THE MICRODYNAMICS OF MUSICAL INNOVATION

THE HISTORY AND FUTURE OF THE HAMMOND ORGAN

The Microdynamics of Musical Innovation. The History and Future of the Hammond Organ

Carlo de Wijs

Colophon

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English translation: James Powell and Sebastiaan West.

carlo@carlodewijs.com
www.carlodewijs.com

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by

Carolus Martinus Maria (Carlo) de Wijs

born in Breda

Erasmus University Rotterdam

Supervisory Committee

Supervisors:

Prof.dr. E.A. van Zoonen

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Other committee members:

Prof.dr. L.H.J. Noordegraaf-Eelens

Prof.dr. B. Wubs

Prof.dr. J. Fidom

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1 Introduction - The Case of the Hammond organ

The Microdynamics of musical innovation of the Hammond organ describes the story of the Hammond organ against the background of the main players, and technological, musical and societal developments. Correspondingly, it is about the special melting pot of instrument, sound and technology. It is my deep preoccupation with this instrument and the contexts in which it lives that has led to this rich and fascinating case study, in which the past and the future are brought together.

As researcher, I bring experience working as a music maker, with other artistic disciplines, with musical and technical innovations of the Hammond organ and with education. The skills that this has bestowed have been operationalised in order to research the Hammond organ in terms of historical and social coherence.

This research employs actor-network theory as well as innovation theory to understand both the history of the instrument and the current period of revival. As such, the research consists of a historical section and a current section, both centred around two questions: firstly, how did the innovations relevant to the Hammond organ in specific periods come about; and secondly, which actors and circumstances played a role in these innovations. The historical research attempts not only to reconstruct the cultural and technological history of the Hammond organ, but also to explore the role of the many musicians that influenced this history. The current section consists of a reflection on my own professional journey --by way of an *autoethnography*--as well as a series of laboratory sessions with musicians, educators, and the Hammond Suzuki company.

In this introduction I highlight three themes: what exactly the Hammond organ is (1.1), what research has already been done on the subject (1.2), and the applicability of concepts from actor-network theory and innovation theory (1.3). In connection with these topics, I formulate several specific research questions (1.4), analyse previous studies of musical instruments (1.5), and outline an actor-network for the Hammond organ (1.6). This introduction concludes with a description of the research methods used for each of these sections.

1.1 What is the Hammond Organ?

The Hammond Organ was invented in the 1930s by the American Laurens Hammond. He sought to create a cheaper alternative for the pipe organ, and inadvertently became one of the prominent forefathers of electric and electronic organs. While attempting to design a smaller, more affordable pipe organ, Hammond and his team of engineers created an entirely new kind of instrument. Their clever solutions to the problems they faced along the way gave the organ an unmistakable, unique sound. This sound grew even more distinct when its users started to combine it with Donald Leslie's revolutionary (and aptly named) Leslie speaker. These combined innovations inspired musicians to introduce the Hammond organ into new musical environments, and thereby delivered it its own place in musical history.

The instrument's history can be divided into several periods. After its successful introduction in 1935 and the innovations that directly followed, the Hammond Company grew to become the international market leader in organ production in the 1950s.[1] Moreover, the next decade saw the company's expansion into a conglomerate that produced more than just organs: the Hammond Corporation. The 1970s saw worldwide economic swings that greatly affected the course of business. This economic crisis, together with the problematic introduction of a novel, yet ill-fated Hammond technology, led to the corporation's bankruptcy in 1985. Its patents, however, were bought by the Japanese company Hammond Suzuki, which ultimately gave rise to the brand's resurrection.

Around the 1990s a whole new musical revival of the Hammond organ began, spearheaded by young organists across the world. The instrument and the Hammond sound experienced a comeback that continues even today, thanks to the digitalisation of the Hammond sound and its use in music production, sound libraries, and the music software of various manufacturers.

Throughout its history, musicians kept placing the instrument in new musical environments, developing new techniques of playing it, and combining it with other technologies such as amplifiers and external accessories. As such, technological

[1] In this text I use the term 'Hammond Company' to refer to the various iterations of this company across the ages. The names Hammond Clock Company (since 1928), Hammond Instrument Company (since 1937), Hammond Corporation (since 1967, of which the Hammond Company comprised a part) and Hammond Organ Company (since 1978), are used in the relevant historical periods.

progress became a catalyst in the processes that led both to successful musical innovations, and to less successful ones. However, in spite of its extraordinary combination of technology and music, there has been little to no research done into the Hammond organ and the Hammond sound.[2]

1.2 What research has been done on the Hammond organ?

Only one article has thus far been written about the organ's original inventor, Laurens Hammond, and the inventions which he devised prior to its creation.[3] Some research has been done into a marginally successful predecessor to the Hammond organ.[4] There are also studies which investigate the origin of synthesised sounds which highlight the development of the Hammond tone-wheel principle and cite it as an inspiration to developers of synthesizers.[5] Some technical universities make Hammond and his method of tone generation, or specific Hammond innovations such as the chorus/vibrato scanner, an object of research. Digital sound emulation and the use of digital filters to achieve the original sound, or new applications of the original Hammond technology, are central to this research.[6]

Additionally, the comparison between Hammond's organ and the pipe organ, as well as the differences in capabilities and limitations between the two instruments, have been the object of research. A Dutch study describes the influence which the pipe

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[2] Kelly Hiser, "Electronic Musical Sounds and Material Culture: Early Reception Histories of the Telharmonium, the Theremin, and the Hammond Organ (Doctoral diss., The University Of Wisconsin-Madison, 2015).

[3] Owen Chapman and Alison Reiko Loader, "On motors, martians and jazz age cities: The stereoscopic inventions of Laurens Hammond," *Public* 24 (47) (2013): 110–122.

[4] Michael Murphy and Eric Kupp, "An examination of early analog and digital sampling - The Robb Wave Organ circa 1927," *Audio Engineering Society Convention*, 134 (2013).

[5] Trevor Pinch, "Emulating sound. What synthesizers can and can't do: Explorations in the social construction of sound," in *BAND 3 Wissen und soziale Konstruktion* ed. Claus Zittel (Berlijn: De Gruyter, 2009): 109-127; Trevor Pinch and Frank Trocco, Analog Days, *the invention of the Moog Synthesizer* (Cambridge, Mass.: Harvard University Press, 2002); David Dunn, "A history of electronic music pioneers, essay written for the catalog that accompanied the exhibition: Eigenwelt und Apparatewelt: Pioneers of Electronic Art," (Austria: Ars Electronica, Linz, 1992): 20-34; "Rise of The Machines: How technology shaped music from the Hammond B-3 to synths and drum machines." published 4 april , 2017. https://www.udiscovermusic.com/in-depth-features/rise-of-the-machines-how-technology-shaped-music/; Peter Webster, "Historical perspectives on technology and music," *Music Educators Journal* vol. 89, no.1 (September 2002); Giulio Moro, Andrew P. McPherson and Mark B. Sandler, "Dynamic temporal behaviour of the keyboard action on the Hammond organ and its perceptual significance," *The Journal of the Acoustical Society of America*, 145 (5) (2017): 2808-2822.

[6] Jussi Pekonen, Tapani Pihlajamäki, and Vesa Välmäki, "Computationally efficient Hammond Organ Synthesis," in Proceedings of the 14th International Conference on Digital Audio Effects (DAFx-11, Paris, 2011); Kurt James Werner, W. Ross Dunkel, and François G. Germain, "A computational model of the Hammond Organ Vibrato/Chorus using wave digital filters," *in Proceedings of the 19th International Conference on Digital Audio Effects*, eds. Pavel Rajmic, František Rund and Jiří Schimmel (DAFx-16, Brno, 2016): 271-278; Kurt James Werner and Jonathan S. Abel, "Modal processor effects inspired by Hammond tonewheel," organs, *Applied sciences* (Switzerland, 6 and 7 June, 2016): 1-18.

organ has had on genres of pop music that typically include Hammond organs.[7] There are also a few studies concerning the use of the Hammond organ in specific Americcontexts, such as at baseball games.[8]

Most research into the Hammond organ centers around the musicians that defined the instrument. Often these studies include in their introduction a truncated history of the life of Laurens Hammond and his tone wheel technique. Some studies describe specific techniques of playing the instrument, analyse transcriptions of influential organists, and describe specific examples of their use of the instrument. Most of these studies make reference to and cite each other.[9]

The authors of these studies often begin their papers in the same way: by taking the organ in jazz as a starting point for new musical styles. They write that Laurens Hammond related the instrument to a pipe organ and its ecclesiastical context, as well as to classical styles. Besides this, the Hammond organ was employed as a modern theater organ and promoted as a living-room instrument. More accessible music styles were at the center of the Hammond Company's publicity surrounding the instrument. These studies then describe how early jazz pioneers introduced the instrument to the Black Christian community (most notably to gospel musicians), giving it an impulse to help develop the sounds of styles such as Rhythm & Blues, soul, and later in rock, pop, and funk.

The studies of Schwartz and Sears are examples of this kind of framework. Sears specifically focuses on the greatest innovator of the jazz organ: Jimmy Smith.[10]

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[7] Fumie Masuda, "Capabilities and limitations of the Hammond organ in imitating pipe organ tones" (Bachelor thesis, London Metropolitan University, Londen, 2004); Jur Leemhuis, "Een onderzoek naar de incorporatie en het specifieke gebruik van de kerkorgelsound in de Nederlandse popmuziek tussen 1967 en 1977 [An investigation of the incorporation and specific use of the church organ sound in Dutch pop music between 1967 and 1977]," (Doctoral thesis, Utrecht University, June, 2007).

[8] Matthew W. Mihalka, "From the Hammond organ to "Sweet Caroline": The historical evolution of baseball's sonic environment" (PhD diss., University of Minnesota, 2012).

[9] Jesse Russell Whiteley, "Hammond technique and methods: Music written for the Hammond organ," (Thesis to the faculty of graduate studies master of arts, York University, Toronto, Canada, 2013, September).

[10] Radam Schwartz, "Organ Jazz" (Dissertation, The State University of New Jersey, USA, 2012, May); Allen Sears, "A walk on the wild side. The story of jazz organ," October-December 1994, http://theatreorgans.com/grounds/docs/wildside.html.

Heinrich researches in his dissertation the early pioneers of the jazz organ that inspired Jimmy Smith to develop his unmistakable sound. He places this movement in a sociological and cultural context and performs an in-depth analysis of the different technical characteristics involved in it. He provides ample musical examples and transcribes entire solos to strengthen his analysis.[11] Hutchinson highlights in his book *The Golden Age of Jazz Organ* (chapter 4) several popular organ trios of the 1960s, and the soul-jazz that arose from these groups.[12] It is noteworthy that Rhoda Scott, an organist who herself played a key role in Hammond history, wrote a master's thesis about Lou Bennett later in her life. Bennett inspired her, as well as standing at the forefront of the birth of a European organ scene.[13]

Nearly all the studies of the jazz organ discussed so far refer to popular and journalistic publications in books or on the Internet, perhaps because there are relatively few scientific sources on the topic.

There is one unofficial biography of Laurens Hammond, in which the inventor tells of his life, the people around him, and the circumstances from which his inventions arose.[14] Several renowned journalists have written about the history of jazz, rock, pop, and electronic music, and have in their accounts paid ample attention to the role of the Hammond organ.[15] There are also publications dedicated specifically to the organ, which typically contain a brief history of the instrument as well as a description of the musicians that influenced its development.[16]

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[11] Darren Heinrich, "The Afrological Soul of Jazz Organ" (PhD diss., Sydney Conservatorium of Music, The University of Sydney, Australia, 2017).
[12] Nelsen Hutchison, "Hammond B3 Organ trios and Soul Jazz 1955 – 1965" (Master thesis, University of California Santa Cruz, USA, 2017, January).
[13] Rhoda R. Sampognaro, "Lou Bennett and the jazz organ scene in Europe" (Master diss., Newark University, The State University of New Jersey, 2014).
[14] Stuyvesant Barry, *Hammond as in Organ*: *The Laurens Hammond story*, *a series of reminiscences from May 1972 through February 1973* (Unpublished, 1974). Available online at: http://thehammondorganstory.com.
[15] The 'Hammond organ'. Laurens Hammond, USA, 1935, *The history of electronical musical instruments from 1800 to 2019*, http://120years.net/the-hammond-organlaurens-hammondusa1935/; Joachim E. Behrendt, "Die Instrumenten des Jazz," in *Das Jazzbuch: Von Rag bis Rock* (Frankfurt am Main: Fischer Taschenbuch Verlag GmbH, 1977), from p. 246; Bob Porter, "Soul Jazz," *in Soul Jazz: Jazz in the black community 1945 – 1975* (Bloomington, Indiana: Xlibris, 2016): 340.
[16] Geoff Alexander, "The jazz organ: A brief history," 1988, updated 2004, http://www.afana.org/jazzorgan.htm; Ian McCann, "Rise of the machines: How technology shaped music from the Hammond B-3 to synths and drum machines," 4 April, 2017, https://www.udiscovermusic.com/in-depth-features/rise-of-the-machines-how-technology-shaped-music/; Mark Vail, *The Hammond Organ: The Beauty in the B. The story of the B-3 and other*

Despite the clear artistic and technical importance of the Hammond organ, it appears that little systematic research into the instrument and/or the sound has been done, and that we lack a theoretical framework through which to unify the instrument's diverse technical and musical facets. This short review of the existing research and the most popular studies shows that the literature until now has placed emphasis on specific components: the instrument's technology, its comparison to other instruments, or its musical biography. It is less clear, however, how the interplay between technique, the instrument's players, related business operations, and societal and commercial changes has influenced its development, the industry around it, and the music arising from it. To achieve a stronger impression of this network of interactions, it is necessary to examine the history and current position of the organ from a new perspective; for this, actor-network theory and innovation theory are perfectly suited.

1.3 Theoretical Framework

The theoretical perspective from which I analyse the innovations surrounding the organ centers around the question of which combination of individuals, groups, techniques, and societal developments is relevant to its study. The Actor-Network Theory (ANT) proposed by French sociologist Bruno Latour serves as my primary theoretical anchor point.[17]

The aim of ANT is to identify the components which played a role in the creation and development of scientific and technological innovations. Both human and non-human entities can serve as such a component. The use of non-human elements is described by Edwin Hayes as follows: "Instead of identifying what non-humans *are*, ANT encourages us to consider what non-humans *do*. We should ask what role it plays in the scenario you're trying to understand."[18] ANT thus focuses on the

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great Hammond organs, plus the Leslie Speaker and much more (San Francisco, U.S.: Miller Freeman Books, 1997); Bob Doerschulk, Rock Keyboard (New York: GPI Publications, 1985); Scott Faragher, *The Hammond organ: An introduction to the instrument and the players who made it famous* (Milwaukee, V.S.: Hal Leonard Books, 2011).

[17] Bruno Latour, *Reassembling the social: An introduction to Actor-Network Theory* (Oxford: Oxford University Press, 2005); Ritske Dankert, "Using Actor-Network Theory (ANT) doing research," 30 November, 2011, https://ritskedankert.nl/using-actor-network-theory-ant-doing-research/; Gerard de Vries, *Bruno Latour* (Cambridge, V.K.: Polity Press, 2016); Nick Prior, "Putting a glitch in the field: Bourdieu, actor-network theory and contemporary music," *Cultural Sociology*, 2 (3) (2008): 301-319; Trevor Pinch, "Between technology and music," in *The emergence of novelty in organizations*, eds. Raghu Garud, Ann Langley en Barbara Simpson (Oxford: Oxford University Press, 2015): 129 – 157.

[18] Edwin Hayes, "Actor-Network Theory and methodology: "Just what does it mean to say that non-humans have agency?"," *Social studies of science*, vol. 44, iss. 1 (2014): 134–149.

interconnections between components, as well as the results of interactions situated within a specific time and place. It does not focus on finding a singular truth or essence, since these can change over time. Latour himself writes that the question is "what role human motivations play, what influence technological means and restrictions had, and even the effect of random chance. It is different every time."[19] Because of this, Hayes sees actor-network theory primarily as a methodology, an approach, and a "tool to help explicate, amplify, and link."[20]

Actor-network theory systematically maps the different actors and circumstances that played a role in an innovation. With this mapping comes the risk, however, that the crucial role of individual innovators is left by the wayside. This is certainly the case with the Hammond organ, in which people can be identified who have accelerated and changed its development. The roles of 'innovators' and 'early adopters,' as outlined in innovation theory, are a relevant addition to ANT which can help us underline the importance of individual creativity.[21]

The American sociologist Everett Rogers can be considered the most successful researcher in the field of the diffusion of innovative ideas, concepts, and technologies within a social system. His work *Diffusion of Innovation* (1962), which was revised many times, is still considered a cornerstone of innovation studies. This study connected terms such as 'innovators' (people who take risks in the process of developing new ideas), 'early adopters' (those who adapt an innovation and communicate it to a larger group), and 'laggards' (skeptics of change, bound to tradition and conservativism) to the study of innovation processes.

Rogers proposed that a person, idea, behaviour, or product must first be experienced as new or innovative before it can be diffused in a social system. This diffusion is a social process that unfolds over time and is not only economical or technological;

[19] Tijmen Schep, "Concept: technologisch determinisme vs sociaal constructivisme," 14 February, 2017, https://www.technologiebeleid.nl/concept-technologisch-determinisme-vs-sociaal-constructivisme/.
[20] Hayes, "Actor-Network Theory and methodology."
[21] Trevor Pinch and Karin Bijsterveld, "Instruments and innovation," in *The Routledge reader on the sociology of music*, eds. John Shepherd en Kyle Devine (New York: Routledge, 2015), 301–308; Erik Tempelman, "De praktische kant van innovatietheorie [The Practical Side of Innovation Theory]," TU Delft, faculty of Industrial Design, https://www.engineersonline.nl/artikelen/id1365-de-praktische-kant-van-innovatietheorie--i.html; Everett M. Rogers, *Diffusion of innovations* (4th edition), (New York: The Free Press, 1995).

interpersonal communication, power dynamics, and personal perceptions play a major role in this process.[22]

The combination of actor-network theory and innovation theory allows us to focus on the microdynamics of innovation; that is to say, the interaction of personal creativity, the contemporary circumstances, and the way in which this interaction leads to innovation.[23] This in the combined approach which I will make use of in this thesis.

1.4 Research Questions

This combination of theoretical perspectives gives rise to the following overarching research question:

How did innovation pertinent to the Hammond organ come about, and what role did individual, social, technological, economic, and other actors play in this process?

Given Latour's observation that interaction between actors is 'different every time,' it is also important to consider how the relative importance and the interactions of the actors changed over time. Considering the extraordinary combination of technological and musical innovation that the Hammond organ embodies, two more research questions have been formulated:

- *How are musical and technological advances interconnected?*
- *What part do non-human actors, such as technique and 'sound,' play in the innovation process?*

[22] Peter Beljaars, "Diffusie van innovatie theorie van Rogers [Rogers' Diffusion of Innovation Theory]," December 2019, https://www.agile4all.nl/diffusie-van-innovatie-theorie-van-rogers/.

[23] 'Microdynamics' is a term which Bob Katz uses in his book "*Mastering audio: The art and the science*". See: Bob Katz, Mastering audio: The art and the science, third edition (Milton Park, Oxfordshire: 2014).
"The art of manipulating dynamics may be divided into Macrodynamics and Microdynamics. I call music's rhythmic expression, integrity, or bounce, the microdynamics of the music. I call macrodynamics the loudness differences between sections of a song or a song-cycle."; https://miloburke.com/blogs/personal-blog/posts/micro-dynamics-and-macro-dynamics; https://www.sciencedirect.com/topics/engineering/microdynamics; https://www.systemsinnovation.io/post/micro-macro-dynamics; https://discovery.ucl.ac.uk/id/eprint/15192/1/15192.pdf.

1.5 Actor-Networks and Innovation in Musical Studies

Studies into other musical instruments have already been conducted using this theoretical approach.

In 'Analog Days,' Pinch and Trocco illustrate how the invention of the electronic music synthesizer came about, in which Robert Moog was identified as one of the most important pioneers. The story of the Moog synthesizer takes places during the 1960s and '70s. The historical conditions which led to the relevant technical experiments; the influence of groundbreaking musicians such as Wendy Carlos, the Beatles, and Emerson, Lake, and Palmer, who paved the way for a novel industry; subsequent developments in the field of sound utilisation; live performances; and the industry itself are described in this study.[24]

In his study, Prior discusses 'glitch,' a musical form derived from the sounds that arise from malfunctions in CD players. He argued that focusing only on musicians and their music is not sufficient to describe the broad variety of glitches that exist (transistors, electronic impulses, laptops, digital signal processors, etc.). It is, in fact, the interaction between the musician and this process of 'glitching', that produces these sounds. Prior concluded that "such a comment to glitchs' materiality is not to ignore the position-taking of the musicians, critics, and labels themselves, but to examine human and non-human materials as co-producers."[25]

In *The Story of the Sony Walkman*, the development, popularisation, and worldwide success of the Walkman are outlined, as well as how Sony was able to take an already existing invention and turn it into a success with young people before it became popular among older generations. This study introduces the so-called 'circuit of culture' in which five cultural processes combine to illuminate the success of this product. These processes are representation, identity, production, consumption, and regulation; as such, they are similar to the individual actors of actor-network theory.[26]

[24] Pinch en Trocco, *Analog Days*.
[25] Prior, "Putting a glitch in the field,".
[26] Paul Du Gay, Stuart Hall, Linda Janes, Anders Koed Madsen, Hugh Mackay, and Keith Negus, *Doing cultural studies: The story of the Sony Walkman*, second edition (Newbury Park, California: Sage Publications Ltd, 2013).

Using these studies, it is possible to construct a precursory outline of the actor-network surrounding the Hammond organ.

1.6 Actor-network of the Hammond Organ

The components of the actor-network which has gradually shaped the Hammond organ can be visualised in the following model, which maps clusters of actors relevant to the instrument.

The actor 'Hammond Company' (A1-HC) zooms in on the role of the company itself; inventor and founder Laurens Hammond, the company's origin, its growth, and the changes it underwent throughout the 20th century. The factors of marketing, PR, and communication also played an important role in this process.

The actor 'materials' (A2-MAT) encompasses the organ itself: the choice of specific materials for its construction, its size, its weight, its design, its ergonomics, and the relevant production processes. This actor also includes which rooms the instrument was designed for, and the prices of the different versions of the organ.

The actor 'sound' (A3-SND) includes all aspects of the instruments related, surprisingly, to its *sound*—the relevant technologies, the sound that was originally produced analogically (in the 1930s), and the new shape which this sound was given with the advent of the digital age (from the 1960s-present).

The actor 'musicians' (A4-MUZ) describes the creative and rejuvenating role of specific musicians. It describes who these musicians were, what education they had in the field, what playing styles they derived from this education, to which musical and social communities they belonged, and how their music was received. It centers on the question of how these musicians contributed to the changes and developments of the organ and the sound.

Finally, the actor 'societal context' (A5-MIJ) has had a great amount of influence on the business strategies of the Hammond company across the ages. It is relevant to the demand for the organ, the role of North America in industrial processes, the role of education, and the influence of government policy, several economic crises and wars, and the availability of materials.

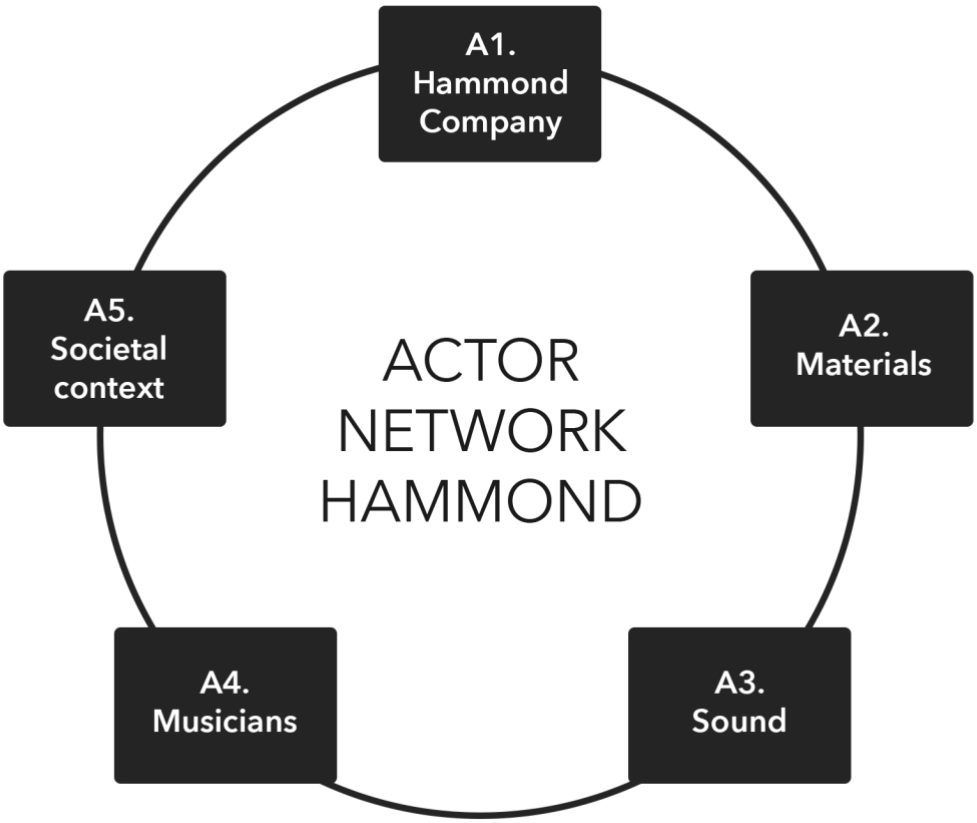

Fig. 1 The Hammond actor-network, modeled after Latour's actor-network theory.

ANT gives us an academic lens with which we can analyse the development of the Hammond organ across different historical periods. This examination gives rise to a study of innovation that illuminates how this actor-network functions in historically specific circumstances. It goes without saying that the actors will affect each other differently in different historical periods. By empirically answering questions such as this, we can acquire scientific insight into not only the development of the Hammond organ, but into the microdynamics of innovation by and large.

1.7 Multiple Methods Design and Dissertation Outline

This dissertation can be classified as a 'multiple methods' design: it makes use of different methods of data collection and analysis within the domain of qualitative research to clarify and describe the development of the Hammond organ over the years. The content of each chapter is as follows:

Chapter 2 – The genesis of the organ, 1930s-40s.

This chapter describes the early development of the Hammond organ. It begins with a global overview of the elements which comprised Hammond's organ, as well as the innovations he introduced. It will subsequently analyse how different external actors from the actor-network (the company, its technology, the musicians, and the societal structures around it) influenced the organ's development. The data for this chapter have been compiled using desk research and literary research.

Chapter 3 – Heyday and the End of an Era; 1950s-80s.

This chapter delves into the role of the Hammond Company, the interplay between its products, old and new technologies, marketing strategies and external influences, namely from the surrounding government, market, and economy. How was the Hammond Company able to make themselves into the market leader of an entirely new category of instrument in little more than a decade? How did changes in the actor-network bring an end to this era of success? The data for this chapter have been retrieved from the "Hammond Organ Company Records, 1929-1985,' that were moved to the Chicago History Museum after the company was dismantled. These consist of reports of board meetings, internal correspondences, yearly reports, technical designs and patents, blueprints, market analyses, presentations, promotion material, and many other documents. A complete description of these sources, compiled through desk research, is available in Appendix I.

Chapter 4 – The Musicians

The role which the musicians played in the development and popularisation of the Hammond organ is central to this chapter. It focuses on how the instrument found a place in different musical streams; how different musicians used the instrument; which new techniques these musicians introduced; and the role of the new tools they introduced.

The research methods for this chapter consist of desk research and in-depth interviews. Appendix II contains an overview of different interviews with people relevant to chapters two to four.

Chapter 5 – An Autoethnography.

This chapter describes my own professional career through the lens of three 'critical moments' that were both the logical consequences and the unexpected results of critical events in my life. In each of these moments, a specific combination of actors caused my musical direction to take an entirely different turn from what I had grown to expect. In this chapter, I describe how my own professional development is connected to the history of the Hammond organ. In this way, I use my professional experience as a means of analysing in as much detail as possible the microdynamics of the Hammond organ from the 1970s onward. The methodology used is an 'autoethnography.' Appendix IV contains detailed information regarding the innovations involved in this process.

Chapter 6 – World of Hammond.

This chapter centers around the question of whether the innovations outlined in chapter 5 can also be scaled up to other domains, specifically the broader community of Hammond organists, music education, and the international Hammond market. Between 2016 and 2019, I and my collaborators organised a number of laboratory sessions and interactions, the central goal of which was the creation of 'World of Hammond,' a multidimensional platform for the Hammond community. I subsequently analyse the position of each group in relation to the Hammond community and the platform. These interactions with musicians, educators, and business people have given rise to the case study World of Hammond (WOH). The WOH plan and a list of participants in the lab sessions can be found, respectively, in appendices IV and II.

Chapter 7 – Conclusion, Reflection, and Recommended Reading

A reflection on how the actors that led to innovation operated in different configurations, is central to this chapter. The actors maintain their influence, but the relationships between them and the influence they had on processes of change are constantly evolving. This interplay gives rise to systems that both stimulate and clash against each other in the microdynamics of innovation. This chapter tells the story of the

Hammond organ against the background of technical, musical, and societal developments, including the primary actors that brought about technical and musical innovations. It also looks at the future and explores themes for subsequent research.

2 The Genesis of the Organ: 1930s-1940s

The Hammond organ was developed in the 1930s by the American inventor Laurens Hammond. Originally seeking to create a viable alternative to the pipe organ, Hammond inadvertently became one of the prominent forefathers of electric and electronic organs. In this chapter, I describe the early stages of the instrument's development, starting with a global overview of the elements which comprised Hammond's organ, as well as the innovations he introduced. This section is partly based on a biography of Laurens Hammond written and published by Stuyvesant Barry (1974), a musician and educator who had access to Hammond's journals and conducted a series of interviews with him. I then proceed to analyse how different external actors from the actor-network outlined in chapter 1 (technique, the Hammond company, notable musicians, and societal context) have influenced the organ's development.

2.1 The Inventor and the Invention

Laurens Hammond was born on January 11, 1895, and grew up in Evanston, Illinois. After his father's unexpected and tragic suicide in 1897, Laurens' mother Idea Louise Strong Hammond (1858-1924), an artist, began looking for a healthier cultural environment where her children could receive a better education. As Laurens' father had been a banker, Idea had access to sufficient coupons and dividends to subsist from, and to fund moves to Paris, Geneva, Dresden, and again to Paris. This cultural upbringing brought Laurens in contact with the concept of pipe organs, something which likely happened in Dresden. He also received piano lessons for a time, but appeared surprisingly lacking in talent, causing him to stop quickly. Laurens was fourteen years old when the family returned to the U.S. He studied at Cornell University in Ithaca, from which he graduated in 1916 with a degree in mechanical engineering.

This intense, broad, and educational origin must have been of great importance to the young Hammond's development. His mother rewarded initiative and perseverance and appeared to view Hammond's creativity and odd behaviour in school not as a deviation from the norm, but as an expression of his extraordinary talents and nascent personality. Hammond already possessed the ambition to become an inventor from an early age, and his family completely supported this passion. This personal support,

combined with an intentionally international and artistic upbringing and a high-quality education, formed a broad foundation on which the young Hammond could build himself up to be a visionary and a successful innovator.

Stuyvesant Barry writes that the inventor possessed a naturally inquisitive and curious spirit, and began busily solving technical problems at an early age.[27] At the age of twelve, during his stay in France, he developed an automatic transmission system for automobiles, which he presented to the automotive manufacturer Panhard. At 16, he acquired his first patent for the development of a remarkably precise differential mercury barometer.

During the First World War, Hammond served for the American Army in France. Soon after the end of the war, he began his first job as head engineer at the Grey Motor Company. According to Barry, this company could not keep him long; Hammond had a strong desire to be an independent inventor. After leaving Grey, he established himself as such in Detroit, where he developed a mechanical silent ('tickless') clock in 1920 as well as a stereoscopic *3D Teleview*, through which three-dimensional moving images could be viewed, in 1922.[28] Another 3D contraption, the Shadowgraph (1923), catalysed the development of a compact synchronous motor which was able to continually keep time.[29]

With this innovation, Hammond was able to improve the mechanics of the Telechron. This electric clock was developed by Henry Warren and was driven by a synchronous motor produced by the General Electric Company. Meanwhile, Hammond had created the Hammond Clock Company (Chicago, 1928), where he modified Telechron clocks, adding his own improvements to help them run more smoothly. One of these improvements ultimately served as the basis for the genesis of the Hammond organ.[30]

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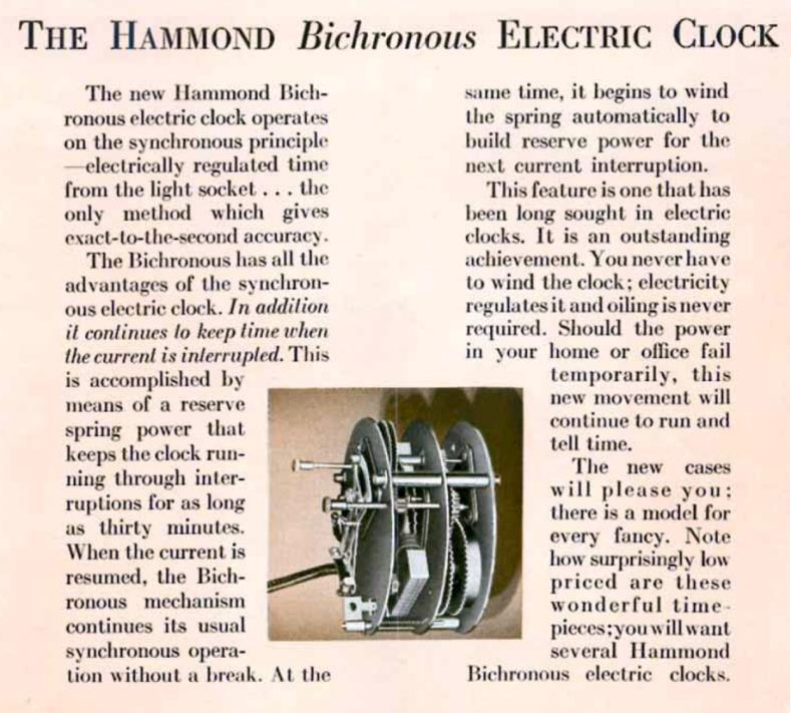
[27] Hammond Organ Company, "The story of the Hammond Organ Company. A company that created an industry," brochure distributed on the 30th anniversary of the Hammond Organ Company, ca. 1967; Hammond Organ Company, "Fifty years of musical excellence. 1934 – 1984," brochure distributed on the 50th anniversary of the Hammond Organ Company, 1984; Barry, *Hammond as in Organ*, chapters I – IX.
[28] Hammond Organ Company, "The story of the Hammond Organ Company,"; Hammond Organ Company, "Fifty years of musical excellence,"; Barry, Hammond as in Organ, chapter X; Owen Chapman and Alison Reiko Loader, "On motors, martians and jazz age cities: The stereoscopic inventions of Laurens Hammond Public 24" (47) (2013): 110–122.
[29] Barry, *Hammond as in Organ*, chapter XI.
[30] Idem, chapter XIII.



THE HAMMOND *Bichronous* ELECTRIC CLOCK

The new Hammond Bichronous electric clock operates on the synchronous principle —electrically regulated time from the light socket . . . the only method which gives exact-to-the-second accuracy.

The Bichronous has all the advantages of the synchronous electric clock. *In addition it continues to keep time when the current is interrupted.* This is accomplished by means of a reserve spring power that keeps the clock running through interruptions for as long as thirty minutes. When the current is resumed, the Bichronous mechanism continues its usual synchronous operation without a break. At the same time, it begins to wind the spring automatically to build reserve power for the next current interruption.

This feature is one that has been long sought in electric clocks. It is an outstanding achievement. You never have to wind the clock; electricity regulates it and oiling is never required. Should the power in your home or office fail temporarily, this new movement will continue to run and tell time.

The new cases will please you; there is a model for every fancy. Note how surprisingly low priced are these wonderful timepieces; you will want several Hammond Bichronous electric clocks.

Fig. 2 The Hammond Bichronous Electric Clock.

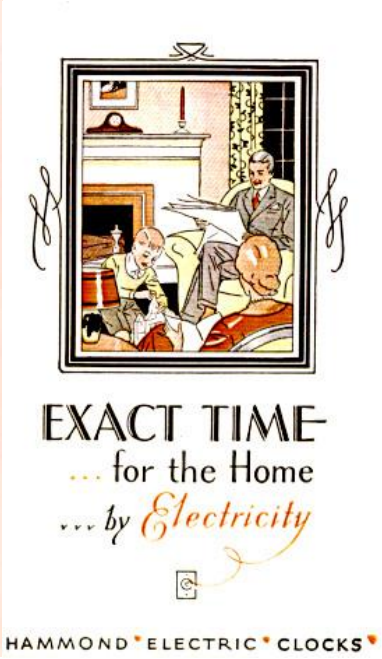


Fig. 3 Hammond ad 'Exact Time'.

2.1.1 The First Organ

Hammond began to develop what would later become the Hammond Organ—based on the idea of *additive synthesis*, the stacking of multiple basic sine waves—in 1931, and had created a working prototype by 1934. The same year, he demonstrated the prototype to the U.S. Patent Office, which granted him a patent for his invention. The first production model, the Series A, was displayed at the 1935 Industrial Arts Exhibit at the Rockefeller Center in New York. The initial reactions to the instrument were overwhelmingly positive. Among the first people to purchase the instrument were such celebrities as George Gershwin and Henry Ford.[31]

Hammond's organ was initially designed to give church organists access to an organ at home, instead of in an often-frigid church. Indeed, the Hammond organ was much more compact than most church organs, as well as more technically reliable, cheaper, and suitable for living rooms. In 1936, the first year of production, Hammond

[31] The Hammond Organ Company, "The story of the Hammond Organ Company,"; Hammond Organ Company, "Fifty years of musical excellence,"; Barry, *Hammond as in Organ*, chapter XIV; https://www.hammondclub.nl/; G.H. Stephens, Patent Organ Console, 7 July, 1936, (Chicago History Museum Collection); Laurens Hammond, Hammond Originele Patenten Orgel, 24 April, 1934 (Chicago History Museum Collection).

sold 1,763 units.[32] It quickly became clear that it would be a challenge to match the high demand for the instrument, due to the complex assembly process.

Most Hammond organs were sold either privately to individuals, or to churches and theaters. The existing industry of pipe and theater organs, which had until that point supplied churches and individuals with organs, saw the new Hammond instrument as a viable and cheaper competitor, and convinced the Federal Trade Commission (FTC) to launch an investigation into business practices within the Hammond company which they deemed to be unfair. Laurens Hammond himself maintained that his organ had a 'voice of its own' and that he did not intend to imitate the pipe organ. Hammond proposed a unique listening test, in which an independent commission compared the sounds of the instruments to decide whether Hammond's instrument could bear the moniker of 'organ.' Hammond passed with flying colours, and the Hammond organ was allowed to keep its name.[33]

2.1.2 Innovations

Hammond and his chief engineer, John Hanert, continued to work on innovations and novel electronic instruments based on the lessons they learned from building the Hammond organ. They built an electronic piano, based on an existing Steinway model, and designed (and produced!) a Roll Player organ.[34] They also produced the *Novachord*, a complex, expensive, and ultimately unsuccessful instrument that, despite its failure to catch on when it was first constructed, is considered by many authors to be the predecessor of polyphonic synthesizers, the first of which were only introduced in the 1970s (see paragraph 2.3.5).[35]

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[32] Hartley Rogers & Company Inc., An analysis of the Hammond Clock Company, common stock, 17 March, 1936, New York (Chicago History Museum Collection).
[33] Boendermaker, Interview, Appendix II; Barry, *Hammond as in Organ*, chapter XVI; Hammond Organ Company, "Fifty years of musical excellence,"; Henry B. Aldridge, " "Music's most glorious voice": The Hammond organ," *Journal of American Culture*, Vol. 19, Iss. 3 (1996): 1-8; Federal Trade Commission (1937), *In the matter of the Hammond Clock Company*, Docket No.2930, complete report, 100 pages and appendices (Collectie Chicago History Museum); Charles Richard Lester, "253 million possible tones. A review of the 1937 complaint filed with the Federal Trade Commission by the Pipe Organ Manufacturers Association against the Hammond Organ Company" (1937); Kelly Hiser, "Electronic musical sounds and material culture: Early reception of the Telharmonium, Theremin, and the Hammond" (PhD diss., University of Wisconsin-Madison, 2015), Chapter 4: Real organ music, 198-274.
[34] The 1937 BC model, which featured a taller cabinet, contained the 'roll playing mechanism' which was implemented in Boston, with permission of the Aeolian Skinner Organ Company. See also: Hammond Organ Company, "The Story of the Hammond Organ Company," 21.
[35] Pinch and Trocco, *Analog days*; Hammond Organ Company, "The story of the Hammond Organ Company,"; Hammond Organ Company, Fifty years of musical excellence; Barry, *Hammond As In Organ*, chapter XIV;

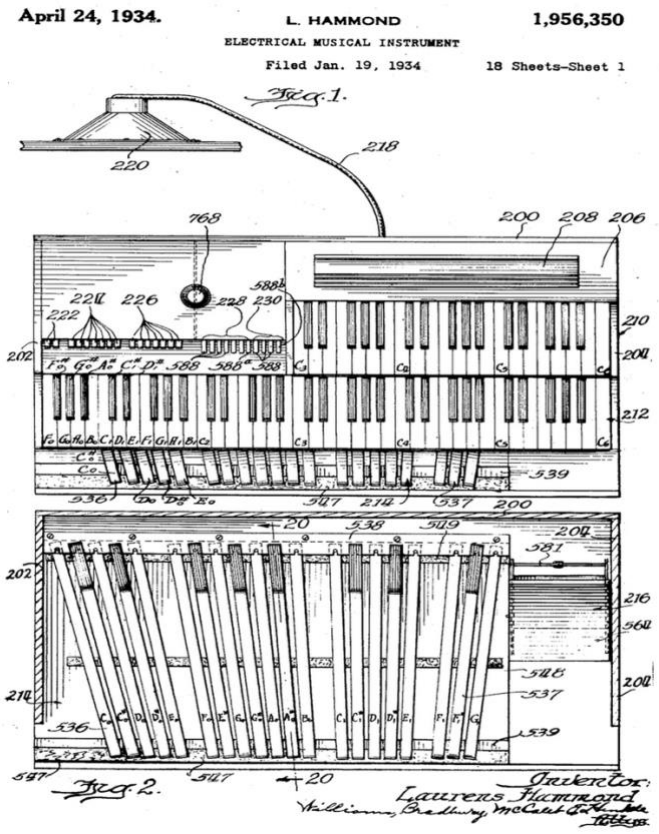

Fig. 4 From the patent application for the Hammond organ, 1934.

2.1.3 The Hammond Enterprise

As an entrepreneur, Laurens Hammond gathered around him a staff that was competent in not only technical and commercial, but also in organisational areas, which allowed his attention to remain primarily on innovation and the development of products.[36] In 1938, the Hammond organ was already in use in 39 countries, one of which was the Netherlands. Well-known musicians used it in different musical streams and began to specialise in the instrument. Hammond was strongly interested in the thoughts and opinions of Hammond organists and used their feedback to further optimise his instrument. Because so many musicians valued the instrument, it began appearing on the radio more frequently, and due to this, its popularity increased steadily.

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http://www.encyclo.nl/begrip/Subtractieve%20synthese; "Blazing New Trails," in *Popular Mechanics* (August, 1939); Dunn, "A history of electronic music pioneers,".

[36] All sources in this footnote are derived from Rien Boendermaker' archive: "Advertentie Hammond pijploze orgels NV," in *Herald for Reformed Churches* (1937); "Prof. Dr. Willem Mengelberg prijst het Hammondorgel aan," in Herald for Reformed Churches (3 July, 1937); J.H.C. Lisman, "Electrische Music," article in *Caecilia and Music*, 1938 edition.

In 1937, the company's name was changed from Hammond Clock Company to Hammond Instrument Company. Its workforce consisted of highly educated craftsmen since Hammond held his products to a high standard of quality. Another innovatory change was the transition to production on a conveyor belt, inspired by the technologies which Henry Ford had developed for the production his company's seminal car, the Model T.[37]

2.1.4 Personal Life

Hammond married Mildred Anton-Smith (1900-1954) and together they had two daughters, Polly (1925) and Peggy (1933). After a tragic accident in which Mildred lost her life, Hammond remarried, and was wed with Roxane Harrison in 1955. Until his retirement at 65, Hammond remained the central member of his company. His retirement meant for him a complete withdrawal from the company, a conviction to which he had long been committed. In an unauthorised biography, he said that he never wanted to look back, and he maintained this until his death on July 1, 1973. At that point, Hammond had claimed 110 patents under his name.[38]

THE NEW YORK TIMES, TUESDAY, JULY 3, 1973

Laurens Hammond Dies at 78; Invented Electric Organ in 30's

Special to The New York Times

CORNWALL, Conn., July 2—Laurens Hammond, inventor of the electric organ, died yesterday at his home here. His age was 78.

Mr. Hammond, who retired as chairman of the Hammond Organ Company (now the Hammond Corporation) in 1960, had also invented a "tickless" electric clock, a system for projecting stereoscopic motion pictures and an improved barometer.

With six workmen in a small room over a Chicago grocery store, he organized the Hammond Clock Company in 1928.

Mr. Hammond turned to the complex problem of producing music by electricity in the early nineteen-thirties. Using the keyboard of a battered secondhand piano, he experimented to create a musical instrument of fine tone and wide range, in which electricity replaced reeds and pipes.

In 1935, the first model of the Hammond organ came out. The late George Gershwin was the first purchaser. Instead of using the conventional tablets for changing tonal combinations, the organ embodied a series of drawbars that made it possible for an organist to form myriads of tonal combinations. The instrument was unaffected by temperature changes, and it could not get out of tune. The company became a leader in its field.

Mr. Hammond had received his first patent as a boy in France, where his mother took him three years after his birth in Evanston, Ill. The patent was for a transmission for automobiles. He received a patent when he was 16 for a barometer that could be sold for $1.

Mr. Hammond earned a mechanical engineering degree from Cornell University in 1916.

Merrill Chase, 1955

Laurens Hammond

In World War I he served in the Army in France and rose to captain. He was a civilian consultant to the guided-missile section of the Army Air Forces in World War II.

Mr. Hammond also worked on stage effects with the late Florenz Ziegfeld, impresario of the "Follies."

Discussing inventing in an interview some years ago, he said, "You have to have some talent and luck; luck is very important. You should keep looking for new ideas."

"A good field for the inventor," he remarked, "is toys for adults."

Surviving are his widow, the former Roxana Scoville, and a daughter, Mrs. Kazimir Karpuszko of Minneapolis.

A memorial service will be held Friday at 2 P.M. in the Second Congregational Church,

Fig. 5 Hammond's epitaph

[37] "Building organs," 1955, https://www.youtube.com/watch?v=5ygP1T4LqfE, https://www.youtube.com/watch?v=3GfvaA02i0s.
[38] Barry, *Hammond as in Organ*, chapter XVII; Hammond Organ Company, Fifty years of musical excellence; William B. Ashworth Jr., Scientist of the Day - Laurens Hammond (Linda Hall Library, 11 January, 2019).

2.2 Technology, Innovations, and the Model A

2.2.1 Precursory Technologies

Several groundbreaking inventions preceded and led to the development of Hammond's first Model A organ.[39] One of these was the *Teleview*, an early motor-driven device made for viewing '3D motion pictures.' The subsequent *Shadowgraph* projected the moving green-and-red shadows of theater actors onto a screen, and was shortly used for the theater piece Ziegfeld Follies on Broadway. The *A-box* was an entirely different invention which converted AC electricity, which was delivered to houses, into DC. Hammond also designed a mechanical bridge table which automatically dealt cards to players.

All these experiments gave Hammond expertise which he would need in designing a synchronous motor, which could also be used in other settings. For example, in an electrical clock this motor ensured a constant display of time. The construction of a mechanism to start this clock gave rise to another improvement: the motor could turn eleven times more slowly than the already-successful Telechron, which Hammond had been using as a reference. The motor had been designed with simple mechanics and a plain exterior, due to a lack of funding, yet this actually propelled the clock to become a more successful product than the Telechron.

[39] The 'Hammond organ'. Laurens Hammond, http://120years.net/the-hammond-organlaurens-hammondusa1935/; Dunn, A History of Electronic Music Pioneers; Webster, "Historical perspectives on technology and music,"; Boendermaker, Interviews, Appendix II; Hiser, "Electronic musical sounds and material culture,".

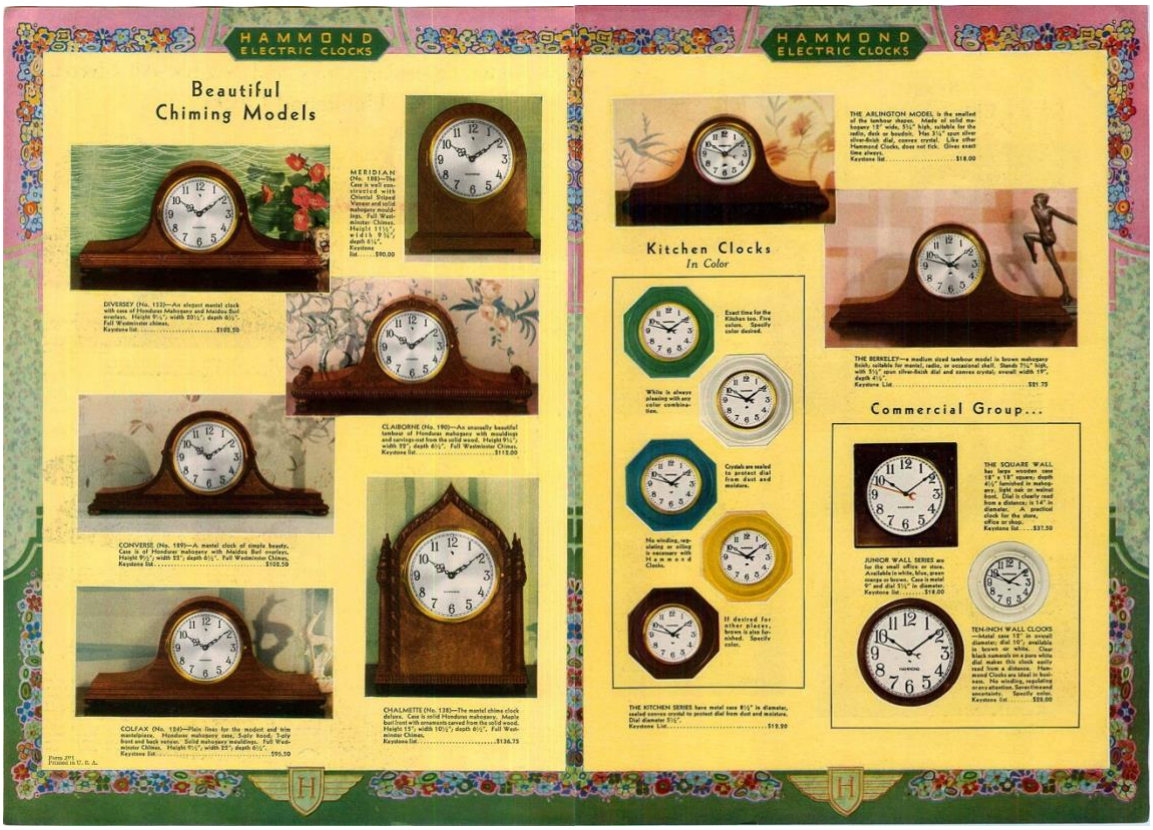

Fig. 6 Hammond Clocks folder.

The Hammond Clock Company in Chicago developed a variety of models for both living-room and commercial markets. This clock market was expansive, and many companies appeared which began to produce clocks using Hammond's invention. In 1932 there were already 120 American producers of electric clocks, and the competition among them was enormous. Because of this, Hammond steadily began earning less from his invention, despite numerous improvements and additions. At this point, it was revealed that Hammond's patent already existed in Germany and could thus not make Hammond any more money. When this happened, the Hammond company reduced their production, and as the Great Depression continued Hammond was forced to produce new inventions that could reanimate his dying company.[40]

[40] Barry, *Hammond as in Organ*, chapter XIII; Chapman and Loader, "On motors, martians and jazz age cities".

2.2.2 The Tone Wheel

Hammond's mother was a member of the Episcopalian Church, and as a boy he had always been touched by the awe-inspiring sound of the pipe organ. Hammond wondered if his synchronous motor could also be used to generate electrical signals which, when amplified, could produce musical frequencies.

This way of thinking built upon Helmholtz' principle which stated that tones are composed of a series of pure waves, otherwise known as 'frequencies.' These frequencies are multiples of the frequency of the 'base tone.' If a tone beats 110 times per second (also called 110 'Hertz'), this generates the base tone of 'A.' When this frequency is doubled, it produces the same base tone an octave higher, a so-called 'harmonic.' This principle made it possible to reproduce the sounds of different instruments, providing the right combination of frequencies was known. Physicists also discovered that when a metal wheel with a given number of smooth bumps on its rim was made to rotate near a magnetic pickup, a similar series of oscillations was produced. The number of bumps on the rim of the magnetic wheel, combined with the speed at which the wheel turns, determine the frequency, which is then amplified by a speaker. The faster the wheel turned, the higher the frequency, and the less bumps, the lower the tone.[41]

This possibility had already been explored by Thaddeus Cahill in the 1880s. He built an enormous, 200-ton installation with electric motors of all sizes, as well as ample switches, condensers and electric circuits. Cahill called his creation the Telharmonium (1906). Each motor functioned as a tone wheel and generated the electrical variant of a frequency that, had it been amplified, would have produced its own musical tone. However, since the amplifier would not be invented for another six years, there was no way to turn the electrical impulses into audible music. Cahill attempted to amplify the music by connecting his invention to a telephone line; while this was a revolutionary idea, interference, technical malfunctions, and legal troubles brought an end to his experiments in 1911 (ironically only one year before the invention of the amplifier!).

[41] Barry, *Hammond as in Organ*, chapter XIV; Hermann L. F. Helmholtz, *Sensations of tone*. *As a physiological basis for the theory of music* (London, New York: Longmans, Green, and Co., 1875).

Hammond never personally knew Cahill, but he did several times cite him as an influence on the creation of the Hammond organ.[42]

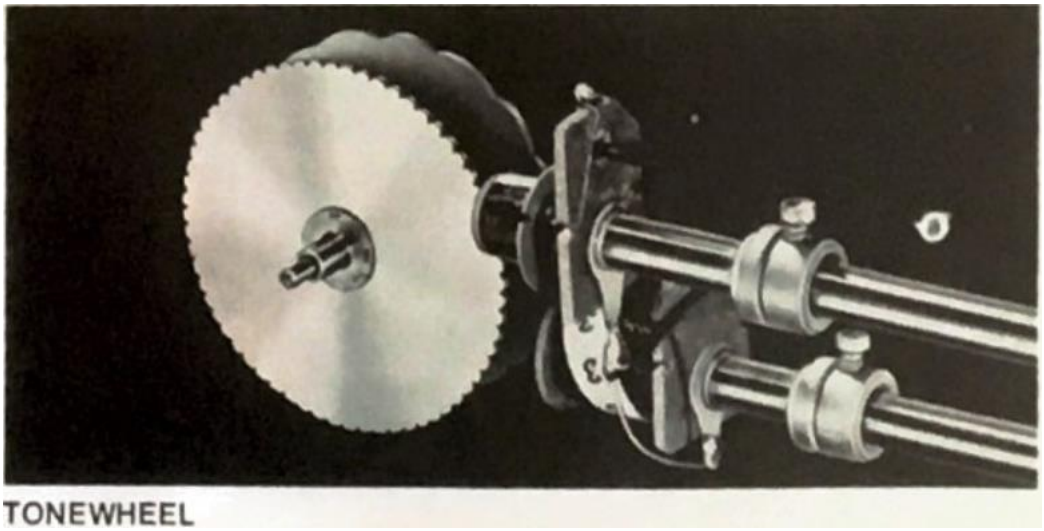

Fig. 7 The electromagnetic tone wheel, as used in Hammond's organs.

In the time between Cahill's and Hammond's experiments, innovations and technological improvements were made which changed the feasibility of Cahill's innovation. Radio broadcasting—in particular its technical aspects—motivated Hammond to begin to delve into the recent innovations in sound-related technology. Hugh Knowles, an engineer at a loudspeaker company, became his mentor in the areas of radio and the acoustics. Knowles taught Hammond largely from a book of Dayton. C. Miller's experiments; this book in turn inspired Hammond and his team of engineers to carry out experiments of their own. These experiments produced the miniature tone wheels that would later be used in the Hammond, as well as other variants of tone wheels which produced less desirable sounds.

Hammond also experimented with using vacuum tubes instead of tone wheels but deemed their sound to be too unstable to use. Since tone wheels are driven by a motor, their tone was so steady that they could even be used to tune other instruments. William Lahey, an employee of Hammond who was also a church organist, called

[42] The 'Telharmonium' or 'Dynamophone' Thaddeus Cahill, USA 1897, http://120years.net/the-telharmonium-thaddeus-cahill-usa-1897/; Dunn, "A history of electronic music pioneers,"; Webster, "Historical perspectives on technology and music,"; Benjamin F. Miessner, "Electronic music and instruments," (Milburn, New Jersey, Miessner Inventions, Inc., November, 1936) *Proceedings of the Institute of Radio Engineers*, Vol. 24, No. 11 (1936).

attention to the flute-like tones which certain experiments produced, and identified which tones sounded akin to those of a church organ. Hammond then bought a second-hand piano, removed everything inside it except for the keyboard, and made connections between his tone generators and the piano's keys. He assumed this configuration would produce a kind of gimmick; for example, he could connect a cheaper, scaled-down version of the keyboard to a radio with speakers and sell the product for thirty or forty dollars. Over time, however, Hammond began to realise that these small inventions could serve as a base for a complete, large-scale organ.

2.2.3 Additions

Before it was completed, the organ would demand numerous additional solutions and compromises. One example is the decision of how many harmonic overtones to add to the tone wheel's fundamental wavelength. Miller had found that it was possible to isolate over thirty distinct overtones from one single of a wind instrument, although the overtones became weaker the higher they were. Hammond felt that, after the eighth overtone, adding extra tones added little to the organ's character, since there was a diminishing amount of difference which could be heard by the human ear. Barring this, it would have been too costly to produce an organ with too many overtone possibilities. A compromise was found by choosing to include the first six overtones, as well as the eighth.

In the Hammond organ, overtones which produce a fundamental tone, or a harmonic a perfect octave above one, are perfectly in tune since their frequencies can be divided exactly. However, the other overtones could not be reproduced precisely, and they needed to be approximated. This theoretical imperfection ultimately contributed to the organ's unique sound; while the Hammond organ is essentially 'in tune' (especially by the standard of the 1930s when computer-assisted tuning did not exist), it deviates from equal temperament at certain points. The choice to leave out the seventh harmonic greatly simplified the production of the organ.

Ultimately, the organ would contain 91 separate tonewheels, affixed to a rotating axle and ultimately producing a tonal series of almost eight octaves. A starter motor was added, which had the power necessary to set the axle in motion and bring it to the necessary speed. This mechanism bore considerable resemblance to the starter motor found in a car engine.

Each tone wheel produced a single sine wave, which on its own sounded flute-like and produced no audible overtones. Since the instrument was built by hand, differences occurred in the wiring, which caused the sequence of overtones for every tone played to vary with each individual instrument. Because of this, each Hammond tone wheel organ has a unique sound despite all being made from the same components. The regulation of the overtones which sounded upon striking any key was carried out by developing controllers that could be pushed in and out, an invention they dubbed the 'drawbar.' These drawbars controlled both which tones were present while playing the organ and the volume of these tones. Each of the two manuals was fitted with nine of these independently controlled drawbars, as well as a series of colour-inverted keys at the left side of the keyboard which functioned as presets. With one of the two sets of drawbars available for each keyboard, an organist could create a combination of registers; and in total it was possible to make circa 253,000,000 combinations of drawbar settings.

The overtones combined with a fundamental sine wave produced realistic, flute-like tones. Theoretically, it would have also been possible to reproduce the more complex tones characteristic of woodwind and brass instruments, had Hammond added more complex overtone combinations and waveforms. This possibility was eventually explored through the development of the Hammond Novachord (1938).

The synchronous motor and the drawbars (combined with the preset functions) are some of the instrument's greatest innovations when compared to the pipe organ. The development of mechanical vibrato and chorus scanners can be cited as a third.[43]

[43] Boendermaker, Interviews, Appendix II; Werner, Dunkel and Germain, "A computational model of the Hammond Organ," 271-278; The Hammond Company, "The wonderful new Hammond Vibrato," an explanation of the vibrato-chorus mechanism.

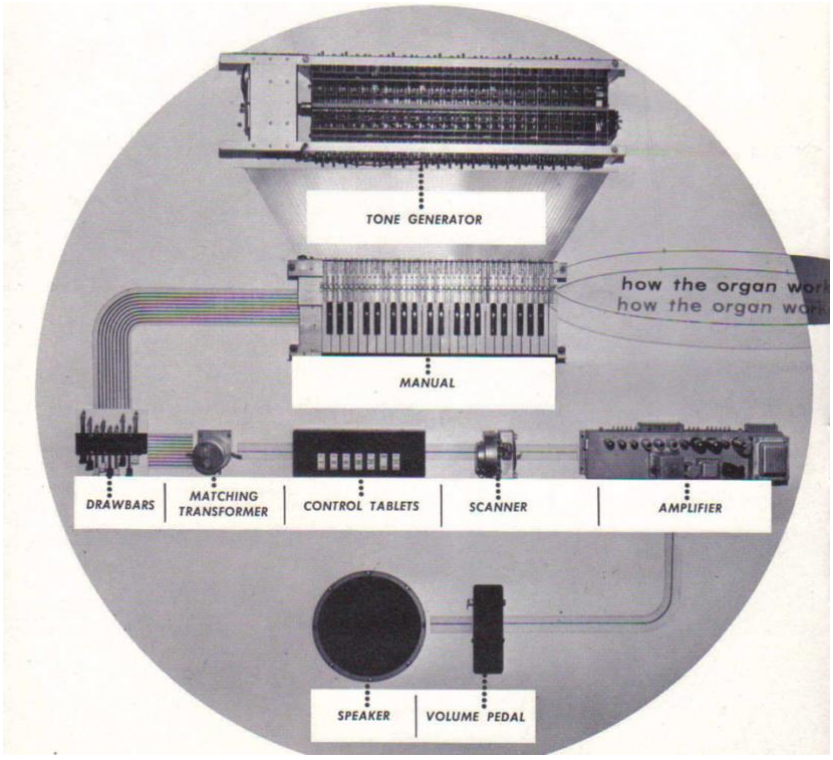

Fig. 8 The innovations of the Hammond organ: "how the organ works."

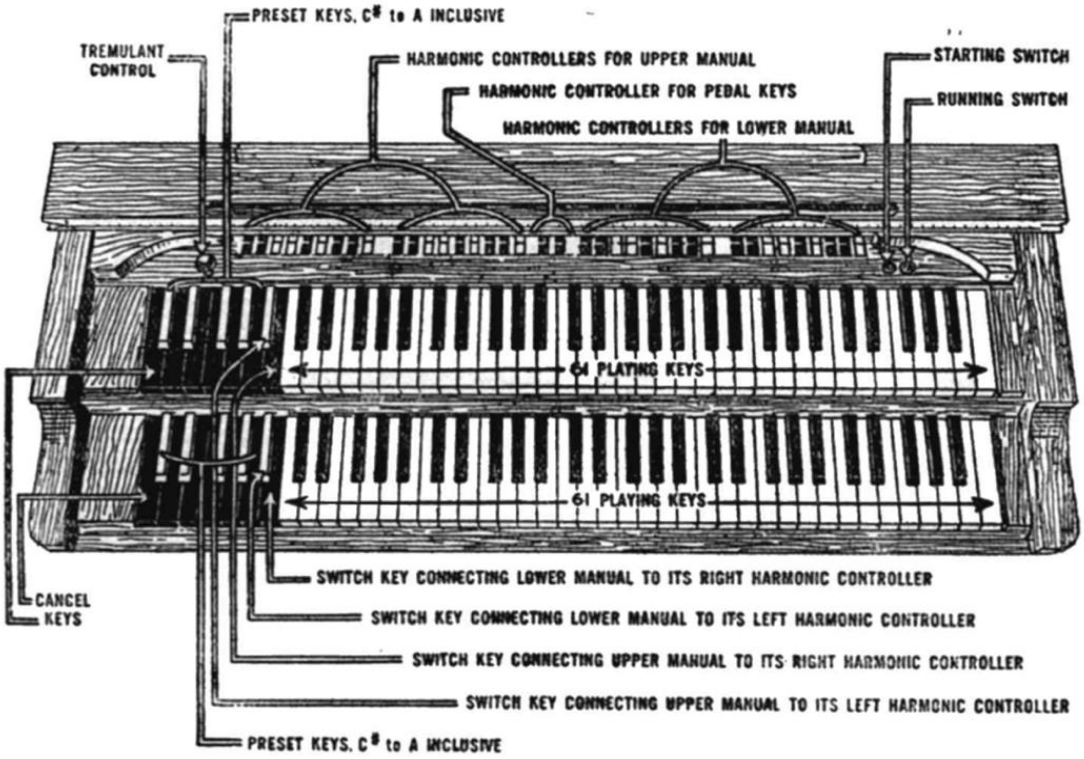

FIGURE 1. PLAN OF CONSOLE (Model A)

Fig. 9 *Diagram of the console of the Hammond Model A.*

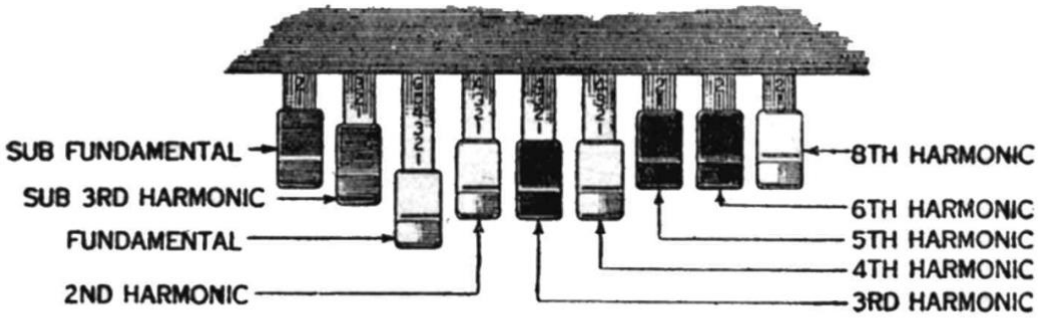

FIGURE 2. A HARMONIC CONTROLLER

Fig. 10 The Hammond's drawbars, and the overtones they modulate

Fig. 11 Hammond Model A.

Unlike a pipe organ or piano, the organ did not need to be tuned. With the right frequency of the alternating current, which determines the rpm, the tone always remains constant.[44] The various challenges in the design included the material to be used for the separate components, the critical interference between the different parts, volume differences between the tones and an audible click that occurred when pressing a key. The solutions found for these issues also proved to be unique and were integrated into the Hammond organ patent. Some solutions did create unwanted noises or a specific functioning of the instrument, emphasising its uniqueness, while the engineers originally sought solutions to eliminate these noises.[45]

2.2.4 Patent Application

Ultimately, each Model A organ contained 17,000 individual parts, and weighed 125 kilograms. It needed to be manufactured by highly skilled workers, such that the complicated assembly process could be properly carried out. In particular, the instrument's wiring was a particularly precise operation in which only one error would lead to a dysfunctional organ. The production lines in the Hammond factories were carefully arranged and kept painstakingly clean and tidy. Hammond's assembly line was inspired by Henry Ford's conveyor belt, which was first introduced for the production of Model T automobiles.[46] In 1933, a small number of prototypes were built before the official line of products was released. One of these prototypes was meant for the organ's patent application in 1934.

This patent application consisted of eighteen pages of diagrams, as well as 20,000 words which explained its inner workings. The application was accepted on April 24, 1934, after a process that went remarkably quickly for such an extensive application. Tensions and expectations around the instrument were high, and the possibility of quickly generating a great number of jobs in a time of financial crisis was also certainly

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[44] The mains frequency of 60 Hz, in Europe 50 Hz, determines the speed of the tone wheel generator. The pitch remains, even at a lower voltage, and only stops as soon as it gets too low. Because voltage is not decisive, but frequency is, the tone wheels must be started at a slightly higher speed.

[45] Barry, *Hammond as in Organ*, Chapter XVI; Hammond Organ Company, "Fifty years of musical excellence,"; Lester, *253 million tones*; Aldridge, " "Music's most glorious voice,"; Hammond Organ Company, *The story of the Hammond Organ Company*; Hammond Instrument Company, Hammond installation, operation & maintenance instructions No.1A, manual of the Hammond organ, 1935; Stevens Irwin, *Dictionary of Hammond organ stops* (G. Schirmer, Inc.: New York, 1970); Miessner, *Electronic music and instruments*.

[46] "Building organs," 1955, https://www.youtube.com/watch?v=5ygP1T4LqfE, https://www.youtube.com/watch?v=3GfvaA02i0s.

of relevance. Several improvements and additions to the organ were also patented during this time, such as *artificial reverberation*, a modification which added a reverberative depth to the organ's otherwise dry sound.[47]

After it was introduced at the 1935 Industrial Arts Exhibit, the Hammond Model A was available to consumers for the price of $1,250. Compared to pipe organs, which cost between $6,000 and $200,000 at the time, the instrument appeared sharply priced. A decently good piano also cost a similar amount of money at this time. The instrument's official production began in June 1935, and in 1936, its first full year of sale, 1,763 Hammond organs were sold in the United States, compared to only 583 pipe organs that were sold by other manufacturers.[48]

2.2.5 'Failures' and Experiments

Hammond refused to sit still after the organ's creation; he continued to test other innovations, such as a touch-sensitive electric piano based on an existing Steinway grand, and a self-playing organ, called the Roll Player Organ. The electric piano turned out to be more expensive to produce than a real Steinway, and as such was removed from production after only a year due to a lack of demand. A third invention, the revolutionary Novachord, never caught on despite being a musical innovation of the same caliber as the Hammond.

[47] Barry, *Hammond as in Organ*, chapter XV; "Reverberation - nagalm. Ontstaan, leveranciers, werking en toekomst van één van de belangrijkste effecten in het orgel" [Reverberation. The creation, suppliers, workings, and future of one of the organ's most important effects], https://www.hammondclub.nl/nl/menu/Hammond/De-Hammond-Encyclopedie/Reverb-history; Hammond Organ Company, "The story of the Hammond Organ Company,".

[48] Barry, *Hammond as in Organ*, chapter XV; Hayden Hall, "Laboratory Music," in *Christian Herald* (September 1938); *The Hammond Organ Catalogus 1935-36* (Chicago History Museum Collection); Annual Report of the Hammond Clock Company 1935 – 1937 (Chicago History Museum Collection); To the stockholders of the Hammond Clock co. 1934 – 1937 (Chicago History Museum Collection); Hammond Organ Company, "Fifty years of musical excellence,".

Electric Piano Is a One-Man Orchestra

MUSICAL tones almost identical with those produced by a piano, harpsicord, oboe, violin, trumpet, French horn, and other instruments are created by an amazing electric piano recently invented by Laurens Hammond, of New York City. Fitted with a single keyboard of seventy-two keys, which are operated exactly like those of a piano, the electric orchestra contains no pipes, reeds, strings, hammers, or other vibrating parts, but produces its tones solely through a circuit of tuned vacuum tubes. These tones are varied over a wide range by means of simple controls mounted on a panel above the keyboard. Volume of sound is controlled accurately by a foot pedal.

Simple controls above the keyboard produce a wide variety of tones

Laurens Hammond, at the right, below, reveals the inner workings of his new electric piano

Fig. 12 The Hammond Electric Piano, highlighted in Popular Science.

Fig. 13 The Hammond 'Roll Player' Organ.

The Novachord was meant to reproduce the individual sounds of the instruments of an orchestra. It was developed using the concept of *subtractive*, rather than additive, synthesis, and was in fact the first polyphonic synthesizer ever produced.[49] It used tubes to generate tones, rather than the Hammond organ's electromagnetic tone wheels. It was rather technically complex, heavy, and expensive. Its style of playing and its controls were entirely different from the Hammond organ, meaning that those who were interested in learning how to use it needed to dedicate lots of time to its study. It did serve as an interesting addition to the soundtracks of horror and science-fiction movies, where it was able to produce never-before-heard musical sounds which amplified unexpected and suspenseful moments. Despite its positive reception, the instrument did not become a success. Until 1942, no more than 1,069 Novachords were made, and its production ceased and did not begin again after the Second World War.[50]

Fig. 14 The Hammond Novachord.

[49] Subtractive synthesis is one of the first, and to this day the most widely used, models of synthesis. In subtractive synthesis, the sound of one or more oscillators, which are rich in overtones, is filtered, in which certain frequencies are removed to alter the tone. This contrasts to the Hammond organ, which generates sound by stacking many basic sine waves on top of one another.

[50] "The Novachord restoration project," http://www.discretesynthesizers.com/nova/intro.htm; Barry, *Hammond as in Organ*, chapter XV; Sarah Broadhurst, "Forerunner of the Moog," *Professional Engineering* (2014); Hammond Organ Company, "Fifty years of musical excellence,"; Hammond Organ Company, The story of Hammond Organ Company.

Fig. 15 The New World Ensemble with the Hammond Model A and four Novachords, during the New York World Fair in 1939.

Fig. 16 A 1938 advertisement for the Hammond Novachord (February 1942).

2.2.6 Variations on the Hammond Organ

The year 1946 marked an important change in direction for the Hammond Company. Up to this point, its models had been mainly aimed at professional use in churches, theaters, and at radio stations. However, since more and more Hammond organs had found their ways to the living rooms of consumers, the company began to develop a series of more accessible, easier-to-play organs. The playing aids used in these organs, such as an automatic accompaniment function, allowed people with less musical prowess to play the instrument reasonably well, and made it such that even amateurs could be inspired by the instrument. This new period in the company's history began with the introduction of a spinet model, called the Hammond M. This model was compacter, cheaper, and more fit to a living room than the model A. It also contained an integrated speaker, which meant that external amplification was no longer necessary.

It was not just the compact Model M which broke from the first series of Hammonds; it was also the way it was put on the market, the lessons and courses that were developed specifically for the instrument, and the creation of 'organ schools' where those wishing to learn the instrument could go. The Model M appeared to set a new standard, as it inspired Hammond's competitors to also begin producing more compact organs. A new market of amateurs who played the instrument as a hobby made its entrance along that of professional and schooled musicians looking for high-quality instruments.[51]

Fig. 17 The compact Spinet Model M, 1949.

[51] Blue Book. *The complete Hammond Catalogue*, Appendix IV (Collectie Chicago History Museum); "Blazing New Trails,".

2.3 The Leslie speaker

Donald James Leslie was born on April 13, 1911, in Danville, Illinois. His interest in the organ was piqued when the firm for which he worked started to sell Hammond organs. Leslie bought an organ but found the combination of the Hammond sound with its speaker lacking. He applied for a job at the Hammond factory and was summarily rejected, but over time was able to work his way into part-time employment at the factory. He worked converting 50 Hertz tone wheels to 60 Hertz versions.

In 1937, Leslie had the idea of developing his own speaker after experiencing the Doppler effect. A car mounted with a loudspeaker on a rotating platform drove by him as Leslie was sitting in his garden, and Leslie noticed that the sound decreased in pitch as the car rode away from him. He had the idea of applying this effect to the Hammond organ, which he deemed to have too dry of a tone. Leslie connected the organ to a speaker, which he then placed on a spinning plateau of which he gradually increased the speed, producing an oscillating effect. Through this effect, also known as vibrato, the organ sounded far warmer than the Hammond organs which used the speakers that were ubiquitous at the time.

One of the organists of the Los Angeles-based radio station KFI contacted Leslie, who showed him his invention. This organist, Bob Mitchell, was impressed by Leslie's invention, and convinced KFI to purchase it. Mitchell was allowed to use this rotating speaker exclusively when playing the Wurlitzer organ at his radio station. Leslie received a patent for his invention and made his first prototype in 1940.

Leslie organised a showcase, in which he brought together 50 organists and demonstrated to them his so-called Vibratone speaker. The reactions were exceedingly positive. Leslie offered Laurens Hammond the rights to build the Vibratone speaker in conjunction with his own organ, but the Hammond Company believed in its own speaker design and never reacted to Leslie's proposal. Don Leslie ultimately chose to start his own company.

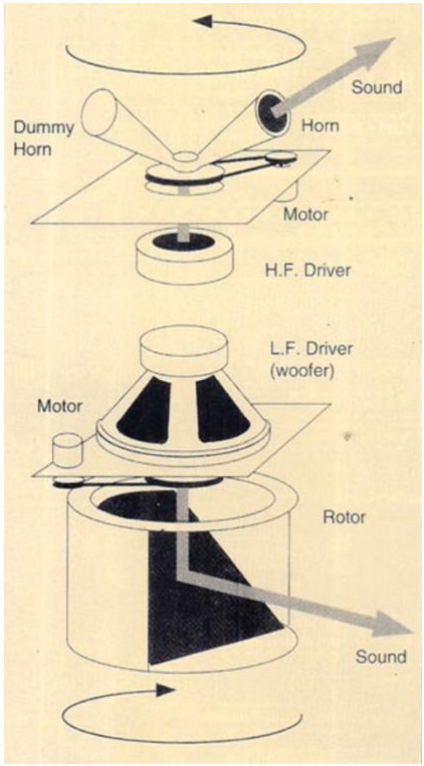
Laurens Hammond had a complicated relationship with the Leslie speaker. This speaker, which was embraced by virtually all Hammond players as an indispensable second half to the Hammond organ, contributed to the organ's enormous popularity and extended the instrument's versatility dramatically. At the same time, Hammond saw Leslie as a competitor for his own speaker cabinets, which he attempted to market as the ultimate compliment to his organ. Ultimately, he had to resign himself to the

supremacy of the invention that wasn't his own, since almost every organ player agreed that the Leslie had a better sound than Hammond's speaker.

The Leslie speaker, combined with the Hammond organ, became so successful that Leslie never even needed to advertise his product to stimulate sales. The Vibraphone was finally dubbed the 'Leslie speaker' as Hammond attempted, without success, to take over the company in the 1950s. Don Leslie sold his company to Columbia Broadcasting System (CBS) in 1965, and it was not until 1980 that the Leslie company ended up in the hands of the Hammond Company. When this fusion ultimately happened, however, the two inseparable inventions were brought under one umbrella. The Leslie system was developed further and dozens of new patents were obtained for the invention. Don Leslie died in 2004.[52]

Fig. 18 The Leslie speaker, Model 122.

Fig. 19 The inner workings of the Leslie.



[52] Hammond Organ Company, "Fifty years of musical excellence,"; *Blue Book. The complete Hammond Catalogue*; https://www.hammondclub.nl/nl/menu/Leslie/Donald-James-Leslie-uitvinder/Even-voorstellen--Don-Leslie; Leslie History by Tony Monaco, https://youtu.be/quE0ElIAwZE?list=ULx-PLNXWGPGs; Boendermaker, Leslie patents 1945 – 1981, Appendix II; Alain Mangenot en Marc Perrot, "Leslie Story," *Multimedia Keyboards* (November, 1996); *Leslie pipe voice of the electronic organ*, Introducing Electro Music, Inc., around 1965; Clifford A. Henricksen, "Unearthing the mysteries of the Leslie Cabinet," *Recording Engineer/Producer Magazine* (April, 1981); Marmon News, Purchase Leslie Speakers by Marmon, 27 June, 1980; Charles Richard Lester, "*Laurens Hammond and Don Leslie*." *The Story of the Leslie Speaker* (2002) (Boendermaker archive); CBS Musical Instruments, Electro Music, "The man behind the Leslie," (ca. 1972); Mark Vail, The Hammond Organ: *The Beauty in the B.;* Glen E. Nelson, "History of the Hammond B-3 Organ," ca. 1998, http://theatreorgans.com/grounds/docs/history.html.

2.4 Hammond Instrument Company

2.4.1 The Team of Engineers

While Hammond played an important role in the organ's development, his team of engineers also played a crucial part. This team included the aforementioned William Lahey, as well as a man named John M. Hanert, one of Hammond's most important co-inventors. In his youth, Hanert had played the pipe organ, and been an accompanist for the silent movies that were popular at the time. He had previously worked at Captain Ranger, the producer and inventor of the vacuum tube organ, but transferred to Hammond's company in 1934. At the Hammond Company, he was given the role of chief designer, and was responsible for the organ's design, among other things. The Solovox, another instrument produced by the Hammond Company, was entirely Hanert's idea. This monophonic electronic synthesizer was intended as a supplement to an existing piano or Hammond organ, playing lead voices over top of these instruments. Besides being played through its keyboard, the Solovox was controlled through a lateral movement of the knee. Produced between 1940 and 1950, it became a successful accessory to the company's organ production.[53] Hanert produced fifty-seven other patented innovations, including notably the Novachord, the organ's vibrato system, the Extravoice, a solo pedal unit, and even an automatic orchestra that could read musical scores with the use of a specialised pen. Hanert served as the vice president of research until he passed away in a tragic car crash in 1962.[54] Since Hammond's name eventually became inseparable from his invention, Hanert's crucial role in the development of the organ and other instruments is often sadly overlooked.

Fig. 20 Laurens Hammond and John Hanert.

Fig. 21 A Hammond with a Solovox.

[53] " 'Hanert Electric Orchestra' John M Hanert, USA, 1945," 21 September, 2013 http://hanert1.rssing.com/chan-68123578/all_p1.html; Barry, *Hammond as in Organ*, Chapter XV; Hammond Organ Company, "Fifty years of musical excellence,"; Hammond Company, *The Story of the Hammond Organ Company*; Hammond Organ Company, "Introduction to the Hammond Novachord, directions for playing".

[54] Hammond Company, *The Story of the Hammond Organ Company*; Hammond Organ Company, "Fifty years of musical excellence,"; Boendermaker, Interviews, Appendix II; Barry, *Hammond as in Organ*; Dunn, "A history of electronic music pioneers,"; Hanert, technical book, patents, Novachord testing (Chicago History Museum Collection).

This adds a world of fun to your piano!

SIMPLY ADD the amazing Solovox to your piano and the fun *begins*.

In an instant you've got practically any instrumental solo effect you want. The sounds of trumpet, violin, saxophone, clarinet, cello, and others, all are yours. You play the instrumental effect you choose on the Solovox with your right hand, while your left hand plays the piano accompaniment.

Even if your piano-playing is limited to a few simple chords or a few tunes by ear—it all sounds *wonderful* with the Solovox*! And you can play the same piece dozens of different ways—to entertain yourself, your family, and friends.

So try the Solovox at your piano dealer's real soon. See how easy it is to play—how easy it is to control the volume from a mere whisper to full voice. See how it makes a "new instrument" out of your piano!

Learn how easily the Solovox can be attached to or removed from any piano in seconds without marring the finish. It will not affect the normal operation of the piano which can be played separately at any time. Send coupon for full information on how to get more fun out of your piano.

Solovox. MADE BY THE MAKERS OF THE HAMMOND ORGAN

Hammond Instrument Company, 4240 W. Diversey Ave., Chicago 39, Illinois

Without obligation, please send me full information about the Solovox. ☐ Check if you also wish full details about the Hammond Organ.

Name_____

Address_____

City_____ P.O. Zone_____ State_____

*T. M. REG. U. S. PAT. OFF. © 1948

Fig. 22 An advertisement for the Solovox, originally created by John Hanert, 1948.

2.4.2 Business Policy

Henry Ford was an early adopter of the Hammond organ, as well as an advocate for the organ from the very beginning. He greatly influenced Hammond's approach to his production techniques, as well as his product marketing.[55] For example, the Novachord was first introduced in the spectacular Ford exposition center at the World Fair in New York City (1940), in which the New World Ensemble (established specifically for this occasion) demonstrated it to the world for the first time. Containing both Hammond organs and Novachords, this orchestra constituted the first 'Electric Orchestra,' according to the accompanying press release.[56] Ford based his business' philosophy around the delivery of just one kind of Model T Ford: "A customer can have a car painted any color he wants as long as it's black." He based his production of car bodies and finish on this central technique as well. This approach greatly influenced Hammond's development of the tone wheel, in which he organised the production method such that it would be feasible to carry out on an assembly line.[57] In contrast, Ford's competitors didn't adopt this production method until the 1950s; by making use of this technique early on, Hammond's production method went on to become an exemplar of instrument manufacture within the organ industry.

After the Depression, the company's revenue began to grow explosively as a result of the organ's introduction. In the 1940s, wartime manufacturing caused revenues to continue to reach new heights. The company's annual reports and other documents contain no information regarding the number of employees during this period, but mention a continuously expanding production capacity and the construction of new factories in 1938, 1942 (wartime production), and 1947 (an investment of $1 million). The reports do contain, however, information regarding the potential market in the U.S.: the reports mention 243,000 churches and 18,000 popular orchestras, the latter of which could use Hammond organs on steamboats, crematoria, and graveyards

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[55] Barry, *Hammond as in Organ*, chapter XIV, 7-9; Hammond Company, *The Story of the Hammond Organ Company*; Rien Boendermaker, conversations and correspondence, Appendix II; Ronnie Schreiber, "The truth about Cars (Ford & Hammond). How Henry Ford, who published racist diatribes against jazz, helped popularise the sound of jazz and R&B," 31 January, 2020, https://www.thetruthaboutcars.com/2020/01/how-henry-ford-who-published-racist-diatribes-against-jazz-helped-popularize-the-sound-of-jazz-and-rb/.

[56] "A first in musical history - The story of the New World Ensemble," *World Fair New York*, press release, 1940 (Boendermaker archive).

[57] "Building organs," 1955, https://www.youtube.com/watch?v=5ygP1T4LqfE, https://www.youtube.com/watch?v=3GfvaA02i0s; Henry Ford en Samuel Crowther, *My life and Work* (Auckland, New-Zealand: The Floating Press, 1922); Peter Jones, "Hammond Organs in the UK 1935-55. (South West Music Services – Last updated February 2013)," http://www.swmusicservices.co.uk/Resources/Hammond%20Organs%20in%20the%20UK%201935-55%20%28Feb%202013%29.pdf.

(1936). The termination of governmental control of prices in 1946, combined with rising wages in 1946, and a limited availability of steel as a result of the Korean war (1948), all influenced revenue in the 1940s.

In 1936, Hammond possessed three studios that exclusively sold Hammond organs (in New York City, Chicago, and Los Angeles), fifty independent dealers, and an export office for international deliveries. The amount of dealers increased to 71 in 1937, and in the same year production of the organs commenced in Canada and the U.K. In 1940, the organ was already being delivered to thirty countries; however, this demand collapsed with the onset of the Second World War.[58]

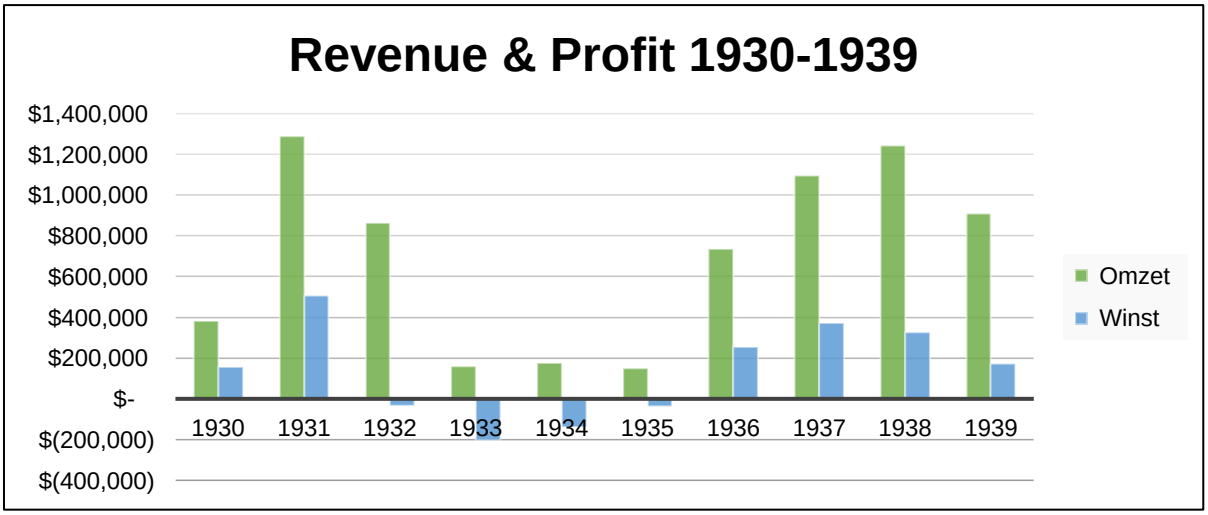

Fig. 23 Profit and revenue in the 1930s: the Hammond Clock Company and the Hammond Instrument Company from 1937 onwards.

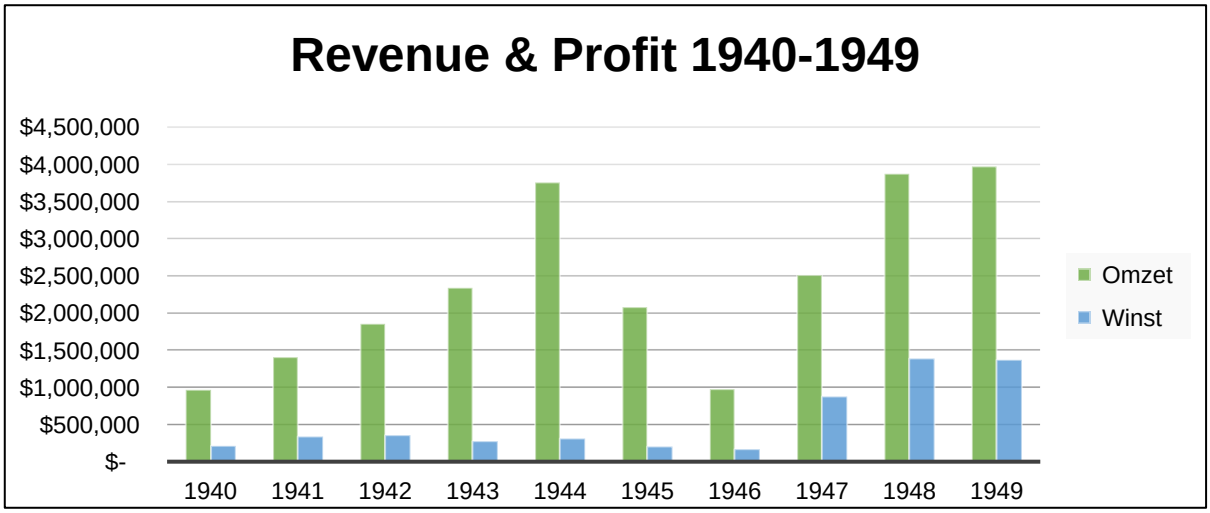

Fig. 24 Profit and revenue of the Hammond Instrument Company in the 1940s.

[58] All sources in this footnote are official documents of the Hammond Company and are located in the Chicago History Museum Collection: Annual Reports 1930 – 1949; To the Shareholders 1930 – 1937; Products & plants 1936; Budgets 1936; Hammond in the UK 1935; Shareholders meeting 1935.

2.4.3 Marketing and Promotion

The Hammond organ began as a novel phenomenon that needed to be brought into the public eye before it could reach success. Of course, the instrument was crafted for the existing market of pipe and theatre organs, but this market had a limited size. It is not known whether Hammond was already conscious of the potential reach his instrument could have, which extended far beyond this limited scope. The incredibly positive reviews which the instrument received from many well-known musicians and celebrities, as well as from industrial leaders and the press, must have at least given the Hammond Company an inkling as to the potential magnitude of the instrument's success.

The Federal Trade Commission's (FTC) contest turned out greatly in Hammond's favour, generating enormous publicity and interest for his product. Emory Penny rose to become the most important salesman in the company, and after the instrument's introduction he traveled across the U.S. to convince possible dealers of the instrument's potential. The result of this expedition was a staggering 1,400 orders.

The first official advertisement juxtaposed the publicity stunts that Hammond had used during the instrument's introduction and the FTC test, emphasising its subtlety and hinting at a certain degree of refinement that the company wished to exude. These advertisements emphasised its unique sound, its durability, its invariable intonation, and its simple maintenance, which consisted of only a few drops of oil per year.

MUSICAL AMERICA *for April* 25, 1935 33

ANNOUNCING THE

Hammond Organ

— A NOTABLE MUSICAL DEVELOPMENT

The Hammond Organ, Concert Model. It consists of a two-manual console, detachable pedal clavier, and separate power cabinet (in inset). The console is 48 inches long, 24 inches wide, and 37½ inches high. All the mechanism is contained in the console. The price is $1250.

The Power Cabinet, in which the music originates as sound. Connected with the console by cable, it may be placed anywhere. Size: 27 inches wide, 15 inches deep, and 30 inches high.

The Hammond Organ is a new musical instrument. Yet it is built to conform to established pipe-organ standards, requires pipe-organ technique of the musician who plays it, and produces the entire range of tone coloring necessary for the rendition, without sacrifice, of the great works of classical organ literature. In addition, it permits many tone colors never before heard on any musical instrument. . . . It is installed by plugging into an electric light socket. It occupies less space than an upright piano. . . . The Hammond Organ constitutes a notable, even a revolutionary, musical development.

Presented at the Industrial Arts Exposition, New York City, April 15 to May 15. . . . Now being shown by leading music dealers. . . . You are cordially invited to write for descriptive material, addressing The Hammond Clock Company, 2911 N. Western Ave., Chicago.

HAMMOND ORGAN

THE ORGAN OF A MILLION TONES

Fig. 25 Announcing the Hammond Organ, 1935.

It also appeared wise to interest dealers of Steinway grand pianos to also begin selling Hammond organs, thus generating a positive impact on the instrument's perceived quality. Hammond also introduced his own Hammond Studios which, besides being a point of sale, also developed into places for education and connection between Hammond organists and those interested in the instrument. Materials developed specially for the organ became available here, ranging from books to educational gramophone plates and from sheet music to courses for potential educators and

practitioners of all musical levels. Promotion activities were organised, demonstrations of the instrument given during public events and in shopping malls, and huge audiences attended exhibitions, sports events, and cultural events that featured it. Hammond pandered heavily to American 'family values,' and saw the American youth as a target audience whom he could introduce to the joys of music making. By 1949, there were already more than 400 Hammond dealers, which had collectively made a revenue of about 110 million dollars.

The Hammond Company set up savings programs, as well as financing plans and accessible lesson plans to make the purchase of Hammond organs more attractive. Models were delivered to churches and burial sites under special conditions; these places had ample money to spend after the Second World War. The company rapidly built its international distribution network, and Laurens Hammond traveled to Europe shortly after the beginning of the Second World War. The Netherlands even had its own dealer, in Amsterdam. The international distribution chain mostly took shape after the war, and the instruments were delivered in different voltages which were adjusted for the power grids of the areas where they were being delivered (220 or 240 volt, 50 or 60 Hertz).

Hammond clubs and Hammond Societies came into being, in which fans and musicians supported the brand's reputation. The instrument's players ensured that the instrument could be seen and heard in various places: concert venues, stadiums, theaters, night clubs, sports events, churches, the army, cruise ships, auditoriums, on the radio, and on TV. They produced records, appeared in popular radio shows, and were the most important ambassadors for the brand and the sound. Women also played a notable role; many female artists and other women contributed significantly to the professionalisation and diffusion of the Hammond organ. Promotional material appeared in magazines, on postcards, and in the regularly published Hammond Times that was steadily being published since the days of the Clock Company. Here, all forms of the instrument's promotion came together. The brand's central slogan, 'Music's Most Glorious Voice,' was adopted around 1950.[59]

[59] Aldridge, " "Music's most glorious voice,"; Hammond Organ Company, "*Fifty years of musical excellence*,"; Boendermaker – Interviews and correspondence with Harvey Olsen, Appendix II; Hammond Organ Company, *The Story of the Hammond Organ Company*; "*Blazing New Trails*,"; Barry, *Hammond as in Organ*; William, Scientist of the Day; The following sources are official documents of the Hammond Company and are located in the Chicago History Museum Collection: Annual Report of the Hammond Clock Company 1930 – 1937; Annual Report of the Hammond Instrument Company 1938 – 1949; To the stockholders of the Hammond Clock co. 1930 – 1937.

2.5 Musicians

The importance of the role of musicians in the fame and popularity of the Hammond organ can be derived from the instrument's use in entirely different musical currents. Laurens Hammond had initially designed his instrument to be used in the church, but it soon began to appear during live radio broadcasts, sports competitions, and theatrical performances. Thanks in part to the company's active marketing campaign and promotional materials, it was also used conspicuously at various demonstrations. It also gradually made its way into living rooms, and took its first steps on its path to incorporation into jazz. The ingenuity of its musicians connected the organ to nascent musical trends, and led to its use in unexpected ways, that Hammond himself had never predicted. Some brief examples, ranging in time from the instrument's genesis to the beginning of WWII, are given here; however, chapter 4 will describe the role of musicians in much greater depth.[60]

The first wave of pioneering Hammond organists can be separated into two main groups: musicians with a formal education in classical music, such as pipe organists; and jazz pianists, who saw the Hammond organ as an accessory instrument. Other musicians began to embrace the theater organ, or cinema organ, which made use of a style of music that became immensely popular in the 1930s. One example of a classically schooled organist is Pietro Yon, organist-in-residence at the St. Patrick's Cathedral in New York City. He demonstrated the organ at its first public introduction, and thus connected his own considerable musical reputation to the then-unknown phenomenon that was the Hammond organ. The senior organist at Radio City Music Hall in New York, Dick Liebert, embraced the organ eagerly, and inspired many of his colleagues to do the same.

Many classically trained organists and pianists stepped over to the theater organ, another kind of electronic organ which was being used as a musical accompaniment to movies and for the making of sound effects. This provided them with extra opportunities for work, generating a culture of theater organ concerts. Ultimately, however, the Hammond organ proved more suitable to the theater setting, even though it possessed fewer special sound effects than the theater organs popular at the time. The mingling of the theatre organ tradition with the novel musical

[60] Hammond Organ Company, The Story of Hammond Organ Company; Hammond Organ Company, "Fifty years of musical excellence,"; Matthew W. Mihalka, "From the Hammond Organ to "Sweet Caroline": The historical evolution of baseball's sonic environment" (University of Minnesota, PhD diss., 2012).

possibilities which the Hammond presented caused new concepts regarding the instrument's use to come into being.

Milt Herth (1902-1969) was a theatre organist, and one of the first to travel to the Hammond factory in 1935 to experience the instrument. Laurens Hammond selected Herth to promote his organ, causing Herth to be 'married to the Hammond' for over thirty years.[61] His record, 'Stompin' at the Savoy,' became the first well-known record that featured a Hammond. He was a master in the art of recording the Hammond sound, and ultimately acquired the title of 'Dean of the Hammond organ.' When the Hammond was directly connected to the sound system in a live radio broadcast, it produced a dry and aggressive tone with which Hammond was not at all happy. As a solution to this problem, Hammond developed an artificial reverberation module, which gave a kind of echo to the Hammond's sound, as if it were being played in a large acoustic space.

Ethel Smith (1911-1996) is the greatest female ambassador the Hammond organ has ever known. The 'First Lady of the organ' was a virtuosic performer with great showmanship and flair.[62] After a single visit to the New York Hammond Studio, Smith entered into an arrangement in which she performed on the organ in CopaCabana in Brazil for 26 weeks. Smith later incorporated the Brazilian influences she was exposed to during this time into her own music. Upon returning to North America, she became the face of music on the Saturday Night show *The Hit Parade* and landed a hit with *Tico, Tico* (featured in the film No Fubá, 1952). Smith became one of the highest-paid radio artists in American history, produced another 26 LPs, and owned a successful publishing company. Her custom-made white Hammond B3 was made to have one of its left legs moved out of the way, such that she could take her place after the instrument more gracefully.

[61] The Hammond Organ Company, "Fifty years of musical excellence," 7.
[62] Scott Faragher, *The Hammond Organ: An introduction to the instrument and the players who made it famous* (Milwaukee, VS: Hal Leonard Books, 2011), 344.

Fig. 26 Ethel Smith.

In 1936, Jesse Crawford (1895-1962) became the organist-in-residence at NBC Radio Studios in Chicago. He formed a duo with his wife, Helen Anderson, and the two played together on their twin-organ console. Crawford gained the title of 'Poet of the organ' due to his extraordinary approach to playing ballads on the instrument. Besides records, he also produced sheet music, lesson books, and instructional material, and was one of the first artists to use the Vibratone (Leslie) speaker in combination with a Wurlitzer theater organ.[63] Due to this early adoption, these speakers were initially referred to as 'Crawford' or 'Hollywood' speakers, rather than Leslie speakers. Crawford's student, Eddie Layton (1925-2004), would later be hired by Hammond to demonstrate the organ. Layton produced books such as the Hammond Drawbar Dictionary, and later wrote for the Hammond Times.

Porter Heaps was involved in the 1935 FTC test, where he played the pipe organ; the result of this evaluation, of course, has already been stated. Heaps produced educational records and sheet music for the Hammond Company, and, starting in 1951, was responsible for workshops where, over the course of three years, 6,000 teachers were educated on how to teach the Hammond organ.[64]

Around the same time, there occurred a change in the Hammond's musical direction which Laurens Hammond was not expecting: his instrument began to be used in jazz.

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[63] Faragher, *The Hammond Organ*, 232.

[64] Hammond Organ Company, "The story of the Hammond Organ Company,"; Hammond Organ Company, "Fifty years of musical excellence. 1934 – 1984,"; Barry, *Hammond as in Organ*; Faragher, *The Hammond Organ*.

Jazz was one of the most popular musical styles in the first half of the twentieth century, and its development gave rise to a plethora of new styles, such as Rhythm & Blues, Rock & Roll, soul, funk, and pop music. The role which the Hammond organ has played in this differentiation and growth of new styles is discussed in more detail in the fourth chapter. The groundwork for this development was laid with the aid of the early experiments of jazz musicians using the Hammond organ.

Glenn Hardman, as a member of the Lester Young band on the questionably titled song 'China Boy,' became known as the first ever Hammond organist on a jazz record. However, it is the virtuosity and genius of pianist and cinema organist Fats Waller (1904-1943) that serves as the first major milestone in the history of the jazz organ. Waller was the house organist of the Lincoln Theatre in New York City, and recorded 'Swingin' the Organ' for the record label RCA, the first record to feature a pipe organ played in a jazz style. Waller also experimented with the Hammond, on which he first recorded his composition 'Jitterbug Waltz' in 1942. His contribution would prove hugely important for an entire generation of musicians after him, including the renowned Count Basie (1904-1984). Basie, in turn, paved the way for the following three organists: Wild Bill Davis, Jackie Davis, and Milt Buckner. Their respective contributions are elucidated in depth in chapter four.

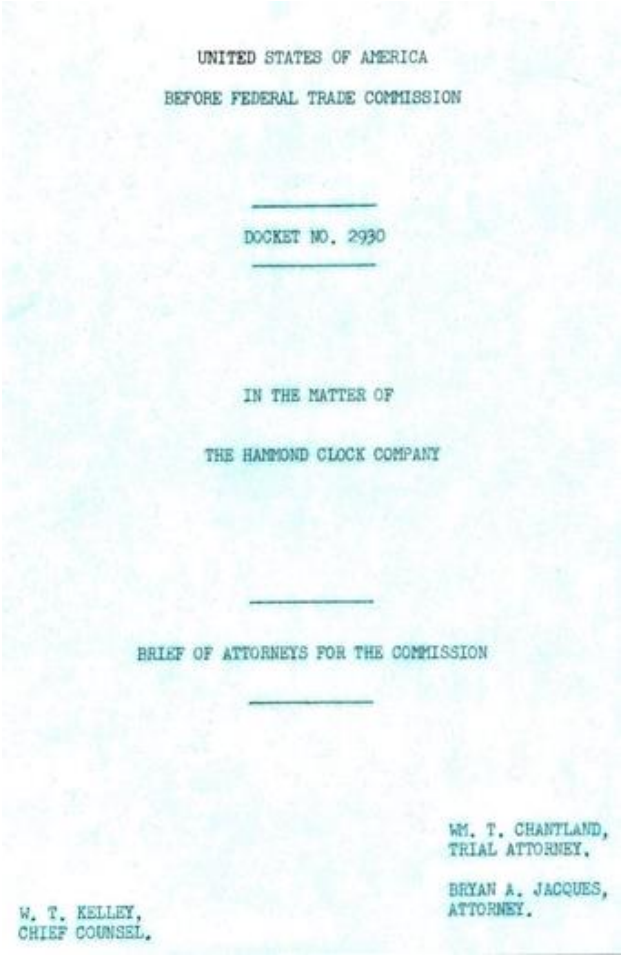
2.6 Societal Context

Initially, Laurens Hammond had set out to search for new inventions to revitalise the Hammond Clock Company, and help it thrive into the future. At the time that the Hammond organ was conceived, the company employed around 700 workers, and the production of clocks began to decline as earnings were jeopardised due to a high degree of competition. Besides this, the Hammond clock patent that had been licensed to many other manufacturers ultimately became worthless, since it came to light that a similar patent had already been issued in Germany several decades earlier.

Several stages of development and experiments later, the breakthrough invention of the Hammond organ came, and its development began around 1930. The investments which Hammond had made into the organ needed to pay themselves off as quickly as possible. The worldwide economic crisis, caused in large part by the Wall Street Crash of 1929 and the high unemployment and lack of general funds that resulted from it, were without a doubt factors which stimulated the rapid approval of

the Hammond organ's 1934 patent application. Every opportunity for work that was preserved (or, even better, created) was considered a positive contribution to the dismal economic situation in the U.S.

The legitimisation of Hammond's use of the name 'organ' was without a doubt significant to the survival of the instrument. The outcome of the 1936 FTC report was that Hammond could call his instrument an 'organ,' and had all rights to advertise it as such. At this time, Hammond inserted engraved plates inside the organ, which read that the instrument was only suitable for amateur or experimental use, to avoid claims by the pipe organ industry. The latter saw the introduction of the Hammond organ as a great threat to their own industry. These fears would soon prove accurate. Sales of pipe and theater organs declined considerably after the appearance of the Hammond: they were too costly, required more maintenance, were less modern, and less revolutionary than the Hammond.[65]


UNITED STATES OF AMERICA

BEFORE FEDERAL TRADE COMMISSION

DOCKET NO. 2930

IN THE MATTER OF

THE HAMMOND CLOCK COMPANY

BRIEF OF ATTORNEYS FOR THE COMMISSION

WM. T. CHANTLAND,
TRIAL ATTORNEY.

BRYAN A. JACQUES,
ATTORNEY.

W. T. KELLEY,
CHIEF COUNSEL.

Fig. 27 Cover of the Federal Trade Commission (FTC) report.

[65] Federal Trade Commission, *In the matter of the Hammond Clock Company,* 1937 (Chicago History Museum ollection); Lester, "253 million possible tones,".

In an interview, Laurens Hammond stated: “Pipe Organ building is an art and you can’t stereotype or mechanise an art. Pipe Organs are tailor made and as long as churches have $25.000 or more to spend on an organ, they will want the tailored fit and appearance that only a magnificently constructed pipe organ can give. The principal church field for which the Hammond is made is now supplied by reed or small organs, or no organs at all. Here it is cost that is the deciding factor. Some churches have been able to buy a Hammond for less than the cost of repairing their old pipe organ.”[66]

The pipe organ industry was not the only organisation that attempted to work against the innovations of the Hammond: the American Federation of Musicians also called a ban on Hammond organs (and eventually Novachords). In concert with an orchestra, the use of a Hammond instrument was forbidden as soon as it began to replace other instruments. However, solo concerts in the instruments were permitted.[67]

After the Japanese attack on Pearl Harbor in December 1941, the United States entered the Second World War, and the American government decided that the Hammond Company needed to begin producing parts for the war effort. Hammond began producing radio transmitters, to be used in airplanes, in an empty factory, a decision which would later prove visionary. Research and work continued as usual in the laboratory, generating innovations including but not limited to a flight control system and light-sensitive bombers, a new type of gyroscope, and a flight path simulation computer for training purposes.

When the war ended, Hammond could immediately begin producing organs in the original factory. In the meantime, the price of second-hand Hammond organs had doubled or even tripled the original price, due to the scarcity of instruments. The organ’s reputation was elevated during the Second World War thanks to the Model G, produced specially for the military. These organs were used widely at church services and army meetings, which resulted in many veterans purchasing an organ after the war, an impulse which led the Hammond company to set up a special savings program.[68]

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[66] Hayden Hall, “Laboratory Music,” article in the *Christian Herald*, September 1938; Noel A. Bonavia-Hunt, *The Organ of tradition or its limitation?* [Roberts & Newton], circa 1930s.
[67] Several newspaper articles from the New York Gazette, July 1940; and Variety, January and April 1939; Federal Trade Commission, *In the matter of the Hammond Clock Company* (Chicago History Museum Collection).
[68] Barry, *Hammond as in Organ*, chapter XVI; Hammond Organ Company, “Instruction Manual for Hammond Electric Organs (model G), War Department, circa 1942 (Chicago History Museum Collection).

2.7 In Summary

In this chapter, I have detailed the development of the Hammond organ, and the life of its inventor, Laurens Hammond, as well as his relation to the instrument. After the instrument's invention, there followed its introduction to the market and its initial reception and subsequent adaptation by the Hammond company. The Hammond organ became an icon of analogue technology, and became a forerunner in the organ and synthesizer industry which only sprang up three decades later.

Now, a brief analysis of the relevant internal and external actors from the actor network, which collectively influenced the Hammond organ's development: Laurens Hammond was a visionary and a genius, particularly skilled at devising new ways to apply technology. His talent already showed itself at a young age, and his family history strongly influenced his development to a widely respected and influential figure. Besides his technical talent, Hammond proved to be steadfast and determined in his work to fill his ambitions and amass a group of talented people to refine and implement his ideas.

The economic crisis of the 1930s, and the expiration of his patent, led him to search quickly for new ways to apply his technology; Hammond already possessed ample technology, as well as a diverse team of co-inventors, which would aid him in this quest. A church organist in his team helped show him the potential of his inventions' application to music, and due to the economic situation, a patent was rapidly awarded. There was ample demand for Hammond's instrument amongst church and theater musicians, and the company was well acquainted with the importance of marketing and dealer networks.

World-class musicians with backgrounds in classical, theater, and jazz music discovered the Hammond organ, and their creativity, combined with the quintessential Leslie speaker, gave rise to entirely new applications for the instrument. Laurens Hammond reacted to this development with ambivalence; in his eyes, the instrument was not being used as it should have been. At the same time, however, these successful, if unorthodox, Hammond musicians proved to be fantastic ambassadors for Hammond's brand.

In conclusion, this chapter reveals a unique combination of factors which, by influencing each other, contributed to the successful introduction of what would ultimately become one of the most revolutionary musical innovations of the 20th century.

3 Heyday and the end of an era

In this chapter, I will be zooming in on the key factors which, together, created the golden days of the Hammond: the role of the company, the interplay between the different products, old and new technologies, marketing strategies and the external influences of the government, the market and the economy. The decisive role that Hammond Company played in the history of the organ is largely underplayed when compared to that of key organ players. The dominant focus on musicians obscures the role of the Company, which on closer inspection, was more consequential for the strident changes that have defined the brand than that of the musicians; a role which only really became apparent in the 1970s.

The largest source of information for this discussion comes from the *Hammond Organ Company Records 1929 - 1985,* which came into the hands of the research centre at the Chicago History Museum after the Company's bankruptcy[69]. These records provide for a wealth of information including minutes from board meetings, internal communications, year and financial reports, technical designs, patents, innovation plans, marketing reports, presentations and promotion materials. In September 2018, I was offered the opportunity to undertake an extensive review of these materials and sources. Together with the information I have gathered from my personal network of Hammond enthusiasts and professional organists, these records provide a substantial layer of support. They provide an internal perspective of the changing strategies of the Company and have yet to have been deployed in their entirety for one research project.

[69] Hammond Organ Company Records 1929 – 1985: descriptive inventory for the Collection at Chicago History Museum, Research Center by Harvey Olsen, 1998. See the complete list in Appendix 1.

3.1 The fifties, the golden age

3.1.1 Business strategy

Laurens Hammond's role within his company changed during the 1950s. In 1953, business director Forrest Redmond, who, until then had managed the company quite capably, passed away. A relatively young team of managers remained, assembled by Hammond from those people who he considered the three most talented. This trio were permitted to make all important decisions and if they could not agree amongst themselves, only then was Laurens consulted. The trio was comprised of John Volkober, Robert Nelson and Stanley Sorenson, until the latter was elected chairman in 1955. Hammond had previously sounded out the other staff members about whose leadership they would prefer to serve. In 1954, the company was renamed from the Hammond Instrument Company to the Hammond Organ Company.[70]

Hammond liked to call his company the "Steinway of the electric organ business", in reference to what he considered to be a superior, relatively small family business; but it had by now far surpassed this description.[71] The management considered the range of models to be relatively small to maintain its leading position in the market, despite the fact that intensive marketing and sales campaigns achieved unprecedented sales figures. In their view, organ sales would not continue to rise indefinitely, and consequently managing director Sorenson asked Laurens Hammond to continue developing new inventions: "you're the only inventor we have". Hammond, together with his engineers, agreed, preferring to focus on new technical developments and inventing new applications. For example, Hammond designed a "steak stick" for the food industry that could indicate the degree of preparedness of a steak in 'rare', 'medium' or 'well done'; this did not, however, represent a commercially interesting breakthrough.[72]

In developing the tone wheel organ, Hammond was pre-disposed towards finding mechanical solutions, while engineer and co-inventor John Hanert experimented with electrical variants.[73] Designer George Stephens' philosophy remained in line with the original Hammond Model A design. Though he was also seen

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[70] Barry, *Hammond as in Organ*, chapter XVII, p.3; Hammond Organ Company, "The story of the Hammond Organ Company,"; Hammond Organ Company, Annual Report of the Hammond Organ Company, 1954, p.3 (Chicago History Museum Collection); "Speech delivered by S.M. Sorenson," San Francisco, July 1954, p.5 (Chicago History Museum Collection).
[71] Barry, *Hammond as in Organ*, chapter XVII, p.6.
[72] Barry, *Hammond as in Organ*, chapter XVII, p.6-7.
[73] See Chapter 1, p.4.

to deviate, as exemplified in developments such as the compact Chord Organ, and create a special models with which Hammond also set a trend.[74]

Fig. 28 The Chord Organ.

3.1.2 Technology

Many derivatives of the organs followed, based technically on the mechanical design of the tone wheel organ. And this original technical basis remained unchanged for the following four decades of the production cycle. There were experiments, but no drastic changes occurred to the tone wheel principle.

Tone wheel organs were developed for specific target groups, such as the Church, Home, and Concert models. Whereas the use in and around the church was central to the original development of the Hammond organ, the introduction of the Spinet organ M in 1949 meant the breakthrough into the living room of American families, and the iconic B3 from 1955 was the model for professional concert practice.[75]

[74] Barry, *Hammond as in Organ*, ch. XVII, p.2.
[75] Rien Boendermaker, Interviews and correspondence, Appendix II; Blue Book. *The complete Hammond Catalogue*, Appendix I (Chicago History Museum Collection).

Fig. 29 The Concert E Model.

Fig 30 The Home model or Model B.

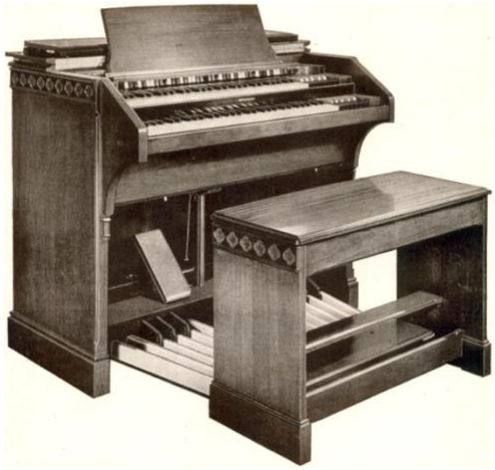

Fig. 31 Model CV.

The B3 introduced 'touch-responsive percussion control', which generated expressive sound possibilities that proved to be especially influential in popular music styles such as jazz and pop.[76] At the same time, it was a step away from the pipe organ, which did not allow such percussive possibilities. The B3 design was based on that of the original Model A and has since been regarded by audiences and musicians alike as the ultimate tone wheel organ design.[77] The B3 has been in production for twenty years and is the longest lasting tone wheel organ to be produced. Even for the contemporary generation of digital Hammonds, the B3 design and sound are still the greatest inspiration.

[76] Hammond Organ Company, Hammond Organ Percussion Controls, 1955 (Chicago History Museum Collection)
[77] Interviews and LABS Geertruidenberg with students and professional organ players, Appendix II; Interactions with members, Hammond Orgel Club Holland; Interview with Rien Boendermaker, Appendix II.

Fig. 32 Hammond B3, the King of Musical Instruments. An advert for Hammond Company.

The Hammond Novachord from 1938 was not brought back into production after the war. It was too large, too heavy, more complex than the organ and required a completely different approach to playing. But the Novachord did provide a basis for new electro-technical applications. John Hanert, the central force behind the Novachord, designed the Solovox, the Chord Organ and the ExtraVoice with technologies derived from it; all enjoying a decade in which they were very successful.

The combination of tone wheel (founder Laurens Hammond) and electronic (founder John Hanert) technologies, saw daylight with the futuristic new top model X-66. With the X-66, the originally separate technical development lines of the Model A and the Novachord coincided: using a combination of a new transistor technology and a modified tone wheel.[78]

[78] Rien Boendermaker, Talks and correspondence, Appendix II; Interviews with Sjaak van Oosterhout, Appendix II; Hammond Organ Company, Brochure X-66, 1967; Hammond Organ Company, Annual Report of the Hammond Organ Company, 1966 (All Chicago History Museum Collection).

Fig. 33 Hammond X-66, a futuristic, new model with tone wheel and electronic technology.

3.1.3 Production

During the 1950s, the production and marketing of the different organs was strongly influenced by the ideas of Henry Ford (Chapter 2). Ford had a great deal of influence on the public perception of the Hammond organ and the Novachord.

In one crucial respect, the production of Hammond organs differed from that of cars in the 1950s. The latter were equipped with new technologies and saw design changes every model year, thus enticing consumers to buy a new model regularly. Hammond's products, by contrast, were renewed less frequently, so consumers consequently felt less compulsion to replace them regularly. Instead of focusing on the replacement market, Hammond's marketing strategy was primarily aimed at expanding market potential and finding new target groups.[79] A promotional film from the factory from 1995 shows the then, modern production process of the organs.[80]

[79] "Speeches delivered by S.M. Sorenson," between 1954 and 1959 (Chicago History Museum Collection); "How Hammond organ builds quality into its cabinets," FDM, *Furniture Design & Manufacturing* (November 1960).
[80] "Building organs," 1955, https://www.youtube.com/watch?v=5ygP1T4LqfE, https://www.youtube.com/watch?v=3GfvaA02i0s.

3.1.4 The market and branding

In the 1950s, Hammond became market leader in the organs sector. This position was not only due to their innovative products: the influence of clever and aggressive marketing strategies also played a major role. Emory Penny was the talented Hammond salesman, and from Henry Ford, learned a number of basic principles in market thinking with the so-called 'push market' strategy: that a product, as it were, pushes the market. This principle was used in advertising campaigns and primetime TV ads, where consumers could receive free organ lessons with the purchase of an organ and some redeemable coupons. Family organ use was encouraged, with wife and children 'enticing' the husband, as head of the family, to buy a Hammond. In this way, the company responded adequately to the changing social conditions in the 1950s.[81]

Due to enormous post-war economic growth, and the creation of more leisure time, the lifestyle of the average American family changed as well. Young people needed more freedom and the hard-working American man needed a hobby to relax with. The woman was the centre, the ‘owner' if you like, of the family, and so there was room to make music together. Music culture was thus dramatically changed in the course of the 1950s, especially when compared to earlier decades.

[81] Lembke, “Think like a Leader. A short lesson on how to keep several jumps ahead of the followers,” 1962; Hammond Organ Company, Hammond's Retail Sales Development Program meeting guide #1-#8 (Chicago History Museum Collection);“Speeches delivered by S.M. Sorenson,” between 1954 and 1959, (Chicago History Museum Collection).

Fig. 34 Hammond advertisement in 1950s. The Hammond as centrepiece in the American family.

Hammond employed striking and imaginative photography; launched surprising slogans with advertisements; and they developed and released a series of television commercials. With the emergence of the television, millions could be reached at a stroke. Multiple campaigns emerged for different target groups: financing schemes were devised with financial partners to make the purchase of an organ more accessible; savings programmes were introduced to enable community-supported purchases of a new instrument for the church; and party games and home-party celebrations appeared, promoting dancing to Hammond accompanied sounds at home. A limited number of free lessons were available at Hammond Studios, (a complete course being given upon purchase), and Hammond sheet music of popular songs was widely distributed. Its own magazine, the 'Hammond Times', which had begun when it was a Clock Company in the twenties, was a model for the diversity of users and the variety of applications and activities.

Fig. 35 Hammond Times, 1956.

Fig. 35 Hammond advertisement in the 1950s.

Fig. 36 and 38 Hammond advertisements from the 1950s and 1960s. The important role of the woman in deciding to purchase a Hammond.

More than five hundred organ societies were formed and the Hammond Company even issued guidelines for setting one up. These societies also began to spring up internationally. The internal budgets involved were enormous for the time and unprecedented in the music industry: everything was geared towards boosting sales and expanding the market for Hammond instruments.[82]

[82] All sources in this footnoot are Hammond Organ Company-issued documents from the Chicago History Museum Collection: "Speeches delivered by S.M. Sorensen," between 1954 and 1959; "Hammond Times,"; "Hammond Organ Society. Organization and meeting kit,"; "Hammond Home Party. More suggestions for your party," (1950s); "A checklist for a Teacher Development Program,"; "Hammond organ master classes by Porter Heaps,"; "Hammond Artist Promotion Kit,"; Two great new ways to step up sales, exclusive from Hammond Organ, 1960s.

Hammond sold directly to its American dealers through a semi-franchise formula. They had to meet strict conditions and meticulously conform to the Hammond policy. In addition, dealers were provided with courses, developed by Hammond, in the areas of marketing, education and technology. They were offered professional promotional concerts on favourable terms, and attractive financing arrangements were available for organ purchases. Hammond originally developed its own sales studios in New York, Houston, Los Angeles and Chicago, which taught the company how merchandising techniques worked and which formulas proved most successful in practice. These studios only sold Hammond's own products and organised educational activities and promotional concerts. Hammond eventually retained one of its own studios in Chicago, designating it a place to test new concepts. The customer was described as a "not walk-in type" who had to be approached aggressively, in places other than the studios: at and during fashion shows, high school games, outdoor activities and other 'public meetings'.

Fig. 38 Hammond Organ Studios.

Hammond collected research data on market developments and the potential of ever new target groups. The results of this became part of presentations given by top management to potential investors from 1954 onwards. This was information that was not shared with the outside world. The decision not to disclose production numbers was also in line with the limited disclosure of corporate information.[83]

President Sorenson spoke at such a presentation about "the world's largest organ manufacturer" and how the “market is growing with each passing day and its potential is nearly unlimited".[84] The organ industry, including Hammond, represented a value of about $100,000,000 in its home market, Sorensen claimed in 1955. He continued with a glimpse of the marketing policy being pursued: "Hammond spied the organ industry in the past, now leading the way from a merchandising standpoint", the reasons being: the offer of a superior product; the broad product line; a strong home market; an aggressively operating network of dealers; and the largest national advertising budget in the industry.[85] The 1950s was characterised by economic growth opportunities, an increase in population, new credit facilities for consumers and more leisure time, which, together, all led to a stronger focus on home life. The trick was to create "desire" and "market saturation is not in our vocabulary".[86] On the competition for the Chord Organ he says: "Simple music that sounds very good on a Hammond organ, sounds very sad on other keyboards”.[87]

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[83] The total amount of Hammond organs produced cannot be retraced. The company has never published production numbers and serial numbers do not correspond, so that numbers can not be derived from them. Hammond enthusiasts and specialists have tried to find out without success. “It has always been our policy not to discuss sales figures, either units or dollars, with anyone.” See also: “Speeches by Sorenson 1955,” p.11.

[84] […] the world largest organ manufacturer”. See also: “Speeches by Sorenson 1955,” p.4.
“This market is growing with each passing day and its potential is nearly unlimited”. See also: “Speeches by Sorenson 1956,” p.15.

[85] “Speeches by S.M. Sorensen 1955,” p.7.

[86] Speeches by S.M. Sorensen 1956,” p.9.

[87] “Simple music that sounds very well on a Hammond organ, sounds very sad on other keyboards”. See also: “Speeches by Sorenson 1954,” p.10.
Lawrence M. Hughes, “Hammond Stirs Families,” *Sales Management*, Dynamarketer, 7 October, 1960 (interview with Stanley Marshall Sorensen); “Speeches delivered by S.M. Sorensen,” between 1954 and 1959.

3.1.5 Operating results

The favourable conditions, combined with the intensive marketing strategy, led to positive figures. Turnover increased enormously and profits were good. The 1958 annual accounts and Sorenson's presentations (1957 and 1958) explained why profits had not risen relatively as much in proportion to turnover in those years: an organisational reorganisation; sharply increased production and personnel costs; expansion of the production facilities; and the doubling in size of the Research & Development department.

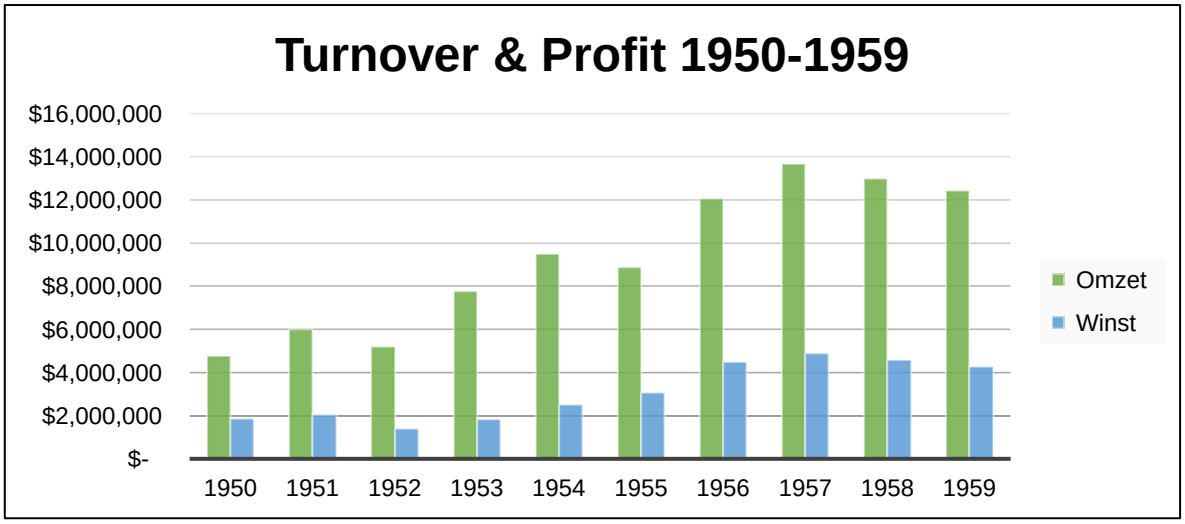

Fig. 40 Sales and Profit 1950 – 1959, Hammond Instrument Company.

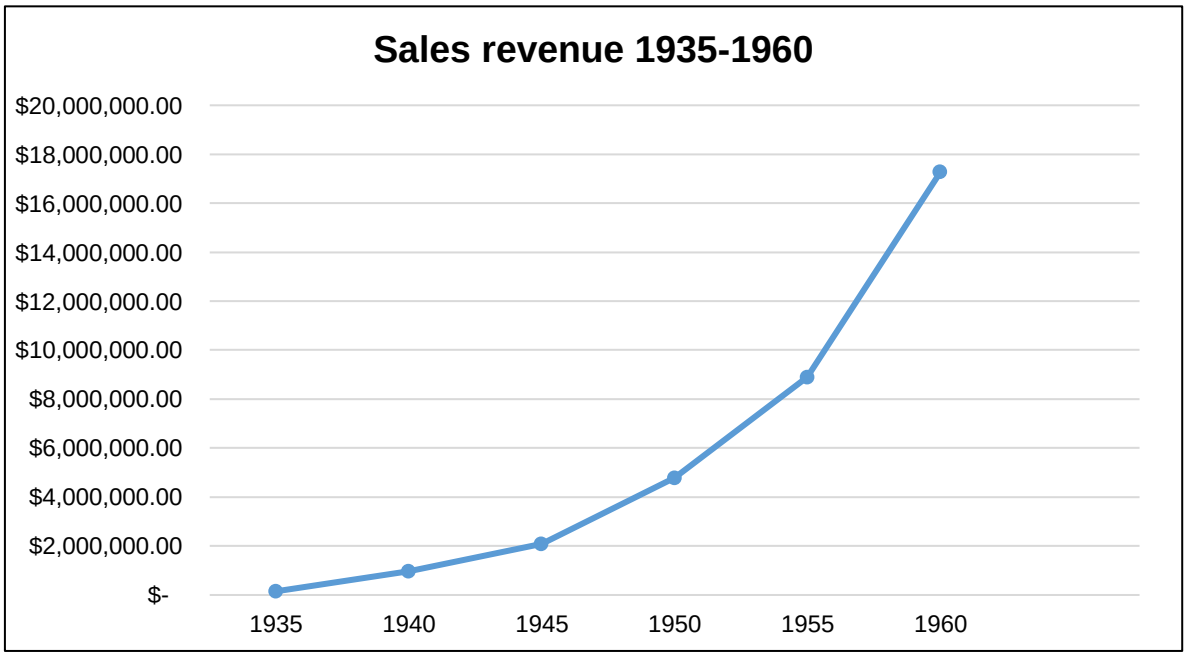

Fig. 41 Revenue 1935 – 1960: Since the introduction of the Hammond organ in 1935 Since the introduction of the Hammond Organ in 1935, there have been $1 billion in sales, Sales have doubled every five years.

3.2 The Sixties, a new vision

3.2.1 Business strategy

When Laurens Hammond retired in 1960, he had been able to 'practice' handing over the daily management of the company for the previous five previous. In his life story, Hammond describes that he had no difficulty in saying goodbye to his company; if you appoint and train your successor, you must also let him lead and allow yourself to leave.[88]

The Hammond Organ Company Records, in the archives of the Chicago History Museum, contain a number of plans for the future from this period on. The revaluation of existing production facilities is one example: this so-called 'Facilities Survey, 1961' describes the production facilities needed for the next decade. It argues that production and instrument design should be more closely interwoven; through the increased use of modern materials and a renewed perspective on manufacturing methods. Existing facilities must be adapted or relocated as a matter of urgency.[89] The subject of production facilities is one that we encounter more often in the subsequent years. Particularly in relation to the geographical spread of the factories, inefficient manufacturing methods and the investments required. The prediction was that sales, and therefore production numbers, would increase dramatically and the introduction of mass production techniques would have to be considered. Greater efficiency could be achieved, and thus an increase in the profit per product obtained, with attention to the required labour force; the number of factories; the purchase of raw materials and semi-manufactured products; and stock management.

Acquisitions of other companies led to greater diversification of the product range and marked a major shift in business strategy from previous decades. The acquisition of the Gibbs Company (1961) influenced the technological course; the eighty-year-old Everett Company (1963) and Cable-Nelson (1964) led to an entry into the piano market; with glove manufacturer Wells-Lamont (1968) Hammond moved completely outside its own field of business and with Innovex (1969), produced sound modulators for musical instruments.[90]

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[88] Barry, *Hammond as in Organ*, ch. XVII, p.7.
[89] Hammond Organ Company, “Facilities Survey Summary Hammond Organ Company,” 1961 (Chicago History Museum Collection).
[90] All sources in this footnote are Hammond Organ Company issued documents from the Collection of the Chicago History Museum: Annual Reports of the Hammond Organ Company 1961 - 1969; Presentation by Robert H. Nelson (Vice President of Finance and Secretary-Treasurer), November 1961, Detroit; "Acquisition Proposal Hammond Organ Company," Hammond Corporation Board Meeting, 1967, Wells Lamont.

The new corporate philosophy led to changes in the corporate structure and a rebalancing of the Hammond cell division within this fast-growing conglomerate.[91] The 1969 annual report stated, "Organs are, and will continue to be, important to Hammond, but as a result of the Company's diversification, they now represent less than half of its total volume." [92]

The expansion into non-specific, music-related businesses was the result of stronger market thinking. It was believed that the dependence on one product group made the company vulnerable and susceptible to the inherent ups and downs of the market.[93] This business philosophy was not unique to Hammond; in the 1960s, many large companies in the US began to expand in this way.

The company was split into a number of separate divisions: Hammond Organ Division, Everett Organ Division, Everett Piano Division, Gibbs Manufacturing and Research Corporation and the International Division.[94] In 1968, the Hammond Organ Company was renamed Hammond Corporation and again an internal reorganisation took place. At this time, only Musical Instruments (Hammond, Everett), Specialty Apparel (Wells) and Time Measurement (Gibbs) were named.[95]

A 'Long Range Corporate Plan' was launched in 1969 with the following instruction to the heads of divisions: 'manage your own environment rather than be managed'. John Volkober succeeded Sorenson as President of the Corporation in 1967 and explained to financial analysts that the board was no longer concerned with operational matters. An acquisition and development team was introduced and a series of inspiration sessions were held with more than five hundred people from all levels of the organisation. The results were compiled in the 'Management by Objectives', which aimed at doubling turnover six times over the course of the next twelve years.

'Meet the Challenges of the Future' endorsed the broadening of the business portfolio and reducing dependence. 'Single-high-ticket' products were introduced that

[91] "Speeches delivered by S.M. Sorenson in 1963, 1964 and May 1969."
[92] Annual Report of the Hammond Corporation 1969, p.4.
[93] Edwin Darby, "Hammond Organ. Old, new tunes for profits," reprint with permission of Chicago Sun-Times, 1969 (Chicago History Museum Collection).
[94] "Speeches delivered by S.M. Sorensen in 1963 and 1964."
[95] Hammond Organ Company, Annual Reports of the Hammond Organ Company, 1968 (Chicago History Museum Collection).

maximised both technical and sales opportunities. The consequence of all these plans was a new operational business dynamic.[96]

Growth as the primary goal defined the strategy and was a central theme in all reports and presentations. The prognosis was that the presence of the organ in American households would increase from 1% in 1960 to 6% in 1970 to 12% in 1980. Executive Board member Robert Nelson presented the results of the American Music Conference (1961) which predicted a growth of amateur musicians from 19 to 32 million in ten years, including 2.5 million organists. It would lead to an 85% increase in sales of musical instruments to a value of $1 billion, according to the forecast.[97]

3.2.2 Technology

Technologically speaking, the tone wheel technology continued to steadily evolve as did the testing of it in combination with more electronics. The commitment to more modern technologies formed the basis for development of completely new organ products.

In 1961, for example, a study was presented to the board proposing the development of two completely new organ product lines. Under the name Laurens, as a tribute to the founder, these were built with a technology not based on the tone wheel. This meant internal competition for the Hammond products, but also the chance to increase market share.[98] Laurens was not established as an organ brand, but the independent products were released under the flag of the Everett Organ Division. A year later, this division was dismantled and absorbed by the Hammond Organ Division. From that moment on, all organs would fall under the name Hammond again.

For the institutional market, the Grand 100 tone wheel organ was introduced (1964): a completely new model with the most extensive implementation of tone wheel technology ever. The organ also differed from the regular versions through the absence of drawbars and percussion. The number of tone wheels, on the other hand,

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[96] All sources in this footnote are documents issued by the Hammond Organ Company from the Collection of the Chicago History Museum: Annual Reports of the Hammond Organ Company, 1969; Factory Shipments, first quarter, Fiscal 1967 vs. 1966; Presentation by John A. Volkober, New York, May 1969 and Los Angeles, October 1969; Darby, "Hammond Organ. Old, New Tunes for Profits,".

[97] Presentation by Robert H. Nelson (vice-president for finance and secretary-treasurer), November 1961, Detroit (Chicago History Museum Collection).

[98] The brand name Laurens. “Exhibit E” to the minutes of the meeting of the Board of Directors, November 1961 (Chicago History Museum Collection).

was increased from ninety-one to one hundred and forty-four, making previously ungenerated sound registers possible, and consequently, the model was specifically targeted towards church use. With a base price of $13,750, it was the most expensive Hammond model ever made. The institutional market was an important target for the company from its inception, and at this point in time, Hammond organs had been installed in around fifty thousand churches. Over the next few years, it was expected that eighty thousand churches would be built, and one hundred thousand organs, including Hammonds, would be purchased.[99]

Fig. 42 Hammond Grand A-100 for the institutional market in 1964. The most expensive Hammond ever at that time, with the most elaborate tone wheel implementation.

[99] Speech delivered by S.M. Sorensen in 1964; Brochure Hammond Grand 100 Organ, 1964 (Chicago History Museum Collection); Correspondence Boendermaker with Harvey Olsen, Appendix II (archive Boendermaker).

With the introduction of the spectacular top model X-66 in 1965, Hammond presented its ultimate successor to the B3. The X-66 had a futuristic design and demonstrated an extensive integration of the tone wheel and electronic technology. The instrument led to disappointment among both the notorious tone wheel enthusiasts and to a host of new admirers, particularly in the theatre organ world. It was not a commercial success, but since then has enjoyed an active community of enthusiasts. A hastily released successor X-77 in 1967, tried to solve the shortcomings of the X-66, including being able to operate with Leslie speakers, but met with a more muted response and even less successful fate.[100]

3.2.3 LSI Technology

Modern electronic sound generation, which the Hammond competition had begun to embark upon, had the capacity to simulate sounds that were not possible with tone wheel technology. These included orchestral sounds, automatic accompaniment patterns and sound effects. Hammond wanted to be part of this development, not least because the consumer wanted to see these new possibilities integrated in a Hammond organ, and the tone wheel organs were purely designed around their own sound. A Large Scale Integration (LSI) technology was developed that could bring about this possibility, while still reproducing the specific, tone wheel sound.

The LSI technology was developed by Gibbs and had been used in the development of the NASA Apollo 12 rocket. Hammond attached the term 'space technology' to it for promotional purposes. The LSI delivered a 75% reduction in internal parts with a chip that contained 2000 components and had a 'human error factor' that was drastically reduced compared to existing products. The manufacturing process also required less manual work and the so-called 'modular concept assembly' ensured maximum standardisation and integration. In addition, opportunities arose for innovative design and the integration of a synthesiser unit. The cost, when compared to that of tone wheel organs, could be kept the same.

[100] Hammond Organ Company, Annual Report of the Hammond Organ Company 1966 (Chicago History Museum Collection); Conversations and interviews with Rien Boenderrmaker and Sjaak van Oosterhout; Hammond Organ Club Holland; Lab sessions Geertruidenberg; Organ Surium Hammond Museum Switzerland (available in Appendix II); Brochures X-66 and X-77 (Chicago History Museum Collection).

In 1969, John Volkober talked about an LSI joint-development programme with the General Instrument Company, a company that specialised in the development of semi-conductors. As a result, the organs could be provided with 'contemporary rhythm features', their own reverberation unit and the 'electronic sound modulator' designed by Innovex.[101]

3.2.4 The market and branding

In 1963, 2% of American households had an organ: this represented a doubling of the sales volume at the end of the 1950s and 121,500 units. Compared to the 215,600 pianos that were sold, there was still a lot of growth potential, which explains the focus on increasing the organ volume. Hammond described this sales approach as "creative selling - actively seeking purchasers" (1965). Other figures were the 37 million amateur musicians in the USA compared to 19 million fifteen years earlier. Of these, 12 million were under twenty years of age compared to 3 million in 1950. The number of organ players grew in fifteen years from 825,000 to 3.7 million, while the number of piano players grew relatively less, from 19.5 to 22.3 million. The opportunities for the organ market seemed quite favourable.[102]

[101] Conversations and interviews with Rien Boendermaker and Sjaak van Oosterhout, Appendix II; The following sources are official documents of the Hammond Organ Company and are in the collection of the Chicago History Museum: "The story of the Hammond Organ Company. A company that created an industry," brochure published on the occasion of the 30th anniversary of the Hammond Organ Company, ca. 1967; Presentation by John A. Volkober, New York, May 1969 and Los Angeles, October 1969; Annual Reports of the Hammond Organ Company, 1961 - 1969; Factory Shipments, first quarter Fiscal 1967 vs. 1966.

[102] Speeches delivered by S.M. Sorensen, 1963 and 1965 (Chicago History Museum Collection); Annual Reports of the Hammond Organ Company 1961 – 1966 (Chicago History Museum Collection); Edwin Darby, “Hammond Is more than Organs. Gloves precision instruments are added to musical line,” ‘reprint with permission of Commerce Magazine’, March 1970.

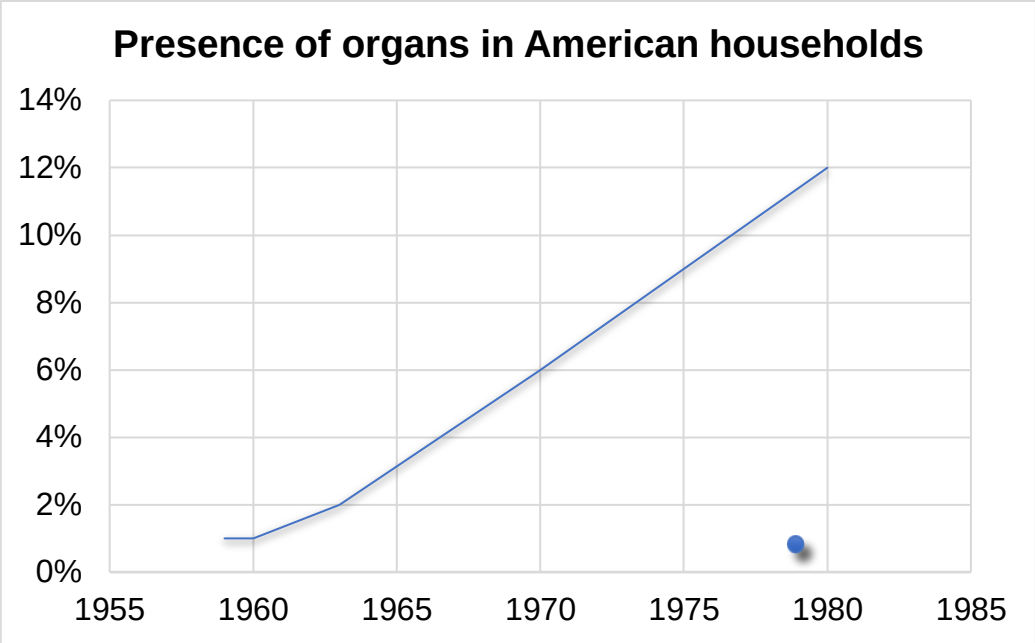

Fig. 42 A spectacular growth in the number of Hammonds in American households.

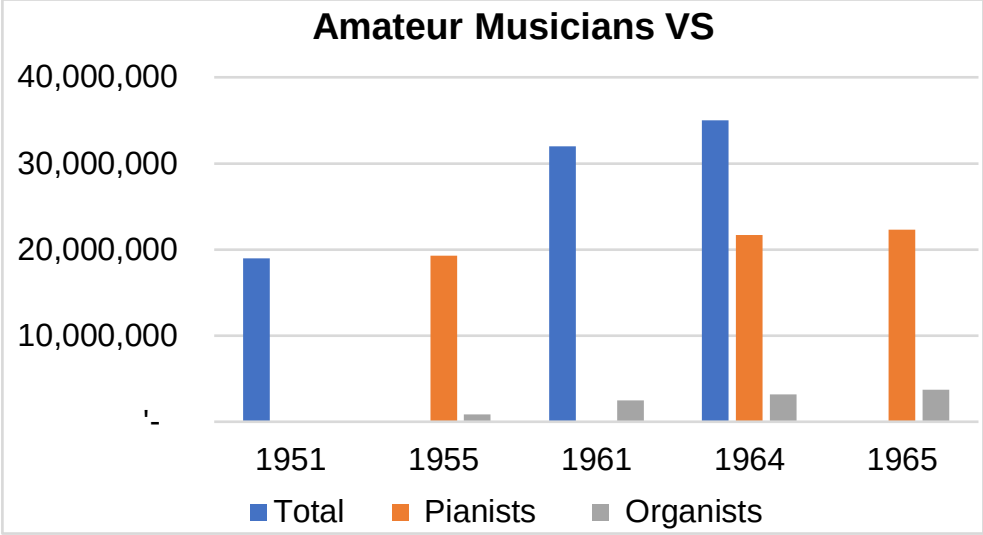

Fig. 43 The growth of the number of amateur musicians in America and the growth opportunities of the share of organists.

The international Hammond division was now attracting more attention, not least because it now accounted for around 10% of all organ turnover. Volkober explored the international market situation during a trip to Europe and the Far East and saw enormous potential. However, a cultural shift was needed to learn to think from a national to a more global perspective. A number of joint ventures, with their own production facilities, were subsequently established: England (1964), Mexico (1964), Switzerland (1966), South Africa (1966) and Belgium (Antwerp) in 1967.[103]

In the 1950s, the electronic industry proved to be a strong driver of the US economy and was described by Volkober as the fastest growing 'major industry'. Of great importance to the company were its employees, which numbered had increased to 2600 by 1965. Volkober found it important that Hammond employees were not part of a union and that the employee-employer relationship was particularly good. The dealers were an indispensable link between producer and consumer, and Hammond had two variants: dealers with several outlets and Hammond Organ Studios that sold Hammond products exclusively. The latter category usually operated as an independent organisation. Sorensen spoke of a new approach between management and dealers through the establishment of a 'President's Dealer Panel' with elected members, drawn from twelve districts, who came to Chicago three times a year at the Corporation's expense to discuss and debate current issues.[104]

The dealers also supported the national advertising campaigns that were increasingly appearing on TV. Hammond developed an aggressive and costly promotional strategy that was carried out by influential advertising companies. ‘Music's Most Glorious Voice' was the slogan that took centre stage in the 1940s and 1950s, followed in the 1960s by 'The new sound of music is you at the Hammond organ'.[105]

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[103] Interview with Dirk Mertens, Hammond Suzuki, Antwerp, 4 May, 2019, Appendix II; The following sources are official documents of the Hammond Organ Company and are in the collection of the Chicago History Museum: Report to Hammond Corporation Board of Directors International Division, August 1967; Speeches delivered by S.M. Sorensen in 1963, 1964 and 1965; Annual Reports of the Hammond Organ Company 1961-1969; Presentation by John A. Volkober, New York, May 1969 and Los Angeles, October 1969.

[104] The following sources are official documents of the Hammond Organ Company and are in the collection of the Chicago History Museum: Speeches given by S.M. Sorensen in 1964 and 1965; Presentation by Robert H. Nelson (vice president of finance and secretary-treasurer), November 1961, Detroit; Annual Reports of the Hammond Organ Company 1961-1969; Two great new ways to boost sales, exclusively from Hammond Organ.

[105] Organ Surium Hammond Museum; Conversations and interviews with Rien Boendermaker and Hammond Suzuki, Hammond Organ Club Holland, Appendix II; Sources Hammond Company (Chicago History Museum): Lembke, "Think Like a Leader. A short lesson on how to stay a few leaps ahead of your followers," 1962; Sounder Network TV Plan, Fall 1974; Presentations by Stanley M. Sorensen & John A. Volkober, from 1963 - 1970.

Hammond's philosophy and self-awareness was perfectly on display in a presentation by Marketing Vice-President, Harold Lebke, at a meeting with, among others, the successful magazines Fortune, Redbook and National Geographic. Here, Hammond communicated his vision of industrial leadership through an extensive advertising campaign. Lebke's presentation was released on the LP 'Think like a leader', which was specially produced and distributed for activities such as this. The accompanying text refers to the original 1935 advert that introduced the Hammond organ: ’Think like a leader. You have to do things first. Things others have never thought of.’[106]

Hammond had its advertising slogans recorded from the early 1950s onwards. And in ever changing guises, certain themes continued to re-appear. ‘The new sound of music is you at the Hammond' was introduced during the 'Think like a leader' campaign, and in 'Redbook', for example, was targeted at the family, and in 'The American Organist' and 'Catholic Market' at institutional models. The photography employed was highly visual and adjusted for the specific target group, the text and slogans often returned in an adapted form. Market research was carried out into the readers and numbers of the magazines, and ‘personas’ were created; a marketing tactic that is also used in our present-day society. An example of the persona description for McCall's magazine: 'The woman who reads McCall's sees an ad that tells about a Hammond Organ in the language, that respects her frame of mind as she sits reading a magazine edited and written around her feminine home-making managing interests.

[106] Lembke, “Think like a Leader. A short lesson on how to keep several jumps ahead of the followers,” 1962

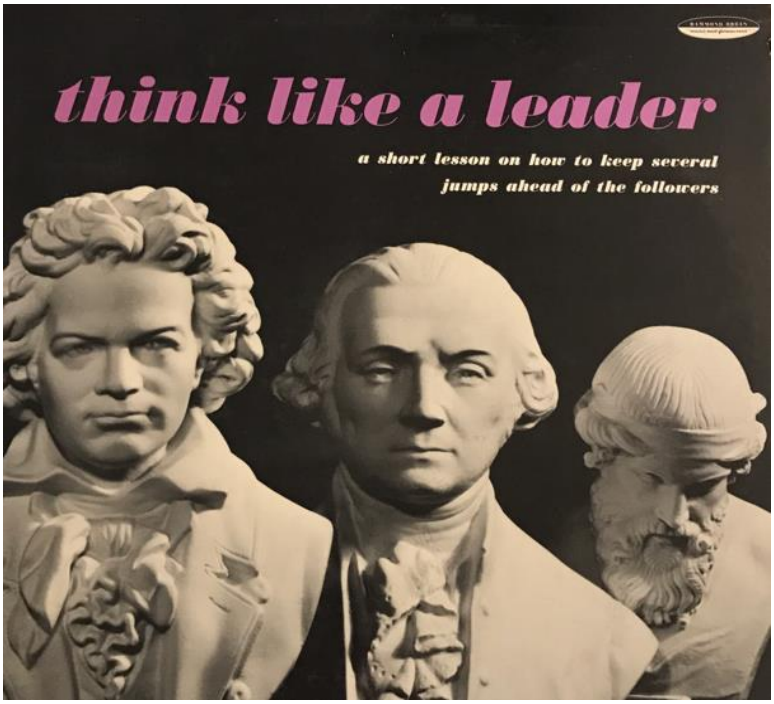


Fig. 44 'Think like a leader' campaign 1962.

01	LP	**Think like a leader.** (de vermelding van het bestaan van deze LP en marketing strategie) (In Piano trade magazine, July 1962, cover) Appl. author: Young & Rubicam, Inc. © 1Jul62;
02	1962 chord.jpg	You're invited to a birthday party for the Hammond chord organ in May at your Hammond dealer, (in **Look**, May 1962, p. 3) Appl. author: Young & Rubicam, Inc. © 1May62;
03		*The new sound of music is you at the Hammond,* (in **National geographic**, May 1962) Appl. author: Young & Rubicam, Inc. © 1May62;
04	1962 the new.JPG	*The new sound of music is you at the Hammond,* (in **Redbook**, May 1962, P. 9) Appl. author: Young & Rubicam, Inc. © 24Apr62;
05	1962 curious.jpg	*The new sound of music is you at the Hammond.* The curious retirement program of Mr. Stuart W. Brown, (in **Fortune**, May 1962, p,12A) Appl. author: Young & Rubicam, Inc. © 24Apr62;
06		*The new sound of music is you at the Hammond.* Listening-type music vs. playing-type music, (in **McCall's**, June 1962, p. 1) Appl. author: Young & Rubicam, Inc. © 21May62;
07		*The new sound of music is you at the Hammond*. The wonderful adventure of staying at home, (in **Holiday**, June 1962, p. 27) Appl. author: Young & Rubicam, Inc. © 15May62;
08	1962 - Tin Ear.jpg	Are you the man who thinks he has a tin ear? We'll bet you ten minutes at the Hammond organ, you're wrong. (In **Fortune**, July 1962, p. 31) Appl. author: Young & Rubicam, Inc. © 26Jun62;
09		Play the melody between the lines, and be a calmer mother; the new sound of music is you at the Hammond. Love song. (In **Redbook**, July 1962, p. 5) Appl. author: Young & Rubicam, Inc. © 26Jun62;
10		Sing along with nobody, but the kids. (In **Look**, July. 1962, p. 55) Appl. author: Young & Rubicam, Inc. © 19Jun62;

Fig. 45 'Think like a leader' overview of ads placed around a campaign. Compiled by Rien Boendermaker.

19 - 1962-parties

23 - 1962 sound of music

27 - 1962 suggestion

31 - 1963 unwind

33 - 1963 hottest

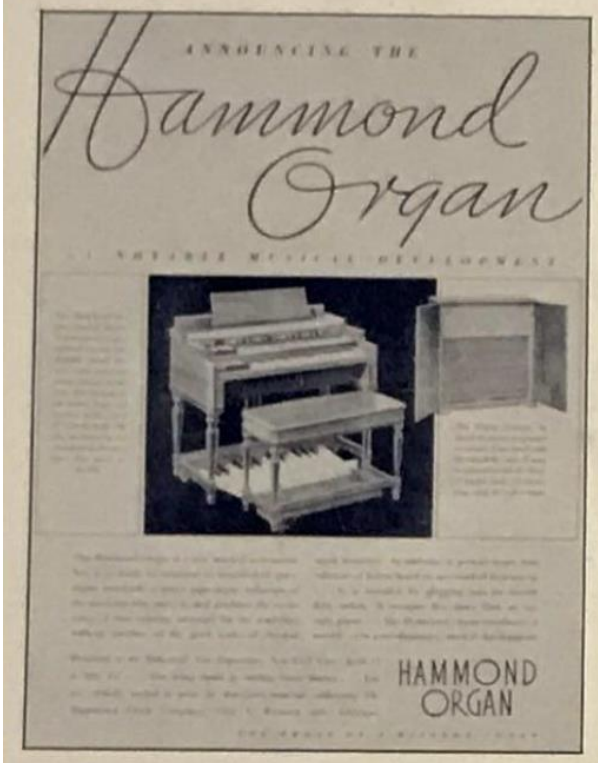
34 - 1963 ad

Fig. 46 'Think like a leader' overview of ads placed around a campaign. Compiled by Rien Boendermaker.

Everybody wants to be a leader. Many people (and companies) think all it takes to be one is to do what the leader does. That's why there are so many more followers than leaders.

To be a leader, you have to lead. You have to THINK like a leader. You have to do things FIRST. Things the others have never thought of.

This record outlines the latest leadership THINKING of a company with a habit of leadership since 1935.



This is the first advertisement ever published for an electric Organ. It started a new industry, created a revolution in music, set a pattern for the next twenty-five years of organ advertising. Significantly, it is a Hammond Organ ad.

We are still the leaders . . . because we continue to do things the followers don't think of . . . until they see us making our new ideas successful.

In the next 12 months, 7 out of 10 families in America will see still another evidence of Hammond leadership...

. . . a group of organ ads that may well set a new pattern for the industry. They look different. They speak differently about organs and people.

Most significant of all, they are based on a fresh concept in the use of magazines. Rather than publishing a single advertisement to appear in all magazines for June, we have prepared a different ad for each magazine on the media list.

Each ad is different in appearance, different in approach, different in the way it talks to the readers of different magazines. Just as you, in your own selling, approach each prospect with a special selling strategy that appeals to his or her own needs and desires and interests . . . so now do Hammond advertisements take note of an individual's attitude of mind as he reads a familiar and respected magazine. Each Hammond ad tunes itself to the "climate" of the magazine in which it appears . . . gains *penetrating* power and conviction.

Fig. 47 'Think like a leader' Retrospective and forward-looking review of the Hammond leadership's strategy in the business.

3.2.5 Operating results

In contrast with the overview from the 1950s (fig. 38), 1968 and 1969 show a sharp increase in turnover at a reduced profit (fig.48). The large difference (in turnover) compared to the 1950s can be explained by the inclusion of the operating results of glove manufacturer Wells-Lamont, which added a large turnover and profit margin compared to Hammond.

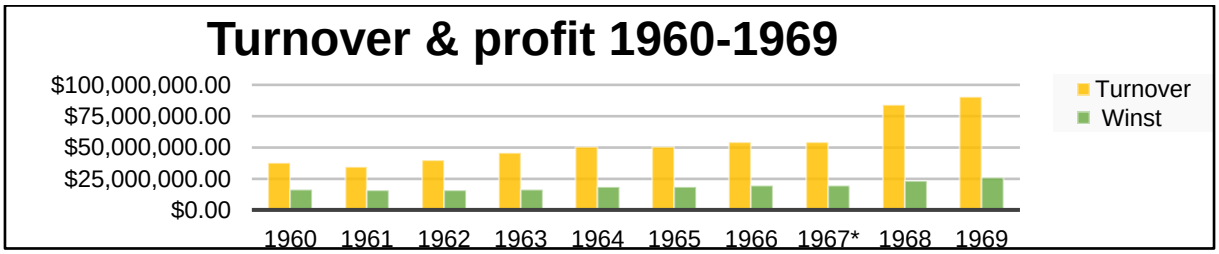


Fig. 48 Turnover & profit 1960 -1969 of the Hammond instrument Company and Hammond Corporation from 1967 onwards.

The sales moved up and new records were achieved. There are also unfavourable signs in the annual reports (1966 and 1967): higher costs for hiring sufficient and qualified personnel, production problems and reduced confidence amongst the dealers due to the reduced quality of the instruments being delivered.

The explanation for the problems can be explained in several ways. A large number of organ models with LSI technology had been brought onto the market, and the new production techniques that this entailed had to be brought up to the required level before production could begin at full speed. The poor availability of the top model of the H-series tone wheel for the living room market was also a problem for the company, because it made relatively high profits.

Competition had increased and consumers demanded more compact models with more playing aids. Hammond had started this trend in the 1950s with the Chord Organ, but the tone wheel technology could not produce these kinds of playing aids. The addition of trendy sounds and automatic playing aids from the competitors lowered the musical entry level and led to a battle in purchase prices. The organ competition came mainly from the US, consisting of Conn, Viscount, Thomas and Allen brands. It was their intention to overthrow the market leader, which was Hammond. Japanese competition, especially from Yamaha, also made itself felt in the declining sales of Everett pianos. In response, various annual reports described new efficiency targets

in the field of production methods and marketing; more intensive cooperation with dealers; a more aggressive advertising policy; and the introduction of an innovative Hammond Organ Music Course.[107]

3.3 The seventies, fluctuations and the turnaround

3.3.1 Business strategy

The Hammond Corporation faced an enormous challenge to make organs with the new LSI technology successful. Rising international competition affected the Corporation's strategic agenda, and the synergy benefits that the various divisions were supposed to bring to each other were not coming to fruition. The global economic situation, the phasing out of tone wheel organ production and the further streamlining of the entire production apparatus, demanded maximum attention and constant adjustments to the plans.

The LSI technology reproduced the tone wheel sound character and could also produce the desired new sounds but, in practice, the development was more difficult than expected. It took a long time to bring the technology up to the desired level, and in the meantime, quality problems emerged. Instead of anticipating the rapidly changing and competitive market, Hammond pursued a pricing policy based on the old quality values of the tone wheel organ and Hammond as the proud market leader. On top of this, Hammond's own loyal and exclusive dealer network was forced to carry out many repairs to the new generation of organs, or even to take back instruments that had been sold. Compounding all this, was the fact that they lacked technical knowledge about LSI and had poor communication with the factory.

The brand reputation, carefully built up over decades, was under intense pressure and effective measures had to be taken with a company structure that had become very complex over time. As a result, decisions could not only be taken at a division level, rather they had to be discussed in the Corporation. The result was a delay in decision-making. Internal and external investigations followed, but did not lead to the necessary calm in the policy to be pursued. The market was rapidly shifting from large organs to compact and less complex keyboards, and the consumer's easy

[107] Sources Hammond Organ Company (Chicago History Museum): Presentations by Stanley M. Sorensen and John A. Volkober from 1963 - 1970; Annual Reports of the Hammond Organ Company 1961-1969; Factory Shipments, First Quarter Fiscal 1967 vs. 1966; Report to the Board of Directors of Hammond Corporation, Hammond Organ Division 1967 vs. 1966.

access to cheaper keyboards led to lower margins per product. As a result, higher production numbers were required to achieve the similarly favourable business results that Hammond was accustomed to.

Japan's Yamaha unleashed an unprecedented race by launching instruments in all price ranges, both technologically and in terms of cost. Yamaha gradually became the new standard in the production of innovative musical instruments in the 1970s. They disrupted the existing market, and the large and higher-margin Hammond models were rapidly losing ground. In response, Hammond quickly developed more affordable products using more modern mass production techniques, but its production facilities were not equipped for such a rapid change and were spread across the country. To make matters worse, a global oil crisis in 1973 had a major impact on the world economy and put the Hammond Corporation in the red for the first time in its history.[108]

Donald R. Sauvey was appointed as the new president of the Hammond division (1975). He had extensive experience in the organ business and was tasked with establishing a stable quality and control system as soon as possible, and recapturing Hammond's "built like a battleship" reputation. At the same time, the latest technological industry standards in engineering and production had to be implemented.[109]

[108] Barry, *Hammond as in Organ*; Conversations and interviews with Rien Boendermaker; Correspondence of Rien Boendermaker with Harvey Olsen (Boendermaker archive); Sources Hammond Organ Company (Chicago History Museum): Annual Report Hammond Corporation 1970 - 1976; Presentation by John A. Volkober, Los Angeles, October 1970.
[109] Sources Hammond Organ Company (Chicago History Museum): Sauvey named President of Hammond Organ Company, June 1975; National Association of electronic Organ Manufacturers, Shipments of electric and electronic organs, 1976.

3.3.2 Technology

Even in the present day, there is still a question among musicians and enthusiasts as to why Hammond made the decision to stop producing tone wheel organs. By shining a light on that time, the question can now be more clearly answered.[110]

The machines that had been producing the complex tone wheel organs for forty years were in need of replacement, and that required highly qualified technicians, who were relatively expensive. The demand for tone organs had been declining for years, and with it the turnover, while the production costs were rising relatively sharply. At the same time, production was centrally located in Chicago, and investments in redesigning and simplifying logistics and production processes were necessary to make use of this old complex. Hammond also had high hopes for the LSI technology that would make the tone wheel organs obsolete. A decision was made to phase out the production of tone wheel organs and to stop investing in them. By the end of 1975, the production was completely phased out. Only instruments with LSI would be developed, which brought an end to the successful innovation which defined the original Hammond organ.[111]

Production of all products based on electromagnetic technology was phased out and various business forecasts promoted the economic potential that replacement of the so-called 'moving parts' would bring. A modular design programme was introduced that minimised work processes and improved quality. It was assumed that positive effects would include a reduction in the number of parts needed and a halving of the failure rate. Rotating speakers remained in the programme because they could not be simulated electronically at that time.

A report from 1971 describes trends in organ construction made possible by mass production techniques such as plastic to replace wood, allowing for more modern styling. Hammond's production techniques were eight to ten years behind the competition, and the transition from several to one central production facility in the US

[110] Interviews with musicians; Lab sessions Geertruidenberg; Hammond Orgel Club Holland (Appendix II).
[111] Sources Hammond Organ Company (Chicago History Museum): Western & Knox Hourly Employees (job changes), 1975; Hammond enters tomorrow in One Giant Step; Anne Chalmers (Creative Services Manager), “Hammond’s Giant Steps,” 1972 (‘Reprinted from October 1972 issue of *Meetings & Conventions*’); Next dimension from Hammond, ads & TV 1970; Tone Wheel Generator Production Plans, 19 March, 1974; Hammond introduced in 1979 with the Hammond Aurora Classic a successor technology to LSI. Its Multiplex synthesis technology built on LSI, but was based on sampling technology.

would result in a 35% reduction in personnel. This could significantly increase profits.[112]

3.3.3 The market and internal policies

The economic situation in the 1970s was characterised by rapid changes: there were large fluctuations in the economy, credit restrictions were imposed by the government and sales trends moved significantly towards low margins per product. The 'Strategic Plan 10 Years' was presented to managing director John Volkober and contained recommendations to increase earnings by 10% per annum within ten years' and to already achieve a 33% market share by 1972. Unfortunately, this plan was struck down almost immediately by the economic depression and a national truck drivers strike in 1971. A decision was therefore taken to sell the long-struggling Everett Company and Innovex. Gibbs was receiving fewer contracts from the government and Wells was experiencing a decline in demand for gloves. The sales volume of organs remained stable, however, increased costs led to an increase in consumer prices, and dealers were purchasing more conservatively as a result.[113]

There was a difference of opinion between the American and the international Hammond Export Division about the way in which international marketing and promotion should be organised. The views diverged between a global approach and a more country- or region-oriented approach. Apparently both Yamaha and Leslie products were sold by some of the international Hammond dealers, while this was unthinkable in the US. Statements like "Yamaha is a growing menace" and "Leslie is a pest threat!" appear in statements from associated documents. The result was that both departments would fall under one designated responsibility in the US.

A similar story can be read in the 'Corporate Planning Philosophy' which describes a series of unresolved internal problems and an increase in tension within the organ industry. The report examines the problems surrounding the planning of new products; the setting up of consumer service centres; the production facilities; and

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[112] Sources Hammond Organ Company (Chicago History Museum): Corporate Planning Philosophy and Procedure Philosophy, 1962 - 1971; Corporate planning Philosophy 1971; Suitability of existing plants to 1971 requirements.

[113] Edwin Darby, “Hammond Is more than Organs. Gloves precision instruments are added to musical line,” ‘reprint with permission of Commerce Magazine’, March 1970 (Chicago History Museum).
Sources Hammond Corporation (Chicago History Museum): Strategic Plan 10 years, to John Volkober, September 1970; Hammond reports first quarter loss, is “cautiously optimistic” for full year, July 1970; Regular quarterly dividends, April 1971; Sells Everett Piano Company, February 1971; Agrees to sell Automobile Sound Products Operation, May 1971.

proposes better procedures for how to operate within the various organisational levels. The management was asked to communicate a clear decision on this.[114]

In 1972, an upward trend seemed to have been found and the music industry grew by a quarter, with Hammond experiencing a 15% increase in sales. Nevertheless, an internal reorganisation took place and there was an expansion in the staff. The unexpected and continued demand for tone wheel organs meant a temporary scaling up of the tone wheel production planning.[115]

In 1970, a joint venture with the Japanese company Nihon was established and since 1972, 'low end' products were sold with a starting price of $695. The intention was to produce these products in Antwerp (Belgium) as well as in the USA. Portable organs and keyboards with a lower quality standard were also introduced through Nihon. Sales of these 'low end' products were also being made through major American shopping centres - thus, no longer exclusively to Hammond dealers - and this required a new approach in terms of marketing and promotion, as well as in the relationship with the company's own dealers. Ultimately, these Japanese instruments, with one small exception, would not prove very successful and in 1972 plans appeared for an American mini-Hammond, the Pixie, which would never see the light of day.

In the opposite direction, an investigation was begun into the potential of the Japanese market for Hammonds. Huge differences emerged between the American and Japanese markets: the best dealers were very 'business-driven' and 'brainwashed by an almost nationalistic musical school approach'.[116] The Japanese dealers were sharply focused on piano sales and had an outdated view of Hammond products and musical trends; the music was oriented more towards a monophonic rather than a polyphonic cultural tradition and the desired sound was based more on a sawtooth tone generation than on the Hammond sine wave. The conclusion was: 'Nihon Hammond management is essentially operating as an export-entity while waltzing itself

[114] Sources Hammond Corporation (Chicago History Museum): Corporate Planning Philosophy and Procedure, 1962 -1971; International interface with Hammond organ Company Departments, 1971.
[115] Sources Hammond Organ Company (Chicago History Museum): Annual Report of the Hammond Organ Company 1972; Report to Board of Directors, Consolidated sales four months, 1972; Product Line, Domestic Five Year Overview (as negotiated between engineering and marketing), 7 July, 1972; Competitive Overview, NAMM 1972 (July).
[116] Yamaha was the founder of this 'music school' tradition.

to sleep with the belief that a few extra factory showrooms and a Hammond name will generate a 10% market share'.[117]

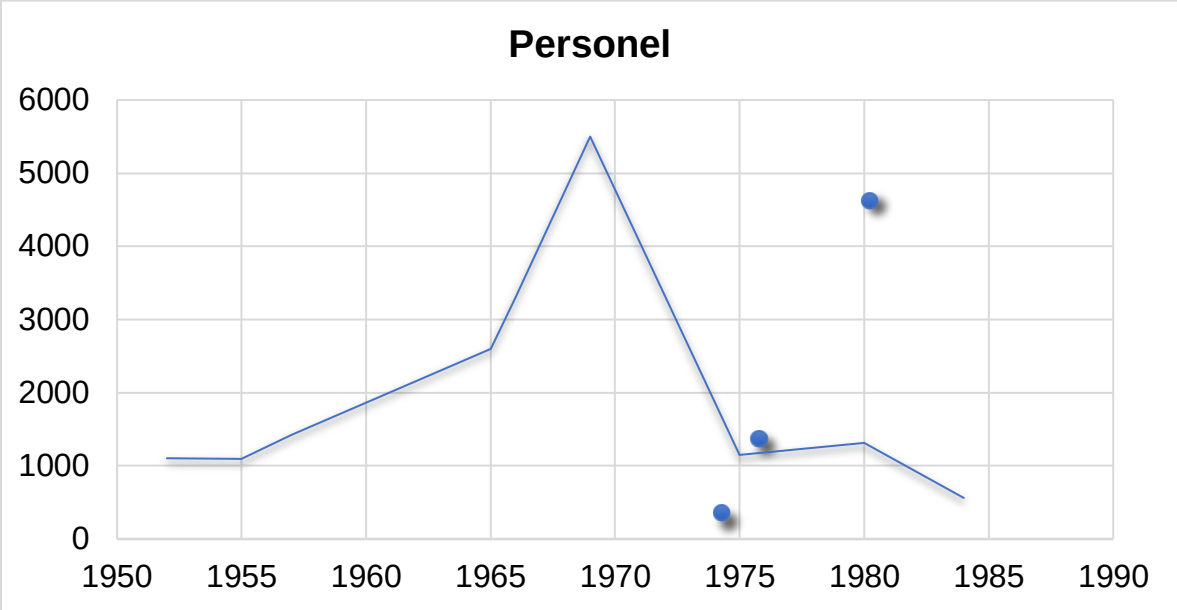

Fig. 49 Staff development, in particular the acquisition and disposal of acquisitions (1960s and 1970s) and the collapse of the organ market (1970s and 1980s).

[117] Sources Hammond Organ Company (Chicago History Museum): Hammond International establishes Japanese joint venture, September 1970; Overview of Japanese Market, August 1974; Marketing Plan Hammond Pixie, 1972; Mini Organ Market Opportunity, 24 April, 1972; Format for a more definitive description of ongoing Hammond U.S. – Nihon Hammond inter-relationships, Market Research Department, December 1974.

3.3.4 The dealer organisation

The relationship with the dealers had been an important topic of discussion with the management for years. As early as 1971, a study carried out by an external agency had been published which examined the opinion of dealers on the company.[118] The dealers at the time were very critical of the rapid decline in product quality, poor factory service and successive price increases, and they demanded more training programmes. "Hammond had lost its long term position as the innovator of the organ industry" was one of the conclusions, but despite the problems the dealers remained positive about the potential of the new models and technology they were using: "the Hammond name is the biggest competitive asset".[119] Two years later, the results of the changes initiated by this report were examined and it turned out that mutual relations had improved considerably, and that reactions to the many new organ models was positive. However, complaints persisted about the poor delivery of service parts; the serious quality problems with the LSI technology; the desire for better coordination of advertising policy; and poor delivery of top models with higher profit margins.[120]

John H. Ripperger was Vice President of Marketing and sent a letter to President Volkober. In 'Random thoughts on marketing', he discusses product margins on the $1000 product category where the impact of Yamaha and the dealer pricing policy was of great concern to him. Some dealers had high margins of up to 46%, while the Corporation itself had much lower margins. The changed relationship with the dealers had led to a disconnect with the factory and they were operating more on a self-interested basis. The international dealer organisation was also addressed and it was determined that in twenty of the sixty international markets were underperforming.

With a 'Retail Program Proposal' presented to the board in 1974, new distribution possibilities were investigated and more specifically, product-oriented sales techniques were introduced. There was a proposal to streamline education programmes and a proposal for less fragmented promotional campaigns. Together

[118] I could not find this first report in the Hammond Company Records, Chicago, but the results are in the follow-up report from 1973.
[119] Each citation: Hammond Organ Company, Hammond Dealer Attitudes, Report for Hammond Organ Company, October 1973, p.2 (Chicago History Museum).
[120]Hammond Organ Company (Chicago History Museum): Hammond Dealer Attitudes, Report for Hammond Organ Company, October 1973; Hammond 5 year product overview; Advertising objectives 1973 -1974; Organ Industry Pricing Analysis 1973-1974; Co-op advertising program beginning March 1974. To all Hammond Organ Dealer Principals; Announcement of 1 July, 1974. Price increase, to all dealers.

they would lead to 'improved consumer product satisfaction' and 'increased dealer loyalty'.[121] A 'teachers development programme' describes Hammond's clear goal with education: "to sell organs, to do business, to solidify promises by salesman" and "teaching should be income product, a teacher is on equal level to a salesman. Money talks![122]

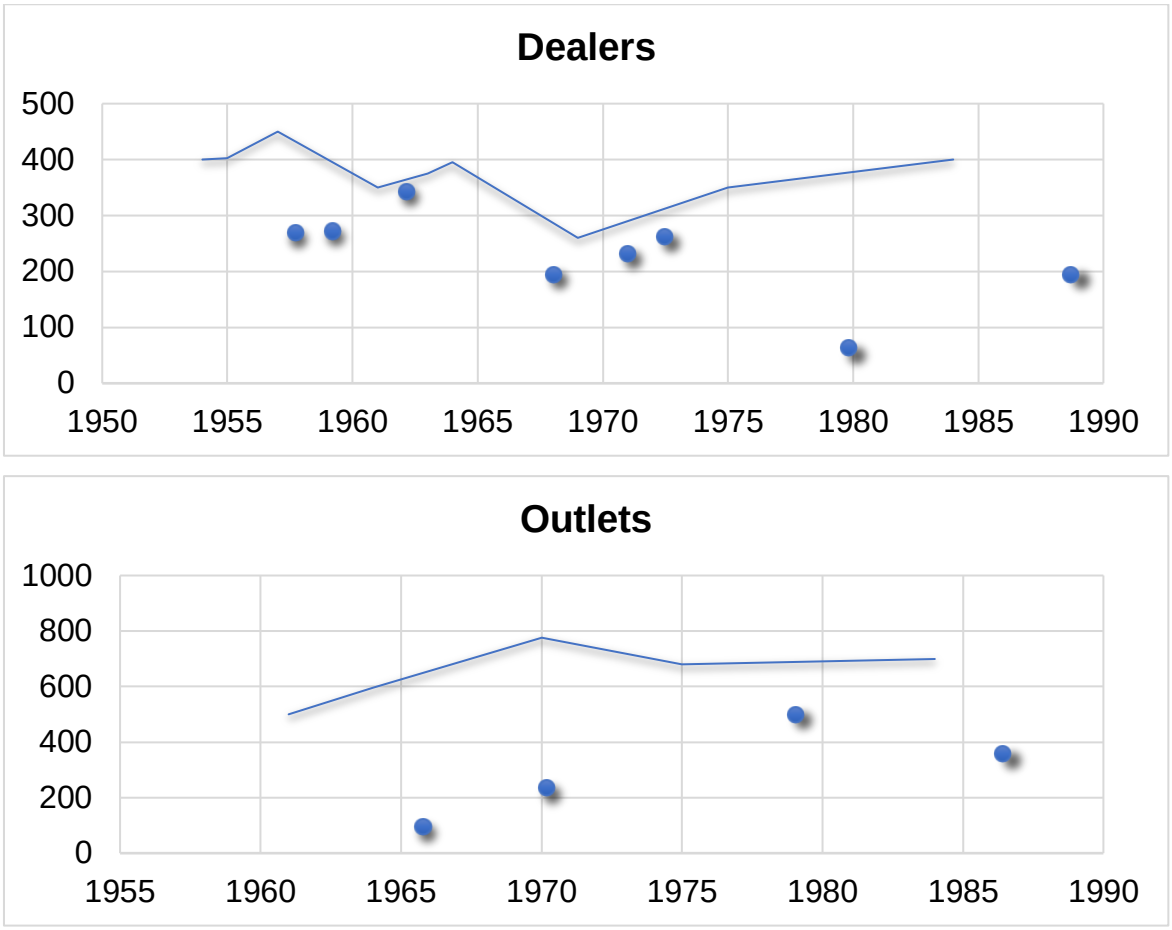

Fig. 50 en 51 The number of Hammond dealers in the sixties is decreasing, but several dealers have a (growing) number of outlets under their care, increasing the size of each company on average.

[121] Sources Hammond Organ Company (Chicago History Museum): Random Thoughts on Marketing from John Volkober, 24 January, 1975; Random Thoughts on Marketing to John Volkober, 27 January, 1975; Retail Franchise Program Proposal, 1974; Reduction in domestic fiscal '75 marketing product requirements, July 1974; Marketing Research Department, 9 January, 1975.
[122] Hammond Organ Company, A checklist for a Teacher Development Program, only motivation is to sell organs, 1970s (Chicago History Museum).

3.3.5 Marketing

Hammond compared the LSI technology with other technologically advanced products. Many of the organ models contained more parts than a modern car, and, it was claimed that a Hammond organ was more advanced than a colour TV. The brochure 'One Giant Step' (1972) explains in detail that Hammond took the decision five years earlier to introduce a revolutionary technical concept with the Large Scale Integrated Circuitry (LSI). The modular concept of this technology made it possible to replace the electromagnetic source of the Hammond sound. The brochure describes the history and working principles of both technologies, the products to which it led, and includes a 'Consumer Forum' with 'frequently asked questions'. [123]

Fig. 52 Hammond enters tomorrow in One Giant Step.

[123] Hammond Organ Company, Hammond enters tomorrow in One Giant Step, 1972 (Chicago History Museum).

3.3.6 Company results

Although the Hammond Corporation as a whole scored record sales during the international oil crisis of 1973 - 1974, Hammond organ sales fell sharply and yielded a profit of only six dollars for the Hammond division in 1974(!). This downward trend continued in 1975, sales stagnated, and a sad moment in the brand's history occurred with a loss of $7,748,000. Hammond had never recorded a loss since the advent of the tone wheel organ, with this moment unfortunately coinciding with the complex conversion of the costly tone wheel to LSI technology. Production of the final tone wheel models was delayed due to reduced production schedules that were established years earlier, and the need to meet outstanding orders in the interim. The necessary investments in technology, the development of a new model range, the transformation of the production apparatus and the retraining of the tone wheel manufacturing staff; all had a strong influence on the negative figures that followed.[124]

When the demand for organs came to a virtual standstill in the autumn of 1974 as a result of the economic crisis, a letter was sent to all employees about the impact of the crisis. The sharply reduced sales, extremely high stock levels and many unsold models at the dealers lead to a halt in organ production in January 1975, and to the non-payment of salaries. Volkober wrote to the music dealers that sales in the organ market would drop from 225,000 to 165,000 units: 'A downward swing following a phenomenal boom period'. In order to develop an appropriate policy for the coming years, company interviews were organised on a large scale to focus the subjects of the current American market situation, the product and price strategy and the effectiveness of the dealer organisation.[125]

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[124] Sources Hammond Organ Company (Chicago History Museum): Annual Report of the Hammond Organ Company 1974, 1974; Basic tool market measurement, OPI – HOPI, 1973; To evaluate pricing activities of organ manufacturers from April 1973 to July 1974; June cash forecast, 6 June, 1974; Current Export Forecasting System and Recommendation for improvement. Market Research Department, July 1973; A proposal for Melrose Park inventory control, 22 March, 1974.

[125] To all employees, 18 December, 1974; Volkober response to music trades inquiry, 1975; Announcement of 1 July, 1974. Price increase and tonewheel stop, to all dealers; Financial Presentation Five Year Forecast 1974 - 1978; To all employees, 20 May, 1975; Hammond Dealer Sales Trends versus Major Competitive Brands, 1975 March; Hayes and Associates, Inc. Management Consultants, A study of Hammond's strategy in the U.S. organ market for Hammond Corporation, 6 March, 1975; Hammond Organ Company, Considering acquisition of Rodgers Organ Company, Church Organ Marketing, 1974.

3.3.7 Marmon Group

The independent existence of the Hammond Corporation came to an end when the wealthy Pritzker family acquired 15% of the shares of the Hammond Corporation and increased this to 47% in May 1974. This made brothers Jay and Robert Pritzker appear on the Board of Directors of the Hammond Corporation. The Marmon Group, with the Pritzker family as major shareholders, consisted of about three hundred companies with strong representation in the oil and metal industries. One of the Pritzker brothers, Robert, was appointed Chairman of the Board of Hammond and in 1977 the complete acquisition of the Hammond Corporation was announced.[126] This separated Wells-Lamont's gloves from Hammond's musical instruments and both parties continued to operate as independent divisions.[127]

[126] No Hammond Corporation financial statements were published from 1977 onwards, and only summary information can be found in the Hammond Company Records for the following operational years.
Hammond Corporation, Pritzker Named Hammond Corporation Director, 27 February, 1974; Marmon Group of Companies, 1979 (review); Losses Hammond Corporation, Marmon Group, 1976; Hammond Organ Company, To Hammond Organ Dealers, December 1977; "The Hustling Pritzkers." *Business Week*, 5 May, 1975. (all Chicago History Museum).

[127] "Shake well before selling. Hammond's new three-year warranty," *The Music Trades*, October 1978; https://www.company-histories.com/The-Marmon-Group-Inc-Company-History.html;
Interview Dirk Mertens, Appendix II. In this interview, he tells about his father as director of the Antwerp Hammond factory and, in that capacity, made an annual trip to Hammond in Chicago and spoke to director Donald Sauvey. Sauvey was regularly invited to the kitchen table of the Pritzker family to discuss the ins and outs of Hammond. The 'hobby' that Hammond meant for the Pritzker brothers, Jay played the organ, could cost quite a bit of money.

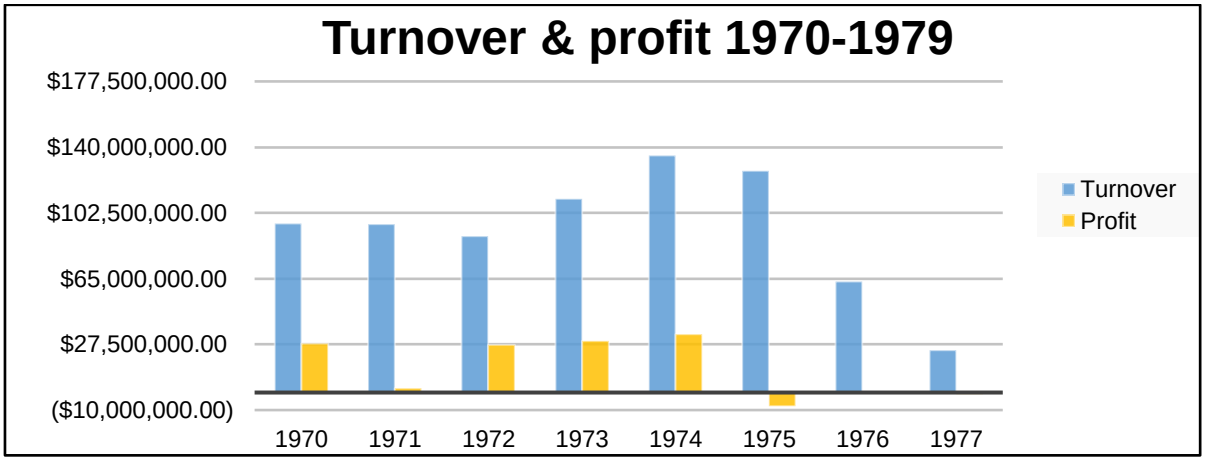

Fig. 53 Turnover and profit 1970s of the Hammond Corporation. Figures published up to and including the third quarter of 1977. Thereafter, the Hammond Corporation is absorbed into the Marmon Group and the Hammond Organ Company continues as an independent division. At that time, no figures for the independent divisions have been published.

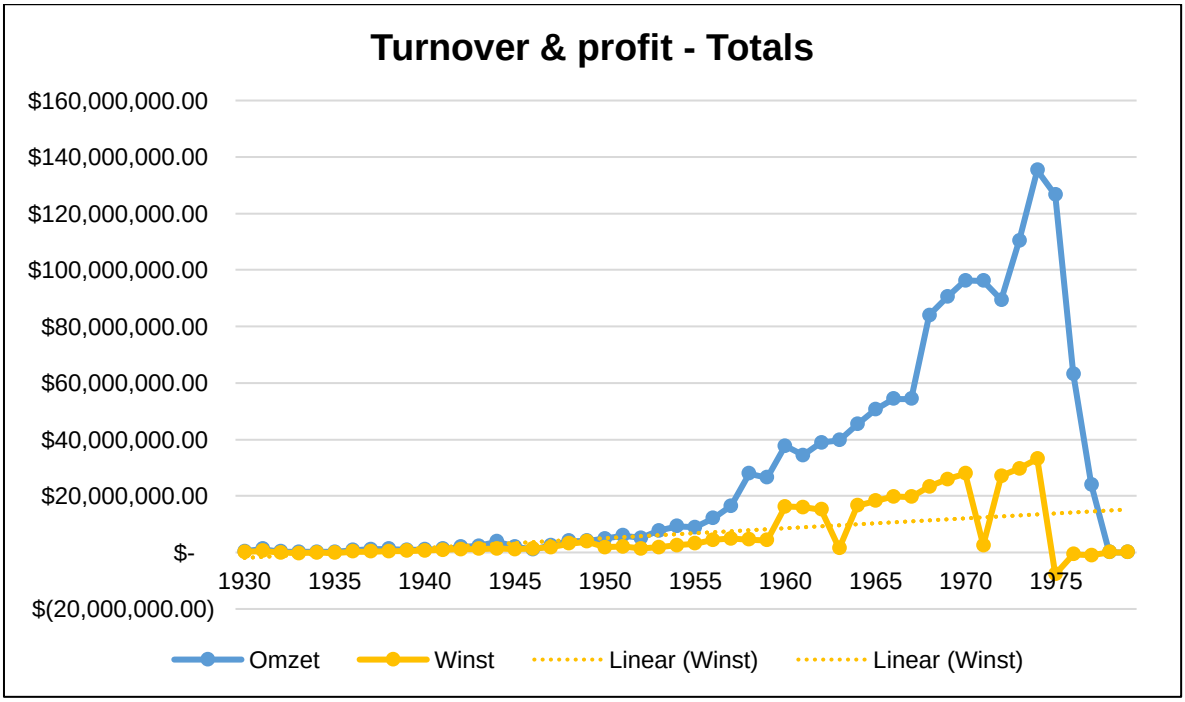

Fig. 54 Turnover and profit of the Hammond Corporation over the decades in graphic form.

3.4 The 1980s, the curtain falls

The situation did not improve. "Operating comments, 1980" describes a sluggish market for the organ industry, with high interest rates and an uncertain economic future.[128] In April, there were the lowest sales for years with figures as low as minus fifty percent and dealers going bankrupt. The market had collapsed due to a new international oil crisis (1979) and all forecasts were revised downwards. Production in Chicago was temporarily halted.

Noteworthy, was the takeover of Leslie Speakers from the CBS Group (1980), which had ended in reorganisation. Despite the musically historic connection between the two brands, Laurens Hammond's dismissive attitude of Leslie meant that there was never a business relationship.[129] After Hammond's retirement in 1960, a few joint projects were undertaken, such as the special Leslie speakers developed for the Hammond X-77 (1967), and Hammond dealers were now selling Leslies direct. Hammond managing director Donald Sauvey had worked at CBS and this probably played a role in the eventual sale of Leslie to Hammond.[130]

How much the organisation had shrunk became clear in 1984: there were four hundred American dealers, who operated seven hundred outlets. Hammond still had 562 employees working in four operational production facilities. Accutronics housed the remaining Gibbs activities. Four international distribution and office organisations operated in Canada, the UK, Australia and Japan, with Nihon-Hammond also manufacturing.[131]

When, in the same year, the fiftieth anniversary of the Hammond organ was celebrated and various festivities were organised, the official Hammond showroom in the Netherlands had just closed.[132] A booklet was sent to all American dealers with an

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[128] Sources Hammond Organ Company (Chicago History Museum): Operating comments 1980, to Don Sauvey; Domestic Sales 1980.
[129] See Chapter 2, para. 2.3.7
[130] Marmon News, Purchase of Leslie Speakers by Marmon, 27 June, 1980; Leslie Pipe Voice of the Electronic Organ. Introducing Elektro Music, Inc., around 1965; Nelson, “History of the Hammond B-3 Organ,”; Correspondence Boendermaker with Harvey Olsen, Appendix II (archive Boendermaker); Online interviews and lab sessions Geertruidenberg with Hammond professionals and students, Appendix II.
[131] Hammond Organ Company, a division of the Marmon Group, Inc., Fact sheet, August 1984 (Chicago History Museum); “Turning Wheel,” Robert Bisschop (for. Director Hammond Benelux), Interview by Fred Bratvogel, April 2009.
[132] Hans Goddijn, ”De historie van het elektronisch orgel in Nederland,” *Orgelwereld* and *Orgel & Keyboard*, 1985 – 1989.

optimistic tone under the heading 'Fifty Years of Musical Excellence'. It describes the glorious history of the brand.[133]

How the Marmon Group, or the Pritzker brothers, eventually quit the loss-making Hammond company is not clear from the documents found. One clear fact is that the company was dismantled and the instrument stock was sold to Hammond dealers, distributors and their own employees. All production facilities and equipment were sold at auction.[134] The service parts of the Service Department were transferred to a new independent company - the Hammond Organ Service Company - and all warranty obligations were thus guaranteed until 1990. The Marmon Group successively sold the brand names Hammond and Leslie and all patents to the Australian distributor Noel Crabbe in December 1985. As a result, the Hammond Organ Service Company had to be renamed the Organ Service Company. The sale of Marmon to Crabbe included the shares of the Nihon-Hammond Limited joint venture.[135] Noel Crabbe made an attempt to develop new Hammond organs and these were offered to the former international Hammond importers. The negative reception to these Australian Hammonds probably led Crabbe to decide, in 1988, to sell both the Hammond and Leslie brand names and patents to Manji Suzuki's, Suzuki Corporation. Hammond Suzuki Musical Instruments, which borne of this moment, is discussed in chapter six.[136]

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[133] Sources Hammond Organ Company (Chicago History Museum): To all dealers, 50 years of the invention of the Hammond Organ, January 1984; "Fifty years of musical excellence,".
Hammond Organ Company, Laurens Hammond model 346/350, Fifty years of musical excellence, 'Hurdy Gurdy' magazine, iss. 2, July/August 1985 (archive Rien Boendermaker).
[134] Thomas Auctions, Sale dates (after closure Chicago plant), ca. 1985; Hammond Organ Company, Lost Illinois manufacturing, Organ Service Company, 1980s after bankruptcy, https://www.facebook.com/lostillinoismanufacturing/posts/hammond-organ-companyin-1962-the-hammond-organ-company-employed-1800-people-in-f/1183663315081875/; "Marmon Group sells Hammond Organ rights," *Chicago Sun-Times*, 3 January, 1986.
[135] Gordon Reid, 'The birth of Roland', interview with Ikutaro Kakehashi, *Sound on Sound Magazine* (UK), 2004; Conversations and interviews with Rien Boendermaker; Correspondence Boendremaker with Harvey Olsen; Hammond Organ Club Holland; Interviews Hammond USA, Chicago 2018, Appendix II.
[136] Hammond Organ Company, "Fifty years of musical excellence,"; Nelson, "History of the Hammond B-3 Organ,"; Interview Dirk Mertens, Appendix II; Noel Crabbe, https://hammondorgans.com.au/about/hammond-australia- history.

3.5 Reflection

To outline the developments from the 1950s to the 1980s, the Hammond actor network, as described in the introduction, is used.

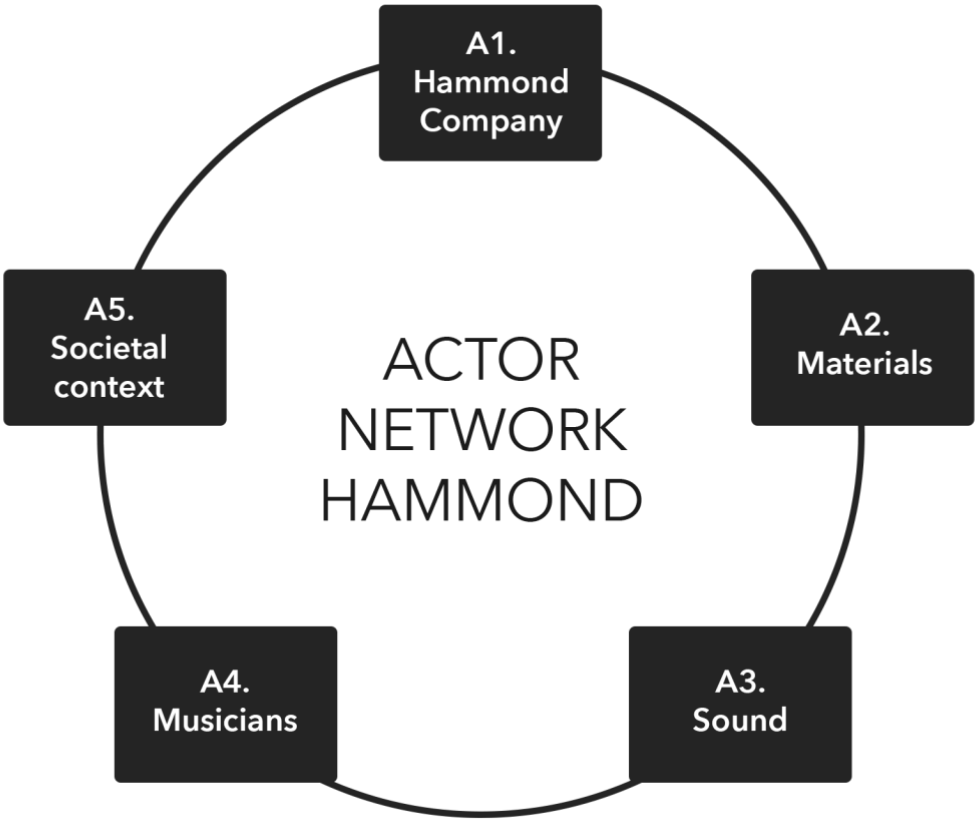

Fig. 55 Actor-network Hammond.

3.5.1 The success

The *Hammond Company* as the first actor (A1-HC) is the starting point, i.e. the Hammond organ as a product and the magic that is created around it. This actor is thus directly connected to the actors *material* and *sound* (A2-MAT and A3-SND).

The leadership of the company was strongly decisive, and in the 1950s this referred to Laurens Hammond and his team of engineers and marketers: they created the structure on which the choices were made for product development, the production methods, the use of materials, the technologies used and the way in which the marketing strategy is determined. This creates a hitherto non-existent product category that sets standards in use, quality and sound, and where competition does not yet play a significant role. Hammond managed to improve its products in an evolutionary way, using two different technologies, electromagnetic and electronic, which reinforce each other and produce innovative derivative products.

The *social influences* as an actor (A5-MIJ) stimulate the activity and contribute to the set course: the post-war period was one of optimism, the family was more central and space was created for hobbies whereby the financial possibilities to purchase an instrument were introduced. The Hammond marketing machine, under the influence of emerging American mass media techniques and the popularity of television, did the rest.

The *musicians* as final actors (A4-MUZ) literally give shape to the magic that the Hammond sound evokes. With new playing practices and musical styles, they managed to develop unprecedented and spectacular forms of use, marked by the moment Jimmy Smith entered the market.

A second innovation, the introduction of the Leslie speaker, was undoubtedly of great influence on the actor *sound* (A3-SND): in combination with the organ, specifically the iconic B3, this is considered the standard reference for how the organ is viewed, even today. Viewed properly, the musicians' contributions were a gift to the Hammond Company. They could not have foreseen that their instrument would take such an enormous leap into such unchartered territories, even undesirable ones, to them, such as jazz and R&B music, or the role it would play in the black church.

3.5.2 A shift

In the sixties, we see a shift amongst the *actors*. Whereas in the fifties they operated in relative harmony with each other, the following years prove to be much more restless. The new leadership of the *Company* set 'growth' as its greatest priority: the tone wheel organ was at that point twenty-five years old, and consideration needs to be given to whether a successor was needed, while the values such as sound and quality need to remain intact. Growth literally translated into the growth of the company through numerous acquisitions. One of these, Gibbs, put Hammond on the track of IC technology. Driven by technological and political will in the race to be the first man on the Moon, this new technology created completely new possibilities (A2-MAT). In terms of *sound*, there are the possibilities through additional playing aids and new sounds; in terms of design, the use of modern materials is possible and therefore designs that fit in with the spirit of the times. Production techniques could be simplified. There were so many developments going on at the same time, that the company found it difficult to formulate a clear strategy and to communicate it, although the marketing department had no trouble doing so. In terms of advertising, the 1960s were a high point in corporate culture and a standard for the music industry. Internal tensions between the marketers and the product developers about who actually sets the company's course were more apparent. Market leadership resulted in a form of arrogance and the company felt quite untouchable.

The desire to grow was not unique, by the way; many other companies followed a path of diversifying their products. An enormous American presence on the international market emerged, as did Hammond. With the emergence of this global market, competition was stirred up and in the field of musical instruments, and Japanese companies such as Yamaha began to appear.

Socially, the emergence of a youth culture influenced the formation of musical taste; in America, the organ jazz culture was at its height, and in England, rock music was emerging, creating new musical icons. They signified a still unprecedented popularity of Hammond use among professionals, amateurs and an enormous crowd of enthusiasts. The role of the *Company* itself in this was marginal; its focus remained primarily on the consumer. Professional top models were marketed, but these had quality issues and did not have the essential additions to which the professional aspires.

3.5.3 Opposing forces

The seventies are the culmination of a forty-year company history with many ups and downs. The company's decision to fully invest in a new technology (LSI) meant the end of the production of tone organs and thus marked a clear turning point in music history. The simultaneous development and abandonment of two completely different technologies was problematic. The inefficient production and manufacturing facilities, the diminished quality and the consequent diminishing levels of trust amongst dealers and consumers, disappointing estimates and consequent price increases, a confused management decision-making process: all these factors interacted in a short space of time.

The Hammond marketing department worked overtime and covered up their internal problems, but the annual reports and other documents tell another other story: the Hammond *Corporation* was kept afloat by merging with a successful glove manufacturer. A global economic crisis did not help, of course, and competition had now taken over the market: Hammond had changed from a proactive to a reactive company.

The *musicians*, who in previous decades contributed so much to the positive image of the brand, were now also playing their part in the perception of amateur organists and enthusiasts. The professionals were focusing on the newly emerging field of synthesizers and the use of portable organs from the competition.

So we see that the actors in these years, which were previously so neatly aligned, are increasingly moving away from each other. This dynamic continues, with the business strategy, market changes and social movements, as well as the role played by the musicians, negatively reinforcing each other at the expense of the Hammond Company's position.

The company, despite new capital and the incorporation into an industrial conglomerate, did not recover. The Hammond products no longer appeared distinctive enough; the sound was no longer unique; and the quality, although much improved, was no longer as exceptional as the tone wheel organs. The era of analogue synthesizers (1970s) and the Japanese market dominance with digital instruments (1980s) took over Hammond's former role. The consumer now mainly buys compact instruments, the music professional and former Hammond icons hardly play the

instrument anymore and a new global economic crisis, with social consequences, is looming.

3.5.4 An interplay

So we see how the dynamics within the actors influence history both positively and negatively. A great product with a fantastic quality and a unique sound has both the internal and the external conditions to grow into a great success. The interplay between the business operations, the achieved market position and the use of an undeveloped technology causes a loss of confidence, and the rapidly changing social reality means that the interacting relationships between the actors lead to the downfall of the company.

Total	Revenue	Profit	Profit percentage
Thirties	$ 7.002.857	$ 1.374.379	20
Forties	$ 23.733.240	$ 5.483.060	23
Fifties	$ 93.294.292	$ 30.935.920	33
Sixties	$ 182.574.370	$ 51.163.506	28
1970 - 1977 (Q3)	$ 220.764.000	$ 17.074.000	7,5

Fig. 56 Turnover and profit of the Hammond Company throughout its existence. This table shows in broad terms how Hammond grew from a small company to a conglomerate. Sales grew to record levels in the first half of the 1970s, but Hammond, as a division within a conglomerate, achieved increasingly poor results.

4 The musicians

This chapter describes the roles musicians played in the development and popularity of the Hammond organ. How did the instrument find its place in various musical movements; how did musicians use the instrument; which new playing techniques did they introduce and did they use added technological aids? I approach these questions using two core roles from innovation theory, namely the role of the innovators and of the 'early adopters'.[137] I consider musicians, who have given the instrument a whole new twist through their playing style, to be innovators. They inspired the early adopters, who developed their own interpretation, but also continued to elaborate on the innovators' content.

In the history of the Hammond organ, different authors and musicians indicate five periods in which the instrument changed its musical character and in which one or two musicians can be seen as innovators.[138]

These are:

- The pre-war period when the organ as a church and theatre instrument was also embraced as a jazz instrument with a key role for the black American, Fats Waller.
- The late forties to mid-fifties in which 'Wild' Bill Davis and Milt Buckner translated Waller's musical legacy to the big band era with a richly orchestrated organ sound and the birth of the organ trio.
- The fifties and sixties in which Jimmy Smith, a black American, introduced a completely new sound to the organ, made it relevant outside jazz, and found many imitators.
- The sixties and seventies in which the organ also became visible outside the US in white rock music with the British musicians Keith Emerson and Jon Lord as driving forces; this led to the rise of the keyboard player.
- A Hammond revival around 1990, in which the organ became popular again and the Americans Joey DeFrancesco was seen as a musical all-rounder and Larry Goldings as a 'musicians' musician.

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[137] Everett Rogers, *Diffusion of Innovations* (*fourth edition*) (New York: Free Press, 1995).
[138] Faragher, *The Hammond Organ: An introduction to the instrument and the players who made it famous*; Heinrich, “The Afrological Soul of Jazz Organ”; Behrendt, “Die Instrumenten des Jazz,”; Porter, “Soul Jazz,”; Vail, *The Hammond Organ: The Beauty in the B*.

For each period, I briefly describe the developments concerning the Hammond organ, and then I go into more detail about the significance of the innovators and the early adopters. In addition to this, I indicate which technical characteristics the organ had at that time or were achieved through musical innovation. The description of these periods is based on archive research and interviews with musicians.[139]

In the last section of this chapter, I zoom in on social developments in the US, in relation to the Hammond organ. Here, black and white music culture and the broader significance of the innovators and early adopters are discussed.

4.1 The church and theatre organ and innovator Fats Waller

4.1.1 An alternative for the pipe organ

We can build a picture of how Laurens Hammond thought about the role of musicians and composers by reading an interview in the magazine 'Popular Mechanics' from 1939. Hammond states: "An instrument which is flexible enough to allow the musician to explore new possibilities in beautiful tone colours, will also permit him to blunder into horrid noises. This, however, is the exact way in which art makes progress."[140] One could deduce from this that Hammond had an open attitude with regards the free and creative use of his instrument. On the other hand, history also shows that Hammond's personal taste was of great influence in actively supporting successful organists who contributed to his products. It is the first generation Hammond organists in the thirties and forties, coming from a predominantly classical church and/or theatre organ background, that Laurens Hammond had in mind when developing his organ. They were actively engaged by the manufacturer in promotional activities and the development of teaching programmes (with the aim of purchasing a Hammond). They also performed during Hammond society activities and received prominent attention in their own 'Hammond Times' magazine.[141]

[139] See Appendix II for the full overview
[140] “Blazing New Trails,” 200-202.
[141] See Appendix II

The second chapter, describes how the classical pipe organ in the church inspired Laurens Hammond to develop his organ. Along with the church, the cinema was an additionally important place where live organ music could be found.[142] The film 'The Jazz Singer', from 1927, meant a public breakthrough for a 'soundtrack' to a film, and theatres started buying speakers and equipment to offer this new form of musical film experience.[143] The economic crisis of the 1930s meant that pipe organs fell out of favour and a cheaper instrument, such as the Hammond organ, could conquer the market.[144]

Players of the theatre organ saw the Hammond organ as a more compact alternative, and although it had fewer built-in sound effects, the typical theatre organ style could be performed on it perfectly. The theatre organ was for the most part installed at fixed locations, with the player making music on location. The Hammond organ made it relatively more manageable for the musician who travelled with his own instrument, and this is certainly one of the reasons why in the thirties and forties people like Milt Herth, Jesse Crawford, Porter Heaps and Eddie Layton became more recognisable in places with a large audience. Ethel Smith was the first great female organist with a stage presence and along with her virtuosity, resulted in a number of hits in the fifties; her work could even be seen and heard on Walt Disney films. Smith was also an exponent of the theatre organ tradition.

In general, the theatre organ style fitted in well with Hammond's vision of making his product popular for the widest possible audience. These organists were important for the visibility and popularity of Hammond instruments. Their musical style was formed in a time when the Hammond organ had not yet been developed and this style did not change significantly through the use of a Hammond. Consequently, organists in this category are not considered innovators.[145]

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[142] Faragher, *The Hammond Organ*, 3-4 (Pipe and Theatre Organs); See 'other interesting sites' in the Bibliography on the history of the Cinema Organ.
[143] Warner Music, *The Jazz Singer*, movie, 1927.
[144] Colin E. Pykett, "The Status and Future of the Organ," 2014, http://www.pykett.org.uk/statusoforgan.htm.
[145] Barry, *Hammond as in Organ*, Chapter XV; Faragher, *The Hammond Organ*, 9-10 ("a brief musical history"), 232 (Jesse Crawford), 277 (Milt Herth); Hammond Organ Company, "Fifty years of musical excellence,"; Vail, *The Hammond Organ: The Beauty in the B*, 17 -19 ("white music"); Hammond Organ Master Classes by Porter Heaps; Hammond Times magazines, various editions, Appendix IV; Alexander, "The jazz organ: A brief history," 13.

4.1.2 Innovators and early adopters

In order to give a picture of the musical development around the Hammond organ, we have to start with Fats Waller (1904 - 1943). Waller was the son of a vicar and learned to play the pipe organ at the church at an early age. As a jazz pianist, the virtuoso Waller wrote history, but he was also open to excursions into theatre organ playing, by improvising soundtracks on the spot, to accompany silent films. Musically speaking, Waller knew how to apply the stride-piano technique, popular in the 1920s, to the pipe organ, which thus received an hitherto unheard of, swing.[146] Furthermore, because the production of a tone on the pipe organ takes place with a delay, Waller could not play together with other instrumentalists such as a drummer. A few black churches would own an expensive pipe organ, however, usually a harmonium was used, so the audience reach of the organist Waller must have been limited. The introduction of the Hammond organ occurred later in his career, so he only had the opportunity to experiment with the instrument for a short period of time. As a result, few recordings exist of Waller behind a Hammond, with the 1942 'Jitterbug Waltz' on a Model A being a notable exception. Waller may not have played a decisive role in the breakthrough of the Hammond in jazz music, but he did inspire Count Basie, who, as his informal pupil, was taught to love the Hammond.[147] So Waller can be seen as one of the first pioneers in jazz in the use of organ-like instruments. The question will remain: what would his musical added value for Hammond have been, if he had not died at such a relatively young age?[148]

[146] Stride piano is a rhythmic form of piano playing in which the left hand alternates bass notes with chords on each beat. It requires a highly developed, technically skilled, playing technique. Fats Waller, as a pupil of the founder of stride technique James P. Johnson, was able to further perfect this playing and apply it to non-stride instruments such as the pipe organ.
[147] Jimmy Smith released an ode to Waller in 1962 with the Blue Note album, *Jimmy Smith plays Fats Waller*.
[148] Heinrich, "The Afrological Soul of Jazz Organ", 21-38; Behrendt, "Die Instrumenten des Jazz," 285-286; Alexander, "The jazz organ: A brief history," 12-13; Hutchison, "Hammond B3 Organ trios and Soul Jazz 1955 - 1965," 11-14; Whiteley, "Hammond technique and methods," 16-19.

Fig. 57 Fats Waller

Count Basie (1904 - 1984) can be seen as the connector between Fats Waller and the first real pioneers: 'Wild' Bill Davis (William Strethen Davis, 1918 - 1995) and Milt Buckner (1915 - 1977). Basie evolved Waller's stride-piano based playing into a more swing-oriented style. He played less as virtuoso and developed an ‘economical', sparse style in the use of the notes. Whiteley writes about this in his master thesis: "Though Basie is another convert from piano to organ, in his playing, it is clear how he used many of the common essential devices of an organist: taking advantage of the sustain of the organ, using dynamics, expression and swells, using it as a backing instrument, and creating brassy horn figures. Basie's tone on the Hammond is similar to Waller's in that he was approximating the sound of a theatre organ." [149]

[149] Whiteley, “Hammond technique and methods,” 20-21.

‘Wild’ Bill Davis is credited as the 'Father of the jazz organ' and with forming a crucial link between Fats Waller and the popular organ trios of the late fifties and sixties.[150] Davis chose the organ after hearing Fats Waller and made the switch in 1949. At that time, he was already known as a pianist and composer-arranger whose piece 'April in Paris', written for the Count Basie big band, is a successful example. Stylistically, Davis was influenced by the Kansas City big bands and R&B. He approached the organ as a big band: with large dynamic differences, continuously changing registrations of sound and broadly layered harmonies that were directly derived from the five-part big band saxophone parts. The typical organ characteristics, such as long sustained tones and a firmly rotating Leslie speaker, also became his trademark. The bass pedal was played with the left foot, which meant that an independent bass player was no longer needed. Through this, Davis became the originator of the O.G.D trio - consisting of Organ, Guitar and Drums - which is still very common today.[151] He also influenced Jimmy Smith, who would truly emancipate the organ within the jazz and R&B circuit after the war.

Fig. 58 Wild Bill Davis.

Milt Buckner's playing also displayed a big band-oriented style in combination with blues and boogie-woogie; he was a renowned arranger. He played mainly in trio and

[150] “Hammond B3 Organ trios and Soul Jazz 1955 – 1965,” 12-13.
[151] Sampognaro, “Lou Bennett and the jazz organ scene in Europe,” 31; Porter, “Soul Jazz,” 142; Schwartz, “Organ Jazz,” 13-14.

is considered a pioneer of the 'locked hands style', in which a melody or improvisation is played in octaves, with the harmonies woven in between. This characteristic 'locked hands' playing technique was further developed by talented jazz pianists such as George Shearing, Erroll Garner and Oscar Peterson.[152] Buckner's sound was a mixture of the traditional use of the original Hammond vibrato scanner, in combination with a rapidly rotating Leslie speaker (tremolo effect). Buckner's physical playing was made difficult by his comparatively short legs, and thus he preferred to play with a bassist rather than play the pedals himself.[153]

Fig. 59 Milt Buckner.

For both Davis and Buckner, the Hammond organ functioned as a solo jazz instrument for the first time and was central to their musical careers. Both popularised the Hammond organ among musicians, and Davis in particular is seen by both Bill Doggett and Jimmy Smith as the defining inspiration in their choice for Hammond.[154]

[152] Behrendt, “Die Instrumenten des Jazz,” 246; Schwartz, “Organ Jazz,” 14-15; Whiteley, “Hammond technique and methods,” 24-28.
[153] Vail, *The Hammond Organ*: *The Beauty in the B*; Steve Lodder, *Classic Hammond Organ. Know the players, play the music* (New York: Backbeat Books, 2008); Sampognaro, “Lou Bennett and the jazz organ scene in Europe,”; Sears, “A walk on the wild side,”; Behrendt, “Die Instrumenten des Jazz,”; Schwartz, “Organ Jazz,”; Porter, “Soul Jazz,”; Alexander, “The jazz organ: A brief history,”; Heinrich, “The Afrological Soul of Jazz Organ”.
[154] Sears, “A walk on the wild side,” 5; Sampognaro, “Lou Bennett and the jazz organ scene in Europe,” 29 en 41; Vail, *The Hammond Organ: The Beauty in the B*, 18; Faragher, *The Hammond Organ*, 219 (Buckner), 238 (Davis) en 376 (Waller); Whiteley, “Hammond technique and methods,” 31; Hammond Organ Hall of Fame, https://hammondorganco.com/artists/hammond-hall-of-fame/.

Jackie Davis (1920 - 1999) incorporated the more musical effects-based theatre organ playing of mostly white organists into his style, with the expression pedal moving rhythmically to the beat. This became his trademark, as can be heard in the big hit 'What's the trouble'.[155] Marlowe Morris (1915 - 1977) is a lesser known musician from this group; his style was a cross between the usual big band approach, and the playing of solo lines with which he distinguished himself and was prescient of the organ style that would become popular in the following period.[156] Bill Doggett (1916 - 1996) also came from the musical lineage of Waller and Davis and was less focused on solo playing. As an accompanist, with his particular repertoire, he laid the foundation for the development of organ use in Rock & Roll and Rhythm & Blues: the styles that would develop into soul and rock music. Doggett became, after Davis, one of the most successful and hit-scoring first generation organists.[157]

4.1.3 Technical characteristics of the organ

The Hammond Company kept adding technical innovations after the introduction of Model A, and these inspired organists to start experimenting with these possibilities. An example is the chorus-vibrato scanner, developed by John Hanert. Originally, the organ was equipped with a pipe organ based tremulant, which was replaced during the first period by an adjustable vibrato and later by the combined chorus-vibrato scanner. Furthermore, the development of a spring reverb and of course the introduction of the Leslie speaker meant other musical uses for the musician.[158] Organist Milt Herth was indirectly responsible for the innovation of the spring reverb, because he would play his Hammond direct, and therefore with a dry and aggressive sound, on the radio. That sound did not enamour Laurens Hammond and he felt compelled to invent a solution to make his instrument sound more spacious.[159]

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[155] Jackie Davis' *Jumpin' Jackie* (LP op Capitol Records)
[156] Heinrich, "The Afrological Soul of Jazz Organ," 54-57.
[157] Sears, "A walk on the wild side," 4; Alexander, "The jazz organ: A brief history," 14; Porter, "Soul Jazz," 142; Faragher, *The Hammond Organ*, 255-257.
[158] 'Laurens Hammond created this effect by repurposing a device designed at the pioneering Bell Labs. This device used springs and wire to simulate the delay experienced during long-distance calls. Hammond used this concept and similar materials to create a delay-based reverb effect called spring reverb'. See: Griffin Brown, A History of Reverb in Music Production, iZotope Content Team, 1 May, 2020, https://www.izotope.com/en/learn/a-history-of-reverb-in-music-production.html.
[159] Barry, *Hammond as in Organ*, Chapter XV, p.2-3.

The bass function of the organ largely determined the new sound of the Hammond trio in the fifties. An organist who combined both the accompaniment function and that of soloist had to form the rhythm section together with a drummer. For the drummer, this meant that the organ bass had to coincide rhythmically with the basic patterns played by the bass drum (in particular), and be experienced as the base of the sound spectrum. If these rhythmic patterns coincided with the bass lines of the organist, a unique swing feel was created, which became characteristic of this organ style. The guitarist acted as a connector of the harmonies and complemented the sounds in the middle spectrum. Both the organ and the guitar could also take care of the solos.

4.2 The jazz organ and innovator Jimmy Smith

4.2.1 The breakthrough

In 1956, a spectacular and definitive breakthrough for the Hammond organ was marked by the stunning rise of Jimmy Smith. Besides the ever popular big band sound, the forties saw the creation of a more intellectual and virtuoso black jazz variant, bebop, pioneered by the likes of alto saxophonist Charlie Parker and trumpet player Dizzy Gillespie. In response, at the beginning of the 1950s, a less complex and more lyrical 'cool jazz' style developed, performed by both black and white musicians. Jimmy Smith, named 'The Boss' by many musicians, managed as an individual musician to fuse the virtuoso bebop style with the blues tradition, and develop as yet undeveloped 'cool' organ sound, that also embodied a completely new approach to Hammond organ playing. The new sound that Smith pioneered had a huge and lasting impact on both the instrument and the genre into which it was introduced.

4.2.2 Innovator Jimmy Smith (James Oscar Smith, 1928 - 2005)

The revolutionary redefinition of the Hammond organ's significance began in 1956, with the release of the LP 'A New Sound...A New Star' on major label, Blue Note. Smith, who came from a family where both parents were professional pianists, was inspired, through the music of Wild Bill Davis, to make the switch from bass and piano to the organ.[160] He built on the organ trio concept developed by Davis, by replacing the big band style with the more intellectual (bebop) approach, bringing an unprecedented

[160] Sears, “A walk on the wild side,” 5; Alexander, “The jazz organ: A brief history,” 15; Heinrich, “The Afrological Soul of Jazz Organ,” 44-45.

feeling for the blues, introducing the (at that time) unusual voicings for the organ - and all this with phenomenal timing, musical phrasing and enormous virtuosity.

Smith thus emancipated the Hammond organ as a fully-fledged and independent solo instrument to which every organist, regardless of musical style, has been stylistically indebted ever since. The musical innovations he conceived inspired a whole generation of musicians to follow in his footsteps, and this led to the unprecedented popularity of Hammond organs in the late 1950s and 1960s. Smith was the first jazz musician to sell more than a million LPs: "His record sales were phenomenal. His albums routinely sold in the 100,000-and-up range, and their chart results were quite astonishing".[161] Smith's contribution to the innovation of Hammond playing has been unparalleled to date. No organist after him has made such an impact and brought forward such change: contemporary Miles Davis even called him "the eighth wonder of the world".[162]

[161] Sears, “A walk on the wild side,” 6; Behrendt, “Die Instrumenten des Jazz,” 287; Porter, “Soul Jazz,” 147; Hutchison, “Hammond B3 Organ trios and Soul Jazz 1955 – 1965,” 28-29.
[162] Sears, “A walk on the wild side,” 6-7; Porter, “Soul Jazz,” 156; Hutchison, “Hammond B3 Organ trios and Soul Jazz 1955 – 1965,” 14-15; DownBeat Magazine Critics Poll 35 time and Readers Poll 41 times from 1962 and Hall of Fame in 2006.


Fig. 60 and 61 Jimmy Smith 'The Boss'.

So what did Smith's virtuosity consist of? The registers of the Hammond foot pedals did not sound very defined in rhythm and groove oriented jazz music. Hammond organists, who were often derived from pianists, found it complex to play the keyboards and pedals simultaneously. Nevertheless, the first generation of organists developed a serving, 'basic' bass function, that accentuated the rhythm of the music by playing along with the left foot on the beat of the measure, but which you could feel more than explicitly discern.

Jimmy Smith developed a new use of the bass pedals by playing the bass lines with his left hand on the lower keyboard. This made them sound more defined and created a musically more independent pattern in relation to the melody and solo parts on the top keyboard or the chords on the bottom keyboard. The tonal range of the lower keyboard is also more extensive than that of the foot pedals, with five octaves instead of two, and this made it easier to incorporate larger musical intervals into the bass patterns. The foot pedals no longer played the central role, but supplemented the left hand bass patterns by 'tapping' the pedals briefly, and simultaneously, playing along with the left hand. This created a rhythmic pulse that was added to the left-hand bass and can be compared to the use of the bass drum by a drummer or the plucking of a string from the double bass. The addition of both parts meant a driving musical factor, in contrast to the more serving and swampy character of the original pedal

sound. Smith himself described the combination of hands and feet as if he were a tap dancer on the pedals.[163]

The combination of sound registers (drawbars) that Smith used were more sparse and less bombastic (all registers open) than that of his predecessors, and the rotors of the Leslie speaker did not rotate continuously at high speed. By stopping the Leslie from rotating (chorale stood for slow speed, tremolo for high speed, brake for stationary), a taut, clear and more defined sound was created. Because of the more 'clean' and percussive approach, the style that Smith conceived was more comparable to a wind player than to the contemporary organist. He also mastered to perfection the maximum use of the expression pedal, by accentuating the individual notes, and he highlighted the use of the newly introduced 'percussive response' from Hammond. This made the Hammond performance more dynamic and allowed for greater musical articulation; characteristics which defined Smith's style. His sound became the sound that is still associated with the Hammond organ. Smith's virtuoso, and even cat-like, approach to the instrument led to the nickname 'the cat', and many of his musical ideas and playing techniques were adopted as musical clichés in the playing styles of his many followers.

Jimmy McGriff, Richard Groove Holmes, Jack McDuff and Don Patterson elaborated on his style and certainly added personal elements, but none matched the ingenuity of the great master. The naming of Smith as greatest source of inspiration by virtually every Hammond organist active from the 1960s to the present is the greatest testimony to this.[164]

[163] Schwartz, “Organ Jazz,” 3, 25-28; Porter, “Soul Jazz,” 146; Alexander, “The jazz organ: A brief history,” 10; Whiteley, “Hammond technique and methods,” 31-38 (regarding the technical aspects of Smith’s bass playing).
[164] Sears, "A walk on the wild side," 6; Online interviews professionals and Hammond students, period May - July 2017, Appendix II; Questionnaire Hammond professionals 2020, Appendix II; Interview with Thijs van Leer, 2020; Sampognaro, "Lou Bennett and the jazz organ scene in Europe," 33-34; Porter, "Soul Jazz," 147; Whiteley, "Hammond technique and methods," 30, 39-53 (on the technical aspects of Smith's playing); Heinrich, "The Afrological Soul of Jazz Organ," 44-49, 50-123 (transcriptions and explanations of solos by Smith published on various albums).

Smith was able to renew himself over several decades and, in the combination with the big band of musical arranger Oliver Nelson, embodied the orchestral sound of the sixties. To these refreshing Nelson arrangements, Smith added his virtuoso solo organ approach, which could 'battle' with the broad and dynamic orchestral sounds (a musical 'battle' between saxophonists or other instrumentalists was a popular custom). This combination of organ and orchestra sold more albums than any other similar combination in history.[165]

In the seventies, when soul and funk had become popular, he again adapted his sound and repertoire to the spirit of the times, as with the arrangements of popular hits in his characteristic style, and in doing so he was once again ahead of the organ troops. Smith played a Hammond solo on 'Bad', Michael Jackson's hugely successful 1987 album. Producer Quincy Jones and Jackson were the most influential artists of their generation, and it is a tribute to Smith's mastery that, even in such an environment, he had the ability to adapt seemingly effortlessly to their new musical developments.[166]

[165] Porter, "Soul Jazz," 149; Alexander, "The jazz organ: A brief history," 16.
[166] Vail, *The Hammond Organ: The Beauty in the B*, 20; Faragher, *The Hammond Organ*, 345; Lodder, *Classic Hammond Organ*, 22; Sears, "A walk on the wild side," 9.

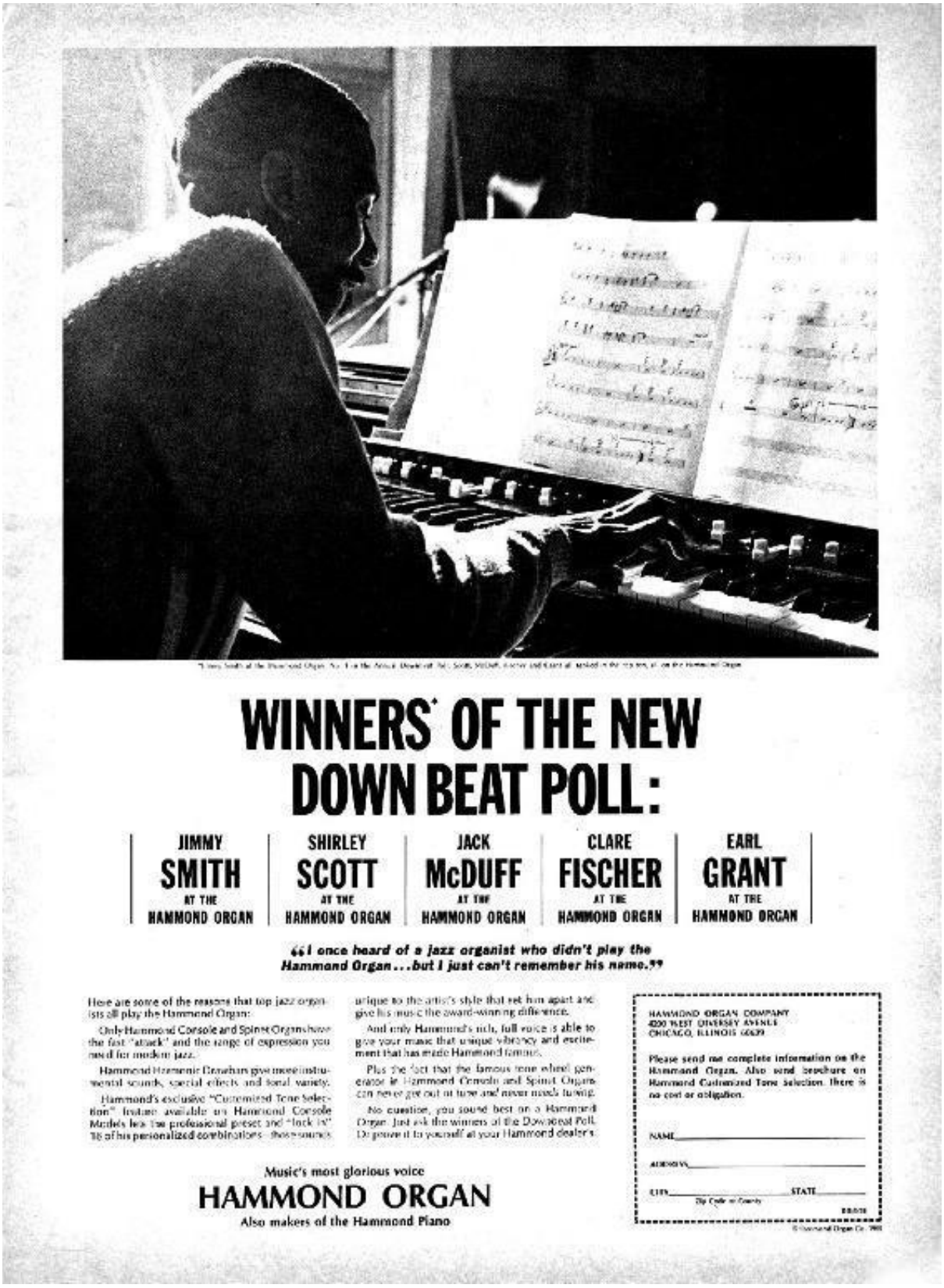

Fig. 62 Winners of the new Down Beat poll, advertisement *Hammond Corporation, 1965.*

4.2.3 Early adopters: Soul Jazz, Rhythm & Blues

Smith unleashed a craze among musicians who made the switch to the Hammond organ. The enormous Hammond popularity during the fifteen years following Smith's rise to prominence has been dubbed the "Golden Age of Jazz Organ".[167]

For these musicians, building a successful career was economically linked to the club circuit, which was called the Chitlin' Circuit (section 4.5.1). The role of the organist was thus determined by the demand for danceable, easy-going and swinging music. If you could not conform to this, then you would have less, or even no, work. Another important factor turned out to be record releases. A great deal of attention was paid to releases in the clubs and on the radio, and organ recordings grew explosively.[168]

Jimmy McGriff (1936 - 2008), Jack McDuff (1926 - 2001) and Richard 'Groove' Holmes (1931 - 1991) are, alongside Smith, considered the most successful organists of their generation. They elaborated on the organ trio with guitar and drums and regularly added a saxophonist. Following Smith' lead, they also made productions with a big band and scored hits like 'Misty' by Holmes or Ray Charles' 'I Got A Woman' performed by McGriff. Among the many pianists who made the transition to the organ under the influence of their success were Charles Earland (1941 - 1999), Big John Patton (1935 - 2002), Johnny 'Hammond' Smith (1933 - 1997), Melvin Rhyne (1936 - 2013) and many others. The young and promising guitar talent George Benson made his debut popular organist Jack McDuff's band; and guitar giant Wes Montgomery had a spectacular collaboration with Jimmy Smith.[169]

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[167] Alexander, "The jazz organ: A brief history," 16; Sears, "A walk on the wild side," 7; Behrendt, "Die Instrumenten des Jazz," 286; Heinrich, "The Afrological Soul of Jazz Organ," 49.
[168] A Spotify playlist is attached with examples from the various stages of the Hammond organ in music history, Appendix IV.
[169] *The New Boss Guitar of George Benson* (with the Brother Jack McDuff Quartet) (1964), *Prestige* (1964); *Jimmy & Wes: The Dynamic Duo* with Jimmy Smith (Verve) (1966).

Fig. 63 Jimmy McGriff and Richard 'Groove' Holmes.

Fig. 64 'Captain' Jack McDuff.

In order to distinguish themselves from Jimmy Smith, the various imitators experimented with their sound by using electronic organs instead of tone wheels, such as the Hammond X-66 (Holmes), or by using effects devices. Musical nuances were created by a more 'funky' approach (McGriff, McDuff, Johnny Smith); more blues oriented (Earland) or more hard bop jazz oriented (Patterson, Patton). Shirley Scott (1934 - 2002) and Trudy Pitts (1932 - 2010) were successful female organists on the jazz circuit and developed a style that was a mixture of the first generation jazz organists Davis and Buckner, and the modern style of Jimmy Smith. Both were known as master accompanists with a 'light touch' in their playing and sound, and also performed under their own names as bandleaders.

Fig. 65 Shirley Scott.

The self-styled doctor, Dr Lonnie Smith (1942 - 2021), has proved to be a popular performer and showman to this day; combining jazz, funk, boogaloo and rock styles. His attire as a 'Sikh' captured the imagination of the audience. He led popular organ groups, such as with George Benson, made many records and, with the revival from the 1990s onwards, became one of the principle icons of the Hammond heyday that was once again enjoying enormous popularity.

McGriff, Holmes, McDuff and Lonnie Smith all made use of an extensive keyboard arsenal with synthesizers, clavinets and string ensembles in the 1970s, releasing a large number of commercial, smoothly produced productions. With the revival of the Hammond organ in the 1990s (section 4.4), they did however return to their original roots in the solo use of the tone wheel organ.[170]

Fig. 66 Dr. Lonnie Smith.

Lou Bennett (1926 - 1997) was the first well-known organist to make a permanent crossing to Europe where he built up a new presence, first in France, and then in Spain. Bennett was known as a virtuoso on the foot pedals and kept searching feverishly for a better bass sound. For this purpose, he built a completely modified Hammond which he called 'The Bennett-Machine'. Due to the many technical complications, and probably due to his less convincing artistic achievements, Bennett as Hammond-technologist *avant-la-lettre* has long remained underexposed in the history of the organ. Rhoda Scott describes Bennett's story at length in her master's thesis: he was at the source of a flourishing European organ scene where Scott himself, and the

[170] Schwartz, "Organ Jazz," various portraits and discographies of organists from the 'Golden age of Jazz Organ,' from p. 7; Porter, "Soul Jazz," various portraits, 143-145, 153-157; Alexander, "The jazz organ: A brief history,"; Faragher, *The Hammond Organ*; Hutchison, "Hammond B3 Organ trios and Soul Jazz 1955 - 1965," 16-17; Whiteley, "Hammond technique and methods," 46-53; Heinrich, "The Afrological Soul of Jazz Organ," 134-135; Dr. Lonnie Smith, Hammond Organ Hall of Fame; DownBeat Magazine Critics Poll 6 times between 2009 and 2018

Frenchman Eddy Louiss, became internationally famous names, and both cited Bennett as a great source of inspiration.[171]

Fig. 67 Lou Bennett with his Bennett-Machine.

Rhoda Scott (1938) learned to play the organ in her father's church and made the move to Europe (France) in 1968. Here she became a public phenomenon and inspired the still young European organ scene with her media-genius, energetic performance, and bare feet on the pedals. Eddy Louiss (1941 - 2015), with a more European approach to jazz, was able to forge a style that was entirely his own and thus deviated from the gospel and soul-jazz tradition of his black colleagues, without actually bypassing these traditions. He was thus an highly original exception as an organist with few imitators who earned many plaudits from musicians, both in Europe and in the US.[172]

[171] Sampognaro, "Lou Bennett and the jazz organ scene in Europe," chapter IV 'The life of Lou Bennett', chapter IX 'The Organ Jazz scene in France and Europe'; Alexander, "The jazz organ: A brief history," 21-23; Faragher, *The Hammond Organ*, 211 (Bennett), 304 (Louiss); Robert Latxague, Franck Bergerot and Pascal Anquetil, "Tout Eddy," *Jazz Magazine* (French), vol. 615, June 2010, pp. 25-33; Interview and conversations with Rhoda Scott (Appendix II).

[172] Sampognaro, "Lou Bennett and the jazz organ scene in Europe," Chapter IX; Chapter 4, autoethnography Carlo de Wijs; DownBeat Magazine Critics Poll mentioned several times in the highest regions.
Lab sessions Geertruidenberg; Online interviews professionals and Hammond students; Conversations with Sjaak van Oosterhout, Musifix; Organ Surium Hammond Museum, Unterengstringen, Switzerland, Jacki Rub; Questionnaire Hammond professionals 2020; Rhoda Scott, masterclass Codarts (Appendix II).

Fig. 68 Rhoda Scott, album Live at the Club Saint-Germain, 1974.

Larry Young, also known as Khalid Yasin (1940 - 1978), developed a very personal jazz style drawing on the playing technique of Jimmy Smith. Young developed from an early Smith-adopter, into an innovator of the organ genre, by adding the musical heritage of saxophonist John Coltrane into his playing. This resulted in a more modern harmonic and rhythmic approach to playing, in contrast to Jimmy Smith, who was influenced by bebop saxophonist Charlie Parker. Stylistically, Young deviated from Smith and his devotees and made the connection between the organ and the modal and freer modern jazz forms that emerged in the sixties. He was also active with advanced (jazz)rock music in Tony Williams' 'Lifetime' groups (formerly, drummer for Miles Davis). Young is still an inspiration to present generations of jazz organists, with Larry Goldings and Sam Yahel as examples, and can be considered an innovator of the musical organ style, still following the sound and playing techniques of Jimmy Smith.[173]

[173] Sears, “A walk on the wild side,” 7-9; Behrendt, “Die Instrumenten des Jazz,” 287; Schwartz, “Organ Jazz,” 15-16; Alexander, “The jazz organ: A brief history,” 24-25; Heinrich, “The Afrological Soul of Jazz Organ”, Various references in comparison with Jimmy Smith; Faragher, *The Hammond Organ*, 385.

Fig. 69 Larry Young.

John Coltrane's musical legacy was continued by his wife Alice Coltrane (1937 - 2007) in the 1960s and 1970s as composer and bandleader. She linked this legacy to Eastern spiritual and meditative influences and the tradition of gospel music in which she had grown up.

4.2.4 Technical characteristics, introduction of the B3

From its introduction in 1955, the Hammond model B3 proved to be the ultimate organ in the world of jazz, R&B, pop and rock, both on stage and for recordings. The B3 brought together all the innovations developed by Hammond and the ones professional musicians aspired to: the sound, the relatively transportable model with extensive manuals and pedals, and a design that appealed to many. The B3 was part of the first series of Hammonds with 'touch-responsive percussion control' (1955) and this percussive sound became a characteristic part of the Jimmy Smith style.[174]

The B3 is also Hammond's longest produced model, and the musical innovations brought about by the musicians has mainly been via this B3 and the technically identical, but differently-configured, models A and C.[175] In Chapter 6, this iconic B3 plays an important role in the interviews and laboratory sessions with musicians. The

[174] Heinrich, "The Afrological Soul of Jazz Organ," 48; Hammond Organ Company, Hammond Organ Percussion Controls, 1955 (Chicago History Museum Collection).
[175] See Chapter 3, paragraph 1.2.

more compact Hammonds, such as the L or the M, were mainly used when transportability or purchase costs were important. The model series E, H and the striking X-66 and X-77 mainly found their place on the theatre and entertainment circuit, or were used indoors.

The reproduction of the low bass frequencies by a Leslie speaker is not ideal, because the bass sounds are not very tight. All frequencies below 800Hz sound rather muddy or shrouded, while the low frequency spectrum of a bass guitar retains much more definition.

Jimmy Smith and others experimented a lot with amplification of the organ bass and they looked into modifications that would reproduce the sound through a separate amplifier. Recording engineer Rudy Van Gelder, responsible for the first Jimmy Smith recordings for the Blue Note label, experimented with these new recording techniques.[176] Van Gelder was able to place the Smith bass sound more prominently in the sound spectrum of the recordings, giving it more definition. From that moment on, every organist wanted to use this new technique on their own recordings; Van Gelder kept the recipe for himself, however, or for those who came to record in his studio.

Hammond itself brought in a string bass modification that had been offered by the competition for some time and was longed for by buyers.[177]

4.3 The pop and rock organ with innovators Keith Emerson and Jon Lord

4.3.1 New developments

For the origin of the pop organ, we can go back to the first phase when the Hammond organ appeared on the market. Musicians with a theatre organ or classical background played accessible and popular tunes that stimulated amateur practice. Examples of this are described in chapters two and three.[178]

[176] Porter, “Soul Jazz,” 147; Alexander, “The jazz organ: A brief history,” 10.
[177] Heinrich, "The Afrological Soul of Jazz Organ," 80-82 ("harmonic foldback" of the bass sound on the lower keyboard); Conversations with and technical archives of Sjaak van Oosterhout, Appendix II.
[178] See also Section 2.4; Hammond Times magazines, various editions and Hammond exercise books, Appendix IV.

Since the 1950s, early adopter Bill Doggett developed a style of playing that has inspired a more pop-like approach to the organ. Popular musicians such as Booker T. Jones and Billy Preston continued this development, and great stars such as Ray Charles, James Brown and Sly Stone often played the instrument themselves.[179]

In the studio, a Hammond was part of the basic equipment and on many successful Motown and Philly Sound recordings, the organ was indispensable.

British bands originally found their inspiration in American R&B, and thus also got to know the Hammond organ. In the course of the sixties, British bands became even more popular and influential than American pop bands. Pop music flourished and provided the musical voice for a young, up-and-coming generation; the Hammond sound proved inseparable from this.

Almost without exception, these pop organists no longer played with foot pedals, because a bass guitar had a faster response and a larger harmonic range in terms of tone spectrum. Pop music was also reaching an increasingly larger audience and, in addition to the clubs, large capacity concert venues and festivals were created. With this development, better band amplification by means of a PA system became necessary. The development of this system was still in its infancy and organists also started to experiment, following the example of guitarists. Several Leslie speakers were driven at the same time - modified or equipped with other drivers and speakers - or the Leslie was completely replaced by heavier amplifiers. The important exponents of this generation are the mainly white British organists and their bands: Brian Auger (Trinity and Oblivion Express), Rod Argent (The Zombies), Steve Winwood (Traffic and The Spencer Davis Group) and American musician Al Kooper (Blood, Sweat & Tears), Felix Cavaliere (the Rascals) and Canadian Garth Hudson (The Band).[180]

The developments in powering the organ sound made it an equal to the electric guitar in terms of volume and musical impact. Like the guitarist, the organist could now play both an accompanying and a solo role. The music became heavier and louder, and resulted in various rock movements with a symphonic, progressive or psychedelic

[179] Faragher, *The Hammond Organ*, 223 (Charles), 214 (Booker T.); Hutchison, “Hammond B3 Organ trios and Soul Jazz 1955 – 1965,” 30; Doerschulk, *Rock Keyboard*, 18 (Booker T.); Behrendt, “Die Instrumenten des Jazz,” 248; Whiteley, “Hammond technique and methods,” 67-75 (Preston).
[180] Faragher, *The Hammond Organ*, 202 (Auger), 291 (Kooper), 200 (Argent), 381 (Winwood); Doerschulk, Rock Keyboard, 23 (Winwood), 29 (Cavaliere), 39 (Hudson); Alexander, “The jazz organ: A brief history,” 23-24.

character. A classical training as pianist or organist formed the musical and technical basis for many rock organists; and by mixing this training with the organ technique developed by Jimmy Smith, a whole new genre was born. Icons such as Keith Emerson (The Nice, Emerson, Lake & Palmer) and Jon Lord (Deep Purple) became the face of this generation of rock organists.[181] In this way, the Hammond organ plays a prominent role in a number of historic pop classics: 'A Whiter Shade of Pale' (Procul Harum) with organist Matthew Fisher, 'Gimme some lovin' by Steve Winwood and the worldwide success of the Dutch band Focus ('Hocus Pocus') with Thijs van Leer.[182]

Even in styles less associated with the American or British music tradition, such as reggae in Jamaica and Latin styles in Brazil, the Hammond was brought in. Well-known examples are the music of reggae legend Bob Marley, and Jamaican organist Jackie Mittoo.[183]

4.3.2 The keyboardist

In the transition from the sixties to the seventies, a new type of musician developed: the keyboard player. In their setup they use several keyboard instruments: acoustic piano, electric piano, organ (besides Hammond also Philicorda, Vox or Farfisa), clavinet, Mellotron (the analogue predecessor of the digital sampler) or string ensemble. The synthesizers from manufacturers such as Moog, Oberheim and Arp were developing explosively and new technologies were giving more and more direction to the sound of jazz, fusion, pop or rock music. The keyboardists modified their instruments as they saw fit, using pedals including wah wah, fuzz, distortion, ring modulator, echo and filters to manipulate the sound. The role of the Hammond foot pedals was almost obsolete, as they worked with a bass player. Techniques for playing different keyboards at the same time were developed to make sounds that are completely different from each other. For example, an organ solo is accompanied by a distorted piano sound or a synthesiser solo is supported by organ chords. Virtuoso musicians such as Jan Hammer, George Duke, Herbie Hancock, Joe Zawinul and the

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[181] Faragher, *The Hammond Organ, an introduction to the Instrument and the Players who made it famous*, p.261 Emerson, p.303 Lord; Hammond Organ Hall of Fame.
[182] Faragher, *The Hammond Organ, an introduction to the Instrument and the Players who made it famous*, p.266 (Fisher), 202-206 (Auger), 327 (Procol Harum); interview Thijs Van leer (Appendix II); Auger, Brian Auger, Hammond B-3 master.
[183] Faragher, *The Hammond Organ, an introduction to the Instrument and the Players who made it famous*, p318; Paul Tingen, “Joe Zawinul,” article in *Sound on Sound* (June 2003).

aforementioned Keith Emerson were shaping this development and still used the organ as one of the means of expression.[184]

4.3.3 Innovators and early adopters

Keith Emerson (1944 - 2016) generated the greatest impact for Hammond in this so-called keyboard revolution. He became the catalyst of these developments and drew a lot of attention to himself. Inspired by Jack McDuff and Billy Preston, Emerson knew that copying their styles was not an option; he devised a synthesis between his classical piano training and the original arrangement of classical works into symphonic rock. He is a gifted improviser and a flamboyant stage personality who combined his rock outfit with spectacular theatrics during live shows; all without compromising on musical skill and tremendous virtuosity.

Emerson gave the Hammond a new 'sexy' image that, as a solo instrument, is not inferior to the electric guitar, which is considered to emblematic of rock culture. With a setup of Hammond organ, grand piano and an impressive modular Moog synthesizer, Emerson developed a new peak in the solo use of the Hammond sound. Emerson became friends with Bob Moog, the inventor of the Moog synthesizers, and Moog mentions in 'Analog Days' that he often talked with Emerson about the ultimate stage use of his synthesizers, and the needs of a successful musician regarding use, sound and design.[185] With the Hammond Company, Emerson's relationship was much more strained and he recalled in interviews that his organ use was not really appreciated by Hammond.[186] Emerson's contribution began with The Nice in 1967, and culminated with the worldwide success and stadium tours of Emerson, Lake & Palmer. Founded in 1970 and active in various periods until 2010, the Hammond organ, with ELP as its instrument, has never before had such an extensive audience.[187]

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[184] Doerschulk, *Rock Keyboard*, 103 (Multi-Keyboard); Behrendt, “Die Instrumenten des Jazz,” 288-290; Alexander, “The jazz organ: A brief history,” 24.
[185] Pinch, “Between technology and music,” chapter ‘Live!’, p.200-213.
[186] Vail, *The Hammond Organ: The Beauty in the B*, 165-167.
[187] Doerschulk, *Rock Keyboard*, 58-65; Sears, “A walk on the wild side,” 2.

Fig. 70 Keith Emerson behind his Hammond and the huge Modular Moog synthesiser.

Jon Lord (1941 - 2012) was infected by the Jimmy Smith virus in 1963 and came to prominence with the formation of influential rock band, Deep Purple in 1968. Like Emerson, Lord had a fascination for classical themes and orchestral works, studied classical piano and wrote a famous "Concerto for Group and Symphony Orchestra". His greatest contribution is the development of his organ sound, which became a trademark for Hammond-playing rock musicians. Lord sent his organ sound through a tower of Marshall amplifiers and this created a 'growling, overdriven, distorted and mechanical heavy' sound. Ritchie Blackmore's lead guitar was given a counterpart and many keyboard players tried to copy Lord's sound, but as is befitting a true innovator: his sound was never fully matched.[188]

Early adopters like Rick Wakeman, one of the keyboardists from Yes, Tony Banks (Genesis), Richard Wright (Pink Floyd), Jan Hammer, the Dutchmen Rick van der Linden (Ekseption) and Thijs van Leer (Focus), continue the (symphonic) Hammond organ rock tradition, often in combination with classical musical influences.[189]

[188] Doerschulk, *Rock Keyboard*, 53-57 (Lord).
[189] Doerschulk, *Rock Keyboard*, 66-74 (Wakeman); Alexander, “The jazz organ: A brief history,” 24 (Hammer).

Fig. 71 Jon Lord with Deep Purple.

4.3.4 The path of the musicians and the Hammond Company diverges

In terms of new models suitable for professional use, the Hammond company did not bring anything worth mentioning onto the market. The professional musician stuck mostly with the tone wheel Hammonds. New electronic organs were provided with extensive playing aids and even rhythm boxes were added, but for the professional, these developments moved further and further away from the creative impulse that the original organs had given them. The reputation of Hammond as a brand for professionals crumbled considerably.[190]

[190] Alexander, “The jazz organ: A brief history,” 9.

New (LSI) Hammonds hardly played a role on stage in the seventies. There were portable versions that sold reasonably well, and other manufacturers also released models that became popular. Hammond competitors Vox, Viscount, Farfisa, Philicorda, Solina and Yamaha were forced to make other designs because Hammond did not want to share its patents with them. The different and more contemporary sound developed by these manufacturers was found increasingly, and especially, in pop productions.

By comparison, a Hammond became heavier and more cumbersome to transport ,and tour, intensively; the instrument gradually faded into the background as it became less hip for the modern keyboardist to carry it around. In the meantime, the disco era had arrived in which the use of synthesizers flourished. In Great Britain, there was the rise of the punk and new wave movements, and the mostly uneducated punk musicians preferred to look for a cheap combo organ from the sixties, or didn't use keyboards at all, let alone a Hammond.

In many recording studios there were still tonewheel organs that proved to be indestructible and here and there they appeared in productions. A period of relative invisibility for the Hammond organ lasted until deep into the 1980s and coincided with the bankruptcy of the Hammond Company.

In 1970, Jimmy Smith, in a gloomy mood, already saw the decline in popularity coming: "Everything is electronics. Somebody's going to invent a computerised organ after a while and mess everybody's mind up, watch. Then we're really gonna be messed up."[191]

[191] Sears, "A walk on the wild side," 7.

4.4 The revival with driving force Joey DeFrancesco

4.4.1 The comeback

In the transition to the 1990s, the ‘old school' Hammond tone wheel returned to the stage: James Brown had his umpteenth musical resurrection with a Hammond on stage. Brown's former horn section, which functions independently under the name of the JBs with saxophonist Maceo Parker, had a young Larry Goldings on the organ. The (then) new megastar Prince had a spectacular see-through Plexiglas Hammond B3 and saxophonist David Sanborn gave organist Ricky Peterson room in his music. The British James Taylor Quartet embodied the hip 'Acid Jazz' movement and Dutch Candy Dulfer was gained world fame with yours truly as the organist in her band 'Funky Stuff'.

In the jazz scene, there was the stratospheric rise of a young 'musical all-rounder' and American with Italian roots Joey DeFrancesco (1971) and Germany was represented on the world stage by Barbara Dennerlein (1964). She also had success in the US and started on the German Wersi organ before making the switch to Hammond. Her bass sound was a sampled double bass; she received many plaudits for her foot technique. The influence that the electronic, Wersi theatre organ had on her style was expressed in the use of not very realistic piano and vibraphone samples. In addition, veteran organists like Lonnie Smith and Jimmy McGriff were touring internationally again.

Fig. 72 Barbara Dennerlein.

The digital technological phenomenon of sampling changes pop music and lead, among other things, to Hip Hop. In 1992, for example, the Beastie Boys released a single in which a Hammond sample was the leading motif, and producer Robin S used a percussive Hammond sample as the bass line in the worldwide dance hit 'Show me love'. In brief, the Hammond sound was returning in musically groundbreaking pieces. Keyboardist John Medeski knew how to combine hip-hop with jazz and create an unconventional sound with Medeski, Martin & Wood. With the successful album 'A Go Go' by guitarist John Scofield, MM&W managed to reach a more mainstream audience.

Around the turn of the century, a new generation of jazz musicians built on Larry Young's musical legacy, musicians such as American Sam Yahel and Dutchman Arno Krijger. Jimmy Smith's influence returned in the danceable music of the trio Soulive. Just as the use of the Hammond sound was becoming popular again, there was also a trend towards the use of vintage equipment and instruments. The (as many have termed) warmer sound of analogue sound components is opposed to the ‘perfect', clean and less coloured sound of digital equipment. In interviews with musicians (Chapter 6), this theme is discussed in detail. The revival of instrumental music served as a further reason why there was an increase in the use of Hammond organs.

Audience favourite Lonnie Smith and the new generation of organists Goldings, Dennerlein and DeFrancesco took full advantage of the favourable tide. Comparable to the sixties in the Chitlin' Circuit, pianists again made the economically favourable move from the piano to the organ: it simply brought them more work. A new phenomenon was the American Cory Henry (1987) who mixed his gospel roots with jazz and soul to create a catchy new mix and created a real furore; first as a member of 'Snarky Puppy' and then with his own 'The Funk Apostles'.[192]

[192] Faragher, *The Hammond Organ*, 253 (Dennerlein), 216 (Brown), 249 (John DeFrancesco), 267 (Goldings), 316 (Medeski), 361 (Taylor), 384 (Yahel); Sampognaro, “Lou Bennett and the jazz organ scene in Europe,” Chapter IX, 98-101.

4.4.2 Joey DeFrancesco

Joey DeFrancesco is the undisputed number one jazz organist after Jimmy Smith.[193] As son of professional organist 'Papa' John DeFrancesco, he came into contact with the Hammond organ at an early age, proved to have a phenomenal talent and at a young age met famous musicians like Jimmy Smith and Richard 'Groove' Holmes. At 16, he signed a contract with Columbia Records and a year later he was playing in Miles Davis' band. DeFrancesco made duo recordings with his heroes Jimmy Smith and Jack McDuff and payed tribute to Larry Young with a tribute band in his style.

DeFrancesco is a technical master, a connoisseur of organ history, and excels in versatility. He also sings and plays the piano, trumpet and saxophone as a multi-instrumentalist. His role as a catalyst for a new generation of organists has proved more decisive than his contribution to the development of a new style, playing technique or sound of the Hammond organ. He moves, however virtuosic, in the mainstream jazz and jazz-rock styles and his contribution to the renewed status of Hammond came at exactly the right time: the aforementioned 'vintage' trend in sound and instruments; record companies looking for new and potential icons to promote the CD medium; and DeFrancesco as a young, undisputed and energetic virtuoso. The media were also eager to capitalise on the 'new Jimmy Smith'.[194]

Fig. 73 Joey DeFrancesco.

[193] Online interviews professionals and Hammond students and Questionnaire Hammond professionals 2020, Carlo de Wijs, Appendix II; 4 Grammy Award nominations, Hammond Organ Hall of Fame; DownBeat Magazine Critics Poll 11 times and Readers Poll 15 times from 2005 to 2019.
[194] Vail, *The Hammond Organ: The Beauty in the B*, 167-169; Faragher, *The Hammond Organ*, 246; Schwartz, “Organ Jazz,” 19; Heinrich, “The Afrological Soul of Jazz Organ,” 134 (Young Phenomenons: Joey DeFrancesco).

4.4.3 Digital Hammond Sound

Around the 2000s, the first digital Hammond sounds appeared on sampled CD-ROMs, the Hammond sound was part of a digital keyboard or virtual forms appeared in digital audio workstations (DAW). From 2010 onwards, hardware B3 clone organs with a design modelled on the original B3 also appeared on the market. These clones contained samples, and later 'virtual modelling' technology. Hammond Suzuki, as successor of the original Hammond Company, had been releasing digitally modelled organs since the late 1980s with a sound quality that is now very close to the original. Formidable competition comes from the Scandinavian Clavia that claims an important share of the market for both amateurs and professionals with its characteristic red and widely usable Nord instruments. Manufacturers such as Yamaha and Roland integrate Hammond-like sounds into their modern workstations and keyboards. The B3 'look-a-likes' from German Ulm and Italian Viscount, represented by Joey DeFrancesco, also benefitted from the Hammond revival.

4.4.4 Professional relationship with the manufacturer

It is striking that DeFrancesco became an ardent supporter of these Viscount Hammond clones, while still playing his original Hammond tone wheel. It is an open secret that his relationship with manufacturer Hammond Suzuki is not optimal and this situation resembles what happened earlier in history with Jimmy Smith. It is a more specific illustration of the reflection from Chapter 2, in which the manufacturer originally acted as a dynamic booster and then increasingly shirked that role. Hammond's endorsement strategy traditionally did not focus on the impact that the great Hammond icons brought to the brand.

In the world of drummers and guitarists, the intensive collaborations (endorsements) of professionals with brands is quite common: the image and quality of the brand is linked to the craftsmanship of the popular professional. Hammond Suzuki chooses a different path in collaborations and offers discounts for the professional with little formal commitment. [195]In the past, Jimmy Smith has commented that as the most important Hammond organist of all time, he gave a major boost to Hammond's image and was felt that the, in his eyes, lack of appreciation, was

[195]Hammond Suzuki USA, Addison, 2018; Hammond Suzuki Europe, Vianen, Director Jan Kok; Lab sessions, Geertruidenberg; Online interviews professionals and Hammond students (Appendix II).

incomprehensible. Perhaps as a response to this, Smith was persuaded to promote the German brand Wersi in the mid-1970s. It is very likely that this was a lucrative deal, however the relationship resulted in little more than one album release and a European promotional tour. Smith returned to the tone wheel organ, but remained reluctant to perform on a new Hammond Suzuki instrument.

For the often pragmatically-minded musician, the relationship with the Hammond manufacturer does not seem to have had a major impact on musical performance. Musicians use both old and new instruments, as well as Hammonds and Hammond clones as and when it suits them. Hammond's view on working with musicians and vice versa is also discussed in Chapter 6, where it was a topic of discussion during lab sessions with professional musicians and my interactions with Hammond Suzuki Europe, Japan and USA.[196]

4.4.5 Innovators or adopters?

With the revival of the Hammond organ, new Hammond role models appear who inspire new generations of musicians and enthusiasts. This created a momentum that several manufacturers responded to. The new generation of organists mainly reinterpret the great masters of earlier times. The soul, jazz and funk of Jimmy Smith, McGriff and Lonnie Smith, whose popularity in the 2000s rose to unprecedented heights; the style developed by Larry Young; and the legacy of rock giants like Lord and Emerson. The Hammond revival does not produce completely new playing insights, playing techniques or uses of sound, and both vintage and new instruments are employed.

[196] Interviews with Hammond Suzuki Europe, Hammond Suzuki USA and American organists, Appendix II.
It was common knowledge that Smith could be quite moody if something was not to his liking (The Guardian, Fordham, 2005). I had a personal experience in 1992 when I was the support act at the North Sea Jazz Festival and afterwards wanted to meet him, which he refused.

4.5 Reflection

What is the significance of the musicians for the development and innovation of the Hammond organ? Were the innovators accidentally gifted? Did the Hammond Company play a role or were other factors important?

The role of the innovators and the changes in the organ cannot be seen separately from the social developments and the spirit of the age. In the preceding paragraphs we have already seen several examples of this. In this last section, as in the previous chapters, I link these to the different actors in the network around the Hammond organ. To begin with, I will add an actor that emerged from the analysis of the role of musicians in this chapter, and that actor is religion.

4.5.1 Religion

The church had been the historical starting point of the technical and musical developments of the pipe and theatre organ, and this took place in a predominantly white community. Gospel music was central to the experience of faith in the tradition of the African-American church. With Rhythm & Blues, a genre was born that combined influences from jazz, gospel and blues styles into a popular and danceable style. It originated in the black American ghettos and black church communities still have a strong influence over it.[197]

From Fats Waller to the popular organ jazz culture of the 1960s, the religious undercurrent always maintained its strong presence and, as it were, transferred directly to the stage in the clubs. Exuberant dancing, clapping, singing and reacting to this music was comparable to the intense experience in the church. This circuit of clubs, where the black population found their own outlet, was called the Chitlin' Circuit.[198] Many musicians have also referred to it in the song and album titles that reflected this feeling, such as 'Prayer Meetin' and 'The Sermon'.[199] The R&B sound would determine the prominence of the Hammond organ in the club circuit until well into the sixties and would therefore play a role in inspiring the emerging pop and rock music of that time.

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[197] Sampognaro, “Lou Bennett and the jazz organ scene in Europe,” II (From the Church to the Jazz Club), 13-14.
[198] Same, 36; Heinrich, “The Afrological Soul of Jazz Organ,” chapter ‘Individual Personality’, from p.6, chapter ‘Chitlin’ Circuit Requirements’, from p.8, chapter ‘Organ and the Racial Divide’, from p.13.
[199] Hutchison, “Hammond B3 Organ trios and Soul Jazz 1955 – 1965,” 58; *Prayer Meetin’* and *The Sermon* are the names of Jimmy Smith LP’s.

Precisely this connection with the church made it difficult for the mainly white critics to see the Hammond organ as a serious (jazz) instrument. Both Wild Bill Davis and Jimmy Smith personally experienced this negative bias in the way an influential critic like Leonard Feather, or a famous club like Birdland viewed the organ: "The club wasn't a church after all, and the Hammond organ especially wasn't suited to jazz like a piano".

When the instrument and the organists became enormously popular, their style, according to the critics, was too closely connected to religious black (gospel) music or danceable R&B, so that it would hinder the free artistic development of the musician in question.[200] That the Chitlin' Circuit was of great importance for the *raison d'etre* of the organists and their bands and that due the fact of its success many pianists even switched to the organ, apparently did not interest them enough. Many young and talented black musicians found in the Circuit the informal education to help develop their musical skills and to build their foundation as professional musicians.[201] The sense of belonging in a time of strong social segregation was of great importance in order to maintain religious and social ties. The white critics were also virtually non-existent among the black people, so it was difficult for them to understand the ultimate importance of the Chitlin' Circuit.[202]

The Chitlin' Circuit gradually disappeared in the late 1960s as jazz became more common in theatres, concert halls and at festivals. The Chitlin' Clubs, on the other hand, were often located in poor and deprived city districts, such as Harlem (New York), which made them less and less attractive to the public.[203]

[200] Sampognaro, "Lou Bennett and the jazz organ scene in Europe," 41 (about Organ Battles); Hutchison, "Hammond B3 Organ trios and Soul Jazz 1955 – 1965," Chapter 2 (Soul Jazz and the Critic), from p.23.
[201] Schwartz, "Organ Jazz," 7, 23, 36; Alexander, "The jazz organ: A brief history," 9.
[202] Heinrich, "The Afrological Soul of Jazz Organ," 8-9 (Chitlin' Circuit Requirements), 131-132 (Chitlin' Circuit Decline and Resurgence).
[203] Heinrich, "The Afrological Soul of Jazz Organ," 15-16 (The Organ and The Racial Divide); Schwartz, "Organ Jazz," 7.

4.5.2 Family and social background

In chapters two and three, I describe the Hammond organ as a product of the Hammond Company and in this fourth chapter, I have added the sound of the musicians. Individual talent and personal curiosity have determined the development of the Hammond playing technique, repertoire, band line-up, productions, instrument modifications, use of new technologies and experiments.

However, we also see that talent is nurtured by family history and the opportunity for musical education. Fats Waller was the son of a minister. Wild Bill Davis and Milt Buckner were trained as pianists and worked as big band arrangers; strongly attracted to the organ because translating the big band arrangements to the organ seemed a natural process. Jimmy Smith had two professional musician parents and followed a formal music education. The first British generation of white pop organists were originally classically trained and often found their inspiration in their black R&B and jazz music heroes.

Innovative Hammond players thus not only built on their individual talents, but also found a vibrant breeding ground in their family background, or musical education, to fully apply their talents to innovation.[204]

[204] Gerbert Kraaykamp and Koen Van Eijck, "The intergenerational reproduction of Cultural Capital: A threefold perspective," *Social Forces* vol. 89, no. 1 (2011); Howard S. Becker, *Art Worlds*, 25th Anniversary Edition (Berkeley and Los Angeles: University of California Press, 2008); Koos Zwaan, Tom ter Bogt and Quinten Raaijmakers, "So you want to be a Rock 'n' Roll star? Career success of pop musicians in the Netherlands," Poetics vol. 37, no. 3 (2009): 250-266; Heewon Chang, *Autoethnography as method* (Walnut Creek, CA: Left Coast Press, Inc., 2008); Carolyn Ellis, *The ethnographic I: A methodological novel about autoethnography* (Walnut Creek, CA: Altamira Press, 2004); Garance Maréchal, "Autoethnography," in *Encyclopedia of case study research*, Albert J. Mills, Gabrielle Durepos en Elden Wiebe (eds.) (Thousand Oaks, CA: Sage Publications, 2010).

4.5.3 The role of the Hammond Company

This chapter also shows that musical innovations may have developed in spite of, rather than thanks to Hammond. The introduction of the instrument, and the improvements that were added especially in the first years, created the basic conditions for its success potential. Hammond primarily focused on the classical and living room market. The popularity of the organ in the other styles, translated into favourable sales numbers, was welcomed as a gift but barely supported.

When the status differences between the various keyboard instruments gradually disappeared and the use of different keyboards and synthesizers became the new norm, Hammond had no answer due to a lack of appealing new models for the professional circuit. The original Hammond tone wheel organ did stand the test of time, but good examples were becoming scarce and maintenance was a speciality. This lead to a demand for new instruments and a replacement market for tone wheel organs.

The new digital products are now able to reproduce the original sound very well, but there is scant discussion of real instrument innovation within the transition from analogue to digital. The digital technologies are modelled and applied to the instruments, but are not developed by a manufacturer such as Hammond Suzuki itself, as was the case with the original tone wheel or even the LSI technology.

4.5.4 Societal influences

Through this chapter it has become clear how much the musical innovations on the organ are connected with social and cultural developments. First, there was the move from the church organ to a more compact organ that was suitable for theatre and cinema; then the rise of black dance music in the big band era; the black church in which the organ was inextricably bound to gospel as religious music; the Chitlin' Circuit as a worldly variant became an unofficial training circuit for young musicians; the rise of R&B and the inspiration it gave to the white band culture in Great Britain without integrating the religious context; all of these were heavily conditioned situations that influenced the creation and innovation of music.

The current revival of the organ is also rooted in social and cultural conditions and especially in the desire for authenticity. Contemporary musicians are looking for original innovations and along this path encounter vintage instruments such as a Hammond, Fender Rhodes and/or analogue (tube) equipment. For them, the answer to rapidly advancing technology is not only the authentic, nostalgic and analogue sound versus the digital, but also the feelings that making music with vintage instruments evoke.

5 An Autoethnography

From the moment I encountered the Hammond at the age of twelve, I started imagining how my own musical future could be. In this autoethnographic chapter, I describe how my professional, artistic development has been bound to the historical development of the Hammond organ. Personal experiences help to further elaborate the actor-network surrounding the innovation of the Hammond organ. I describe my path through three major 'critical moments' that were both the logical and unexpected consequence of events that foreshadowed them. At each of these moments, it was a specific constellation of actors that caused my musical direction to take a completely different turn. In this way, my professional history has been used to analyse, in as much detail as possible, the micro-dynamics of the innovation of the Hammond organ, from the seventies onwards.

In section 5.1, I describe the autoethnographic method and how it has been applied in various music studies. I also draw a connection to 'critical event analysis' and link the method to innovation theory.

5.1 Autoethnography

Autoethnography is a relatively young research method in the social sciences; and it is used to link the personal experience and personal biography of the author, to a stronger cultural and content-related understanding of the subject of study. It focuses on the subjective experiences of the author and is usually written in the first person. Autoethnography is commonly used in disciplines such as performance studies; applied management studies; anthropology; and cultural, sociological and communication studies.[205] Where can connections be made between my own personal experiences and the trail of innovations occurring in Hammond's history? Where has this history influenced my own path; where does it run parallel; and how did I arrive at my own innovations?

[205] Brydie-Leigh Bartleet en Carolyn Ellis, *Making Autoethography Sing/Making Music Personal* (Brisbane: Australian Academic Press, 2009).

Autoethnographic work can appear in different variants such as short stories, compositions, poetry or photography essays. It is also a frequently used form in music studies: 'Written through the eyes, ears, emotions, experiences and stories of music and autoethnography practitioners, [...] autoethnography can expand musicians' awareness of their practices'.[206]

How the researchers manage to combine autoethnographic data with theoretical reflections ultimately determines the descriptive and analytical quality of their autoethnographic study. According to author T. Müller, the challenge of the autoethnographic method is to find a balance between the real-life descriptions and analytical and theoretical insights.[207] In 'Ethnography at the Edge', Ferrell indicates that autoethnographic insights can be optimised if researchers participate as much as possible in the social world they are studying.[208]

In 'Call it Swing' (2016), the method is used to investigate the phenomenon of jazz swing; the specific timing within this musical form. Here, the twenty-five year career of a jazz musician is studied by his daughter.[209]

A great inspiration for this autoethnographic chapter is 'The Influence of Situated and Experimental Music Education in Teacher-Practitioner', the study by Leon R. de Bruin in which he describes his professional career built up through both formal and informal learning routes. The son of Dutch parents who emigrated to Melbourne (Australia) after the Second World War because they saw no future for themselves in their devastated homeland, De Bruin learned to play the trumpet in an environment where music was always present. He became a professional jazz musician and worked in Australia, the USA and Europe, including the Netherlands. Gradually, he developed a professional interest in education, ultimately became his second passion. As a performer, educator and researcher, he explored three facets in his PhD research: personal identity, professional identity, and the impact on student teaching. De Bruin said of his study: "This autoethnographic study is thus a therapeutic self-analysis; it is

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[206] Bartleet and Ellis, *Making Autoethography Sing*.
[207] Thaddeus Müller, “Voorbij navelstaren en narcisme. Ferrell's autoethnography as part of the ethnography,” *Kwalon 2011* vol. 16, no. 3 (2011): 25-31.
[208] Jeff Ferrell and Mark S. Hamm (eds.), *Ethnography at the edge: Crime, deviance, and field research* (Boston: Northeastern University Press, 1998)
[209] Tami Spry, “Call it Swing: A jazz blues autoetnography,” *Cultural Studies Critical Methodologies* vol. 10, no. 4 (2010).

both a re-evaluation of what has been, and what now is, it is of understanding myself personally and professionally as I negotiate drastic musical changes in my life. This study explores how such lived experiences reflect on the "social and cultural aspects of the personal".[210]

This brief tour of the literature on autoethnography has culminated in the decision to describe my own professional development as a Hammond organist in this form.[211] Theoretical significance is created by systematically examining how specific actors have been important in that development. In this way, autoethnography contributes to the understanding of the ever-shifting actor-networks surrounding the innovations of the Hammond organ.

5.1.1 Critical events

My professional development is largely determined by three critical moments. These are moments that appear more or less unexpectedly, but do nonetheless have a clear origin, making them significant for a stream of successive events and developments. Such events may seem coincidental, however they are the logical consequence of earlier processes and may have had major consequences.[212] Besides the fact that it is essential to understand what influence a critical event has had on personal development, it is also crucial to identify which actors play an inspiring or frustrating role in it. Indeed, actor-network theories of innovation are not about the brilliant impulses of an individual, rather they are about the interaction of actors who give direction to processes of renewal.

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[210] Leon R. de Bruin, "The influence of situated and experimental music education in teacher-practioner formation: An Autoethnography," *The Qualitative Report* vol. 21, no. 2 (2016): 407-427; Mary Lynn Hamilton, Laura Smith and Kristen Worthington, "Fitting the methodology with the research: An exploration of narrative, self-study and auto-ethnography," *Studying Teacher Education* vol. 4, no. 1 (2008): 24.

[211] Leon Anderson, "Analytic autoethnography," *Journal of Contemporary Ethnography* vol. 35, no. 4 (2006): 373-395.

[212] Laura García-Montoya and James Mahoney, "The Logic of Critical Event Analysis," *Trajectories (Newsletter of the ASA)* vol. 30, no. 2-3 (2019). "The category of non-critical events can be partitioned into three kinds of events: events that are contingent but not causally important; events that are causally important but not contingent; and events that are neither contingent nor causally important." "With critical event analysis, the counterfactual question of what would have happened – what could have happened – is spotlighted and given center stage. Critical event explanation accords with self-understandings of one's own personal development: we often explain our own trajectory using critical event analysis." In sum, when formulating hypotheses about the sufficiency properties of an event, the challenge is identifying the productive causal chain that links the event to the outcome." http://chs.asa-comparative-historical.org/the-logic-of-critical-event-analysis/; C. Moorselaar, "Het orgeltje van de bakker. Aart van de Beek," interview in *Orgelwereld* (December 1985).

In describing these critical moments, I proceed as follows: so-called mental maps of the interrelationships have been compiled on the basis of memos. Examples can be found in Appendix III. These analyses are elaborated per decade and each paragraph opens with a short introduction where relevant actors are mentioned. The major and minor critical moments are described and an analysis is made of the period. The actor technology, which runs as a thread through my professional life, is discussed per period.

To be able to place the first critical event in a clear context, I begin by describing the Dutch organ culture and my family history.

5.2 Early years

5.2.1 The Dutch organ market

In the 1960s, the Netherlands developed into an important country for the organ market. While at first primarily American brands such as Wurlitzer, Lowrey and Hammond could be found on the market, by the end of the 1950s articles about home-built organs began appearing in technical magazines. One of the authors of such an article (Hendrik van der Horst), that can be found in the magazine Radio Elektronica, experimented with a new circuit for frequency dividers and resulted in providing an initial impetus to Dutch organ building.[213] Johannus Versteegt subsequently developed the first Dutch electronic factory organ, the Eminent, which was launched in 1961. In mid 1963, Phillips also brought out its own organ, the Philicorda. Versteegt continued to pioneer new organ brands after he left Eminent; the brands Riha, Viscount and Johannus Orgels all emerged from his stable. Johannus Organs has been building digital pipe organs for decades, is the market leader in Europe and is active in a over a hundred international markets.[214]

Engineer Van der Kooy became Versteegt's successor at Eminent and was responsible for the Solina sub-brand, which was acquired from a Swiss owner in 1965. The first organ I ever played was a Solina. Van der Kooy has many innovations to his

[213] Hans Goddijn, “De historie van het elektronisch orgel in Nederland (1 and 13),”; published in *Orgelwereld* (1 t/m 11) and *Orgel & Keyboard* (12 and 13) (1985 – 1989); Interviews and talks with Dirk Mertens, Head Finance Hammond Suzuki Europe, 2019, Appendix II.
[214] “Roland Corporation and the Vandeweerd family enter into an acquisition of Rodgers”, 2016, http://www.clynemedia.com/Roland/Rodgers_Acquisition/Roland_Corporation_Rodgers_Acquisition.html; “USA dealer network announcement,” 4 April, 2019, https://www.johannus.com/en-us/news/dealer-announcement.

name that inspired international followers, such as the Orbitone system, functioning as an electronic Leslie, and the Solina String Ensemble, which together with synthesiser manufacturer ARP became a huge success in the seventies. ARP was dominated synthesiser manufacturing at the time, with a 40% market share.[215]

Hammond was of course also a big name in the Netherlands in the 1960s. With the opening of the Antwerp production facility in 1967, Hammond also focused vigorously on the Dutch speaking region. Just like in the US in the 1950s, in the 1960s there was more leisure time in Europe, which created space for new hobbies, namely, making music in the living room. The Netherlands caught on to this American trend, albeit a decade later.

The top models that caught the imagination of almost all manufacturers cost between fl.15.000,- and fl.25.000,- (Dutch Gilders). Even the Hammond X-66, which had a retail price of around fl.51.000,-.[216] The public were mostly familiar with organists from the theatre or entertainment organ tradition, and largely drawn from a classical education. Examples include, international organists like Ken Griffin, Ethel Smith, Jackie Davis, the German Klaus Wunderlich and Dutch players Bernard Drukker, Cor Steyn, Guus Janssen, Pierre Palla and Eddie de Jong.[217]

[215] Alex Ball, “Electromotive - The story of ARP Instruments,” documentary, https://youtu.be/l31RXiVSI9s; Pinch and Trocco, *Analog days*, 9.
[216] Goddijn, “De historie van het elektronisch orgel in Nederland (1 and 13),”; “Hammond Times,” magazine published by the Hammond Company between 1950s and 1970s.
[217] Bernard Drukker and Hans Goddijn, *Handboek elektronische orgels en synthesizers* (Deventer: Kluwer, 1978).

5.2.2 Family

In my hometown Breda, a strong music culture developed after the Second World War and many musicians were active in (dance) bands. My father, Martien de Wijs (1938 - 2013), was one of them. He began piano lessons at a young age, and also learned to play the accordion. His father, my grandfather Mathijs de Wijs (1906 - 1955), thought that music education was very important seen clearly when on showing some talent, took lessons from a piano teacher who asked fl.25,- a time. This was quite a sum for a family that worked hard but did not have an abundance of money. My father's sisters also took music lessons, but it was my father who was already actively playing music in dance bands by the time he was a teenager. Starting a family and his having work commitments caused him to stop playing music; however, when he found more free time, he bought himself a modern electronic organ.

Music dealer Bob Janssens had a shop in the centre of Breda and was both a well-known local musician and a clever salesman. I remember this because, as a young teenager, I used to play the top models from the Eminent range in his shop and he wanted to use this opportunity to try and talk me out of the dream of owning my own Hammond, by offering a favourable arrangement for such a top Eminent. It is highly likely that it was Janssens who stoked my father’s enthusiasm to purchase an organ and to start to play music again. The purchase of the Solina T organ must have taken place around 1967 and indeed, my father started playing again. I remember that the Solina soon produced swinging sounds and it turned out that, fortunately, his original talent had not been dampened. His musical tastes centred around American jazz swing, big bands, the vocalist Ella Fitzgerald and pianist Oscar Peterson; which in turn played an important role in nurturing my own musical tastes and preferences.

Musical talent was also present in my older brother Matty (1960); evidenced from his earliest years where he would already be found drumming on everything that was loose and stuck. Matty quickly got his first real drum and, at the age of six, a small but complete drum kit and drum lessons. If my father arguably passed on his musical talent, my mother Coby Schachtschabel (1937) must have similarly given him entrepreneurial gifts. Partly because of her, Matty soon found himself in the local Old Style Jazz music scene. Breda had been pioneering in this field - being home to the oldest Dutch jazz festival - since 1971. Due to his developing tastes, he was soon to

be found at the Modern Jazz Breda in the club, 't Hijgend Hert. Matty was also the one who, in his teens, listened to progressive rock music like Yes and Emerson, Lake & Palmer, at precisely the moment when I had just discovered the big band sound of, among others, Count Basie.[218]

So, music was always present in our family. I started taking organ lessons at the age of seven (1969), together with my mother (who didn't continue for long), but during those years it was mainly a matter of finding a suitable learning environment. In five years until the first critical event, I had lessons from three teachers. They were all trained in entertainment music and gradually, their ability to motivate me, diminished. Teacher two, for instance, introduced the formula of classical organ to the lessons, taken from the US, and that was an immediate sign for my father to bring the lessons to a halt. In his opinion, I should receive individual attention and not play the same songs with a group in ensemble. Until then, I had been allowed to play on the teacher's Hammond, although, at that time, I did not find that really appealing. Teacher three came to give lessons at my home and when I asked if he could bring some modern music, he brought 'Bring the Roses to Sandra' by the artist, Ronnie Tober. I had reached the lowest ebb in my motivation to play the organ; and although I continued to play, it was probably to avoid disappointing my father.

5.3 Critical moment 1. Rhoda Scott, seventies

My introduction to the music of Hammond organist Rhoda Scott is the first critical moment. The family is the connecting link between my introduction to Scott, the local music network and in facilitating the first instruments for live performance. Informal education provides for the next phase of development, and the actor material (the organ design: specific materials, size, weight, design, ergonomics, production processes) is an important prerequisite in building experience in the live context.

I can remember that my father often listened to Muziekmozaïek on the radio, and that we watched 'Voor de vuist weg' on TV, both of which were presented by Willem Duys. These programmes showed live musicians whose styles matched my parents' tastes. I think Duys' attention to organist Rhoda Scott was the reason my father bought her

[218] Conversations with my brother Matty de Wijs about our family history.

European debut LP 'Take a Ladder' from 1969. This gave my life a completely new direction.[219]

This must have happened in 1974, when I was twelve, and I can still remember the sensation of the overwhelming sound of the Hammond organ and the heavy swing of Rhoda's playing. From that moment on, I knew that this instrument would define my life: I wanted to become an organist and conquer the world just like Rhoda. Her style was completely different from what I had come to know about the electronic organ and I also thought she was incredibly beautiful. How could I make this style my own? I wanted to be in her shoes and that provided the motivation, the perseverance and the burgeoning passion for the instrument. Rhoda was the role model and consequently the starting point for my personal development.

[219] Rhoda Scott a l'Orgue Hammond (Take a Ladder), re-release by Barclay.

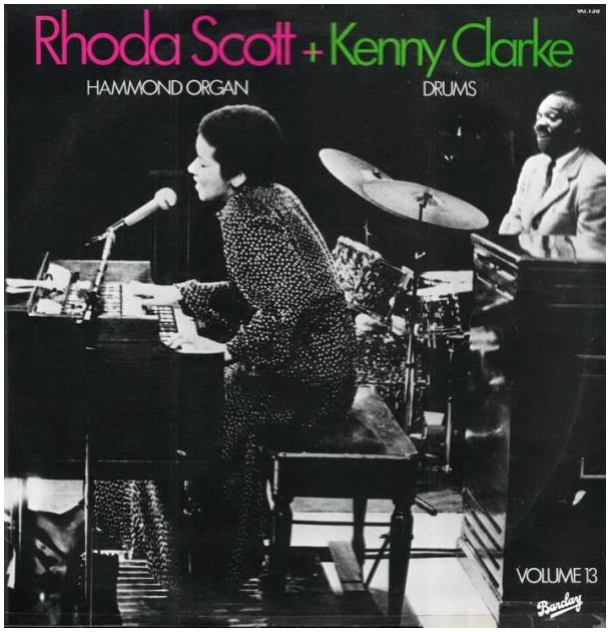

Fig. 74 Rhoda Scott and Kenny Clarke, 1977.

Other actors also came into the picture: I finally had an inspiring teacher, in the form of Jack de Kanter, who, as an amateur organist, was inspired by the organ jazz tradition of Wild Bill Davis, Milt Buckner and Jimmy McGriff. De Kanter had all of Rhoda Scott's LPs, which of course I was permitted to record onto cassette; and by playing them all every day, I could fantasise at my desk that I too was playing a Hammond organ.

The cheap recording technology of cassette tape (which we can refer to as a technological 'actor') enabled this intense sense of purpose possible. Owning my own record player quickly followed, as eventually I wanted to feel, in my own hands, the record cover with liner notes and pictures of Rhoda behind her Hammond. De Kanter taught me the American Songbook repertoire and taught me the principles of extended jazz harmonies. He paid less attention to note reading, which I didn't mind, and he gave me plenty of room for my own interpretation and improvisation.

Improvisation was also stimulated in the youth choir band from Breda North in which I participated, following in the footsteps of my brother, Matty. The repertoire consisted of a mix of popular sixties pop songs and musical songs such as 'Jesus Christ Superstar'. The band consisted of good jazz musicians; and when the reasonably, virtuoso organist left, my father began an unprecedented 'power play'. He demanded that his thirteen-year-old (inexperienced and far too young for a choir of teenagers and twenty-somethings) should be allowed to take the departing organist's place. If not, my

highly esteemed brother, Matty would be taken out of the band! This became my first band and my creativity was given ample opportunity to develop.

I formed my own jazz trio with the guitarist of the choir, who studied at the music conservatory, and of course, Matty on drums. Soon (I must have been around fifteen), we were allowed to play as a break-act with local jazz heroes in the many jazz cafes that Breda had; it is through this that I came into contact with the Modern Jazz Breda Club and attended acclaimed, national concerts. From 'break-act', we became a more regular act and were considered the new, young jazz talent from Breda.

This created the right climate, on leaving secondary school, to begin studying at the conservatory, with like-minded young talent such as drummer Hans Eijkenaar and pianist Rob van Bavel. We followed improvisation workshops and together we went to the North Sea Jazz Festival in The Hague.

Fig. 75 Performing in 't Hijgend Hert in Breda, around 1980.

5.3.1 Technology and money

As described earlier, technology and money play an important role in the innovation of the Hammond organ, alongside human factors. These factors also come to the fore in the first period of my development as a musician.

The wish to own a B3 Hammond, the ultimate Hammond in my opinion, was the logical result of all the surrounding musical inspiration; but for the time being, still unattainable. The Solina organ did make way for a portable Farfisa Vip 600. Matty and I could start performing with this model, and a Farfisa with accompanying Solton rotary speakers just passed into the boot of my father's BMW. In the meantime, my father fulfilled the role of driver-roadie, until Matty got his driving licence. I could save for the Vip 600 because in the meantime, I was giving organ lessons in our garage and had set it up as a real teaching practice space. To this day, I still often encounter people who say they received lessons from me at the time; the fact that I often don't recognise them any more speaks volumes about the goal I pursuing during this period.

With extra help from my parents, I managed to buy the first Hammond A100 with Leslie 147 for just under fl.15.000,-. An organ shop in Breda had one second hand and the garage at home was adapted to accommodate it. We lived in a detached house, and because of this, it was no problem to make music incidentally, with or without bands. My parents were happy with this and were always accommodating to those who wanted to jam along. I had played on Hammonds before, but mostly on E or H models from the theatre series, or a small L or M model. The A, B and C Hammonds had no added playing aids, so the transition from the Farfisa to Hammond was quite confronting. The sound is very direct and dry, which makes the instrument ‘not very forgiving'; you get back what you put in, magnifying the imperfections and inaccuracies in your playing, as it were. Through extensive practice, you gradually evolve a feeling of knowing, and controlling, the instrument.

For live use, the Farfisa was exchanged (1978) for an easy-to-transport, compact Hammond M. We purchased a trailer to transport the drum kit and organ, hanging behind Matty's Citroën Ami, which could barely move. This M was used until my 'dream organ' the Hammond B3 could take the stage.

5.3.2 Reflection

From the research literature on 'musical habitus' and the resources for developing talent, it is accepted that it is a crucial and formative period to acquire cultural capital at a young age.[220]

In retrospect, the great importance of my cultural capital can be seen, namely: family history, the local musical culture of Breda, the national interest and attention given to new American music, and also the changing technological and material conditions. Sharing music became easier with the use of cassette recorders, cassette tapes and the introduction of the Walkman, the phenomenon that broke through in youth culture at the time.[221] We could afford to buy several different instruments and space was created to accommodate this at home. One of the Hammonds was even sawn in half to make it easier to transport. All of these were necessary factors that contributed to my own development as a Hammond organist, and they demonstrate in concrete terms the specific composition and combination of all actors, still without the Hammond Company, in the network.

5.4 The 1980s

Where new musical role models provide inspiration, formal education and live playing are important for becoming a professional. Technology is introduced on the instrument level and for sound development. The expansion of the network and a curiosity for new possibilities of use lead to changes in the way the organ is used.

5.4.1 Conservatoire and the stage

My study period at the Rotterdam Conservatory, and all the performances that followed, were the logical next step for my further development. However, the electronic organ as a principal study at the conservatory was still in its infancy in the 1970s and 1980s. Organist Bernhard Drukker had campaigned for the organ's emancipation and consequently it was included as a state exam in the early 1970s.

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[220] Gerbert Kraaykamp and Koen Van Eijck, "The intergenerational reproduction of Cultural Capital: A threefold perspective," *Social Forces* vol. 89, no. 1 (2011); Koos Zwaan, Tom ter Bogt and Quinten Raaijmakers, "So you want to be a Rock 'n' Roll star? Career success of pop musicians in the Netherlands," *Poetics* vol. 37, no. 3 (2009): 250-266; Nan Dirk de Graaf, Paul M. de Graaf and Gerbert Kraaykamp, "Parental Cultural Capital and educational attainment in the Netherlands: A refinement of the Cultural Capital perspective," *Sociology of Education* vol. 73, no. 2 (2000): 92-111.

[221] Du Gay et al., *The story of the Sony Walkman*.

Study opportunities at the conservatories of Enschede, Tilburg, Rotterdam and Utrecht soon followed.[222]

That the musical tradition was based on the theatre organ tradition with classical overtones became apparent when I started studying in 1980. I had visited various study programmes and Rotterdam seemed the best choice because a they offered a Light Music Jazz study programme. This was a forerunner in Europe, and I hoped to be part of it with my Hammond. Unfortunately, this hope proved to be in vain; the electronic organ was not even taught in the main building, rather sidelined to an annex of the Rotterdam music school.

Fortunately, in the meantime, I played with renowned jazz musicians such as tenorist Harry Verbeke, drummer John Engels and trombonist Bart van Lier and had made my live debut on Dutch radio and TV and in the Amsterdam Concertgebouw. An extensive club circuit and many festivals provided a favourable climate for live music and I was active in organising as many concerts as possible in order to be able to perform with these musicians. My musical inspiration also came from outside the school, through organists such as Eddy Louiss, Jimmy Smith and keyboardist Joe Zawinul. In 1985, I graduated with a Teaching Musician (DM) degree in Light Music, a diploma that is comparable to the current Bachelor's degree in Music.

5.4.2 The B3 and Van Ooyen

The ultimate wish to own a B3 came true in 1980. I found it in a barely played, original condition when I was looking for a suitable Hammond for a student, at the Van der Stam music store in Apeldoorn. The deal was quickly sealed: my A 100 went to the student and I bought this B3, with speaker cabinet PR-40 and Leslie 122, for the sweet sum of fl.18.750,-. This particular B3, still in my possession, was assembled in the Antwerp Hammond factory and one of the last generations of B3s.

This was the first moment when technology began to have a substantial influence on performance practice, as I was determined to perform with it, instead of the smaller and less elaborate M model. Clever ways had to be found to transport the heavy B3 and Leslie speaker without outside help. My brother knew Ad van Ooyen, who was known as someone who could solve technical problems with wind instruments. One conversation with him revealed to me that in his work, he was

[222] Drukker and Goddijn, *Handboek elektronische orgels en synthesizers*.

responsible for the development, adjustment and maintenance of an entire factory's machinery. As such, he was always looking for tailor-made solutions. He was a precision mechanic who also manufactured his own tools in his private workshop; and was quite interested in coming up with solutions for organ transport. Van Ooyen became the first person to link inventive technological solutions to my professional practice, and hereby is considered a minor critical moment in the development of my instrument.

With him, a system was created with which the organ was lifted, brackets were installed against it, it stood on wheels and could be driven into the trailer.

When travelling with my own driving licence, I found myself unexpectedly struck from the rear on the motorway after a nighttime gig in bad weather. I attributed this to the limited speed of 80 km/h with a trailer, in combination with fatigue after a gig. As I also was experimenting with an electronic variant of the mechanical Leslie, it was seemed possible to that further refininements could be made to the transport system. Once again, Van Ooyen took up the challenge; devising an ingenious organ chassis, with a built-in rotary mechanism, driven by a drilling machine, through which the instrument could rise and fall. This created a compact unit, meaning I could transport the B3 in an estate car instead of the trailer.

Van Ooyen devised several other modifications, including an innovative system to provide MIDI to the foot pedals when a market option for this did not yet exist.[223] A Yamaha KX5 remote keyboard acted as the interface and a mechanical connection mounted under the foot pedals operated the small MIDI keyboard. Both the construction with the drill, which was in use for twenty-nine years, and the pedal, which was replaced after fifteen years when the Yamaha technology broke down and proved irreparable, are examples of the unique contributions that Van Ooyen developed for my instrument.

[223] MIDI stands for Musical Instrument Digital Interface. It is a digital protocol whereby electronic musical instruments can exchange musical information in real time.

Technology thus had an almost immediate impact on the way I used my B3 on and around the stage. Ease of use, transportability and ergonomics also saw adjustments, and my reputation as an organist who dared to modify the expensive B3 was established.

Fig. 76 A drill drives the transport system of the B3, developed by A.van Ooyen.

Fig. 77 B3 transport systeem developed by A.van Ooyen.

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Fig. 78 Activation of drilling machine transport system B3, developed by A. van Ooyen.

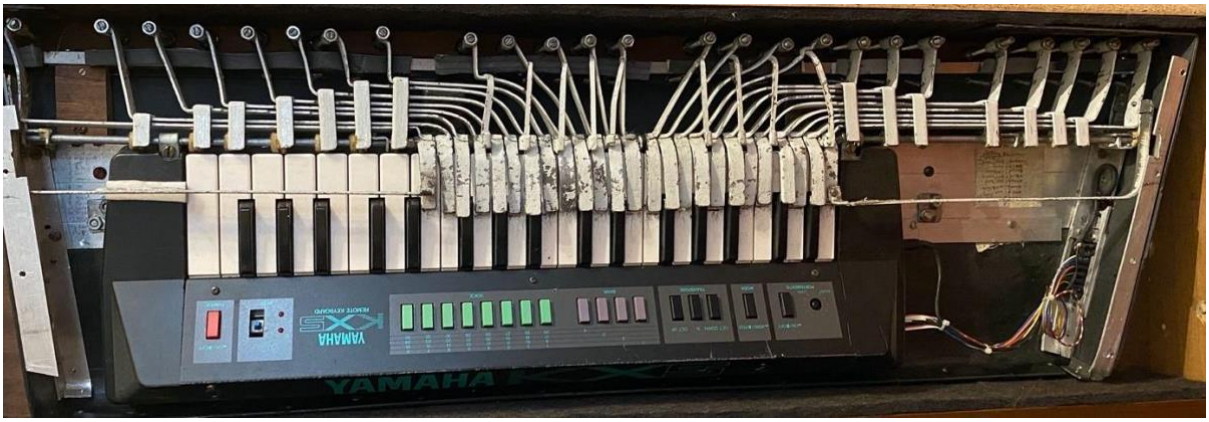
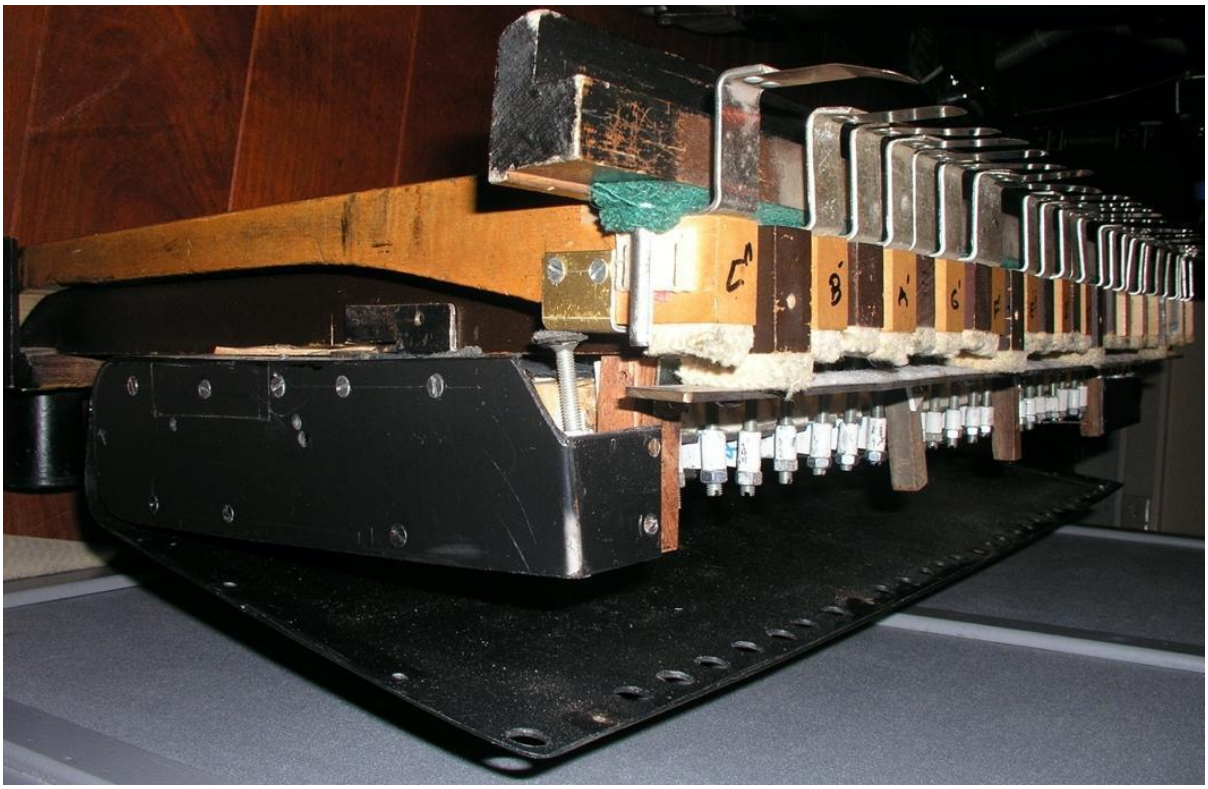


Fig. 79 and 80 Construction of Hammond foot pedals fitted with a Yamaha MIDI keyboard and a mechanical bridge that provided the pedals with touch sensitivity. Design A. van Ooyen.



5.4.3 Bonis & Yamaha

While Van Ooyen was of great influence, especially on the mechanical development of my organ, Ernst Bonis was likewise so in the field of sound design. He stimulated the development of the creative domain and my perception of sound through the use of technology and so my acquaintance with him counts as a small critical moment.

In 1982, a weekend course was organised at the Rotterdam Conservatory, focusing on the operation of analogue synthesizers and from through this my interest was piqued. It was during this course that I met synthesis specialist Bonis, who taught in Rotterdam and Utrecht, and wrote manuals for Yamaha about a new, digital generation of synthesizers. These instruments were equipped with the complex FM synthesis software, and Bonis could describe all of it accessibly and clearly. When I told him about my organ modifications, he became extremely enthusiastic and suggested that I have a talk with Yamaha.[224] The conversation that subsequently took place with Mr. Harder, director-owner of Yamaha Benelux Import, led to my consideration of 'sound', which still forms the basis for the current modifications to my B3.

All the possibilities Yamaha could offer me were available; through experimentation with their equipment and technical knowledge. Together with Bonis, we looked for a possibility to equip my Hammond with MIDI, and found a self-build option at the German organ firm, Dr. Böhm. The MIDI interfaces were built in by a technician we found through the Yamaha network. The Hammond specialists I knew, not even Van Ooyen, dared to undertake this exercise because of the complexity of the new MIDI technology. They reservations were partly well placed, as this project was ultimately not a success. Only the MIDI on the foot pedals proved reliable, and so Bonis could at least get to work designing a bass sound that matched the Hammond characteristics.

Two Yamaha TX81Z synthesizers were used, and the bass sound was no longer amplified through the Leslie speaker, but through a separate bass speaker. This completely changed the ‘bottom-end' of the Hammond sound spectrum: greater prominence, and increase in low frequencies and therefore, tighter sound reproduction.

Other experiments were conceived by Bonis, such as a delay of the direct organ sound programmed in a digital effect unit, which resulted in a rich chorus effect. Bonis had extensive knowledge of classical organ building and tone generation, in general. Extra overtones were programmed so that different harmonic sound layers were added to the standard Hammond drawbars; Hammond and Leslie setups were expanded with a bass synthesiser, separate bass amplification, peripherals and effects equipment and from here, and for the following years, the first of many consecutive live setups was born. Some of Bonis' ideas would even come to fruition in my current modular

[224] Yamaha was an innovative Japanese manufacturer and pioneer in the area of digital technology and solutions.

organ, which is the subject of section 5.6.2. The combination of the analogue B3 technology and new digital developments turned out to be a long and complex process. In this light, it is perhaps not odd to observe that in the 1960s, the Hammond Company opted to pursue a completely new form of technology rather than continuing to develop the tone wheel.

In 1985, Yamaha's operational director Jan Uding asked me to prepare a one-man demonstration tour in which a lot of Yamaha digital equipment would be central; and after intensive preparations, I went on a tour through the large sales centres in the Netherlands. I had about fl.100.000,- worth of equipment with me, including synthesizers, a number of 'one-off' models (which were specially brought over from Japan), drum computers, an electronic wind instrument, digital mixing tables with automatically moving faders, amplifiers and much more.

It was very instructive to immerse myself in all this equipment, and after the tour in 1987, I was allowed to take over the whole set of equipment for a fraction of its value. This laid the foundation for my later studio environment. Artistically, the one-man show was not a path I wanted to follow; the tension between creativity and the commercial, Yamaha goals did not correspond with my artistic aspirations. Yamaha still sponsored my final exams and the following Swing Support tour, but when the importation was transferred to a central European Yamaha organisation, I continued to endorse the brand; however, their direct involvement in my projects came to an end.

5.4.4 Swing Support

After obtaining my conservatory diploma, I took a break and continued with the UM 'Performing Musician' course in 1986.[225] I wanted to make up for what I felt I had missed out on during my previous studies, and now studied jazz piano with Rob van Kreeveld, a celebrity in his field. I translated the content of these piano lessons to the Hammond and also enrolled for composition and arranging lessons.

[225] Comparable to the current master diploma

I saw a final opportunity for me to graduate as a performing musician, and here I could combine musical development, budding aspirations as a composer and cultural entrepreneurship. It was a great opportunity to be in the spotlight with my own musical conceptions, and inspired by Quincy Jones and Eddy Louiss (in his starring role on 'Wings' by composer Michel Colombier), I created my 'Gesamtkunstwerk'. The size of this project was unprecedented for a final exam at the time: twenty musicians, five soloists, a conductor and director, dancers and an enormous arsenal of acoustic and electronic instruments. On 25 October 1988, I graduated cum laude with a programme called 'Swing Support' in a sold out Concordia auditorium in Breda.

The 900 people in attendance were not informed beforehand that it was a graduation show; family and friends had been brought in to sell tickets; VARA radio was there to record it; and I had secured sponsorship for publicity, technology and the instruments. Pim Jacobs (pianist, presenter), whom I had met during my TV debut in 1982, was the host of the evening. Jacobs was a strong advocate of young talent and probably interested in my entrepreneurial side.

The enthusiasm that Swing Support generated led to the ambition to tour the programme. The spirit of the times had a positive influence, because after an economic crisis in the early 1980s, I found a major sponsor. Smoking advertisements were still allowed and despite my fervent anti-smoking attitude, cigarette manufacturer Barclay helped me realise this dream.

Pim Jacobs recorded a promotional video, theatre managers were approached and in 1990 the Swing Support tour started with fifteen concerts. The musical line-up, compositions and arrangements were adjusted and preparations were made to release a CD.[226]

Sold out venues in Maastricht, Breda and Amersfoort alternated with poorly attended performances, and this threw the finances completely out of balance. I thus experienced entrepreneurial risk first hand though fortunately, with the support of my parents, I was able to set up a less extensive follow-up tour. As a result, we performed at the more lucrative festivals in 1991 and were able to compensate for the losses. The effort turned out to have been enormous and I decided to stop the project. The

[226] *Swing Support Avenue*, later re-released under the name ‘First Moves’ published, https://open.spotify.com/album/39PqSmoPKAbIw6SLmCQA9K?si=FdVQZXNsRXeUjNn9AWil7Q.

adventure had definitely been exciting and formative, and as such the period from the introduction to the Hammond organ to the processes that led to Swing Support can be regarded as the first 'micro dynamic of musical innovation' in my professional life.

Fig. 81 The final exam of Performing Musician 25-10-1988, Swing Support in Theatre Concordia, Breda.

Fig. 82 The final exam of Performing Musician 25-10-1988, Swing Support in Theatre Concordia, Breda.

5.4.5 Reflection

The cultural capital was expanded via the conservatory to the national professional music circuit. Getting to know technical specialists, exploring the first technological possibilities, and a favourable cultural climate, driven by the economic boom of the late 1980s, culminated in Swing Support. It was the preliminary result of everything I had managed to do up to that point: musical development, an extensive network, curiosity about technology, the partnership with Yamaha that made it possible to use it, and extensive entrepreneurship. The result had a positive effect on professional and creative development and media visibility, but also increased personal pressure to take the next step in my career.

5.5 Critical moment 2. Candy Dulfer, 1990s

The second major critical event is the saxophonist Candy Dulfer's invitation to perform with her in Japan. We will see that actors such as internationalisation (of the market), a younger generation of musicians and the increasing technological influence on making music were important.

Tenor saxophonist Hans Dulfer, with whom I had been sharing the stage from time to time for years, asked me to join his band. Dulfer generated a lot of work, sometimes three gigs a day, and I loved making music, 'carefree'. Swing Support required attention on many levels at once: the organisation, the band, the production and business. In Swing Support the Hammond organ was central, but orchestra and soloists were the main focus.

With Dulfer, I learned how important it was to make contact with your audience, which he did in a playful way, and it was lovely to make less complex music with unbridled energy. When Hans's young daughter Candy, who plays the alto saxophone, was jamming with him, she asked me if I would like to go with her to Japan. We were to perform near Nagasaki during the 'Holland Village Festival'; this summer in 1992 signalled a completely unexpected career boost.

The Japanese performance was the prelude to an intense collaboration. Candy was in the process of forming a new band after her worldwide breakthrough with 'Saxuality' in 1990. I played as a soloist on 'Sax-a-Go-Go', the follow-up to her debut album, and as a band member on 'Funky Stuff'. From the autumn of 1992, I was part of Candy's world tour which lasted a year and a half. We toured and played in clubs, festivals and did many live TV shows all over Europe, Japan, Curaçao and America. Funk had become the new, popular, 'jazz', because, although it was firmly rooted in jazz, funk was at that time more danceable and experimented with crossovers in sound and improvisation.[227]

[227] Candy Dulfer, *Bob's Jazz*, 'Sax-a-go-go', 1993, https://open.spotify.com/track/3jkas74qUC0ROS6S2Bw8bU?si=0c1inGLfREeAJJMrXiA0Lg.

Working with professional musicians like Candy Dulfer, as with Swing Support, is different to working with young talent; due to having had a taste of the world stage. It is a different kind of commitment and, as a late twenty-something and slightly older band member as Candy was, this was a revelation. Everyone was so motivated to get the best out of the band, and after two months of daily rehearsals, we stormed onto the stage like lions released from their cages. I had rarely seen such energy and this would be the model for all my new projects in the future. The live arrangements and form of the pieces were constantly being changed during these rehearsals, so you always had to stay sharp. This was also a contrast to the pre-arranged compositions and forms with Swing Support.

I was now in my thirties and felt like a top artist and performer; from a craftsman's point of view I had never operated at such a high level before. Candy gave me a lot of solo space, especially during performances abroad, and the encores often started with a solo act lasting a few minutes, during which the other band members joined in one by one. I also found it intriguing how such a world tour was managed from a business point of view, and had regular conversations about this with Inge Dulfer, Candy's mother and manager.

Undoubtedly, the renewed international attention for the Hammond organ (chapter 4) and my national visibility led to a great deal of attention during the 1992 North Sea Jazz Festival. I was allowed to share the stage with Hammond icons Jimmy Smith, Jimmy McGriff and rising star Barbara Dennerlein in the Garden Pavilion of The Hague's Congress Building, while one the previous day, the concert with Candy took place in the Statenhal, packed with ten thousand people.

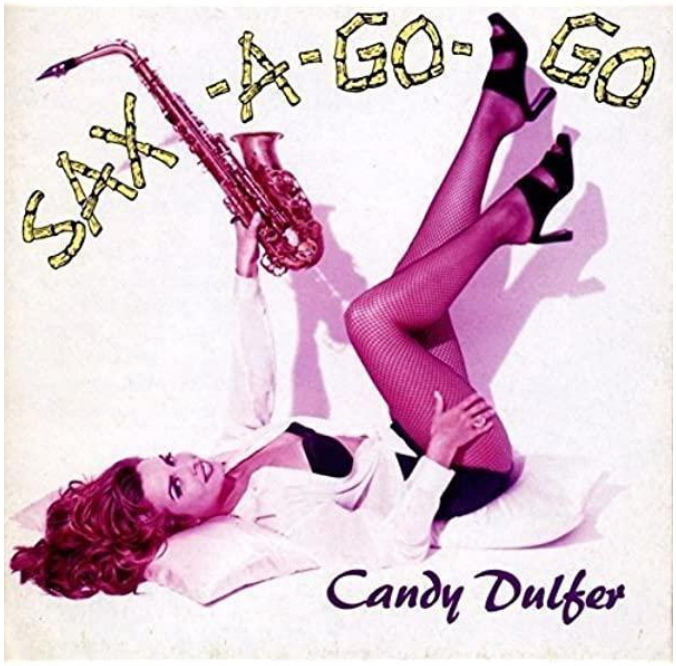


Fig. 83 CD Candy Dulfer Sax-a-Go-Go from 1993 with me as band member and soloist.

I landed a contract with Peer Music Publishing for several albums, and a one-week residency at London's famous Ronnie Scott's Jazz Club with Candy as my guest, among others. This led to two tracks on the upcoming hip British 'Acid Jazz' label and a live track on the then, yet-to-be-released album of my own.

Hammond Suzuki Europe asked me to premier their new digital top model, the XB3, at the Frankfurter Musikmesse, The London Music Fair and during a Japanese tour with Candy.

In these early 1990s, the favourable market situation for music and the professional level I had reached coalesced, which allowed me to develop in new environments and at the same time, made me highly visible to musicians, audiences and the media. During the long and many tours, I worked on a new musical creation that was to be called D'WYS. In this, my changed view of the professional music world, both from an artistic and a business point of view, would be illuminated.

5.5.1 D’WYS (deewise)

This new musical concept had influences from both jazz and pop, was oriented towards both Hammond and vocal, and integrated the new available technologies that I describe below. This created a modern band sound, with young talented musicians and a vocalist. The publishing contract provided for a D'WYS debut CD, and the opportunity to work for five, uninterrupted weeks with a renowned engineer in a top Flemish studio, where I also functioned as producer for the first time.

The O'BEAT, Organ Beat sound, signified the first project, production, band and sound that was to became characteristic of my musical style. It was a mix of the musical baggage I had accumulated, and experiences as a session musician and in devising projects.[228] Once this O'BEAT sound was picked up by the media, through persistent promotion, a period of full touring started. We sold about 25,000 CDs during the live performances. The CD had become the most popular listening medium that the digitisation of sound had brought.

In 1997, the band was expanded with six new vocalists, and thus D'WYS & Voices of Soul was born. This turned out to be a hit; we became a popular festival act and had our own regularly repeated TV-special on public television. The O'BEAT successor 'Organtasy' was similarly self-produced in an optimised space at my home, a former café, in Geertruidenberg.[229]

[228] Carlo de Wijs, *O’Beat*, 1996, https://open.spotify.com/album/2Agf7yxTKXUXB7bmwtFTQN?si=vfVD9aaVRZOK-fXItXR0gg.
[229] Carlo de Wijs, *Organtasy*, 1999, https://open.spotify.com/album/7gtwR0DfzQXLp8O5K0Hh4Y?si=eXhvCurGT2msgNt8U5ujvg.

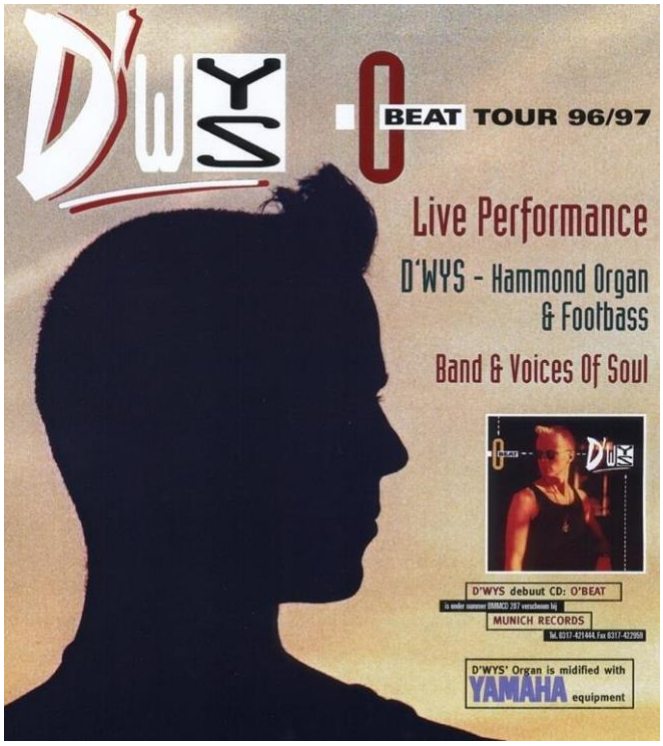


Fig. 84 A poster of the O'BEAT tour 1996 - 1997. The endorsement of Yamaha was used to connect a prominent use of the footbass 'soundwise' and therefore deviated strongly from the way most Hammond professionals followed.

Fig. 85 Performance D'WYS & Voices of Soul during the North Sea Jazz Festival in 1997.

5.5.2 Technology

As a result of the technical adaptations to my organ which began in the 1980s, the sound had developed into something increasingly more my own. Analogue and digital synthesizers, digital effects equipment and samplers expanded the organ setup and became an integral part of the compositions and arrangements. In the D'WYS concept, the organ was in service of the compositions and band sound and therefore less prominent especially when compared to more traditional organ formations, where the band was built around the organ as a solo instrument.

Not only the technological factors influenced the sound development, but also the 'career approach' of my musical role models, who, for a long time, no longer consisted of mere organists. In the music industry, with Stevie Wonder (1970s), Michael Jackson (1980s) and Prince (1980s and 1990s) as the driving forces, the division of roles between the individual composer, artist, record company, publisher and booker had shifted. Top artists wanted to control the various processes themselves and be less dependent on the powerful record companies; companies who determined when and which of their products were released on the market. In doing so, they broke the chain that had characterised the music industry until this point.

My own practice consisted of organising the various processes myself anyway, because as a small artist you are forced to do more yourself. As a musician, bandleader, organiser, booker and producer, I worked on D'WYS and as such, a second micro dynamic of innovation emerged after Swing Support. Here, there had been a development from enthusiast to professional, and D'WYS functioned in the creation of the musical identity and an organisational environment needed to facilitate these processes.

5.5.3 Reflection

Historically, this period of success coincided with an international revival of the Hammond organ and the rise of a young international guard, with the market as a strong actor. I was able to hitch a ride on this movement and develop into a national Hammond role model. This role is validated by various organists.[230] My mission was to increase the attention for Hammond.

Funk music' was on the rise with Prince as the undisputed grand master and with Candy Dulfer's switch from jazz to funk, a larger audience, and greater media attention, were now being reached. Manufacturer Hammond Suzuki returned to the market and sought a fresh face for their European branding. CDs were hot, digitisation in instruments and peripherals was booming, and the overall economic and cultural climate stimulated the practice of performance.

What the two great critical moments teach us is that Scott initiated the choice of my instrument and a professional life and that, through Dulfer, the experience and knowledge I had gained in the meantime reached an international stage. The path of learning and experience proved to be a condition for the individual to grow into a stronger musical personality and, often still intuitively, to build up understanding and skills for processes of change. This growth was reciprocal because it opened the doors both to new trajectories with interesting musicians, and to cooperation with a younger generation. Thus, a continuous interaction was created on different levels of creativity, craft and intellectual challenge.

5.6 Critical moment 3. The studio, the 00s

The twenty-first century also means a new era in my professional life. Making live music became less central due to the construction of a professional studio and, in retrospect I can point to the construction of this studio (2000 - 2001) as a third critical moment. The studio had a major impact on developments in the musical, technological and business fields and paved the way to an intensive involvement in conservatory education.

[230] Interviews and lab sessions, Geertruidenberg with professionals 2017, Appendix II.

The 1990s had been quite successful artistically, and commercially, and having my own studio allowed me to develop my composition and production skills, and to use them for third parties. Touring and travelling had been demanding and time-consuming, especially since I had a family with growing children. The studio allowed me to work more from home; the construction became part of an extensive renovation of our premises. The preparations and work took place from 2000 until the spring of 2001. There was one major setback which arrived in the loss of an investment from one of the partners in the final phase of construction. I decided to continue the process and, certainly in hindsight, took a big risk in doing so. Fortunately, there was the willing cooperation from the equipment supplier, a second partner, family and the steady job of my wife Monique. As a result, the studio could become operational, and I could start. In the end, it took five years of hard work to break even.

The first studio production came about with a third D'WYS album and the production of a children's musical 'Rocko'. A theatre show in London and a number of advertising and TV leads followed.[231] The scope of work had broadened considerably, and even though the 'studio life' took place indoors, it proved to be almost more intense than touring. Running a studio was completely new and at the same time I had to learn the work flow of a studio, normally a process of years, and let the creativity flow. Together with the less frequent performances, the business tensions and their influence on the private situation, it was not the most carefree period.

[231] Carlo de Wijs, *Turn down the B*, 2002.
https://open.spotify.com/album/1jYgDQRwDYHNyZ1VbYA09x?si=nWamm5byS8mjW2y83tHy7A

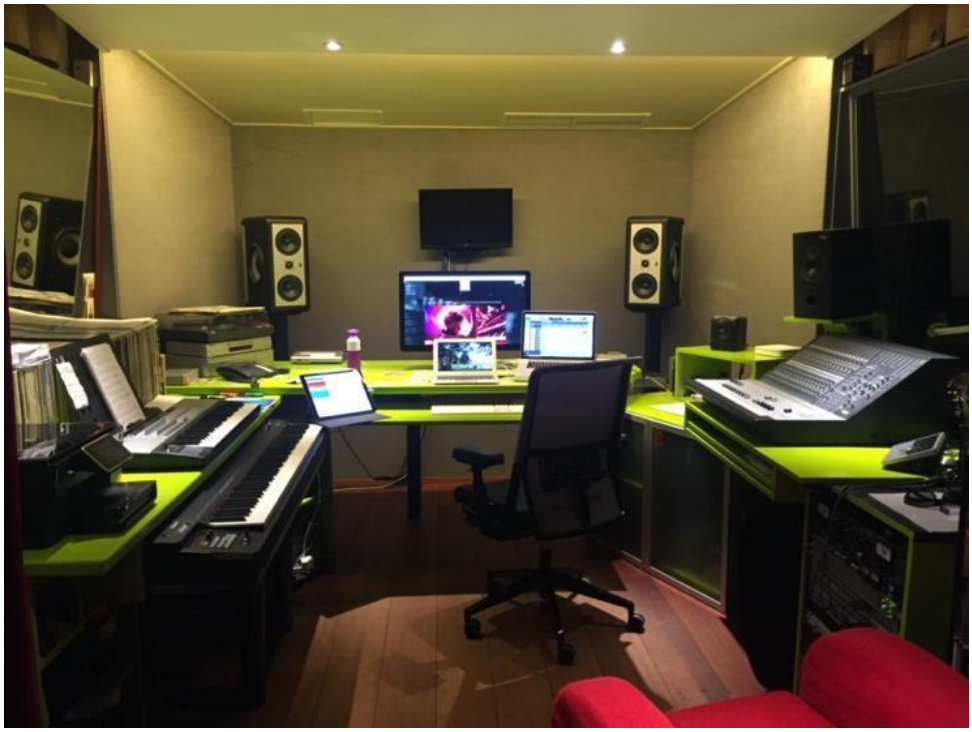


Fig. 86 The studio in Geertruidenberg with the control room (from 2001).

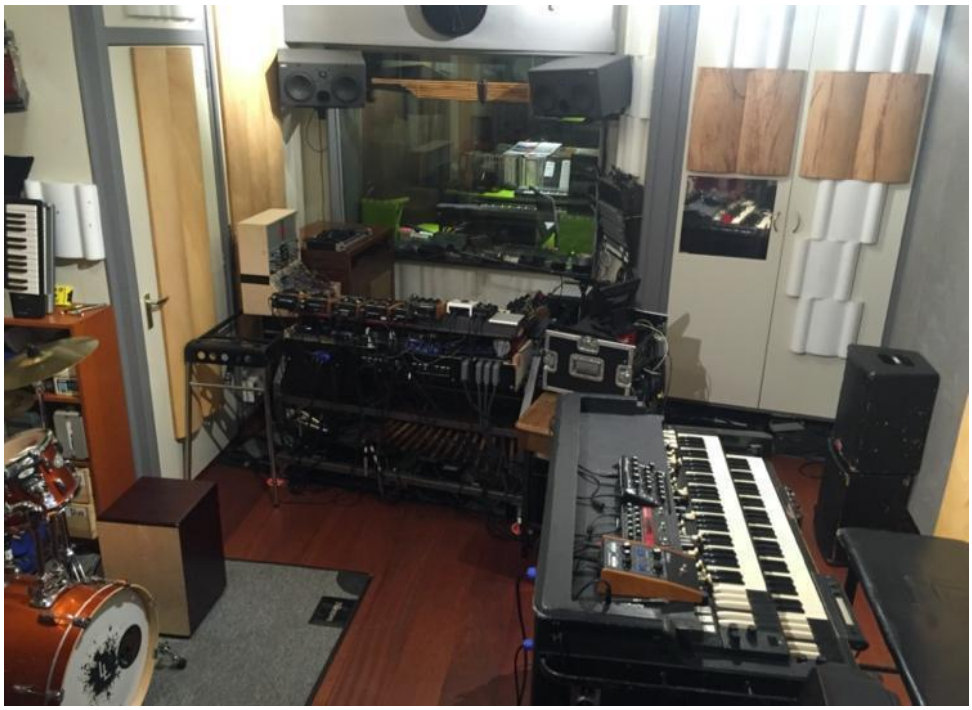


Fig. 87 The studio in Geertruidenberg with the recording room with the B3 and the prototype Modular Hammond.

5.6.1 Technology & Hammond integration

The studio provided a strong technological incentive, in the vein of how studio technology could be integrated with Hammond. During the production process of 'Organtasy' in the late 90s, music technologist Jeroen van Iterson had been involved in the sampling and the beats. In 2004, I met Hammond specialist Sjaak van Oosterhout and the link between them was very quickly secured.

Technological knowledge and Hammond expertise came together. With Van Iterson, a plan was devised to be able to edit the Hammond in real time using effects equipment and, with Van Oosterhout, a way of feeding these processed signals back into the organ. This way, a mix between the original and the processed audio signal was produced, which together were amplified by the Leslie speaker, creating a new 'Hammond-technological' insight, in which the original organ tone wheel mechanism became the basis for realtime sound manipulation. The end result still sounded like a Hammond, but with additional layers of sound.

In 2005, with the B3 adjusted, 'KeyJay' was founded with 'different drummer' Marnix Stassen who experimented with a mix of drums, hand percussion and electronics. Visual artist Jaap Drupsteen and a number of VJs also latched on to the idea of showing live generated visuals during our concerts. This created a hybrid between music and visuals and, despite the high expectations these experiments generated, the technical problems of creating such a link proved to have a major impact on the end result. Time did not seem quite right for this ambitious plan and we did not have the means to realise such complexity. For this reason, 'KeyJay' disbanded in 2007, but provided crucial experience for later projects.

With the technical team of Van Oosterhout - Van Iterson, the following, most radical and far-reaching modifications to the B3 so far, were worked out and it seemed wise to first build a prototype and gain experience. A Hammond A from 1962 became the donor and the realtime processing of the organ signals could now be controlled separately, per keyboard. The different audio streams could be reproduced independently, dry or with processing. The organ was divided into zones, for example the lower and upper manual, the foot pedals, software, controllers and effect equipment. All zones came together in a programmable audio matrix module that brought operationality to an unprecedented level. The ongoing technological

developments came together in Paradiso (Amsterdam, 2012), with the construction of a 'Modular Hammond' and the accompanying introduction of the 'New Hammond Sound' and CD of the same name.[232]

This sound stood for the cooperation with a younger generation of musicians, for whom the Hammond tradition still provided a strong inspiration. In addition, I was looking for new inspiration that would lead to new musical journeys. Influenced by a younger generation of aspiring musicians, I immersed myself in electronic (underground) music with strongly deviating musical structures, non-traditional production techniques and a sound component that was central to the creative process.

An important musical alliance arose with the young Flemish virtuoso drummer, Jordi Geuens; who was an exponent of this new generation of musicians. I had met him at the pop department of Codarts (2003) and we performed together for the first time in 2007. His role has developed from accompanying drummer to equal producer and designer of the current projects.

The steady development of our own musical sound was strongly nourished by the far-reaching changes that were almost continuously carried out on my B3 with the technical team. Composing and producing achieved greater depth due to the new possibilities the modified instrument offered me, and the sounds that were inspiring new musical ideas.

5.6.2 Modular Hammond

The Hammond prototype that was completed in 2012 set a new benchmark for how the technical team wanted to approach existing Hammond technology. There was a gradual development and build up of knowledge and understanding. This grew from relatively simple adjustments to the instrument and an ingenious transport system (sections 5.4.2 and 5.4.3), through the addition of extra instrumentation, effects equipment and other devices (section 5.5.2) to a more 'open' and daring approach to the technical possibilities (section 5.6.1). This open approach gave rise to a plan that added an additional structural layer, based on the original principles of the Hammond

[232] Carlo de Wijs, *New Hammond Sound*, 2012, https://open.spotify.com/album/6ceNGwbqtkZ9XFNAf8XSn1?si=8f0q8Bc6Q4iUwR4qVt9rZA

tone wheel. It thus became possible to carry out sound manipulation in real time and to reintroduce the original organ tone wheel technology.

The original and the processed signal, which experienced the typical Hammond processing, were therefore merged into one new Hammond sound. I called this concept 'Modular Hammond', because from this moment on it was possible to add or remove both analogue and digital components from the original technical chain of the tone wheel organ.[233]

The prototype created the possibility to start modifying the B3 drastically. A combination of the extensive, complicated programmability of the prototype, with the more intuitive operation of the B3 organ, with which I performed live, became the new goal. The modifications were carried out in two stages between 2018 and 2020.

A detailed description, vlogs and a 360 degree visualisation are included in Appendix IV. This also makes it clear that the instrument poses an enormous challenge in terms of playability. Due to the sharp increase in the number of buttons, switches, controllers and parameters operated by hands, feet, knees and the mouth, the whole thing has become a challenging learning process in terms of coordination and musical use. This adds to the already complex regular operation of the organ.

[233] The 'Modular Hammond' is not a fully modular instrument, as this would require the construction of a completely new device in which a sensor is attached to each tone wheel and which could generate data independently. Theoretically, the resulting tone wheel technology does not even have to produce a Hammond sine wave anymore and can also produce other wave forms. The modular name has been chosen because the possibility exists to add or replace analogue and/or digital components with this instrument without changing the typical Hammond playing technique. See Appendix IV.

Fig. 88 Prototype Modular Hammond from 2012 in the studio (Dordrecht 2018).

The Modular Hammond B3 is the provisional end result of the technical and musical experiences accumulated over decades, in which the various stakeholders have contributed to the creation of the whole. The mission to transform the unique original Hammond innovation into a truly personal instrument, and thus to explore musical boundaries, was a success.

The instrument got its first outing, both live and online, with the 'New Hammond Sound Project' (NHSP), of which drummer and producer Jordi Geuens, visual artist Job van Nuenen and audio engineer Theo Janssen are members.[234]

[234] The results can be found on: www.carlodewijs.com and YouTube: https://www.youtube.com/channel/UCAjAztS-3PYARZzqDNDfS2A LP and softreleases https://open.spotify.com/album/4hDA15fMcWMxIO5Vw9IygG?si=atTqPzZGSsezBjudNFJWjQ




Fig. 89, 90 and 91 Pictures of the 'transformation B3' to the Modular Hammond. Installation of MIDI on keys and drawbars, painting of the cabinet, installation of electronics.

Fig. 92 Modular Hammond set-up in the Energiehuis, Dordrecht 2021.

The 'personal historical circle' came together with Rhoda Scott writing the liner notes, printed on the inner cover of the 2019 vinyl LP, ’New Hammond Sound Project'.[235]

"The Hammond Organ is reaching into the 21st century, and it's thanks to Carlo de Wijs. With this new recording, Carlo has succeeded in conjugating technology, research, and... soul. The Hammond organ has its traditional sound, which we all love, but so much more, since Carlo has created the modular Hammond, based on tradition and the tone wheel, and expanded to include digital and analog technology, enabling real time expression and new sounds. Carlo's music is full of emotion, invention, and energy. He brings new possibilities to younger musicians as well as to veterans of the keyboard. The evolution of the Hammond Organ is great news for all keyboard players and could incite some keyboardists to start getting familiar with the pedalboard too. Carlo, and Jordi Geuens on drums make their fantastic music in real time, creating with their talent a new and exciting style. Finally, after all the research and technical advances are made, it's all about the music, and that's a resounding success." Rhoda Scott, 2019

Fig. 93 Vinyl debut of the New Hammond Sound Project, 2020. The artwork uses tone wheels modelled in 3D by Job van Nuenen.

[235] Carlo de Wijs, *New Hammond Sound Project*, 2019, https://open.spotify.com/album/4hDA15fMcWMxIO5Vw9IygG?si=obiR0-FdRRSwY1swnnOK7A; videoclips YouTube, https://www.youtube.com/channel/UCAjAztS-3PYARZzqDNDfS2A/.

Fig. 94 New Hammond Sound Project (NHSP) Live at the Energiehuis, Dordrecht, November 2019. Together with Jordi Geuens (hybrid drums), Job van Nuenen (visuals), Theo Janssen (sound engineer).

5.6.3 Analysis

With the construction of the studio as the third critical moment, another phase in the 'micro-dynamics of musical innovation' emerges, building on the first (Swing Support, section 5.4.4) and second (D'WYS, section 5.5.1). Both the 'Modular Hammond' and the 'New Hammond Sound' have been presented and exposed to the market, the public, the industry and other creatives. The future will show whether this personal innovation means a broader perspective for the development of the instrument and/or the field.

The search for a personal sound inspired the innovation of my instrument, which coincided with material and technological developments. Now that this innovation has been realised, a reverse process is taking place: the possibilities and sound produced by Modular Hammond inspire the composition of new music, i.e. New Hammond

Sound, and new forms of collaboration. Sound is the abstract factor, the Modular Hammond instrument the concrete one.

5.7 Reflection

Which actors can be recognised in this autoethnography, and how does the specific combination of actors in critical moments repeatedly lead to innovation?

The impact of Rhoda Scott's music and personality proved to be most profound, and formed the basis for my development as a Hammond organist in the 1970s and 1980s. My family made crucial contributions during this period by fostering a love of music, through their entrepreneurial attitude and their financial support. Education and playing on national stages became more important over the years and contributed to professional development. This first phase is rounded off with the Swing Support project in which musical maturation, the pursuit of greater visibility, in combination with cultural entrepreneurship, coincided to mark the first period of the personal micro-dynamics of musical innovation.

Through the cooperation with Candy Dulfer, the second critical moment, I grew into a national 'frontrunner' for a new generation of organists. At the same time, the Hammond organ experienced an international revival. A second period of innovation was the result in which the combination with technology played a prominent role. The economic and cultural boom period contributed to this. After Swing Support, a period of artistic blossoming and business success with D'WYS provides a second example of a process of micro-dynamic musical innovation. It led to music with a non-traditional mix of styles, and a band line-up that differed from the more regular Hammond trios. This gave a face to the global revival of the Hammond sound.

The third critical moment, the studio, marked a major break with the preceding period. The studio stimulated new professional practices and created different conditions. The influence of technology became more visible in the development of my own compositions and in the technical additions to the instrument. This is also reflected in education.

The combination of composition, production and technological developments lead to a new sound and the personal innovation of the 'Modular Hammond'. This marks the next phase of a micro-dynamic of musical innovation. The hybridisation and modularisation of the organ leads, via education, to this thesis.

According to Rogers' innovation theory, my embrace of the Hammond organ makes me an 'early adopter' in Europe and a 'laggard' in the US. When Hammond's popularity declined in the mid-seventies and most organists switched to synthesizers, my motivation persisted, to give the Hammond organ a new place in the music world. This shifted my position from early adopter to a more innovative role as a founding musician, who in turn could inspire a number of new 'early adopters'. The innovations were mainly in the integration of technology and instrument, covering material dimensions, as well as sound and playing technique. In the development of the 'Modular Hammond', it is important to mention that it is an analogue instrument. This lends itself better to individual adjustments than the digital simulations that are part of modern electronic organs and keyboards.

In this chapter I have outlined the circumstances in which it became possible for me to renew the Hammond organ as an instrument and as a 'sound'. My personal energy and skills were of great importance and were a condition of the innovations. However, these are by no means a guarantee for success; as we will see in the next section.

6 World of Hammond (WOH)

This chapter is about whether the personal innovations described in the previous chapter can also be scaled up to the wider community of Hammond players, music education and the international Hammond market. Between 2016 and 2019, I organised a number of laboratory sessions and interactions with the main goal of facilitating a multidimensional platform for the Hammond community, named 'World of Hammond'. This had the mission to be *"an international platform for the world of the Hammond organ and Hammond sound in the broadest sense of the word. A place where young and old, professional and amateur, can find the connection between tradition and future, preservation and innovation, technique and use, in words, pictures and sound, off- and online. All this with the aim of achieving maximum visibility and development. Besides the visibility of every participant, the WOH organisation develops, facilitates and organises activities and events that support these objectives."*[236]

To realise the platform's mission, three collective actors were needed: the community of musicians, education and the manufacturer. In this chapter I will discuss the position of each group in relation to the Hammond organ and the platform. From this it will become clear that in each group there are a number of specific thoughts and processes going on, which make it challenging to scale up the micro-innovations to a broader platform.

The initial innovations of the modular Hammond organ were not with the intention of scaling up to the market. Now that this autonomous development has been completed and is being presented to the world, time will tell whether it leads to imitation or proves to be the inspiration for new developments. The Modular Hammond will only be discussed indirectly; in the context of the chapter.

The material for this chapter originates from a series of conversations, lab sessions, interviews and surveys.[237] Musicians participated in lab sessions, interviews and surveys. The group consisted of experienced organists, keyboardists and/or pianists,

[236] From the World of Hammond concept plan, version summer 2018, Appendix IV
[237] The full list of all activities is added to Appendix II

from several continents, as well as young professionals and students. Some of them are active as teachers at a conservatory, music institution or public school, or are affiliated with the manufacturer Hammond Suzuki as product specialists. The role that technology plays in their professional practice means, at least for some of them, being active as makers and producers; for others working with (studio) recording facilities.

Music education is represented by the group of musicians mentioned above, by (former) students of the Hammond at Codarts Rotterdam, keyboard and piano, by the Codarts Blended Learning lectorate, and by policy makers or management from conservatories, education and research institutes.

The market domain is predominantly represented by Hammond Suzuki, whereby conversations with the European importer, and also presentations and conversations with Hammond Suzuki Japan and USA, form the basis of the analyses.

6.1 Platform World of Hammond

The initial idea for the development of a platform around the Hammond organ originated in 2010, and developed more contours through this PhD research. From the personal drive for innovation and knowledge of the actors, it became a challenge to connect the important elements and scale them up to the envisioned platform.

The WOH platform had to play a meaningful role for all target groups around the Hammond organ: from professional to amateur, and from the creative industry to education. I expected that an organic Hammond community, active both offline and online, would arise. The idea was that this would create the impulse and incentives that would strengthen the future of the instrument and its sound. Innovation would be stimulated and the platform would have the potential to grow into an international Hammond expertise centre. With the commitment of various parties, the goal was to develop a business model that was interesting and sustainable for all.

Consequently, professionals would be able to contribute their content, based on a template developed through the platform, creating a larger network and reach for all participants.

The music circuit is used to operating in separate style areas such as jazz (modern, R&B, gospel), rock and blues, more pop or studio oriented; keyboard players, organists, pianists, producers are also independent target groups. By connecting different streams on the platform, new possibilities for inspiration can arise. By paying specific attention to electronic music, young DJs and producers can participate. The latter group generally focuses more on sound than on instruments, which would result in a broadening of the sales area.

Existing internet platforms such as Facebook, Instagram and Youtube would be linked to the platform, thereby improving the recognition of Hammond by the corresponding algorithms. Part of the WOH plan was also to organise (live) events, festivals, projects and lectures. On streaming services such as Spotify, Apple Music and Amazon there are increasing opportunities to generate impact as a group, in addition to opportunities offered by the podcast medium.[238] Presence in old and new media, at booking offices, agencies, labels and publishers could be increased in this way because Hammond would be more visible as an organised field, offering clear content and products.

Strengthening the Hammond niche in the market in this way, can create opportunities that would undoubtedly have a stronger chance of success than through individual activity. Moreover, combining the global, often very passionate, manifestations would generate a more professional look and contribute to the solid Hammond brand name. This as a complete whole, is potentially more interesting for business parties.

An important function of the platform should also be the exchange of new and used instruments: parts and technical expertise are brought together in a virtual Hammond marketplace. Sound and image carriers, merchandising, management and bookings, legal expertise, intellectual property knowledge: WOH develops a toolkit for the professional in all these areas over time. This makes it easier to reach the market professionally, to get in touch with interested and interesting partners and, not least, to learn from each other's experiences, motivation and expertise.

[238] An inspiration for WOH was a weekly Radio 6 feature 'Hammond Alive' for the Dutch public broadcaster in 2012-2013. Here, Hammond professionals were interviewed and added tracks to the 'Hammond Songbook' inspired by an idea from Lucien Ravensberg and myself, https://open.spotify.com/playlist/2l1S7ocZIzWMfdKNMelh9P?si=nhobZ1-tTUyneL0z5qPXPw.

Education is an important pivot for amateur players, young and aspiring professionals, keyboardists and pianists, as well as other users. There are several Hammond online courses and teaching initiatives that are offered through social media or the own network. In addition, there are music schools, and music opportunities through secondary and higher vocational education. Here, too, there is a great diversity in set-up and content; that said, professional Hammond education is still a largely undeveloped field. The plan meant an opportunity for Codarts to play a pioneering role in this field and to grow into the centre of professional European Hammond education. In conjunction with the World of Hammond Academy, which was to be founded, a continuous learning line from young to old, and at different levels and competences, would be created.

For the consumer, starting musician, enthusiast or amateur player, the platform means a convenient entrance into the most complete domain of Hammond content: knowledge, education, products and services and the possibility to compare them. In addition, one can easily get in touch with professionals, share one's own inspiration and experiences, trade products and parts, but above all, stay well-informed of everything that happens in the World of Hammond. For the industry, it means the possibility to reach various target groups, directly.

That concludes this brief overview of the ideas in the World of Hammond plan (2018). The next section highlights the interactions with the different actors that were important for the success of WOH. The musicians are discussed first, then education and finally Hammond Suzuki.[239]

[239] World of Hammond plan, 2018, Appendix IV; Geoffrey G. Parker, Marshall W. Van Alstyne and Sangeet Paul Choudary, *Platform revolution: How networked markets are transforming the economy and how to make them work for you* (New York, Londen: W.W. Norton Company, 2016).

6.2 The community of Hammond musicians

Musicians are the beating heart of a thriving Hammond community and shape history, present and future, through their music, concerts, charisma and creative abilities. Their history is described in chapter 4 and for the development of a Hammond platform, this community is a crucial factor.[240]

The group of fifty-six musicians who participated during the research and in the labs, was diversely composed and differed widely in terms of historical Hammond knowledge, the way their own professional practice was shaped, ages, stage activities, style(s) of playing music and involvement in education. Both my own students, and those of colleagues were involved, as well as Hammond Suzuki product specialists. Both national and international icons were involved, as well as budding talents; organists, keyboardists, pianists, producers or musicians who were active in a combination of these. Some received a master's degree, such as Rhoda Scott, or a doctorate, such as Darren Heinrich; both in the field of Hammond-related research. Ten nationalities were involved, with a male to female ratio that unfortunately proved unbalanced, but which did reflect the current professional practice of organists. Musicians were approached on the basis of their personal network and via social media. In almost all cases, they were willing to cooperate with the research.[241]

I have personal contact with a number of the participants in the physical lab sessions and therefore requires a robust analytical method for an accurate representation of the content; a representation that is coloured as little as possible by personal interpretation. Twelve professional organists and students participated in the labs at my studio in Geertruidenberg (2017), which was spread over four days. Each day consisted of a morning and an afternoon section, during which various themes and the instruments present were tested and discussed. My presence in the labs played a role in the possible perception and response to themes linked, such as World of Hammond and the modular Hammond organ. I tried to avoid researcher-bias, by encouraging the participants to not let their opinions depend on my presence and/or

[240] The material analysed for this section comes from a series of interviews, lab sessions, surveys and conversations that took place throughout almost the entire research period. All the material was first coded according to the questions posed and then according to the themes that frequently appeared; see Appendices II and IV and the personal archive.

[241] A first series of interviews took place in 2017, followed by physical lab sessions in my studio in Geertruidenberg. A second series of interviews aimed at a more international group of organists took place between 2019 and 2021. During this time there were also education labs with Hammond students, a student questionnaire and interviews and/or visits throughout the time of the research. The complete list is part of Appendices II and IV and the personal archive.

passion for these subjects. On the contrary, critical reflection on them was encouraged, as it helps to mature these concepts and the relevance of the research.

The activities and conversations were analysed with a bottom-up strategy, in which 'sound', 'craft and playing technique', 'Hammond revival', 'Hammond Suzuki' and 'innovation' appeared as the most important themes.

Fig. 95 One of the lab sessions in the studio with different instruments. from left to right: organists Govert van der Kolm, Rob Mostert, Arno Krijger and Willem 't Hart.

6.2.1 Theme 1: the sound

The sound of the Hammond organ is described with emotional associations as 'magic, infatuation, euphoria, freedom, emotion and timelessness'. The central theme is the nostalgia that the organ evokes and the authentic character of the instrument. Like 'an old vintage car that you go on holiday with every year' (Robin Piso) or 'a Hammond never sounds the way you left it the day before, but whether that is due to your own emotions or mood is a question, although I am sure that due to the complexity of the instrument, transferring an electromagnetically generated signal via dozens of wires, resistors and tubes to a vibration in your ear, is partly to blame' (Herbert Noord). These all constitute different descriptions for a feeling shared by the majority.

Of course, even the Hammond organ can turn out to be not perfect, as was frequently discussed during the lab sessions in 2017: 'Perfection versus imperfection' and 'This encourages both creativity and nostalgia' (Rob Mostert). Other sentiments: 'It looks like it sounds' (Pierre Swärd); ’it gets my body moving' (Piso); 'it evokes a very strong emotional response in me' (Darren Heinrich). The comparison with another Hammond invention, the Novachord, also came to the fore: 'When you hear what has been done on it, in the thirties. It's almost impossible to get rid of the spirit of that time from the instrument; certain instruments seem to be made to disappear again, but not the Hammond organ. The sine generation, for example; everything that isn't a sine forms sound-subjectivity, the sine rises above it and makes Hammond an illusion! (Bert van den Brink).

6.2.2 Theme 2: craft and playing technique

While the Hammond sound evokes many emotions, mastering the physical playing of instrument requires a long-term investment of time. Playing with hands and feet simultaneously requires highly developed coordination, that can be compared to that of a drummer, to which the harmonic and melodic component is then added', says Boye Ingwersen. A playing technique is therefore important, but also how you adapt to the sound of the organ itself. Because the tone wheel instruments are hand built, the age and technical condition of each instrument strongly influences the sound. Graduate Hammond organist-keyboardist Willem 't Hart describes it as: 'The organ doesn't just listen to you, it's an obstacle to overcome’; his Brazilian colleague Daniel Latorre says: 'It's like the fundamental stone and future at the same time. It's still a challenge.’

The tactile experience of the instrument plays an important role because specific materials such as wood and Bakelite (later plastic) were used for the original design, and the keyboards have a built-in mechanism that creates resistance when the keys are pressed. The sliding of the drawbars and the rasping sound that this produces; the electrical 'click' (keyclick) that occurs when a note is pressed; the mechanical sound that all playing actions produce; the reverse, black- and white-coloured presets; the mechanically rotating Leslie that produces wind and wind noise; the material used and the heaviness of the execution: all these examples are specifically mentioned as characteristics of the direct link with the playing experience.

‘In the modern Hammonds, clones and other keyboard instruments, these actions are mainly carried out electronically with touch keys and touch screens and thus these instruments deliver a completely different feeling of playing' (Mostert).

‘The expressive possibilities of the organ have partly determined the role of Hammond in music history: the inherent bass function that makes you both a keyboardist and a bassist simultaneously, means (physical) limitation and power'. Arno Krijger expresses here one of the views about Hammond playing with or without the use of the feet. The so-called Jimmy Smith template, a technique in which the footwork moves to the lower keyboard, played with the left hand, whether or not rhythmically supported by the pedal, is frequently used. There is also the more gospel-based technique, with hands and left foot simultaneously, derived from the classical organ tradition. In this classical organ approach, both feet on the pedal play an independent musical part; however, this technique has made little headway among musicians in the jazz, pop and rock circuit.

‘There are few footbass-playing organists', says the prominent organist Michel Benebig from the South Pacific, 'therefore they also create fewer personality opportunities for themselves. The combination of keyboard and pedal playing together with the rich sound possibilities even gives you the possibilities of being a one-man orchestra'. Where one embraces such a one-man orchestra approach, the other avoids it as much as possible; as illustrated by Krijger in the following quote: 'I approach the Hammond as a wind instrument and don't want to be a clichéd (Jimmy Smith-like) organist. I do want to use the traditional sound, but I avoid the effects as a soloist'.

Thus, there are quite some differences in approach; however, it is generally agreed that Hammond techniques form a solid basis, to be applied to other keyboard instruments, or in learning to think in different musical layers at the same time.

6.2.3 Theme 3: Hammondrevival

The Hammond revival, as described in chapter 4, started around 1990 and continues into the present time. In the eyes of most organists, the B3 model represents the ultimate Hammond and this is reflected in both the design and ergonomics of current Hammond Suzuki products and those of the competition. The iconic B3 look, and the original Hammond sound with a Leslie, continues to inspire the use of Hammond in the revival of popular styles. The R&B-based jazz-blues of the 1950s and 1960s, and the (symphonic) rock music of the 1970s are examples of this. 'There are few new musical approaches, but accents *are* being added, such as the gospel influences in the music of Cory Henry and his band Funk Apostles', says Latorre.

The Hammond revival doesn't stand alone,' says young German alumnus Simon Oslender. 'Technological developments are moving so fast that there's a longing earlier times, and that is true for nature, history and original instruments'. An experienced teacher (Wiboud Burkens) adds a philosophical perspective: 'There is a longing for old instruments purely because they represent an era with a longing for (utopian) social and individual freedom.'

Within the Hammond revival, the influence of the greatest Hammond innovator still prevails, according to Brit Will Bartlett: 'Jimmy Smith developed many elements of what became the standard jazz style. His vision in terms of the way the organ trio sounds as a whole, the interplay of pedals and left-hand bass, the registers for ballad playing and the clarity and feel of his improvised lines cannot be overstated'.

6.2.4 Theme 4: the new instruments of Hammond Suzuki

The view that Hammond embodies a worldwide niche, and reaches a globally small target group, is confirmed by almost every participant in the lab sessions. Manufacturer Hammond Suzuki is primarily concerned with meeting the existing demand in the market, which is considered a logical consequence of the niche that the brand represents. Moreover, according to Folkert Oosterbeek: ’innovation is a costly, time-consuming and complex process'. Evidently, according to various professionals, it is either not the vision of Hammond Suzuki or it is not within their power to achieve.

The new Suzuki instruments are reliable, technically up-to-date, more portable and therefore well suited to the stage, say a number of organists who already own such instruments. However, it is believed that the original tone wheel Hammonds have not been surpassed in quality and originality; but these instruments are expensive to maintain technically and therefore less suitable for transport. The ability of young musicians to purchase an instrument is also a topic of discussion. A replacement market for original tone wheel organs has manifested, and that Hammond Suzuki is cleverly capitalising on this, is the prevailing opinion.

The recently introduced digital Hammond Suzuki XK5 was present during the lab sessions and received positive feedback, as well as criticism. Mostert: 'I experience inconsistencies in the (software) design, ergonomics and operation, because these are fashioned after the originals, and the imperfections deriving from the original are simply copied'. Bert van den Brink misses 'the unpredictable, but musically inspiring factor that the mutual sound differences between the various tone wheel organs produce'. ‘The enormous expressiveness has disappeared and because of the lower quality materials and response of the keyboards, the tactility is also reduced when compared with the original' (Mostert). A big change is the introduction of software: 'There is a lot to program with the XK5, but because of that the operation is less intuitive. Many possibilities may therefore remain unused to the user' (Ingwersen).

Rob Mostert brings the issue into focus: 'In the end, it's about how it sounds and feels and not about the marketing talk. Hammond was an innovator, the current manufacturer is no innovator. Why don't they just start building tone wheel organs again?

Young participants ('t Hart, Ingwersen, Schippers, Oslender, Vullings) felt that Hammond Suzuki did not show much empathy towards their target group: 'The instruments are expensive and seem to be developed for older and richer people', Ingwersen said. The Hammond product specialists Van der Linden and Lanslots agree that the manufacturer should pay more attention to younger musicians and develop new product lines with them. A colleague from the Amsterdam Conservatory sums this up: 'Musical and technological innovation influence each other, but not so much in the Hammond world. We miss a Hammond software app like those from Moog synthesizers, to introduce the sound to children alongside the expensive and complex instruments. Children will eventually do new things with it, and from there you trigger a possible Hammond future for them' (Burkens).

6.2.5 Theme 5: innovation

Why is innovation necessary at all, some, usually more experienced, participants wonder. A number of quotes reflect this sentiment: 'The Hammond sine wave has limitations for innovation, which is why Hammond designed the Novachord itself. In the end, it is a ingenious concept that can barely be improved. Why should we make it even more complex?' (Van den Brink) or 'I myself am not very concerned with the renewal of the Hammond organ, because I am so much in love with the original character. As far as I'm concerned, nothing needs to change. (Frank Montis) And: 'I came to the conclusion that there is only one Hammond and that it was invented in 1934 by a certain Laurens Hammond, and that I had to make do with that. It is what it is, every addition detracts from the sound, and becomes electronic without a soul' (Herbert Noord).

A striking vision on a return to the original tone wheel technology comes from Brazil: 'The new technologies are great but very far from the original. The electro-mechanical tonewheel sound is a state of art that should be preserved. I always thought of a future for it, maybe miniaturise the mechanical tonewheel and multi contacts in very small devices; replicate the B3 state of the art preamp with new tube technologies, etc., would be a new way to preserve and innovate [...] Restore the real Hammond culture and instrument. People lose more time trying to reach the original sound than to try to innovate. But innovate on the Hammond playing language is still something to be done' (Latorre). The well-known American professional Tony Monaco has returned to the

origins of the Hammond, which was ultimately also inspired by the pipe organ, and for him it does not matter how it is used in today's music; whether this is as a synthesiser reproducing different sounds, or going back to the original Hammond innovators and their playing styles.

Especially the young generation including students feel that more pioneers are needed who can function at a high level and introduce new possibilities to the user, as shown in the interviews, student surveys and lab sessions. Playing with different Hammond sounds and effects enables them to step outside the Hammond concept, allowing for exciting and more natural processes that escape the most common 'jazz-blues-gospel-rock' approach. Piano and keyboard students with little or no Hammond experience say they want to learn the traditional basic techniques and apply them correctly in order to be able to deal with the sound. At the same time, they also see connections with electronic or urban music styles or in the context of traditional music such as Indonesian Gamelan. Here it becomes clear that the globalisation of education, among other things, is a positive factor. The traditional role of today's musician is also changing as a result of technological progress; musicians of today more often combine the roles of creator/producer/organiser/promoter of their own work. For Hammond, this development can also lead to new conceptions of use and design.

Ideas such as the disconnection between making music and controlling the sounds, inspired by the classical organ world, come in to the discussion, as well as the use of self-thinking technology, resulting in a 'patchable' or 'template' Hammond instrument that integrates programmed actions into the playing or provides unexpected musical impulses. In addition, technology can be used to improve authentic Hammond components, which are now almost unaltered, and be incorporated into new instruments, thus enhancing their playability and usability.

Rhoda Scott, despite her impressive career and the tradition in which she grew up, prefers to look to the future and notes that innovators will only lead to imitators if they themselves have first become successful and widely visible. As an example, she cites her own musical inspiration, Lou Bennett, about whom she wrote a master's thesis: Bennett would have liked to develop in a broader context and find supporters for innovating the Hammond, but he was alone in his quest. I am sure he would have gladly embraced the modular Hammond experiment had he still been alive.

Fig. 96 Rhoda Scott during her Codarts masterclass in 2018. Other organists in the photo: Boye Ingwersen (l), Thijs Schrijnemakers (m), the researcher (r).

Is the development of the modular Hammond also seen as an innovation during the lab sessions? Only the prototype was present during these sessions and the modular B3 Hammond was still under development, so examples of how this would work during a concert or in productions had not yet been realised.

In the world of the classical (pipe) organ, similar experiments do exist, as a visit to Het Orgelpark in Amsterdam (September 2019) taught me. Professor Hans Fidom is in residency here as chair of Organ Science (UvA, Amsterdam) and demonstrated the development of the 'Hyper Organ', which explores the future of the pipe organ.[242] Ideas for a modular Hammond can certainly not be called revolutionary from this perspective, but in the context of Hammond history, they do garner various reactions. 'It is no longer a Hammond, but a mega-controller, which makes does you a disservice to call it a Hammond' (Oosterbeek) or the analogy with the Novachord, which only had thirteen buttons, but had a very complex mechanism. 'Is it not getting too complex? (Van den Brink).

'Perhaps the innovation lies in breaking through the stylistic boundaries and not an innovation of the instrument, in which working with soundscapes is more contemporary. The balance between the musical and technological aspects is the challenge', says producer Burkens.

In general, there is a consensus that the search for one's own musical voice in combination with a personal sound is the core of musicianship and artistry and, in a philosophical sense, gives meaning to the individual. According to Govert van der Kolm, the goal of the modular Hammond organ thus seems to be the meeting of research and musicianship, in which personal limitations influence the end result, because the technical possibilities are practically unlimited.

[242] The Utopa Baroque organ is now internationally known as a leading "hyperorgan". Hyperorgans are organs whose sound material is accessible in more ways than just keys and stop knobs. The Orgelpark Research Programme maps out what this means for the creation of music, whether it refers to Bach or is completely new. The focus is on research into the activity of making music and the listener's role in assessing it. The aim is to inspire musicians and other artists to new ways of making music and thus to give the organ a natural place in the twenty-first century. See: https://www.orgelpark.nl/nl/Wetenschap/Wetenschap-in-het-Orgelpark.

Others, both young and old, find it difficult to form an opinion about the modular Hammond concept because the idea never occurred to them before. Everyone is happy that the love for Hammond remains the point of departure. During the lab sessions, ideas surfaced as to what this could lead to: 'In twenty-five years time, I expect that the demand for the sound will have remained, but I doubt that the knowledge and craftsmanship will remain. So this is a worthwhile experiment' (Van der Kolm).

6.2.6 Theme 6: platform WOH

The reactions to the set up of WOH demonstrated that the vast majority saw a better mutual cooperation as a possibility to expand their own audience and that of the Hammond organ, in general. Five participants (from a total of twelve) were also willing to co-invest in the development: sharing of their personal network, and the development of specific content for the platform. One participant (Mostert) was of the opinion that Hammond Suzuki should actually run with the plan. A few people also questioned the feasibility (Krijger) and a small minority were reluctant to share the personal network; a network they had amassed with a great deal of effort. The many disparate initiatives from enthusiasts, via Facebook and YouTube in particular, were mentioned as potentially dampening forces, and it was proposed as to whether it would not be better to set up a broader platform for organists, keyboard players and pianists alike.

In any case, the community idea was beautifully captured by Robert Schippers: 'Belonging; worship; joy; reconciling with others and yourself; speaking truth; overcoming adversity, focusing on positive goals; participating in a ritual; being joyful while working towards a good outcome.

6.2.7 Reflection

Among the musicians, the motivating and detracting forces surrounding innovation loom large, simultaneously. According to some professionals, innovation of the Hammond organ itself, is actually not necessary; on the contrary, various musicians have a nostalgic longing for the original organ and the original sound. There are different opinions about the digital products of Hammond Suzuki (such as the XK5) and Hammond clone-manufacturers (such as Clavia), but these products are now

being purchased because, compared to the tone wheel organs, they are more practical for stage use without sacrificing functionality and sound. The sound is still not as perfect as with the tone wheel organs, but the advantages - ease of transport, weight and maintenance - outweigh the disadvantages, such as being less authentic, more difficult to personalise, the lower quality of hardware, like keyboards and the materials used. Suzuki Hammonds are also considerably more expensive in comparison with those of the competition.

Thus, the time factor certainly appears to have played a role in professionals' acceptance of the latest generation of Suzuki instruments. Hammond released the B3000 in 1978 (with LSI technology) as an alternative to the B3, and Hammond Suzuki developed a digitally sampled variant with the XB3 in the early 1990s. Only recently, some twenty-five years later, with the Hammond Suzuki XK5, a breakthrough has been made in the acceptance of a digital alternative to the original tone wheel, within and amongst a growing group of professionals.

Innovator Laurens Hammond is admired by everyone, but the will to innovate is mainly seen as a solo initiative and certainly not expected from the manufacturer. Both older and younger players represent these different points of view, although among the younger generation, there is a greater expectation that the organ, and its sound, will blend into current innovative trends (and this does not only concern my own students). Some, especially those who profile themselves more as keyboardists and producers, see an important role for technology in opportunities for innovation: they see the specific Hammond domain developing more widely by not only approaching it from the instrument tradition.

The attitude towards WOH is similar to the other views regarding Hammond innovation. All find the platform, in principle, a useful initiative; but there is a mix of opinions in terms of pro-active participation; doubts about the feasibility and willingness to commit; and a wait-and-see attitude about what the future will bring.

6.3 Music Education

Attention to education was historically very important to the commercial goals of the Hammond Corporation, as described in chapter 3. Also in the planning surrounding WOH and the creation of a community, education played an important role. Furthermore, many Dutch professionals are active in their own private practice or work at a music institute, such as a music school, MBO music education or conservatory. The possibilities for professional Hammond education are part of this PhD research. How these were started and continue in current practice, I describe from both a substantive and institutional point of view. The complexity of finding a place for the niche that is the Hammond profession, within an established organisation and existing structure of education, shows that both the substantive and institutional logic must be in harmony, in order to produce results.

Historically, the material that the Hammond Company developed specifically for Hammond playing was primarily aimed at amateur practice. These courses principally served the purpose of selling more organs; had a low-threshold set-up; and were accompanied by a sophisticated marketing strategy (chapter 2.4.3). The target group consisted mainly of the white middle class, who had the financial means to buy an instrument. A later generation of white British (rock) organists often had a classical piano or organ conservatory education, before making the switch to the Hammond organ. In the 1970s, electronic organ courses were established at various Dutch conservatories. These were also based on a classical or theatre organ tradition, rather than on jazz or rock music. Most of these courses disappeared altogether with the declining popularity of the electronic organ in the 1980s.

Even when a Hammond revival burst onto the scene around 1990, no new European Hammond conservatory courses were established. The revival continues to the present day, and this is the reason the climate seemed favourable to develop a European Hammond study programme at Codarts, with the PhD research as a source of inspiration and knowledge.[243] The Codarts lectorate 'Blended Learning' started around the same period, and aimed at guiding the development of a specific Hammond

[243] Carlo de Wijs, Proposal (in Dutch) ‘The Microdynamics of Musical Innovation. The History and Future of the Hammond Organ, Erasmus University, 2015. In the personal archive.

didactic as a case study and using it for a broader modern and hybrid educational model.

Two specific Hammond students (Ingwersen, Oslender) were admitted and one student ('t Hart) made the switch from principally studying keyboard, to Hammond. We experimented with them in various ways: the ensemble became a lab in which everyone contributed material and peer feedback forms were used; educational films were made that served as mutual learning material; in- and extra-curricular activities blended into one another; musical styles, compositional, production and entrepreneurial skills formed a second thread of the programme, next to the craft. Twice, a Hammond Education Day was organised which was open to everyone; Rhoda Scott gave a masterclass; and Hammond Suzuki and Codarts signed a Letter of Intent - with the goal of cooperation in the field of Hammond education.[244] In the Codarts study year 2021 - 2022, Hammond will also be, alongside the main subject Hammond organ, a regular part of the Pop Keys curriculum; there will be a pilot for piano jazz students, and there is the possibility of a master course.

The interviews and lab sessions involved various teachers who teach at Dutch conservatoires and/or at MBO music courses (Kool, Burkens, Maas, Hondorp, Mostert, Oosterbeek, Van der Kolm, Den Engelsen, Schrijnemakers, Van der Brink). Here, the specific attention to Hammond was discussed: 'Investing in education is very important. ‘Hammond is seen as a difficult instrument to master and ‘unknown’ means ‘unloved’. By actively working with the instrument, students learn to recognise and use its possibilities and added value. Combining multiple functions is very instructive, such as combining the bass function with solo playing. Due to this awareness, the student also starts to compose or produce differently' (Hondorp). The relative unfamiliarity with the specific Hammond techniques has, according to a keyboard teacher, another cause: 'At conservatories, they often think in piano terms because of the training that the teachers themselves have received, but it is good for every keyboard player to learn the Hammond basics. The skills are multi-applicable and you can create a unique space for it within the education programme' (Kool). Many keyboard students have a Nord keyboard with drawbars, but in the music they listen to, the organ is not so

[244] Reference to education films with and by students, Blended Learning lectorate (2016 - 2019), Hammond events, Appendix IV; Letter of Intent (LOI) Codarts - Hammond Suzuki 2018. In the personal archive.

prominent. ‘It is important to go through the whole instrument and in that way, discover it' (Den Engelsen). Graduate Hammond organist 't Hart reflects: 'It has given me greater depth when approaching other complex instruments like Dave Smith and Moog synths. I recommend it for all keyboard players'. According to Ingwersen, another alumnus: ’The awareness of how a Hammond works has an immediate impact on the way you play or use sound, coordinate, and create arrangements with other keyboard instruments. It is a different instrument than just a piano or keyboard derivative; and this awareness needs to sink in more in general'.

But there are also questions: 'Do you need four years to learn how to play the pedal board and to learn specific Hammond techniques? (Oosterbeek) And, ’will there be enough candidates?’. ‘Learning specific techniques takes a lot of time and for many, a partial mastering of the organ will be enough' (Krijger).

Finally, Burkens is of the opinion that within education too much attention is paid to the reproduction of existing styles: 'The electronic 'Dutch sound' is interesting and we as teacher-musicians should take example from this. Find your voice with this instrument in a different context. The combination of the culture at the conservatoire and what the students bring to it, determines their mindset.'

A request to twenty pop and jazz students in 2020-2021 to provide written comments on the possible forms of Hammond education, elicited a variety of responses. Most said they had had no experience with Hammond before starting their studies. They found it instructive to get in touch with the specifics of the playing technique: 'Because the Hammond organ is so complex, it requires a certain strategic structure of study and this is very applicable to other aspects of the programme' (West). The independence between hands and feet is instructive: creating four brains to learn to multitask better' (Verloop), 'I find Hammond a really complex and unique instrument: the touch experience, the technique, the creativity of changing sounds' (Kalasyena) and 'It's closer to playing drums than an actual piano, in terms of coordination' (Peréz Vos).

They also said that the organ inspired them to new musical ideas: 'Incredibly good to develop the control of different sounds and musical roles' and 'because the sound can be manipulated so much, it has changes my approach to music and has lead to new insights' (Hijink). However, an investment of time is necessary: 'Soundwise, a lot is possible, but I still find it difficult to hear which sound fits exactly in which context. The subtlety that a Hammond can sometimes give is very nice to apply to other instruments' (Jacobs). And finally: 'If you want to embrace the Hammond in its totality, so pedals, both keyboards and drawbars - it takes a lot of playing time. More than with the piano, I have the feeling that I can distinguish myself with Hammond, because not many keyboard players really master it' (Poleij).

A further critical reflection on the various experiences and opinions of teachers and students shows that the importance of specific Hammond techniques is often seen as useful for other purposes, such as the simultaneous physical mastery of hand and foot playing; the application of sound or the renewal of compositions; and arrangements for other instruments. The learning of skills and the reproduction of an existing repertoire, receive more attention than the development of new applications and musical contexts for the instrument itself.

For the time being, there is no great interest in the Hammond subject as a completely independent field. Innovation of the Hammond field itself is not generally considered a priority, and the urgency of this is contained within a limited group of specialists.

6.3.1 The institutional side

A session with Codarts to analyse the developmental trajectory of Hammond education took place in June 2021.[245] This made it possible to reflect on almost the entire period of the research. The aim was to look at the institutional conditions for Hammond education from an innovation-oriented perspective: which actors were involved and how did they interact? The reflection showed that, apart from financial and human resources, support, communication and organisational embedding are crucial conditions for making new educational projects and forms realistic.

The most important condition mentioned was the creation of *support* and that, ideally, the start should be executed by a team that is situated in the midst of educational practice and thus able to closely monitor the various processes. One participant was convinced that it was better for the person who devised the plan not to continue operating as an individual catalyst. With the support of the so-called 'front runners', or early adopters in the innovation theory, there is a greater chance of it being embedded in the institutional context. This creates a middle group and the possibility to act, and react, on a broader scale, thus achieving a broader support base. Crucial to this is the support of training management because the more hierarchical structure within the institute is less geared to developments from within, than from above. It was also indicated that a *too* large and enthusiastic specialisation, such as my expertise with the Hammond, may actually have a negative influence, due to broader application possibilities consequently being unclear, and thus little to no opportunity to create support.

A second important element concerns communication: both internally with the management, colleagues and students; and externally with other organisations and institutes. The possible importance of Hammond education for the institution does not materialise automatically, and needs to be positioned in conversation with others. ‘What does Hammond actually mean?' asks one of the participants in the discussion, 'a technique, an image or a sound? By describing the definition of this, you can better

[245] The session took place with the programme manager for the Codarts Master of Music, who is also my immediate superior, the Head of Research, lectors and an educational psychologist involved in the former Codarts lectorate Blended Learning with whom, among other things, the specific didactics for Hammond education were developed. Recorded in the personal archive. In this paragraph, for reasons of privacy, names have not been mention.

determine how to position the profession being offered'. ‘Is it the craft that is central, and the historical achievements, or do you want to place it in a new environment where the factor sound is more the focus?’ A complicating factor in the whole thing turned out to be, in accordance with the initial plan, positioning Hammond between the fields of jazz and pop. This is both traditionally and historically the context of the instrument; sound and innovation, on the other hand, have more in common with production and technology, which are manifest in the main subjects Creative Producer and Composition. In the operational structure within Codarts, jazz (encompassing composition) and pop (encompassing production) form two separate entities, and this, in practice, makes the substantive positioning of Hammond very difficult.

Thirdly, in retrospect it is important to note that Hammond education became organisationally embedded with the Blended Learning lectorate.[246] This professorship was launched in 2016, and its mission was to research new educational models. A project group, as part of the lectorate, developed an e-didactic model that aimed to guide the artistic development of students through blended teaching. The physical music education was actively supported with online tools, and took shape in a 'learning community' in which the individual student continuously developed in collaboration with others. The new Hammond curriculum, based on this approach, functioned as a case study within the lectorate.[247] In this way, a double innovation environment of blended Hammond learning was created.[248]

Nevertheless, there were insufficient possibilities within the institution, and thus for the professorship, to successfully complete the experiment; resulting in its premature demise. With current knowledge (Covid-19), and the resulting need to offer blended education, the lectorate was actually too early in its ambition to beging a hybrid learning environment within Codarts, as the joint reflection shows. One of the discussion partners says: 'A coincidence, like a pandemic, is sometimes necessary to get the necessary insight and support.’ Another adds: 'The transition to the purchase and use of digital resources that Codarts is going through in this area has been

[246] An educational reflection by J. ten Hoonte, educationalist and educational psychologist, member of the Codarts Blended Learning knowledge network (2016-2019). In the personal archive.
[247] The basic principles of this e-didactics model: examples of teaching methods and student feedback are included in the personal archive.
[248] Reports and video sessions with students and the lectorate. Examples of student created and shared content in the personal archive.

accelerated by the pandemic, but at the time of the Blended Learning professorship, and the development of Hammond didactics, it was completely insufficient to be able to fulfil the ambitions.'

Examples of such complicating factors: an unclear mandate to the professorship that gradually evolved; the lack of a digital infrastructure including an effective working internet and sufficient computers; video equipment and the ability to edit video content; the repeated postponement of the choice of an electronic learning environment; the limited capacity represented by the small team; a lecturer who did not sufficiently highlight what the professorship stood for.

6.3.2 Reflection

In summary, it can be said that for Codarts the proposition of Hammond education was not sufficiently defined. Personal idealism and the lack of sufficient institutional support were difficult to reconcile. Moreover, the intended contribution of Hammond Suzuki to the education programme turned out to be very small. As noted in the analysis session, 'The manufacturer is almost exclusively looking to serve the market, and is not overly interested in education'.[249]

In 2016 and 2017, discussions took place with other conservatories, with the aim of bringing Hammond developments to their attention and exploring possible collaborations. However, nowhere was Hammond included as a specific specialisation in the curriculum. The programme managers showed little interest in changing this or starting a collaboration with Codarts. All these elements demonstrate that an existing image, an existing field of influence and the institutional structures, can hinder innovation-focused initiatives. If substantive and personal ambitions do not coincide with the short- or long-term strategies of an institute, there is no shared need for innovation, and no joint implementation strategy.

[249] More about Hammond Suzuki in paragraph 6.4

6.4 Hammond Suzuki and the market

An organised Hammond community, comparable to the percussion, guitar, classical piano, DJ and producer worlds, does not yet exist.[250] The lively dynamics observed in these communities - between professionals, industry, enthusiasts and amateur players - led to the question as to why such a platform would not be equally possible in the Hammond world. Necessary for the positioning and use of the intended name World of Hammond was the permission to use the protected brand name Hammond. Therefore, the cooperation of the Hammond Suzuki company was crucial.

6.4.1 Approach

My history with Hammond Suzuki dates back to the early 1990s (Section 5.5.1) and intermittent interactions have occurred through various projects. From 2015, we had various discussions about a collaboration in the field of PhD research, and the plans for World of Hammond.[251] When the NWO grant was awarded, I gave a presentation for fellow laureates and it was streamed live on the internet by Hammond Suzuki.[252] Following the European Musikmesse in Frankfurt in 2016, an extensive Japanese Hammond Suzuki delegation was present to introduce the new Hammond XK5.

Following the presentation, we spoke to each other on a regular basis where it was my intention to have Hammond Suzuki actively participate in ongoing developments. Tangible results included the publication of a joint press release about the partnership between Hammond Suzuki Europe and myself in January 2017. This cooperation included research, education development and events such as a Hammond festival.[253]

Mutual trust grew and culminated in a musical presentation at the Frankfurter Musikmesse 2017, a test track for the Hammond XK5; talks about an advisory role for the European company; and a collaboration with Codarts, School of the Arts in Rotterdam. A Hammond@Codarts promotional day took place (2018 and 2019); Rhoda Scott gave a masterclass (2018); and the cooperation between Codarts and

[250] World of Hammond plan, p.3, Appendix IV. Comparable platforms such as Drumeo.com, Lynda.com, Masterclass.com, Truefire.com and BoilerroomTV focus on specific target groups. Ableton Live software has developed an active user community where the content and user experiences are strongly linked to the identity of the manufacturer.
[251] Conversations with Hammond Suzuki, Appendix II
[252] Presentation of research at the presentation of the NWO grants to the laureates by Jet Bussemakers, Minister of Education, Culture and Science, 4 April, 2016.
[253] Press release, Hammond Suzuki Europe and Carlo de Wijs announce partnership collaboration, Vianen, 12 January, 2017. In the personal archive.

Hammond Suzuki was formalised with a Letter of Intent (2018). Present at the signing was Shuji Suzuki, the Japanese president and grandson of founder Manji Suzuki, who was at that time in Europe on business.[254]

Differences in vision were also apparent. For example, there was a lack of understanding about my personal choice to convert an original tone wheel Hammond B3 into a modular instrument, instead of switching to a new Suzuki Hammond. There was also difficulty with the lab sessions during the summer of 2017, in which an original B3, the prototype modular Hammond, a Hammond Suzuki XK5 and a clone organ from the rival firm Clavia had been brought together. The aim was to explore the differences and similarities between these different models with professionals, and to reflect on them (section 6.2). An intended joint publicity around these sessions did not get off the ground, as Hammond Suzuki did not want to acknowledge to the competition.

6.4.2 World of Hammond

The concept plan for World of Hammond was finalised in the spring of 2018, and our cooperation seemed to accelerate when Hammond Suzuki Europe proposed establishing a joint foundation, 'World of Hammond'. Inspiration for this idea was the decades-old Yamaha Foundation.[255] Hammond Europe wanted to present the plan to the Japanese management and ask for their approval. An additional idea was to invite Rhoda Scott as ambassador for the foundation, and thereby build up European visibility. Hammond Suzuki's contribution would be the Hammond name, their international network and goodwill, the European director as a member of the board, and the use of instruments. Swing Support, my company, brought in the WOH concept, as well as the PhD research, the joint development of professional education, a music publisher, a publicist and my unpaid hours for the duration of the research.

[254] LOI Codarts and Hammond Suzuki, 17 April, 2018. In the personal archive.
[255] Yamaha Foundation, https://www.yamaha-mf.or.jp/english/.

The intensive negotiations that followed focused on ambitions, time frame, costs and staff support; platform technology and maintenance; the involvement of the network; and a marketing and communication strategy.

Hammond Suzuki's biggest contribution to WOH was in the naming rights, as staff support proved impossible. Access for competing brands on the platform was non-negotiable and there was a difference of opinion on the hosting of the platform, the potential reach of the platform and the start-up costs. As a result of the disagreements, Hammond Suzuki Europe decided, in September 2018, not to continue the WOH trajectory and not to submit the idea to Hammond Suzuki Japan for approval. Support for the PhD research, and the cooperation with Codarts, were continued.

6.4.3 Hammond Suzuki USA and the Hammond culture

It is logical that there are cultural differences between the three 'Hammond Suzuki continents' that influence the way they operate internationally. Japan is the boss, it determines the product strategy, and the Japanese tradition is not one of great dialogue.[256] Europe distributes from the Netherlands to many countries on the continent, resulting in a common approach to distribution and product handling, but not in a homogeneous communication and marketing strategy. Hammond Suzuki USA feels that it is the moral founder of the brand on historical grounds, and expressed this belief strongly during the interviews I had with them. Both America and Europe have wishes in the area of product development, but are dependent on the choices Japan makes.

All parties agree on a number of principles: full market focus; larger and more expensive products that deliver better margins; competition excluded as much as possible; and technology used to reinterpret historic Hammonds.

At the time I was involved in discussions between Hammond Europe and Japan, the differences in outlook and culture could be clearly observed: it concerned the way Japan listened to Europe's proposals, and how passively they seemed to react to the presentation on the study (both in 2016). The importance of developing professional Hammond education, which was discussed during the signing of a Letter of Intent with Codarts (2018), also found little resonance. People were positive about the

[256] Based on various internal conversations with Hammond Suzuki.

development, but could contribute little to it from Japan given the different views of the education system there.

My visit to Hammond Suzuki USA, in the autumn of 2018, provided more insight into the Hammond Suzuki culture and the historical values on which it is still strongly based.[257] 'It's important to keep the history alive' and 'Artists are our family, they keep the motion going.' About the digitalisation of the Hammond sound or the development of a Hammond software app, the reaction was: 'Keyword is money! Software will be more important, but is a tool for the younger generation. Not a true competition for our hardware.'[258] They saw that a bigger development was going on, but they did not take up the development of software related products themselves: 'The Hammond brand is slowly moving from an organ company to a music company.

The idea of a possible Hammond platform led to the reaction of the Artist Relations Manager that American organists would probably not contribute to it 'because of their egos!' and that 'real life musicians' see no added value in a 'virtual world'.

[257] Various product specialists, a technical manager and the operations manager were present at these talks. Brand history, current practice and the future were the central topics of discussion.
[258] For software-based products, a partnership with the American music producer IK Multimedia has been launched (https://www.ikmultimedia.com/products/hammondb3x/). A Hammond app was released in 2020, but it did not exist at the time of the interview.

6.4.4 Reflection

Building a superior product with the unsurpassed Hammond sound: history and the brand experience are central to the way Hammond Suzuki looks to the future. For decades, the business model and resulting strategy have been based on the core values of the past.

What is striking is the limited knowledge and/or interest in the current dominant platform economy, and the use of new technology other than to simulate the existing Hammond sound. Money remains the main motive, investing in deviating programmes (young talent, education, WOH, Hammond festival) should cost as little as possible, and is therefore not approached proactively.

6.5 Conclusion

In this chapter, the central question is whether personal innovations can also be scaled up to other domains. In order to answer this question, it is important to understand how the broader community of Hammond players, music education and the international Hammond market operate.

An inevitable and confronting question is whether the personal innovation one tries to scale up will actually have broader relevance. From the conversations I had with the musicians in the labs, it soon became clear that the involvement with the WOH or the modular organ did not go much further than an expression of encouragement. Moreover, the urge to renew one's own instrument did not fit in with the nostalgic experience of the device which many musicians expressed. From Codarts' perspective, there was no broader relevance of the Hammond innovations either. And the manufacturer appeared not to see a business case, and saw a threat to the brand because of their unfamiliarity with the impact of platform technology.

However, the conclusion that the WOH might not have been a good idea is too easy and too hasty. After all, the various data in this chapter show that it is not only the quality of an idea itself, but also the way in which it coincides with specific interests and circumstances that determines whether one recognises and acknowledges its innovative power.

The actor-network theory and innovation theory describe such mechanisms as an ongoing dynamic process between various actors who jointly define both the quality of the idea and the possibilities for implementing it. The latter is where innovation theory comes in: talking about the initiators (innovators or pioneers), the first followers (early adopters), the later followers (early and late majority) and the laggards.[259] Rogers, as the most successful researcher of innovation theory, saw the diffusion of an idea primarily as a social process that takes time to develop: it involves human work under the influence of mutual communication, power relations and perceptions in addition to the influence of economics and technology.[260]

[259] Rogers, *Diffusion of innovations*.
[260] Erik Tempelman, “De praktische kant van innovatietheorie,” TU Delft, Industrial Design Department, 30 March, 2017, https://www.engineersonline.nl/artikelen/id1365-de-praktische-kant-van-innovatietheorie--i.html

In this innovation theory, however, there is limited attention to the way in which a pioneer organises followers and wider acceptance; as the pioneer himself is often prepared to take more risks in development. It is important to get to know the group that helps spread the ideas, the so-called change agents. They must be the first to believe in the potential of an idea and be willing to actively spread it. Only then can a critical mass be achieved that gives potential innovation room to develop. There is also opposition to the assumption that innovation, by definition, brings improvement, and laggards consequently often resist innovation.[261]

Of course, the personal role in the aforementioned processes cannot be eliminated. Examples include the presentation of ideas, the counter-reactions to personal ambitions, the experience of the necessity presented and the incorporation of third-party interests. In addition, this chapter shows that it is virtually impossible for an individual 'inventor' without their own resources (which Laurens Hammond did have), in terms of time and persuasive tools, to get broader communities, institutions and companies to accompany them on a path of innovation.

According to the manufacturer, the creation of the platform World of Hammond also meant a potential threat to the autonomy of the brand, as the Hammond community, and that of the Hammond competition, would achieve greater visibility. For example, bad reviews of the products could appear, or the competition or older Hammond instruments could be praised. The connection to the Hammond brand name, which was supposed to be automatic when World of Hammond was conceived, turned out in retrospect, not to be a good choice. The creation of a platform and the bringing to life of a Hammond community would have led in time to Hammond Suzuki's inevitable participation; except perhaps on more favourable terms for the community.

[261] Mathew J. Manimala, "Networking for innovation: Anecdotal evidences from a large sample study of innovative enterprises," *The Journal of Entrepreneurship* vol. 7, no. 2 (1998): 153-169; "The institutional context of innovation," in David Morley, Stuart Proudfoot and Thomas Burns (eds.) *Making Cities Work. The dynamics of urban innovation*, 1st Edition (New York: Routledge, 1980); John Hartley and Stuart Cunningham (eds.), *Hidden innovation. Policy, industry and the creative sector* (Brisbane, Queensland: University of Queensland Press, 2013).

What about the musicians who are such an important, and visible, part of the Hammond community? As the various interactions have shown, they are generally busy giving content to their own playing practice, often combined with teaching. Their innovativeness is primarily invested in their own development, and in building up their economic practices, rather than in a larger movement for change in the entire profession. In the examples where this was the case, they encountered similar complicating factors, as has been described in this paper.

7 Conclusion, Reflection and Recommendations

This dissertation is an analysis that brings together the various relevant aspects about, and surrounding, the Hammond organ and the Hammond sound. It deals with the interplay between technology, musicians, business management, social and market developments and the influence these variables had on the development of the instrument, the music and the music industry. The result is a broad research that is therefore evidently significant for the instrument's history, its contemporary position and its future role.

The answer to the central research questions and the sub-questions is structured in three sections:

7.1. Most important results per chapter

7.2. The methodology (ANT, innovation theory, autoethnography)

7.3. Discussion and recommendations

In section 7.1, the main findings of this research are described on the basis of the actors. In 7.2, the results are linked to the scientific theory on actor networks (ANT) by Latour, innovation theory by Rogers and the autoethnographic methodology used. The ANT forms the theoretical and methodological basis for describing the specific Hammond actor networks.

The third and concluding section 7.3 focuses on the future: how to proceed with the Hammond organ and which themes can be the subject of follow-up research.

This research on the Hammond Organ as a technological and musical innovation has provided a reflection of current practice from both a historical and future perspective. It describes the constantly changing actors. These processes took place in the community of Hammond organists, enthusiasts and the music industry; they were influenced by society, market dynamics, government and consumer behaviour. The ANT view therefore adds practical knowledge to the understanding of the successes or failures of ideas or inventions. The components of the actor network in which the Hammond organ takes shape through time are visualised in the accompanying model in which clusters of actors are presented.

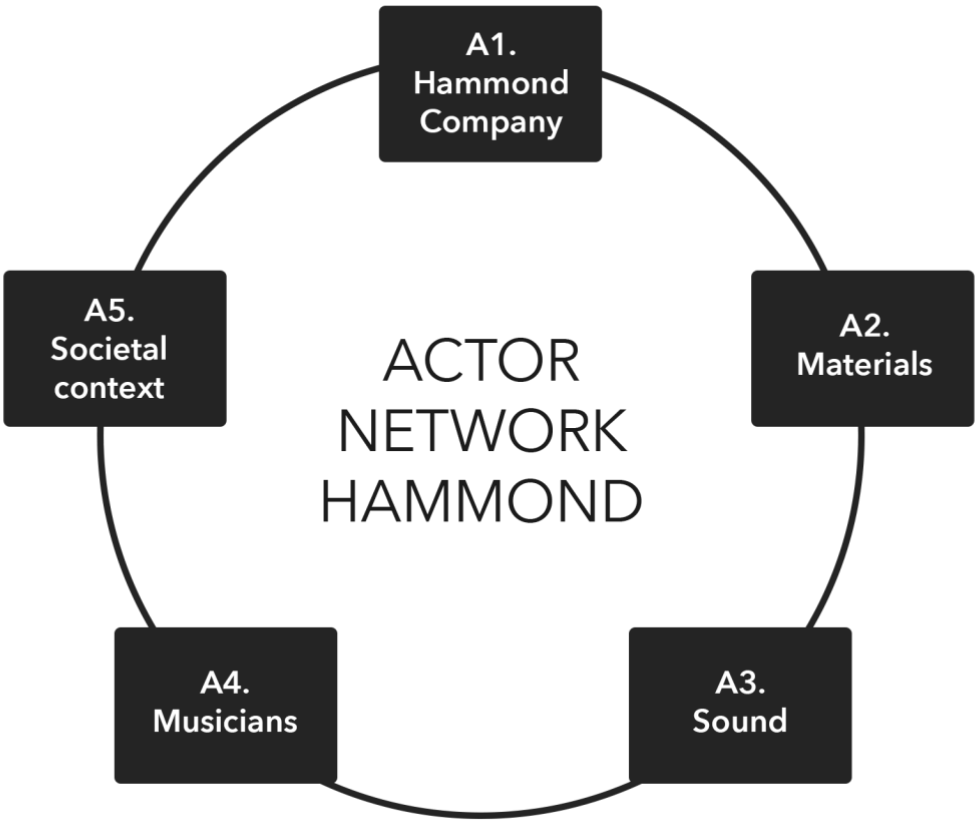


Fig. 97 Hammond actor- network modelled on Latour's actor-network.

Innovation theory is complementary as it adds the role of key individuals to the above processes and specifically clarifies the larger connections within the actor-networks. In this way, the combined theories and empirical research provide the most complete picture possible of the relevant movements around the Hammond organ and the micro-dynamics of innovation that they create.

In the following summaries of the chapters, the various actors and their mutual influence are further elucidated.

The research question central to this thesis is:
How did innovation of the Hammond organ come about and what role do individual, social, technological, economic and other actors play in it? (Q1)

Supplementary to this are the subquestions:

- *How are musical and technological developments interwoven? (Q1.a)*
- *How are non-human actors such as technology and sound part of the innovation process? (Q1.b)*

7.1 Key Results

For each chapter, it is indicated which research question or sub-question is relevant.
In addition, the actors used, as in Figure 97, are represented by A1 to A5.

Actor 1 (A1-HC) stands for the role that the Hammond Company and important individuals played in relation to the company;
Actor 2 (A2-MAT) concerns the material side of the instrument, namely the materials used, the design and the production;
Actor 3 (A3-SND) concerns the sound;
Actor 4 (A4-MUZ) refers the role the musicians played;
Actor 5 (A5- ME) describes the social processes and contexts that influenced the genesis of the Hammond organ.

Several actors are regularly referred to because they influence the development processes simultaneously. This also explains why it is impossible, and inadvisable, to separate the actors completely. There are continuous movements observable that affect each other from different directions and lead to particular consequences. In the second section, this interplay, in relation to theory, will be further discussed.

7.1.1 The genesis of the organ

This chapter describes 'The genesis of the organ in the 1930's and 1940's', in which the biography of founder Laurens Hammond, which forms the starting point and the background to how he came to his innovations, is highlighted.

It was established that the invention of the Hammond organ could only come about because Laurens Hammond developed into a unique, technically gifted and visionary person. In combination with these character traits, his international and rich cultural upbringing, and a thorough technical education, proved to be of decisive influence.

Hammond's personal education was directly related to the way he wanted to run his company (A1-HC). The resulting corporate culture provided room for multiple talented individuals, each representing complementary competencies in their own unique area. Thus, many solutions to technical problems were devised, the special organ design was created and a variety of innovations were added to the organ concept.

At its launch, the Hammond organ proved to be both a familiar, and an innovative and idiosyncratic concept (A2-MAT). The familiarity applied to the design, that evoked many associations with the pipe organ, and the 'Hammond sound' that similarly had a strong connection with the pipe organ (A3-SND). The innovative and idiosyncratic features included: a range of possibilities for inventively controlling and manipulating the Hammond sound; and the possibility of transporting the instrument.

The birth of the Leslie speaker, developed independently of Hammond, was also of great importance (A1-HC, A2-MAT, A3-SND). Both Laurens and his organisation showed ambivalence towards this invention and its creator, Don Leslie. The Leslie speaker was not developed by Hammond itself, so the Hammond Company thought that the device could not be a meaningful addition to its own organ. As it turned out, the opposite was true: Don Leslie had developed the perfect complement to the Hammond organ. The Leslie speaker added to the popularity of both Leslie and Hammond, which was was in turn converted into higher sales figures (A1-HC, A2-MAT, A3-SND).

The first musicians (A3-SND, A4-MUZ) to adapt the Hammond organ were operating within existing musical traditions, and they gave the instrument visibility almost simultaneously. Adventurous (jazz) musicians subsequently introduced the organ into new environments and to audiences that did not yet exist (A5-MIJ). In this way, the popularity of these musicians contributed to the sales success of the manufacturer, resulting in the need for very little personal effort (A1-HC, A3-SND and A4-MUZ).

With the 1929 stock market crash (A5-MIJ), and the impact this had on the economy, the development of the Hammond organ accelerated with the expediting of their patent application process. This allowed Hammond to quickly start production and create new jobs (A1-HC). The technology that served as a basis for this, a synchronous motor functioning as the heart of an electric clock, had already been developed, and the patent meant that the introduction of the Hammond organ could take place in 1935 (A2-MAT and A5-MIJ).

Obstruction from the pipe organ industry to the use of the generic name 'organ', led to a lawsuit (A5-MIJ); a lawsuit that was partly won and then cleverly utilised to create a more sympathetic and favourable image. Marketing played an important role after the Second World War, just as it did during the introduction: organs were used for the benefit of faith-based activities, such as in chapels on warships; and post-war publicity was linked to the Allied victory. The desire among ex-soldiers to own a Hammond was stimulated, as in their perception there was a positive association between the instrument and winning the war (A1-HC and A5-MIJ).

In analysing the individual actors in this first phase of the Hammond organ, I conclude that each actor almost unanimously moved in the same direction around the design of the Hammond organ, which had a tremendous, reinforcing effect and propelled the start for this new instrument.

Chapter 2 thus answers the research question (Q1) of how the innovation of the Hammond organ came about and which actors were involved. It also gives an initial insight into the way musical and technological developments were interwoven (V1.b).

7.1.2 The heyday and the end of an era

Following this, the heyday of the Hammond Company from 1950 onwards is highlighted. Its success grew enormously until the mid-1960s. This was followed by sharp fluctuations and turbulent times, that resulted in bankruptcy in 1985.

It became clear that the leadership of the Hammond Company had a major impact on the company's philosophy (A1-HC): this gradually changed from being engineering-driven (Laurens Hammond and his team) to a singularly economically-driven organisation with market expansion as the ultimate goal. This turnaround occurred around 1960, with product innovation becoming increasingly focused on profit optimisation per product. This led to a change in the values achieved such as quality, reliability, sustainability and innovation (A2-MAT). As a result, the organ market and, consequently, the development philosophy of Hammond products (A2-MAT and A5-MIJ) became increasingly subject to competition. Hammond increasingly had to compete with external manufacturers, whereas in an earlier stage, market leader Hammond was the target of competition (A5-MIJ). Hammond as trendsetter gradually became more market follower. In the 1970s, management was even more concerned with crisis management than with stimulating the development of high-profile products (A1-HC, A2-MAT and A5-MIJ).

In the area of the technologies used, a major change took place (A2-MAT). The evolutionary development of tone wheel technology and electronic Hammond products reinforced each other until the mid-1960s; but the choice of an entirely new electronic chip-based (LSI) technology was a completely separate development from the tone wheel organs (A1-HC and A3-SND). LSI brought with it the desired new sound possibilities, a modern design and more efficient production methods, which ultimately generated more money per product than the complex and labour-intensive tone wheel organs (A1-HC, A2-MAT, A3-SND).

When the under-developed LSI technology was introduced to the market under pressure from the Hammond marketers, it led to serious quality problems and a reduction in consumer and dealer confidence (A1-HC, A2-MAT and A5-MIJ). LSI as a technology was more in line with the consumer organs of the competition, but it also meant, in 1975, the cessation of production of the unique tone wheel organs (A3-SND and A5-MIJ). The contradictions that arose here characterised the changed company philosophy: the consumer aspired to additional sound possibilities and modern gadgets; the professional was inspired by the unique and authentic tone wheel sound (A1-HC, A2-MAT, A3-SND, A4-MUZ, A5-MIJ).

Innovative and successful musicians (A4-MUZ) developed autonomously from the Company and had strong connections with society and the church (A5-MIJ). In the first phase of the Hammond organ they contributed significantly to its image, and the development of the sound, on stage and in the studio; but they followed their own artistic path (A3-SND and A4-MUZ). The latter reached new target groups: the jazz scene from the 1950s, the 'Flower Power' generation with rock music during the 1960s, and symphonic rock music in the 1970s (A3-SND and A5-MIJ). Musical developments no longer coincided with the path followed by the Hammond Company in its focus on the consumer and the institutional market (A1-HC and A4-MUZ).

In post-war American society, the family had become central and a climate of optimism prevailed (A5-MIJ). New technological products, such as washing machines and refrigerators, quickly found their way into consumers households and were spurred on by emerging mass media technologies and the television, which was making inroads into living rooms.

The 1960s, on the other hand, were marked by an emerging youth culture (A5-MIJ), which proved less docile and aspired to having its own voice, independent of parents or political leaders. The related music culture played a robust and unifying role in this. The potent presence of the Hammond organ within many bands created a new young crowd of admirers for the instrument and its sound (A4-MUZ and A5-MIJ).

Its popularity came under pressure due to the global oil crisis in 1973 (A5-MIJ). This crisis led very quickly to a drastically deteriorated social and economic climate. This had a major impact on the personal circumstances of many: there was concern about the sufficient availability of work and financial resources. The turbulent American political situation, with the Vietnam War and the Watergate scandal as examples, also

contributed to a general mood of pessimism. All these social influences had a direct and negative compounding impact on the business results of the Hammond Company (5-MIJ).

In conclusion, these three decades can be viewed from the interplay between the actors described. In the fifties, major shifts can be observed. In this period, as in the early days of the Hammond organ, the actors reinforce each other. The company, the engineers and the products, the post-war period of construction, and the positive role of musicians: in an almost natural way, it lead to an explosive growth of the Hammond Company and the popularity of the Hammond Organ.

In the period that followed, the mutual movements were no longer synchronous. The individual actors strengthened each other less or often worked against each other. The causes: the conflicting strategies of the manufacturer; technical problems; creativity of musicians who feel a diminishing attraction to new Hammond products and a market that moves from states of stability to turbulence in a relatively short period of time.

Chapter 3 addresses the research question (Q1) of how further innovation of the Hammond organ came about in the decades following its introduction. The changing importance and the interaction of the actors through time is elaborated and from the position of the Hammond Company (Q1.a).

7.1.3 The musicians

The history of the Hammond organists is divided into five periods: the pre-war and post-war era (1935 - 1950); the spectacular rise of Jimmy Smith as the greatest innovator (1955) that leads to the 'Golden Age of Jazz Organ' in the 1960s; the emergence of rock music with an important role for the organ (1965 -1975); afterwards a relative silence and then an organ revival around the 1990s with an undiminished popularity that continues to the present day (A3-SND, A4-MUZ and A5-MIJ).

The role of the musicians cannot be viewed separately from the social context (A5-MIJ). As a prerequisite, a great original talent was present amongst them, as well as personal (family) circumstances had a pervasive influence. The social status of various population groups in American society was decisive: black musicians, with their strong cultural roots in Africa, encountered intense social restrictions when practising their profession. Religion played a major role in the musical experience and the learning process. This resulted in a powerful connection between the black church and professional practice, and thus the so-called Chitlin' Circuit of jazz and dance clubs came into being as the 'worldly' variant of black religious experience (A4-MUZ and A5-MIJ). This black music culture represented a completely new form that could only emerge by combining the original roots with the oppressed social status. The Hammond organ benefited from this because it proved to be a perfect link between social status and faith (A1-HC and A5-MIJ).

The white organist was predominantly formed through the traditions of the pipe organ, with European music traditions as its source. The theatre or cinema organ was also rooted in this tradition. There were no social restrictions for the white organists as there were for the black musicians (A4-MUZ and A5-MIJ). Predominantly white critics also played a role in reinforcing the divisions between the 'white' and 'black' experience of music: they decided impact on public opinion in which black music was discussed or judged in the context of the white cultural background and therefore with a limited knowledge or understanding of black music culture (A5-MIJ). They viewed the Hammond organ in the same vein, which was only considered a 'full-fledged' (jazz) instrument from the 1960s.

The Hammond Company was a predominantly 'white' led company, whose original, primary for was to seek to connect with white musicians; with a few exceptions (A1-HC and A4-MUZ). From the company's perspective, these white musicians represented the greatest buyer potential. The successes of the black organists, with Jimmy Smith as the driving force, indirectly contributed to the positive image and sales, but even when the British rock organists (Jon Lord and Keith Emerson) were causing a furore, the Hammond Company did not associate itself with this originally white movement (A1-HC, A4-MUZ and A5-MIJ).

The new Hammond technology, introduced in the mid-sixties, did not appeal to the professionals and reinforced the view that the Company saw no benefit in supporting a professional musician, however successful (A1-HC, A3-SND and A4-MUZ).

However, the Hammond Company's attitude towards famous Hammond icons (which continued until its bankruptcy in 1985) seems to have changed significantly in the present day, due to Hammond Suzuki (since the Hammond revival around 1990). Cultural differences between black and white musicians do not play a role and almost every professional organist with ambition is welcomed as a member of the 'Hammond family'. Full artist endorsements still do not exist, but the mutual commitment helps Hammond Suzuki to market the products and for the musician it generates extra visibility (A1-HC, A4-MUZ and A5-MIJ).

The importance of musicians as actors in the history of the Hammond organ has proven to be enormous. They are the ones who transformed the potential of the instrument and the inventions around it into Hammond sounds. In doing so, they inspired many others: fellow musicians, fans and amateur players. The inspiration they still generate today gave the Hammond organ the 'magic' many speak of when they think of a Hammond.

In addition to its role in religion, the instrument also proved to have social significance in family and entertainment life. The dividing lines between church and society became less defined, especially in the black community. The musical expressions, which had both a religious (think of gospel) and a secular connotation (think of jazz and dance clubs), gave meaning to the desire for more autonomy in American society.

A decade later, the organ once again played an important role in the sound of a young generation in white rock music - with Keith Emerson and Jon Lord as the driving forces.

Chapter 4 describes the role that individual musicians played in the innovation of the Hammond organ and thus answers the research question (Q1). A musical and technological interconnectedness also significantly influences the way musicians express their creativity, and thus the sub-question Q1.a is addressed.

7.1.4 An autoethnography

The autoethnography, in which my personal professional development is positioned along the lines of Hammond history, is described in the fifth chapter. Three critical events in my personal career are preceded by moments that turn out to be conditional for my further professional development. Thus, this development is mirrored in the broader historical trajectory of the Hammond organ (A4-MUZ and A5-MIJ).

The acquaintance with Rhoda Scott as a Hammond role model (A4-MUZ) preordained the first critical moment, and led to the ambition for a professional Hammond career. In the development that followed, family history, the local music scene, national attention to American music culture (A5-MIJ) and the available technical possibilities (A3-SND and A5-MIJ) were important prerequisites for developing this talent.

Professional training and the expansion of the musical network provided the breeding ground for a first fusion of various actors: musical development, a large network, curiosity about technology, a company (Yamaha) that facilitated this curiosity with technical help and equipment, the extensive entrepreneurial spirit and an economically and culturally favourable climate that contributed to this (A5-MIJ).

A second critical personal moment facilitated the expansion to an international stage, where the international Hammond revival was simultaneously gaining momentum (A4-MUZ and A5-MIJ). This gave greater visibility to personal ambitions, in which exciting projects and collaborations coincided with increased experience and professionalism (A4-MUZ and A5-MIJ).

A third critical moment was the building of a studio (A3-SND) and marked a break with the almost singular focus on the stage that had dominated up to that point (A4-MUZ).

If the first critical moment led to personal and musical developments, the second critical moment to a deepening of these: the experience of success, the formation of a personal vision combining technology, musicality and professional practice (A3-SND, A4-MUZ and A5-MIJ). The third critical moment signified a major investment in a still relatively new field; where innovation became the central, driving force.

This process led to the development of a personally adapted Hammond instrument in which technology was an important factor in shaping new creative processes (A3-SND and A4-MUZ).

Favourable personal circumstances provided the foundation for becoming a professional musician, to discover part of this cultural world and give shape to innovation processes. A combination of actors continuously interacted with each other. The results of such micro-innovations were significantly influenced by a personal drive to bring them to an advantageous outcome (A2-MAT, A3-SND, A4-MUZ, A5-MIJ). It also reflects that, provided the contributing forces are fairly balanced, the individual has a strong influence on the path that is taken, but environmental factors are of great importance for its eventual success (A5-MIJ).

In summary, it is clear that the personal dynamics are very similar to the dynamics described in the three chapters of this research on Hammond history. Each of the developmental stages had a different set of forces. Whereas these forces began relatively small on the personal level, as ambitions increased, a new scope of field emerged each time. An individual can experience support as soon as persons or organisations show themselves to be allies in their personal innovation processes and this increases the chances of success. Therefore, any positive results achieved do not guarantee future successes; a seemingly logical assertion. However, advancing insight, experience, perseverance, a bit of luck or a chance event can contribute to the chance of results: a better understanding of how actors work is created.

Chapter 5 illuminates both the main research question and the subquestions from a personal perspective and thus sketches an individual case about the micro-dynamics of musical innovation in the wider historical context of the Hammond.

7.1.5 World of Hammond

Chapter 6 is directly connected to Chapter 5, but here it is a question of scaling up (micro) innovations to other domains such as the wider community of organists, music education and the international Hammond market (A1-HC, A4-MUZ and A5-MIJ). During the research, a series of laboratory sessions and interactions were organised with the aim of creating a multidimensional platform for the Hammond community, called World of Hammond (WOH).

The theme of innovation did not appear to be a major driving force for most, and was often seen more as a solo initiative. Innovation of the Hammond organ or the Hammond sound was actually not necessary according to the participants in the labs; rather, there was a strong and nostalgic desire for the original sound and the instrument (A2-MAT, A3-SND and A5-MI).

Now that a new generation of Hammond Suzuki organs are qualitatively good instruments and sound quite convincing, many organists have taken the decision to purchase these new organs (AA1-HC, A2-MAT, A3-SND and A4-MUZ). The acceptance process for these products, alongside or instead of an original tone wheel Hammond, persisted for several decades, indeed, forty-five years if the cessation in production in 1975 serves as the reference (A4-MUZ and A5-MIJ).

The role of technology is seen by a producing, often still studying, (young) organist or keyboardist as an opportunity to expand the Hammond domain. They see the abandonment of the Hammond tradition as a precondition for this (A3-SND, A4-MUZ and A5-MIJ).

The idea for a Hammond platform (WOH) had similar reactions as the Hammond innovations: positive, dubious or wait-and-see (A4-MUZ and A5-MIJ).

Within the art education sector, personal idealism and the lack of sufficient institutional support proved difficult to reconcile. A broader relevance for Hammond innovations, or the relevance of the instrument as an educational specialisation were received with little enthusiasm by some colleagues and management. In contrast, Hammond, keyboard and piano students reacted positively to the innovative approach, and the possibility of educational specialisation. Existing perceptions, institutional structures and decision-making processes proved to be complicating factors: if these do not coincide with the strategy of the institute, there is no shared need for joint innovation (A4-MUZ and A5-MIJ).

For manufacturer Hammond Suzuki, the original Hammond history forms the basis for the brand experience, and despite the many discussions held, the management saw an insufficient business case for WOH. On the details, the platform was perceived as potentially threatening, and in the development of a professional Hammond education platform, they were not overly interested either (A1-HC and A5-MIJ).

Technology is used principally by Hammond Suzuki to simulate the original Hammond sound as effectively as possible and to add extra features. Technological or creative challenges to place the sound in new contexts or to support the creation of a community platform inspire a limited response (A3-SND and A5-MIJ). Making money remains the main driver for Hammond (A1-HC, A2-MAT, A3-SND, A4-MUZ, A5-MIJ): a good product sells itself and data research on the size of the market is not available. A possible disruption of the Hammond market by new applications of technology is not recognised, and thus the line that was started in the 1960s is still being followed.

Chapter 6 thus answers all research questions, focusing on the period from the Hammond revival (1990) to the present.

7.2 The methodology

What does this research contribute to the knowledge of the microdynamics of innovations, actor networks and innovation theory?

A combination of the different methodologies has made it possible to reach a better understanding of the microdynamics of innovation. They complement each other, strengthen each other and zoom in on various different aspects relevant to innovation.

7.2.1 Actor-network theory (ANT)

The ANT theory is used here as a methodology. It analyses the environmental factors that influence innovation processes: what happens during innovation, how does the environment react to it and what larger movements can be recognised in society? The coincidence factor is not included here, because coincidental circumstances are included as an active actor in the ANT. This creates a more complete playing field of influences that is mapped before, during and after the innovation processes. Human factors, material things and the influence of technology are all described. By applying the ANT method, it becomes clear why an idea or invention is in some cases successful, and in others underexposed or even failing completely.

Shifting interplay of actors

The analysis of the network of actors provides the insight that an actor network is constantly changing through time. It is clear that the ANT is a dynamic concept, in which the emphasis lies more than usual on shifts in time. This is expressed in the early period of Hammond history where the focus shifts from inventor Laurens Hammond (human) to technology in the form of the Hammond organ (A2-MAT and A3-SND). With this, the focus shifted to the role of the musicians (individuals) who developed the musical voice of the technology (A3-SND and A4-MUZ). The Hammond Company's initial role as a driver of innovation turned out to be more passive once the company had become an international market leader. The role of innovation had shifted to the musicians who brought the possibilities of instrument and sound to life through their music and concerts. These musicians coupled their creativity with the fresh new sound of the Hammond organ and linked it first to jazz and later to rock and pop music.

The Hammond revival of decades later, did not develop a completely new sound; it harked back to earlier popular currents of the fifties and sixties. This revival thus landed with a young generation of players and enthusiasts. The Hammond sound as an actor thus connected itself several times to the spirit of the times, and influenced the creative expression of those musicians.

While social factors had created an advantageous climate for musical innovation in the earlier decades, during the Hammond revival these factors had the effect of harking back to musical styles from earlier times. Such a reaction is more often seen in times of great social change, such as today, with the exponentially growth and impact of technology.[262]

A vivid example of shifting actors is the influence of major economic fluctuations or war. In the genesis phase of the Hammond organ, the economic crisis (1929) proved beneficial in accelerating organ development. The need to develop new profitable products helped in the expeditious granting of the patent. After the Second World War, a new economic and social reality emerged that contributed greatly to the spread of Hammonds through the emergence of music hobbyism among the white middle classes. Industrial marketing techniques drove consumerism, encouraging consumers to buy increasingly modern instruments as they became more affordable. By contrast, the crisis of the 1970s had an entirely different effect: Hammond was in the midst of a technological transformation and had not yet got it right in terms of quality and durability. As a result, the reputation built up over the preceding years of the organ came under pressure, and the competition increased considerably, offering interesting alternatives. The uniqueness of the original Hammond organs was not surpassed by the new technology. It 'merely' simulated the familiar Hammond tone wheel sound in an unconvincing manner and offered innovations that had already been largely introduced by competitors. Hammond's market proposition in the 1930s appeared now, in the 1970s, to be completely different. An economic crisis, which had originally contributed to its success, now turned against the manufacturer. It led to huge costs, a decrease in dealer and consumer confidence, and decreased consumer spending power, as a result of the crisis.

[262] Simon Reynolds, Retromania: *Pop culture's addiction to its own past* (Londen: Faber & Faber, 2012); A.A. van den Braembussche, *Denken over kunst*. *Een inleiding in de kunstfilosofie* (3rd Print) (Bussum: Coutinho, 1994).

In conclusion: innovations at the beginning of a product cycle work completely differently from innovating an existing product where the expectation pattern has grown and the perception of the public, musicians and music industry has grown. A new economic crisis in the early 1980s meant the end for the manufacturer. The company had not sufficiently ensured that existing technologies had become successful on a scale that would have insulated it from a new crisis. In the meantime, the market had changed considerably with more compact instruments that were less profitable per model, and the emergence of Yamaha as the new international market leader.

The constantly changing actors thus created a new balance in each era. The reactions to this constant was a new dynamic reality. The processes between the individuals, groups, techniques and society were continuously influencing each other and evolving.

7.2.2 Individuals and the Microdynamics

ANT thus incorporates all actual movements, actions and results that automatically determine subsequent developments. As such, ANT does not produce a singular truth or essence, but as recalled in the introduction, 'It is different every time' (Bruno Latour, 2016). ANT works as a methodology, an approach, and constitutes a 'tool to help explicate, amplify and link' (Hayes, 2014). The consequence of this approach is that individual moments of innovation are less central to the larger movements of actors. This is why the stories of individuals, which were essential within the larger movements, were specifically highlighted. In this section, I would like to mention three personal stories: that of inventor Laurens Hammond (chapter 2), the musical concept of Jimmy Smith (chapter 4) and autoethnography (chapter 5). These stories, together with ANT, form the key to the microdynamics of innovation that this research embodies.

The Microdynamics of Innovation

The history of Laurens Hammond shows that his ambition and talent to be an inventor allowed the growth from a small-scale enterprise into an industrial conglomerate. Hammond's vision was reflected in his original approach to problem solving, his eye for product quality and his ability to attract talent. The introduction of the Hammond organ in 1935 permanently changed the organ world. The new organ fitted in with the spirit of the times, gave an impulse to making music in the living room and inspired the competition to develop organs as well. Laurens Hammond acted very decisively and was able to shape his environment to his liking. This environment in turn created new opportunities for Laurens Hammond as an individual. This story forms the core example in this thesis on the micro-dynamics that stimulated (technological) innovation.

Jimmy Smiths' exceptional musical genius represents the greatest musical contribution to the success story started by Laurens Hammond. Smith played the leading role in the development of a new musical language for the instrument. Whereas prior to him, this language was primarily based on existing classical organ techniques, Smith introduced completely unknown possibilities for the instrument. His playing technique, sound conception, stage performance, studio recordings, and connection to new musical movements meant that everything changed. He brought the artistry of Hammond playing to an unprecedented level, and thus emancipated the Hammond organ from the music world. His sound is still the reference for today's Hammond sound.

The individual contributions that both Hammond and Smith made thus prove to be of crucial importance. The technological conditions created by Hammond were the basis upon which Smith was able to develop his musical innovations.

Smith influenced many generations of organists after him and had a decided impact on the overall musical perception of the Hammond organ; in return, the instrument gave him the opportunity to become a world star.

The personal autoethnography, in the context of the actor-network theory, tells of the emergence of micro-dynamics on a smaller scale than that of Hammond and Smith. A self-examination (autoethnography) is a narrative part of psychology and, in combination with ANT, is a method to gain more understanding of the research topic.

Most likely, the processes that Hammond and Smith developed will be similar to the environmental factors and influences that I also experienced. In both their personal and professional lives, critical moments arose that determined their further path. In this study, it is not possible to discuss the critical moments with Hammond or Smith; both have passed away and the sources have only limited references to such critical moments. It is for this reason that I have placed my experiences, in which these moments can be distinguished, along the larger lines of Hammond history. In this way, an understanding of the micro-dynamics is gained from within and the larger Hammond history is better understood; theory and practice, here, are combined.

The autoethnography is not intended to explain the personal contribution to Hammond history. A role that can be regarded as the driving force behind the Hammond revival in the Benelux region. The personal development runs from making music to composing and producing with an increasing share of technology. The integration of technology as part of the creative process is increasingly central and leads to a process of transformation of the authentic Hammond B3 to a twenty-first century personalised version. This transformation process has repercussions on other activities such as in education and the intention to establish a Hammond community platform. The way in which these developments take shape is strongly determined by my own interactions as an individual, and with the environments in which I work.

With the three individual paths of Hammond, Smith and myself, concrete examples of interactions between an environment and actor-networks have been described: each of them has led to a greater understanding of the micro-dynamics of innovation processes.

7.2.3 Innovation theory

Understanding how people react to changes or innovations is provided by the model 'Diffusion of Innovation' by Everett Rogers (1962). Using this model, people's natural response patterns to (product) innovations are studied; the model is therefore continuously updated. What is needed for an invention (by the innovator) to gain wider acceptance (through the use of early adopters, followed by late adopters) and what consequences and systematics can be identified in these processes? This innovation theory studies the stages of adoption that can be linked to the life cycle of a product, and that influence decision-making processes.

During the development of the Hammond organ, Laurens Hammond inspired those around him to develop a wider community to further his innovation. Other engineers were in turn stimulated to add new innovations. A clever marketing strategy, inspired by Henry Ford's 'push economy' principle, played am important role in the overwhelming public reception.

The three chapters on Hammond history serve as a broad foundation in this study to which the auto-ethnography adds the personal experience. The Hammond history is thereby constructed from the outside (society) to the inside (personal), by consulting sources and studies, interactions with musicians, the current manufacturer and buyers, and education. The autoethnography describes the story from inside (personal) to the outside (society), mirroring its relevance to the theory deployed. The Hammond story offers insights into the processes of the inventor and his company; the personal history, and the complex of factors that play alongside this, adds a more detailed insight.

The scaling up of the personal innovations to a larger environment is the focus of Chapter 6. It describes the complex and dynamic reality that intended innovation processes can bring about. Here, too, a strong field of forces emerges. Without equating these individual innovation processes with the historical Hammond innovations, I conclude that the 'Diffusion of Innovation' theory leads to a better understanding. The complexity of such force fields, with their conflicting ambitions and interests, largely determine the conditions for development and the chances of success.

The original innovation started with Laurens Hammond; during the first twenty-five years of its existence, his Hammond Company managed to reinvent itself in many areas. One can think of the products, the marketing, the offering of courses and the way dealers presented themselves. As such, innovation processes took place from within the company towards the market and the consumer.

The impact on innovation processes, which different organists brought about, can be monitored. Musical innovators almost without exception had many followers and achieved formidable results with record sales, concerts and media attention. The extent to which colleagues talked about them during the lab sessions also underlines the influence of these pioneers. The direct results of their musical successes for the Hammond Company are hard to determine: no known research about this is available. However, the successful image of a number of organists was linked to Hammon Company advertising campaigns in the 1960s and 1970s. Chapter 4 describes the role of these musicians and the influence on their followers.

An idea, behaviour or product must be perceived as positive (or promising) by the environment in order for it to spread out to a larger social context (system). Human communication, existing power relations within communities, and personal perceptions are leading. The concepts used in this innovation theory: 'innovators', 'early and late adopters' and 'laggards' complement the ANT. They are also helpful in describing individual creativity.

7.2.4 Significance of this research

As described in the introduction, there is little scientific research into the Hammond organ. The existing studies mainly deal with specific matters such as the (tone wheel) technique; the role of Hammond in the development of other instruments (synthesizers) or musical movements; individual organists; or are situated in a broader context in which the Hammond theme only plays a marginal role.

This dissertation, on the other hand, is a broad analysis of all relevant aspects related to the Hammond organ, its sound and the world around it. It tells the history of the Hammond organ against the background of technical, musical and social developments, including the key players who were responsible for either technical or musical innovations.

This shows, in contrast to previous studies, that the historical line consists of very complex and context-bound processes that have been dependent on talented and ambitious protagonists.

Socially, the research provides an impetus for the continuation and development of the instrumental tradition through the knowledge of historical and contemporary interactions with technology. The experiments in different musical environments, brainstorming sessions on not yet existing market applications and the formation of a Hammond community also contribute to this. All these possibilities create dynamics in the current practice and help the instrument and its players to continue positioning themselves. At the same time, within the Hammond field, which is mainly based on traditional and existing values, the question arises as to whether innovation is desirable, and which actors would be best placed to set that in motion.

Looking at the Hammond organ with this broader perspective, applying different theories and using different research methods, has resulted in a combined form of artistic and academic research. The holistic view as an experienced expert in the field of art, education and technology provides a fresh perspective to enrich and nourish the scientific approach, and imagine it anew.

This concept can also be used for follow-up research such as into the history of other musical instruments or inventions with the aim of driving forward further innovations.

I round this dissertation off with a personal reflection in the last paragraph.

7.3 Discussion and recommendations

This research contributes to the understanding of innovation processes in which the Hammond organ serves as a case study in a broader dynamic field of innovation. A new instrument emerged that introduced an unfamiliar sound to popular music movements, and accelerated the use of electrically amplified instruments. The ANT approach helped to unravel this material, led to a better understanding of the processes, and sharpened the existing frameworks. In this research, art and science have come closer together: the 'multiple methods' design of this research reinforced, complicated and created an area of tension in making choices. Combining a scientific and an artistic mindset is a contribution to the role that science and art play in the public social domain.

To conclude, I would like to add some reflections on the personal actor network created by the processes, namely:

1. Science.
2. Education.
3. The practice of musicians and the market.
4. The researcher.

7.3.1 Science

The insights provided by the study offer a space for deepening a number of aspects that were only touched upon to a limited extent within the scope of this study.

Further research

Here I want to make a distinction between practice-related research (p) with musical innovation as its goal (from the perspective of art) and further research into the applied theories (from the perspective of science) (t).

- Laurens Hammond's inventions that preceded his Hammond organ and sometimes did or did not see the light of day, are briefly described in chapter 2. Perhaps the most important innovation besides the organ was the Hammond Novachord. In the history of synthesizers and electronic organs, this has turned out to be a crucial invention that has hardly been researched (p). Even during the development of the Hammond organ, there were already instruments that were at least as idiosyncratic.

Think of the Ondes Martenot, the Trautonium and the Theremin, of which the last two still exist in a limited form of production. Why did these not make it or remain relatively unknown? (p)

- The role of individual musicians has been written about in chapters 2 and 4. Musicians are the most common research subject in external studies of the Hammond organ. Both in various master's theses, non-scientific literature and in a rare dissertation, these musicians are central. The unmistakable position that the female organist occupied therein, certainly in relation to other instruments, is a very underexposed phenomenon (p and t).
- The mystical aspect of the Hammond sound, as referred to during the many interactions, is another intriguing theme. Does such magic also exist in other instruments and what role does it play in the history of those instruments? Additionally interesting is the comparison between acoustic, electric (like the Hammond tone wheel) and digital instruments and the impact this has on the 'magic' (p and t).
- Research into the actual size of the Hammond market. How many professional musicians, enthusiasts and amateur players and thus potential users are active and how can the connection with young target groups be made and developed? These questions came up when talking to Hammond Suzuki about World of Hammond. No research has been done to date (p and t).
- As soon as the idea that the use of the Hammond sound must be connected to history is abandoned, space is created for a different view and use. Think of the original angles that Jimmy Smith, Ethel Smith, Keith Emerson, Jon Lord and others created. Jazz music provided the breakthrough for Hammond in the 1950s, and similarly, electronic music represents a new opportunity for innovation in the present day. The electronic underground scene is constantly looking for creative expressions to distinguish itself from mainstream music and the powerful music industry. In doing so, they intuitively fuse art, street art, fashion and new media: inspiration comes from all available art forms and breaks down existing style boundaries. What would it mean for Hammond if the electronic music scene took over the instrument and its sound? (p)
- Artificial Intelligence (AI) and blockchain technology will undoubtedly deliver future generations of new instruments and from there the question arises as to whether

existing musical instrument manufacturers such as Hammond Suzuki will be able to attract young and creative engineering talent. Technical talent that can carry them into these new possibilities and innovate the existing manufacturer from within. If that fails, the innovation (disruption) will undoubtedly come from brilliant individuals and/or start-up companies. For example, a new generation of students at technical universities can invent the instrument or the (Hammond) sound of the future and form the layer of compost for a new Laurens or Jimmy (p and t).

7.3.2 Education

The importance of education has been discussed in several chapters, and the way in which it is given shape has a strong influence on it. History shows that the technical education received by Laurens Hammond and many of his engineers served as the basis for their craftsmanship. History also shows that non-formal education in the black community formed the bridge between religion (gospel) and the practice of dance and jazz clubs. In contrast, the white pipe and theatre organists, and the later rock keyboardists, had a traditional and formal, classical conservatory education. In the late seventies, professional (conservatory) music education developed for jazz and around the turn of the century this happened for pop, additional to the classical training. Thus, jazz and pop became embedded in the practices of traditional forms of transmission.

- It is interesting to see how this tradition relates to a more hybrid professional practice; in relation to the many blended forms of teaching that are offered via the Internet and the rapid development of technological (auxiliary) resources. Artificial Intelligence (AI) and (live) coding will have an increasing impact on the development of future generations and how they will innovate (p and t).
- The question is how can real innovation take place through the integration of technological and creative sound concepts in a traditional and artisanal environment? Can the resulting dynamic have a positive impact on art, education and the music industry of tomorrow? (p and t)

7.3.3 The practice of musicians and the market

With or without formal education, innovative people will always rise and bring about change. The crucial role played by the Hammond Company is not addressed in any of the existing studies or articles. The archival documents from the Chicago History Museum proved indispensable in arriving at this insight. It is remarkable that Hammond Suzuki itself has not carried out any research into this archive.

A community platform, of which many successful examples exist, can play an active role in connecting tradition and innovation.

The complexity is that like-minded people like to see their own opinions and views confirmed. This makes it difficult to develop such a dynamic environment that facilitates lively discussion between vastly divergent views. World of Hammond attempted to organise the international Hammond niche, which at the same time represents a huge target group, and to give it a common voice; musicians, enthusiasts and fans, education and the market, together in an organised community. At the outset, this initiative was too much oriented towards existing target groups to facilitate the intended interaction, and the desire for innovation is not shared by everyone.

Similar forces are at play in the market: manufacturers prefer to bring out equipment with which they expect to generate optimal sales figures; programmers of clubs, theatres and festivals prefer to programme acts that attract sufficient audiences in advance. Fortunately, there are also some venues that specifically programme new art forms. In fact, these are examples where people focus on specific target groups and no joint approach is created that leads to innovation.

The marketing strategy based on the 'push economy', which made Hammond great, has meanwhile been succeeded by the digital platform economy, where other rules apply. This has opened up new possibilities in reaching, approaching and interacting with different target groups simultaneously. The long-established musical professional practice with successive cycles of making, producing and releasing music has been broken by the do-it-yourself (DIY) mentality driven by Internet culture. Ever more compact, powerful, self-programmable equipment, and the ever-exponentially increasing computer power, have consequences for the way in which artists, and other creative people, will develop groundbreaking (artistic) products (p and t).

The Moog Company as Inspiration

The Hammond Company, the American car industry, and analogue synthesiser manufacturers all lost the technological battle to Japanese industry in the 1970s and 1980s. This Japanese tech industry proved more innovative, competitive and disruptive to American industry. Two decades later, the Japanese in turn lost this leading international position, and earlier innovators, such as the Moog Synthesizer Company, developed modified and successful models of existence.

From my position, this Moog Company serves as an inspiration for Hammond Suzuki: it too has a great history; created a new category of musical instruments; and worked with many top musicians as their ambassadors. Stimulated by a current revival of modular synthesizers, Moog is re-releasing its vintage instruments in small series. At the same time, these legendary models are being emulated digitally and made available as virtual apps. These apps are reaching a new young target group. For a low price, but with high quality, they can experiment with the famous Moog sound in environments that are applicable for them. The Moog Company, which proudly states that it is an employee-owned company, has a very active community of enthusiasts and users and thus builds a bridge between its own history, the present and the future. The Moog sound also surpasses the manufacturer's own name, as is the case with Hammond sound. Moog seems to be reinventing itself; a similar dynamic is not yet noticeable at Hammond Suzuki. The actions of the Moog Company could serve as inspiration for Hammond Suzuki.

7.3.4 The researcher

A long practice of experience as a performing and teaching musician, combined with a musicological and scientific curiosity, are the ingredients that led to the research questions for this thesis. Meeting the scientific requirements, in combination with the personal ambitions, and fulfilling the different roles, has been an interesting, demanding and sometimes confusing process. Different personal roles complemented each other and at the same time obscured other processes as the opening of this paragraph outlines. Nevertheless, the whole thing functioned as a personal actor network.

D-Sound

With innovation as a personal motive, the combination of practice fed by scientific research will lead to a more solid foundation for new initiatives and experiments. In the area of creating a community, I would mention D-Sound as exemplary. A current and promising project that is being set up together with Kunstmin, and the Energiehuis as its cradle (both in Dordrecht). Here, the current research experiences are transformed into a practice in which the arts, education and the business community come together in an intended innovative social form (p and t).[263]

Modular Hammond

With the construction and ongoing development of the modular Hammond organ, I aim to build a bridge. The analogue era of tone wheels, Leslie speakers, effect devices comes together with modern digital synthesiser technologies, virtual devices, software and controllers. The data generated by this play a role in finding - and connecting to - new applications.

Experiments with this setup take place in the environments of various art disciplines: visual technology, light and projection, AI and robotics; it actually never stops (freely translated from Bruno Latour).

This evidence-based practical research is close to the boundary of the Hammond domain and that is why it is so interesting. As a personal experiment, isn't

[263] D-Sound (a new sound in the Dordrecht region) is an initiative of Kunstmin and the researcher. The plan aims to develop a creative hub (learning community) in which makers from the art and culture sector, education, the business community and society form the pillars. The aim is to develop new creative forms in which innovation in connection with technology is the objective.

a Hammond tone wheel organ as a multi-controller and multi-user interface exactly in line with the world that Laurens Hammond and his engineers must have experienced when developing their Hammond organ?

This process can lead to wider innovations and inspire musicians, students or enthusiasts. A number of developed applications have already found their way into the setup of other Hammond organists. An example lies in Sjaak van Oosterhout, technician and organ restorer, who modifies several existing Hammond organs based on the experiments.

Technological developments offer possibilities to mix different musical (sound or instrument) entities or to 'borrow' characteristics from each other. For example, organ characteristics can be mixed or manipulated in real time by completely different instrument characteristics such as those of string, wind or percussion instruments. Artificial Intelligence (AI) and blockchain technology combined with Hammond technology?

In the end, it does not matter what this path leads to: the road to imagining a possible future for the Hammond organ is actually the most beautiful road to travel (p and t).[264]

[264] Hector Soto is a chip designer at ASML Eindhoven. In addition, he is an amateur Hammond player. Together with Hammond technician Sjaak van Oosterhout, he develops smart applications for existing Hammond organs and they are actively involved in the development of the modular Hammond organ (Appendix IV).

7.4 In conclusion

The introduction of the Hammond organ in 1935 marked the instrument's most defining innovation. The Hammond Company built its empire on the basis of individual qualities forged together in an era of social and technological change. The foundation - the combination of craftsmanship, creativity, determination and vision - turned out to be so positive that it inspired pioneering artistic processes and results. In retrospect, it can be remarked upon how extraordinary the success story of the Hammond organ turned out to be.

The combined artistic and scientific skills through the execution of this research has given me, as a PhD student, insights into the coherence within the field of change processes. It has provided a number of specific contributions that researchers can make use of when conducting a similar study, whereby practice has shown that unexpected movements in actor-networks always result in new dynamics.

I believe that the sharing of knowledge is of great importance in order to achieve a positive innovation research agenda. I believe that there is now momentum to take steps in this direction and to broaden the horizon.

Carlo de Wijs
Dordrecht, December 2021

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Photo and visual credits

All photographs are from Hammond Organ Company Records, Chicago History Museum unless noted below.

Illustration front cover designed by Job van Nuenen

Fig 1, 55, 97 Actor-netwerk Hammond visualisation

Fig 23, 24, 39, 40, 42, 43, 48, 49, 50, 51, 53, 54, 56 Romy de Wijs.

Fig 3, 5, 6, 11, 13, 14, 15, 17, 26, 33, 38, 41, 44, 45, 46, 66, 72 Rien Boendermaker.

Fig 92 Photographer Mark van Stokkom.

Fig 93 Artwork Job van Nuenen.

Fig 94 Photographer Bas Czerwinski.

Fig 75, 76, 77, 78, 79, 80, 81, 82, 84, 85, 86, 87, 88, 89, 90, 91, 95, 96 personal archive.

Appendix I: Hammond Organ Company Records 1929 - 1985

Descriptive inventory for the Collection at Chicago History Museum, USA, by Harvey Olsen (1998).

Summary description of the collection: Corporate records relate to Mr. Laurens Hammond and the company he founded, which was known as the Hammond Clock Company, 1928-1937, the Hammond Instrument Company, 1937-1953, and finally the Hammond Organ Company, 1953-1986. The collection includes correspondence, reports, minutes, manufacturing drawings, patents, budgets, and other operating records of the company that founded the industry of small electric organs and helped to popularize organ music for home and small institutional venues.

List of contents of the collection:

Box *1*

Summary: Biographical materials concerning Laurens Hammond; and historical sketches or materials concerning the Hammond Clock Company, the Hammond Instrument Company, and the Hammond Organ Company:
1 "Hammond As In Organ," biography of Laurens Hammond and History of the Hammond Organ Company and predecessors to 1960, by Stuyvesant Barry, typescript, 230 p., in ring binder; 2 "The Story of An Inventor, Some Notes on the Career of Laurens Hammond," typescript, 47 p. (copy 1) and 53 p. (copy 2); 3 "Background Information on Hammond Organ Company," by R. A. Gilruth, 1958, typescript, 18 p.; 4 "Historical/Fact Book, Hammond Corporation," 1972. Hammond Organ Story.; 5 "Hammond, The Company that Created An Industry," n.d. (ca. 1980). 33 p.; 6 "History of Hammond Organ Company," typescript, 5 p.; 7 Hammond, Laurens, biographical, in folder.; 8 Hammond, Laurens, in folder.; 9 Hammond Hall of Fame application re. nomination of Laurens H. to Hall of Fame, in folder.; 10 Historical, Hammond Corporation, in 2 folders.; 11 Hammond trademark, in folder.; 12 Hammond history, in folder.; 13 Hammond Organ story, in folder.; 14 History of Hammond Instrument Company, in folder.; 15 Corporate staff history, in folder.; 16 Executives biographical data, in folder.

Box *2*

"Hammond History," 102 slides in carousel together with pulsed cassette tape, 1979.

Box *3*

1 Scrapbook, 1935-1938 of clippings on Hammond Organ Company & brochures issued by the company, perhaps assembled by Laurens Hammond.; 2 Clippings, ca. 1979-1985, in folders and envelopes. 0.4 linear feet.

Boxes *4-9*

Summary: Minutes of meetings of the board of directors & annual meetings of stockholders, with copies of certificates of incorporation, by-laws, & other corporate records, 1928-1976 6.5 linear feet. Includes 18 bound volumes plus records in folders and binders:

In folders: 1 Hammond Clock Company organized 3/12/28; 2 H Clock Company incorporated 3/11/29; 3 H C Company organized 5/2/30; 4 Hammond Clock Company annual meeting 3/12/30; 5 Hammond Clock Company reorganization; 6 Hammond Clock Company budget reports; 7 Hammond Instrument Company registered agent.

In bound volumes: Lettering on spines includes the name of the company at top, the words "Corporate Records" in the center, and at bottom the words "Illinois 1929" referring to the company as incorporated in Illinois or the words "Delaware 1930" referring to the company as incorporated in Delaware.): Hammond Clock Company (Illinois), 1928-1931; Hammond Clock Company (Illinois 1929), Vol. 1, 1929-1931 Hammond Clock Company (Delaware 1930).

1 Hammond Clock Company, Vol. 1, 1930; 2 Hammond Clock Company, Vol. 2, 1930-1934; 3 Hammond Clock Company, Vol. 3, 1934-1937; 4 Hammond Instrument Company, Vol. 4, 1937-1940; 5 Hammond Instrument Company, Vol. 5, 1940-1944;

6 Hammond Instrument Company, Vol. 6, 1945-1947; 7 Hammond Instrument Company, Vol. 7, 1948-1951; 8 Hammond Instrument Company, Vol. 8, 1951-1954; 9 Hammond Organ Company, Vol. 9, 1954-1959; 10 Hammond Organ Company, Vol. 10, 1959-1962; 11 Hammond Organ Company, Vol. 11, 1962-1965; 12 Hammond Organ Company, Vol. 12, 1965-1967; 13 Hammond Organ Company, Vol. 13, 1967; 14 Hammond Organ Company, Vol. 14, 1968-1970; 15 Hammond Organ Company, Vol. 15, 1970-1973; 16 Hammond Organ Company, Vol. 16, 1973-1976.

In binders (one for each year): Minutes, 1931-1947.

In bound volume: Hammond Organ Company corporate records, 1967-1984.

In binders and folders for each meeting: Agenda and minutes, 1965-1974.

Box *10*

In folders and binders: 1 Minutes of the Hammond Instrument Western Export

Corporation, 1952-1971; ;2 Minutes of Hammond Organ Europe, N.V., 1970-1975; 3 Minutes of the Management Committee, 1951-1953; 4 Minutes of the Hammond Organ Foundation, 1952-1955; 5 Reports of divisions to Hammond Corporation board of directors, 1963-1977; 6 Reports of divisions: Everett Organ Company;
7 Reports of divisions: Everett Piano Company; 8 Reports of divisions: Gibbs Manufacturing & Research Corporation; 9 Reports of divisions: Hammond Organ Division; 10 Reports of divisions: Wells Lamont Corporation; 11 Reports of divisions: Finance Department; 12 Reports of divisions: International Division; 13 Annual reports to the Securities and Exchange Commission, 1972-1974; 14 Reports to Secretary of State, State of Illinois, about issuance of shares, 1929-1960; 15 Correspondence of chairman of the board, executive vice president, and others involving legal opinions, 1968-1972.

Boxes *11-13*

Summary: Annual reports & quarterly reports to stockholders, with notices of meetings, proxy statements, & other letters to stockholders, 1930-1976:
(There is some duplication, because reports were kept in binders in different offices, but some binders are not complete. All will be retained temporarily until staff can check and assemble a complete file of each type of report.)
In ring binders: 1 Annual reports, 1930-1976;2 Annual reports, quarterly reports, other communications, 1934-1964; 3 Annual reports and other notices, 1931-1959;
4 Annual reports and other notices, 1948-1961; 5 Quarterly reports, proxy statements, letters, 1945-1974; 6 Stockholder communications, 1960-1966;
7 Stockholder communications, 1967-1975; 8 Company releases, 1965-1968;
9 Company releases, 1969-1971.
In folders: 10 Letters to Stockholders, 1945-1967 chronological; 11 Correspondence with stockholders, 1930-1960; 12 Alphabetical, mostly letters from stockholders and responses but also early letters to stockholders not duplicated elsewhere.

Box *14*

Summary: Speeches by presidents of the Hammond Organ Co. before security analysts groups in various cities, 1954-1970, concerning production, sales, and other activities of the Hammond Organ Co., in three ring binders.

Box *15*

Summary: Policies and procedures of the Hammond Organ Co., 1964-1974, in ring binders: 1 Company policy, 1964-1968; 2 Standard procedures manual, book I, 1969-

1974; 3 Standard procedures manual, book II, 1969-1974; 4 (Book III of the Standard procedures manual was issued; CHS received a binder so labeled, but policies had been removed and clippings inserted; this binder has been filed in box 3.)

Box *16*

Summary: Patents of Laurens Hammond, books I and II, in two ring binders. Photocopies of patents and specifications arranged chronologically by patent number, with table of contents listing all his patents.

Box *17*

Summary: Original patents, in folders, 0.75 linear feet: 1 Hammond, Laurens: patents, foreign.; 2 Patents, domestic: clock.; 3 Patents, foreign: clock;

4 Patents, domestic: organ.; 5 Patents, foreign: organ.; 6 Patents: automatic electric orchestra.

Boxes 18-24

Summary: Engineering logs, 1936 to ca. 1984, in bound numbered notebooks assigned to various engineering staff, containing diagrams and notes concerning research and development of organs and components. about 9 linear feet.

Boxes 25-26

plus Oversize-boxes A, B, C described on p. 10: 1 Engineering drawings, 1936 to ca. 1984, various sizes: 24 x 36", 18x24", 12x18", other. approximately 2, 000 drawings (in stack about two feet high). Oversize drawings are temporarily stored in a box 39x26x10:, a box 31x24x18", and a box 38x10x17". Most are flat; about 60 are rolled.; 2 Microfilm of engineering drawings, 14 rolls.; 3 Index to microfilm of engineering drawings.

Box 27

1 Coordination requests, 1958-1964. 0.7 linear feet.; 2 Memoranda concerning changes in design and production.; 3 Layout part number index. 2 binders;

4 Engineering parts list. 0.25 linear feet.

Box 28

Summary: Parts books no. 1, 2, 3, 4, and an unnumbered book, in binders.

Boxes 29-30

1 Reports from testing laboratories, ca. 1940-1980. 1.8 linear feet.; 2 The Hammond Organ, Installation, Operation, and Maintenance Instructions, Bulletin No.

1A, 1944.; 3 The Hammond Organ, Manual for the Service Engineer, 1951, in ring binder.; 4 Hammond Organ, Service Manual. Sections published at different times from ca. 1953, ca. 1959 and assembled in ring binder.; 5 Service Manual, Models A,A-100, AB, BA, BC, BCV BV, B2, B3, C, CV, C2, C-2G, C3, D, DV, D100, E, G, GV, RT, RT-2, RT-3. (CHS received a Model B-3 organ and a Model E organ.);
6 Service Manual, Piper Autochord. (CHS received a Piper Autochord organ.); 7 Service manuals for M-3, L-100, T-300, X-77 organs.; 8 Hammond Organ installations. Sections listing churches by denomination that have
Hammond organs, as well as hospitals, auditoriums, funeral homes, schools and colleges, and fraternal organizations. In ring binder.; 9 Places Hammond organ has been placed, in folder.

Boxes 31-43

Summary: Record of organs made, packed, and shipped, 1942-1979. Early records are on sheets, and later records are in bound volumes as described below. 16 linear feet.

Records 1942-1965: on 8.5x5.5" sheets originally kept in loose-leaf ring binders, but most were removed at some time and placed between particleboards held by rubber bands. Sheets are arranged by model number and then by serial number. Information on sheet includes serial number, remarks, date made, date packed, date shipped.

Records 1965-1969: in bound volumes by model number and then by serial number, with model numbers A to X appearing on spines. Information includes serial number followed by model number, date made, date packed, date shipped.

Records 1969-1979: in bound volumes by serial number, with serial numbers appearing on spines in several sequences.

Spine numbers start with A20,000 (Apr. 3, 1969) and go to E237,600 (Oct. 16, 1973); numbers continue consecutively and do not go back to "0" for each new letter prefix; and the letter prefixes were not part of the serial number.

Subsequent spine numbers delete the letter prefix, starting with 237,601 (Aug. 2, 1973) and going to 248, 413 (Oct. 26, 1973). Subsequent volumes are numbered from Vol. 1 (starting with serial number 300,000, made on July 17, 1973) and going to Vol. 25 (ending with serial number 1,056,692, made on May 17, 1979).

Vol. 19 is missing.

Information includes serial number, model number, date made, date packed, date shipped.

Boxes 44-45

Summary: Materials concerning hearings and report of the Federal Trade Commission, 1937, on advertising claims for Hammond organs: Official Report of Proceedings before the Federal Trade Commission, 1937, in two binders.; 1 Brief of attorneys for the commission.; 2 Brief for respondent.; 3 Federal Trade Commission vs. Hammond Clock Co., commission's exhibits, 1937, in binder.; 4 Federal Trade Commission vs. Hammond Clock Co., respondent's exhibits, 1937, in binder.; 5 Federal Trade Commission, in 3 folders.

Boxes 46-53

Summary: Files from office of Donald R. Sauvey, President, concerning Personnel, Operations, Marketing & Sales, finance, International, Miscellaneous, 1979-1982. 10 linear feet: 1979 in box 46; 1980 in boxes 47-49; 1981 in boxes 50-51; 1982 in boxes 52-53.

Box 54

1 Hammond national distribution status, 1968, in binder.; 2 Strategic plan, 1971-1980, in ring binder.; 3 Gallup study of electronic organ owners and prospective buyers for 1972, conducted for the Hammond Organ Co., in ring binder.; 4 European Odyssey for Hammond dealers, 1972, in binder.; 5 Report, Hammond dealer attitudes, 1973.; 6 Marketing correspondence & reports, 1973, in folder.; 7 Long range marketing plans, 1973-1977, in folder.; 8 Industry data, 1974, in ring binder.;

9 Report: Hammond dealer sales trends vs. major competitive brands, 1975, in binder.; 10 Study of Hammond's Strategy in the U. S. Organ Market, discussion guide, 1975.

Box 55

Marketing forecasts and reports and miscellaneous papers concerning marketing and sales, ca. 1973-ca. 1977, in folders. 1 linear foot.

Box 56

1 Competition and market share, 1972-1974, in folder.; 2 New product planning, 1974, in folder.; 3 Sales analysis, 1975, in folder.; 4 Piper Organ, 1972, in folder.;

5 Performance and factory overhead reports, 1975, in folder.; 6 Financial projections, 1974-1976, in folder.; 7 Regular & Piper orders vs. shipments, 1971-1978, in bound ledger.; 8 Regular & Piper orders vs. shipments, 1972-1977, in bound ledger.; 9 Combined Hoc-Nh-Hoe shipments for calendar 1977, in ring binder.; 10 Summary marketing budgets, 1980, in ring binder.; 11 Export shipments, 1978, 1979, 1980. in binder.

Box 57

1 Budget, 1973-1976, in computer printout in binder.; 2 Dealer planned quota analysis, Jan-Dec, 1977; Monthly district sales model analysis, Jan-
Dec., 1977; Monthly dealer sales analysis, Jan-Dec.,1977, all in computer printout in binder.; 3 Monthly district sales analysis, Dec. 1980, in computer printout in binder.

Box 58

1 Target analysis report, 1980, in computer printout in binder.; 2 Hammond Financial Service Company operating manual, ca. 1980, in binder.; 3 List of dealers, service centers, sales managers, ca. 1980, in ring binder (no label).; 4 District sales maps & dealer quotas, 1982, in ring binder.; 5 Seventh Economic Council of the Music Industry, the Action Plan for Increasing Music Participation in America, 1983, in binder.; 6 Co-op programs, in binder.; 7 Hammond's Retail Sales Development Program meeting guide #1-#8, in four binders.

Box 59

1 Letters and mailings to dealers, ca. 1974-1985. 0.2 linear feet, in folders.; 2 Order forms, ca. 1970-1980. 0.1 linear feet, in folder.; 3 Newspaper advertisements (camera ready copy), ca. 1970-1980. 0.2 linear feet, in folders.;
4 Scripts for radio and television advertisements, in folder.; 5 Advertisements and programs for concerts by Hammond Artists. 0.1 linear feet, in folder.; 6 Miscellaneous advertising pieces. 0.1 linear feet, in folder.

Box 60

Summary: Merchandising Job Envelopes, 1972-1973. 1 linear foot. These include texts of slide talks for sales presentations and orders for promotional materials. They also include other materials listed elsewhere such as product sheets describing organs, photographs of organs, playing guides, owner's manuals, music collections, buttons and banners, and similar items used in marketing and sales campaigns were selected from merchandising job envelopes at the Hammond factory on Diversey Avenue in Chicago.

Box 61

Summary: Correspondence and reports concerning labor relations, 1961-1974: folders: 1 Union activity, Bloomingdale agreement, 1961-1974; 2 Union activity, Diversey & Western, 1968; 3 Union activity, Melrose Park agreement, 1971-1974;
4 Labor contract, Hammond Organ Division; 5 Unfair labor practices issues, Hammond Organ Division; 6 Union activity, all plants, 1967; 7 Union election, all plants, 1965.

Box 62

Summary: Miscellaneous records in folders labeled:

1 Bridge table; 2 Brochures, organ; 3 Clocks; 4 Correspondence; 5 HOC acquisitions; 6 Hammond Corp. identity; 7 Hammond Organ Company fact sheet;

8 Hammond news releases; 9 Hammond Organ Company letterhead; 10 HOC personnel; 11 Hammond profile resumes; 12 Leslie Speakers; 13 Notes, financial info., reports, etc.; 14 Product line; 15 Sikeston Woodworking Company fact sheet;

16 Sikeston letterhead, envelopes; 17 Tax exemption forms; 18 Tone cabinets; 19 Trademark, domestic: clocks; 20 Trademarks, foreign: clocks; 21 Trade shows.

Everett and Hammond pianos. Brochures, in envelope.

1 Keyboard guides, in folder.; 2 Letters from conductors and other musicians, 1937-1937, praising the Hammond organ, in ring binder.; 3 Record retention guide, 1969. Lists types of records kept by Hammond Organ Company and makes recommendations on disposition.; 4 Trust indentures and agreements, in folder.;

5 Warranties, in folder.; 6 Miscellaneous records, in folders.

Oversize package:

Framed certificate from committee on Sciences and the Arts, Franklin Institute, Philadelphia, awarding John Price Wetherill Medal to Laurens Hammond, May 15, 1940.

OVERSIZE boxes A, B, C.

Summary: Described with boxes 25-26. Design drawings from the Hammond companies (relating to the manufacturing processes) are stored with these corporate records.

Appendix II: Interactions with 3rd parties

Interviews

Krijger, Arno. Online interview, Geertruidenberg, 16-5-2017.
Van der Kolm, Govert. Online interview, Geertruidenberg, 19-5-2017.
Maas, Will. Online interview, Geertruidenberg, 23-5-2017.
Mostert, Rob. Online interview, Geertruidenberg, 29-5-2017.
Den Engelsen, Leon. Online interview, Geertruidenberg, 31-5-2017.
Burkens, Wibaud. Online interview, Geertruidenberg, 5-6-2017.
Oosterbeek, Folkert. Online interview, Geertruidenberg, 5-6-2017.
Brandsen, Nico. Online interview, Geertruidenberg, 8-6-2017.
Van den Brink, Bert. Online interview, Geertruidenberg, 20-6-2017.
Kool, Ronald. Online interview, Geertruidenberg, 20-6-2017.
Schrijnemakers, Thijs. Online interview, Geertruidenberg, 20-6-2017.
Hondorp, John. Online interview, Geertruidenberg, 23-6-2017.
Ingwersen, Boye. Online interview, Geertruidenberg, 25-6-2017.
't Hart, Willem. Online interview, Geertruidenberg, 25-6-2017.
Oslender, Simon. Online interview, Geertruidenberg, 10-7-2017.
Van der Linden, Dirk. Online interview, Geertruidenberg, 10-7-2017.
Tsuchida, Hal. Online interview, Dordrecht, 25-4-2018.
Hammond Suzuki USA, Peter Nguyen (Director), Raymond Gerlich (Technical Director), Scott May (Productmanager, Artist Relations), Steve Eaklor (musician, former Director Promotion). Addison, VS. 21-9-2018.
Mertens, Dirk. Hammond Suzuki Europe, Antwerp, Belgium. 11-5-2019.
Van Leer, Thijs. Interview. Lathum, 9-3-2020.
De Wijs, Matty. Interviews family history, 2020.

Conversations, presentations

Presentation of research to the laureates at the presentation of NWO grants by Jet Bussemakers, Minister of Education, Culture and Science, 4-4-2016.
Musik Messe Frankfurt, presentation to Hammond Suzuki Europe and Japan (including president Shuji Suzuki): Frankfurt, Germany 7-4-2016.
Hammond Toonwiel Club Holland, Obertop, Frank and Boendermaker, Rien. Oudendijk, 1-10-2016.
Hammond Suzuki Europe, Kok, Jan. Vianen, 28-10-2016.
Conservatoire Amsterdam (CvA). Talks about collaboration. Amsterdam, November and December.
Press release Hammond Suzuki Europe and Carlo de Wijs announce partnership collaboration, Vianen, 12-1-2017.
HKU and Fontys Conservatoires. Talks about collaboration. Utrecht, Tilburg, March, April, May 2017
Musik Messe Frankfurt, Hammond Suzuki Europe, Kok, Jan. Frankfurt, Germany 6 and 7-4-2017

Hammond Suzuki Europe, Kok, Jan. Vianen, 15-7-2017.
Hammond Suzuki Europe, Kok, Jan. Vianen, 3-8-2017.
Hammond Suzuki Europe, Kok, Jan. Vianen, 1-12-2017.
Hammond Suzuki Europe, Kok, Jan. Vianen, 12-1-2018.
Codarts, Broek, Rob, and Hammond Suzuki Europe, Kok, Jan. Rotterdam, 5-2-2018.
Hammond Suzuki Europe, Kok, Jan. Vianen, 1-3-2018.
Codarts, Broek, Rob, and Hammond Suzuki Europe, Kok, Jan. Signing Letter of Intent (LOI). Rotterdam, 17-4-2018..
Hammond Suzuki Europe, Kok, Jan. Vianen, 24-5-2018.
Hammond Suzuki Europe, Kok, Jan. Dordrecht, 19-7-2018.
Hammond Suzuki Europe, Kok, Jan. Vianen, 19-10-2018.
Hammond Suzuki Europe, Kok, Jan. Dordrecht, 7-9-2019.
Codarts, Stubbe, Janine; Broek, Rob; Ten Hoonte, Joan; online analysis dissertation. Dordrecht, 24-6-2021.

Lab sessions, brainstorms, concert & lectures, masterclasses

Danielsson, Ake. Modular Hammond Performance Lab, Geertruidenberg, 23-4-2016.
Danielsson, Ake. Modular Hammond Performance Lab, Geertruidenberg, 29-5-2016.
Keij, Menno. Modular Hammond Performance Lab, Geertruidenberg, 13-7-2016.
Van Iterson, Jeroen. Modular Hammond Performance Lab, Geertruidenberg, 11-8-2016.
Danielsson, Ake. Modular Hammond Performance Lab, Geertruidenberg, 8-12-2016.
Van Iterson, Jeroen. Modular Hammond Performance Lab, Geertruidenberg, 28-2-2017.
Keij, Menno. Modular Hammond Performance Lab, Geertruidenberg, 22-3-2017.
Keij, Menno. Modular Hammond Performance Lab, Geertruidenberg, 14-4-2017.
HKU, jazz-pop department and musician 3.0, masterclass Modular Hammond, Utrecht 20-4-2017.
Danielsson, Ake. Modular Hammond Performance Lab, Geertruidenberg, 11-5-2017.
Codarts, Bended Learning video session Hammond students, Rotterdam, 7-6-2017.
Lab sessions with professionals, Geertruidenberg, 4, 5, 13 en 14-7-2017. Participants: Ingwersen, Boye; Kool, Ronald; Lanslots, Pascal; Den Engelsen, Leon; Oslender, Simon; Van den Brink, Bert; Oosterbeek, Folkert; Van der Linden, Dirk; ’t Hart, Willem; Mostert, Rob; Krijger, Arno; Van der Kolm., Govert; Van Zoonen (observant); Van Oosterhout, Sjaak (observer).
World of Hammond brainstorm session with marketing and business specialists. Geertruidenberg, 12-9-2017.
Hammond Toonwiel Club Holland, concert, lecture, discussion. Veenendaal, 25-11-2017.
Scott, Rhoda. Masterclass, interview, conversations. Rotterdam, Utrecht, Nijmegen, 12, 13, 14 en 15-2-2018.
Hammond Toonwiel Club Holland, brainstorm with the board. Dordrecht, 19-2-2018.
Hammond Day at Codarts, with students, professionals, fans. Rotterdam, 10-3-2018.

Van Iterson, Jeroen. Modular Hammond Performance Lab, Dordrecht, 16-3-2018.
De Jong, Hidde. Modular Hammond Performance Lab, Dordrecht, 6-4-2018.
De Jong, Hidde. Modular Hammond Performance Lab, Dordrecht, 16-4-2018.
Keij, Menno. Modular Hammond Performance Lab, Dordrecht, 4-5-2018.
Keij, Menno. Modular Hammond Performance Lab, Dordrecht, 18-5-2018.
Lanslots, Pascal. Modular Hammond Performance Lab, Dordrecht, 27-7-2018.
Keij, Menno. Modular Hammond Performance Lab, Dordrecht, 9-10-2018.
Boendermaker, Rien. Hammond specialist in the domain of history and technology. Twijzelerheide, 24-10-2018.
Boendermaker, Rien. Hammond specialist in the domain of history and technology. Twijzelerheide, 27-2-2019.
Keij, Menno. Modular Hammond Performance Lab, Dordrecht, 7-3-2019.
Keij, Menno. Modular Hammond Performance Lab, Dordrecht, 26-3-2019.
Hammond Day at Codarts, with students, professionals, fans. Rotterdam 13-4-2019.
Van der Burg, Tim. Modular Hammond Performance Lab, Dordrecht, 19-4-2019.
Moiseenkov, Akim. Modular Hammond Performance Lab, Dordrecht, 29-4-2019.
Moiseenkov, Akim. Modular Hammond Performance Lab, Dordrecht, 2-5-2019.
Van der Burg, Tim. Modular Hammond Performance Lab, Dordrecht, 17-5-2019.
Van Nuenen, Job. Modular Hammond Performance Lab, Dordrecht, 17-5-2019.
Van der Burg, Tim. Modular Hammond Performance Lab, Dordrecht, 21-6-2019.
Van Nuenen, Job. Modular Hammond Performance Lab, Dordrecht, 15-7-2019.
Van der Burg, Tim. Modular Hammond Performance Lab, Dordrecht, 10-8-2019.
Moiseenkov, Akim. Modular Hammond Performance Lab, Dordrecht, 14-8-2019.
Van Nuenen, Job. Modular Hammond Performance Lab, Dordrecht, 14-8-2019.
Van der Burg, Tim. Modular Hammond Performance Lab, Dordrecht, 31-8-2019.
Boendermaker, Rien. Hammond specialist in the domain of history and technology. Twijzelerheide, 18-9-2019.
Orgelpark Amsterdam, Fidom, Hans. Colloquium Hammond innovation. Amsterdam, 21-9-2019.
Van der Burg, Tim. Modular Hammond Performance Lab, Dordrecht, 2-11-2019.
D-Sound première. Energiehuis, Dordrecht. Presentation Modular Hammond & lecture, 14-11-2019.
Hammond Festival. De Melkweg, Amsterdam. 2-2-2020.
Moiseenkov, Akim. Modular Hammond Performance Lab, Dordrecht, 15-9-2020.
Van der Burg, Tim. Modular Hammond Performance Lab, Dordrecht, 9-10-2020.
Soto, Hector. Modular Hammond Performance Lab, Dordrecht, 27-11-2020.
Van der Burg, Tim. Modular Hammond Performance Lab, Dordrecht, 11-12-2020.
Van Nuenen, Job. Modular Hammond Performance Lab, Dordrecht, 16-1-2021.
Soto, Hector. Modular Hammond Performance Lab, Dordrecht, 19-1-2021.
Van der Burg, Tim. Modular Hammond Performance Lab, Dordrecht, 20-2-2021.
Soto, Hector. Modular Hammond Performance Lab, Dordrecht, 17-4-2021.
Soto, Hector. Modular Hammond Performance Lab, Dordrecht, 2-5-2021.
Soto, Hector. Modular Hammond Performance Lab, Dordrecht, 31-8-2021.
Soto, Hector. Modular Hammond Performance Lab, Dordrecht, 12-9-2021.

Soto, Hector. Modular Hammond Performance Lab, Dordrecht, 22-9-2021.
Van der Burg, Tim. Modular Hammond Performance Lab, Dordrecht, 25-9-2021.
Van der Burg, Tim. Modular Hammond Performance Lab, Dordrecht, 9-10-2021.

Congresses, museums, research institutes

Loop conference, Ableton Germany. On new technology. Berlijn, 4, 5 and 6 November, 2016.
Chicago History Museum Research Center, Chicago, VS. 16 – 24 September, 2018.
Orgelsurium, Rubi, Jacki. Hammond Museum. Unterengstringen, Zwitserland. 8 and 9 July, 2019.
Ars Elektronic, Bauer, Andreas. Linz, Austria. 10 July, 2019.

Surveys

Online survey by international professionals: Noord, Herbert; Vullings, Quint; Montis, Frank; Piso, Robin; Gütlich, Nathan; Schellekens, Ado; Langevelt, Jack; Schippers, Robert; Bartlett, Will; Patry, Stefan; Benebig, Michael; Burt, Kevin W.; Monaco, Tony; Latorre, Daniël; Heinrich, Darren; Swärd, Pierre; Gudmundsäter, Patrik. Between 1-11-2019 and 23-10-2020.

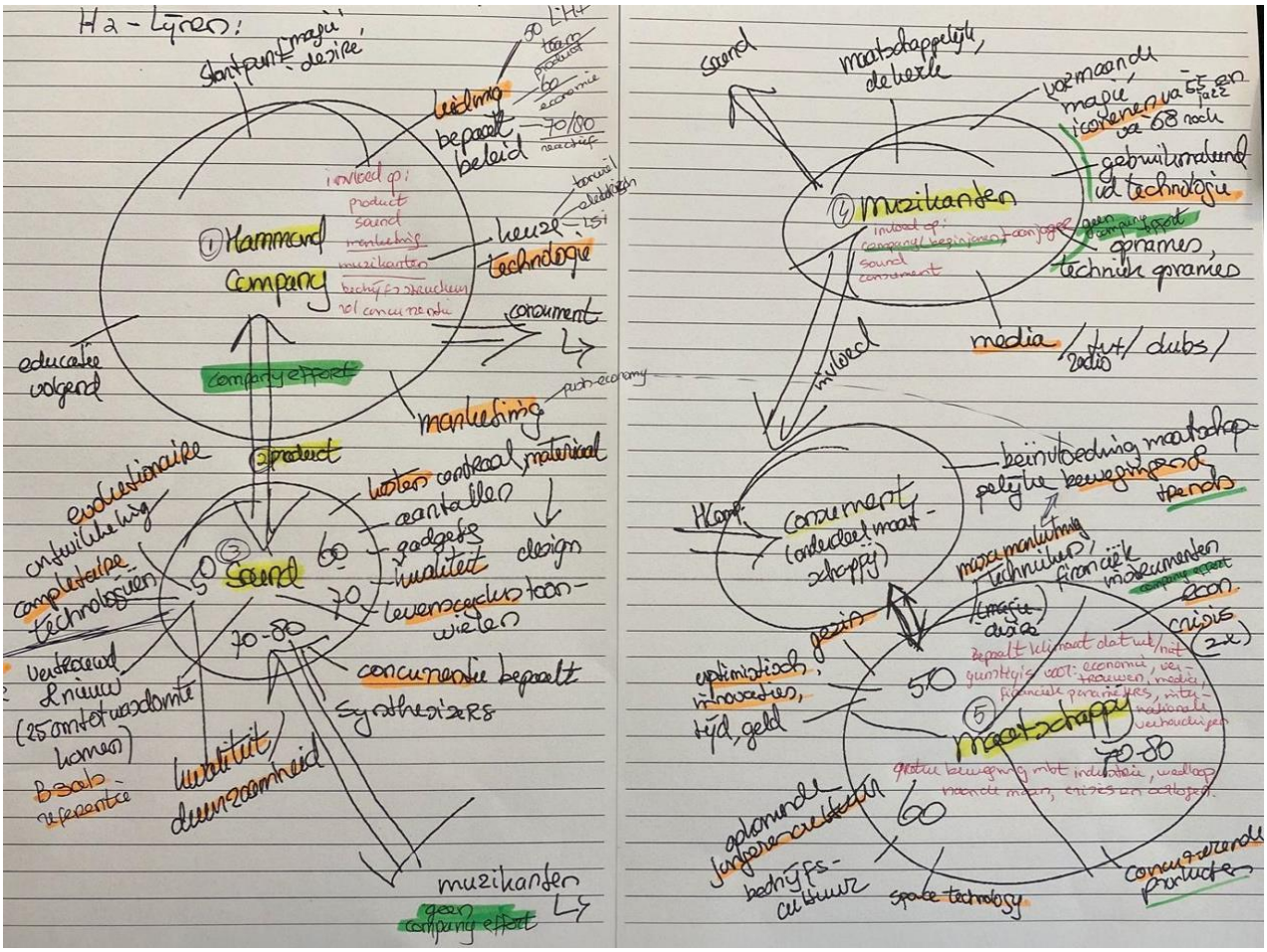
Online survey, Codarts students pop keys and piano jazz: Varekamp, Bob; Hebels, Charlotte; Huyge, Emma; Jacobs, Esther; Pérez Vos, Gabriel; Van der Zanden, Jay; Poodt, Job; Kalasyena, Kasifi; Cremers, Martijn; Koster, Michiel; Makalew, Nadine; Verloop, Niek; Hijink, Ray; Gerad, Rottem; Poleij, Sander; West, Sebastiaan; Snapper, Stefan; Bos, Vince. Between 20-10-2020 and 31-3-2021.

Many interactions surrounding the development of the Modular Hammond (2015 - present), World of Hammond (2015 - 2019) and Hammond education at Codarts (2016 - present) are not further specified here due to ongoing development.

Appendix III: Personal mental maps

Examples of personal mental maps that served to analyse the subject matter.

Mental map 1 – The actors from the Hammond actor-network.



Mental map 2 – Critical events & consequences that run like a thread through my personal history. Accompanying Chapter 5.

Appendix IV: Additional files website

Added material can be found at carlodewijs.com

Or QR-code for mobile

Password: ModularHammond

Historical material (inc. The Blue Book with all Hammond models between 1935 – 1985, annual accounts, Hammond Times magazines, The Story of Hammond Organ Company, brochures, Corporate Plans, studies, patents and designs).

Questionnaire / surveys for professionals and students, a compilation of a lab session with professionals in 2017, video compilation of Hammond@Codarts, a video compilation where students explain how they see the Hammond Organ.

The concept plan for World of Hammond (WOH).

Document overview with personal blogs and newsletters, period 2018 - 2021.

Interviews and press articles and the Modular Hammond.

A Spotify Hammond Songbook with relevant tracks from Hammond history. Partly compiled by Hammond professionals and as a result of the radio show 'Hammond Alive' on Radio 6 (2012 -2013), presented by Co de Kloet and Carlo de Wijs.

YouTube channel belonging to Carlo de Wijs with both live and studio recordings of the New Hammond Sound Project. A recommendation is Element Dm in which the visual elements are taken from the original Hammond patents of the Model A in combination with 3D modelled tone wheels and a (Hammond) clock that displays the metre of the song.

A series of vlogs explaining the development and operation of the Modular Hammond and a 360 degree visualisation of the instrument where individual parts can be zoomed in on.

Summary

The Microdynamics of musical innovation describes the history of the Hammond Organ in the context of the instrument's main innovators; as well as the technical, musical, and societal developments that occured simultaneously. It focuses on the extraordinary amalgamation of instrument, sound, and technology that has given rise to the overarching research question: *How did innovation pertinent to the Hammond organ come about, and what role did individual, social, technological, economic, and other actors play in this process?*

The research consists of a historical section and a present day section.

The historical analysis attempts not only to reconstruct the cultural and technological history of the Hammond organ, but also to explore the role of the many musicians that influenced these trajectories.

The present day section consists of a reflection on my own professional journey by way of an auto-ethnography; a series of laboratory sessions with musicians, educators, and the industry; and a vision for the future.

This dissertation uses empirical research to illuminate not only the development of the Hammond organ, but also the microdynamics of innovation in its entirety. With the aid of Latour's Actor-Network Theory (ANT), Rogers' innovation theory, and an auto-ethnography, this dissertation illustrates the developments in the world surrounding the Hammond organ.

The history of the Hammond organ began in the 1930s with the American Laurens Hammond. He was successful in developing an alternative to the pipe organ (1935) and inadvertently became a forefather of electric and electronic instruments.

The Hammond actor-network encompasses a cast of five main characters: the 'Hammond Company' including the role of the business and its founder; the actor *'material'* including design, choice of materials, ergonomics, and production processes; the actor *'sound'* encompassing the sound domain and relevant technologies; the actor *'musicians'* including the creative and rejuvenating contributions of musicians, in particular Jimmy Smith; and the actor *'societal context'* encompassing the societal position of the company, its consumers, education, and the influence of governments and economic circumstances.

The dynamics among these actors have both positively and negatively impacted the instrument's history. Between the 1930s and the 1950s, the introduction of a high-quality instrument and its unique sound collided with a perfect mix of economic and societal factors to grow into a global success. However, the dynamics between ineffective business policy, international market leadership, investment in underdeveloped technologies, and the rise of competition, quickly changed that reality. These factors even led to the business' demise in 1985.

Around the 1990s, a revival of the sound began with both traditional and new instruments, rooted in societal and cultural circumstances in which a longing for authenticity played a major role.

In the autoethnography, I describe how personal experiences, specifically a series of major critical moments, illuminate the actor-network surrounding the innovation of the Hammond organ and the microdynamics of innovation.

World of Hammond, a concept for a multidimensional platform, has explored the question of whether personal innovations can be upscaled to a larger Hammond community. Not only the qualities of Hammond-related innovations, but also the way in which they combine with specific interests and circumstances, determine whether these innovations are seen as powerful, acknowledged, or dismissed.

The conclusion states that analysis of the actor-network offers the insight that actor-networks are dynamic, and continuously evolving. The timings of innovations play a key role in this regard; innovation at the beginning of a product cycle works entirely differently from innovations of an existing product, for which the expectation pattern has grown, and where a particular perceptions of audience, musicians, and an industry are evident. These constantly changing actors continue to bring about new internal equilibria, and the reactions to these changes produce yet another dynamic reality.

Individual innovation moments are examined microcosms: the personal stories of Laurens Hammond, musical innovator Jimmy Smith, and Carlo de Wijs are the key to the microdynamics of innovation that this research investigates.

The case of the Hammond organ has demanded a combined methodological approach, in which both artistic and academic perspectives influence and enrich each other, and the interplay between the two perspectives offers novel insights into the field of transformation processes.

Samenvatting (Dutch)

De microdynamiek van muzikale innovatie beschrijft de geschiedenis van het Hammondorgel tegen de achtergrond van de hoofdrolspelers en technische, muzikale en maatschappelijke ontwikkelingen. De focus ligt daarbij op de bijzondere samensmelting van instrument, sound en technologie welke heeft geleid tot de overkoepelende onderzoeksvraag:
Hoe is innovatie van het Hammondorgel tot stand gekomen en welke rol spelen daarbij individuele, sociale, technologische, economische en andere actoren?

Het onderzoek bestaat uit een historisch en een actueel deel. In het historisch onderzoek wordt zowel de culturele en technologische biografie als de rol van de muzikanten die hierop van invloed waren gereconstrueerd.

Het actuele deel omvat een reflectie op mijn professionele ontwikkeling middels een auto-etnografie, een serie laboratoriumsessies met muzikanten, docenten, de industrie en een visie op de toekomst.

Door empirisch onderzoek is inzicht verkregen in de ontwikkeling van het Hammondorgel, maar ook meer algemeen in de microdynamiek van innovatie. Met behulp van de ANT (Actor-Netwerk Theorie, Latour), de innovatietheorie (Rogers) en een auto-etnografie zijn de ontwikkelingen van de wereld rondom het Hammondorgel beschreven.

Deze historie startte rond de jaren dertig van de twintigste eeuw door de Amerikaan Laurens Hammond. Hij ontwikkelde een succesvol alternatief voor het pijporgel (1935) en werd tevens een van de stamvaders van elektrische en elektronische orgels.

Het actor-netwerk Hammond kent de volgende vijf hoofdactoren: de ‘Hammond Company’ waaronder de rol van het bedrijf en haar grondlegger; de actor ‘materiaal’ waarin ontwerp, materiaalkeuze, ergonomie en productieprocessen; de actor ‘sound’ over klankmatige aspecten en gebruikte technologieën; de actor ‘muzikanten’ over creatieve en vernieuwende bijdragen van muzikanten, in het bijzonder Jimmy Smith; de actor ‘maatschappelijke context’ zoals bedrijfspositie, consument, educatie, overheid en economische omstandigheden.

De dynamiek binnen deze actoren zijn zowel positief als negatief van invloed op de geschiedenis. In de periode jaren dertig tot en met vijftig had de introductie van

het kwalitatief hoogstaande product en de unieke sound de omstandigheden volledig mee om tot een mondiaal succes uit te groeien.

De dynamiek tussen bedrijfsvoering, het internationale marktleiderschap, de inzet op nog niet uitontwikkelde technologieën en de opkomende concurrentie zorgden voor een snel veranderende maatschappelijke werkelijkheid. Deze factoren leiden zelfs tot de ondergang van het bedrijf in 1985.

Een revival startend rond de jaren negentig van de sound met zowel oorspronkelijke als nieuwe instrumenten is geworteld in maatschappelijke en culturele omstandigheden waarbinnen het verlangen naar authenticiteit een grote rol speelt.

In de auto-etnografie beschrijf ik hoe persoonlijke ervaringen aan de hand van grote kritische momenten het actor-netwerk rond de innovatie van het Hammondorgel en de microdynamiek van de innovatie expliciteren.

World of Hammond, een concept voor een multidimensionaal platform, onderzocht de vraag of persoonlijke innovaties op te schalen zijn naar een bredere Hammond community. Niet alleen de kwaliteit van een dergelijk concept, maar de manier waarop dit samenvalt met specifieke belangen en omstandigheden bepaalt of men de innovatieve kracht herkent, erkent of afwijst.

In de conclusie is toegelicht dat de analyse van het actorennetwerk het inzicht oplevert dat een actor-netwerk voortdurend door de tijd heen verandert en tevens een sterk dynamisch begrip is. De nadruk komt op verschuivingen in de tijd te liggen: innovatie aan het begin van een productcyclus werkt geheel anders dan het innoveren van een bestaand product. Daarbij is de perceptie van publiek, muzikanten en industrie al gegroeid. Deze continu veranderende actoren leveren steeds een nieuwe onderlinge balans op en de reacties hierop zorgen weer voor een andere dynamische werkelijkheid.

Individuele innovatiemomenten zijn specifiek op microniveau uitgelicht: de persoonlijke verhalen van Laurens Hammond, muzikale innovator Jimmy Smith en Carlo de Wijs vormen samen de sleutel tot de microdynamiek van innovatie waarover dit onderzoek gaat.

De casus van het Hammondorgel vereiste een gecombineerde methodische aanpak, waarbij zowel artistieke als academische perspectieven elkaar beïnvloedden

en verrijkten, en in samenhang inzicht verschaffen op het gebied van veranderingsprocessen.

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Carlo
December, 2021

About the author

Carlo de Wijs (Breda, 1962) is one of Europe's leading Hammond organists. At the age of seven, he played the electric organ for the first time. When, at the age of twelve, he heard a Rhoda Scott record, he was immediately captivated by the sound of the Hammond organ. This instrument determined his professional career.

Between 1979 and 1988, he studied for a Bachelor's degree in Teaching and Performing Musicians at Rotterdam Conservatory. During his studies, he performed with many celebrities from the Dutch jazz scene, and in 1986 he started his company Swing Support.

His graduation concert was a grand cross-over project of jazz, funk and soul with twenty-four musicians - including international soloists - with a live recording produced for the public broadcasting company in the sold-out Concordia Theatre in Breda. This graduation concert, which received a Cum Laude, was developed into a theatre and festival tour during 1990 - 1992.

The following year Carlo embarked on a world tour (1992 - 1994) with saxophonist Candy Dulfer, as soloist and band member - where his development from jazz to funk-pop musician began. As a result, his project *D'WYS* (deewise) *& The Voices of Soul* was born, resulting in several albums and tours (1995 - 2000).

The influence of technology on his work became more prevalent during these years, leading to adjustments to his Hammond, and the construction of his own studio (2001).

Codarts (formerly the Rotterdam Conservatory) asked him to teach Hammond within the jazz and pop department (1997 - present). He developed into Artistic Manager for the Pop (2003 - 2014) and Jazz department (2007 -2013). From 2015 he chose to return to teaching in order to focus more on his own projects. In addition, he was a researcher at the Blended Learning lectureship (2016 - 2019) and began his PhD trajectory (2016).

An innovative musical concept and the technological developments on his Hammond organ came together in the 'New Hammond Sound'. The technological transformation of his B3 Hammond organ into a personal 'Modular Hammond' was completed in 2021. The collective '*New Hammond Sound Project*' plays support to his new artistic mission to create synergy between music making, technological innovation and visual arts.

The research into '*The Microdynamics of Musical Innovation'* is based on a variety of scientific sources, experiments and experience. The concepts initiated in this thesis find a concrete form in initiatives in the fields of music, education and business. Some examples are *D-Sound*, a creative hub-cum-learning community in Dordrecht, and the dissemination of this thesis through publications, lectures and workshops.