During the fall of 2015, composer Kaija Saariaho took up residence as Bloch Professor in the Department of Music at the University of California, Berkeley (UCB). In addition to conducting master classes and private lessons with student composers, she participated in appearances at UCB’s Center for New Music and Audio Technologies (CNMAT) and at the Doreen B. Townsend Center for the Humanities. Her music was performed by the UCB Symphony Orchestra and the Eco Ensemble, both with David Milnes; the Berkeley Symphony, conducted by Joana Carneiro; the San Francisco Contemporary Music Players; and the Left Coast Chamber Ensemble. Saariaho gave public Bloch Lectures, featuring conversations with distinguished collaborators. Cellist, long-time collaborator, and concurrent Regent’s Lecturer Anssi Karttunen appeared as soloist in the Cal Performances Saariaho portrait concert. Camilla Hoitenga, Jennifer Koh, and Susanna Malkki appeared on stage with Saariaho for lectures and live performances.

One of the concerts and lectures presented during Saariaho’s residency was with long-time collaborator Jean-Baptiste Barrière, the Parisian composer and visual artist. Barrière worked from 1981 to 1997 at Institut de Recherche et de Coordination Acoustique/Musique (IRCAM), successively as director of Musical Research, Pedagogy, and Production. Barrière held the first David Wessel Residency in Music and Science at CNMAT in the fall of 2015. He performed a multimedia concert at UCB’s Hertz Hall on 28 October of that year, where his historical electronic piece Chrétode was played. Also performed were Violance, for flutes and electronics, performed by Camilla Hoitenga, and Ekstasis, for soprano and electronics, based on two texts by Simone Weil and Louise Michel and sung by soprano Raphaëlle Kennedy.

On 1 December 2015 I interviewed Saariaho and Barrière (see Figure 1) at CNMAT in Berkeley. Saariaho had just completed her Bloch Residency and Barrière had just ended his David Wessel Music and Science Fellow Residency. The interview has been extensively edited by Danielle DeGruttola in close consultation with the interviewees.

Recent Saariaho Projects and Real-Time Processing

Edmund Campion: What’s going on recently in your lives, musically speaking?
Kaija Saariaho: Today I had a long meeting on Skype with Christophe Lebreton, who works at the studio of the GRAME center, in Lyon, and is collaborating with me on my latest opera, Only the Sound Remains, in which I am using real-time transformations of human voice, and live electronics in general, different from those used in my previous works with electronics. We are, in particular, developing two kinds of real-time treatments for one of the two soloists in the opera, who represent two supernatural characters: a ghost and an angel.

This is a commission from the Amsterdam National Opera with the Finnish National Opera, the Teatro Real opera house in Madrid, the Toronto Opera, and the Paris Opera. [Interviewer’s note: The premiere took place 15 March 2016.] It is based on two classic Noh plays, first translated into English by Ernest Fenollosa and then adapted by Ezra Pound, whose language I admire greatly. The
stage director is Peter Sellars. There are only seven instrumentalists, two vocal soloists, and a choir or vocal ensemble of four voices. It is not a large score, but the electronic part is important. I imagine it being performed in rather large spaces, allowing the processing to be spatialized widely around the audience.

Campion: How many pieces have you done with voice and processing in this way?

Saariaho: In the past, I had not done much in terms of complex real-time processing. Rather, I created lots of material with recorded voices, mostly for pieces in which voice processing was realized with different kinds of filtering: phase-vocoder, models of resonance, etc. I really like the voice and want it to be prominent and not blurred with effects. Sound quality in electronics is extremely important for me, and for a long time it was not attainable with real-time technology. So when I worked with the voice, I prepared processed treatments in sound files to be triggered at given cues in the score, and I mixed these together with amplification and live electronics, mostly consisting of reverberation. In this way, I could achieve a satisfying blend between instrumental qualities and electronics possibilities.

Now real-time sound quality has finally improved greatly, so this time there is only real-time processing. I started this kind of work with my third opera, Émilie, a monodrama for soprano and orchestra based on the life and work of Emilie du Châtelet,
one of the first important woman scientists of the 18th century. During the opera, set during the last night of her life, she is remembering and thinking about various persons who have been important in her life. I wanted her voice to change, in real time, into a child's and into several men's voices when she was quoting these characters. That is how I started this work with Christophe. It is about finding the intimate characteristics of a person's voice, older or younger, and all the acoustic parameters that define a specific voice timbre and quality. *Only the Sound Remains* further develops these ideas started in *Émilie* in a much more abstract way.

**Campion:** Is the use of real time an extension of how you conceived of doing electronics all along, or is it a huge shift in your approach?

**Saariaho:** The aspects I am addressing more recently with electronics, like when we collaborated with Jean-Baptiste for *Frises*, mostly deal with the fact that the technologies are finally now capable of meeting the quality I want to achieve, especially in interaction with the voices and instruments live on stage.

**Campion:** Are the electronics a kind of scenographic aspect of your music, or is it integral, more essential to your sound world?

**Saariaho:** Until *Émilie* or this new opera, the electronics were mostly an extension of the orchestration, even if they could have an autonomy, like in *Lonh* for soprano or *Jardin Secret II* for harpsichord. I was essentially using processing as a kind of orchestration and a way to blend the voice or the instrument with the electronics. More recently, the processing sometimes has to do with the dramaturgy of the piece, not only extending the voice or the instrument, but in its own way contributing to the narration, which of course makes special sense in an operatic context.

I've been working with technology for a long time. I started doing so during my studies in Helsinki, going to the studio to amplify sounds and adding reverberation to them, because I could not stand the lousy concert spaces where my music was then being played. Later, I used tape recorders and other analog devices, and later still, digital electronics and computers.

**Campion:** What were you trying to achieve?

**Saariaho:** I just wanted my music to sound as I imagined it. That is how at some point it became an important aim for me to get to IRCAM so that I could understand more about sound itself through acoustics and psychoacoustics, and develop the knowledge to achieve what I imagined.

I took my first course at IRCAM in 1982. I started using the program Chant, which allowed me to control the physical and acoustical parameters for creating sound, whereas in other programs you were working principally with oscillators, filters, and envelopes. I learned about sound properties and how they are perceived, how to hear sounds, and what to do to build the sound I wanted. I understood the importance of designing coherent variations of all parameters with Chant to obtain a living, organic sound. Which, in turn, also gave me ideas for my orchestration.

**Saariaho and Barrière at IRCAM**

**Campion:** In 1982, is that when you met Jean-Baptiste?

**Saariaho:** Yes, he was my teacher at IRCAM. We got married in 1984, and have been married for over thirty years.

**Campion:** You mentioned the program Chant, which is deeply connected to Jean-Baptiste. It would be a good time to hear from him about it.

Jean-Baptiste Barrière: Kaïja, as she explained, was first “orchestrating through amplification,” using microphones like microscopes, observing and revealing modes of playing, timbres that could not be heard in purely acoustical music. Amplifying these sonic worlds actually provided a natural bridge to her work with computers, which started by detailed analysis of vocal and instrumental sounds with spectral analysis (e.g., with Iana, a program implementing Ernst Terhardt's algorithms for determining the perceptual weights of spectral components for complex sounds), and compositional manipulations (with Formes and Esquisse) of the analysis data to control filtering, synthesis, and processing with Chant.

**Campion:** The issue of space also comes into my mind . . . resonance and space.
Saariaho: I was interested in space since the beginning when working on amplification, because it helps to create dimensions. Later, I was interested in making something much more organized with space: I imagined, for instance, gestures like a trill in space. At the end of the 1980s and in the 1990s, some people were doing elaborated work with space. Elaborated on paper but not at all audible. My aim is always to have audible results in all my compositional work. I realized by experimenting that it is difficult to get much detail in space, at least with current speaker technology. We do not seem to have enough perceptual sensitivity to realize more than if something is moving or located at different points in space. But space is central to the perception and life of a global sound image, to differentiate and articulate its various elements. Since the 1990s I have been using IRCAM’s Spat library in nearly all my electronics.

Barrière: When Kaija started to use the computer in 1982, she was extending her idea of orchestration by analyzing and processing sound, making synthesis expand her sonic universe even further and unfolding all of this in space with spatialization techniques. But she was also interested in organizing these new territories; for instance, making scales between pure and noisy sounds to classify sonic materials. To do so, she wanted to find ways of dealing with perception and cognitive constraints. Meeting with researchers David Wessel and Stephen McAdams at IRCAM was crucial for her, because they brought her state-of-the-art knowledge about psychoacoustics and music cognition.

Saariaho: At that time, many people were involved with algorithmic composition—at IRCAM, Stanford, San Diego, and many other places. Once we could build and control sound with computers, the question immediately raised itself about how to organize sound and also, for me, about how it was perceived. Such questions were, of course, also raised in the context of postserialism—or rather, when listening to some serial works.

Barrière: It was about adding perception to the traditional dichotomy between sound and organization. An interest for algorithms came from the fact that it was so cumbersome to manually specify all the small variations of parameters needed to make a sound interesting, so ways were needed to automatically generate such kinds of variations. Hence the importance of the reference to traditional musical models: the voice, in the case of Chant, and instruments, with physical modeling in Modalys. Voice and traditional instruments indeed embody a knowledge sedimented through centuries of practice and a form of cultural selection. This knowledge is helpful to design and control sound production with rules, providing in turn meaningful strategies both for composition and for perception and cognition. It was also part of a dream, at the time, to directly connect sound control with compositional concepts. But this approach requires hard work, and even today, despite all the progress, there are apparently few people working in that direction.

Limits of Technology and Music

Campion: The use of samples is still as pervasive—mainly, I would say, because there is a richness that is immediately available.

Barrière: You are absolutely right. This is the reason that one of the things I insist upon for young composers is the—still relevant—importance of this sound synthesis utopia, what sound synthesis was opening, and is still opening: the promises of new territories, this initial utopia of building your own sound, which was paired with using the computer as an assistant to composition, a duplicate of yourself with which you can interact in an intelligent way. These two dreams of the beginnings of computer music are still vivid, left open. But few people seem to be truly trying—even being interested in trying—to build their own sound or their own compositional environment.

It is a paradox of the current state of computer music that has invaded all of the aspects of music production. Everyone is using notation programs and all sorts of computer tools for making music, but the utopias have given way to productivist attitudes, where you do not have time to conduct research to build your own musical universe. Many people today are not interested in listening carefully
to the sound they produce, they just want to get an immediate, endless flow of sound.

Campion: I am thinking of the old story where Iannis Xenakis pointed at the loudspeakers and said something like: “Those things are the problem!”

Barrière: Much more research is needed to develop speakers that will radiate sound with the same richness as acoustic instruments. The new territories opened by computer music can be conceived most efficiently as an extension of the traditional acoustical world, and they embrace all of the aspects of sound, from production to diffusion. This is another reason why research on synthesis, especially through physical modeling—where the unfolding of sound in space is part of an instrument definition—must be encouraged. To take up the challenge of the utopia of synthesis, and to be able to control and build your own sound—specific yet nevertheless as complex and as rich as voice and instruments—requires a great deal of effort, knowledge, and craftsmanship.

Campion: Is this still your dream in practice?

Barrière: It is my dream, but to some extent it should even be part of a musician’s curriculum. Learning how to design your own sound, as a composer, should be part of musical education, like learning an instrument. It is a way to learn what is sound, what makes a violin or a voice interesting, a constructive way to get to know sound, the first step of musicianship.

Saariaho: We spoke about the beginning of the 1980s, so I have all these vivid memories of computer music conferences, with all sorts of interesting research projects, and people bringing their pieces, often algorithmic compositions, which were sometimes musically quite boring, having nothing to do with the laws of perception, and not really handling any musical issues. All this happened on a completely different planet, disconnected from the rest of the musical world, which I found really problematic.

So after a period completely dedicated to the investigation of sound synthesis potential, it became important for me to come back to the instrumental world with this new knowledge and experience. I continued to work with the same compositional ideas about how to control the different parameters of sound, but in the context of instrumental music and musique mixte, and it became a tool for thinking about music in general. That was a big step, like stepping back to sunlight from a cave where I had been for some years, mentally and physically.

Barrière: Some of the aims of those times may, however, still be valid. Musical research still needs to be organized in a way that makes the larger community of composers, researchers, and all people interested with these kinds of topics be able to communicate and progress together. During the last twenty years, the emphasis has been too much on production, and research is not valued properly.

Dissemination, Tools, and Pedagogy

Campion: You are both creating art works in very public ways. Kaija, you write with scores and produce many works—I’m thinking of the many pieces for solo instruments and electronic, such as Six Japanese Gardens, “classic” works that are constantly being played everywhere. They all involve libraries of sound files, which are rich sources of material, and they are very sculptural. What are your thoughts today about these contributions to the literature?

Barrière: Indeed, Kaija has been building a series of works that have become a sort of repertoire, since many of these pieces are played all the time around the world. They are pieces that exist beyond a specific moment in technology, despite the fact that they originally used very specific equipment. Over the last thirty years, the electronics needed to be maintained and sometimes even reconstructed. It is an effort that we have made because people want to perform these pieces, and the availability of more “general-purpose” programming tools, like Max, has facilitated our efforts. The fight for the existence of open software tools versus limited applications must continue, especially at a moment where operating systems are becoming more and more closed. Beyond the perennity and survival of works, resisting programmed obsolescence is a valid political fight that also proceeds from this.
Saariaho: Nevertheless, I never wrote a piece thinking that it is or would be part of the repertoire. When composing, my motivations are only musical.

Campion: Jean-Baptiste, you were an important figure in terms of defining directions of research and pedagogy at IRCAM. Can we learn more about this utopic mission?

Barrière: There are many aspects, but to sum up and make a hierarchy, sound synthesis, as I already mentioned, should be a priority field, part of the education of a musician, so that using sound processing and synthesis would be natural, together with playing instruments and also with making them!

The second important field for me is computer-aided composition. The radical project of algorithmic composition, using a computer as a composing machine that automatically generates complete musical materials, may be an important research area, but it can also become dangerous for people who are not strong enough musically. Without speaking about its potential commercial use for “elevator music”, etc., I prefer the idea of the computer as an assistant, analyzing and sending back information about what you are composing, even when you are doing it by hand—the computer proposing various solutions to a given musical problem. This is a better model, compositionally and ethically, for research and education. It is an important potential of programming languages and tools, including music notation, like OpenMusic or PWGL, as well as Esquisse and Patchwork before, and now the Bach library in Max . . . if they are used properly and do not take over the personality of the composer. One goal is to develop a catalogue of compositional techniques and strategies that allow student composers, as well as musicologists, to play with them and to compare their results. This is a good way for composers to gain some distance from compositional techniques and to develop their own style.

These fields should be priorities of institutions. Unfortunately, many have slowed down or given up musical research, and they are mostly focusing on music production. Software development is oriented too much toward tasks that are limited and mostly commercial. There is a need for more artistically speculative and meaningful perspectives. Defending the idea of “Musical Research,” as it was conceived at the beginning of IRCAM in Boulez’s original formulation—to determine common problems to find personal solutions—is more important than ever in this market-driven era.

There was a moment at IRCAM where there was a bunch of composers discussing their problems, literally 24/7, and trying to solve them together with researchers. What such places can uniquely provide is a forum where you confront and exchange all sorts of ideas—technical, musical and aesthetic, and even political. The need for this is greater than ever.

Campion: Kaija, do you relate to the computer-assisted composition discourse in terms of your own process?

Saariaho: I have not used these kinds of tools much for a long time, even if I come back to them when needed. It was important for me when I was focused on understanding my compositional process, my own thinking and acting, when composing. I realized myself over the years that, to find oneself as a composer, one needs to work enormously to define one’s own musical language, and it is so complex that one learns it only by composing.

Campion: Why do composers have such a hard time collaborating, or sharing what they do?

Barrière: It is not only the composers; it is the state of society. Collaborating and sharing are in crisis in society today because of the dominant individualism and the obsession with productivity. However, there is a rising interest for collaborative effort in the new generations, and institutions should assume more the role of providing exchange platforms.

Saariaho: Collaborating is not easy. In the Musical Research department at IRCAM in the mid 1980s, there were big feelings of jealousy all the time. It’s normal: We all were young composers, not really discovered yet, so frustrated, and we all wanted to create our own masterpieces. In that situation it was very complicated to share things sincerely with your rival!

Barrière: What came out of this confrontation, however, has been really important: Max, Patchwork (which split into OpenMusic and PWGL), Modalys,
SVP, and AudioSculpt, etc., were all born during that period, in a context where composers, researchers, and developers were closely collaborating. It helped to bring computer music concepts and tools to the next level. Nothing similar happened after or elsewhere . . .

**Saariaho:** Speaking about my own experience of building programs for structural interpolations (first in Formes and then in Esquisse), it was useful because I created them by myself, rather than relying on an automatic process. The programs, the tools have nothing of interest in themselves, what was interesting was trying to build them, to think about all the details that needed to be entered in the machine to get even the first primitive result. If anything profited, it’s mostly my own experience, in the way it helped me to understand what I did or did not want to create with such musical processes.

**Campion:** From the experience of the program Chant, how do you conceive of the notion of tool?

**Barrière:** As a tool, what was interesting in Chant was that it allowed one to build a sound by describing some of its physical properties, the formants, which are peaks of energy in the spectrum, perceptually an important part of timbre. And because it was originally modeled on the simulation of the voice, it also emphasized the importance of combined temporal variations of all parameters to make rich, living sounds.

The logical extension of Chant as a tool could be a synthesis engine centered around physical modeling and coupled with perceptual and cognitive models. It should allow the description of a musical idea in direct connection with one’s imagination, which refers also to the physical world, because it is anchored in this world. It would proceed through a dialogue with a perceptual-cognitive model, making one aware of what can and cannot be perceived in the sound you are actually constructing. That is what I expect of such a tool today, smoothing and clarifying in the compositional process the relation between musical imagination, sound production, and perception. This tool should be, in fact, more of an environment, a series of interconnected programs, encompassing all of the compositional process, from sketches and notation to sound diffusion in space.

In the 1990s, Patchwork was a prototype of such an environment, a toolbox to manipulate different ways of representing and generating musical parameters, which in turn controlled various programs for sound analysis, processing, and synthesis. An approach continued today by OpenMusic and PWGL, and by Max, thanks to the Bach library. Another similar interesting approach, prototyped also in the mid 1990s, is the connection between Notability and Max, allowing electronics to be directly controlled from musical notation.

I agree with Kaija, however, that—from a compositional point of view—the most important thing is not the tool itself; what may be more important is the process of designing or using a tool, through which you may solve the musical problem that you are working on. In the mid 1980s, and later on, what was interesting at IRCAM was that there was a series of people working on similar problems and sharing ideas. It was an exciting stimulation, pushing everybody to go further. That kind of emulation is the real value of collaboration. It does not matter if the result is not necessarily a collective tool. The most important thing is making musical ideas, and music, progress. That is why musical research and production need to interact. Open tools that can expand are important because it means that all the efforts of the different people may become bits and pieces of knowledge and experience from which the next people can eventually learn, build, and move to their own next step—which, in turn, may hopefully serve the larger community. That vision of musical research as a collective process has a clear value. It is the reason why places like IRCAM, CNMAT, and other research centers must continue to exist. In fact, we need more of them!

The more the industry is pushing toward closed tools, the more places are needed where open tools can evolve. They remind everybody that there is an infinity of different ways to compose music.

**Saariaho’s and Barrière’s Practices**

**Campion:** Could you detail more about the research-development-production cycle in relation to how you create pieces?

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Saariaho: When I start writing the score, I often know quite well what I want, and how I want the electronic part to be. I then discuss my ideas with the person I am working with, and we speak about how the ideas could be realized. Then, while I am writing the score, my collaborator is looking for various technical solutions for the ideas we have discussed, which sometimes involve developing new tools and finding solutions for possible problems.

Campion: Where does that leave the creative life for the person making the electronics? Are they only at the service of a production?

Barrière: There are all sorts of cases. I personally suggest different realizations and let the composer decide what is the most suited to the musical ideas. Together, we test different techniques in a kind of laboratory situation to help determine the best solution for a given musical idea. This is undoubtedly a creative contribution.

Saariaho: Working with Jean-Baptiste is, of course, very special because of our personal relationship. For him my music is a little bit our common work, it is our music. He is never jealous or offended, only unhappy if it is not good enough, for one reason or another. He shares my music differently than anybody else I have collaborated with.

Campion: When we were in the Hertz Hall here at UCB for a concert of Jean-Baptiste’s works, you were very concerned with all aspects of what was happening in terms of the production quality.

Saariaho: Of course.

Barrière: In a context like this, when I am taking care of both the sound and image together, it is important to have a reliable person who is slightly detached from the technical contingencies. We play this role for each other in all sorts of contexts. It is beneficial to have Kaija’s ears tell me, for instance, that at a particular moment the balance should be different. We have developed so much experience that she is able to do it faster and more accurately than anybody else. The experience of thirty years of common work is irreplaceable.

Campion: I notice after attending productions where you have been in charge, how careful a protocol you have.

Saariaho: Again, this is the result of long experience. It does not happen often that the computers die in concert, but we had one memorable concert in Brussels, where we were mixing from the hall and there was a musician on stage with the computer just behind the curtain, triggering the sounds for my piece Amers. The computer kept crashing and repowering. The musician was signaling from behind the curtain when it crashed, so that I could turn down the levels until it restarted. It would be horrible if something so drastic would happen in an opera house with thousands of people. For this reason, as much as possible, we have backup systems that are ready to be switched on in case of problems. We also try to have all sorts of alternative strategies of control for everything that can fail . . .

Jean-Baptiste has also developed iPad interfaces for all my patches, allowing me to control important parameters from anywhere in a hall, so in rehearsal I can easily and quickly test how the electronics sound everywhere; and in concert I can mix without depending on different mixing desks. We usually do not have enough rehearsal time to get used to many different desks. Over the years we have developed many such strategies to be as efficient as possible within today’s constraints.

Campion: The issue of enlargement of the image with the technology, that’s something that runs through a lot of your work. You capture an immersive space, an entire hall.

Barrière: Unfortunately, it is not easy to realize sound immersion in most concert halls. When you try transposing the virtual-reality theater model into an opera house or concert hall, you realize that the halls, as they are conceived, are not designed for surround sound. Typically, there is not enough distance between the audience and the side or rear speakers. Kaija’s second opera, Adriana Mater, has an extensive scheme of spatialization of the choir around the audience. When it was premiered at the Bastille Opera, we controlled the speaker system inside of the walls with Spat. It was an enormous amount of work, impossible to bring somewhere else. When we performed it in Santa Fe, I had to completely rethink it and redo everything. That is a typical limitation encountered when trying to achieve immersion. The technology is available, but concert spaces are not necessarily adapted. It is sometimes easier to build an ephemeral
concert space completely from scratch for that purpose, for instance, in an older industrial plant, but unfortunately these places are often acoustically unsatisfactory. In the long term, a more constructive move is to advocate the construction of concert halls conceived to accommodate spatialized electronics.

**Campion:** Do you consider the issue of reception from the audience’s point of view when using technology?

**Saariaho:** The electronics should be so tightly integrated that people do not think about it. That is my aim. If we take the example of Adriana Mater, I wanted to have the choir sound everywhere in the hall because it was in the Bastille Opera, a huge, horribly cold hall. The most beautiful musical moments can take place there, but it feels like you are a kilometer away from what happens on the stage. It was a challenge to try to reach people with music.

**Barrière:** We use technology to extend expression, but the economical and practical constraints actually restrict our capacity to do things more expressively. That is why I personally try to find pragmatic ways to move away from larger “machines,” like orchestras and operas, to concentrate more on chamber music, a context that is more open and, in principle, allows more time for rehearsal and closer interactions with musicians, providing more opportunities to reach a satisfying artistic result.

**Campion:** It must take enormous energy to create the works and to create the technology that you are using to produce those works without having larger institutions behind you.

**Saariaho:** We are conscious of this and are pragmatic about technological choices; we try to make technical compromises, hopefully without compromising the integrity of the musical ideas. It is an issue, because we cannot be everywhere all the time.

**Barrière:** We make the electronics of Kaija’s pieces available on the Web so that people can take the patches and play the pieces without us, and we leave some adaptability in the sound configuration. But the more freedom we give to allow for adaptability, the more difficult it is to show the way it should be done. It is a difficult design balance. When I know that Kaija is behind the mixing desk, I give her the maximum amount of control. So when we distribute the patch, I am tempted to leave that kind of freedom, but it may be dangerous and can be misused if people do not understand her music in depth.

Some people believe that when they start to run a Max patch, their job is done. They do not understand that their part actually starts there. They have to do all the rest, mixing the balance between the instruments and the electronics, and dynamically controlling the way it lives and moves through a given concert space. They have to take care of all of that while reading the score and adapting the mix according to the way a specific interpretation sounds in a given acoustics.

**Saariaho:** There are many good people all around the world performing the electronics of my music. At the beginning of my scores, I usually try to describe the relation of the electronics and the instruments. I cannot imagine there not being a sensitive musician or engineer controlling it. We should still probably find better ways to explain the delicate balance required in the score, since sometimes there are problematic performances, not due to the instrumentalists but in terms of balance with the electronics.

**Campion:** So research, development, and production are problematic in terms of investment. Why do you add electronics if it increases the workload for everyone?

**Saariaho:** It is challenging for the imagination, the precise musical reason being different every time. For Frises, I was asked to write music to be played after J.S. Bach’s Chaconne. What can you possibly do? I decided to bring the violin to another dimension, because I conceded that one can write nothing to follow the Chaconne, music in which the violin has been used in the richest and most beautiful way! So I needed another element, one that gave me possibilities to detach my violin writing into something different.

**Barrière:** Kaija has no technical bias in the beginning; therefore, she is not limited by technological constraints. She imagines something musically and we find a way to realize it. Many people are the other way around: They discover a specific tool and then imagine how to use it musically.
For me it is a mixture of different things depending of the context. Sometimes my imagination is stimulated by a tool, and sometimes I imagine a specific musical or visual idea, then I search for the proper tool to realize it. I may also have a musical or visual idea and keep it in the back of my head and, many years later, return to it, because the tools and our knowledge have evolved to finally make it possible.

Imagination and Representation

Campion: I am seeing two big limbs of the tree. One of the limbs comes out of the IRCAM utopic discussion and the idea that an investigation, the research and development of the tool, is a creative act that might produce many kinds of pieces. The other limb is the role of the composer as arbiter of the work of art, a focal point that contains a realizable vision of sound.

Barrière: Both attitudes are valid and equally fertile. But I think advocating for collective and institutional visions is especially needed today, when research institutions are facing a major identity crisis. My twenty years or so at IRCAM marked me enormously, and I see that important notions, like the very concept of research, are in danger. That is why I stress this point.

Today, I design my own projects with a certain freedom but within the constraint of any individual outside of an institution. I preserve some of the lessons I learned at IRCAM, but I have to be very pragmatic, as Kaija is and has always been regarding electronics.

Campion: Why aren’t more composers working in a similar way, with the level of attention to outcomes and details, high-level artistic outcomes with technology and instruments?

Saariaho: There are probably more than we know. I am in a privileged situation because my music is played so much, it is commissioned by institutions, and so I have a practical position in which I can spend time as I want for my projects. Maybe that is why there are so few women even today: It is often a practical question of organization of life and childcare, and of one’s economic situation.

Campion: Making use of emerging research-based tools or novel applications in the compositional process really challenges all aspects of the production and creation. There has to be some greater interest in it, because it often appears to be too much trouble.

Saariaho: One can well ask: What is so interesting about writing an opera, which takes three to eight years, night and day? If it is a question of artistic necessity, time and efforts do not matter.

Campion: For one thing, the material will be preserved. It can be done again, long after laptop computers have ceased to exist.

Barrière: Tools for notating electronics are quite limited, this is another domain where research is needed, to allow temporal representations of computer music processes. Some sort of musical, temporal hypertext, in which we can zoom in on the electronics from the musical notation and back. Without proper tools, including time representation tools, it is hard to manipulate these kinds of musical ideas.

In another domain, we need tools that merge capacities to manipulate images and sounds together.

Campion: In a space like Xenakis’s UPIC?

Barrière: Yes, but that is one single representation flattening everything, giving one particular strong angle: a pitch-versus-time representation. You should be able to switch dynamically between multidimensional representations, and find the ones that are best adapted to the specific process or concept that you are manipulating. There are no musical conceptual tools for that. The nearest thing is the concept of maquette in OpenMusic, a wonderful idea that needs to be developed further.

But even before this, we need to be able to go back and forth between music notation and electronics, to have the instrumental score connected directly with the electronics patch. Until this becomes a common practice that is endorsed by a community of composers, we will be lacking higher levels of representation, allowing work on musical forms, for instance. We need to go further into the representation and notation of electronics, so that a score includes both the instrumental part and the electronics. In rehearsal, if you want to remove one bar, you should just remove it in the score and everything in the electronics should be automatically recalculated, right away. Or, if you insert a fragment,
changes should be propagated properly in all the code immediately.

Saariaho: I do not think there are many people working with really exact notation of electronics.

Barrière: It is an issue, not only in terms of transmission, but also for the imagination. Notation is a support for the imagination. When the imagination is only in your brain, without something to embody musical concepts, it is limited in terms of the range of manipulations.

Another aspect that needs strong support in terms of research is conceiving tools to abstractly describe electronics—for instance, taking a Max patch and making an abstract diagram about what it actually produces, so that you can understand it and possibly recreate it in another tool. It is extremely important to get these things soon because, even if Max is a sort of standard in the computer music community today, nobody knows what it will become in the future. There are a few theoretical research projects in universities on this theme of abstracting electronics, but the nearest actually working tool for this purpose is Faust, developed at the Grame center.

Campion: Could you encapsulate, what is the nature of your creative work? What are you doing? How would you describe it?

Barrière: My work is divided into two streams. One stream—which I call visual concerts, for lack of a better name—consists of performance contexts that involve performers, singers, instrumentalists, electronics, and image processing. The second stream consists of installations, mostly interactive installations. Both cases involve a similar kind of technology, which is a mixture of prepared electronics, either for sound or image, and live electronics. I use cameras and microphones to process live sources, which are mixed with and treated by the prepared sources.

Since I left IRCAM about twenty years ago, most of my work is about the interaction between music and image. Performance and installations, investigating the potential relations between these two dimensions, dynamic relationships that come from the musical score and are developed in the electronics and then image. Back-and-forth interactions that can be extremely different from one context to another.

A recent work, *Distant Mirrors*, is a performance involving two flutists in different locations, who play together through the Internet, using a dynamic score. The whole score is not fixed at the start. Fragments are prepared that I trigger at times, and they are shown on a screen on which performers can also see each other, mixed with abstract forms and colors. They sight-read what appears on the score and decipher what is otherwise happening in the image, since forms and colors carry a musical meaning representing characters, modes of playing, timbres, etc. So image has a double function. The score is sometimes generated by the computer according to a given context, which is analyzed. Sometimes the performers are asked to improvise on a sketch. The problematics of dynamic scores and “floating structure” are something I am interested in and want to continue developing in the future. It comes from my experience about interactive installations. I am trying to bring the interactive installations into a performance situation.

Campion: Kaija, I connect your music to earlier music traditions from the Baroque to the present, yet it is not anachronistic. You are still a searcher, you still use these tools, you still work to seek newness and your pieces often have novelty in the sense that something totally unexpected might occur in the course of the work that would not be a hallmark of someone who relies only on the past. How do you manage that?

Saariaho: Our past is a major source of inspiration, and as long as there is music with pitches and rhythms, we are dealing with the same musical parameters and the same musical questions concerning their organization that our ancestors were dealing with. And this is infinitely interesting. Personally, I do not want to do what has been done before or to repeat myself. For me, composition is a way of life and a personal path to try to tell what is going on in the world today. That is why it is not only an intellectual attitude, but it also proceeds from an intuitive need to use tools that are part of our society today. My studies and my intuition brought me to analyze sounds and build them with
the concepts and the tools we have discussed here and which I found at IRCAM. As a Finn, I have loved nature and the sounds of nature since my childhood, and when I came to Paris, I also found musique concrète and the concepts of tools developed at the studio of the GRM. In my mind, musique concrète is connected with my childhood in Finland and my oversensitivity to sounds. That brought me to use noises in my music. More generally, concrete elements add a powerful level of associations into music, normally so abstract. My music is born from many kinds of sources and with the help of many different tools. As we can be inspired by history without copying it, we can also find different tools in today's technologies, not be prisoners of them, customize them for our needs, develop them to suit our visions, and create music that was never heard before.

Works

Selected Works by Kaija Saariaho for Electronics

Verblendungen (1984), for orchestra and computer tape
Lichtbogen (1986), for ensemble and electronics
Nymphéa (1987), for string quartet and electronics
Stilleben (1988), for stereophonic computer tape
NoaNoa (1992), for flute and electronics
Près (1992), for cello and electronics
Six Japanese Gardens (1994), for percussion and electronics
Lonh (1996), for soprano and electronics

L’Amour de loin (2000), opera with orchestra, choir, and electronics
Vent Nocturne (2006), for viola and electronics
Écho! (2007), for mixed choir and electronics
Frisés (2011), for violin and electronics

For a complete list, see http://www.petals.org/Saariaho/Electronics.html and http://saariaho.org/.

Selected Works by Jean-Baptiste Barrière for Electronics and Installations

Chréode (1983), for quadrophonic computer tape
Hybris (1987), quadrophonic computer for tape
100 Objects to Represent the World (1997), electronic music for Peter Greenaway’s PropOpera
Autoportrait en Mouvement (1998), interactive musical and visual installation
Cellitude (1998), for cello and electronics
Time Dusts (2001), for percussion and electronics
Violence (2003), for violin, child voice, and electronics
Crossing the Blind Forest (2011), for bass flute, piccolo, and electronics
The Garden of Dreams (2015), interactive musical and visual installation
Ekstasis (2015), for soprano and electronics
Palimpsest Capriccio (2016), for violin and electronics
Contemplation (2016), for alto flute and electronics

For more information, see http://barriere.org.