of neurodiversity on the usability of computer applications and looks at organ console design from both neuroscience and information science perspectives. He has been a Visiting Professor at the Information School, University of Sheffield, since 2002. In 2023 he played over 20 different organs, all of them with at least somewhat idiosyncratic console layouts.
Rethinking the Organ from the Ground Up: Hyperorgans

Asked why one—for goodness’ sake—would buy a pipe organ, the CEOs of the organ building companies Rieger, Klais, Grenzing, and Fisk remained silent for a while: then they confessed to never having considered that question seriously. That was two years ago, when I interviewed them for the International Online Organ Festival. It astounded me that the situation in the organ market didn’t worry them as much as it ever more does me. In my perspective, ever more churches are closing, and concert halls just don’t have the time to programme organ music. Also, loudspeaker organ manufacturers compete aggressively with pipe organ makers: it is truly worrying how fast the number of the latter is decreasing lately.

And there’s more. For example: that organ art keeps moving into the direction of smooth and fast sounding organs, with sound concepts designed to meet the demands of many styles, is that a good thing? I know I prefer historic organs, with their lively, easy sound, perfect for the style of musicking their makers lived with. Secondly: in my experience, people that were forced to listen to the suboptimal organ music on ditto organs in their childhoods in churches have serious trouble enjoying organ music, even if it is created by gifted musickers, playing the best organs in the world. I actually understand them, given that most organs in churches are not at all that convincing, and given the fact that most organists aren’t aware of what their instruments are capable of—due to lack of education. Thirdly: how supportive is the online to organ art? I am an audiophile, and I adore the audio set I have at home; but exactly that taught me that loudspeakers are reductive devices, not at all capable of transporting the complex sounds of organs, most certainly not in larger rooms.

Yet there might be a solution, as the linking pin between all these developments is neglect of the sounds that organs afford musicians to create. As paradoxical as it may appear: most organists and organ builders apply a paradigm that says that organs should be perfect. They need to speak fast, each stop should provide the same timbre in all its pipes, they have to be able to evoke shock and awe (be really loud), and to whisper (be really soft). As said, loudspeaker-instruments (synthesisers, Hauptwerk-rigs) fail at doing that in large spaces, so I won’t condemn the Asian concert hall organ type. But there is so much more possible. We just have to shift paradigms.

One way to do that is developing the hyperorgan. The inspiration to try it at all was straightforward and simple enough: we love the sounds of historical organs, so diverse, so multi-faceted, so imperfect, so human, so not machine-like. Having learned, in Gothenburg, that it is possible to create new organs with convincing uncompromised historic sound concept, our question was: could such sound concept perhaps be opened up, be made available beyond the realms of churches and concert halls? Add new bubbles to the traditional organ bubbles? Perhaps even interconnect them?

My keynote addresses the way this answer has been constructed, reconstructed, adjusted, and rethought over the past fifteen years, as that has been the lifespan of the hyperorgan so far. Hyperorgans are innovative, to be sure, in a radical and disruptive way: they show that organs actually are dynamic by heart, much more than churches and concert halls allow them to be, often beyond the comfort zone of traditional organists. By doing so, they already prove that organ musicking cultures can be significantly more inclusive, more diverse, more pluriform.

Hans Fidom

Hans holds the Chair of Organ Studies at the Vrije Universiteit Amsterdam. He also leads the research program at the Amsterdam Orgelpark, a venue dedicated to integrate the organ into the realms of anyone loving music. In line with these functions, he is the initiator and organiser of, among many other things, the annual International Orgelpark Symposium, the artistic research week for organ musickers, Organ in Situ, the e-book series Orgelpark Research Reports, containing music where words fail and available for free online. Hans is internationally active as an organ expert, a lecturer, a thinker, an organist, a writer; he integrates in his activities the fields of music and those of sound studies, science and technology studies, heritage studies, philosophy. Hans lives in the Northern part of the Netherlands, on the countryside near the Waddensea, and is organist in a few of the many medieval churches that populate those magnificent shores, being each one equipped with a fascinating historical organ. In his free time, Hans Fidom loves to spend time maintaining his Mercedes youngtimers, which, just as historic organs, deserve to be used as daily drivers.
Translating Our Souls into Music—smARTvalve

In the search of translating our souls into music we seek tools to do so. The biggest tool of them all being a pipe organ has many advantages but has one big disadvantage, it’s a binary system. A pipe’s valve can only open or close, resulting in a mechanical sound, unlike our souls.

After years and years of development, Tony Decap, who’s family have been building dance organs for over 120 years, has found a way of controlling the air for each pipe individually. They call it ‘smARTvalves’ which is capable of adjusting the valve position to any degree between fully open and closed, with sensors measuring air pressure inside the pipes thousand times per second, corrections are made seamlessly at the same speed. The air supplied to the organ is pressurised threefold, ensuring a buffer. Users simply select their desired air pressure, and the smARTvalves take care of the rest—whether it’s 90mm, 120mm, or 300mm air pressure. Each note now possesses its own expression, attack, pressure, vibrato, and so on.

Essentially, every pipe becomes a sort of sound generator, like a synthesiser. Integration with MIDI technology allows compatibility with a wide array of MIDI controllers, whether it be an organ console, keyboard, wind controller, or simply a computer equipped with a DAW for composing and playing music.

The collaboration between Decap’s expertise in dance organs and Yves Rechtsteiner’s mastery of church organs has led to the creation of a groundbreaking innovation—a portable church organ named ‘L’explorateur’ boasting 800+ pipes across 12 different stops, each equipped with its own smARTvalve. We are now talking about a ‘windthesiser’.

With the introduction of smARTvalves, everything changes. Every note now possesses its own soul, breathing life into organ music like never before.
Developing Live-Interactive Approaches to new Music for Organ and Electronics through Collaboration

In this presentation, I consider the collaborative and co-creative development of new music for organ and live, interactive electronics, reflecting on over 10 years of work in this area. I argue for a shift of focus from mechanical/technological and sonic approaches to this music towards the role of the organist as an autonomous performing musician in the collaborative development of new work. To do so, I address the roles and limitations of technologies in organ performance, taking an embodied approach to understanding and critiquing the work of the organist in the context of my collaboration with Alistair Zaldua (live electronics). I consider composition and performing practical solutions to the heterogeneity of the organ, addressing this heterogeneity as an affordance rather than a problem to be solved. Examples will be drawn from the range of repertoire Zaldua and I worked on as part of our 2023 residency at Festival Registri with the unique 1745 Nacchini Organ in the chapel at San Servolo in Venice, including the Swiss composer Annette Schmucki’s piece 54 stops, grésillement, alphabet des rauschens (2020). By examining the collaborative development of live-interactive approaches in this context, I show what this hybrid practice offers for the realisation of this music, what it means for the consideration of the performing experience of the organist, and what recommendations can be made for the organ as a focus for contemporary compositional innovation.

Lauren Redhead

Lauren is a composer, organist, and a musicologist who writes about contemporary music. She is also interested in the ways that these things relate to each other. Her background as a composer is in contemporary chamber music, although now she works across acoustic, electronic, and studio-based contexts. She is interested in notation and materiality, and uses a combination of experimental approaches in the creation of scores and electronic materials, alongside improvisation. This often means that she takes on the role of the composer-as-performer, including working with others so that many of her pieces are devised and created collaboratively. The often graphic- and text-based approaches to notation that she has developed have further been presented in art galleries and as video work. In her work for organ and electronics, with Alistair Zaldua, she works on developing live-interactive approaches to performance for organ and electronics through collaboration with other composers. Her work in these contexts has been presented at many international contemporary festivals including HCMF, NyMusikk/Only Connect, Tectonics, Gaudeamus Muziekweek, TRANSIT, the London Ear Festival, London Contemporary Music Festival, Firenze Suona Contemporanea, Prague Quadrennial, Full of Noises Festival, the New York City Electroacoustic Music Festival, and on BBCR3, DLF Kultur, and NRK2.
Contemporary Perspectives on the Hyperorgan: Designing, Playing, and Writing for an Augmented Casavant Frères Pipe Organ

This presentation gives a brief insight into my master’s thesis research-creation project at l’Université de Montréal, in which I examine the unique problem space of pipe-organ augmentation. As part of this project, I have developed a synthesis server in python, called OrganLab, which serves to emulate and mutate pipe-organ based sounds and is placed in dialogue with the acoustic instrument. The pipe organ can be considered the original synthesiser, and I extend this rich tradition with additive, subtractive, and FM synthesis, allowing me to access effects not possible with the original instrument, like interpolation between stops, glissandi, and inharmonic sounds. Since each partial is independently controlled, the harmonic spectrum can be exploded, contracted, and distorted, creating a rich palette of new timbral possibilities. These innovations are put into practice with the piece Élégies, written for my hyper-organ interface at l’église Saint-Édouard, where I’ve been organist since July of 2022. Based on the 10 Duino Élégies of Maria-Rainer Rilke, the piece incorporates the aural iconography of the space, making use of the sounds of bells, the fire alarm of the church, and the sounds of footsteps through its many corridors. This symbolic and spatial exploration mimics the aural exploration that seeks to navigate the continuum of acoustic and simulated—the sacred and the profane.

Kjel Sidloski

Kjel is a composer and multi-instrumentalist from Saskatchewan, currently living in Montréal. As an artist, he adores to construct and inhabit emotional sound spaces, from micro to macroscopic structures; intimately close to distant rumblings; quietude to profoundly sonorous. He is fascinated by the fragility of the transmission and reception of information; both lost fidelity and the incommunicable, as well as the juxtaposition of private and shared experience, and the play between the synthetic and organic sound worlds. In the fall of 2022, he embarked on a master’s in composition at l’Université de Montréal where he is exploring the pipe organ from a modern perspective, developing a hyper-instrument interface for the organ of l’église Saint-Édouard, where he’s been organist since July of 2022.
Les Ombres du Fâtome: Improvisation, Recording, Production in Artistic Research

This paper examines aspects of a set of 14 organ improvisations (Robert Sholl, subsequently co-created with Justin Paterson) with Anna McCreedy (soprano) and Andy Visser (Saxophone/Bass clarinet) released on by Divine Art (April 2024). These improvisations form a meta-narrative of Gaston Leroux’s novel Le Fantôme de l’Opéra (1910) entitled Les ombres du Fantôme, implying shadows of ideas/themes/characters in the book. They were recorded by Justin Paterson and Mike Exarchos (aka ‘Stereo Mike’) using the organs of Arundel and Coventry Cathedrals in May and July 2021.

The project was animated by various questions concerning the search for a new language, the properties and acoustic behaviours of the organ, and the engagement between the instrument and its ecclesiastical space. Intrinsic to the project was the relationship between this ecosystem and electronic augmentation that expands natural perspectives and possibilities, which creates a meta-modernist extension of the organ’s abilities to realise the mystical and gnostic. This post-production augmentation conjures the idea of the idea of ‘the double’, and the layering of the textures enables the possibilities of redoublings—and of future sonic outcomes from the materials.

In this presentation Robert Sholl and Justin Paterson will detail insights from the improvisation and production process. Robert will discuss the place of the organ in this digital economy, spectralism and the origins of his musical language, and the use of previous organ literature. Justin Paterson (electronics, producer, co-composer) will describe how the production aesthetic was conceived and then realised by digital-audio-manipulation tools and advanced techniques taking extended Gouldian acoustic-choreography recordings, and then reimagining with computer automation, convolution processing, formant manipulation, time-stretching, and creative editing—culminating in a recomposition of the originals.

Robert Sholl
Robert teaches at The Royal Academy of Music and the University of West London. His has written extensively on twentieth-century music, including Messiaen Studies, and James MacMillan Studies, ed. with George Parsons (both Cambridge University Press, 2007 and 2021), Contemporary Music and Spirituality ed. with Sander van Maas (Routledge, 2017), and The Feldenkrais Method in Creative Practice (Bloomsbury, 2021), and on musical improvisation to film (published in Princeton’s journal Perspectives of New Music); he is the editor of Olivier Messiaen in Context (Cambridge University Press, 2023), and author of a new biography of Messiaen (Reaktion, 2024). Robert studied in Melbourne, then in Paris (with Olivier Latry, and at the Sorbonne, Paris IV), and finally in London (at King’s College). In 2016-17 he played all of Messiaen’s organ works at Arundel Cathedral, and he has given recitals at the St John’s Smith Square, St Paul’s Cathedral, Westminster Abbey, and twice at the Madeleine and at Notre-Dame de Paris.

Justin Paterson
Justin is Professor of Music Production at London College of Music, University of West London (UWL). His research has ranged from transient enhancement in multi-mic recordings through various papers on the musicology of record production, to two AHRC-funded projects developing interactive music playback with Warner Music Group. As part of the ‘HAPPIE’ consortium, he led the UWL team on a £1m Innovate-UK-funded project—to develop a novel music-production interface in mixed reality with tactile force-feedback.

Commercial research bid partners have included: BBC, Abbey Road Studios, Ninja Tune, Sony Interactive Entertainment, MelodyVR, Science Museum, Skywalker Sound, Ecco VR, 1.618 Digital, Blue Studios, Swedish Museum of Performing Arts. Justin is co-chair of the Innovation in Music conference series – and with Routledge – is co-editor of both its associated books, and also the book 3D Audio. He is a consultant to RT Sixty Ltd for the apps iDrumTune and Drummer ITP.