



NEWSLETTER

This Issue's CONTENT LUCA 7th Consortium General Assembly Meeting

Interview with Reiko Yamada - Composer and sound artist in collaboration with LUCA

New video publication

The COVID-19 situation

List of publications

LUCA 7th Consortium General Assembly Meeting

Milan, Italy - November 27-28, 2019



From November 27th-28th 2019, partners of the LUCA consortium gathered in Milan, Italy, to hold the 7th Consortium General Assembly Meeting and review the evolution of the project, bringing to the table all the needs foreseen for the LUCA device development and discussing possible solutions to advance and take the next steps towards completion of the project.

Turgut Durduran, the coordinator of the project, gave the introduction talk and explained the overall progress of the project. All work package leaders gave an overview of their current development within the project and gave the updates on the different achievements and results as well as risks they had to overcome to accomplish the ultimate goals of the project.

With respect to the validation in real-settings, M. Mora summarized that this work package had made significant progress with the measurements of 10 controls and 24 patients. She pointed out that next steps would include the finalisation of the measurements of the controls, the completion of patient recruitment, preparations for the statistical data analysis, and additional measurements to show the potential of the LUCA device for other applications in the field of oncology.

Regarding the exploitation phase of the project, S. Ferrando explained that, since the last review meeting, the exploitation scheme had been modified according to the new focus and now also included the individual commercialisation paths for LUCA-related product. As LUCA advances, the exploitation activities will be closely evaluated to ensure optimal impact. Subsequently, A. Dalla Mora provided an update on timings, deliverables, milestones and risks of the ex vivo phantom validation and standardisation work package. He informed the consortium that work on the characterisation of LUCA as a unique multimodal system is well underway and on schedule.

As for the development of components and sub-systems work package, L. Cortese reported that the LUCA device was fully functional and phantom and in vivo tests had been carried out. T. Durduran summarized that the LUCA device was working but required several short- and long-term upgrades, such as improvements of the touch sensor and safety button on the probe and optimising the holder to improve the procedure.

The consortium also discussed about management, and P. Zolda provided an overview of recent and upcoming dissemination activities. ■



Interview with Reiko Yamada

Composer and sound artist collaborating with LUCA on the project Beyond Absolute

She is originally from Hiroshima, Japan and has been working mainly in North America and Europe for the last 20 years. She uses sounds to think, discover and communicate; in other words, she composes concert works, creates sound art installations and works with interdisciplinary collaborators. She's especially interested in the aesthetic concept of imperfection.

She holds a D.Mus in composition from McGill University, and since she graduated in 2014 she was invited to work in a number of settings, including as a fellow of the Radcliffe Institute for Advanced Study at Harvard, as an artist in residence at the Institut für Elektronische Musik und Akustik (in Graz, Austria) and as the Innovator-in-Residence at Colorado College. Before coming to Spain, she has lived in Japan, the United States, Canada, France, Argentina, Austria, and the Netherlands.

How did you find the artist in residence program?

I learned about the Artist in Residence program through IRCAM, the Institut de Recherche et Communication Artistique/Music, which is located in Paris and where I worked for a couple of weeks many years ago. They coordinate the program that funds these residencies.

Why did you choose to work with the LUCA project?

I have a personal history with thyroid disorders. When I saw the description of their research project I realized it would be a great opportunity to explore and stimulate the communication between medical professionals and patients, which is especially challenging in the case of thyroid problems because patients have such a wide range of symptoms that are not always clearly reflected in the data used by physicians.

When I experienced thyroid problems, it happened all at once. As I discovered later, it was the result of a virus infection. I was hospitalized with severe physical symptoms, such as extreme weakness, daily fever and violent headaches. These are the symptoms that the physician took in consideration and attempted to treat.

But the illness also affected me mentally, changing my mood and, crucially for the person I am, radically decreasing my creativity. These psychological effects began with other symptoms (and lasted much longer),

yet the physician paid no attention to them whatsoever, even though in some ways they were at least as important to me as the physical ones.

It is this disconnect between the way I experienced the illness and the way my physician approached it that I found particularly problematic. And it is this disconnect that I'd like to help bridging, at least to a modest extent, in my work with the LUCA team.

Could you explain your project briefly?

The LUCA device uses ultrasounds and lasers to determine whether nodules in the thyroid are cancerous or not. This is a fantastic medical advance because it's infinitely less invasive than the current practice which requires a biopsy. But it still entails working only with physical data and doesn't take into account the subjective experience of the patients.

In my project, I map the output data of LUCA device into variety of sound parameters but I also find creative ways to integrate those with elements that reflect the perspective of the patients. The result is that each time the device is used the algorithm I'm developing will produce a short piece of music that combines the two types of information. I'm hoping this could serve as a conversation starter for physicians and their patients, that will allow them to take each other's perspective into consideration. ■

The project Beyond Absolute is an artistic research project in collaboration with researchers at ICFO. The main component of the project is the creation of personalised acousmatic soundscapes based on the data generated by the LUCA diagnostic device in conjunction with sonic alterations that represent the subjective mindset of the patients. The project Beyond Absolute is a part of STARTS residencies initiated by the European commission and IRCAM.

Have you worked with scientists before?

I had a project about drosophilae (fruit flies) entitled Small Small Things that led me to work with biologists before coming to Spain. It began with a 7-month residency in Austria, and I presented it in a number of settings in Europe and the US. In fact, it was the first artwork to be presented at an annual conference of the Netherland Society for Evolutionary Biology in 2018.

After I complete my project with the LUCA team, I will be serving as the first artist-in-residence at the biology department of the University of Groningen in the Netherlands.

What have you learned so far from the different scientists/clinicians that you have been working with? What has surprised you the most?

The way scientists work as teams is very different from the way artists usually collaborate with each other, so it's been fascinating to observe the dynamics I've encountered at ICFO. But obviously I also benefited a lot from the team members who took the time to guide me through their thinking process.

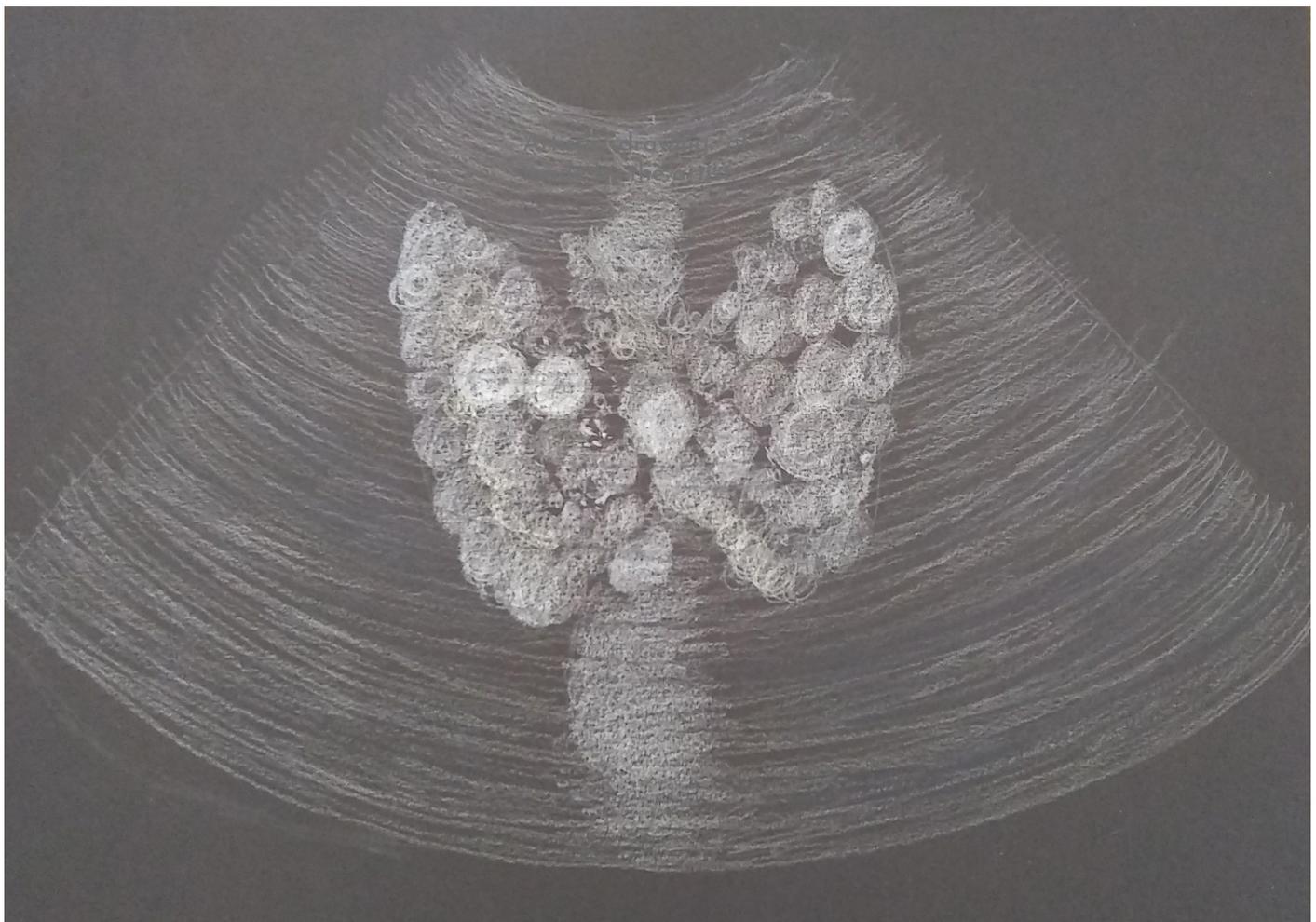
It's fascinating to see the huge amount of variables that they need to take in account when going from the theoretical design of something like the LUCA device to a tool that will actually be used in clinical settings.

Why is this a process-based project and not a goal-oriented project? Could you explain a little more what you are searching for in patients?

Lots of people think that what I do is all about what comes out as an art piece in the end. However, especially for experimental projects such as this one, the most important part of what I do is within everyday interaction with people I encounter. My job is to ask unusual questions, initiate difficult conversations, demonstrate different ways of thinking and attempt to solve problems in alternative approaches. This naturally happens while I and the team work together towards creating an artwork that is especially challenging for both parties. In other words, a lot of the benefits of this residency (for myself and for the researchers) are achieved long before any performance takes place.

What do you foresee to achieve at the end of the project?

Any project that ends up looking exactly like what I had originally envisioned is, at some level, unsuccessful because it means I didn't learn anything in the meantime. Besides the algorithm I mentioned earlier, I imagine creating some kind of sound-art piece that represents my interactions with the LUCA team but I hope it turns out to be something unlike anything I could have imagined before arriving here. ■



Artistic drawing of the thyroid made by Reiko Yamada.

NEW VIDEO PUBLICATION

Merging Art and Science: from LUCA to Beyond Absolute

"Beyond Absolute is sound-art project by composer and sound artist Reiko Yamada. The title of the project refers both to the representational character of the project (as opposed to absolute music), but also to the effort it makes to transcend, without denying, the objective physiological measurements at the root of modern scientific medicine". [LINK](#)



THE COVID-19 SITUATION

The LUCA consortium is taking measures in response to the COVID-19 situation

Partners at IDIBAPS are the forefront of the COVID-19 management and have currently paused their scientific tasks to focus on their medical efforts and attend patients with COVID-19. Therefore, clinical studies have been put on hold. At the same time, the consortium continues working on the analysis and interpretation of the existing data.

Face-to-face project meetings have been postponed and options are being considered to have a no-cost extension to the project duration to achieve the scientific goals.

We hope the current situation of the COVID-19 pandemic will be solved as soon as possible. We want to extend our sincere gratitude to all doctors, nurses, medical staff and healthcare workers who are in the front-line endless days and nights fighting this pandemic as they take care of many critically ill patients and help them fight in their recovery. A sincere thank you to all!

LIST OF PUBLICATIONS

Learn more about the research carried out within the LUCA project from the consortiums' scientific publications:

Title	Date	Link
Systematic study of the effect of ultrasound gel on the performances of time-domain diffuse optics and diffuse correlation spectroscopy (Biomedical Optics Express)	2019	Link
Self-calibrating time-resolved near infrared spectroscopy (Biomedical Optics Express)	2019	Link
In vivo time-gated diffuse correlation spectroscopy at quasi-null source-detector separation (Optics Letters)	2018	Link
Eight-Wavelength, Dual Detection Channel Instrument for Near-Infrared Time-Resolved Diffuse Optical Spectroscopy (IEEE Journal of Selected Topics in Quantum Electronics)	2018	Link
Broadband (550-1350 nm) diffuse optical characterization of thyroid chromophores (Scientific Reports)	2018	Link
In vivo time-gated diffuse correlation spectroscopy at quasi-null source-detector separation (Optics Letters)	2018	Link
Novel Technologies for Time - Domain Diffuse Optics: Miniaturized Wearable Devices and Bioresorbable Optical Fibers (Abstract at Biophotonics Congress: Biomedical Optics Congress 2018)	2018	Link Link
Liquid phantoms for near-infrared and diffuse correlation spectroscopies with tunable optical and dynamic properties (Biomedical Optics Express)	2018	Link
Broadband (600-1100 nm) diffuse optical characterization of thyroid tissue constituents and application to in vivo thyroid studies (Abstract at Biophotonics Congress: Biomedical Optics Congress 2018)	2018	Link Link
Time -resolved near infrared light propagation using frequency domain superposition (Biomedical Optics Express)	2017	Link
A Compact Two-Wavelength Time-Domain NIRS System Based on SiPM and Pulsed Diode Lasers (IEEE Photonics Journal)	2017	Link
Time-resolved single-photon detection module based on silicon photomultiplier: A novel building block for time-correlated measurement systems (Review of Scientific Instruments)	2016	Link
Diffuse Optical Characterization of the Healthy Human Thyroid Tissue and Two Pathological Case Studies (PLOS ONE)	2016	Link