TRANSLATING SOUND AND LIGHT

EXPLORING THE SYMBIOTIC RELATIONSHIP BETWEEN SOUND AND LIGHT TECHNICIANS AND TECHNOLOGY FROM AN ACTOR-NETWORK PERSPECTIVE

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Abstract

This thesis explores the symbiotic relationship between sound and light technicians and technology in live electronic music events through the lens of Actor-Network Theory (ANT), which contends that networks are composed of both human and non-human actors. This thesis supports ANT theorists such as Bruno Latour, Michel Callon, and John Law, emphasising that humans and non-humans (which can include technologies, objects, institutions, and other entities) are integral actants in production networks. These actors, who interact and influence each other, contributing to the collective dynamic and outcome within the network.

Despite their critical role in shaping the sensory experiences of these events, sound and light technicians are often overlooked in academic literature. Extending from the research of Battentier and Kuipiers, this research aims to illuminate the mediative role of technicians, thereby positioning them as pivotal contributors who mediate the gap between creativity and technology in cultural production, in this context, live electronic music events.

For this study, a qualitative research methodology was employed, integrating ethnographic research, participant observation, and in-depth interviews. Data collection occurred over eight months, involving 120 hours of observations in six electronic music venues in the Netherlands. Primary data were found in participant observations at Club P, a nightclub in Rotterdam with a capacity of 500 people, and Festival D, a large-scale festival in Nijmegen of 10,000 people. Five in-depth interviews with technicians aged 18 to 28 provided additional insights into the routines and rituals of their work.

The findings are centred around three central themes:

1. **Rituals and Routines of Production Networks**: Sound and light technicians operate within complex production networks that include DJs, production staff, and technologies. Their work is characterised by collective action, continuous learning, and mentorship. Moreover, technicians' dedication to their roles is evident through their professional identities and passion, noting the demanding nature of their work. This thesis aims to shed light on their mediative impact on cultural productions.
2. **Sound and Light Technology Integration**: The role of the ever-evolving boundaries of sound and light technologies, such as sound equalisation tools and DMX lighting displays, is acknowledged through the lens of Actor-Network Theory. This thesis suggests that these technologies are not merely tools but active participants in the production process. The integration of advanced technologies into production networks underscores their significance and positions ANT as a framework for recognising the role of technologies in creating cultural productions.

3. **Symbiosis and Co-Evolution of Networks**: The relationship between human and technological actors in live electronic music events is symbiotic and dynamic. Technicians and technologies mutually influence each other, leading to continuous co-evolution. This interdependence emphasises the need for a broader lens to production studies that acknowledges the inherent agency of non-human actors.

In conclusion, this study contributes to a deeper understanding of the production of live electronic music events, highlighting the significant role of sound and light technicians. It posits Actor-Network Theory to explain their contributions and suggests that future research should continue to explore the dynamic interactions between humans and technology in cultural productions.

KEYWORDS: Technician, Technology, Sound, Light, ANT

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Introduction

In 1861, German scientist Johann Philip Reis marked a pivotal juncture in the history of modern technologies. His invention, initially designed to amplify human voices across telecommunication lines, is considered to be the prototype of the electronic loudspeaker (Robjohns, 2001, p. 1). Unknowingly, Reis had created a powerful medium of communication, with the contemporary loudspeaker now capable of binding together diverse social groups through the shared appreciation of music (Sicko, 2010, p. 41).

Emerging from its countercultural roots, electronic music prevailed as a genre during the technological revolution of the 1990s. The transition from analogue hardware to digital equipment is one of many technological triumphs that have transformed how we produce, consume and understand cultural productions such as live music events (Horning, 2004, p. 704; Varghese et al., 2015, p. 1305). Revolutionary portability technologies, such as the "Universal Serial Bus", or USB, offered the formally analogue disc jockeys (DJs) opportunities to perform, with technologies such as Digital Audio Workstations (DAWs) and Digital Multiplex Lighting (DMX) offering unprecedented capabilities in sound manipulation and visual enhancement (Correia et al., 2017, p. 5; Fraser, 2012, p. 504)

Within the walls of an event, the role of the disc jockey (DJ) is deservedly acknowledged and celebrated; their names feature on the timetables as they find themselves in the spotlight (Attias et al., 2013, pp. 145-162). Yet, beyond the DJ, many more actors work diligently behind the scenes to create the multisensory experience by which these events are categorised. Situated at the back of the venue, often hidden from the eyes of attendees, are sound and light technicians, who are responsible for the intricate crafting of sound and light design, mediating the aural and visual manifestations of the production (Slaten, 2018, p. 12).

1.1 The Pivotal Contributions of Sound and Light Technicians

Classical academic literature has given little insight into the roles of sound and light technicians within cultural productions. Stemming from the work of Howard Becker, the concept of "art worlds" emphasises the collaborative nature of creative productions, where art is seen not as the product of an individual actor but as the outcome of a "collective action" (Becker, 1974, p. 767). Within the context of electronic music productions, an art world comprises a network of individuals—DJs, technicians, and supporting staff. Inside this framework, Becker categorises technicians in a loosely defined "miscellaneous category," intended for roles that do not fit neatly elsewhere. He views technicians as "support personnel," primarily as individuals who assist the artist, hired for their

specific functions and largely “interchangeable” (Becker, 1974, p. 768). This perspective positions technicians not as artists but as caretakers who facilitate musicians’ performances, contradicting the very meaning of the word technician, which originates from the Greek “tekhnikos,” meaning “pertaining to art, experienced in art, made by art,” (Leyshon, 2009, p. 1322; Connelly, 2022, p. 2).

Given the ever-evolving state of technologies in the field, which have revolutionised the experience of live music, it is essential to highlight the significant role of technicians in the production process (Zhang & Negus, 2021, p. 545). In addressing the scarcity of research on their roles, Batteniter (2021) emphasises that this oversight neglects to understand the technical mediation in cultural productions (pp. 1-22).

1.2 Translating Sound and Light: Proposing Actor-Network Theory

In his research, Battentier (2020) notes the technical nature of technicians in integrating technologies into productions (pp. 41-68). Building on this, this mediation process can be explored through the concept of “translation,” a central component of Actor-Network Theory (ANT). This theory, developed by scholars such as Bruno Latour, Michel Callon, and John Law, provides a comprehensive framework for understanding the interconnectedness and co-evolution of human and non-human actors within networks. ANT suggests that all “actants” within a network possess a degree of agency, thereby dismantling the traditional distinctions between humans and technology (Latour, 2011, p. 800). This approach emphasises the dynamic interactions and mutual shaping between actors, whether they are humans or technologies. In the context of contemporary music,

ANT prompts critical reflections with a more agential approach to technology, raising questions about the continued relevance and adaptability of existing theoretical frameworks in light of technological advancements (Latour, 2011, p. 810; Pinch & Bijker, 1984, pp. 399-44; Prior, 2008, pp. 301-319). Consequently, this paper adopts an ANT lens, positing electronic music productions to be comprised of both human (technicians, DJs, production staff) and non-human actors (sound systems, lighting fixtures, cables, and operating equipment) ().

Despite criticism from scholars who claim it is prone to downplaying human social processes and power dynamics, ANT offers a robust framework for explaining the roles of sound and light technicians, particularly in relation to their continuous engagement with and adaptation to technological advancements within their field (Battentier and Kuipers, 2020, pp. 10-22; Elder-Vass, 2015, p. 465-473).

1.2 Research Objectives

At a foundational level, this thesis seeks to contribute to our understanding of the production of live electronic music events, the value they hold, and the network of human actors involved. It will explore the network of actors and the collective action that is present in the routines and rituals of sound and light technicians (Becker, 1974, p. 770; Wijgarden, 2023, p. 1881). Technicians will be central to this research, following the work of Battentier & Kuipers (2020, pp. 1-22), placing them as technical intermediaries. Furthermore, they will be examined through the lens of cultural intermediaries for their contributions to translating technology into cultural goods (Prior, p. 310; Pinch & Bijker, 1984, p. 410-441). This segment aims to illuminate the roles of sound and light technicians as valuable contributors in the field of cultural productions. (Latour, 1988, pp.180-220; Battentier & Kuipers, 2020, p. 18)

Secondly, the research explores the evolution of sound and light technologies through the lens of Actor-Network theory. Insights into the extent to which they can be considered agentive. Moreover, this research seeks to illuminate how technologies have upgraded production value within, but not limited to, the context of live electronic music events. The objective of this segment of the research is to propose a less human-centric lens in production studies and to identify technologies as active participants (Callon, 1984, p. 201; Latour, 2011, p. 800).

Finally, the research delves into notions of symbiotic partnerships between humans and technology within the context of technicians and their tools. In doing so, the ANT principle of network co-evolution will be used to explore the mutual dependency present in the context of sound and light technicians. The aim of this is to consider what this relationship means within a broader framework of human and technological interaction, contending it leads to the evolution of both parties (Williams, 2020, p. 20; Pinch and Bijker, 1987, p. 400; Latour, 2011, p. 808)

Through the qualitative approach to examining the workflows and creative practices of sound and light technicians, this research aims to demonstrate the mutual dependence between humans and technologies within the context of production studies, technology and society (Callon & Law, 1995, pp. 491-500).

Literature Review

Firstly, this literature review serves to contextualise electronic music to evaluate the history of production and consumption of electronic music as a genre. Secondly, it acknowledges both the economic and cultural value of events, with reference to the experience economy (Pine and Gilmore, 2011, p. 47). Actor-Network Theory will then be introduced, proposing a model that includes non-human actors, sound and light technologies, as contributing and agentive actants in the context of electronic music events before presenting technicians as central human actors within this relationship.

2.1 Contextualising Electronic Music Production and Consumption

Despite its surge in popularity, electronic music culture has roots deeply embedded in historical subcultural movements (Peter, 2014, pp. 47-48; Hodkinson, 2002, pp. 87-90). Its musical lineage can be traced back to the emergence of Disco in America during the 1970s, when clubbing and dancing enjoyed a renewed popularity as a form of cultural ritual (Shapin, 1989, pp. 554-556; Hodkinson, 2002, pp. 90-100; Sommer, 2001, pp. 72-75). During this period, commercial music bands such as Pink Floyd's use of synchronised audiovisual performances during their concerts set the foundations of what would evolve into the multifaceted sensory experiences of modern live music events. This innovative approach not only liberated the concert experience from purely auditory dimensions but also set a foundational precedent for integrating visual arts in live music performances (Perrin, 2019, pp. 60-65; Correia et al., 2017, pp. 2-4).

The following two decades saw the proliferation of electronic music as a genre, with clubs, warehouses, and (outdoor) raves being the primary venues for its production and consumption (Attias, Gavanas, & Rietveld, 2013, pp. 5-15, 85-95). The pervasive spread of electronic music productions of the 1990s was critical in the emergence of subgenres such as Chicago House or Breakbeat (Hodkinson, 2002, pp. 110-115; van Venrooij & Wilderom, 2022, pp. 265-270). Its success was integrated with other sociocultural moments of this time, with Japanese artist Ken Ishii being commissioned for the opening and clothing themes for the 1998 Winter Olympics. In the Netherlands, techno artist Speedy J's "Pull Over" hit reached the Top 40, and in Germany, the street festival "Love Parade" continues to attract millions of attendees every year (Sicko, 2010, p. 90). Moreover, continuous advancements in live touring experiences came from artists such as Daft Punk, with their 1997 'Alive' tour, which featured a radical pyramid stage setup integrated with synchronised lighting designed by technician Tony Gardner (Perrin, 2019, pp. 65-70).

The widespread acclaim for electronic music is attributable primarily to the digitalisation of its technologies, which have revolutionised music production and consumption, making it portable and

accessible for artists to perform for paying audiences (Attias, Gavanas, & Rietveld, 2013, pp. 10-15, 90-95; Peter, 2023, pp. 9-14). This ease of access has expanded the market, particularly within club environments, which are seen as primary venues for live performances, offering experiential settings for creative expression (Fraser, 2012, pp. 505-507; Lawrence, 2011, pp. 234-235). Economically, electronic music has established itself as a robust sector within the global music industry, driving significant revenue through live events, recordings, and digital streams, thus providing livelihoods, albeit precarious, for those involved in the scene. The genre's impact extends beyond entertainment, underscoring substantial economic and cultural significance. The global electronic music market, valued at approximately $11.3 billion in 2021, reflects almost $3 billion in growth from the previous year, highlighting its expansive reach and revenue-generating capacity (Chandran, 2023, p. 9). This growth underscores the genre's pivotal role in shaping contemporary music and cultural landscapes through live events, recordings, and digital streams.

2.1.1 Cultural Value

Electronic music transcends mere entertainment, compressing significant economic and cultural impacts. Economically, the footprint of today's electronic music industry is substantial. As of the latest estimates, the global electronic music market is valued at approximately $11.3 billion as of 2021, demonstrating almost $3 billion in growth since the previous year (Chandran, 2023, p. 9). This growth underscores the genre's expansive reach and its ability to generate considerable revenue through live events, recordings, and digital streams.

Furthermore, electronic music events are integral to Pine and Gilmore's (2011) concept of the "experience economy," which posits that experiences are inherently personal and create lasting impressions on emotional, intellectual, physical, or spiritual levels. In this context, electronic music productions are more than mere performances; they are immersive experiences that engage audiences in multisensory ways, fostering deep personal and collective connections. Understanding electronic music productions through the lens of the experience economy emphasises the significant role that DJs, technicians, and production members play in creating these meaningful experiences. The electronic music sector is characterised by its unique atmospheric settings—from underground clubs to large-scale festivals—and experimental stage designs, where the interplay of light, sound, and spatial design creates fertile ground for creative outputs (Lawrence, 2011, p. 231; Slaten, 2018, p. 12). These environments contribute to what Gilmore and Pine (2007) describe as "transformative experiences" as the highest level of economic value, where the experience leads to a lasting change in the individual's behaviour, attitudes, or outlook.

The cultural value of electronic music is also evident in its role as a medium for social and artistic expression. It acts as a conduit for liberal and progressive ideologies, often reflecting and shaping cultural movements. For example, the Berlin techno scene, which UNESCO has recently afforded

cultural heritage status, serves as a testament to the genre's cultural significance (Peter, 2013, p. 55). This recognition underscores the genre's influence in promoting cultural identity and social cohesion, particularly in post-reunification Germany.

Electronic music events epitomise a multisensory entertainment experience, simultaneously engaging various sensory pathways to produce an ample experience for audiences worldwide (Ryce, 2012; Sommer, 2001, pp. 72-86; van Venrooij & Wilderom, 2022, p. 285). Central to this recognition is the atmosphere within the walls of an electronic music club, described as a "vibe" by Sommer (2001, p. 75):

> "The vibe is an active communal force, a feeling, a rhythm that is created by the mix of dancers, the balance of loud music, the effects of darkness and light, the energy… The vibe is an active, exhilarating feeling of 'now-ness' that everything is coming together… a good party is in the making."

Kolehmainen and Mäkinen (2021) argue that creating atmospheres involves emotional and sensory effort, which is collective, involving many people, intracorporeal, involving physical interactions, and trans-subjective, involving shared feelings, encompassing both physical and symbolic interaction. (p. 449). Similarly, Hesmondhalgh and Baker (2010) highlight the significant physical and mental strain on technicians due to the emotional and affective demands of their work, exacerbated by precarious employment conditions (p. 34). Evident from this description, the value of electronic music events transcends mere entertainment; they serve as physical manifestations of what electronic music strives to create, showcasing the interplay of sound, light, and human interaction to create sensory experiences. These venues foster diversity, inclusion, and connection, allowing attendees to experience a sense of transcendence and a hedonistic retreat from daily life (Lawrence, 2011, p. 235; Woo et al., 2015, p. 287; Sommer, 2001, p. 77; Fraser, 2012, p. 507). Central to this is the role of technicians, who orchestrate these elements, ensuring each event resonates with its attendees (Attias et al., 2013, p. 98; St. John, 2006, p. 12).

2.2 Technicians and Actor-Networks

The role of technicians in electronic music events extends far beyond technical support. Their work demonstrates the principles of Actor-Network Theory (ANT), where both human and non-human actors are seen as integral parts of a network involving human and non-human actors. This section explores the essential contributions of technicians within the context of art worlds and collective action, reinstating their technical intermediates as described by Battentier & Kuipers (2021, p. 30).

2.2.1 Technicians in the Context of Art Worlds

Technicians are a vital component of the collaborative networks that underpin the production of electronic music events. This dynamic aligns with Becker's concept of "art worlds," which elucidates that the creation and appreciation of art involve interconnected networks of artists, critics, and other human contributors. Becker (1984, pp. 767-776) argues that artistic creation is a collective process, reflecting the mutual influence and interdependence of its participants. Moreover, the principle of "art as collective action" posits that art production emerges from the complex interplay among all contributors, not solely the artists (Becker, 1974, p. 770; 2008, pp. 1-5). In this context, every participant, from technicians to DJs to floor staff, is a significant actor within the cultural narrative and overall significance of the event.

These networks are characterized by established conventions and shared understandings, which facilitate coordination and cooperation among members. Becker's analysis reveals how these conventions are not only technical but also social constructs that are learned and perpetuated through informal mentorship and apprenticeship relationships (Becker, 1982, pp. 25-50; 2008, pp. 15-45). By emphasizing the collaborative dimension of art production, Becker challenges the traditional notion of the solitary artist and highlights the importance of support structures in sustaining artistic practices. Moreover, this perspective has significant implications for the study of cultural industries, illustrating how art is inherently a social product shaped by collective efforts and institutional contexts (Bourdieu, 1993, pp. 29-53; Caves, 2000, pp. 17-45). Understanding art worlds provides a comprehensive framework for examining the social dynamics of creativity and the complex interplay between individual agency and collective action in the cultural sector.

Moreover, reputation and trust are critical elements exchanged in these interactions, with a positive reputation enabling opportunity based on past performance (Burt, 1992, pp. 1-3). As Becker (1982, pp. 733-768) notes, support personnel often maintain professional networks that generate conventions and standards, which they strive to uphold in their interactions with artists due to their reliance on their reputation (Crossley, 2020, pp. 100-105). However, the closeness between promoters or DJs and technicians can vary significantly. On one end of the spectrum is a one-time collaboration where a venue hires a technician to manage sound or lighting for an artist they have never previously worked with. On the other hand, there is a long-term collaboration based on informal kinship, where the technician is familiar with the artist and deeply involved in artistic decisions.

2.2.2 Empirical Insights on Sound and Light Technicians

Given the ever-evolving state of technologies in the field, which have revolutionised the experience of live music, it is essential to bring attention to the significant nature of technicians' work in the production process (Zhang & Negus, 2021, pp. 544). In this context, technicians act as intermediaries through negotiation with a given technology, which also has its own rules and programs, extending beyond functional use; through their operation, they co-author the event's atmosphere by mediating the artistic capabilities of technicians and turning them into tangible experiences, thereby demonstrating agency in shaping creative output.

Though ample research has been done on DJs and electronic music events (Allington, Dueck, & Jordanous, 2015; Attias, Gavanas, & Rietveld, 2013; Crossley, 2020; Sommer, 2001; St John, 2006), much less is known about technicians and their role in the development of cultural productions. Of this research, little has directly examined routines and rituals of sound and light technicians (Battentier, 2021; Sandstrom, 2000) differentiates live and studio engineering as interrelated practices in her discussion of the work of "mix engineers," who refer to the sound engineers who operate mixing consoles at concerts and in recording studios (Slaten, 2018, p. 13). Insights from Battentier (2021), these ethnographic accounts mainly focus on recording sound engineers, which emphasise "tacit knowledge and craft skill importance," presented in the "mediation" of cultural productions such as live electronic music events (Battentier, 2021, pp. 57-65).

Sound and light engineers have fallen under various descriptions in existing literature, but none directly position them as actors in the production process. From "tech crew" to "support personnel," sound and light engineers have been categorised in existing literature for their roles in assisting the production process without being definitively placed as actors themselves. Contrary to his emphasis on the collective dimension of artistic works, Becker categorises technicians in a loosely defined "miscellaneous category," intended for roles that do not fit neatly elsewhere. In this framework, Becker views support personnel primarily as individuals "assisting the artist," hired for their specific functions and largely "interchangeable" (Becker, 1982, pp. 733-768). This perspective positions technicians not as artists but as caretakers who facilitate musicians' performances (Leyshon, 2009, pp. 1309-1331). However, this view is somewhat contradictory, as Becker also asserts that "every function within an art world can be taken seriously as art" (Battentier & Kuipers, 2020, p. 4).

In addressing the work of Becker (1976), Battentier & Kuipers (2020, pp. 3-5) categorise art world workers into four main groups: artists, audiences, cultural intermediaries, and technical intermediaries, placing sound and light technicians within the bracket of "technical intermediaries" (p. 5) in that they rely on technologies—tools or devices manipulated by humans to work on physical objects—for mediation (Battentier & Kuipers, 2020, p. 4). This evolution in terminology from "tech

crew" to more specific designations reflects an increasing recognition of the importance of their contributions. However, existing literature still falls short of fully acknowledging their value within cultural productions.

2.2.3 Technical Mediation

Technicians, operating within art worlds seek to translate their artistic visions into products (Latour, 2011, p. 809). The value derived by technicians is not only measured in monetary terms but in the continual process of translating artistic aspirations into tangible productions (Latour, 2011, p. 810; Slaten, 2018, p. 10). The creation of cultural goods, often not for financial gain, reflects Caves' principle of "art for art's sake," where the dedication to artistic pursuits extends beyond conventional benefits associated with paid labour (Caves, 2000, pp. 73-83; Maguire & Matthews, 2014, p. 18; 2012, pp. 551-562).

Their ethnographic studies demonstrate that creating atmospheres requires ongoing, embodied investments from both organisers and participants, highlighting how affective labour extends beyond traditional notions of work (pp. 449-451). This broader perspective on affective labour aligns with the insights of Hesmondhalgh and Baker (2010), who note the significant physical and mental strain on those in creative labour markets due to the high emotional and affective demands of their roles (p. 34)

The role of technicians is crucial in how audiences experience music. By aligning their outputs with artistic visions, technicians ensure that the performance resonates with the cultural expectations of the audience, effectively translating the "invisible" cultural codes into tangible experiences (Maguire & Matthews, 2014, p. 18). Prior (2008, p. 310) complements this by integrating Bourdieu's ideas with Actor-Network Theory (ANT), emphasising that technicians, alongside artists and technologies, form a network that co-produces cultural outcomes.

Furthermore, Battentier and Kuipers (2020) pay notice to the cultural role that sound and light technicians play in the production process, a role often overshadowed by their technical responsibilities. While these technicians may not directly engage in the cultural framing or generation of "buzz" typically associated with artistic endeavours, they are instrumental in infusing symbolic meaning into the material aspects of productions. Their contribution surpasses technical execution, involving a complex form of cultural translation that allows attendees to become fully immersed in the performances. Often reflecting a cultural item or the apparent landscape on which they are based, technicians contribute to the material and symbolic dimensions of electronic music productions (Battentier & Kuipers, 2020, p. 9).

Human actors are essential in the production process. However, there is a duality to this network. The emergence and adaptation of technologies play an equally crucial role. In Actor-Network Theory (ANT), human actors are considered alongside non-human entities as equally influential within networks. This reflects a unique approach where relationships are dynamic, mediated by both material and semiotic elements (Callon, 1984, pp. 196-233; Latour, 2011, p. 805).

2.3 The Role of Technologies in Productions

In understanding the pivotal role of technology in cultural productions, a classic example that Bruno Latour often cites to illustrate technology as an active participant involves a hydraulic door-closer. Installed by a human, this device functions to maintain a door's closed state, thereby stabilizing its network. This example highlights how the operation of an automatic door undermines the conventional distinctions between users and tools, and between subjects and objects (Latour, 2011, p. 799).

2.3.1 Actor-Network Theory

Actor-Network Theory (ANT), developed by Bruno Latour, Michel Callon, and John Law, extends this analysis by emphasising the interconnectedness of human and non-human actors within networks. ANT dismantles traditional distinctions between humans and technology, proposing that all "actants" within a network possess a degree of agency (Williams, 2020, p. 45). This perspective is crucial for understanding the dynamics between sound and light technicians and the technologies they employ, highlighting that these technologies are not mere tools but active participants in the production process (Law, 2009, p. 12; Latour, 2011, p. 800). By ascribing agency to non-human actors, ANT reconfigures the role of technology in social networks, asserting that technologies influence social outcomes as decisively as human agents. In ANT, technologies are treated symmetrically with humans, serving as both intermediaries and mediators in networks (Latour, 2011, p. 801).

As intermediaries, technologies transmit actions without alteration, while as mediators, they transform and shape outcomes through the processes they facilitate – a concept known as translation, a central component of ANT (Callon, 1986; p. 197; Latour, 2011, p. 800). Translation is the critical stages through which actors are aligned, roles are defined, and collective action is coordinated to achieve network stability and functionality. This theory was first presented by Callon (1986) through the study of the fishermen and scallops in St. Brieuc Bay (pp. 196-223). In this example, the fishermen collaborate with scientists to cultivate and sustainably harvest scallops, while the scallops themselves are manipulated and studied to ensure successful reproduction and growth. Callon

demonstrates that the stabilisation of this network relies on the interdependencies and mutual adjustments of both the fishermen and the scallops, reflecting how human and non-human entities co-evolve and influence each other (Callon, 1984, p. 201). Building on this theory, Latour (2011) proceeded to divide translation into four stages (p. 799-801):

i. Problematisation is the initial stage where an actor, often termed the "initiator" or "obligatory passage point," identifies a problem and proposes a solution that necessitates the involvement of other actors (Callon, 1986, p. 196). The initiator frames the problem in such a way that other actors must engage with the proposed solution, positioning itself as indispensable for resolving the issue. This strategic framing ensures that the initiator's role is perceived as crucial to the resolution process.
ii. In the interessement stage, the initiator seeks to lock other actors into the roles defined during the problematisation stage. This involves convincing the actors that the proposed network and roles are beneficial for them (Callon, 1986, p. 199). Interessement involves negotiations and communication in stabilising the identities and roles of the actors within the network. This stage can include creating alliances and overcoming personal resistance, ensuring actors are to ensure actors remain committed to their designated roles.
iii. Enrolment is the stage where the roles of various actors within the network are formally defined and interrelated. It signifies that the actors have accepted their roles and are ready to participate in the network (Callon, 1986, p. 202). Enrolment involves the actual mobilisation of actors, each performing their designated role. This stage requires the alignment of interests and the successful coordination of various entities towards the common goal.
iv. Mobilisation is the final stage that ensures the network remains stable and operational by keeping the enrolled actors aligned and active. It involves the collective action of the network to achieve its objectives (Callon, 1986, p. 205). This stage includes maintaining support and participation from actors, addressing emerging issues, and ensuring the network can adapt to changes while remaining functional. The initiator must continuously manage the network to prevent it from disintegrating.

2.3.2 The Complexity of Actor-Networks

Callon and Law challenge traditional notions of agency within production, claiming that it is distributed across a network of human and non-human actors. They propose that actions, or results, come from interconnected relationships within this network, where both technological artefacts and human actors play crucial roles in enabling or constraining outcomes (Callon & Law, 1995, p. 484). Latour extends these ideas by contending that technological advancements are the products of complex networks involving technologies. He argues that human actors construct and stabilise the understanding of technological actors, actively integrating them into their network rather than just

discovering them (Latour, 1999, pp. 150-170). Furthermore, he redefines social networks as a body of heterogeneous elements shaped by the interactions between actors (Latour, 2011, p. 800). Law emphasises heterogeneous networks, such as that of ANT, carry a degree of complexity and messiness, often involving intense negotiation between humans and technologies. He advocates for a more flexible and inclusive approach to research methodologies that can capture the fluid and dynamic nature of these interactions (Law, 1999, p. 12).

The Social Construction of Technology (SCOT) was introduced by Pinch and Bijker, positing that technological development is not solely determined by technical factors but is significantly shaped by social processes (Pinch & Bijker, 1984, p. 399). Interactions between "relevant social groups" have different perspectives and priorities, leading to "interpretative flexibility," where technology can be understood and used in multiple ways (Pinch & Bijker, 1984, p. 421). Through interactions and negotiations among these groups, a dominant interpretation eventually emerges, stabilising the network.

Feenberg's (1991) Critical Theory of Technology further rejects a purely functionalist view of technology (pp. 40-120). Feenberg distinguishes between primary instrumentalization, which focuses on the technical functions and capabilities of artefacts, and secondary instrumentalization, which examines how technology is embedded in and transforms social contexts through its use. This dual consideration supports ANT's principle of symmetry, wherein all actors, both human and non-human, are viewed as integral components of a network, each influencing and stabilising the other (Feenberg, 1991, pp. 55-70; 2002, pp. 178-180)

Akrich's presentation of technologies coming with embedded "scripts" or "scenarios" refers to the specific sequences of actions that are inscribed into a technological artefact (Akrich, 1997, p. 218). These scripts dictate how users interact with technology by either enabling or constraining specific actions. In the context of electronic music events, a speaker either functions or doesn't. This conceptualisation challenges the passive role often attributed to technologies. Through their operation, technologies will actively contribute according to the scripts they carry (Akrich et al., 2002, pp. 187-230).

2.4. The Impact of Technologies in Production

In the context of electronic music, events are not solely about the performances of DJs or their operating technicians; they are significantly shaped by lighting and sound technologies. Such technology transforms these events into immersive sensory experiences, influencing both the auditory and visual engagement of the audience. These technologies will now be explored further, presenting them as actors within the production network.

2.4.1 Sound Technologies

In sound design, a recognisable contributor is the loudspeaker. The 1980s marked significant advancements in speaker technology, with the introduction of subwoofers and bass speakers designed to handle low-frequency sounds with greater clarity and power (Greene & Porcello, 2005, pp. 145-150). The development of speaker technology continued with the refinement of two-way and three-way speaker systems, which separate sound into different "frequency bands," referring to the ranges of sound frequencies that are grouped together based on their role in audio transmission. Each band is then handled by specialised "drivers," referring to components within speakers that convert electrical audio signals into sound waves (Horning, 2004, pp. 710-20; Sandstrom, 2000, pp. 290-300). This separation produces cleaner, more efficient sound reproduction and less distortion at high volumes (Slaten, 2018, p. 6). In Actor-Network Theory (ANT) terms, loudspeakers and drivers act as non-human actors integral to the network of sound production. These technologies not only fulfil a technical function but also shape the practices and capabilities of human actors, such as sound engineers and performers. This dynamic interaction reflects the problematisation stage in ANT, where the need for high-quality sound output is identified, and these technologies are positioned as essential to achieving this goal (Callon, 1986, p. 196).

The introduction of the Musical Instrument Digital Interface (MIDI) in the early 1980s reformed possibilities for aspiring DJs and producers. MIDI allowed electronic musical instruments, computers, and other digital devices to communicate and synchronise. This technology became fundamental in developing Digital Audio Workstations (DAWs), which became central to sound engineering in studio and live settings by the late 1980s and 1990s. DAWs like Pro Tools, Logic, and Ableton allowed sound technicians and musicians to rapidly manipulate audio, facilitating complex editing, sound design, and mixing techniques (Leyshon, 2009, pp. 1315-1320). Electronic music production has increasingly relied on technologies such as samplers, synthesisers, and drum machines coupled with sophisticated music production software. This shift allows artists and producers to create music without traditional musical instrument skills, democratising music production and marking a significant change in the creative process where technological proficiency is as critical as musical talent (Fraser, 2012, pp. 505-510). These technologies demonstrate the interessement stage in ANT,

where the capabilities of DAWs and MIDI systems are aligned with the needs of producers and performers. By stabilising the identities and roles of these technological and human actors within the network, sound engineers can produce high-quality music efficiently (Callon, 1986, p. 199).

As sound technology advanced, so did the methods for sound distribution at live events. Public Address (PA) systems, consisting of microphones, mixing desks, effects modules, cables, amplifiers, and speakers, have become increasingly sophisticated (Battentier, 2021, p. 40). The design of the PA system itself is a way to get closer to this ideal. In the 1990s, the technology of Line Array was introduced, leading to a substantial change in concert amplification. Rather than concentrating sound diffusion on one point targeting the whole audience, the Line Array multiplies the sources so that each is focused on one part of the audience only (Battentier, 2021, p. 37; Horning, 2004, pp. 717-720). These systems became a staple in large venues and outdoor festivals, helping technicians manage the challenging acoustics of different environments. More recently, the incorporation of networked audio and digital signal processing (DSP) facilitated the transmission of high-quality digital audio over Ethernet, allowing for more flexible and scalable setups (Greene & Porcello, 2005, pp. 210-222). This development can be seen as part of the enrolment stage in ANT, where the formal definitions and interrelations of the roles of various actors are established. The Line Array system, for example, as a non-human actor, plays a crucial role in the distribution of audio across different sections of the audience. Nonetheless, its successful integration relies on the equally coordinated efforts of sound technicians through acknowledging the spatial features of their environment (Callon, 1986, p. 202).

Sound technicians address audio elements during live events through a combination of hardware and software tools. Pre-event sound checks are crucial to ensure sound technologies are operational, with digital mixing allowing for recall settings, a tool inherently valuable for technicians addressing audio in the same or similar event setting (Slaten, 2018, p. 8). This process resonates within the mobilisation stage of translation, where sound technicians must safeguard the audio network by ensuring the enrolled actors, DJs, sound systems, and microphones are aligned and active (Callon, 1986, p. 200). Furthermore, the alignment of actors reflects the mutual support of all actors, reflecting Becker's collective action principle (Becker, 1974, p. 770).

The advancements in sound technology from the 1980s to the present have enhanced the quality and scope of live sound and redefined the role of sound technologies, positioning them as pivotal contributors (Battentier, 2021, p. 22; Slaten, 2018, p. 27). Sound technicians, as human actors, maintain the functionality, adapt to changes, and elevate productions by ensuring a seamless, high-quality audio experience for attendees (REF). These innovations and working rituals are known to produce a sense of "feeling the music," "tactile sound," or "tactile perception of sound." This refers to the ability to perceive vibrations caused by sound waves through physical touch, particularly low-frequency vibrations such as those produced by bass frequencies. These sensations are not just heard

through the ears but are also felt throughout the body, thereby elevating the inherent atmosphere within live events (Horning, 2004, pp. 710-713; St. John, 2006, p. 13).

2.4.2 Light Technologies

Concurrently, lighting technology has also undergone significant development. The advent of Digital Multiplex (DMX) lighting technology transformed how lighting is operated in electronic music events and beyond (Varghese et al., 2015, pp. 1301-1306). The transition from analog-controlled lighting, where lights had to be manually adjusted individually, to digital control systems has facilitated the ability to coordinate complex lighting effects across multiple fixtures (Hsiao et al., 2017, pp. 14-35). New lighting "fixtures," explicitly referring to the physical hardware components that produce light, were constructed, each with its individual light distribution technique. These fixtures include PAR (parabolic aluminised reflector lights) that create backgrounds through soft "wash" lighting and a variety of laser and flash producers, including derby lights and scanners (Schielke, 2013, pp. 223-243; Schulte-Römer, 2018, pp. 699-727). The technical workings of DMX involve a digital communication network that sends control signals to the lighting fixtures. Each fixture is assigned a specific address within the DMX network, which can manage up to 512 channels per universe—a term that refers to a "single DMX network" (Wallraff, 1979, pp. 44-49). Lighting fixtures are distributed around the event space in coordination with the visual manifestations of those involved in the cultural production. DMX cables are used to transmit an output from the lighting controller, or "desk," to a single lighting fixture, where the signal is then transmitted to other fixtures through additional DMX cables or recently developed Bluetooth signalling (Wallraff, 1979, pp. 44-49; Varghese et al., 2015, pp. 1301-1306). In ANT terms, DMX lighting systems and fixtures act as non-human actors that significantly influence the event's visual and sensory experience. During the problematisation stage, the need for dynamic and synchronised lighting is identified, and DMX technology is positioned as crucial for achieving these effects (Hsiao et al., 2017, pp. 16-20).

Light technicians can program scenes and transitions, presenting opportunities for lighting that is in sync with musical beats and transitions (Schulte-Römer, 2018, p. 715). The ability to dynamically adjust lighting parameters, referred to by technicians as "busking," to match the rhythm and intensity of electronic music elevates the immersive quality of live performances. It has significantly raised the production value and standard of events. Furthermore, the amalgamation of DMX lighting and LED technology has presented new possibilities by offering enhanced colour-mixing capabilities, lower power consumption, and greater longevity than traditional lighting solutions. When combined with the physical stencils for lighting fixtures, or GOBOs, shapes and patterns can be shown through the light to create illuminating visual effects (Hsiao et al., 2017, pp. 22-25; Schulte-Römer, 2018, p. 719). The combination of different fixtures, GOBOs, and LED colouring presents infinite possibilities for

their operating technicians and light design of events, from subtle ambient lighting to intense, pulsating effects that resonate with the beats of electronic music, mirroring the interessement stage in lighting technology that involves aligning the capabilities of DMX and LED systems with the needs of event producers and light designers (Grundhöfer & Iwai, 2018, p. 663; Callon, 1986, p. 199).

DMX lighting provides technicians with an indispensable tool for artistic expression and technical performance. It enables precise control and synchronisation of complex lighting setups, which are critical in conveying the intended mood and enhancing the sensory experience of an event. Light design contributes to creating disorienting effects that align the body with sound and enhance the spiritual and trance-like experiences during events. These lighting effects are instrumental in facilitating psycho-biological effects and altered states of consciousness, enriching the expressive and spiritual dimensions of electronic music events (Peter, 2014, pp. 47-64; St John, 2006, p. 12), during the enrolment stage in ANT, where the roles of various lighting technologies are formally defined within the network. Technicians set up and configure the equipment, ensuring each component functions as intended, and integrate these technologies to produce the desired visual effects (Callon, 1986, p. 202). Finally, in the mobilisation stage, continuous adjustments and monitoring ensure the network remains stable and operational. Light technicians, as human actors, maintain the functionality and adaptability of the lighting setup, ensuring a seamless visual experience that enhances the overall event (REF).

Although sound and light technologies exist as separate entities, they are similar in nature and require stabilisation within their network. The stabilisation of devices between all parties results in the network's success, bringing "closure" to the interaction (Latour, 2011, p. 803; Bijker, 1995, pp. 51-82). This mutual dependency detonates a symbiotic element to the relation, where closure can result in network co-evolution, referring to the reciprocal process by which human and non-human actors continuously influence and adapt to each other within a network, leading to the upgrading of their capabilities (Latour, 2011, p. 803; Maguire & Matthews, 2012, p. 555).

2.5 Research Gap

This literature review highlights the necessity to illuminate the roles of sound and light technicians within productions, not just as support personnel but as pivotal agents in bridging the gap between technology and cultural experiences. By positioning technicians as both technical and cultural intermediaries, this study aims to explore how they negotiate closure. Moreover, existing literature often underestimates the agency of non-human actors, such as sound and light technologies, within these networks. By applying Actor-Network Theory (ANT), this research seeks to fortify the understanding of technologies as active participants that co-create the sensory experiences central to

electronic music events. This perspective shifts the focus from a purely human-centric view of production to a more integrated approach that acknowledges the symbiotic relationships between human and technological actors.

Symbiotic relationships in network co-evolution refer to the mutually beneficial interactions between human and non-human actors within a network. In these relationships, each actor influences and supports the development and evolution of the other. This concept is essential for understanding how technologies and social actors co-create and shape each other over time. Returning to Feenburg (2014), he explores the relationship between technology and society further, drawing from Marxist and phenomenological traditions to argue for a praxis-oriented approach (pp. 100-140). He contends that technology should serve as a means of human liberation rather than domination, proposing that technology can steer cultural production innovation towards more advanced outcomes, or in ANT terms, network co-evolution (Latour, 1988, pp. 180-200)

Methodology

3.1 Research Design

For the purpose of this study, a qualitative research design was chosen to explore the professional lives of sound and light technicians, focusing on their specific practices within their network, the roles of technologies used in live electronic music productions, the extent to which technologies can be considered actors, and the complex dynamics between technicians and the technologies they employ (Flick, 2018, pp. 5-10; Creswell, 2014, pp. 17-30). This approach offers nuanced insights into the contributions of sound and light technicians in shaping live electronic music experiences, revealing their methods, techniques, and the impacts of their technological interactions.

The research aims to answer sub-questions related to the evolving role of technological developments in cultural productions and the agentive role of technology in creating immersive live music performances. To achieve this, the study employs a combination of in-depth interviews, ethnographic research, and participant observation. In-depth interviews facilitate a deep exploration of technicians' personal experiences and professional perspectives, revealing their decision-making processes and challenges. Ethnographic research provides contextual understanding through direct observation of their work environments, documenting the real-time application of their skills and technologies. Additionally, participant observation at venues enabled me to engage closely with the technicians' daily routines and interactions, offering insider insights into their operational practices and collaborative efforts (Wijngaarden, 2023, pp. 1886; Becker, 1982, p. 769). This combination of methods affords a comprehensive view of both the subjective experiences of the technicians and the objective realities of their work settings, thereby enriching the overall understanding of their professional lives.

Guided by an auto-ethnography paradigm, this research leverages personal narrative and reflexivity to bridge the gap between the personal and the cultural, gaining rich insights into this network (Ellis & Bochner, 2000, pp. 733-768). This method is particularly effective for exploring the largely undocumented presence of sound and light technicians in academia. Additionally, becoming a light technician during the research process fostered a personal attachment to the study, similar to the emotional and therapeutic dimensions of auto-ethnography highlighted by Ellis (2004, pp. 1-10), bringing great personal satisfaction to me as a researcher. Efforts were made to balance narrative with theoretical understanding, following Anderson’s (2006, pp. 373-395) approach to analytic auto-ethnography. This involved maintaining analytic reflexivity, narrative visibility of the researcher’s self, dialogue with informants beyond the self, and commitment to keeping observations within theoretical frameworks.

3.2 Data Collection

Data collection took place between September 2023 and May 2024, following a three-step process: ethnographic observation, participant observation, and in-depth interviews. Combining these complementary methods aims to uncover comprehensive qualitative insights from different perspectives, contributing to our understanding of technicians, the role of technology, and cultural productions (Braun & Clarke, 2012, p. 61; Madden, 2017, p. 80; Mertens, 2018, p. 35).

3.2.1 Ethnography

The initial step involved conducting ethnographic research, a qualitative method characterized by immersive observation and participation, allowing me to gain in-depth insights into the lived experiences, social practices, and cultural contexts of participants (Hammersley & Atkinson, 2007, p. 5; Coffey, 2021, p. 12; Buscatto, 2018, p. 328). Given the agency of technicians in mediating live music, this research focused on observing how they manage technologies in live settings, contrasting with existing ethnographic accounts that primarily focus on recording engineers (Leyshon, 2009, p. 1312; Sandstrom, 2000, p. 290; Kuipers, 2015, p. 9; Horning, 2013, p. 10). Observations included how technicians navigate challenges, their real-time decision-making processes, and the process of translating non-human actors (Callon, 1986, p. 200; Latour, 2011, p. 800). The agency of technology was evident in instances such as lights not working as intended, system failures, or technicians visibly distressed by technological malfunctions.

3.2.2 Participant Observation

In the process of ethnography, building rapport with respective technicians (Bell et al., 2016, p. 200) facilitated my participation in technician practices such as setup, stage planning, and light operation at Club P and Festival D (Thompson, 2019, p. 680). This participant observation provided more profound insights into the routines and rituals of light technicians, which will be described in the results section.

The research was conducted at different electronic music venues within the Randstad region, primarily in Rotterdam. Given the global nature of electronic music (Varriale, 2016, p. 45), the study aims to interpret sound and light dynamics within venues not just in the Netherlands but potentially extending to global contexts. Venues were selected by examining their social media pages, programming of artists, and perceived technological capabilities. Additionally, participant observation was recorded at one festival. Descriptions of the venues are presented in the table below:

Pseudonym of Venue	(Sub) genre of electronic music	Location of venue	Venue capacity	Ethnography Sessions	Participant Observation Sessions	Total Hours
Club P	Techno, atmospheric	Rotterdam, NL	500-800	4	4	24
Club B	Techno, house	Rotterdam, NL	1500	0	1	8
Club G	House, dance	Rotterdam, NL	1000	2	2	12
Club L	Techno, house	Amsterdam, NL	1500	1	1	6
Club O	Dance, euphoric	Rotterdam, NL	1000	1	2	16
Festival D	Dance, techno	Nijmegen. NL	20,000	0	2	20
Total	6 subgenres	3 cities in NL	500-1500	8	8	120

Building rapport, which involves establishing a relationship of mutual trust, respect, and understanding (Bell et al., 2016, p. 200), was fundamental throughout the research process. This rapport facilitated my participation in technician practices, such as setup, stage planning, and light operation at Club P (Thompson, 2019, p. 680). The lack of existing literature on the roles of sound and light technicians created a sense of urgency among respondents, who felt that their responses would contribute significantly to the understanding of their work, their relationship with technology, and cultural productions.

Throughout the ethnographic process, in line with the interviews and participant observations, my observations were guided by the Operational Framework (Appendix A).

3.2.3 In-Depth Interviews

A purposive sampling strategy was implemented to recruit participants for in-depth interviews, which was pragmatic in gathering tangible data on sound and light engineers and their technologies (Emmel, 2013, p. 38). During the recruitment process, efforts were made to ensure a diverse range of experiences and perspectives were captured. Given the limited number of electronic music spaces in the city's infrastructure, the number of operational sound and light engineers available for recruitment was also limited. Interviews were guided by methodological principles presented by Platt (2001, p. 45). The interviews followed a semi-structured approach with a conversational style, aiming to enable participants to talk in a discursive and open manner (Wang & Yan, 2012, p. 235). Techniques such as informal conversational methods, avoiding leading questions,

and employing reflective listening served to uphold natural and equal dialogue dynamics, minimizing the interviewer's influence on respondents' answers and encouraging participants to express their views and experiences more freely (Platt, 2001, p. 47; Flick, 2018, p. 11; Johnson, 2011, p. 110).

Before the interviews, participants were issued a consent form (Appendix B) and a topic guide (Appendix C). Efforts were made to adhere to the structure of the topic guide. However, complete standardization was not expected or intended, as a standardized approach could constrain the development of rapport between the interviewer and participant (Bell et al., 2016, p. 200). Descriptions of respondents are presented in the table below:

Name	**Age**	**Profession**	**Location**	**Years of Experience**
Ron	18-24	Sound and light technician	Rotterdam, NL	4
Louis	18-24	Light technician and stage design	Rotterdam, NL	4
Charlie	18-24	Sound technician and stagehand	Maastricht, NL	2
Greg	18-24	Light technician	Dublin, Ireland	4
Tony*	25-28	DJ, club promoter, event organiser	Rotterdam, NL	5
*The interview with Tony was excluded from the analysis as it did not provide applicable insights into the roles of technicians, the technologies employed, or the symbiotic relationships between them. However, due to Tony's role in hiring Ron and me to organise lighting at Club O, he will be referred to in the results for context.				

In total, five interviews were conducted with various sound and light engineers. The participants recruited for interviews ranged from 18 to 28 years old, with each interview averaging 45 minutes in length. Additionally, an interview with a DJ/booker/club promoter was included due to the significance of the individual in facilitating participant observation in the later stages of the analysis. Four interviews were conducted face-to-face, while one interview with Greg was conducted via Zoom video conference. All interviews were audio-recorded and transcribed using Otter.ai before being uploaded for further analysis to ensure accurate and coherent transcripts.

3.3 Operationalization

An operational framework was developed to systematically guide the collection and analysis of data, ensuring that the research concepts were thoroughly explored. This framework aligns with the interpretive model of data collection (Ryan, 2018, p. 45; Appendix A). The defined concepts within this framework are as follows:

3.3.1 Venues and Cultural Productions (VEN-PROD)

This concept evaluates how venue layout and design, including lighting and sound, contribute to creating the appropriate "vibe" (Sommer, 2011, p. 75; Correia et al., 2017, p. 8). Ethnographic observations will map venue layouts, DJ and technician positioning, and technician movement patterns during events. Interviews will explore participants' workplace layouts, design considerations, and how these elements impact the overall production process, revealing how multiple actors within a network collaborate to create a cohesive production.

3.3.2 Being a Technician (BE-TECH)

This concept analyses the practices and routines of technicians, focusing on their roles within the production network (Battentier & Kuipers, 2020, p. 10; Hadley, 2021, p. 65). It investigates working conditions, routines, and the impact of surrounding networks (Wijngaarden, 2023, p. 1881; Crossley, 2020, pp. 98-102). Ethnographic and shadowing research will explore technicians' self-perceptions and experiences, highlighting their crucial roles in the production process.

3.3.3 Interactions with Technology (IN-TECH)

This concept examines how technicians interact with and utilize sound and light technologies, acknowledging these technologies as actors in the production process (Williams, 2020, p. 15; Green & Porcello, 2005, pp. 150-153). Observations will document the practical use of technology. At the same time, interviews will cover the range of technologies used and their impact on the production process, emphasizing the extent to which technology can be considered an actor.

3.3.4 Interaction with Co-Workers/Team/Surrounding Personnel (IN-COMS)

This concept evaluates workplace dynamics and resource-sharing among sound and light engineers and the production team (Wijngaarden, 2023, p. 1883). Observations will consider the venue as a collective workplace, noting interactions and privacy levels (Gandini & Cossu, 2021, p. 73; Wijngaarden, 2023, p. 1883). Interviews will explore the principle of collective action in cultural productions and how this operates during events, further evaluating the role of human networks in production (Becker, 1982, p. 769).

3.3.5 Personal Connection to Technology (CON-WORK)

This concept explores technicians' personal relationships with technology (Leyshon, 2009, p. 1315). It examines how personal feelings, self-perception, and emotional rewards impact their work, aiming to uncover the hidden aspects of their contributions (Shapin, 1989, p. 555). This is observed through interviews and shadowing, noting technicians' emotions during and after events, exploring the personal connections between technicians and technology, and evaluating symbiotic elements.

3.3.6 Perception of Technology as an Actor (CON-TECH)

This concept delves into the mediation process from the technicians' perspective using Actor-Network Theory (ANT) (Latour, 2011, pp. 799-805). It assesses technicians' opinions on considering technology as an actor, which is central to forming conclusions about their relationship with technology. Observations and interviews will evaluate the feasibility of translation as a robust framework for understanding these relationships, emphasizing the mutual relationship between technicians and technology.

3.4 Data Analysis

A thematic analysis of the interview transcriptions was conducted using the qualitative data analysis software ATLAS.ti. Thematic analysis, chosen for its ability to "legitimately focus on analyzing meaning across the dataset, or […] examine one particular aspect," is considered most appropriate for systematically identifying shared meanings and experiences across interviews (Braun & Clarke, 2012, p. 61). The analysis primarily employed an inductive approach "to create categories" flexibly, driven by the data itself (Kennedy, 2018, p. 12).

In the first stage of the analysis, interview transcripts were uploaded into ATLAS.ti. The transcripts were initially coded using an in-vivo coding approach, assigning codes based on participants' actual words. However, the process was also guided by concepts from the operationalization guide, reflecting a blend of in-vivo and a priori coding. In later analysis phases, the ethnographic field notes, transcripts, and "going native" voice memos were inputted into ATLAS.ti. The subcategories were then refined into the seven operational concepts listed in the operationalization guide using these three data sources. Finally, certain concepts were merged to present the emerging three themes: Technicians in the context of Networks, Technological Integration in Electronic Music, and Symbiosis and Network Co-Evolution.

The coding process was guided by the Operational Framework (Appendix A) and an additional Coding Guide (Appendix D), which was made for ease of performing coding.

3.5 Ethical Considerations

Two primary ethical principles guided this research: respect for the autonomy of attendees, organizers, and production teams, and adherence to the rules and regulations of the venues, including guidelines regarding photography and communication practices. This stems from Kant's perspective that individuals should never be exploited but treated with intrinsic respect (Mertens, 2018, p. 40).

Respecting the autonomy of all involved parties was paramount throughout the research process. Attendees, organizers, and production teams were afforded the opportunity to engage with the research voluntarily and were assured that their participation would be conducted with integrity and respect. This commitment to autonomy ensured that participants felt empowered to share their experiences and perspectives freely, without coercion or undue influence.

The principle of informed consent upheld the ethical integrity of the research. Prior to engaging in interviews, participants were fully informed about the nature and purpose of the research. They were provided with detailed information about the study, including its objectives, procedures, potential risks, and benefits. An informed consent form (Appendix B) was issued, allowing participants to voluntarily consent to participation with full awareness and understanding (Silverman, 2011, p. 352).

The anonymity of both respondents and venues was rigorously maintained throughout the research process. Pseudonyms were used to identify participants, and specific details about venues were kept confidential, safeguarding the anonymity of individuals and locations and upholding the trust and confidentiality essential for ethical research practices (Flick, 2018, p. 13; Silverman, 2011, p. 360).

Results

Emerging from the analysis, three subsequent themes were identified. First, the rituals and routines of sound and light technicians were explored, shedding light on their professional identities, learning processes, and the precarious yet fulfilling nature of their work. This theme highlights the technicians' continuous learning and mentorship, along with the satisfaction they derive from their roles.

Second, through the lens of ANT, the role of non-human actors, particularly the hardware and software used by sound and light technicians, was explored. This theme delves into the specific sound and light technologies, how technicians interact with them, with technology, the connection technicians have with their tools, and how these non-human actors transform and shape the production process. It emphasizes the indispensable role of technology in facilitating cultural productions.

Lastly, the symbiotic relationships between human and non-human actors within these production networks were analysed. Using insights from applying ANT's translation process, this theme examines the co-evolution of technicians and technology, the cultural and societal implications of their work, and the moments of symmetry where human and non-human interactions culminate in successful event productions. This theme underscores a symbiotic relationship between technicians and technologies.

4.1 Rituals and Routines of Production Networks

Human actors, more specifically sound and light technicians, within the network of production of live electronic music events. The routines, rituals, and professional identities of technicians are examined alongside their continual learning process, the mentorship involved and their willingness to learn. Moreover, the precarious nature of technicians will be acknowledged, as well as how their professional development comes to fruition and the satisfaction they derive from doing so. This theme is derived from subcategories: being a technician (BE-TECH), interaction with people/audience/DJ (IN-COMS), and connection to work/job satisfaction (CON-WORK)

The primary observations of the rituals and routines of sound and light technicians came from two perspectives. Firstly, from findings at Club P, I gathered insight into the rituals and routines of technicians working for an organisation. Secondly, at Festival D, I observed and interacted with a small group of light technicians and additional crew members, including myself. These observations, conducted from both an external and internal perspective, offered me a nuanced understanding of sound and light technician practices and their roles in event production.

Upon my first observations, they were seeing light technicians perform at Club P (ethnographic field notes, 16/12/23), which induced in me a sense of urgency to explore their contributions to cultivating an atmosphere. Club P has a capacity of about 500 people, but throughout the research time, it did not frequently hit capacity. Resultingly, the events seemed to be nearly tailored to you, evoking a sense of "now-ness" in the air (Sommer, 2011, p. 75). The small surface area, low ceilings, and dark aura of Club P presented a fertile ground for an array of lighting techniques, such as moving heads, highlighting the high degree of technical knowledge required in implementing sound and light technologies.

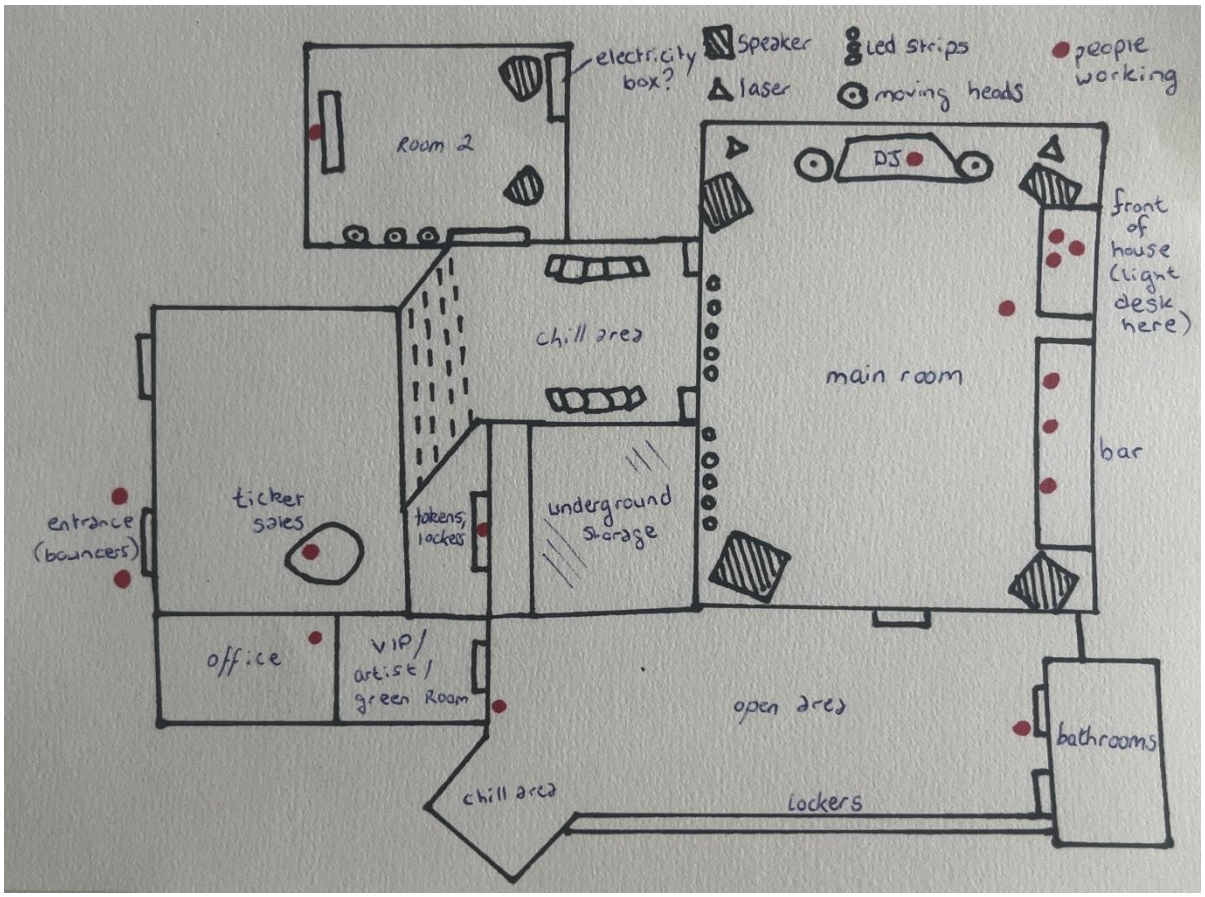

Figure 1: Floorplan of Club P (Ethnography, Club P, 16/12/23)

Upon first interacting with light technicians in practice at Club P (ethnographic field notes, 17/02/24), who were positioned the stage left of the DJ, neatly tucked against the wall beside the bar, out of immediate sight from the attendees. Upon interacting with them after the show, informing them they had done an excellent job, as they acknowledged their performance - it was a good one". This reminded me that their work is relatively hidden, both in acknowledgements from attendees and in academic literature (Slaten, 2018, p. 12). Technicians often operate in the shadows, both literally and figuratively. In contrast, I observed in other venues that their presence is similarly obscured due to the

haze sweeping across the dance floor (Club O, 26/04/24), their positioning in less visible areas (Club L, 02/03/24), or their absence from production entirely (Club B, 31/12/23).

This hidden nature of their work contrasts sharply with the visibility afforded to DJs, aligning with the portrayal of technicians in existing literature as overlooked yet essential contributors to the event's success. Technicians, while not seeking the limelight, seek a certain degree of recognition in an industry that often overlooks their contributions, with Charlie, a freelance sound technician, addressing the notion of invisibility associated with their work:

> "A level of invisibility? Yes, for sure. It does not bother me at all… But at the same time, yes, it is sometimes looked down upon, considering the fact that you have so much responsibility as a sound engineer. You do not really get the recognition… like the best compliment you can get as a sound engineer is no one's saying anything about your work" (Interview, Charlie, 30/01/23)

4.1.1 Role Formation and Collective Action and Motley Crews

Addressing the working practices of sound and light technicians, interviews conducted with these professionals were inherently valuable in understanding their relationship with co-technicians. Ron, who coordinates a group of sound and light technicians in Club P, points to the significance of having a reliable team with whom you can build connections as crucial in managing operations:

> "A team you can rely on and actually build a relationship with, especially in this brand because if you have random teams, I get the bigger company like Ahoy and Ziggo… But if you don't do what you're supposed to do, you're screwed" (Interview, Ron, 18/04/24).

The coordination of team dynamics is crucial for successful collaboration, with positive interactions leading to successful morale formation (Wijngaarden, 2023, p. 1882). Ron credits his team for cultivating team spirit at Club P, claiming that he cannot be present for some time and that his team will work diligently in his absence. The team was evident in the formation of group chats, not necessarily on a working basis (Participant Observation, Club O, 24/05/24).

It also must be noted that the technicians accepting the roles they are assigned is beneficial within the network, reflecting the concept of interessement in ANT terms (Latour, 2011, p. 800). Charlie illustrates this disciplined approach to his role, claiming that he will stay out of others' way if he is working as a stagehand as opposed to an engineer, highlighting the professionalism in acknowledging his skills: technicians maintain to support the broader goals of the event (Interview, 30/01/23). This was a prominent attribute at Festival D, where the first day of my role at Festival D

(08/06/24) was primarily attributed to cutting large sheets of metal, see Figure 2, that would be used for one of the stages.

Figure 2: Metal sheets for stage at Festival D (28/06/23)

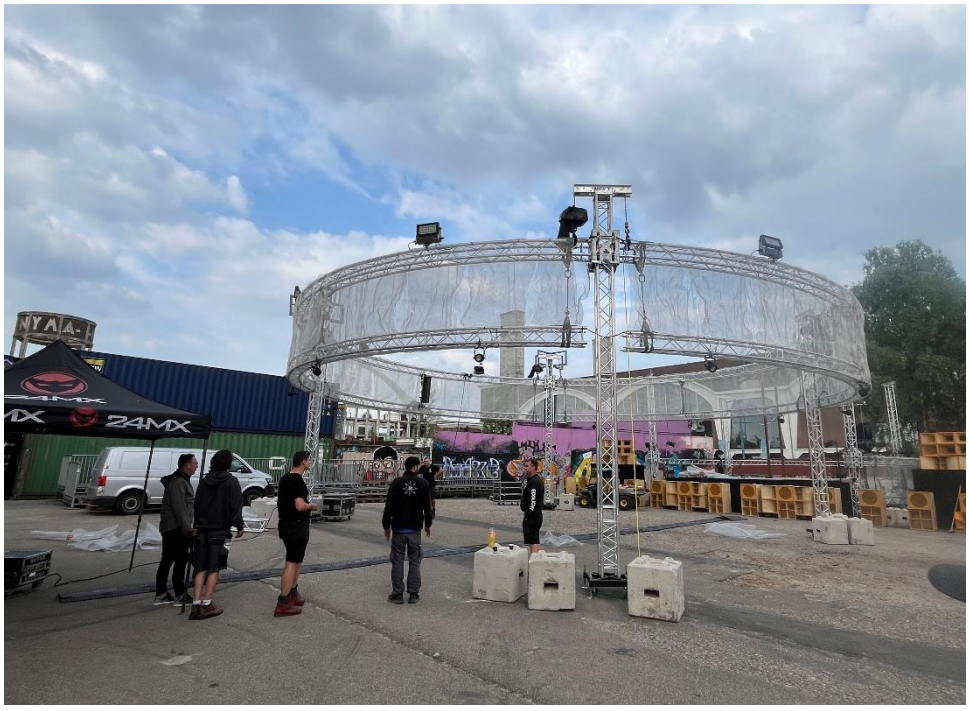

Figure 3 Metal sheets attached to frame

This alignment of roles resonated with Charlie's affirmation that smooth operations between technicians significantly contribute to the success of an event. Moreover, it reflects Caves' concept of the "motley crew," where the diverse skills and abilities of various team members are essential in the coordinated execution of complex productions (Caves, 2000, p. 9). Furthermore, Ron speaks on the importance of communicating to everyone involved in production with respect, regardless of the extent of their impact on the production (Interview, 30/01/23). I observed this to be true in the group dynamics of Club P, where I, as someone coming from the outside with little experience, was greeted and helped continually by the technicians present (Participant Observation, Club P, 19/04/203). Furthermore, casual or "serendipitous" encounters in liminal spaces, such as the parking lot by Club P, prompted development between myself and the technicians at Club P, promoting cohesion within the network (Wijngaarden, 2023, p. 1895).

Building on acknowledging the variance of roles between technicians, Becker's (1982) notion of "collective action" highlights the ongoing contributions of supporting staff in their work. Supporting staff, which includes production crew, DJs, bar staff, and security, were evident across all ethnographic observations at Club P and Club G. The integral connection of the technicians to the broader production team underscores the collective action principle, which will now be explored through the acknowledgement of other human actors present in productions.

The technicians' deep integration into the team is highlighted by their mutual support and the seamless integration of roles within the event's framework. Louis comments on the collective responsibility shared among the team members, reflecting on how every role contributes to the total experience of the event, even attendees, as all have an impact on the event's success. Aside from the technical contributions, it must be noted that floor staff, such as the "angels" of Club G (05/01/24), also play a role in the smooth functioning of the event. In observing their practices, they moved around the event space, smiling and gesturing to attendees. This role, while objectively simple, played a big part in the night, as it promoted the sense of community within the walls of the event (Lawrence, 2011, p. 235; Woo et al., 2015, p. 287; Sommer, 2001, p. 77).

Such testimonials emphasize the importance of collective efficacy among technical teams, where each member's flawless execution upholds the success of the event. Within this collaborative framework, technicians acknowledge their specific roles and the importance of performing them diligently and precisely. Becker's analysis of art worlds further strengthens this notion by demonstrating that the success of any artistic production relies on the coordinated efforts of all participants involved. Becker emphasizes that each member's role is crucial to the collective outcome (Becker, 1976, p. 39). This collective effort and mutual recognition of roles are essential in creating a harmonious and efficient working environment, ultimately contributing to the event's success.

In conclusion, this theme explores the critical role of human actors, sound and light technicians, in live electronic music events. Despite their crucial contributions, Ron speaks on the importance of speaking to everyone involved in production with respect, regardless of the impact on the individual. I observed this to be true in the group dynamics of Club P, where I, as someone coming from the outside with little experience, was greeted and helped continually by the technicians present. From this principle, the collective action and teamwork necessary for successful events are evident.

4.1.2 Continuous Learning and Mentorship

Emerging from initial ethnographic insights at Club P (Ethnography notes, 16.12.23), it became evident that sound and light technicians express a profound devotion to their work. This dedication is deeply rooted in their intrinsic interest and fascination with the field. Ron's journey into light and sound engineering exemplifies this, as he described his motivation: “It was all interest, all being completely intrigued by everything that was in front of me” (Interview, Ron, 18.04.23). His learning curve was fuelled by a natural desire to learn and seize opportunities as they arose: “I got my chance, and I took it.” This sentiment resonates with another technician at Club P, who was observed operating lights for entire nights without formal education or training, driven solely by a desire to learn, similar to my own experiences.

In addressing the process of becoming a light or sound technician, both Louis and Charlie acknowledge the role of formal education in their professional development. Louis attributes his growth to watching online tutorials before experimenting with them at his place of work (Club G):

> “From there I started watching tutorials, and what can I do to make it better? There was also a lot of space from that point for me to experiment with lighting, because they had a basic light plan, minimalistic like low, cheap fixtures. And they said yeah, if you want to want to try something else, let’s do it, and we’ll turn it around” (Interview, Louis, 10/05/24).

Similarly, Charlie highlights the importance of structured learning environments (Interview, 30/01/23):

> “We had a whole theatre and everything like everything was set up for us so we could practice. It was like within a section of the school that was made, especially for the entertainment industry, basically.”

The learning curve for both technicians was characterized by a blend of formal education, independent experimentation, and mentorship, which together facilitated their skill development and specialization within the production field. This educational foundation not only enhanced their technical abilities but also fostered their artistic expression as they advanced in their careers.

Mentorship emerges as a prominent undertone for these processes. Throughout the interview, Ron makes numerous references to his mentors, attributing his success in his role to them:

> "If I look at my experience, compared to when I wouldn't have the mentorship and the guidance, I'd be back like 90%, I would have to figure it out all by myself… My mentors, John and Daniel. They gave me all the space I needed. And it backed out pretty well, actually."

John and Daniel were, in turn, the same mentors as Louis during his two-year period at Club P. In a similar pattern, throughout this research, I was exposed to continuous mentorship from Ron. Without his mentorship, events such as Club O (24.05) would not have come to fruition. This sentiment is attributed to the positive team dynamics present at Club P, who promote a supportive working environment, which promotes the professional development of workers while fostering a sense of belonging (Wijngaarden, 2023, p. 1884). The mentor-mentee relationship often goes beyond professional guidance, offering emotional and moral support, which can be critical in an industry known for its uncertainties and challenges (Becker, 1976, p. 38).

4.1.3 Professional Identity and Passion

Having worked as a participant observer – being a light technician during the process of writing this thesis – I witnessed the demanding nature of the role of sound and light technicians. The build-up for stages, regardless of scale, takes far longer than (WIJ – MOMENTS), sometimes without taking a break for several hours, as observed in "build-up" sessions at Club P (25/04/24), Club O (24/05/24) and Festival D (28/05/24). This commitment underscores the devotion technicians have to their roles, often impacting their social lives. Louis, for example, outlines the sometimes lengths he goes to in preparation for lighting gigs:

> "Sometimes I spent like 5 pm till 5 am only programming, and then imagine you're constantly blowing smoke into the room because you're simulating your party setting."

Mostly, technicians seem comfortable with this, although there were ample descriptions of times when being a technician was too much for the interview candidates. The role of a sound and light technician also requires you to be physically and mentally available for an extended period of time. Charlie presents this subdued attribute of the job:

> "It's really not that romantic, to be honest. Because it's mostly just breaking stuff up. Well, building stuff up and breaking it down. It is also fun because I get to be part of the whole process, you know, and I still get to see the whole thing. But my job is not super glamorous."

Consequently, mood and temperament can be an issue for technicians who are operating elongated hours, simply due to being overworked, under-slept, or a combination of the two. Being a technician can also result in self-exploitation due to the passion for the work itself, leading to extensive overtime without additional compensation. The job's emotional and affective demands, combined with precarious employment conditions, can lead to significant physical and mental strain (Hesmondhalgh & Baker, 2010, p. 13). Indications toward resisting the manual labour involved in the practices of technicians, which often take time far longer than intended, were expressed by Charlie (Interview, 30/01/24):

> "I personally am not super engaged or super committed to this life because it is a very hard life. If you especially like being a touring sound engineer, it is exhausting. Like you'll be on the road for six weeks. Sleeping on a bus with six people you know. I've never personally experienced this, but the sound techs that I've seen, at the end or even during the middle of their tour, they're always grumpy when they come in and like, get me to the backstage… give me a glass of water, or a cup of coffee. Let me smoke my cigarette outside. And then I'll talk to you (Charlie, Interview, 30/01/24."

In the context of Actor-Network Theory, the experiences of burnout and fatigue among technicians illustrate the failure of translation, where misalignment of interests leads to network breakdowns, impacting motivation and performance (Callon, 1986, p. 210). Ron stands testament to these claims, stating his performance can often depend on how things are going in his personal life(Interview, Ron, 18/04/24). The challenges of balancing these long hours and the demanding nature of work, as seen in technicians' experiences, can lead to controversies and the dissolution of the network (Callon, 1986, p. 212). However, this was not a prominent observation.

Furthermore, I sensed there was an underlying satisfaction in Louis' claim about blowing smoke into their room until the early hours of the morning. Furthermore, he exerted his dedication to being a freelance light technician - "I want to do this for myself" (Interview, Louis, 10/05/24). The passion technicians have for their professional careers is evident not only in their commitment to their

technical roles but also in their continuous pursuit of learning and improvement, driven by a deep-seated love for their work. This intrinsic motivation aligns with the concept of "art for art's sake," as described by Caves (2000), which highlights the extent to which workers in the creative cultural industry will go, albeit to their own personal or economic detriment (Caves, 2000, p. 85). This is not to position technicians as financially incapable, with Louis asserting there is always work in this industry available, with Ron echoing this sentiment:

> "Now I'm in love with the work... I cannot imagine anything better than this to make my bread."

This passion-driven approach underscores the technicians' devotion to production, where personal fulfilment and artistic expression exceed financial gain. Moreover, technicians are driven by collective action, in that they are part of a team and the collective goal must be met. Observations revealed an inherent camaraderie among technicians, fostered by the small, close-knit, yet dedicated nature of the community. This sense of friendship and mutual support reflects a mutual passion and dedication to their craft (Wijngaarden, 2023, p. 1884).

4.2 Non-Human Actors

The second theme that became apparent is non-human actors, specifically hardware and software used by sound and light technicians in the production of live electronic music events. This theme seeks to evaluate the theories of Latour, Callon and Law, who position non-human actors as co-contributors to the creation and enhancement of live electronic music experiences. It follows the order in which each technology would be considered during the event setup, from build-up to operation. This theme was developed through insights gained from the following subcategories: interactions with technology (IN-TECH), connection with technology (CON-TECH) and venues and cultural productions (VEN-PROD). The analysis will reveal how these technologies transform and shape the production process, emphasising their indispensable role alongside human actors.

4.2.1 Facilitating Technology: Buildup and Cabling

The backbone of any sound and light setup in event production is the cabling and infrastructure. Proper cabling ensures the seamless operation of all technological components, from sound systems to lighting fixtures. The complexity of these setups often involves a myriad of cables, connectors, and adapters to interconnect the equipment efficiently. This "build-up" process conveys a large portion of technicians' working hours, consistent with all build-up processes I was involved in

throughout my experience at Club P, Club O and Festival D, (Participant Observation, 19/04/24; 25/04/24; 23/05/24; 24/05/24; 08/06/24)

The significant quantity and variety of cables required, not to mention stage tape to keep them in place, is evident in the setup at Festival D, where an independent sound technician, who also built the physical hardware, constructed and monitored the sound for a stage at the festival (Participant Observation, 08/06/24). In conversation with this technician, he mentioned he had been working with sound systems for over twenty years, and during this time, the sound technician had formed an inherent connection with the sound system he had built. This relationship underscores the manual aspects of production logistics, which, without meticulous attention, will result in the dissolution of the entire audio network (Callon, 1986, p. 210). Furthermore, the independent sound technician at Festival D, with his own set of technologies, worked in harmony with Louis and the light team in a collective effort to ensure the production was mobilized from a logistical standpoint (Becker, 1976, p. 39; Latour, 2011, p. 801).

Figure 4: Efficient cabling from independent sound technician at Festival D (28/05/24)

Moreover, Greg suggests the role batteries are integral in their facilitation of light design, suggesting traditional cabling may fall behind in the emergence of advanced battery sources:

> "Seeing it in the last two years, battery is becoming a big thing. We're getting better batteries, the likes used for electric cars and stuff. They're trying to make the battery smaller and more powerful, and that's translating over into lights now. So I think the evolution of the wireless battery will revolutionize, say, a festival stage. You're just sticking the light up, no cables. It will get rid of generators, which can be good from an eco-perspective as well" (Interview, Greg, 30/01/24)

This perspective suggests that the emergence of new technologies facilitates the ease of the buildup process, further reflecting the problematisaton stage of translation where problems are identified, and solutions are presented through the involvement of additional actors (c, 2011, p. 799)

4.2.2 Operating and Equalizing

Once the choice of technology is made, its implementation can be used to create an array of effects, with this section exploring these capabilities. The process of programming lighting and sound design involves meticulous attention to detail, as described by Greg, who gathers the entire waveform of the music and attaches different lighting cues to each point (Interview, Greg, 30/01/24). This process exemplifies Akrich's (1991) concept of scripts, where lighting fixtures carry out functions according to how they are programmed, highlighting the dynamic interaction between human creativity and technological capability. This negotiation between the capabilities of the fixture and that of the programmer highlights a dual nature in operation, where the fixture mediates the creative expression of the technician, and the technician mediates the capabilities of the fixture (Battentier, 2021). This dynamic interaction highlights the agency of technologies in shaping artistic outputs and transforming creative visions into tangible experiences (Battentier & Kuipers, 2020).

The different types of lighting fixtures and their uses also play a significant role in the choice of technology. Ron opts for at least three different fixture types, such as scanners, PAR cans, and strobe lights, each contributing uniquely to the production. These can include scanners, which are fast-moving beams that sweep across the room; parabolic aluminized reflector lights (PAR cans), which present a wash effect that can be used for backgrounds; or strobe lights, which create flashes for high-intensity moments (Schielke, 2013, pp. 223-243; Schulte-Römer, 2018, pp. 699-727). These different fixtures, each with their own set of functions, translate the many different meanings the music and the operating technician are trying to convey.

The intricate programming of LED strips showcases their potential for detailed light mapping, highlighting the diverse capabilities of modern lighting technology. As Louis explains, “Like an LED bar that is, let’s say, 100 pixels, has three channels. So, use RGB (red, green, blue), and you can get about 300 channels for one strip. So, if you get 40 strips for solving 40 universes and map that together, I feel like you can do a lot with LED strips. You can map them on and off, like the whole strip, or you can make it narrower, so you work per pixel” (Interview, Louis, 10/05/24). Furthermore, Louis's ability to project his ideas into visualization software, such as Resolume, offers the opportunity to pre-plan stage design, a tactic utilized in preparation for Festival D (Participant Observation, 08/06/24). Evidently, these software technologies offer an indispensable tool in creating visualisations for upcoming events.

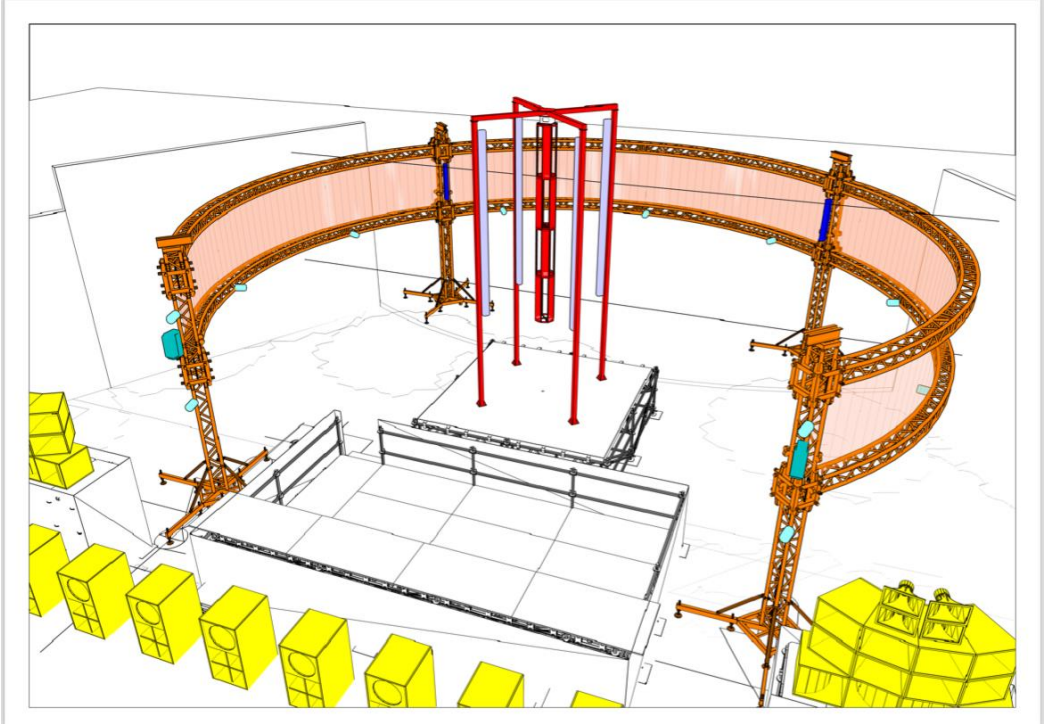

Figure 5: Light plan for one of the stages at Festival D (28/06/24), designed by Louis using Resolume

However, excessive light displays and the use of sound parameters do not always result in a positive outcome. For instance, minimal lighting fixtures at Club L created a compelling atmosphere. In contrast, the extensive sound system at Club O temporarily failed due to an insufficient power supply, demonstrating the temperamental nature of technology (Participant Observation, Club O, 24/05/23; Battentier & Kuipers, 2020, p. 37). The financial capacity of the event organizers also plays a crucial role in the extent of technology used. Club P, with its extensive equipment inventory, contrasts with Club B, which relied on a MIDI controller at the bar, demonstrating that effectiveness can be achieved even with minimal resources (Fraser, 2012; p. 508; Participant Observation, Club B, 31.12).

During live events, real-time interaction and adaptation are essential. Technicians must be attuned to the music, the DJ's cues, and the audience's reactions. Greg describes the process of "busking," likening it to DJing with lighting, where different elements are brought in and out depending on the music (Interview, Greg, 30/01/24). This real-time adjustment was observed at Club P, where technicians made live changes to light sequences based on the music's BPM and the apparent energy in the room (Kolehmainen & Mäkinen, 2019, p. 450). While operating lights at Club P (Participant Observation, 25/04/24), it was observed that one must pay close attention to both the DJ and the attendees, allowing for real-time adjustments to light sequences. While operating, I faced outwards toward the dance floor rather than toward the DJ, a process that felt somewhat unnatural but made sense, given the nature of the task. Given that this was a day event, I decided to implement brighter shades of light and activate the LED strips on the walls of the venue, demonstrating a degree of agency and creativity in operating lights (Williams, 2020, p. 45).

Moreover, the combination of different fixtures and colouring options presents infinite possibilities for their operating technicians and light design of events, from subtle ambient lighting (Ethnography, Club L, 02/03/24), to high-intensity strobing (Ethnography, Club P,16/03), to illumainating LED strips attached to a "Figure of 8" hanging from the ceiling (Ethnography, Club G, 25/02/24., intertwined (Grundhöfer & Iwai, 2018, p. 663; Callon, 1986, p. 199). These lighting effects, a product of the technology employed and their operating technician, are instrumental in facilitating psycho-biological effects and altered states of consciousness, enriching the expressive and mystical dimensions of electronic music events (Peter, 2013, p. 50; St John, 2006, p. 12; Grundhöfer & Iwai, 2018, p. 663).

Lighting aside, sound actors also require careful monitoring and adjustment to ensure optimal performance. At Club P, technicians moved around the space, modifying sound levels to achieve a balanced and immersive auditory experience. Ron and other sound technicians' commitment to optimising and "equalising" sound was evident throughout my observations at Club P, where technicians moved around the space, modifying sound levels accordingly. An inherent use of a tablet-like controller was used in equalizing sound levels, which can often happen as a result of the DJ turning the sound up on their controller in search of an affective atmosphere. Problematisation was also apparent through the equalization of sound technologies in live settings. During performances, DJs are prone to push the volume capacity on their DJ controller in, thinking it will result in an affective atmosphere (Kolehmainen & Mäkinen, 2021, p. 452; Ethnography, Club G, 25/02/24; Ethnography, Club L, 02/03/24). This can result in distorted sound effects that are unappealing to attendees (Slaten, 2018, p. 6). In combating this, sound technicians such as Ron use their expertise to balance the audio levels effectively.

The commitment to optimizing and "equalizing" sound underscores the tactile nature of sound technology, where the goal is to create a sound that can be both heard and felt by attendees. This level of investment from organizers, as well as the excitement of technicians upon receiving new technologies to implement, underscores the commitment to creating a tactile sound that can not only be heard but felt by attendees (Sommer, 2001; Battentier, 2021).

4.2.3 Agentive Implementation

The selection of technologies used in a live electronic music event significantly impacts the audience's perception and overall experience (Crossley, 2020, p. 95-100; Sommer, 2001, pp. 77-81; St John, 2006, p. 13). However, excessive light displays and speaker use do not always result in a positive outcome. For instance, at Club L, a minimal lighting rig created a compelling atmosphere, with simple wash lights illuminating spaces of the dance floor, with little to no attention given to moving head fixtures (Ethnography, Club L, 02/03/24). The financial capacity of the event organizers also plays a crucial role in the extent of technology used. Club P has an extensive equipment inventory, in contrast with Club B, which relied on a MIDI controller at the bar, demonstrating that effective light plans can be achieved even with minimal resources (Fraser, 2012, p. 507; Participant Observation, Club B, 31/12/23).

Greg, for example, consults with bands and DJs to align the lighting with their preferences, enhancing the collaborative nature of the production (Interview, Greg, 30/01/24). Ron, on the other hand, demonstrates that while he takes the opinions and perceptions of DJs into account, he will ultimately decide for himself what technologies to implement in productions, stating in relation to DJs:

> "Like they have posers. I get that they have an image, but forgive me because there are some posers. So, they're like, I want our colours to be the main colours to be blue and yellow. You can work around it, but often, DJs themselves don't have that much input. Maybe what DJs ask is, like 'don't use blinders because I don't want it to be back bright'. You know, like even those little moments of blindness, they don't like it. I'll take that into consideration. That's how I work with DJs and lighting" (Interview, Ron, 18/04/24)

Ron elaborates to state that he is "here for a reason", denoting his position as an accumulation of his own skill and hard work. He stresses that forming a "middle ground" is vital in formulating a light play that satisfies his own vision with that of the DJ's success, presenting collectivity as pivotal in the event's success (Interview, Ron, 18/04/24; Becker, 1976, p. 39). Louis, on the other hand, views the event space as his personal blank canvas, allowing for personal creative expression in each setup,

further illustrating how technology can be tailored to the unique vision of technicians:

> "You could see it as a canvas. The club is like a blank canvas. Every time a painter looks at a white canvas, it's like, what am I going to paint now? Right? I look at the club space like that, like okay, what are we going to do with this space?" (Interview, Louis, 10/05/24).

Furthermore, light and sound and light technologies used in production came from a multitude of sources. In building Club O, an independent sound engineer accounting for the 8-meter-long sound system, with lighting equipment coming from Ron and Club P, and curtains and other accessories being brought by the marketing team (Participant Observation, 24/05/23). I learned that the sharing of resources was a common practice among technicians and event organisers, with Louis confirming during the interview:

> "I'm bringing in extra, right? So, I work with people, I work with the tiger touche (lighting controller) from them, with their fixtures, and then I work with my laptop and my own gear, with the fixtures I brought in."

At Club P, Ron stated that despite the extensive collection of sound and technology available, artists would often bring their own hardware (Interview, Ron, 18/04/24).

Likewise, collaboration among technicians also emerged in the practical implementation of technology. During a collaborative event between Club P and Club G, technicians, including Ron and Louis, worked together to integrate new lighting fixtures and reconfigure existing ones, culminating in a shared vision for the event. This collaboration in skills resulted in the merging of technological hardware, such as Louis's implementation of LED strips, and the flashes and strobes present at Club P (Participant Observation, Club P, 25/04/24). This teamwork underscores the facilitation of joint problem-solving and innovation, referred to as fostering "accelerated serendipity" (Wijngaarden, 2023, p. 1884).

The interplay between human and non-human actors, viewed through the lens of Actor-Network Theory, underscores the duality of actors involved in production. Technicians demonstrate how creativity and technological capability interact dynamically, reinstating their indispensable role in creating captivating electronic music productions (Battentier & Kuipers, 2020, p. 33).

4.3 Symbiotic Relationships and Network Co-Evolution

This theme examines the underlying symbioses between technicians and technology. Firstly, this relationship will be analysed through ANT's four steps of translation; problemisation, interesssement, enrolement and mobilisaiton, presented by Callon (1986) and Latour (2011) (p 197; p. 802). Insights revealed that both human and non-human actors are capable of translating objectives in their own way (Latour, 2011, p. 800). The following section, therefore, offers the viability of Actor-Network Theory to interpret the relationship between technicians and their technologies. Secondly, this network's contributions will be explored, where events symbolise broader cultural significance. Finally, the concept of 'co-evolution' will be presented as a result of the actor-network shared between technician and technology. I will conclude with what I observed to be moments of co-evolution, where the human and non-human components met at max capacity . This theme was developed through insights gained from the following subcategories: connection with technology (CON-TECH), being a technician (BE-TECH) and venues and cultural productions (VEN-PROD)

4.3.1 Moments of Translation

Taking insights from the four-step process of translation (Latour, 2011, p. 801).

i. During the research project, I encountered many instances of problematisation. When I met with Tony, a DJ and event organiser, to discuss the possibility of light operating for an upcoming event at Club O, I proceeded to contact Ron, who possesses more expertise in organizing and building up the event, thereby framing the problem and positioning Ron's involvement as necessary. (Participant Observation Notes, Club O, 15.05). In this instance, I was the "initiator, who identifies a problem and proposes a solution through the involvement of other actors (Callon, 1986, p. 196).

ii. Interessement refers to negotiating and aligning the interests of various actors to ensure their commitment. (Callon, 1986, p. 199). Interessement negotiations aim to stabilise the identities of actors with other actors within the network (p. 482). This can come through the role of manually assigning tasks between, such as cutting material used for a stage at Festival D (28-29.05/24). It can also come through negotiation, such as the stabilisation of a lighting fixture against the rigging system (Participant Observation, Club P, 19/04/24)

iii. Enrollment involves the formal definition and interrelation of the roles of various actors within the network. The number of actors enrolled in a production network can vary greatly. Approximately eight individuals participated in the build-up for the event at Club

O. This group included the organisers (Tony, his friend, and the marketing team), independent contributors (the sound technician and the AV artist), and the light team (Ron and I). These are, however, only the human actors are listed. Upon build-up, upwards of fifteen lighting fixtures were present, and an 8-meter sound wall took up the majority of the space. From a numerical perspective, far more technological actants were enrolled.

iv. The final stage, mobilisation, ensures that the network remains stable and operational. This ongoing interaction maintained support and participation from the actors, who were present in Ron's monitoring of sound actors at Club P (Participant Observation, Club P, 19/04/24). The active management of the network during the event highlights the efforts to prevent disintegration and maintain stability (Participant Observation Notes, Club O, 24.05). This aligns with Latour's (2011) assertion that the durability of a network depends on the continuous alignment and activity of its actors (p. 808).

Evident from the negotiations between production staff and technologies through the lens of translation, the interactions between heterogeneous elements shape the stability of the production network ((Law, 1999, p. 12). This can be observed as symmetry in ANT refers when human and non-human actors with are in complete alignment (Latour, 2011, p. 800).

4.3.2. Cultural and Societal Mediation

Emerging from insights at Club P, Battentier and Kuipers (2020) emphasise that technicians play a crucial role by carrying symbolic meaning through the transformation of the material aspects into creative outputs. This transformation is vital as it facilitates the connection between the artistic creation and the audience, thereby becoming an integral part of the production process, and the materiality of their work significantly impacts how the event is perceived and experienced (Battentier & Kuipers, 2020, p. 9). Thereby, the work of technicians is to translate invisible cultural codes into tangible experiences (Maguire & Matthews, 2014, p. 18

At the closing party of Club G (Ethnography, 25/02/24), Louis, in coordination with the rest of the production team, converted the former arcade room into a dance floor with a unique lighting rig. This transformation featured two hanging fixtures resembling arcade game machines suspended from the ceiling, with LED strips attached to their rims. The choice of these hanging fixtures was not merely aesthetic but deeply symbolic, embodying an acknowledgement of the cultural background of the setting. This use of the arcade machines, technologies in their own right, incorporates iconic symbols of the venue's past, provoking an emotional response from the Club G team and the attendees

(Hesmondhalgh, Baker, 2010, p. 16; Fraser, 2012, p. 503) This was also a feature at Festival D, where the visions of Louis and his co-technicians was to create a stage representative of the cites surroundings, which included an array of energy harnessing technologies such as windmill turbines and electricity pylons (Participant Observation, Festival D, 28/05/23). This portrays how an event can commemorate its cultural setting, further posting sound and light technicians as not only technical but cultural intermediaries too (Battentier & Kuipers, 2020, p. 9).

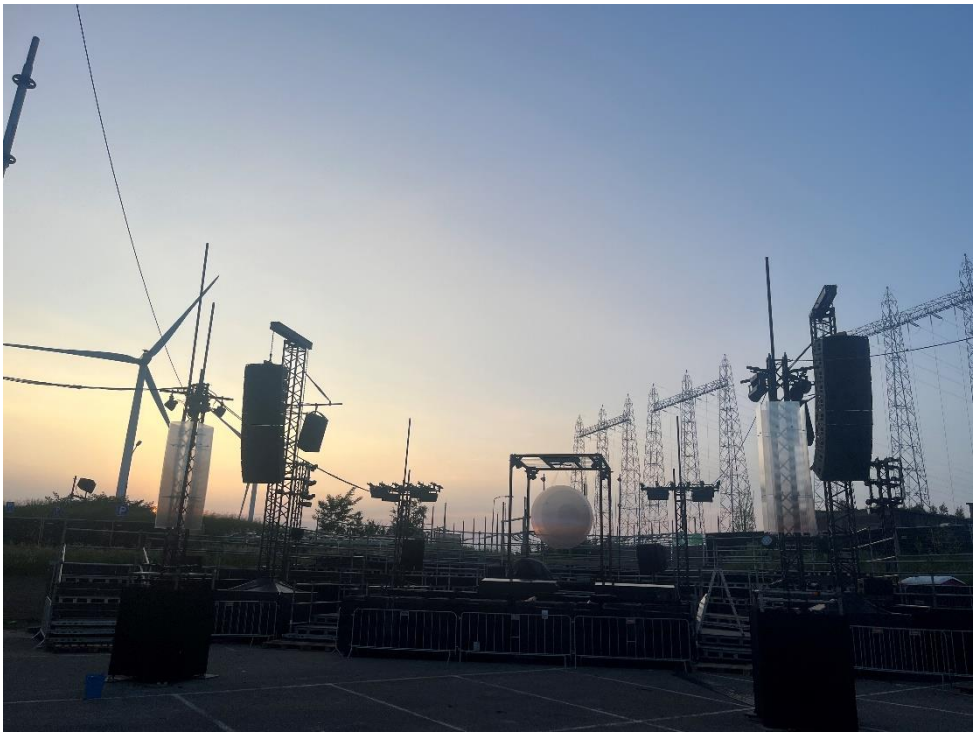

Figure 6. Stage design for a stage at Festival D, with the lighting rig complimenting the energy-harnessing backdrop of the site (28.05/24)

Moreover, the insights from interviewees showed that technicians are unwavering in bringing together diverse cultural backgrounds (Lawrence, 2011). This reflects a sentiment that technology has an impact on the formation of social groups in event settings, reflective of Latour's claim that technologies can be seen as society-made, as they embody social practices and norms (Latour, 1987, pp. 129-132). This highlights how the integration of sound and light technologies transforms the entire experience of the event, making their contributions not just a technical feat but a cultural and social phenomenon as well (Battentier & Kuipers, 2020, p. 31)

4.3.3 Transformative Experiences

As evident from the analysis, there is a deep-rooted connection between technicians and technologies. This was observed in Louis' excitement to thinking of a new fixture to add, which promoted literal running to his van to retrieve it (Participant Observation, 28/05/24). There was seemingly a Ron contests that there is always another step to be taken in implementing more tools into productions, affirming:

> "If you use stuff to the full extent by the level, they are capable, you get the best out of it, and I have learned that even technology was written to have its max, but you can go past." (Interview, Ron, 18/04/24)

This quotation prompted a sense of liberation in this field of production, reflecting SCOT's classical (1984) contention that technology serves to liberate human expression (p. 400). In ANT terms, this can be referred to as network co-evolution (Latour, 1988, pp. 180-200), where both human and non-human actors continuously influence and adapt to each other, leading to mutual advancement. This can be observed as symmetry in ANT refers when human and non-human actors with are in complete alignment (Latour, 2011, p. 800). The technical relationship between human and non-human actors extends beyond tacit knowledge and involves a deep understanding and mastery of the tools at hand (Battentier & Kuipers, 2020, p. 30). This will, in turn, lead to the evolving capabilities of both actors; with Ron testifying this is a never-ending process:

> " I have learned that even technology was written to have its max but you can go past... Like my programming, when I was a year ago compared to now, is completely different… And it just keeps going. It never stops." (Interview, Ron, 18/04/24)

In the final hours of Festival D building, Louis and his co-technician ascended on the scissor lift to attach the centrepiece to the lighting rig; symmetry was observed as both human and non-human actors reached a capability climax (Participant Observation, Festival D, 09/06). This centrepiece, being attached in the early hours of the morning after two days of building and six months of planning, was observed to be the accumulative labour Louis and the team had manifested, with labour being translated into the stage that was built (Latour, 2011). Through the seemingly simplistic action of then turning on the power, the creative vision of the technicians came alive, triggering emotional responses such as hugging and cheering among the group, reaffirming the emotional nature of the job (Hesmondhalgh and Baker, 2010, p. 15). This moment could be referred to as a "transformative experience" as a feeling of revelation was perceived amongst the team (Pine & Gilmore, 1999, p. 22). A moment like this was also felt during my first time operating at Club P,

where I felt agentive action of the lighting desk (Participant Observation, Club P, 11/05/24).

The integration of sound and light technologies thus transforms the entire experience of the event as something mystical, as Ron further adds, “merge of technology, at the same time, it's a merge of magic," underscoring a mystical relationship between human and non-humans (St. John, 2006).

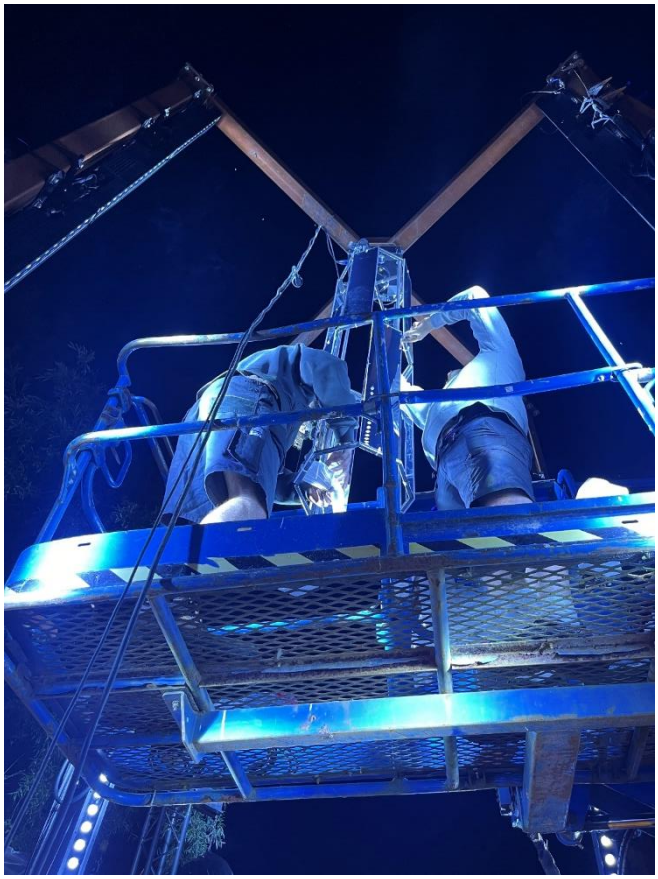

Figure 7 Louis and his co-technician reach co-evolution by extending their visions into reality

Conclusion

Building on the research of Battentier and Kuipiers (2020) and Battentier (2021), this thesis presents sound and light technicians as technical intermediaries, through their complex negotiation of integrating technologies into productions. Building on this, the mediation process has been explored through the concept of "translation," a central component of Actor-Network Theory (ANT). This theory, developed by scholars such as Bruno Latour, Michel Callon, and John Law, provides a comprehensive framework for understanding the interconnectedness and co-evolution of human and non-human actors within networks. ANT suggests that all actors within a network possess a degree of agency, thereby dismantling the traditional distinctions between humans and technology offers a nuanced perspective on the reality of production labour (Latour, 2011, p. 800). This thesis emphasises the dynamic interactions and mutual shaping between actors, whether they are humans or technologies. In the context of contemporary production theories, ANT prompts a more agential approach to technology, raising questions about the continued relevance and adaptability of existing theoretical frameworks considering the ever-evolving roles of technology (Latour, 2011, p. 810; Pinch & Bijker, 1984, pp. 410; Akrich, 1999, p. 218; Prior, 2008, pp. 301-319).

Firstly, this thesis contributes to our understanding of the production of live electronic music events, the value they hold, and the collective actors that constitute production. It presents the diverse network of human actors, from mentors to co-technicians, as significant influencers in the personal and professional lives of sound and light technicians (Becker, 1974, p. 770; Wijngaarden, 2023, p. 1881). Following the work of Battentier & Kuipers (2020, pp. 1-22), technicians have been placed at the centre of this production study, reposting their critical role in society as technical intermediaries. Furthermore, they have been examined through the lens of cultural intermediaries for their contributions to translating technology into cultural experiences (Prior, p. 310; Pinch & Bijker, 1984, p. 410-441). (Latour, 1988, pp. 180-220; Battentier & Kuipers, 2020, p. 18).

Secondly, the recognition of sound and light technologies has also been examined through the lens of Actor-Network Theory, providing insights into the extent to which these technologies can be considered agentive. This research illuminates how technologies have upgraded production value within, but not limited to, the context of live electronic music events. The objective was to propose a less human-centric lens in production studies and to identify technologies as active participants in the production process. In describing the network of non-human actors, various sound and light technologies, this paper presented the vast array of capabilities within actors. Furthemore, effective in presenting the complexity of the relationship between technicians and the technologies they implement in production (Callon, 1984, pp. 196-233; Latour, 2011, p. 800).

Finally, the research presents the emergence of a symbiotic partnership between humans and technology within the context of, but not limited to, technicians and their tools. The ANT principle of translation has been used to describe the ways technicians and technologies interact, highlighting their interdependency. This exploration has revealed what this relationship means within a broader framework of human and technological interaction, presenting that once symmetry is found, it can lead to a transformative experience (Williams, 2020; Pinch and Bijker, 1987; Latour, 2011, p. 808).

Limitations and Further Research

The primary limitation lies in the scope of the research, which is confined to electronic music events in the Netherlands. This geographic limitation means that the findings may not be universally applicable to technicians working in different cultural or organizational contexts. Moreover, respondents reported a variance in technologies implemented outside of Europe, such as in the United States. Additionally, the research excludes other music genres that might have similarities within their network, therefore extending this research to cover all sound and light technicians, not just those operating in the electronic music scene.

Another limitation could be the reliance on ANT as the sole theoretical framework. While ANT provides a robust lens for examining the interactions between human and non-human actors, it has been criticised for downplaying human social processes and power dynamics (Battentier & Kuipers, 2020, p. 39; Elder-Vass, 2015, p. 470). This could lead to an underrepresentation of the socio-political contexts in which these technologies and technicians operate. In addressing this, future research could incorporate theories such as the Social Construction of Technology (SCOT), which posits that technological development is also significantly shaped by social processes (Pinch & Bijker, 1984, p. 399), Insights from these perspectives could provide additional insights into how actors are influenced by their social setting.

A final limitation could be a lack of focus on audience perception of technologically enhanced live music productions. Investigating how different technological elements, such as lighting, sound design, and visual effects, impact audience experiences and satisfaction can provide valuable feedback for technicians and cultural production organisers.

By integrating these perspectives, future studies are encouraged to shift towards a less human-centric lens in production studies. This approach acknowledges the active participation and agency of technological actors. It provides a comprehensive framework for understanding nuances of sound and light technicians in the production of live electronic music production events and, more broadly, symbiotic relations between humans and technology.

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Appendix

Appendix A: Operational Framework

THEMES		
Human Actors	**Non-Human Actors**	**Symbosis of Human and Non-Human**
Being a Technician (BE-TECH)	Interactions with Technology (IN-TECH)	Connection with technology (CON-TECH)
Interaction with People/Audience/DJ (IN-COMS)	Connection with technology (CON-TECH)	Being a Technician (BE-TECH)
Connection with what they do (CON-WORK)	Venues and Cultural Productions (VEN-PROD)	Venues and Cultural Productions (VEN-PROD)

Venues and Cultural Productions (VEN-PROD)	Definition, what ppl said about this Creating a "vibe" (Sommer, 2011)	Venue Layout Dynamics (VEN-PROD. LAY) Venue/Workplace Design (VEN-PROD. DES) Venue/Event Atmosphere (VEN-PROD. ATMO)	Ethnographic: map of the venue - Location of DJ - Location of light desk - Movement of technicians - Location of technician What is the atmosphere in the room? Where are attendees standing? What are they doing?	Can you describe the layout of your venue/workplace/etc. Can you explain where you are located/where your work centers? What factors must be considered in designing the space in the creation of an atmosphere?
Being a Technician (BE-TECH)	"Cultural mediators" (Battentier & Kuipers, 2020) "Hidden technician" (Slaten,	Identification as a Technician (BE-TECH. ID) Relationship with other team workers (BE-TECH. TEAM)	Interaction with DJ Interaction with co-technicians Interaction with staff Interaction with audience	To what extent do the people around you influence your work? How do you manage perceiving what the DJ wants vs. your own visualization of what the production should look like?
Interactions with Technology (IN-TECH)	"Translating" (Latour, 2011) "Generalised symmetry" (Callon, 1984, Law, 2009)	Impact of Technology on working practices (IN-TECH. IMPACT) Overall use of Technology (IN-TECH. USE)	Operating in practice with technology (lights, panels, cables, stuff) How much/little technology is being used	What technologies do you use for a given event, between hardware and software? - Are there any non-negotiable things you use? How do you find the operation process? Does it come easily or more natural to you? Does technology help or hinder the creative process?
Interaction with People/Audience/DJ (IN-COMS)	"Collective action" (Becker, 1976)	How they interact/are interacted with other people working at venue (IN-COMS. HOW) Influence of others on working output (IN-COMS. EFFECT)	Interaction with DJ Interaction with co-technicians Interaction with staff Interaction with audience	To what extent do the people around you influence your work? How do you manage perceiving what the DJ wants vs. your own visualization of what the production should look like?
Connection with what they do (CON-WORK)	"Emotional labour" (Leyshon, 2009; Watson, 2014)	Emotional attachment to what they are doing (CON-WORK. EMO) Perceived job satisfaction (CON-WORK. SATIS)	What emotions can you see across the board? After event... sense of relief/happiness/...?	Why did you become a technician? Do you enjoy your work? To what extent do you think emotion comes into your work while you are operating? Do you try to channel emotions into light /

				sound design / through listening to? How does it feel when you are finished a show?
Connection with technology (CON-TECH)	Sensory environments facilitate deep communal interaction (Schulte-Romer, 2018; Slaten; 2018) "Mediation" (Battentier & Kuipers, 2015; Bourdieu, 2008; Magurie & Matthews, 2012)	Perceived dependency on technology (CON-TECH. NEED) Personal relationship with technology (CON-TECH. PERS)	Where are people looking when they are attending events (at the DJ or toward the lights…?)	How do you perceive technology? (as an actor) Are you giving technology an output, or is technology giving you an output?
Societal importance/relevance (SOC-REL)	Historical proliferation Unique social setting – subcultures (Hodkinson, 2002) "Acts of valuing" (Allington et al., 2015) Heightened states (St. Paul, 2006) ANT networks – the role of technology is to upgrade civilisations (Williams, 2020)	Relevance of technology in cultural productions (SOC-REL. CULT) Relevance of technicians within this production (SOC-REL. TECH)	How long have venues been open? Types of people in attendance How they are interacting with everything Percieving how they feel about the event/music/experience Closing tracks – lights etc. Going 100%... What is the feeling in the venue	How do you perceive electronic music and its surrounding culture? Do you think your perception is the same as the rest of society? Why do you think electronic music events are amongst a "subculture" and not mainstream like other music cultures such as pop or rap? To what extent is technology to thank for the popularization of electronic music?

Appendix B: Consent Form

CONSENT REQUEST FOR PARTICIPATING IN RESEARCH

FOR QUESTIONS ABOUT THE STUDY, CONTACT:
George Kelly, 696329gk@eur.nl

DESCRIPTION

You[4] are invited to participate in a research project about sound and light technicians. The purpose of the study is to understand the relationship between technicians and the technologies they use in the production of live electronic music events. This research seeks to deepen our understanding of sound and light technicians, cultural mediation and the symbiosis of human and non-human actors through the lens of Actor-Network Theory.

Your acceptance to participate in this study means that you accept to participate in a survey / be interviewed / be observed while you In general terms,[5]

- in the case of interview my questions will be related to the practices of light and sound technicians and relationship with the technologies used in their workplace
- in the case of participant observation my observations will focus on the nuances and perceptions of technicians within the domain of sound and light design, electronic music productions and cultural mediation

Unless you prefer that no recordings are made, I will make an audio recording of the interview.

I will use the material from the interviews and my observation exclusively for academic work, such as further research, academic meetings and publications.

RISKS AND BENEFITS [alternatives A and B are presented below, but there may be further variations]

A. As far as I can tell, there are no risks associated with participating in this research. I will not use your name or other identifying information, such as your place of work, in the study. The participants and venues of the study will only be referred to with pseudonyms, and in terms of general characteristics such as age and gender, etc.

B. I am aware that the possibility of identifying the people who participate in this study may involve risks for corrupting the ethical guidelines of the research. For that reason—unless you prefer to be identified fully (first name, last name, occupation, etc.)—I will not keep any information that may lead to the identification of those involved in the study. I will only pseudonyms to identify participants.

You are always free not to answer any particular question, and/or stop participating at any point. Every time I want to accompany you in any activity, such as build up or light operating, I will ask you your permission again.

TIME INVOLVEMENT

Your participation in this study will take 2 months. You may interrupt your participation at any time.

PAYMENTS

[3] This Word template is available on Canvas (BA Thesis Class CM3051; Premaster Thesis Class
CM0053 and CM0054; Master Class CM4500; Master Thesis Project CM5000; Master Thesis Project CS5050).

[4] In the case of minors, informed consent must be obtained from the parents or other official carers. They will have to sign this form. Please make sure to adjust this form accordingly. Even if/when consent has been provided, children should never be forced to participate or to continue participating.

[5] Select what is appropriate.

There will be no monetary compensation for your participation.

PARTICIPANTS' RIGHTS

If you have decided to accept to participate in this project, please understand your participation is voluntary and you have the right to withdraw your consent or discontinue participation at any time without penalty. You have the right to refuse to answer particular questions. If you prefer, your identity will be made known in all written data resulting from the study. Otherwise, your individual privacy will be maintained in all published and written data resulting from the study.

CONTACTS AND QUESTIONS

If you have questions about your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact –anonymously, if you wish— Dr. Yosha Wijngaarden, wijngaarden@eshcc.eur.nl

SIGNING THE CONSENT FORM

If you sign this consent form, your signature will be the only documentation of your identity. Thus, you DO NOT NEED to sign this form. In order to minimize risks and protect your identity, you may prefer to consent orally. Your oral consent is sufficient.

I give consent to be recorded during this study:

Name Signature
Date

I prefer my identity to be revealed in all written data resulting from this study

Name Signature
Date

This copy of the consent form is for you to keep. [6]

[6] Two copies should be made for each subject: one for the subject to keep and one for the student's records.

Appendix C: Topic Guide

Introductions
- Describe yourself and your relationship with electronic music?
- How did you get into being a technician?

The Space
- Can you describe the layout of your venue/workplace/etc.
- Can you explain where you are located/where your work centers are?
- How do you move around? Why so? In which stages?
- What factors must be considered in designing the space?

The Events
- What constitutes a good party, club setting or otherwise, in your opinion?
- Do you recall an event in which you operated that was particularly memorable? Why?
- What would you like events to look like, if you had it completely your way?

Interaction with Technology
- What technologies do you use for a given event, between hardware and software? Are there any non-negotiable things you use?
- How do you find the operation process? Does it come easily or more natural to you?
- Does technology help or hinder the creative process?

Interaction with People
- To what extent do the people around you influence your work?
- How do you manage perceiving what the DJ wants vs. your own visualization of what the production should look like?

Being a Technician
- Why did you become a technician?
- Do you enjoy your work?
- To what extent do you think emotion comes into your work while you are operating?
- Do you try to channel emotions into light / sound design / through listening to?
- How does it feel when you are finished with a show?

Connecting with Technology
- How do you perceive technology? (as an actor)
- Do you try to channel emotions into light / sound design / through listening to the DJ?
- Does technology give you an opportunity to express yourself, or do you give technology the opportunity to be used and transferred into something creative?

Societal Relevance
- How do you perceive electronic music and its surrounding culture? Do you think your perception is the same as the rest of society?
- Why do you think electronic music events are amongst a “subculture” and not mainstream like other music cultures such as pop or rap?
- To what extent is technology to thank for the popularization of electronic music?

Appendix D: Coding Guide

CONCEPT	**1**	**Venues and Cultural Productions (VEN-PROD)**
SUBCATAGORIES	**1.1**	**Venue Layout Dynamics (VEN-PROD. ATMO)**
		Techniques for atmosphere creation
		Effective practices noted
	1.2	**Layout of Venue (VEN-PROD. LAY)**
		Mappings of venue layouts
		Placement and positioning of key personnel like DJs and technicians
	1.3	**Design of Venue (VEN-PROD. DES)**
		Factors considered in designing workplace layouts
		Participant input on layout effectiveness

CONCEPT	**2**	**Being a Technician (BE-TECH)**
SUBCATAGORIES	**.1**	**Self-perception (BE-TECH. TEAM)**
		How technicians identify within their workplace
		Characteristics of the job requirements
	2.2	**Professional relationships (BE-TECH. TEAM)**
		Impact on practices and outcomes

CONCEPT	**3**	**Interactions with Technology (IN-TECH)**
SUBCATAGORIES	**3.1**	**Usage and functionality (IN-TECH. USE)**
		Types of technologies used – hardware, software, cabling
		Operational challenges
	3.2	**Impact on creative processes (IN-TECH. IMPACT)**
		Enhancements to creative output/event success
		Constraints due to learning process

CONCEPT	**4**	**Interaction with People/Audience/DJ (IN-COMS)**
SUBCATAGORIES	**4.1**	**Nature of interactions (IN-COMS. HOW)**
		Strategies for effective communication
		Efficiency/nature of communication
	4.2	**Influence on work and event outcomes (IN-COMS. EFFECT)**
		Impact of communication on atmosphere during production
		Adjustments made based on feedback

CONCEPT	**5**	**Connection with their work (CON-WORK)**
SUBCATAGORIES	**5.1**	**Emotional attachment (CON-WORK. EMO)**
		Sources of emotional rewards
		Impact on personal satisfaction
	5.2	**Job satisfaction (CON-WORK. SATIS)**

		Factors influencing satisfaction
		Impact on performance and commitment

CONCEPT	**6**	**Connection with Technology (CON-TECH)**
CATAGORIES	**6.1**	**Dependency on technology (CON-TECH: NEED)**
		Types and extent of dependency
		Challenges and solutions
	6.2	**Personification of technology (CON-TECH: PERS)**
		Technology as a collaborator
		Emotional connections to technology