The *ligeti center*: Ligeti and his vision of a center for computer music in Hamburg

Georg Hajdu
Hamburg University of Music and Drama
georg.hajdu@hfmt-hamburg.de

Christine Preuschl
Hamburg University of Music and Drama
christine.preuschl@hfmt-hamburg.de

Jacob Sello
Hamburg University of Music and Drama
jacob.sello@hfmt-hamburg.de

Manfred Stahnke
Hamburg University of Music and Drama
ms@manfred-stahnke.de

John Chowning
CCRMA
Stanford University
jc@ccrma.stanford.edu

ABSTRACT

When György Ligeti was appointed professor of composition to the Hamburg University of Music and Drama (HfMT) 50 years ago, he wished to see the establishment of an interdisciplinary computer music center of the kind he had encountered the year before at Stanford University. At the invitation of the young assistant professor John Chowning, Ligeti spent five months in the San Francisco Bay Area and was so taken with what he saw and heard at the Artificial Intelligence Lab that he visited several times. And indeed, for the planning of the Hamburg center, he managed to get Chowning, who had just received a DAAD fellowship for a stay in Berlin, as well as two of his Stanford colleagues on board. The University of Hamburg was also supposed to become a project partner while the money for the considerable investment was to come from the German Research Foundation. Unfortunately, to Ligeti's great disappointment, this center could not be realized. Instead, such centers were established elsewhere at Stanford University and in Paris. Yet, the development of computer music and later multimedia composition continued at the HfMT on a smaller scale until, in 2023, the transdisciplinary Ligeti Center was finally founded as a joint effort between the Hamburg University of Music and Drama, the Hamburg University of Applied Sciences, the Hamburg Technical University and the University Medical Center Hamburg-Eppendorf.

1. GYÖRGY LIGETI: HIS VISIONARY ABSTRACTION BECOMES CONCRETE

Invited by Stanford University's Department of Music, György Ligeti arrived in the winter of 1972, unaware of the system John Chowning and his colleagues had built at the Stanford Artificial Intelligence Laboratory beginning in 1964[1]. He accepted the invitation to find a calm atmosphere to "catch up on his commissions," far away from the pressures of Europe. But Ligeti's very nature was engagement, and he asked to visit the AI Lab for a demonstration of work being done there. Over the next five months, he made many visits to the lab, always probing for knowledge and learning of the *allure of their intrinsic abstraction*. He also visited the University of California in San Diego and the California Institute of the Arts, but he was most impressed with what was happening at Stanford's AI Lab. It was about six weeks after arriving that Ligeti asked to visit the lab, knowing only that Chowning and his colleagues were using a computer in connection with some aspect of music. Chowning demonstrated his spatialization work on the lab's quad system and played his first synthesized composition, *Sabelithe*. Never having heard music synthesized by a computer, Ligeti was astonished and immediately began asking questions, how computers work, and about programming. What was to have been a short visit became an entire afternoon. It was the first of several visits he made to the AI Lab.

How was it that this digital system for synthesizing music and research in signal processing, and perception, was unknown in Europe? In a conversation with musicologist/journalist Louis Christensen, Ligeti spoke at length about what he learned about computer music at Stanford — published in Numus-West, No.2, 1972 [2].

Chowning explained to Ligeti his spatialization strategy in 1972 which he was less interested in than in the FM synthesis of timbre. It was in searching for tones with internal dynamism for the distance cue that Chowning discovered FM Synthesis. But, beyond the AI Lab as well as Max Mathews, Jean-Claude Risset and colleagues at Bell Labs, no one knew of the work that had been accomplished at Stanford. That was about to change following Ligeti's presence at Stanford.

Chowning understood the importance of the diverse disciplines in the population of funded researchers at the AI Lab — computer scientists and electrical engineers, of

Copyright: © 2023 Georg Hajdu et al. This is an open-access article dis- tributed under the terms of the Creative Commons Attribution License 3.0 Unported, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

[1] https://lifeorange.com/writing/ChowningAnalysis_McGee.pdf

[2] https://ccrma.stanford.edu/sites/default/files/user/jc/conversation_with_ligeti_at_stanford_0.doc

course, also a philosopher, a linguist, a physicist and a psychiatrist.

Chowning, beginning in 1964, joined by his fellows in the Computer Music Project by 1970, were, in a sense, students. They found in these colleagues patient teachers who willingly answered their questions as they watched them build a new means for making and representing music.

"I think Chowning is the first who puts the two things together and composes directly with the computer and composes music which is entirely based on the thinking possibilities... (not of the computer; the computer is doing what you want it to)... but on this feedback effect that the use of computers has on the thinking of the composers. So, I think this is so important that you can compare it with the situation at the Cologne electronic studio in 1952-53, the beginning of a new thing. I had no information of it [the work at Stanford] in Europe. Nobody in Europe, I think, has information of just what is going on here at Stanford."[3]

On returning to Germany after his five months at Stanford, Ligeti told Boulez to "pay attention to what is going on at Stanford." Boulez did and invited Chowning to join the meetings of IRCAM planning committee beginning in 1973. In 1974, he invited Ligeti, and in 1975, the CCRMA team. IRCAM opened in 1977, with a PDP-10 computer running the CCRMA/AI Lab software/operating system. One of the Paris newspapers headlined "Stanford sur Seine!"

In 1973, Ligeti asked Chowning and computer scientist James A. Moorer help him set up a mirror system between the Computer Science at the University of Hamburg and the Hamburg State University of Music and Performing Arts (as it was called then), where he had just accepted a professorship of composition. Ligeti vigorously pursued his vision until the entire project was blocked because of the withdrawal of support from the City of Hamburg. He was greatly disappointed, of course[4]. They remained in close contact in the years following. He continued to learn, reading about scientific subjects, especially about computers. On a visit to Stanford in the early 1990s, he said to Jean-Claude Risset and Chowning, "I compose computer music, but I don't use computers."

Figure 1. Ligeti, Chowning, Silvia Fómina and Risset at Stanford's CCRMA.

[3] ibid

2. THE INTERIM

2.1 The Institute for Microtonal, Electronic and Computer Music

When György Ligeti came to Hamburg in 1973, he envisioned that computer equipment would be acquired with funds from the German Research Foundation (DFG) and that Chowning and Moorer would direct the center [1]. Ligeti donated the prize money of his Hamburg Bach Prize to this major project. Rooms for computer music were integrated into the new university building - and are still designated as such today, easily recognizable by the elevator labeling "Computer Music" for the ELA rooms (an abbreviation for electroacoustics) in the basement of "Green Wing". Unfortunately, all these efforts to establish electronics and an ensemble in Hamburg came to an end in the mid 1970s. Whatever may have stood in the way: the will was still there, especially with Werner Krützfeldt, who later became vice president and had already played a leading role in inviting Ligeti to Hamburg. Krützfeldt, himself a musicologist and theorist at the university, had a considerable interest in electronic music. Eckhard Maronn, sound engineer at the HfMT, who had achieved fame as Karajan's room acoustician in Berlin and at many opera houses, was also open to Ligeti's plans and, after the failure of the first large-scale plans, pursued the acquisition of analog technology. From the mid-1980s on, university president Hermann Rauhe repeatedly helped out with funds, although the amounts were rather symbolic. When Ligeti was joined by the Japanese student Kiyoshi Furukawa, who showed interest in computers, Krützfeldt, together with Rauhe and Stahnke, seized the opportunity to set up an environment that allowed initial research and composition by digital means. Krützfeldt and Furukawa first installed Atari PCs in the ELA rooms and soon thereafter Apple Macintosh computers. The machines used at CCRMA would have cost hundreds of thousands of Deutsche Marks (DM), yet for the Atari computers and their periphery, supplemented by four Yamaha DX7-II digital synthesizers, sponsored by Yamaha Music Europe in Rellingen (just outside of Hamburg), only a few thousand DM were sufficient.

Figure 2. Chowning with DX7 (1984)

[4] In a personal communication in August 2022, his widow Vera stated that he felt that he could have made significant contributions to the field, outside the canon of his works, had the center been built.

Furukawa soon learned to elicit sounds from the Atari computer. With his "cellular automata," programmed in C++, Furukawa created his interactive program "Small Fish" which was licensed by Sony[5]. It is remarkable that this all happened in Hamburg, of all places, where the companies Emagic and Steinberg soon started to dominate the sequencer market and thus revolutionized the pop music scene. And many composers of so-called 'serious music', including Stahnke, were also interested in the possibilities of trying out the precise rendering of complex rhythmic structures on the computers available to them. Klaus-Peter Dencker of the Hamburg authority of culture was extremely helpful and interested[6]. He organized the Interface symposium which also featured concerts and installations several times in the late 1980s and early 1990s cooperating with Furukawa, Stahnke and the HfMT. In 1988, Stahnke, previously a lecturer like Furukawa, was appointed part-time professor, at the instigation of Ligeti, who retired around the same time. The university leadership around Rauhe and Krützfeldt wanted to reconcile with Ligeti, who had never quite gotten over the failure of the computer music center he planned to establish 15 years prior. Krützfeldt was also eager to found an institute which he and Stahnke named "Institute for Microtonal, Electronic and Computer Music" (IMEC). Under the IMEC label, Stahnke and his collaborators organized a number of successful concerts and also attracted students from within and outside the university, Sascha Lino Lemke and Marko Ciciliani among them.

2.2 Multimedia Composition and ZM4

For the next years, and particularly after the departure of Furukawa who now is professor at the Tokyo National University of Fine Arts and Music, Stahnke pursued the establishment of a professorship in the field of computer music[7]. Considerable resistance had to be overcome, but finally in 2002, it was possible to get computer music specialist and composer Georg Hajdu to join the university [4]. The IMEC was ended and instead, in 2004, Germany's first master program in multimedia composition established at the instigation of Hajdu. The program has produced successful graduates (Konstantina Orlandatou, Alexander Schubert, Jacob Sello, Constantin Basica, Xiao Fu, Dong Zhou among them), In addition, Hajdu established the Center for Microtonal Music and Multimedia (ZM4) in 2010, and together with his colleagues, musicologists Beatrix Borchard, Reinhard Flender and Manfred Stahnke (also a musicologist by training) he initiated a doctoral program in Artistic Research—the first of its kind at a German music university.

Figure 3. The Hexenkesselchen developed by Jacob Sello

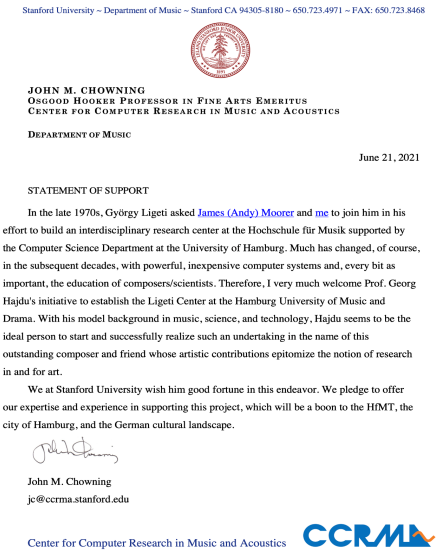
Between 2011 and 2020, various artistic and educational projects were realized in the multimedia department: Jacob Sello received an honorary mention in 2011 at the prestigious Guthman Musical Instrument Competition for his Hexenkessel, a timpani tripling as digital controller and score display to which he later added a smaller variant, the Hexelkesselchen, based on a tom-tom [2]. In the same year, a 288-channel wavefield synthesis system was installed in one of the ELA rooms which was used as a mobile system in various other contexts, most spectacularly in combination with the video wall for an audio-visual installation at the Internationales Bauforum which took place in August 2019 at the Hamburg Deichtorhallen[8].

In 2016, the university invited John Chowning as a keynote speaker to the Sound and Music Computing conference (SMC) hosted in Hamburg[9]. His keynote address was entitled *The Early Years of Computer Music and Ligeti's Dream - Stanford, Paris, CCRMA, Hamburg*, in which he detailed the original plans for the Hamburg computer music center. On this occasion, the university bestowed an honorary doctoral degree on him. Following the conference, he offered to write a letter of support should the need arise. Hajdu accepted his offer when it came to applying for funds for the *ligeti center*.

In 2016 and 2020, two editions of the ArtSearch symposium were organized by the multimedia department raising the bar for the discourse of artistic research in Germany[10]. In 2019, the Music Technology Online Repository (MUTOR) was revived with funds of the Hamburg Open Online University (HOOU) after an early attempt in the late 2000s – pursued by HfMT, the University of California, Berkeley and Northeastern University – had to be buried for lack of money. This

[5] https://zkm.de/en/artwork/small-fish
[6] https://vangoghtv.hs-mainz.de/?portfolio=baiba-ripa-3
[7] http://georghajdu.de/wp-content/uploads/MMM_Jubelschrift_17x24_170619.pdf
[8] https://youtu.be/j-0oFXyel_Q
[9] https://smc2016.hfmt-hamburg.de
[10] https://artsearch.hfmt-hamburg.de/wp-content/uploads/2020/01/abstracts_artsearch_druck.pdf

repository was created with the aim to turn David Wessel's Music Perception and Cognition class at Berkeley into an online course. A second course named History and Practice of Multimedia was added soon after the completion of the former[11].



Stanford University ~ Department of Music ~ Stanford CA 94305-8180 ~ 650.723.4971 ~ FAX: 650.723.8468

JOHN M. CHOWNING
OSGOOD HOOKER PROFESSOR IN FINE ARTS EMERITUS
CENTER FOR COMPUTER RESEARCH IN MUSIC AND ACOUSTICS

DEPARTMENT OF MUSIC

June 21, 2021

STATEMENT OF SUPPORT

In the late 1970s, György Ligeti asked James (Andy) Moorer and me to join him in his effort to build an interdisciplinary research center at the Hochschule für Musik supported by the Computer Science Department at the University of Hamburg. Much has changed, of course, in the subsequent decades, with powerful, inexpensive computer systems and, every bit as important, the education of composers/scientists. Therefore, I very much welcome Prof. Georg Hajdu's initiative to establish the Ligeti Center at the Hamburg University of Music and Drama. With his model background in music, science, and technology, Hajdu seems to be the ideal person to start and successfully realize such an undertaking in the name of this outstanding composer and friend whose artistic contributions epitomize the notion of research in and for art.

We at Stanford University wish him good fortune in this endeavor. We pledge to offer our expertise and experience in supporting this project, which will be a boon to the HfMT, the city of Hamburg, and the German cultural landscape.

John M. Chowning
jc@ccrma.stanford.edu

Center for Computer Research in Music and Acoustics CCRMA

Figure 4. John Chowning's letter in support of the application for the *ligeti center*.

In the same year, the doctoral student artistic research project KiSS (Kinetics in Sound & Space) received funding for six part-time research assistantships (German Qualifikationsstellen) and the position of a coordinator. KiSS, which brought together people from such diverse areas such as multimedia composition, sound design, theater dramaturgy, musicology, and improvisation, was confidently steered by doctoral student Benjamin Helmer. In addition, KiSS was able to support a variety of projects including several full-scale music theater projects, installations, performances and a book release [3].

2.3 Multimedia Composition and ZM4

As certain areas at the HfMT are chronically underfunded, Hajdu repeatedly sought third-party funding. Hence, the university became part of the multi-year European Culture 2007 CO-ME-DI-A project on networked and telematic music, initiated the Healing Environment project together with music psychologist Clemens Wöllner of the University of Hamburg focusing on interactive sound installations in hospital waiting areas, and, in 2017, considerable funds were raised for the Stage_2.0 project as part of the Federal-State Innovative Hochschule initiative. In the application, Hajdu and co-author Jacob Sello set out to define the (music) stage of the 21st century. They came up with the following four categories:

- Real stages as dedicated performance spaces
- Virtual stages mediated by digital technologies
- Alternative stages as public places outside the established venues
- Hybrid stages as a combination of the previous three categories

Figure 5. Musicians performing in the Symphony in the St. Pauli Elbe Tunnel.

Between 2018 and 2022, the university thus embarked on numerous structural, strategic and translational projects some of which also took an unexpected turn during the Covid pandemic. Among them were (1) in 2019 the Symphony for the St. Pauli Elbe Tunnel[12] which placed 144 musicians in an elongated circle of a circumference of nearly 900m around the two tubes of this Hamburg landmark, synchronized by software developed at the HfMT [5], (2) the Moving Sound Pictures project which turned some of the classics of modern abstract painting such as *Der weiße Punkt* by Wassily Kandinsky into VR installations[13], (3) the *Remote Choir* at the 2021 online-only edition of the TENOR conference[14] which featured a choir of singers performing from their homes, controlled by animated notation (some of which used the same technology developed for the tunnel project) and (4) the large-scale multimedia project *A Space Journey – Perspectives of the Unknown* which brought together members of the HfMT multimedia and theater departments and astrophysicists from the university of Hamburg[15]. This two-hour production which premiered in October 2022 involved nearly 80 people (a 19-member Bohlen-Pierce ensemble with choir among them) and made use of the state of art technology installed in the main concert hall (a 146-speaker Meyer Sound constellation system[16] and a modular 600 square feet video wall mounted on a computer-controlled fly system).

3. THE LIGETI CENTER - A NEW PLACE FOR ARTS, SCIENCE AND TECHNOLOGY

Despite its obvious success—one of the sub project leaders was even invited for her work with seniors during the pandemic to a celebratory event organized by the president of the Federal Republic of Germany—neither the

[11] https://mutor-2.github.io/ScienceOfMusic/
[12] https://youtu.be/BXlaSBo0KXs
[13] https://youtu.be/zprjeT97RRI
[14] https://www.youtube.com/live/1sumbS_c8Y4?feature=share
[15] https://youtu.be/-2TCAVtklrQ
[16] https://meyersound.com/news/hfmt-hamburg/

university nor the City of Hamburg were able to allocate further funds to sustain the project. Concerned about a similar fate that Ligeti's first attempt at establishing a computer music center had endured, the HfMT decided to apply again together with the University of Applied Sciences, the Technical University and the University Medical Center to the same funding program in order to establish a Research and Transfer Center in the Harburg district of Hamburg. Searching for a suitable name that would also be suitable as an acronym. The choice fell on Ligeti, who would have turned 100 in 2023 and who 50 years earlier had made the founding of a center for computer music in Hamburg a condition of his appointment negotiations. The acronym stands for *Laboratorien für Innovation und Gesellschaftliche Entwicklung durch den Transfer von Ideen* (Laboratories for Innovation and Societal Development through the Transfer of Ideas). On May 5, 2022, the HfMT received the good news that its application had been successful. As mentioned before, the idea of transdisciplinarity was essential to Ligeti—connecting disciplines across the boundaries of music, fine arts, humanities, natural sciences, medicine, and technology. In this vein, the *ligeti center* will host twelve sub-projects in two clusters for a period of five years from 2023 to 2027: the cluster for music and health and the cluster for the transfer of ideas, knowledge, and technology. Especially against the backdrop of the Covid 19 pandemic, the field of work of the first cluster appears to be of particular societal relevance and aims to contribute to the exploration of the health-promoting effects of music and sound. The second cluster for the transfer of ideas, knowledge and technology brings together various laboratories in which cross-university and transdisciplinary cooperation takes place in working groups. The six labs (Artistic Research Lab, the XR Lab, the Innovation Lab, the Haptic Lab and the Sustainable Theater Lab) cover a wide range of topics which are expected to lead to synergies between the groups. As the core element of the *ligeti center*, the Production Lab will be established as a flexible production studio, serving as a platform to enable the members of both clusters as well as guest artists and scientists of the center's residency program to experiment with future technologies and enter into a dialogue with the public.

The opening of the *ligeti center* took place on May 3, 2023 in the presence of the second mayor of Hamburg, Katharina Fegebank, as well as John and Maureen Chowning who had flown in from Palo Alto to see the idea of a center finally come to fruition.

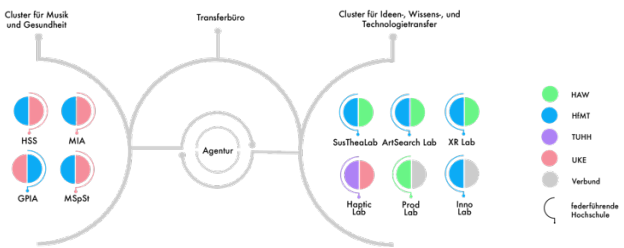


Figure 6. Overview of the 12 projects and work groups in the *ligeti center*. MIA = music therapy institute and teaching clinic; HSS = Healing Soundscapes; MSpSt = consultation hour for musicians with health concerns; GPIA = preventative healthcare for instrumental performers; Inno Lab = Innovations Lab; XR Lab = Extended Reality Lab; ArtSearch Lab = Artistic Research Lab; SusTheaLab = Sustainable Theater Lab; Prod Lab = Production Lab.

4. CONCLUSIONS

On the occasion of György Ligeti's 100 birthday and 50 years after his appointment as professor of composition, his vision of a transdisciplinary research center for art, science, health and technology is finally becoming reality. This center carries his name which can also be read as an acronym in line with its mission: innovation and societal impact through the transfer of knowledge.

Acknowledgments

We would like to acknowledge the Federal Ministry of Education and Research in Germany (BMBF), for their support of this research through the Innovative Hochschule initiative.

5. REFERENCES

[1] G. Hajdu (ed.), *13 Jahre: Masterstudiengang Multimediale Komposition an der Hochschule für Musik und Theater Hamburg*. HfMT Hamburg, 2017.

[2] J. Sello, "The Hexenkessel: A Hybrid Musical Instrument for Multimedia Performances," *NIME*, pp. 122–125, 2016.

[3] Th. Görne, G. Hajdu, B. Helmer, J. Richter (eds.), *KiSS, Kinetics in Sound & Space.* Wolke, 2022.

[4] G. Hajdu, "Von der Mövenstraße zum Ligeti Zentrum Mein Werdegang im Spiegel eines großen Komponisten," *György Ligeti im Spiegel seiner Hamburger Kompositionsklasse through a glass, and darkly, but face to face*, Manfred Stahnke, Sidney Corbett, Hubertus Dreyer, Wolfgang-Andreas Schultz, Hans Peter Reutter, Mari Takano (eds.), Hamburg, 2023, pp. 266-285.

[5] G. Hajdu and R. Gottfried, "Networked music performance in the St. Pauli Elbe Tunnel," in *Proceedings of the International Conference on Technologies for Music Notation and Representation (TENOR'19)*, Melbourne, 2019.