Custodianship across Generations: Preserving the Practice of Vinyl Record Manufacturing

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Abstract

Drawing on a global, longitudinal case study of the vinyl record manufacturing practice following a global decline in sales, we examine the work undertaken to preserve it over time. Our process model of practice preservation highlights that a declining practice may persist across generations if it is made more accessible and resilient by reducing its dependence on specific types of meanings, materials and competences that risk being lost. Our analysis suggests that these outcomes depend on the work of two types of custodians (legacy professionals and new enthusiasts) in terms of *diversifying* the practice to accommodate multiple configurations of meanings, materials and competences, thus constituting new practice variants, as well as supporting the continued enactment of variants over time by engaging in processes we label *propping up, recovering, replenishing* and *releasing*. In addition to developing a rich understanding of preservation, our findings contribute to a nuanced perspective on practice evolution by conceptualizing a practice as comprising multiple, potentially fluid variants. Moreover, by highlighting inclusive custodianship processes, which differ from gatekeeping and guarding so far emphasized, and by unpacking the role of materials to complement the traditional emphasis on symbolic elements, our findings enrich the nascent custodianship literature.

Keywords: practice theory; preservation; custodianship; declining industry; vinyl records.

How can a declining practice be kept alive? Practices, such as film photography, typewriter production, wooden boat building, and Stradivarius violin making, declined substantially due to technological and societal changes (Cattani, Dunbar, & Shapira, 2013). Practice decline depletes the existing elements of a practice –that is, the meanings, materials and competences that constitute it (Shove, Pantzar, & Watson, 2012). The depletion of even one of these elements may have ripple-effects on the others, eventually leading to its extinction.

And yet, history tells us that practices that have witnessed substantial decline may survive for a long time when current meanings persist or new meanings become associated with them, and when remnants in the form of relevant materials and competences survive and are passed on from one generation of practitioners[1] to the next. For instance, ancient crafts that are inefficient compared to modern industrial methods may continue to be practiced (Bell, Mangia, Taylor, & Toraldo, 2018) and manufacturing practices that have been abandoned by large corporations, such as making instant photographic film or typewriters, may be conducted by small firms or individuals (Hampel, Tracey, & Weber, 2016; Rohrlich, 2011). It is often only when practices are in danger of becoming extinct (Clarke, 2020; Heritage Crafts Association, 2023), or become re-associated with a market and profitability (Bacco & Dalpiaz, 2022; Kroezen & Heugens, 2019; Raffaelli, 2019), that we tend to take note. The work performed over time to preserve practices in decline has remained largely hidden and underappreciated. Indeed, practice studies in the management and organization literature have primarily focused on emergence, growth and diffusion (Anand, Gardner, & Morris, 2007; Furnari, 2014; Gomez & Bouty, 2011; Lounsbury & Crumley, 2007; Smets, Morris, & Greenwood, 2012), or on maintaining dominance in the face of

[1] We define a generation of practitioners as a group that has begun to engage with a practice in a specific time period and, as a consequence of their time of entry, has developed a particular relationship with the practice, associating with it meanings, materials and/or competences that differ from the preceding generation.

potential threats (Heaphy, 2013; Lok & de Rond, 2013), remaining relatively silent about the work involved in preserving practices already in decline.

A nascent and rapidly growing body of literature concerned with custodianship (Dacin & Dacin, 2008, 2019; Dacin, Dacin, & Kent, 2019; Montgomery & Dacin, 2020) provides insights into the work of preservation. This literature suggests that individual or collective actors with a vested interest in an institution (Dacin, Munir, & Tracey, 2010; Montgomery & Dacin, 2020), tradition (Dacin & Dacin, 2008; Dacin et al., 2019), identity (Howard-Grenville, Metzger, & Meyer, 2013), place (Wright, Meyer, Reay, & Staggs, 2021), or brand (Cooper, Miller, & Merrilees, 2015) act as custodians by performing critical roles to prevent entropy. By focusing on the preservation of traditions, institutions, and identities, the custodianship literature –like recent studies of technology and institution re-emergence (Kroezen & Heugens, 2019; Raffaelli, 2019)– has emphasized meanings and symbolic elements, devoting less attention to the role of materials and competences. But just because something is regarded as meaningful by some does not guarantee that it *can* and *will* be preserved: we still know very little about how custodians can gain access to, and become proficient in using materials and competences that are key to practice preservation, and how they can pass these on to future generations. Thus, we ask: *How can custodians preserve a declining practice across generations*?

We address this question with a global, longitudinal case study of the practice of vinyl record manufacturing,[2] which experienced significant decline worldwide following the successful commercialization of the audio cassette and digital compact disc (CD). While never completely abandoned (Hogan, 2014) and enjoying a renaissance several decades after its decline (Bartmanski & Woodward, 2020; Hendricks, 2016), for a protracted period of time vinyl record

[2] We use the terms "vinyl record" and "analog audio disc" interchangeably although technically not all audio-information-carrying discs that can be played back on a standard phonographic turntable contain vinyl.

manufacturing became highly precarious due to a substantial drop in supplies of specialized tools and services (Harris, 2015). Drawing on our analysis, we develop a process model comprising custodianship processes that sustain a practice that has experienced substantial decline. We find that two types of custodians –*legacy professionals* (i.e., members of a generation that had a relationship with the practice before decline and continued to depend on it for financial income) and *new enthusiasts* (i.e., members of a newer generation that developed a relationship with the practice after decline had begun and primarily for non-economic reasons)– both perform key preservation activities across these processes.

Specifically, legacy professionals engage in *propping up* by continuing to enact and support the practice –thus maintaining some of its existing meanings, materials, and competences. They may also *diversify* the practice by creating new configurations of meanings, materials, and competences, which establish new variants of the practice. Meanwhile, new enthusiasts can themselves diversify the practice, as well as engage in *recovering* (ensuring abandoned remnants are reusable), *replenishing* (increasing the available stock of materials required for practice enactment) and *releasing* (helping others acquire relevant materials and competences) efforts. Such custodial efforts may also inspire other enthusiasts to do the same, thereby attracting further custodians to the practice, thus enriching the multiplicity of custodians that further enables these custodianship processes. Taken together, these processes support practice preservation because the creation and uptake of multiple practice variants increase the practice's resilience (i.e., reducing dependence on specific meanings, materials and competences for survival) and its accessibility to new entrants (i.e., supporting regeneration by providing multiple opportunities to enter the practice). We thereby show that rather than defending the uniformity of

a practice in the face of an existential threat or possible deviations ('e pluribus unum'), differentiation ('ex uno plures') may play a more critical role in supporting persistence.

Our main contributions are to foreground practice preservation as a phenomenon of theoretical interest and to identify a set of custodianship roles and processes underlying the preservation of declining practices. In doing so, we integrate the hitherto disconnected literatures on practice evolution and custodianship, showing that to preserve a declining practice, custodians do not only need to renew the meanings inscribed in the practice but also re-generate the materials and competences that constitute it, as well as enable and support new generations of custodians in sustaining the enactment of the practice over time.

PRACTICE PRESERVATION

Below we draw from practice studies to define the terms practice, practice decline and practice preservation. Since these studies devote limited attention to practice preservation activities, we then turn to the custodianship literature for preservation-related insights.

The Evolution of Practices and their Preservation

Practices and practice variants. A practice commonly refers to a pattern of repeated activities that is recognizable to members of a community (Nicolini & Monteiro, 2016). Thus, practices are not just isolated activities but rather comprise sets of interrelated activities "that are both recurring and meaningful in the eyes of some social group" (Furnari, 2014: 442). Examples include teaching a class, manufacturing a car, and performing heart surgery. Shove, Pantzar and Watson (2012) suggest that every practice consists of three elements: (1) *meanings* (i.e., symbols, ideas, goals); (2) *materials* (i.e., things, technologies, tangible physical entities); and (3) *competences* (i.e., skills, know-how, techniques). For example, by enacting the practice of manufacturing a car, workers of a car manufacturing plant combine meanings (e.g., the goal of producing a car as part of their job; earning a salary) with the use of materials (e.g., the chassis,

steering wheel, assembly line) and competences (e.g., knowing how to operate a car assembly line). These three elements of a practice are interdependent and connected every time someone manufactures a car, i.e., every time the practice is enacted.

Each enactment of a practice introduces potential variations. As every teacher knows, no class is taught the same way twice. While practice enactments vary all the time, often in subtle ways, their variations are "mostly absorbed without trouble" (Shove et al., 2012: 102) into the same practice and so typically do not generate a distinct variant. Occasionally, variations in enacting a practice can lead to noticeable changes in the meanings, materials or competences underlying it, or in the ways these three elements are linked through the practice's activities (Schatzki, 2019; Shove et al., 2012: 103). For example, Lounsbury and Crumley (2007) describe how "active money management" was born as a "practice variant" of traditional money management practices. Practice variants are kept together as parts of the same practice (rather than becoming different practices) when they are anchored in some common, core elements constituting them as different ways of enacting ostensibly the same practice (Schatzki, 2019; Swidler, 2001). For example, while there are at least two distinctive variants of snowboarding ("street" vs "professional athlete" snowboarding, see Humphreys, 1997), there are some core elements that are common across these variants, such as similar materials (i.e., the snowboard) and competences (i.e., ability to perform basic snowboarding moves), which keep the variants together as different ways of enacting the same basic sets of activities. More generally, core elements of a practice (either meanings, materials or competences; or combinations thereof) constitute the practice as a *pattern* (Barnes, 2001). This means that practice variants enact a practice "in a form similar enough that they are recognizably related" (Shove et al., 2012: 123).

Practice decline. Practice decline can be defined as a substantial decrease in the level of enactment (i.e., frequency of performances) of a practice over time. Practice decline is both shaped by and shapes the availability of relevant meanings, materials and/or competences and linkages across these elements. For example, consider the practice of blacksmithing, which declined with the advent of automated metal manufacturing machines during the Industrial Revolution, allowing iron and other metals to be mass produced in a much faster and cheaper manner. Accordingly, blacksmithing declined because the adoption of alternative practices broke the established linkages among the meanings (e.g., an efficient and effective method of processing metal), materials (e.g., small metal batches) and competences (e.g., being able to forge and bend) constituting blacksmithing as a practice. Breaking these linkages in turn activated a cycle that reduced the availability of the elements of the practice, accelerating practice decline. For instance, since blacksmiths increasingly struggled to generate sufficient financial income, fewer people were interested in learning how to blacksmith and therefore actors with relevant competences also become more difficult to find.

Practice preservation. We refer to the sustained enactment of a practice as practice preservation. While practices may witness preservation efforts throughout their lifecyle, the decline of a practice makes such efforts particularly salient, observable and meaningful. When a practice is not witnessing decline, preservation may occur more or less automatically, especially when it is enacted routinely and taken for granted: while stabilization efforts may be required (Lok & de Rond, 2013; Tsoukas & Chia, 2002), its continued existence is usually not at risk.

Hence, we do not define practice preservation as sustaining the volume of enactment at the same level over time (or returning to pre-decline levels); or as the meanings associated with the practice remaining the same; or as enactment continuing in precisely the same way, using the

same materials, over time. Practice preservation, therefore, is less stringent than maintenance –it refers merely to keeping a practice alive rather than keeping it the same. Moreover, while complete discontinuation of a practice technically makes it extinct, this does not mean that it cannot be re-enacted and revived at some point in the future. However, such resurrection (Bacco & Dalpiaz, 2022; Howard-Grenville et al., 2013) of a practice is not the same as preservation as it entails (re-)emergence rather than persistence. Preservation can reduce the costs of re-enacting a practice that may otherwise be prohibitive (especially if it requires retrieving lost knowledge and/or re-building extensive material infrastructure).

To date, studies of practice evolution have focused on how a practice can emerge (e.g., Furnari, 2014; Gomez & Bouty, 2011; Lounsbury & Crumley, 2007), grow (e.g., Boxenbaum & Battilana, 2005; Nicolini, 2007), displace dominant practices (e.g., Bijker, 1997; Hargadon & Douglas, 2001), and remain dominant (e.g., Lok & de Rond, 2013; Siebert, Wilson, & Hamilton, 2017). Less attention has been devoted to the preservation of declining practices, despite growing recognition that they may survive for long time periods (Adner & Snow, 2010; Bell et al., 2018) and experience revivals (Kroezen & Heugens, 2019; Raffaelli, 2019).

Research on products and technologies that experienced decline offers insights into how their underlying practices can be preserved in a variety of ways, such as via market re-emergence that may re-activate latent meanings (Kroezen & Heugens, 2019; Nelson, Anthony, & Tripsas, 2023; Raffaelli, 2019), or through interventions by (non-)government organizations (e.g., Karakul, 2015; Zimmer & Toepler, 1999). These processes foreground relatively top-down, field-level mechanisms contributing to practice preservation through markets or the concerted efforts of established organizations and institutions with sufficient financial means. We know less about

how practices that have witnessed decline may be preserved bottom-up, i.e., through preservation activities that people do "on the ground". Hence, we turn to the literature on custodianship.

Custodianship and Practice Preservation

Drawing on existing research defining custodians in reference to traditions and given our emphasis on practices, we define custodians as actors who have a vested interest in a practice and, through their actions, actively establish, modify, add, or remove elements of the practice (cf. Dacin et al., 2019: 358). Custodians may be "independent and interdependent, [and] have overlapping and divergent vested interests" (Montgomery & Dacin, 2020: 1456). They can assume official and unofficial roles to guide, adapt, and protect a practice's longevity and prevent its demise (cf. Dacin & Dacin, 2008; Giddens, 1994; Shils, 1981; Soares, 1997). Introduced into an organizational context by Dacin and Dacin (2008), the custodianship literature has identified several types of custodianship activities that we group into *guarding*, *reviving meaning* and *grooming successors*. We outline each of these below.

Guarding. The bulk of the literature on custodianship focuses on various forms of guardianship or gatekeeping, essentially equating custodianship with the defense of an institution or established tradition (Crawford & Dacin, 2021). Specifically, custodians may seek to limit and constrain participation so as not to dilute the meaning, status, or benefits associated with a tradition (Dacin et al., 2019). For instance, members of guilds may define, monitor and enforce strict entrance requirements, rules, guidelines and standards to which practitioners need to conform (Dacin et al., 2010). Faced with competing demands, actors overseeing a highly demanded institution may need to engage in forms of rationing to prevent its collapse or misuse (Wright et al., 2021). Moreover, those evangelically promoting a certain endeavor may engage in "shepherding activities" (Massa, 2022) in attempts to safeguard its integrity.

Reviving meaning. Actors may also engage in efforts to revive appreciation for something they perceive as at risk of being lost (Montgomery and Dacin, 2020). This may involve the invocation of remnants of the past to revive a tradition (Dacin & Dacin, 2008). Building on these ideas, Kroezen & Heugens (2019), via their study of the revival of craft beer brewing, examined how declining traditions benefit from "dormant" custodians being "reawakened" as mnemonic traces or institutional remnants (Dacin & Dacin, 2008) are blended with modern elements. Cancellieri, Cattani, and Ferriani's (2022) study of the renewal of the Italian opera industry deepens our understanding of how traditions can be adapted by adding, modifying, or removing elements, and how such adaptation is dependent on audience members' openness to novelty. Relatedly, Bacco and Dalpiaz (2022) examine cultural entrepreneurs as custodians who revive extinct societal traditions by recomposing, mobilizing, and organizing collectives of dormant and dispersed custodians. This body of work highlights agency and affordance in the renewal and change of meanings of institutionalized practices and traditions.

Grooming successors. Finally, a limited number of studies examine the work of promoting and extending traditions, institutions and identities to new and existing audiences across time with the objective of recruiting custodian successors to pass them on to future generations. For example, Dacin et al. (2010) describe the recruitment and socialization of newcomers in maintaining the institution of social class, while Howard-Grenville et al. (2013) demonstrate the importance of authenticating experiences, enrolling others, and modeling behavior.

While the custodianship literature has identified key activities to preserve traditions, institutions and identities, this body of work has paid less attention to the preservation of *practices*. As a result of this gap, we know less about how custodians can gain access to, and utilize, the materials and competences required to ensure their sustained enactment. Further, we

know little about how a generation of custodians can transfer materials and competences to another and, as a result, about how declining practices can be preserved *across generations*.

METHODS

Research Setting

The global vinyl record manufacturing industry after the successful commercialization of audio cassettes and CDs is an ideal setting to study the preservation of a declining practice because it represents an extreme case that makes preservation processes "transparently observable" (Pettigrew, 1990: 275). Indeed, vinyl record sales decreased globally for several decades (with annual vinyl LP sales dropping in the US from 1978; and in the UK, Germany, France and Japan from 1979) with no sign of any potential for market resurgence during this period. As shown in Figure 1, by 1990 the volume of all vinyl records sold in the US (the largest market) had dwindled to less than 10% of sales recorded for 1977 and continued to drop each year, eventually amounting to less than 1% (<2m units) in 2007.[3]

As sales dropped dramatically across the world, the *manufacturing* of vinyl records followed suit and fell sharply (i.e., the level of enactment of the vinyl record manufacturing practice declined), with certain activities supporting the practice also declining and disappearing. Specifically, as highlighted in Figure 1, by 1990 all manufacturers of essential materials, such as pressing machines and disc cutting lathes, ceased production (with only consumables, such as lacquer-coated aluminum discs still being made).[4] Using Shove et al.'s (2012) conception of practice as a configuration of meanings, materials, and competences, we outline how each of these three elements declined with respect to vinyl record manufacturing activities (see Table 1).

-----INSERT FIGURE 1 AND TABLE 1 ABOUT HERE-----

[3] See Table A1 in the Online Appendix for further vinyl record sales and production-related data.
[4] See Figures A1-6 in the Online Appendix for images of relevant materials.

As a result of scarce materials and competences, mastering studios across the world faced potentially long interruptions when facing technical issues concerning their disc cutting systems. As a report in Music Week noted, "with only two people in the UK … now able to service the cutting equipment, there is a chance that the gear might give in first" (Bonutto, 1997). With vinyl record sales declining rapidly and increasing dependence on scarce *materials* and the *competences* of just a few individuals, the vinyl record manufacturing practice became unprofitable (and therefore lost its established *meaning*) for many practitioners.

By the time terms such as *vinyl revival* began appearing in the media (Harris, 2015; Hendricks, 2016), thereby associating the practice with consumer demand growth and therefore reviving a certain source of *meaning*, several developments had occurred that stemmed further decline of relevant *materials* and *competences*. For instance, specialized tool repair services were being offered by a new generation of individuals who had not been involved in the practice's heyday; pressing plants across Europe were pressing records without relying on traditional lacquer-coated aluminum master discs; and newly designed disc cutting devices were being used around the world. How did these preservation activities unfold?

Data Collection

Intrigued by the survival of vinyl record manufacturing, the first author began having informal conversations with record label owners, musicians, and mastering engineers in 2015 and 2016. These conversations revealed that certain parts of the vinyl record manufacturing supply chain had deteriorated to the point of causing disruptions. The first author also compiled a global list of vinyl record pressing plants using listings on several websites, noticing that at least 30 pressing plants had been established between 1990 and 2010, i.e., before any signs of a vinyl revival.

The research progressively focused on understanding the challenges the founders and managers of both old and new pressing plants had faced and how they had addressed them.

Aware of supply shortages, the scope expanded beyond pressing plants to the entire global supply chain –with a focus on the most precarious elements of the practice and how these had survived. Our investigation thereby extended to supporting activities, such as grinding disc cutting styli and coating aluminum discs to produce “lacquers”.

The first author subsequently contacted pressing plant managers, mastering engineers, dubplate cutters, lacquer disc manufacturers, electroplating specialists, antistatic record sleeve makers, mastering and pressing equipment part manufacturers, repair technicians and others involved in enacting or supporting vinyl record manufacturing. This resulted in 107 semi-structured interviews between 2016 and 2023 with 101 individuals around the world (see Table A2 in the Online Appendix). 29 interviews were combined with site visits (in Austria, Brazil, Canada, Czech Republic, France, Germany, Japan, Switzerland, UK, USA) to observe first-hand the activities and materials involved in vinyl record manufacturing. Site visits also provided opportunities for ethnographic interviews that were often triggered by specific activities and materials that were present. Six interviews featured more than one respondent and 11 respondents were interviewed multiple times to follow up on emerging insights from our data analyses. Of the 101 interview respondents, 20 had been active (or represented an organization that had been active) in activities related to vinyl record making before 1985 (i.e., before sustained decline), which we later classified as *legacy professionals*. All but 8 interviews were recorded, subsequently transcribed, and imported into NVivo for subsequent data analysis. Regarding the interviews that were not audio recorded, the first author took detailed notes.

Interviews used a biographical approach (Rosenthal, 2004) to capture narratives about how and why individuals had become involved in vinyl record manufacturing, the challenges they had experienced, and how they had addressed them. All respondents were offered the opportunity to

remain anonymous. As the research progressed, interviews focused on understanding how individuals had obtained certain materials and skills. Respondents were also asked about developments mentioned by others to gain further evidence or provide different perspectives.

We sought to identify key events that affected vinyl record manufacturing by asking participants about noteworthy developments and who was responsible for them, in addition to screening articles in the news and relevant trade journals, as well as reviewing posts in relevant online forums. This allowed us to identify certain individuals as key contributors to preservation and the types of preservation work they engaged in. All individuals regarded as instrumental to preservation were contacted and asked to participate in the study. In preparation for interviews, and as a substitute when interview requests were declined, articles in newspapers and magazines that mentioned these individuals (or their companies) were collected from the Nexis Uni database and general internet searches. Additionally, books (e.g. Bartmanski & Woodward, 2020; Haagsma, 2018; Osborne, 2014), academic journal articles (e.g. Bartmanski & Woodward, 2015; Sarpong, Dong, & Appiah, 2016) and trade magazines (e.g., Analog Audio Association) about developments in the vinyl record industry, as well as blogs, internet forum entries, and audio/video recordings of interviews (via YouTube, Vimeo, the Women in Vinyl podcast, and the Chasing Sound Oral History Project (Louie B. Nunn Center for Oral History, n.d.)) with relevant individuals were collected. The first author also met with several journalists who had published articles about vinyl record manufacturing after 1990 to gain further insights about specific developments. Comparing and probing for information across these different sources allowed us to triangulate our data (Flick, 2004) and address retrospective bias. On several occasions the first author reached out to the global vinyl record making community using online channels to request information and received valuable responses from community members.

An online forum created in 2005, known as the "Secret Society of Lathe Trolls", became an especially important data source in this respect. This forum, which is dedicated to sharing information regarding analog disc manufacturing, contains a complete archive of messages exchanged by its approximately 5,000 enthusiast members and therefore provides detailed insight into topics of interest to enthusiasts active in vinyl record manufacturing. The first author interviewed the forum's host, Steve Espinola, who granted access to the entire database.

Finally, the first author participated in a practitioner conference at which attendees engaged in discussions about developments in the field (which were audio recorded and transcribed for analysis). An overview of all data sources is presented in Table A3 (see online Appendix).

Data Analysis

Data collection and analysis occurred iteratively, with reflections on interviews and archival data raising questions and triggering ideas that were subsequently investigated with further data collection efforts (Alvesson & Kärreman, 2007; Becker, 1998). Our analysis initially focused on identifying who continued to make vinyl records after production figures had declined, as well as how they were able to continue enacting the practice, and why they did so. Having identified new entrants during this period of decline, we also analyzed our data with regard to how, when and why they had become involved in the practice. These insights formed the empirical basis of another paper (Holt & Wiedner, 2023). By contrast, for this paper, Shove et al.'s (2012) social practice dynamics framework consisting of meanings, materials and competences guides our abductive analyses (Mantere & Ketokivi, 2013) about how custodians preserved the declining vinyl record manufacturing practice across generations. We compiled lists of materials (e.g., disc recording lathes) and competences (e.g., repairing broken cutterheads) that became scarce during the practice's decline and constructed a timeline comprising events that addressed such scarcity.

Throughout our analysis, several distinctions became apparent, such as *legacy professionals* vs *new enthusiasts*; *enacting* vs *supporting* the practice; and *maintenance* of existing methods of enactment vs *creation* of new methods of enactment. Initially surprised by the finding that several methods of making analog audio discs that are common today emerged while the practice declined, we turned to the literature on practice evolution and, following Shove et al. (2012) and Lounsbury and Crumley (2007), conceptualized such methods as new practice *variants* (see Table 2). Interrogating our data, we sought to understand how these new variants, alongside traditional variants, unfolded over time. We subsequently re-structured our singular timeline by mapping key developments onto each identified variant over time (see Figure 2), highlighting notable transitions in support services (i.e., new enthusiasts taking over certain functions).

---------- INSERT TABLE 2 AND FIGURE 2 ABOUT HERE ----------

Our analysis involved both backward and forward readings of our data: beginning with our ultimate outcome of interest, namely how hundreds of individuals around the world were able to make vinyl records decades after the practice had declined, we analyzed how they acquired relevant competences and materials and who was responsible for providing access to them. Then, going further back in time, we studied how those responsible for providing access themselves acquired relevant competences and materials and who in turn was responsible for providing access to them. By working our way back this way, we adopted a genealogic approach which we complemented with our forward-looking analyses of these practitioners' activities over time.

---------- INSERT TABLE 3 ABOUT HERE ----------

Tracing these activities to our overarching outcome of interest, we grouped them into custodianship processes (see Table 3 for the data structure), assigned to different types of actors (legacy professionals and new enthusiasts). Structuring our data sequentially, we realized that

several custodianship processes (namely recovering, replenishing, and releasing) were highly interrelated and ongoing but mostly appeared after 1990 (ten years after decline had begun) and that two processes had begun earlier (namely propping up and diversifying). We identified connections between the earlier and later processes in terms of inter-generational transitions: for instance, a key transition took place when new enthusiasts started offering support services that previously only legacy professionals had provided.

Finally, we examined relationships between the identified processes, recognizing in our data not only that several actors had been involved in both maintaining and diversifying the practice, but also that these enabled one another. For instance, our data showed that several individuals who had acquired materials and developed competences by enacting and supporting traditional variants applied these to support the spread of new variants, while these new variants in turn provided accessible entry points for enthusiasts, some of whom later transitioned to enacting traditional variants. Several iterations of our findings were presented and discussed with practitioners, thereby increasing validity (Lincoln & Guba, 1985).

---------- INSERT FIGURE 3 ABOUT HERE ----------

FINDINGS

Given the complexity of the phenomenon studied, we first present the process model induced from our data (Figure 3) before presenting each of the identified processes that constitute it using illustrative data. Our model shows that declining practices can be preserved over time through five interrelated custodianship processes, two of which ("propping up" and "diversifying") unfold during an initial phase of decline, while the other three ("recovering", "replenishing" and "releasing") unfold in a subsequent phase of abating decline. Notably, our processes are enabled by the presence of different types of custodians and practice variants. Our model identifies two types of custodians (legacy professionals and new enthusiasts), which differ in their time of entry

vis-à-vis the decline (as indicated by "legacy" and "new") and in the meanings, materials and competences linking them to the practice, as detailed below. Given their diversity, legacy professionals and new enthusiasts engage in different custodianship processes at different times, in overlapping or sequential ways. Specifically, some legacy professionals respond to the initial decline of the practice by propping up and thereby maintaining existing variants of the practice, while others diversify it (as do some new enthusiasts) by creating new practice variants.

While *propping up* and *diversifying* are necessary to prevent further practice decline, they are not sufficient to sustain the continuous enactment of the practice across generations. This is what the new enthusiasts do by engaging in processes of recovering, replenishing and releasing across both the traditional and new practice variants. Taken together, these processes extend the level of enactment of each practice variant, thereby strengthening the practice as a whole. Indeed, it is the increasing diversity of the practice that increases its resilience (i.e., reducing dependence on specific configurations of meanings, materials, and competences) and accessibility, attracting new custodians to the practice and hence reinforcing the multiplicity of custodians and variants. Below we provide empirical evidence supporting each of the processes in turn, organizing our exposition by phase (see Table 4 for further data).

--------- INSERT TABLE 4 AND TABLE 5 ABOUT HERE ----------

Phase 1: Initial decline (1980-1994)

In this section, we illustrate the multiplicity of custodians and practice variants, as well as the two custodianship processes, that characterized the initial phase of practice decline.

Multiplicity of Custodians and Practice Variants

Custodians. Table 5 summarizes, and reports evidence about, the main characteristics of the two types of custodians –legacy professionals and enthusiasts– who were present during the period of initial decline. Two key characteristics differentiate these types of custodians in

relation to their preservation activities, namely (1) their times of entry (vis-à-vis the decline) and (2) the relationship they developed with the vinyl record manufacturing practice and its constitutive elements.[5] Specifically, we can distinguish between those who entered before the initial decline and benefitted economically from the practice (i.e., *legacy professionals*) and those who entered during decline, for whom the practice was meaningful primarily for other, non-economic reasons (i.e., *new enthusiasts*).

Before practice decline, making vinyl records was conducted almost exclusively by mastering engineers at mastering studios and employees at pressing plants. While these professionals may have also engaged with the practice for non-economic reasons, they typically derived financial income from it. Vinyl record production outside of commercial settings after the advent of affordable and portable tape machines was very rare, limited to a few individuals who enjoyed experimenting with decades-old equipment (see e.g., Brown, 1986), but had no meaningful influence on the practice. A few legacy professionals continued to enact or support the practice during the initial decline primarily because it represented a source of financial income for them. Instead of associating the practice with nostalgia, they predominately viewed it as an annoying chore. For instance, Dave Miller (who had built pressing machines in the 1970s) noted, "without a doubt, manufacturing vinyl records is the dirtiest, worst, most annoying part of the music business … You can babysit drunken bands who throw up on themselves all day long and it doesn't compare to this" (Miller in Rojas, 2016).

Differently, the vast majority of those who became involved in vinyl record manufacturing during or after initial decline associated the practice with non-financial meanings (we label these actors *new enthusiasts*). Many of them had engaged in adjacent practices (primarily as a hobby

[5] Regarding commonalities across custodians in our sample, the vast majority of both legacy professionals and new enthusiasts we identified were male, white, and middle class.

rather than a career) to vinyl record manufacturing, such as DJ-ing (i.e., using vinyl records as musical instruments at live performances) or tinkering with electronics.

Practice variants. Only two variants of the vinyl record manufacturing practice were routinely enacted by 1980, when audio cassettes had become the most popular format in the US, and Phillips and Sony had begun persuading record companies around the world to adopt the new CD format. The by far most popular variant, labelled here *traditional lacquer + PVC mass manufacturing,* involved the traditional mass manufacturing process consisting of three steps: (1) *mastering,* or disc cutting, involving cutting grooves with a sapphire stylus attached to a cutterhead into lacquer-coated aluminum discs on a lathe, (2) *electroplating* the discs (using chemical processes involving silver, nickel and copper) to create stampers, and (3) *pressing,* using hydraulic machines to press heated batches of polyvinylchloride (PVC) granulate between these stampers that are attached to steam-heated molds (see Figure A7 in online Appendix).

The second variant –which we label *traditional lacquer (dubplate)*– only involved the first step, resulting in a record (sometimes referred to as an "acetate") that could be played back on a standard turntable but deteriorated with every playback, quickly wearing out the soft lacquer. This alternative enjoyed some popularity in Jamaica in the 1950s and 1960s, and later across North America and Europe, as DJs could have a disc made quickly and use it at their performances to showcase a completely unique recording (Warwick, 2017). The lacquer disc's fragility made it unsuitable for most other uses, such as "scratching" by hip-hop DJs. As we will demonstrate below, however, new practice variants emerged as the practice declined.

Propping Up

We define propping up as using existing materials and competences to keep a declining practice going for the time being. Below we describe how legacy professionals maintained the practice of vinyl record making for years by continuing to enact and support its existing variants.

Continuing to enact. With demand for vinyl records declining substantially, the vast majority of pressing plants around the world shut down or shifted production to other media, such as CDs. Eventually, this resulted in only a handful of vinyl record pressing plants remaining operational in North America and Europe, as well as one each in Asia (Japan) and South America (Brazil) – receiving small orders from record labels and a few very popular artists:

> [When] record sales reached the absolute bottom … the people who were putting vinyl out [were] mainly established artists who had a fan following who still wanted vinyl. But their labels were losing money on it, [so the artists] ended up paying for it themselves. (Crispin Murray, speaking at a conference in 2023)

Developments with regard to disc mastering studios were similar. However, because disc cutting does not involve high fixed costs, it is not as dependent on economies of scale. Benefitting from DJs' continued demand for dubplates (i.e., products of the *traditional lacquer (dubplate)* variant), several disc mastering studios near electronic dance music hotspots continued to receive orders. Nevertheless, work for many disc cutting engineers dried up. According to Graeme Durham, co-founder of one of the most prestigious mastering studios in London (The Exchange), "there wasn't the work and we had to lay people off" (interview).

Reduced profitability, coupled with a clear trajectory of continuing decline, meant that pressing plants and mastering studios stopped investing in R&D and no longer offered apprenticeships nor new employment opportunities with respect to vinyl record making. Such investments would have been at odds with the *meaning* of obtaining financial profit from a practice that had seemingly reached the end of its life. *Competences* therefore declined as practitioners with relevant expertise moved to different practices, retired, or saw their skills deteriorate with age. With respect to *materials*, the few pressing plants that remained active engaged in hoarding (see Bonutto, 1997) by purchasing second hand equipment –because non-consumables, such as pressing machines, were no longer being produced– from businesses

planning to exit vinyl record manufacturing or at insolvency auctions. According to Thomas Bernich, who wanted to set up his own pressing plant in NYC, finding willing sellers of materials was difficult because record labels incentivized destroying vinyl record manufacturing equipment (to speed up the transition to manufacturing CDs) and the few remaining pressing plants were "just buying machines and not selling them" (interview).

Over time, as existing materials deteriorated, the worldwide stock of specialized materials required for making vinyl records declined. Competing over declining, residual markets also inhibited sharing knowledge and materials with others, further contributing to the decline of *competences*. In summary, while several legacy professionals continued to enact existing practice variants, traditional meanings, materials, and competences declined.

Continuing to Support. As a practice declines, there may be no need, at least temporarily, for making certain durable materials due to remaining supply exceeding limited demand. However, such durable materials require servicing from time to time and new consumable materials –i.e., those that need to be regularly replaced– are still needed. Continuing to support a declining practice is therefore essential to propping it up.

Traditional vinyl record manufacturing consumables include lacquer-coated discs, cutting styli and pressing molds, all of which are produced specifically for the practice. Following consolidation and downscaling, only two relatively small businesses producing lacquer-coated discs, and two making sapphire cutting styli, survived. Similar to pressing plant owners, these materials suppliers did not invest in R&D because vinyl record manufacturing was perceived as becoming extinct. According to Apollo Master Audiodiscs' general manager Terry Carlson, "in all the board meetings going back as far as I can remember it was like, 'hey, you know, three to five years and this is going to be through'" (interview).

With respect to disc cutting material repairs, less than a handful of legacy professionals around the world continued to provide technical support services. These individuals either performed such services in addition to other income-generating activities (or receiving their pension) or were unable to learn new practices. Again, given declining demand, they did not offer apprenticeships. Being experienced service technicians, the few legacy professionals who remained active had access to residual stocks of relevant materials. Abandoned machines were used to source spare parts for repairs, rather than source, or make, new parts –contributing to a general decline in available materials over time. Meanwhile, materials and knowledge were mostly kept secret as these remaining legacy professionals tried to control and financially profit from servicing residual markets. For instance, even the former business partners in the US of the last disc cutting lathe manufacturing company unsuccessfully tried to gain access to resources from former Neumann employees:

> Al [Grundy] and I, in the '90s, we went to Germany and we drank beers in the backyard with … several of the other Neumann engineers. We're shaking them down for parts: Al and I wanted to rebuild heads and so we went over to Germany to try and get anything out of them; any drawings, any parts, anything. We couldn't do it. It was impossible; they just didn't want to give it up. (Chris Muth, interview)

In summary, while trying to exploit remnants, legacy professionals may engage in custodianship by propping up a declining practice: without their continued efforts, the vinyl record manufacturing practice –or at least the traditional variants thereof– may well have ceased to exist. While such propping up contributes to the maintenance of existing practice variants, it also leaves a declining practice increasingly precarious and fragile: the supplies of certain materials and the provision of certain support services had become dependent on the materials and competences of just one or two small businesses or less than a handful of individuals around

the world (Mouk, 2014). By relying solely on propping up, the meanings, materials and competences of the practice were on a trajectory of decline.

Diversifying

While legacy professionals engage in propping up a declining practice, legacy professionals and new enthusiasts can develop new ways of enacting it by using different materials and/or techniques. We refer to introducing variants comprising new configurations of meanings, materials, and competences as *diversifying* (see Figure 3). Interestingly, we identified several, quite different, motivations for introducing new variants, as we outline below.

Modifying to compete. Faced with the threat of the practice becoming extinct due to advances in digital technology, the last remaining disc mastering system manufacturer (Neumann), worked with Telefunken-Decca Schallplatten (a.k.a. Teldec) in the early 1980s to develop a new method of making vinyl records that reduced surface noise. Learning from attempts to store audio-video information in grooves, Teldec devised a method of cutting grooves into copper (known as Direct to Metal Mastering, or "DMM") (Spencer-Allen, 2003: 45) using a diamond stylus. A commercial flop, only just over 30 of these lathes were made. Uptake was limited mainly to a few pressing plants in continental Europe that sought to save costs due to the concomitant electroplating process being simpler and shorter.

While commercially unsuccessful, DMM introduced a new variant of the vinyl record manufacturing practice ('*DMM + PVC mass manufacturing*', see Table 2) that relied on new materials (specialized lathes, diamond styli and copper discs), new competences (adjusting to the specificities of cutting into copper), and new meanings (competing with digital media on sound quality and costs). The meanings of traditional variants thereby also changed: cutting into lacquer-coated discs became associated with a warmer sound that emphasized bass frequencies in contrast to DMM, which was regarded as clear but sterile (although not as sterile as CDs).

While dependent on just one company in the world (Teldec) for the specialized styli, this variant reduced dependence on other scarce materials, such as lacquer-coated aluminum discs.

Modifying to more easily enact. Lacking access to rare state-of-the-art materials, a few enthusiasts began experimenting with more readily available materials to develop low-cost ways of enacting the practice. One of these enthusiasts was Peter King, a New Zealand-based musician who recalls noticing a couple of old, abandoned mono disc cutting lathes at a TV studio in the mid-1980s: "I saw these machines and fell in love with them, and … because I was an engineer before I got on the music scene, I thought maybe [I could] reproduce something very similar" (interview). King acquired the lathes and set out to bring them back to life.

The process of assembling the disc cutting systems and making a good sounding record proved very challenging, requiring several years of trial and error, and finding relevant materials (including information). While the lathes King had acquired had been used to cut grooves into lacquer-coated discs, such discs were expensive and not as durable as vinyl records. King tested many different types of plastic and paradoxically achieved the best results with the soft plastic surface of the CD, the medium that was displacing vinyl records. He then started ordering sheets of the same polycarbonate plastic, which he cut into circles. Rather than cutting grooves into the material, warming up the polycarbonate allowed impressing or "embossing" the groove.

Regarding styli, King learned to sharpen old phonograph needles but the sound quality was still poor compared to standard vinyl records. A breakthrough came when King called the general manager at a pressing plant in California, who suggested changing the angle of the cutterhead (Sullivan, 2018). Why did a legacy professional know how to emboss grooves? While largely forgotten, this was not a new technique, as a manual from 1944 notes:

> Recently revived in America, the embossing or burnishing method, in which no coating material [is] removed … makes possible 30 minutes' music recording … on

> one side of a 12 in. disc. A polished, round, embossing stylus (in contrast to the usual sharp cutting or engraving tool) … impresses grooves in, e.g., a lacquer coating or in ethyl-cellulose, producing a high signal/noise ratio. (Aldous, 1944: 41)

Hence, this technique was essentially *recovered* by King, via information provided by a legacy professional, rather than newly invented. We will further discuss *recovering* as a key custodianship process in a separate section below but note how we represented recovering and diversifying as mutually connected activities in our model (see bottom left of Figure 3).

Eventually, once he was able to produce decent-sounding records, local artists started contacting him. Despite producing lo-fi records, King's reputation for producing small quantities quickly spread because small orders were not financially viable for factory production. Since small artists could not expect to sell more than a few dozen vinyl records but still regarded them as means of materializing their music, King's offer of making just a few discs satisfied a market niche that appeared as the overall practice of vinyl record manufacturing declined. For some artists and fans, the records' visual features were more important than the sound quality, turning them into art objects and collector items. After making records for several years, King attracted attention from popular artists around the world, culminating in requests in the 1990s for limited edition records from, among many "alternative" artists, Pavement and the Beastie Boys.

To summarize, enthusiasts can create new variants of a declining practice by experimenting with different materials and techniques. Repurposing decades-old remnants and combining these with widely accessible new materials, such variants may enable enactment without requiring very expensive and scarce materials. Such a new practice variant may also attract interest from others if it helps enact other practices, such as, in this case, artists selling merchandise at concerts and fans collecting rare articles by their favorite artists.

Modifying to profit from residual demand. Legacy professionals who depend on the declining practice for income may also develop new practice variants to profit from residual demand. For instance, in the 1980s, two brothers (Fritz and Ulrich Sourisseau), who had been running a business supplying jukeboxes in Germany, realized that many new pop singles were no longer being released on vinyl, thereby making their jukeboxes less attractive. To address this issue, they attempted to make durable seven-inch records themselves. Similar to Peter King's efforts, this involved experimenting with different materials. Having developed a personal relationship with a retired Neumann engineer, Ulrich Sourisseau (a.k.a. "Souri") "would bounce ideas off of him" (anonymous, interview), thereby *recovering* certain competences. Attempting to create high-fidelity durable discs, the Sourisseau brothers eventually settled on cutting grooves into PETG-coated discs using diamond styli (similar to those used for the DMM variant).

The Sourisseaus' successful attempts of using their new PETG diamond cutting variant attracted the attention of DJs and other enthusiasts, eventually enabling them to produce and ship several hundred disc cutting devices around the world. The "Souri vinyl recorder" is regarded as a game changer among disc-making enthusiasts as it allowed creating small batches of relatively high quality, durable records (that, unlike embossed records or lacquer dubplates, could be "scratched" by hip-hop DJs). However, a problem was that enthusiasts were dependent on a two-man operation for acquiring the disc cutting device and all the consumables, with each vinyl recorder made by hand. Therefore, access to this practice variant (like access to other variants, such as '*DMM + PVC mass manufacturing*') was somewhat uncertain and restricted.

In summary, both legacy professionals and new enthusiasts can diversify a declining practice by creating new practice variants and making the practice as a whole less dependent on the continued support of traditional variants. As our findings show, those responsible for creating

new variants may also engage in limited *replenishing* and *releasing* processes (such as the Sourisseau brothers making and selling their devices and consumable materials to enthusiasts). However, we also found that, just like traditional variants, the enactment of these variants may be limited due to the scarcity of relevant materials and competences. Such scarcity may be addressed by enthusiasts via three inter-related custodianship processes that we describe below.

Phase 2: Abating decline (1995-)

In this section, we illustrate the interrelated processes of *recovering*, *replenishing* and *releasing* undertaken by new enthusiasts in the second phase of our process model (see right of Figure 3).

Recovering

Enacting a practice that has evolved over many decades is much simpler by using existing materials and learning from existing practitioners than by starting from scratch. We identified three activities performed by new enthusiasts as part of the process of recovering remnants: *scavenging*, *restoring*, and *demonstrating competences to practitioners*.

Scavenging. Enthusiasts adopted several strategies to locate and acquire unused materials (including tools, parts, and documents) to help them make vinyl records. For instance, Flo Kaufmann (an artist based in Switzerland) created a directory of mastering studios and pressing plants in the wider region as a teenager and contacted each one, asking legacy professionals there if they had any spare materials they were willing to sell or give away. While he was able to collect a few small spare parts this way, many legacy professionals were dismissive. Kaufmann, like several other enthusiasts we interviewed, also scanned classified ads, attended yard sales and participated in auctions. In some cases, enthusiasts resorted to searching for abandoned materials in junkyards. Enthusiasts' determination to scavenge is evident from the amount of time and money they invested, as well as the distances they travelled to retrieve materials. For instance, Chris King, a musician and DJ who co-founded a pressing plant in the UK in 1998, purchased

used pressing machines in Guatemala and Ex-Yugoslavia, while Frank Kirschner (also a DJ with an engineering background), purchased machines in Bolivia and Russia that he and his partner used to set up a pressing plant in Germany in the same year (Marschner, 2005).

Additionally, to learn how to operate relevant equipment, enthusiasts around the world looked for relevant documents in libraries and studied decades-old scientific papers, such as those published by the Audio Engineering Society (Temmer, 1980, 1981) and former mastering engineer Larry Boden (1978). In the 1990s, with the internet being in its infancy and legacy professionals used to guarding their competences, online information was scarce.

Restoring. Via scavenging, enthusiasts may be able to acquire relevant materials to enact certain activities that constitute the practice. However, these remnants are likely to be damaged and/or incomplete due to the lack of maintenance by most legacy professionals. For instance, the enthusiast Gil Tamazyan, interested in establishing a pressing plant in the 1990s, recounted:

> The machine came from a guy at another pressing plant who couldn't get it to work. I answered an ad for it, came down to his warehouse and bought it at full price. He was skeptical to sell it to me at first because that meant he had new competition, but with the money I paid for it he bought a new boiler water cooling system and wrote me off as a sucker. (Stabile, 2011)

To use these remnants effectively, enthusiasts needed to restore them by cleaning, repairing and replacing missing or damaged parts, and repeatedly experimenting with them. In many cases, enthusiasts spent years attempting to turn their acquired remnants into fully functioning tools that enabled them to achieve high and consistent quality. If they had sufficient financial means, enthusiasts could hire a legacy professional to support the installation and calibration of materials. But because experienced legacy professionals offered their services at high rates due

to having "a monopoly on the market" (Darrel Sheinman, interview), and because many enthusiasts were inspired by a do-it-yourself ethic,[6] several tried to figure things out themselves.

Demonstrating competences. As noted above, legacy professionals who adopt the "last man standing" strategy (Gerome, 2007) have few incentives to share their knowledge and tools with others, given that such sharing could reduce their market share in an already small and shrinking field. This threatens the viability of the declining practice over the long term because gaps in competences and materials may appear that become be too difficult for enthusiasts to fill.

In the case of vinyl record manufacturing, specialized knowledge and tools are essential for building and repairing precision instruments, such as cutterheads. How then can enthusiasts gain access to such highly specialized competences and materials? We found that enthusiasts could develop amicable relationships with legacy professionals by demonstrating certain attributes that the latter valued. While the attributes valued by a specific practitioner are to some degree personal and idiosyncratic, we found that the ability to demonstrate competence was often positively related to previous scavenging and restoring efforts.

For instance, in the mid-1990s, Flo Kaufmann persuaded Johannes Richter, a former employee of the by-then defunct Neumann company, to meet and show him his disc-cutting lathe. However, the latter was unwilling to sell or give away any of his materials or competences. Kaufmann, though, persevered and, after showing Richter a prototype he had assembled based on his drawings of Richter's lathe, gained his respect. Kaufmann noted that Richter was particularly impressed with his mechanical precision engineering skills because Richter's own skillset was limited to electrical engineering, which constrained his ability to replicate certain

[6] As evidenced by the proclamation "do it yourself is king" by Flo Kaufmann on https://www.vinylike.com/

mechanical parts. Valuing Kaufmann's determination and skills, Richter asked if he could wind feedback coils (which can burn out in cutterheads and are thinner than human hair):

> And I said: 'Yes, of course; I just need to know how.' And then came the first concrete drawings from him and manuals … Exactly how you wind these coils was a company secret … So, he instructed me a bit … and he'd comment, 'yeah, that's alright but it still needs to get a bit better' and stuff … Then he started giving me more drawings and telling me more. (Flo Kaufmann, interview)

Kaufmann assisted Richter with cutterhead repair jobs for several years. Instead of money, Kaufmann asked to be reimbursed with blueprints and spare parts, i.e., providing materials necessary to develop very specific competences. Eventually, Richter sold Kaufmann an incomplete Neumann mastering lathe for 3,000 DM, which was less than 10% of the market price for such a specialized piece of equipment (despite largely being considered obsolete). Having acquired the incomplete lathe, Kaufmann engaged in further scavenging and restoring. Similar actions by other enthusiasts resulted in recovering other materials and competences that legacy professionals otherwise would have "taken with them to their graves" (Grassegger, 2016).

In summary, by recovering remnants, enthusiasts rescue and put to use abandoned materials and increasingly rare competences. They thereby carry these over from the previous generation and can become the successors of legacy professionals. But recovering by itself does not ensure a declining practice will remain viable for long. As Terry Carlson and others noted in interviews, what happens "if the proverbial bus hits [the individual] that knew that little bit of stuff that will cause you such a headache in the long run"?[7] Our analysis suggests that, together with propping up and diversifying, recovering also needs to be complemented by two other processes (replenishing and releasing) to support practice preservation across generations.

Replenishing

[7] Indeed, less than four years after being interviewed for this study, the factory where he worked exploded and Apollo Master Audiodiscs thereafter ceased to produce master discs and sapphire styli (Spice, 2020).

At some point, the available stock of used materials that are no longer produced will be depleted. To help more practitioners become involved in a declining practice, more materials must be created. We refer to increasing the stock of materials needed to enact a practice as *replenishing* and identified two types of activities by which this can be achieved.

Replicating. Copying materials during the practice's decline was facilitated by the fact that patents had already expired or were no longer enforced. Enthusiasts employed several techniques to recreate materials used to enact the practice. For instance, some enthusiasts were able to acquire, via their scavenging, abandoned precision engineering tools that had been used many decades earlier to make parts for making vinyl records. For example, J.I. Agnew, a recording engineer with some mechanical and electrical engineering experience, acquired and restored old milling machines so he could make parts for disc cutting lathes. Others opted for modern CNC machines and 3D printers to make parts, such as Todd Mariana, a computer programmer and DJ in the US. Yet others collected abandoned parts originally used in various industries to make certain materials, such as new silent and stable disc cutting motors.

Enthusiasts were often initially driven to replicate materials themselves because they only required small quantities using specific materials, made to very specific measurements –orders that modern machine shops were unwilling to take on. As J.I. Agnew noted:

> What I also realized was that a lot of the components [of disc cutting lathes] were to completely non-standard dimensions. So, you couldn't find anything … from industrial suppliers [and] I couldn't actually find any machine shop in Europe [or] in the United States [to] take this on … So, it was at that point that I saw the need to be able to make some parts. So, I did. (interview)

Enthusiasts also engaged in replicating materials needed to enact *new* practice variants, including blank discs, styli, cutterheads and even entire disc cutting systems. In some cases, this was tied directly to recovery efforts (see above). For instance, for many years only a couple of

diamond styli for the DMM variant were being made by one legacy professional (a retired Teldec employee named Karl-Heinz Lehmann) in Germany. After many requests by the enthusiasts Flo Kaufmann and Martin Sukale to share his knowledge about how to grind such styli, in 2015 Lehmann eventually agreed. Kaufmann and Sukale arranged for Lehmann to teach a local diamond grinder at a diamond tooling firm, thereby securing diamond stylus supplies to enable the continued enactment of the DMM variant.

Upgrading. Rather than simply copying or cloning parts, enthusiasts may also attempt to redesign and improve them by exploiting technological advances and using materials that had not been available decades earlier. For instance, Flo Kaufmann designed a new cutterhead, which he named Caruso, using the "Swatch Principle", i.e., simplifying the design by minimizing the number of individual parts using advanced machining processes. Together with his college friend, Jvo Studer, he also developed a new pitch controller and other accessories (Helfet, 2018), as did several other enthusiasts around the world, using modern computer software.

Releasing

By recovering and replenishing, enthusiasts make it less dependent on legacy professionals' competences and scarce materials. But without supporting other practitioners they risk simply shifting dependence onto themselves. To sustain the preservation of a practice across multiple generations, enthusiasts need to facilitate others' abilities to enact and support the practice. In our data we identified various forms of sharing and exchanging information and materials that enthusiasts enacted to both help and inspire other enthusiasts to contribute to practice preservation. These sharing and exchanging activities contribute to dispersing meanings, materials and competences beyond legacy professionals and their immediate enthusiast successors, which is why we label this final process *releasing*.

Sharing. Since enthusiasts, by definition, become involved in a practice they are enthusiastic about for reasons other than earning money, they are more likely to share what they have obtained with other enthusiasts. As the enthusiast Mex Wieshofer (founder of Dr Dub mastering studios) noted by contrasting members of his generation with legacy professionals:

> You trust and respect each other and share. The whole thing only works like that. [I'm talking about] our generation that has been doing this job; whether it's Andy [Bauer] or Jan [Freund], or Flo [Kaufmann]… all of these guys… Martin [Sukale] – it's about sharing. The old generation before us, before we started … they had a lot of secrets that they guarded. You wouldn't get anything from them. (interview)

Key events that kicked off and catalyzed this sharing online (and hence beyond local circles of enthusiasts) were initiated by Flo Kaufmann and later Steve Espinola. Kaufmann started publishing information online in the mid-1990s when the internet was still in its infancy:

> [My website] became totally important for the entire global community. I just posted photos and all the knowledge that I had there [and I did this] because I was so annoyed that no-one was sharing any of this. These old guys kept all their knowledge to themselves … Then, suddenly, I started receiving messages from people: 'Hey, I still have this cutterhead' and 'I've got this machine', and stuff. And then, in a way, the global vinyl scene came together virtually in my e-mail account. (interview)

Independent of Kaufmann's efforts, Steve Espinola, a musician and computer programmer in New York who acquired a used lo-fi disc cutting lathe, founded an online forum in 2005 dedicated to sharing information about making analog records. He jokingly named the forum, which he made publicly accessible, "The Secret Society of Lathe Trolls". The public forum became the main hub for the enthusiast vinyl record making community and was recognized by professionals as consequential in preserving vinyl record manufacturing:

> Apollo Master Audiodiscs congratulates the secret society of lathe trolls on 10 years of helping record makers make records! (advertisement banner, retrieved from forum)

The forum is regularly mentioned by enthusiastic record makers when asked about how they acquired relevant knowledge and materials. For instance, one of the very few female disc cutters,

Tasha Trigger, noted she "started looking into how vinyl was manufactured and discovered *Lathe Trolls*. That is where my learning journey began" (womeninvinyl, 2021). Apart from the Lathe Trolls forum, enthusiasts later also created and participated in other online groups.

Making information about the practice freely available, enthusiasts not only help others who seek information but may also contribute to inspiring some to engage in custodianship processes themselves. Similar to the punk movement in music, providing insights into activities previously deemed impossible without corporate R&D, such as creating a new disc cutting device or cutterhead, may make them appear achievable, as one Lathe Trolls member noted:

> I know I'm not the first to consider this. Jvo [Studer] and Flo [Kaufmann] are two of my biggest inspirations with respect to device fabrication for cutting! (opcode66, posted on Oct 19, 2012)

Exchanging. Finally, enthusiasts can offer materials or services to practitioners in exchange for fees, turning their passion into a source of income. For instance, Flo Kaufmann and his college friends started buying and selling remnants, offering repair services to mastering studios around the world, and selling their own disc cutting devices and cloned cutterheads in the late 1990s and early 2000s. Later, Kaufmann sold copies of his newly developed lathes and cutterheads (including 75 copies of the new 'Caruso' cutterhead from 2010). Pressing plants and mastering studios fulfilling orders from major record labels –as well as enthusiasts with no commercial interests– benefitted from Kaufmann's products and services.

At the time of writing (2024), many legendary studios that have continued or re-started offering vinyl record mastering, such as AIR studios in London, rely on repair services from enthusiasts rather than corporations or individual legacy professionals, to remain operational:

> [To] repair cutterheads we use a chap in Italy … He's got to be insane because he's repairing cutterheads [which is incredibly difficult]. Robbie is really good; he's had both of our cutterheads at various points. (Barry Grint, interview)

Kaufmann supported other enthusiasts who were developing their own disc cutting devices, cutterheads, styli and blank discs. Instead of treating them as competitors, he regarded them as kindred spirits, all ultimately aiming for the same goal: to keep the practice open to experimentation for enthusiasts and thus alive, rather than act as its guardian by establishing or enforcing rules. Taking his custodianship role seriously, Kaufmann argued that it was part of his mission to redistribute materials "from large structures to micro-organizations" (interview), i.e., to support actors with an interest in the long-term preservation of the practice and prevent consolidation that would favor large players with a predominantly short-term financial interest.

In summary, by recovering, replenishing and releasing materials and knowledge to others, enthusiasts contribute to extending traditional and new practice variants beyond previous generations and themselves, thereby further enriching the multiplicity of custodians.

Outcomes

We identify two preservation-related outcomes that we discuss below.

Increased practice accessibility for enthusiasts. As of 2024, barriers to entry for making vinyl records have come down considerably compared to forty years earlier when the practice began to witness substantial decline. Today, enthusiasts can learn how to enact the practice and use relevant materials from information that other enthusiasts have made publicly available (i.e., released). Moreover, acquiring expensive infrastructure required for running a pressing plant is no longer necessary to make small batches of durable analog audio discs due to the appearance of new variants. Rather than having to engage in extensive scavenging, restoring, and demonstrating competences to other experienced practitioners, enthusiasts can now acquire a restored, or even new, disc cutting device by contacting other enthusiasts. Providing entry points to alternative, more easily accessible variants also reduces risks for new entrants –enabling

small-scale trials before committing to "go all in". New variants may therefore act as stepping stones, connecting new and traditional variants.

Increased practice resilience. Another important outcome of creating and supporting multiple practice variants is increased practice resilience. This is because the reliance on specific configurations of meanings, materials and competences is reduced, allowing the practice to persist even when certain supplies are depleted. A clear example in our case is the situation of lacquer-coated aluminum disc production, which, at the time of writing, is only enacted by one firm (a family business in Japan), resulting in supply shortages around the world. Even before this development, enthusiasts such as Flo Kaufmann and Martin Sukale encouraged mastering studios to shift from lacquer-based variants towards the '*DMM + PVC mass manufacturing*' variant, helping them convert their existing disc cutting systems to enable this transition.

The increased multiplicity of custodians and variants means that the vinyl record manufacturing practice is no longer as endangered as it was shortly after decline set in, regardless of how long a commercial vinyl revival may last. Building on the custodianship processes performed by other enthusiasts over time, enthusiasts now can, and do, make materials that support multiple vinyl record manufacturing variants, allowing almost anyone to make an analog audio disc even "if there wasn't anyone to buy it" (James Sillitoe, interview).

DISCUSSION

Drawing on the findings of our longitudinal case study of the declining practice of vinyl record manufacturing, we have developed a process model that unpacks how declining practices are kept in existence and thus preserved through the work of two types of custodians –i.e., legacy professionals and new enthusiasts. These custodians engage in five processes of custodianship: (1) *propping up*; (2) *diversifying*; (3) *recovering*; (4) *replenishing*; and (5) *releasing*. Taken together, these processes reduce the dependence of a declining practice on depleted meanings,

materials and competences, while also contributing to the creation of new and diverse configurations of meanings, materials and competences (i.e., practice variants). In doing so, these processes increase the practice's resilience as well as its accessibility for future generations.

Our main contribution is to highlight practice preservation as a phenomenon of theoretical interest that has so far been neglected compared to practice (re-)emergence, growth and diffusion (Anand et al., 2007; Gomez & Bouty, 2011; Raffaelli, 2019), on the one hand, and the maintenance of a practice's dominance or taken-for-grantedness (Lok & de Rond, 2013; Siebert et al., 2017), on the other. By identifying a set of custodianship roles and processes underlying the preservation of declining practices, we integrate the so far disconnected literatures on practice evolution and custodianship that offer complementary insights to understand practice preservation: by adopting a practice theoretical lens, a custodianship theoretical frame benefits from expanding the traditional focus on meaning renewal to include the re-generation of materials and competences and the relations between these elements. Conversely, a custodianship lens highlights the actors involved, and the relations between them, that play an important role in sustaining the enactment of a practice across generations. This combination of perspectives allows us to recognize custodianship as the agentic glue that connects generations of practitioners with one another as well as with the constitutive elements of a practice over time.

All in all, we advance a processual, dynamic view of practice preservation that goes beyond simple maintenance and conservation to include renewal and regeneration as essential components of practice persistence. Below, we discuss how our findings relate to existing theory concerning practice evolution and custodianship.

Contributions to the Practice Evolution Literature

Theorizing practice preservation as including both continuity and renewal. Our first contribution to understanding practice evolution is to foreground practice preservation as a key

phenomenon of theoretical interest. Indeed, our study is the first that conceptualizes the notion of practice preservation and theorizes the processes underlying the preservation of practices in decline. More specifically, we show that practice preservation (i.e., keeping in existence through continued enactment) is different from conservation (i.e., keeping the same) in that it includes renewal and modification of existing elements of a practice.

Further, we contribute to the scholarship on re-emergence (Howard-Grenville et al., 2013; Kroezen & Heugens, 2019; Raffaelli, 2019) an understanding of the preservation work that can occur in the transitional phase between decline and re-emergence. By doing so, we point to the importance of understanding the possibly lengthy transitional period when a practice declines and re-emergence is still unforeseeable. While a few studies of technology and industry lifecycles have highlighted that certain production practices may continue to be enacted by incumbent firms after the onset of decline (Adner & Snow, 2010; Henderson, 1995), studies of re-emergence have paid scant attention to this transitional phase. Rather than viewing it as dormant or liminal, our study shows that this phase can involve much consequential activity, including efforts that contribute to the renewal of not just meanings, but also materials and competences. By unpacking the practice preservation activities unfolding between decline and subsequent potential re-emergence, our study shows precisely how a declining practice can be preserved in the absence of market re-emergence. This is important because it may take time for a market to re-emerge and, before that happens, the competences and materials needed to preserve a practice may become substantially depleted or irreparably lost (Cattani et al., 2013), preventing enactment even if and when consumer interest later re-appears (e.g. Gorvett, 2021).

Unpacking the multiplicity and diversity of actors involved in practice preservation. Our model shows the multiplicity and diversity of the actors involved in practice preservation,

highlighting two key groups of actors (i.e., enthusiasts and legacy professionals) and unpacking the preservation activities in which these actors are involved. Regarding the involvement of enthusiasts, our findings add to an increasing body of work in management studies that highlights that hobbyists', amateurs' or tinkerers' roles may extend beyond passionate consumers to makers (Browder, Aldrich, & Bradley, 2019; Lifshitz-Assaf, Lebovitz, & Zalmanson, 2021).

To date, studies have shown that by experimenting with and adapting products to suit their needs, or influencing the development of technology standards (Baldwin & von Hippel, 2011; Croidieu & Kim, 2018; Leblebici, Salancik, Copay, & King, 1991; Nelson, 2015), enthusiasts may be instrumental in shaping an emerging practice that is later successfully commercialized. Our findings demonstrate that enthusiasts may also play an important role in supporting a practice even after commercialization has begun to subside, such as by taking over responsibilities from legacy professionals to become experts upon which the latter become increasingly reliant. Hence, rather than merely assisting corporations in the context of product testing or innovation projects (Baldwin & von Hippel, 2011; Lifshitz-Assaf, 2018), enthusiasts' roles may extend to supporting the survival of organizations (such as established pressing plants in our case) that lack or lose access to knowledge related to simply maintaining production.

Our findings also show that legacy professionals may continue to enact or support elements of a declining practice if they are able to profit financially from servicing a remaining market niche and/or if they are unable or unwilling to direct their efforts to other practices. We argue that such propping up does not secure the long-term persistence of the practice (because propping up, by itself, does not sustainably renew it). However, legacy professionals who continue to enact or support it should nevertheless be regarded as custodians as they play a key role in keeping it alive within their generation and guard remnants from which members of

future generations (i.e., new enthusiasts) may draw. While a lack of propping up may make it easier for new enthusiasts to recover material remnants (because the absence of hoarding by legacy professionals may make remnants more easily accessible), it also risks knowledge loss, making it more difficult for enthusiasts to quickly develop competences. Hence, while propping up may arise from actors' short-term strategies to extract remaining profit from a declining practice, it may also have positive long-term preservation-related consequences.

Studies in management and organization rarely pay much attention to "laggards" who are seemingly unwilling or unable to transition to new practices or technologies –usually depicting them as failures to adapt (Lucas & Goh, 2009). However, Adner & Snow, pointing to examples such as making piston aircraft engines and fountain pens, argue that some of the oldest and most prestigious companies in the world have successfully "soldiered on" (2010: 1656) rather than transitioned to new technologies, industries or products when witnessing decline. This is especially the case for incumbents that have established luxury brands, such as British and Swiss watchmakers (Raffaelli, 2019), or shotgun making firms (e.g., Holland & Holland, which was taken over by Chanel in the 1980s).

Contrary to our studied setting, however, the above-mentioned cases are companies rather than individual legacy professionals, and have benefitted from financial support from investors, wealthy clients, or donors who value their brand. Such branding and therefore economic support was limited in the case of vinyl record manufacturing, forcing many legacy professionals to continue on their own rather than rely on supportive organizational infrastructure. Hence, by comparing preservation in our setting with others, we can theorize whether the custodians of a practice –and by implication, technology– may be *individuals* rather than (incumbent) firms.

Practice diversification as key to preservation and resilience. Finally, we contribute to our understanding of practice evolution by showing that increasing the diversity of meanings, materials and competences underlying a practice can be beneficial for its preservation. Our analysis suggests that diversification can be initiated by several actors independently of one another for different reasons and that while the creation of new variants may –just like propping up– initially appear futile or irrelevant, this may lay the foundation for a practice's persistence: Diversity, through the creation and uptake of practice variants, reduces the declining practice's dependence on depleted meanings, materials and competences, thus making the practice more robust to breakdowns (cf. Lok & de Rond, 2013; Sandberg & Tsoukas, 2011).

This insight contrasts with the finding that a practice can be preserved by keeping its underlying meanings consistent and relatively stable through forms of "defensive institutional work" (Maguire & Hardy, 2009). Differently, our model emphasizes that the diversity and multivocality of meanings (Ferraro, Etzion, & Gehman, 2015; Furnari, 2014), materials and competences can benefit preservation by enabling different practitioners across multiple generations to renew and reinvent the practice. Hence, our findings show that practice preservation goes well beyond conservation by including renewal and modification.

Other studies that have highlighted diversity have mostly focused on its benefits for practice emergence and diffusion (e.g., Nelson, 2015). For example, Armstrong's (2002) study highlights how the practice of the Lesbian/Gay Freedom Day Parade anchored the emergence of the San Francisco's gay community in the 70s through the plurality of the meanings associated with the practice (such as "diversity", "diversity pride", "diversity celebration"). Such plurality enabled different groups and organizations to unite around abstract and multivocal ideals. Our paper expands on these insights by foregrounding an expanded notion of practice diversity (beyond

meanings, to include the diversity of materials and competences) and unpacking how such diversity facilitates not just practice emergence and diffusion but also preservation. Specifically, we show that increasing diversity of a practice supports preservation by counteracting the decay of existing elements and contributing to the re-generation and sustained enactment of the practice. Our finding parallels insights from studies of socio-ecological systems that highlight the benefits of diversity for increasing the resilience of quasi-extinct species and systems affected by crises or shocks (e.g., Peterson, Allen, & Holling, 1998).

In fact, as is evident from the many examples provided by the history of technology scholar Rachel Maines (2009), vinyl record manufacturing is not the only practice that has undergone transformation by transitioning from industrial or professional settings to enthusiasts at home. Such transitions often require adapting traditional methods and replacing traditional materials with smaller and more easily accessible alternatives (such as hobby kits). Indeed, implicit in Adner & Snow's (2010) argument that a declining market requires firms to shift from mass manufacturing to small batch and custom production, is the development of new production methods, and therefore the emergence of new practice variants. Our study not only provides further details concerning such change and resulting diversification but also highlights how traditional restrictions and exclusivity may limit variation before decline but not thereafter: It is when a practice's enactment is largely restricted to professionals before decline that modifications are more likely to appear when enthusiasts seek to become involved with it post-decline as restrictions are no longer enforced.

Contributions to the Custodianship Literature

Extending custodianship beyond guardianship to inclusion across generations. Custodians have traditionally been depicted as guardians (Crawford & Dacin, 2021; Crawford & Dacin, 2020; Dacin & Dacin, 2008; DeJordy, 2010; Lok & de Rond, 2013), i.e., actors who defend and

preserve a practice (or tradition, institution) by setting and enforcing boundaries, for instance by shaping how, when, where and by whom it can or should (not) be performed. Hence, custodianship is generally associated with protection against incursion, and therefore with exclusion (Dacin et al., 2010; Siebert et al., 2017). Our findings instead show how custodians may do the opposite, namely contribute to the opening up of a practice, potentially to anyone interested. This inclusionary role is necessary for preserving declining practices threatened with extinction. Thus, our findings extend Wright and colleagues' (2021) argument that custodians may actively work towards inclusion when an inclusive practice is at risk of being subverted due to potentially overwhelming demands. If a certain practice is intended to be inclusive by definition –such as providing care to anyone who shows up at a public hospital– then custodians would be expected to fight for inclusivity and the existence of competing demands will inevitably require adjudicating and rationing. In contrast, as we have shown in our paper, few competing demands may exist with respect to a practice that has witnessed *decline*, and preservation therefore becomes increasingly dependent on the practice being *performed at all*, rather than a question of how, when, where or by whom. In such a case, custodianship truly does become a matter of supporting inclusion by inviting everyone to participate.

Building on the notion that different processes of custodianship and types of custodians may exist across time (Dacin et al., 2019; Montgomery & Dacin, 2020), our findings also suggest that custodianship processes may play different roles depending on the state of the practice. Hence, at times custodianship may be concerned with restricting experimentation and innovation, while at others the opposite may be the case. Our paper thereby also extends our understanding of when, why, how and by whom certain breaches to standardized performances of a practice may be sanctioned, tolerated or welcomed (Lok & de Rond, 2013).

Understanding processes of custodial succession. By opening up a practice "trans-temporally" across generations to new enthusiasts, we demonstrate the importance of inter-generational processes to enable and support custodianship. Crucially, our findings go beyond earlier work that emphasizes the actions by which successors are chosen and cultivated (Dacin et al., 2010; Howard-Grenville et al., 2013; Lingo & Elmes, 2019), showing instead that enthusiasts who eventually become successors may need to demonstrate competences to court recalcitrant incumbents and persuade them to share remnants in the form of knowledge and scarce materials. We find that enthusiasts, in turn, also may not actively groom successors but rather more indirectly attract potential future custodians by sharing, exchanging, and themselves opening up especially to those whose meanings are aligned with their own; they may liberally share their knowledge and offer support to like-minded individuals, thereby nurturing successors through empowerment and inspiration instead of actively seeking to mobilize others to support their cause (Montgomery & Dacin, 2020). This finding resonates with recent studies examining the key role of amateurs and enthusiasts in open innovation and production activities that were previously restricted to professionals and corporate firms (Aversa, Furnari, & Jenkins, 2022; Baldwin & von Hippel, 2011; Browder et al., 2019; Lifshitz-Assaf et al., 2021).

In this respect it is also noteworthy that our findings suggest that *decline* creates opportunities for new enthusiasts to fill voids left behind by professionals. This complements Croidieu & Kim's (2018) findings, in their study of the early U.S. radio field, that *increasing popularity* of a practice can create openings for amateurs to become recognized as legitimate experts.

Materials as key elements in custodianship. Prior research has traditionally associated custodianship with the maintenance, renewal or restoration of *meaning*. For instance, craft beer, analog cameras, and mechanical watches need to be imbued with meaning so that people will

purchase and use them when cheaper, more efficient, or more versatile means are available (Kroezen & Heugens, 2019; Raffaelli, 2019). Similarly, resurrecting past identities (Howard-Grenville et al., 2013) and triggering nostalgia (Suddaby et al., 2017) may contribute to renewed meaningfulness and thereby attract new audiences and practitioners. However, this predominant focus on meaning –which is merely *one* foundational element of a practice (Schatzki, 2005; Shove et al., 2012)– risks overlooking how relevant materials and competences are maintained, renewed, and/or restored over time (Cattani et al., 2013).

Our findings demonstrate that pockets of latent meaning may exist independently of coordinated revival efforts and that, instead of reviving meaning, the greatest challenge facing actors interested in enacting and/or preserving a practice may be accessing and generating materials, and learning how to use them. In our case, enthusiasts needed to demonstrate their proficiency through processes of scavenging and restoring remnants. Further, we show that, to some extent, the acquisition of relevant materials is dependent on building relationships and demonstrating competences (such as skilled use of materials) to legacy professionals. Hence, we find that materials are integral in custodianship processes directed at practice preservation.

In other contexts, the importance of accessing and engaging with materials may not be as apparent and explain why, to date, the custodianship literature has largely focused on discursive strategies and the elicitation of emotional responses in support of continuation or resurrection (e.g., Howard-Grenville et al., 2013). However, every practice has a material dimension, and this is most likely to reveal itself when critical infrastructure that we tend to take for granted is missing, broken or incomplete (Sandberg & Tsoukas, 2011; Star, 1999).

Boundary Conditions and Future Research

Not all declining practices are preserved (Cattani et al., 2013; Gorvett, 2021; Heritage Crafts Association, 2023) and preservation does not always involve the custodianship processes we

identified. Below we discuss boundary conditions that also give rise to future research avenues. Given that our model identifies two core categories of custodians -i.e., legacy professionals and new enthusiasts- who enact various custodial activities, we focus on the conditions that favor or inhibit the emergence of such custodians and the identified custodianship processes.

Level of practice institutionalization. The more institutionalized a practice, the more likely a large volume of materials, competences and meanings will have accumulated over time, reducing the likelihood of its complete and sudden termination. This presents opportunities for legacy professionals to continue to extract profit from the practice for a while after decline has set in and may reduce their willingness to abandon it, thereby supporting propping up activities. Similarly, a practice that is embedded in, or connected to, other popular practices is more likely to attract enthusiasts and their willingness to engage in custodianship efforts. For instance, both making analog synthesizers (Nelson et al., 2023) and vinyl records are connected to making music and technological tinkering, which resonate strongly with popular culture (see e.g., May, 2017). Additionally, it is when a previously popular practice is perceived as being on the brink of collapse that a fear of loss resulting from its complete discontinuation (cf. Heritage Crafts Association, 2023) may motivate not only enthusiasts to step in by recovering, replenishing and releasing, but also by engaging in diversification efforts because any means of keeping the practice alive are preferred over extinction. In fact, other studies have shown that existential threats due to the appearance of new, more efficient or effective alternatives may spur innovation in practices that are written off as obsolete. For instance, Raffaelli, DeJordy and McDonald note how Swiss watchmaking, following a substantial decline in sales, underwent a revolution not just due to novel designs and marketing but also because a new production process was introduced

(2022: 1601). Such an existential threat may not only motivate incumbent firms to experiment but also, as in our case, enthusiasts who are concerned about the practice's potential demise.

On the other hand, even a once highly institutionalized practice that is perceived as at risk of extinction may fail to trigger the processes we identified if it is no longer deemed compatible with societal norms or regulations. This provides unfavorable conditions for propping up but could stimulate the emergence of new variants. Understanding how once well-accepted but increasingly controversial practices may be preserved merits future research.

It is also possible that a practice's high degree of institutionalization may in some cases inhibit the entry of new enthusiasts due to top-down efforts by powerful actors, such as national governments or wealthy investors, to subsidize and thereby conserve, certain declining practices (e.g., linked to agriculture, defense or tradition). Such efforts would support continued propping up and thus reduce the need for enthusiasts' custodianship efforts. Nevertheless, relying on such economic incentives to generate meaning is arguably not the most sustainable preservation method – what happens when such incentives disappear?

Barriers to entry. As we have highlighted, new enthusiasts' abilities to preserve a declining practice depend on gaining access to materials and competences. In our case, we identified increasing use of production and communication tools, such as personal computers, online market places, CAD software and CNC machines, allowing enthusiasts to acquire, make, and repair certain parts themselves instead of relying solely on legacy professionals or industrial machinery. The increased availability of material infrastructure in the twenty-first century that allows individual hobbyists to engage in practices that were previously restricted to organizations has implications for many other practices (Browder et al., 2019). In other words, it appears that,

in general, barriers to recovering, replenishing and releasing are coming down in increasingly technology-mediated societies, providing ever more opportunities for enthusiast-led preservation.

And yet, we can also conjecture that practices that have been historically restricted to professionals and therefore associated with exclusivity may support new enthusiasts' desires to become involved in them. Vinyl record manufacturing's historical exclusivity and concomitant mysteriousness (cf. Suddaby et al., 2017) which allowed enthusiasts to distinguish themselves from mere consumers of vinyl records arguably played a role in piquing their interest: they could claim to be able to do something of which few others were capable.

Potential to develop mastery and/or scope for experimentation. Finally, could there be something specific about vinyl record making that will always continue to attract more enthusiasts than other practices? According to Maines (2009), any practice that is no longer necessary –including coal mining (2009: 3–4)– can become a leisure activity, thus attracting enthusiasts. Shove et al. (2012: 75), meanwhile, suggest that practices that allow for mastery and creativity (and hence are intrinsically motivating) are most likely to sustain interest (see also Bell et al., 2018; Sennett, 2009), while others have highlighted the benefits of multivocality (Ferraro et al., 2015; Furnari, 2014) –i.e., the extent to which a practice can appeal to different actors– that favor practices that afford more possibilities for direct sensory engagement and experimentation (Ocejo, 2017) than those that entail engaging with 'black-boxed' devices (Nelson et al., 2023). Vinyl record manufacturing preservation efforts may therefore be seen as part of a wider response to progressive technological mediation (Holt & Wiedner, 2023).

Implications for future research. Future research may further explore the boundary conditions of our arguments. For example, scholars may want to study the extent to which high levels of diversity in the meanings, materials and competences associated with a declining

practice may, perhaps inadvertently, dilute the practice, causing fractures and ultimately transforming it into a different practice altogether. Arguably, in our case the practice of vinyl record manufacturing was still recognizable to all practitioners (i.e., it was still fundamentally about making discs that can be played back on a standard phonographic turntable) despite the reinventions and experimentations that legacy professionals and new enthusiasts added. Theoretically, however, the recognizability of a practice can be altered through preservation efforts, especially if they increase the heterogeneity of its constitutive elements. One interesting avenue to explore would be to distinguish between core and peripheral elements of a practice (cf., Dacin & Dacin, 2008), investigating the different effects that altering either or both these elements may have on the practice and its preservation. Finally, a promising area of inquiry for future research would be to explore more deeply the diversity across and within generations of custodians to provide more nuanced insights about the persistence and erosion of practices in light of individual and collective custodial efforts.

CONCLUSION

Increasing concerns about today's "throwaway society" call for a greater understanding of how declining practices can be preserved (Cooper, 2016). Our custodianship process model contributes to such an understanding, highlighting the relevance of practice diversity –not just in terms of meanings, but also materials and competences– and the benefits of inclusiveness, as opposed to guarding and gatekeeping, that to date have been largely treated as synonymous with custodianship. In other words, rather than preservation necessarily being dependent on policing homogeneity and purity in the face of potential deviations ('e pluribus unum'), differentiation ('ex uno plures') may play a more critical role in supporting a practice's persistence over time.

REFERENCES

Adner, R., & Snow, D. 2010. Old technology responses to new technology threats: Demand heterogeneity and technology retreats. ***Industrial and Corporate Change***, 19(5): 1655–1675.

Agnew, J. 2022a, July 15. Around the World In 80 Lathes, Part 17. ***PS Audio***, (167). https://www.psaudio.com/blogs/copper/around-the-world-in-80-lathes-part-17.

Agnew, J. 2022b, July 1. Around the World In 80 Lathes, Part 16. ***PS Audio***, (166). https://www.psaudio.com/blogs/copper/around-the-world-in-80-lathes-part-16.

Aldous, D. W. 1944. ***Manual of Direct Disc Recording***. London: Bernards.

Alvesson, M., & Kärreman, D. 2007. Constructing Mystery: Empirical Matters in Theory Development. ***Academy of Management Review***, 32(4): 1265–1281.

Anand, N., Gardner, H. K., & Morris, T. 2007. Knowledge-Based Innovation: Emergence and Embedding of New Practice Areas in Management Consulting Firms. ***Academy of Management Journal***, 50(2): 406–428.

Armstrong, E. A. 2002. ***Forging Gay Identities: Organizing Sexuality in San Francisco, 1950-1994***. Chicago: University of Chicago Press.

Aversa, P., Furnari, S., & Jenkins, M. 2022. The Primordial Soup: Exploring the Emotional Microfoundations of Cluster Genesis. ***Organization Science***, 33(4): 1340–1371.

Bacco, F., & Dalpiaz, E. 2022. The Perfume of Traditions: Cultural Entrepreneurship and the Resurrection of Extinct Societal Traditions. In C. Lockwood & J.-F. Soublière (Eds.), ***Advances in Cultural Entrepreneurship***, vol. 80: 113–136. Bingley: Emerald Publishing Limited.

Baldwin, C., & von Hippel, E. 2011. Modeling a Paradigm Shift: From Producer Innovation to User and Open Collaborative Innovation. ***Organization Science***, 22(6): 1399–1417.

Barnes, B. 2001. Practice as collective action. In T. R. Schatzki, K. (Karin) Knorr-Cetina, & E. von Savigny (Eds.), ***The practice turn in contemporary theory***: 17–28. London: Routledge.

Bartmanski, D., & Woodward, I. 2015. The vinyl: The analogue medium in the age of digital reproduction. ***Journal of Consumer Culture***, 15(1): 3–27.

Bartmanski, D., & Woodward, I. 2020. ***Vinyl: The Analogue Record in the Digital Age***. London; New York: Routledge.

Becker, H. S. 1998. ***Tricks of the Trade: How to Think about Your Research While You're Doing It***. Chicago: University of Chicago Press.

Bell, E., Mangia, G., Taylor, S., & Toraldo, M. L. (Eds.). 2018. ***The Organization of Craft Work: Identities, Meanings, and Materiality***. New York: Routledge.

Bickerdike, J. O. 2020, December 14. The Brave New (Old) World of Cutting Vinyl on a Lathe | Discogs. ***Discogs Blog***. http://blog.discogs.com/en/cutting-vinyl-lathe-process-interview/.

Bijker, W. E. 1997. ***Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change***. London: MIT Press.

Boden, L. 1978. ***Basic Disc Mastering*** (First edition). Glendale, CA: self-published.

Bonutto, D. 1997, August 2. Age against the machine. ***Music Week***, 24.

Boxenbaum, E., & Battilana, J. 2005. Importation as innovation: Transposing managerial practices across fields. ***Strategic Organization***, 3(4): 355–383.

Browder, R. E., Aldrich, H. E., & Bradley, S. W. 2019. The emergence of the maker movement: Implications for entrepreneurship research. ***Journal of Business Venturing***, 34(3): 459–476.

Brown, G. 1986, April 23. Cutting discs poses no mystery for Aardvark pair. ***Denver Post***. Denver. https://www.aardvarkmastering.com/post-86.htm.

Cancellieri, G., Cattani, G., & Ferriani, S. 2022. Tradition as a resource: Robust and radical interpretations of operatic tradition in the Italian opera industry, 1989–2011. ***Strategic Management Journal***, 43(13): 2703–2741.

Cattani, G., Dunbar, R. L. M., & Shapira, Z. 2013. Value Creation and Knowledge Loss: The Case of Cremonese Stringed Instruments. ***Organization Science***, 24(3): 813–830.

Clarke, R. 2020, September 1. The UK crafts at risk of extinction after COVID-19. ***Forbes***. https://www.forbes.com/sites/roddyclarke/2020/09/01/the-uk-crafts-at-risk-of-extinction-after-covid-19/.

Cooper, H., Miller, D., & Merrilees, B. 2015. Restoring luxury corporate heritage brands: From crisis to ascendency. ***Journal of Brand Management***, 22(5): 448–466.

Cooper, T. (Ed.). 2016. ***Longer lasting products: Alternatives to the throwaway society***. Abingdon: Routledge.

Crawford, B., & Dacin, M. T. 2021. Policing Work: Emotions and Violence in Institutional Work. ***Organization Studies***, 42(8): 1219–1240.

Croidieu, G., & Kim, P. H. 2018. Labor of Love: Amateurs and Lay-expertise Legitimation in the Early U.S. Radio Field. ***Administrative Science Quarterly***, 63(1): 1–42.

Dacin, M. T., & Dacin, P. A. 2008. Traditions as institutionalized practice: Implications for deinstitutionalization. In R. Greenwood, C. Oliver, K. Sahlin, & R. Suddaby (Eds.), ***The Sage handbook of organizational institutionalism***: 327–352. London: SAGE.

Dacin, M. T., & Dacin, P. A. 2019. Collective Social Innovation: Leveraging Custodianship, Tradition and Place on Fogo Island. In G. George, T. Baker, P. Tracey, & H. Joshi (Eds.), ***Handbook of inclusive innovation: The role of organizations, markets and communities in social innovation***. Cheltenham: Edward Elgar Publishing.

Dacin, M. T., Dacin, P. A., & Kent, D. 2019. Tradition in Organizations: A Custodianship Framework. ***Academy of Management Annals***, 13(1): 342–373.

Dacin, M. T., Munir, K., & Tracey, P. 2010. Formal Dining at Cambridge Colleges: Linking Ritual Performance and Institutional Maintenance. ***Academy of Management Journal***, 53(6): 1393–1418.

Ferraro, F., Etzion, D., & Gehman, J. 2015. Tackling Grand Challenges Pragmatically: Robust Action Revisited. ***Organization Studies***, 36(3): 363–390.

Flick, U. 2004. Triangulation in qualitative research. In U. Flick, E. von Kardoff, & I. Steinke (Eds.), ***A Companion to Qualitative Research***: 178–183. London: SAGE.

Furnari, S. 2014. Interstitial Spaces: Microinteraction Settings and the Genesis of New Practices Between Institutional Fields. ***Academy of Management Review***, 39(4): 439–462.

Gerome, J. 2007, February 21. Vinyl still remains relevant at Nashville record pressing plant. ***The Canadian Press***.

Giddens, A. 1994. Living in a post-traditional society. In U. Beck, A. Giddens, & S. Lash (Eds.), ***Reflexive modernization: Politics, tradition and aesthetics in the modern social order***: 56–109. Stanford: Stanford University Press.

Gomez, M.-L., & Bouty, I. 2011. The Emergence of an Influential Practice: Food for Thought. ***Organization Studies***, 32(7): 921–940.

Gorvett, Z. 2021, March 17. The ancient fabric that no one knows how to make. ***BBC Future***. https://www.bbc.com/future/article/20210316-the-legendary-fabric-that-no-one-knows-how-to-make.

Grassegger. 2016, August 5. Der Herr der Rille. ***Das Magazin***, 28–29.

Haagsma, R. (Ed.). 2018. ***Passion for Vinyl Part II: An Ode to Analog***. Haarlem: Record Industry.

Hampel, C. E., Tracey, P., & Weber, K. 2016. Institutional Reincarnation: "The Impossible Project" of Reviving Analog Instant Photography. ***Academy of Management Proceedings***, 2016(1): 12153.

Hargadon, A. B., & Douglas, Y. 2001. When Innovations Meet Institutions: Edison and the Design of the Electric Light. ***Administrative Science Quarterly***, 46(3): 476–501.

Harris, J. 2015, January 7. Vinyl's difficult comeback. ***The Guardian***. http://www.theguardian.com/music/2015/jan/07/-sp-vinyls-difficult-comeback.

Heaphy, E. D. 2013. Repairing Breaches with Rules: Maintaining Institutions in the Face of Everyday Disruptions. ***Organization Science***, 24(5): 1291–1315.

Helfet, G. 2018, June 20. Cutting edge: Meet one of the world's only lathe repair experts. ***The Vinyl Factory***. https://thevinylfactory.com/features/cutter-head-repair-flo-kaufmann/.

Henderson, R. 1995. Of life cycles real and imaginary: The unexpectedly long old age of optical lithography. ***Research Policy***, 24(4): 631–643.

Hendricks, J. M. 2016. Curating Value in Changing Markets: Independent Record Stores and the Vinyl Record Revival. ***Sociological Perspectives***, 59(2): 479–497.

Heritage Crafts Association. 2023. ***Red List of Endangered Crafts***. https://heritagecrafts.org.uk/redlist/.

Hogan, M. 2014, May 16. Did Vinyl Really Die in the '90s? Well, Sort Of…. ***Spin***. https://www.spin.com/2014/05/did-vinyl-really-die-in-the-90s-death-resurgence-sales/.

Holt, R., & Wiedner, R. 2023. Technology, Maturity, and Craft: Making Vinyl Records in the Digital Age. ***Business Ethics Quarterly***, 33(3): 532–564.

Hospodarske noviny. 1996, June 12. Gramofonove zavody exports the majority of its production. ***Hospodarske Noviny***.

Howard-Grenville, J., Metzger, M. L., & Meyer, A. D. 2013. Rekindling the Flame: Processes of Identity Resurrection. ***Academy of Management Journal***, 56(1): 113–136.

Humphreys, D. 1997. `Shredheads go mainstream'? Snowboarding and alternative youth. ***International Review for the Sociology of Sport***, 32(2): 147–160.

Jaffee, L. 2019, March 23. Refurbishing this vintage Scully Lathe took 4 years, $25,000+. ***Making Vinyl***. https://makingvinyl.com/refurbishing-this-vintage-scully-lathe-took-4-years-25000/.

Karakul, O. 2015. An Integrated Methodology for the Conservation of Traditional Craftsmanship in Historic Buildings. ***International Journal of Intangible Heritage***, 10: 136–144.

Koever, C. 2015, September 30. Die Vinyl-Szene muss erst lernen, dass Open Source cool ist. ***Wired***. https://www.wired.de/article/ausgabe-1115-plattenpresser-martin-sukale-im-wired-interview.

Kroezen, J. J., & Heugens, P. 2019. What Is Dead May Never Die: Institutional Regeneration through Logic Reemergence in Dutch Beer Brewing. ***Administrative Science Quarterly***, 64(4): 976–1019.

Leblebici, H., Salancik, G., Copay, A., & King, T. 1991. Institutional Change and the Transformation of Interorganizational Fields—An Organizational History of the United-States Radio Broadcasting Industry. ***Administrative Science Quarterly***, 36(3): 333–363.

Lifshitz-Assaf, H. 2018. Dismantling Knowledge Boundaries at NASA: The Critical Role of Professional Identity in Open Innovation. ***Administrative Science Quarterly***, 63(4): 746–782.

Lifshitz-Assaf, H., Lebovitz, S., & Zalmanson, L. 2021. Minimal and Adaptive Coordination: How Hackathons' Projects Accelerate Innovation without Killing it. ***Academy of Management Journal***, 64(3): 684–715.

Lincoln, Y. S., & Guba, E. G. 1985. ***Naturalistic Inquiry***. London: Sage.

Lingo, E. L., & Elmes, M. B. 2019. Institutional Preservation Work at a Family Business in Crisis: Micro-processes, Emotions, and Nonfamily Members: ***Organization Studies***, 40(6): 887–916.

Lok, J., & de Rond, M. 2013. On the Plasticity of Institutions: Containing and Restoring Practice Breakdowns at the Cambridge University Boat Club. ***Academy of Management Journal***, 56(1): 185–207.

Lopez, D. 2015, March 18. Custom vinyl maker displays wares at SXSW. ***The Daily Texan***. https://thedailytexan.com/2015/03/18/custom-vinyl-maker-displays-wares-at-sxsw/.

Louie B. Nunn Center for Oral History. n.d. ***Chasing Sound Oral History Project***. https://kentuckyoralhistory.org/ark:/16417/xt7pzg6g4k5n, February 17, 2024.

Lounsbury, M., & Crumley, E. T. 2007. New practice creation: An institutional perspective on innovation. ***Organization Studies***, 28(7): 993–1012.

Lucas, H. C., & Goh, J. M. 2009. Disruptive technology: How Kodak missed the digital photography revolution. ***The Journal of Strategic Information Systems***, 18(1): 46–55.

Maguire, S., & Hardy, C. 2009. Discourse and Deinstitutionalization: The Decline of DDT. ***Academy of Management Journal***, 52(1): 148–178.

Maines, R. P. 2009. ***Hedonizing Technologies: Paths to Pleasure in Hobbies and Leisure***. Baltimore: Johns Hopkins University Press.

Mantere, S., & Ketokivi, M. 2013. Reasoning in Organization Science. ***Academy of Management Review***, 38(1): 70–89.

Marschner, J. 2005, February 8. Erfolg mit der Jugendliebe. ***Saechsische.de***. https://www.saechsische.de/plus/erfolg-mit-der-jugendliebe-959742.html.

Massa, F. G. 2022. Change-maker and Culture-bearer: Entrepreneurs as Evangelists and Shepherds of Culture. In C. Lockwood & J.-F. Soublière (Eds.), ***Advances in Cultural Entrepreneurship***, vol. 80: 17–35. Bingley: Emerald Publishing Limited.

May, J. 2017. ***The Reassembler***. London: Hodder & Stoughton.

Montgomery, A. W., & Dacin, M. T. 2020. Water Wars in Detroit: Custodianship and the Work of Institutional Renewal. ***Academy of Management Journal***, 63(5): 1455–1484.

Mouk, M. 2014, June 13. Don't Call It Vinyl Cutting. ***DJBroadcast***. https://www.djbroadcast.net/article/98883/dont-call-it-vinyl-cutting.

Murata, K. 1983, August 23. Much hope is laid on Compact Discs. ***The Japan Economic Journal***, 30.

Nelson, A., Anthony, C., & Tripsas, M. 2023. "If I Could Turn Back Time": Occupational Dynamics, Technology Trajectories, and the Reemergence of the Analog Music Synthesizer. ***Administrative Science Quarterly***, 68(2): 551–599.

Nelson, A. J. 2015. ***The Sound of Innovation: Stanford and the Computer Music Revolution***. Cambridge, MA: MIT Press.

Nicolini, D. 2007. Stretching out and expanding work practices in time and space: The case of telemedicine. ***Human Relations***, 60(6): 889–920.

Nicolini, D., & Monteiro, P. 2016. The practice approach in organizational and management studies. In A. Langley & H. Tsoukas (Eds.), ***The SAGE Handbook of Process Organization Studies***. London: SAGE.

Ocejo, R. 2017. ***Masters of Craft: Old Jobs in the New Urban Economy***. Princeton: Princeton University Press.

Osborne, M. 2003, January 16. Vinyl Records Still Being Made in Nashville Factory. ***Voice of America News***.

Osborne, R. 2014. ***Vinyl: A History of the Analogue Record***. Farnham, Surrey: Routledge.

Parmenter, J. 2019, July 4. Vinyl: Then and Now - The Ongoing Evolution of Record Production. ***Vinyl Chapters***. https://www.vinylchapters.com/vinyl-then-and-now-record-production/.

Peterson, G., Allen, C. R., & Holling, C. S. 1998. Ecological Resilience, Biodiversity, and Scale. ***Ecosystems***, 1(1): 6–18.

Pettigrew, A. M. 1990. Longitudinal Field Research on Change: Theory and Practice. ***Organization Science***, 1(3): 267–292.

Raffaelli, R. 2019. Technology Reemergence: Creating New Value for Old Technologies in Swiss Mechanical Watchmaking, 1970-2008. ***Administrative Science Quarterly***, 64(3): 576–618.

Raffaelli, R., DeJordy, R., & McDonald, R. M. 2022. How Leaders with Divergent Visions Generate Novel Strategy: Navigating the Paradox of Preservation and Modernization in Swiss Watchmaking. ***Academy of Management Journal***, 65(5): 1593–1622.

Reckwitz, A. 2002. Toward a Theory of Social Practices A Development in Culturalist Theorizing. ***European Journal of Social Theory***, 5(2): 243–263.

Rohrlich, J. 2011, April 25. Contrary to Reports, Typewriter Industry "Far From Dead." ***Minyanville***. http://www.minyanville.com/mvpremium/2011/04/25/contrary-to-reports-typewriter-industry/.

Rojas, C. 2016, April 16. N.J. plant fills pressing need for new vinyl. ***NJ Advance Media***. https://www.nj.com/news/2016/04/record_store_day_2016_vinyl.html.

Rosenthal, G. 2004. Biographical research. In C. Seale, G. Gobo, J. F. Gubrium, & D. Silverman (Eds.), ***Qualitative Research Practice***: 48–64. London: SAGE.

Sandberg, J., & Tsoukas, H. 2011. Grasping the logic of practice: Theorizing through practical rationality. ***Academy of Management Review***, 36(2): 338–360.

Sarpong, D., Dong, S., & Appiah, G. 2016. "Vinyl never say die": The re-incarnation, adoption and diffusion of retro-technologies. ***Technological Forecasting and Social Change***, 103: 109–118.

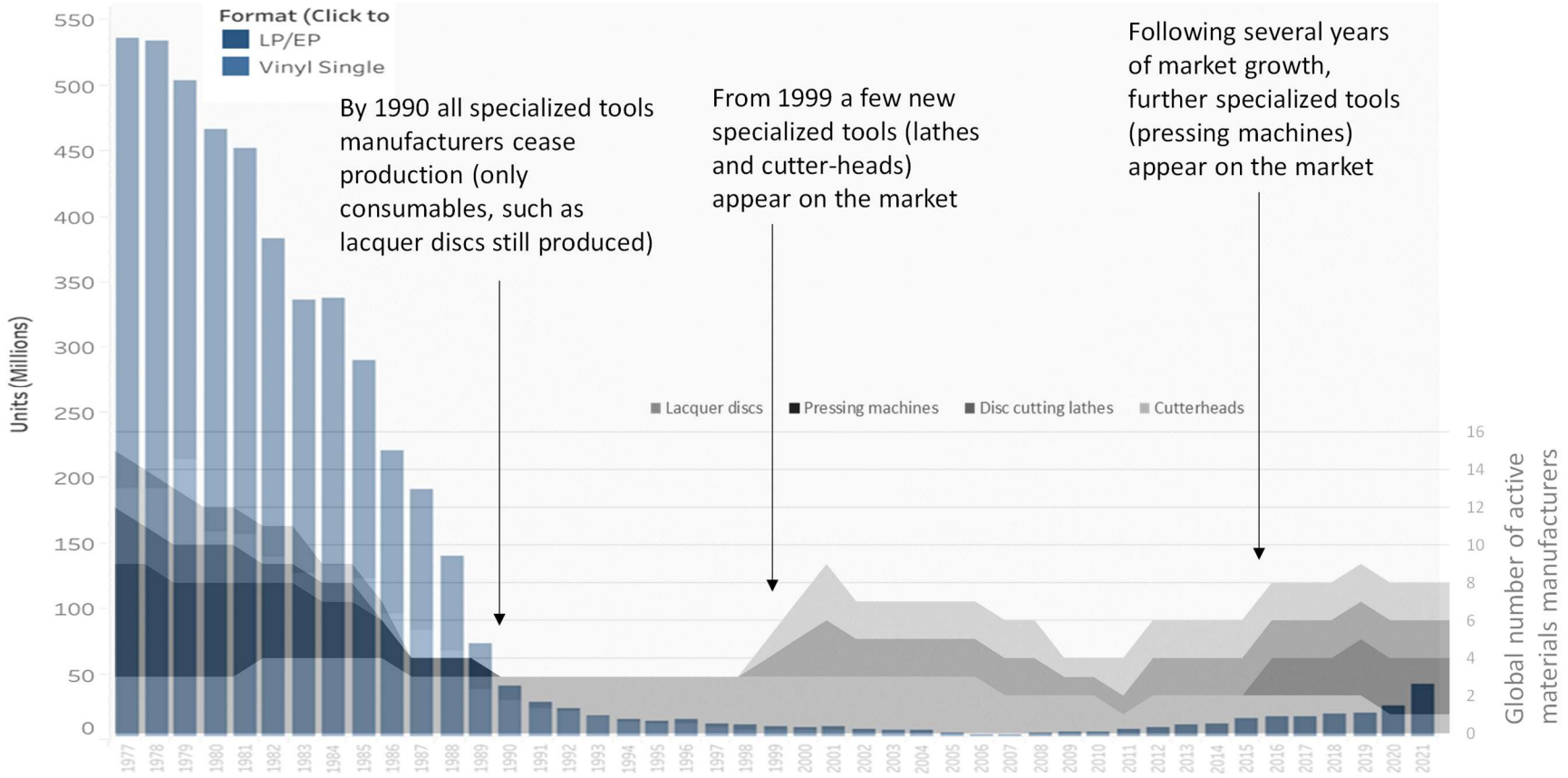
Schatzki, T. R. 2005. The sites of organizations. ***Organization Studies***, 26(3): 465–484.

Schatzki, T. R. 2019. ***Social Change in a Material World***. Abingdon: Routledge.

Sennett, R. 2009. ***The Craftsman***. London: Penguin.
Shils, E. C. 1981. ***Tradition***. Chicago: University of Chicago Press.
Shove, E., Pantzar, M., & Watson, M. 2012. ***The Dynamics of Social Practice: Everyday Life and how it Changes***. London: SAGE.
Siebert, S., Wilson, F., & Hamilton, J. R. A. 2017. "Devils May Sit Here:" The Role of Enchantment in Institutional Maintenance. ***Academy of Management Journal***, 60(4): 1607–1632.
Smets, M., Morris, T., & Greenwood, R. 2012. From practice to field: A multilevel model of practice-driven institutional change. ***Academy of Management Journal***, 55(4): 877–904.
Soares, J. A. 1997. A reformulation of the concept of tradition. ***International Journal of Sociology and Social Policy***, 17(6): 6–21.
Spencer-Allen, K. 2003. Vinyl: Still at the cutting edge. ***Resolution***, (November/December): 44–48.
Spice, A. 2020, February 28. Apollo/Transco: What is a lacquer and how will the crisis affect the vinyl industry? ***The Vinyl Factory***. https://thevinylfactory.com/features/apollo-transco-lacquer-impact-vinyl-industry/.
Stabile, R. 2011, August 20. The Process of Pressing Vinyl at Capsule Labs -. ***Mxdwn Music***. https://music.mxdwn.com/2011/08/20/features/the-process-of-pressing-vinyl-at-capsule-labs/.
Star, S. L. 1999. The ethnography of infrastructure. ***American Behavioral Scientist***, 43(3): 377–391.
Stoller, K. 2015, August 1. New Record Pressing Plant Opens in Oregon! | Discogs. ***Discogs Blog***. https://blog.discogs.com/en/cascade-record-pressing/.
Suddaby, R., Ganzin, M., & Minkus, A. 2017. Craft, magic and the re-enchantment of the world. ***European Management Journal***, 35(3): 285–296.
Sullivan, G. 2018. Peter King and his one-off vinyl. ***Tape Op***, (152). https://tapeop.com/interviews/bonus/peter-king-and-his-one-vinyl/.
Swidler, A. 2001. What anchors cultural practices. In T. R. Schatzki, K. (Karin) Knorr-Cetina, & E. von Savigny (Eds.), ***The practice turn in contemporary theory***: 74–92. London: Routledge.
Temmer, S. F. (Ed.). 1980. ***An anthology of articles on disk recording from the pages of the Journal of the Audio Engineering Society Vol.1-Vol.28 (1953-1980)***, vol. 1. Audio Engineering Society.
Temmer, S. F. (Ed.). 1981. ***An anthology of articles on disk recording from the pages of the Journal of the Audio Engineering Society Vol.1-Vol.28 (1953-1980)***, vol. 2. Audio Engineering Society.
Tsoukas, H., & Chia, R. 2002. On organizational becoming: Rethinking organizational change. ***Organization Science***, 13(5): 567–582.
Tuffly, R. 1985, October. Direct Metal Mastering. ***Recording Engineer Producer***, 16(5): 58–73.
VoyageLA. 2018, October 17. Meet Len Horowitz of History of Recorded Sound—Voyage LA Magazine | LA City Guide. ***VoyageLA***. http://voyagela.com/interview/meet-len-horowitz-history-recorded-sound-culver-city/.
Warwick, O. 2017, August 28. Meet the studios keeping dubplate culture alive. ***The Vinyl Factory***. https://thevinylfactory.com/features/studios-dubplates-culture-alive/.
womeninvinyl. 2021, July 24. Tasha Trigger: Owner, Lathe to the Grave. ***Women in Vinyl***. https://womeninvinyl.com/2021/07/24/tasha-trigger-owner-lathe-to-the-grave/.
Wright, A. L., Meyer, A. D., Reay, T., & Staggs, J. 2021. Maintaining Places of Social Inclusion: Ebola and the Emergency Department. ***Administrative Science Quarterly***, 66(1): 42–85.
Zimmer, A., & Toepler, S. 1999. The Subsidized Muse: Government and the Arts in Western Europe and the United States. ***Journal of Cultural Economics***, 23(1): 33–49.

FIGURES AND TABLES

Figure 1: US vinyl record sales and global number of active materials manufacturers



Source (US vinyl record sales): Recording Industry Association of America (RIAA)

Figure 2: Timeline across vinyl record manufacturing practice variants

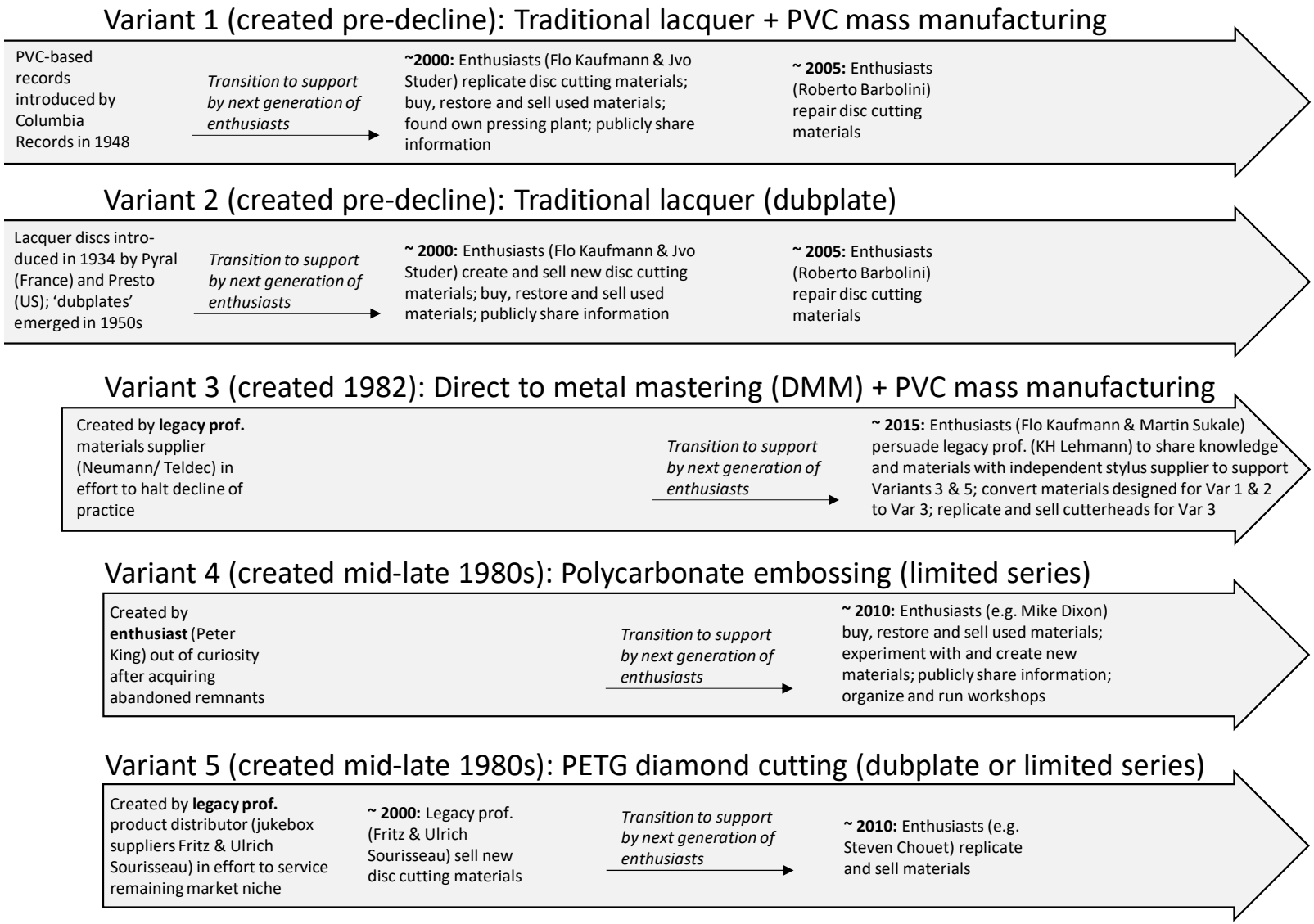


Figure 3: A custodianship model of practice preservation

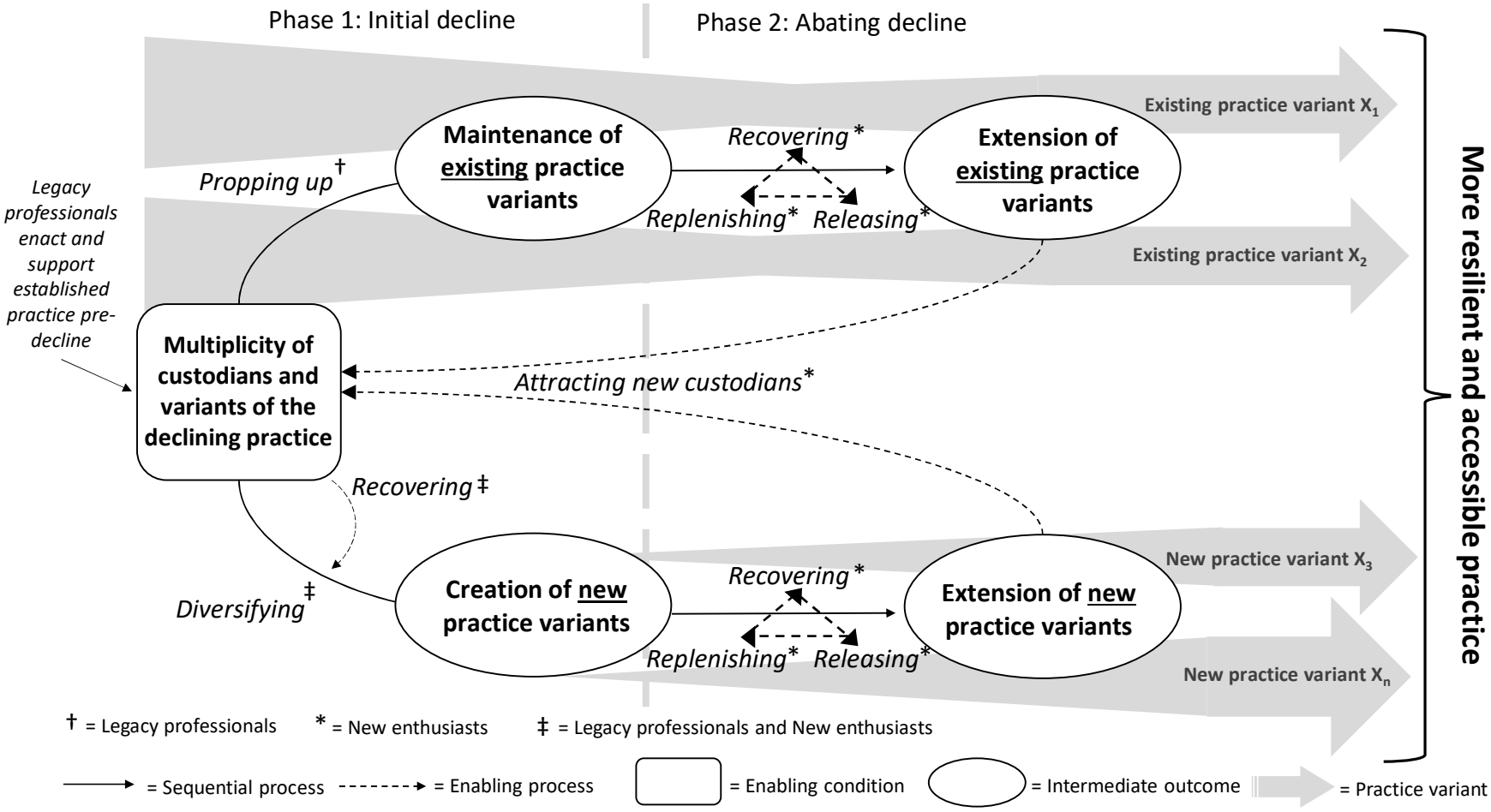


Table 1: Decline-related developments concerning the vinyl record manufacturing practice

Practice Activities	Decline-related developments
Mastering/ disc cutting	**Meaning depletion:** The majority of mastering studios discontinue disc cutting due to lack of financial incentives *"In the mainstream music world where CDs really ascended in the late '80s into the '90s –that's what pushed the disks out. It's definitely a big fall off [of vinyl record production] then." (Chris Muth, interview)*
	Competence depletion: Mastering engineers at several studios around the world cannot repair mastering equipment when it breaks *"[The Dubplates & Mastering studio] has a Neumann machine - and its decades-old technology constantly causes problems... The studio grinds to a halt" (translated from Grassegger, 2016)*
	Material depletion: Mastering engineers at several studios around the world face difficulties obtaining certain materials (e.g., styli; lacquer-coated discs); certain materials no longer produced because suppliers discontinue production *"If traditional lathes are considered endangered, then Neumann's VMS-82DMM lathes are practically extinct" (Spice, 2020)*
Electro-plating (aka electro-forming or galvanics)	**Meaning depletion:** The majority of galvanic operations for vinyl record manufacturing shut down due to lack of financial incentives *"We had a lot of terrible plating over the years in the United States but mainly because of the volume and basically because all these record places were run by accountants who wanted to do everything on an economy of scale that didn't lead to quality" (Larry Boden, interview)*
	Competence depletion: Managers at several pressing plants around the world experience problems they are unable to solve without support *"[An established pressing plant] needed some help and they kept complaining to customers that if somebody sent in a cut [they couldn't electroplate it]. They would say, "We seem to be all right with the B side but the A side was always a problem."" (John Rooke, interview)*
	Material depletion: Electroforming equipment for vinyl record manufacturing no longer produced because suppliers discontinue production *[Note: While new, specialized electroforming equipment for vinyl record manufacturing was no longer available from the 1980s, electroforming continues to be performed for optical disc manufacturing and in other industries]*
Pressing	**Meaning depletion:** The majority of pressing operations for vinyl record manufacturing shut down due to lack of financial incentives *"At the end of the 1980s, in the early 90s, the vinyl record basically went to sleep, which of course made the majors scrap everything to do with vinyl completely" (Holger Neumann, interview)*
	Competence depletion: Managers at several pressing plants around the world experience problems they are unable to solve without support *"We're an older industry with an erosion of expertise," explains Chris Rose, managing director of the Damont pressing plant. "The machines may cause problems … but that's nothing compared with the problems we have finding people with the skills to service them." (Bonutto, 1997)*
	Material depletion: New pressing machines no longer available because suppliers discontinue production *"The vinyl industry is sustained by a complex network of industrial processes, and there are pinch points throughout … [T]here was a time when a relatively finite number of functional record presses remained in circulation" (Spice, 2020)*

Table 2: Variants of the vinyl record manufacturing practice during initial and abating decline

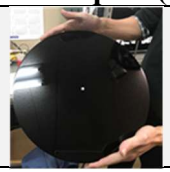
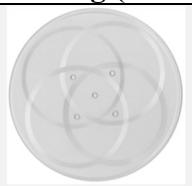
Variant 1 (created pre-decline): Traditional lacquer + PVC mass manufacturing			
Meanings: Trad. way to produce hi-fi copies of audio recordings; financial profit ***Materials:*** Professional disc cutting system, galvanics, pressing machines… ***Competences***: Specialized audio, basic mechanical, electrical, chemical…			*Abating decline (changes in* **bold***)* ***Meanings***: Traditional; **warm sounding** ***Materials***: **Used + new** materials ***Competence***s: Specialized audio, specialized mechanical, electrical, chemical… (reduced technical support)
Variant 2 (created pre-decline): Traditional lacquer (dubplate)			
Meanings: Traditional way to produce unique audio medium to impress audience or test market ***Materials:*** Professional disc cutting system ***Competences***: Specialized audio engineering			***Meanings***: Traditional, **ephemeral, warm sounding**, unique audio medium ***Materials***: **Used + new** materials ***Competences***: Specialized audio eng.; electrical and mechanical engineering
Variant 3 (created 1982): Direct to metal mastering (DMM) + PVC mass manufacturing			
	Meanings: Clearer + more efficient than Var 1 to compete with digital ***Materials***: New prof lathe + cutterhead, diamond stylus, galvanics, press mach… ***Competences***: Specialized audio, mechanical, electrical, chemical…			***Meanings***: Tangible audio medium; clearer + more efficient than Var 1; **less dependence on blank disc supplies** ***Materials***: Used + new materials ***Competences***: Specialized audio, mechanical, electrical, chemical…
Variant 4 (created late 1980s): Polycarbonate embossing (limited series)			
	Meanings: Create affordable, rare, tangible audio carrying art objects for indie artists ***Materials***: Abandoned mono lathes, Tungsten styli, widely available plastic sheets ***Competences***: Basic audio; intermed. mechanical and electrical engineering			***Meanings***: **Lo-fi**, affordable, rare, tangible audio carrying art objects ***Materials***: Abandoned mono lathes, **different styli**, plastic sheets ***Competences***: Basic audio; intermed. mechanical and electrical engineering
Variant 5 (created late 1980s): PETG diamond cutting (dubplate or limited series)			
	Meanings: Convert digital source to tangible, durable, mid-fi audio medium; financial profit ***Materials***: Modified technics turntable, diamond stylus, PETG coated discs ***Competences***: Basic audio; intermed. mechanical and electrical engineering			***Meanings***: Convert digital source to tangible, durable, mid-fi audio medium ***Materials***: Modified technics turntable, diamond stylus, PETG coated discs ***Competences***: Basic audio; intermed. mechanical and electrical engineering

Table 3: Data structure

First order codes	Second order codes (Activities)	Themes (Processes)
Legacy professionals scale down production	Continuing to enact	Propping up
Legacy professionals continue to serve residual demand		
Legacy professionals continue to produce and/or distribute certain materials	Continuing to support	
Legacy professionals continue to repair and service remnants		
Legacy professionals hoard remnants and use them for spare parts		
Legacy professionals create new method to compete with substitutes	Modifying to compete	Diversifying
Enthusiast combines remnants with new materials to create more affordable method	Modifying to more easily enact	
Legacy professionals create new method in response to income threats	Modifying to profit from residual demand	
Enthusiasts search for abandoned remnants	Scavenging	Recovering
Enthusiasts search for information about elements of practice		
Enthusiasts clean and repair remnants	Restoring remnants	
Enthusiasts replace parts of remnants		
Enthusiasts make adjustments via trial and error		
Enthusiasts impress practitioners with skills and/or knowledge	Demonstrating competences	
Enthusiasts demonstrate dedication		
Enthusiasts use/adapt remnants to make parts	Replicating	Replenishing
Enthusiasts use new tools to make parts		
Enthusiasts replace scarce materials with alternatives	Upgrading	
Enthusiasts replace materials with better performing alternatives		
Enthusiasts publish information online	Sharing	Releasing
Enthusiasts help other enthusiasts with problems		
Enthusiasts sell and trade materials	Exchanging	
Enthusiasts provide support, training, and advisory services in exchange for fees		

Table 4: Illustrative evidence for each code

Second order code (Activities)	First order code	Data examples
	1. Propping Up	
Continuing to enact	Legacy professionals scale down production	[The established Czech company GZ Media expects to] manufacture more than 1 mil vinyl records in 1996 compared to 16 mil pieces in 1992. (Hospodarske noviny, 1996) We then reduced the shifts from three to two to one, and in the end we only worked half a shift. (Holger Neumann, interview)
	Legacy professionals continue to serve residual demand	Chris Ashworth noted on a tour of the plant floor that [of the 38 employees] quite a few … have been at the plant making records for at least 30 years. All that experience is essential because producing a quality vinyl record is a complex, exacting task … Today, United is the last of Music City's pressing plants. (Osborne, 2003) [In London, vinyl mastering] didn't go away … those guys stuck with it as well, didn't they? In the early 2000s it would have been easier for them to go, "What's the point?" So, luckily, they hung around, kept the kit, kept a lot of the expertise … so it's good that those skills hung around, as well, really. (Adam Teskey, interview)
Continuing to support	Legacy professionals continue to produce and/or distribute certain materials	And then as the industry started getting smaller, [I] carried on … we kept supplying it … because we'd done vinyl for so long, we still kept that game on the backburner … I thought that would be a nice little retirement job I could keep going. (George Thumwood, interview) We got to the '80s and it almost disappeared but … I kept a small interest in it … I'm 73, … Peter's 87. Peter [Inker] and I have been in this industry together and actually worked together for many, many years. (John Rooke, interview)
	Legacy professionals continue to repair and service remnants	Back in the late '90s there really wasn't anybody doing this stuff [servicing lathes and repairing cutterheads in North America]. It was Al Grundy and myself … as far as flying around and taking care of these things … Now all the old guys are going away, they're all dying off … so, yeah, we're the old farts now. (Chris Muth, interview) It took us a year to restore that lathe … We paid a guy called Sean Davies, who is this great sound engineer, now in his 80s … [Davies and his business partners] somewhat have a monopoly on the market; there aren't many people who do electrical and mechanical engineering in this way. (Darrel Sheinman, interview)
	Legacy professionals hoard remnants and use them for spare parts	"It went as far as if something went wrong with a machine, they would have to go back to another old machine and take pieces off it and refix it like that." (Karen Emanuel, cited in Parmenter, 2019) "So, many of the bigger studios were having to purchase two or three lathes at the same time just to keep one running and just making parts from the others." (J.I. Agnew, interview)
	2. Diversifying	
Modifying to compete	Legacy professionals create new method to	Jim Shelton, Europadisk co- owner with Christian Lach, says that his facility has always been a record manufacturer, and "our decision to utilize DMM came from a natural progression. The choice of DMM was because the system is better - much better than lacquer technology. Technically, DMM sounds cleaner with a musically wide dynamic range. … DMM results directly from trying to improve the LP record." (Tuffly, 1985: 64)

	compete with substitutes	While expectations are high for innovative CDs to dramatically prop up market demand, no less expectations are given to the future for top-quality analog audio equipment. It is the prevailing view in the industry that these two products will be the main pillars supporting the audio market … It will still take some time before CDs can fulfill all the different user needs. There is an enormous selection of hardware and software available to play conventional records, and they compete well with compact discs in terms of sound quality … Attracting attention also is DMM (Direct Metal Mastering) by means of a new cutting system [from] TELDEC. (Murata, 1983)
Modifying to more easily enact	Enthusiast combines remnants with new materials to create more affordable method	What we did here was look into different types of plastics that would be very similar [to vinyl]. So we [tested hundreds of] different types of plastic … for about three years and … we were cutting directly onto a CDR … The polycarbonate seemed to be the best thing to cut directly onto. (Peter King, interview) No discussion of disk recording … could be considered complete without a mention of the individuals who never gave up on the vinyl record and kept making records with whatever means they had available, just to keep the medium alive. It is largely through their efforts that a lot of equipment was rescued from the scrapyard and a lot of the know-how was preserved … [I]n the 1980s, Peter King in New Zealand put together a custom disk recording lathe and restored a couple of lathes he got from the BBC, using washing machine parts. (Agnew, 2022a)
Modifying to profit from residual demand	Legacy professionals create new method in response to income threats	In the 1970s, [Souris] Automaten ran a business placing vinyl jukeboxes in bars but, eventually, CD jukeboxes came out. [Souri] responded by learning to cut vinyl and outfitted his jukeboxes with music others lacked. (Lopez, 2015) Basically, [Souri worked] out how to make his own music for jukeboxes. And he said he hates the CD … When the CD came along, it really ruined his jukebox business. (Matt Martin, interview)
3. Recovering		
Scavenging	Enthusiasts search for abandoned remnants	In order to locate and purchase presses, the founders of Cascade had to go on what Lanning describes as an "epic quest to locate equipment." (Stoller, 2015) All of the equipment here [note: pressing machines] comes from a junkyard. (Michel Nath, interview)
	Enthusiasts search for information about elements of practice	I intensely searched the literature, trawled through the university library, and combed the internet for any snippets of information … and then I started to research the component terms in French, because there might just be French literature that contains a diagram I could read. (Lukas Obwaller, interview) Libraries was the key; going to libraries and getting libraries to send information in books from all over the world and then reading over and over and over all the information. (Peter King, interview)
Restoring remnants	Enthusiasts clean and repair remnants	Chris [Moss] and I bought the company and started to redevelop and fix the machines. The machines were destroyed; in very bad condition. We fixed a lot of stuff. (Filippo De Fassi Negrelli, interview) [I bought a Neumann cutting lathe] that was still in its original state. It had to be completely refurbished. I did that by myself. It took almost a year or so because the technology was also new to me. (Andy Bauer, interview)
	Enthusiasts replace parts of remnants	So, it [became] a Frankenstein; it's a special lathe. So, there are things that I had to [add to it]. (Arthur Joly, interview)

		Key missing pieces … included a vacuum system for the platter, electronics, microscope, light, and a table, among them. Some parts needed to be recreated from machine shops, and [Eric Conn] found other spare parts on eBay … "I'm a mastering engineer, not a machinist," said Conn, yet he ended up building himself the lathe's drive system. (Jaffee, 2019)
	Enthusiasts make adjustments via trial and error	I probably had 50 or 60 machines come through me over the last ten years and so [learning to use and repair them] was by trial and error … A lot of the techniques that I use, either I pioneered or me and one or two other people kind of bounced ideas off of each other, and there is a lot, a lot of trial and error. (Mike Dixon, interview) It took me a long time to put it together and even get a basic groove, even just a silent continuous groove. So, I really learned from trial and error … I basically ended up cutting 10,000 records and by the end of it I guess I got quite good at it … I really learned from trial and error. (Frank Merritt, interview)
Demonstrating competences	Enthusiasts impress practitioners with skills and/or knowledge	People appreciate when … you do research and you don't just send an email telling your life story and that you want all their knowledge … You call Chris Muth and … you gain his respect. Anyone, not just him … you show them that you know what you're talking about, then you can demonstrate to them that you're self-thinking and you diagnose the problem a bit but are open to suggestions and that kind of thing. (Chris Mara, interview) We had an incomplete Neumann VMS 66 lathe and spent over half a year repairing it and … cloning the missing cards for the cutting amplifier. When Johannes Richter came over to fix the lathe, he was flabbergasted. He said all the parts we had made looked like original parts from the factory. He was really impressed. And we developed a very good relationship after that. He shared original drawings and diagrams with us, which he didn't do with others. (John Zippro, interview)
	Enthusiasts demonstrate dedication	It turned out that it wouldn't have been possible to do this via commercial means. Well, we came really close, but we wouldn't have been able to do it to the same standard with normal machines …. but [Karl-Heinz Lehmann] also saw that and said, 'oh, actually, you're doing cool stuff'. And so, our poor diamond grinder [at Indimant] basically had to go back to becoming an apprentice and was taught by Lehmann: 'this is how you grind properly'. (Martin Sukale, interview) I bought it [my first cutting lathe] from a very old recording studio here in Bologna; the old man who gave it to me didn't want to sell because he loved it so much. But then, speaking with me, he understood how much love I had inside for the field. (Roberto Barbolini, interview)
4. Replenishing		
Replicating	Enthusiasts use/adapt remnants to make parts	Yeah, it's a quite famous machine, actually; there was only four of that model ever built. It's quite unique; it does the gatefold in a single piece - the only unit built in the '70s. (Adam Teskey, interview) Special equipment is needed for these cutter heads, which I got directly from Westrex. We still use the same equipment from the 1940s. (Len Horowitz, interview in VoyageLA, 2018)
	Enthusiasts use new tools to make parts	I'm dealing with [Todd Mariana who is] doing cutter heads right now. He does 3D printed cutter heads which is crazy, super cool. (Malin Johnson, interview) None of [the companies] were able to make [a tool I requested]. So … I've learned [to build my own equipment] by practicing. I wanted to do some special geometry and special faceting. The only way to do that was to make my own machinery. (Steven Chouet, interview)

Upgrading	Enthusiasts replace scarce materials with alternatives	I've sourced all of the fixes. So, I don't have to rely on the machine builder … and an example of that is … stamper ring bolts that hold the stamper ring in place, and this was a glorified Allen head bolt … something like $6 a bolt. And I was frustrated because it would snap, or would get lost or you know, you'd find that the Allen head is worn out … so I sourced a part at a local supplier for 23 cents apiece. (Thomas Bernich, interview) I've designed [a new cutterhead]; not just copied the Neumann sX 74 cutterhead … a moving magnet feedback cutter head now which people have tried unsuccessfully [in the past]. (James Sillitoe, interview)
	Enthusiasts replace materials with better performing alternatives	The pitch depth automation systems … developed by Flo Kaufmann and his associate Jvo Studer … can be found as aftermarket upgrades on several Neumann, Scully, Fairchild and other lathes. (Agnew, 2022b) The prestos with TKV cutterheads is very interesting to me, it opens a whole new world up to those lathes. An incredible upgrade to the most workhorse lathe there is! (Tyler Bisson, email correspondence)
5. Releasing		
Sharing	Enthusiasts publish information online	One needs to keep in mind that record manufacturers in the past kept their secrets … Being here in this forum with the free exchange of ideas, one gets the feeling it was always like that; of course, this was not the case. (Mossboss, via https://www.lathetrolls.com/viewtopic.php?f=1&t=1198, May 2009) The … Lathe Trolls [forum] is a godsend ... The knowledge contained in those pages … is "the ark" of record cutting. We will be forever in their debt. (Melissa Moore, interview in Bickerdike, 2020)
	Enthusiasts help other enthusiasts with problems	We have just opened a pressing-café in which we show people how they can make good vinyl records themselves and we share the knowledge. (Martin Sukale, quoted in and translated from Koever, 2015). I think there's a certain network and … if any of those guys from a pressing plant called me up and asked my opinion on something I would absolutely help them out … and it's really in our own best interest for the format to try and help each other out where we can (Sean Rutkowski, interview)
Exchanging	Enthusiasts sell and trade materials	I also … buy and sell old lathes. (Mike Dixon, interview) If someone from [a pressing plant] said, "I desperately need a circuit breaker for the left channel' then I'd send it to them and think, 'ok, maybe I'll need something in the future as well' (Frank Kirschner, interview)
	Enthusiasts provide support, training, and advisory services in exchange for fees	When [the mastering studio] The Exchange shut down and the engineers went off, I set up the lathe for one of the engineers; before, that would have been Sean [Davies] doing that. (Lewis Durham, interview) It's grown men calling you crying in a panic and also calling you in a rage … and flying me back to their homes to where I'm in the house for a minute and then I fix the problem they were so upset about. (Wesley Wolfe, interview)

Table 5: Characteristics of Custodians and Illustrative Evidence

Type of custodian	Time of entry	Meanings	Competences	Materials
Legacy professionals	Entry before phase of initial decline	**Practice as mean to earn income and have a good career; general fascination with sound.** "[To me, vinyl is] just another medium. I'm a specialist … or an 'expert' with vinyl, I suppose … I don't buy vinyl very much at all, personally". (Ray Staff, interview) "It's 1959 and I'm 13 years old … I go to a bus-stop and there's a bag on the bench; in it were nine 45 RPM records; somebody had left them there … I looked at these records and said, "These are the same records I've been hearing on the radio … how the hell does this work?" … Well, that was the beginning of my career because I was fascinated. [But today] I do not own a turntable … it's a flawed medium" (Larry Boden, interview)	**Skills developed through practice and experimentation** "At the outskirts of Munich [in the late 1940s] I found a stripped Messerschmitt fighter plane hidden in the woods. With the help of a set of pliers and a screw-driver, I removed most of the electrical wires and equipment from the cockpit and later at home built a very simple radio [before moving to the US to work in electrical engineering for the audio industry]" (George Alexandrovich, interview). "No one expected vinyl to last and the traditional training programs were stopped or scaled down … Training was originally within the studio on a watch and learn basis with the trainee gradually taking more responsibility under supervision. It is not something you can pick-up overnight" (Sean Davies, cited in Spencer-Allen, 2023)	**Companies providing state-of-the-art tools; access to remnants** "At Sterling Sound there really wasn't a question of: 'Can we afford [a new, expensive tool]?'; it was more or less like, 'Why don't we have one here now?' … Of course, there was money back in those days." (Chris Muth, interview) "Well, buying my own equipment wasn't much of a problem; I knew where the bones were buried" (Len Horowitz, interview)
New enthusiasts	Entry during or after the phase of initial decline	**Practice as an end in itself; value of experimentation** "I was really more interested in records as … a quirky art form … in people doing records in an experimental way … crazy shit" (Steve Espinola, interview)	**Skills developed by tinkering and engaging in manual/analog crafts** "We used to repair TVs and stuff like that, set up antenna units" (Andy Bauer, interview) "I … was a picture frame restorer [and I] kind of learned this craft … So that was another thing that's very similar to [making vinyl records]; it's all analog basically." (James Sillitoe, interview)	**Difficulties accessing remnants** "When I was looking originally, I had pretty much given up hope [of finding professional tools for making vinyl records]. You don't find a cutting lathe, basically; that's what everyone was telling me." (Nick Strang, interview)

ONLINE APPENDIX FIGURES AND TABLES

Figure A1: A mastering engineer operating a Neumann disc cutting lathe

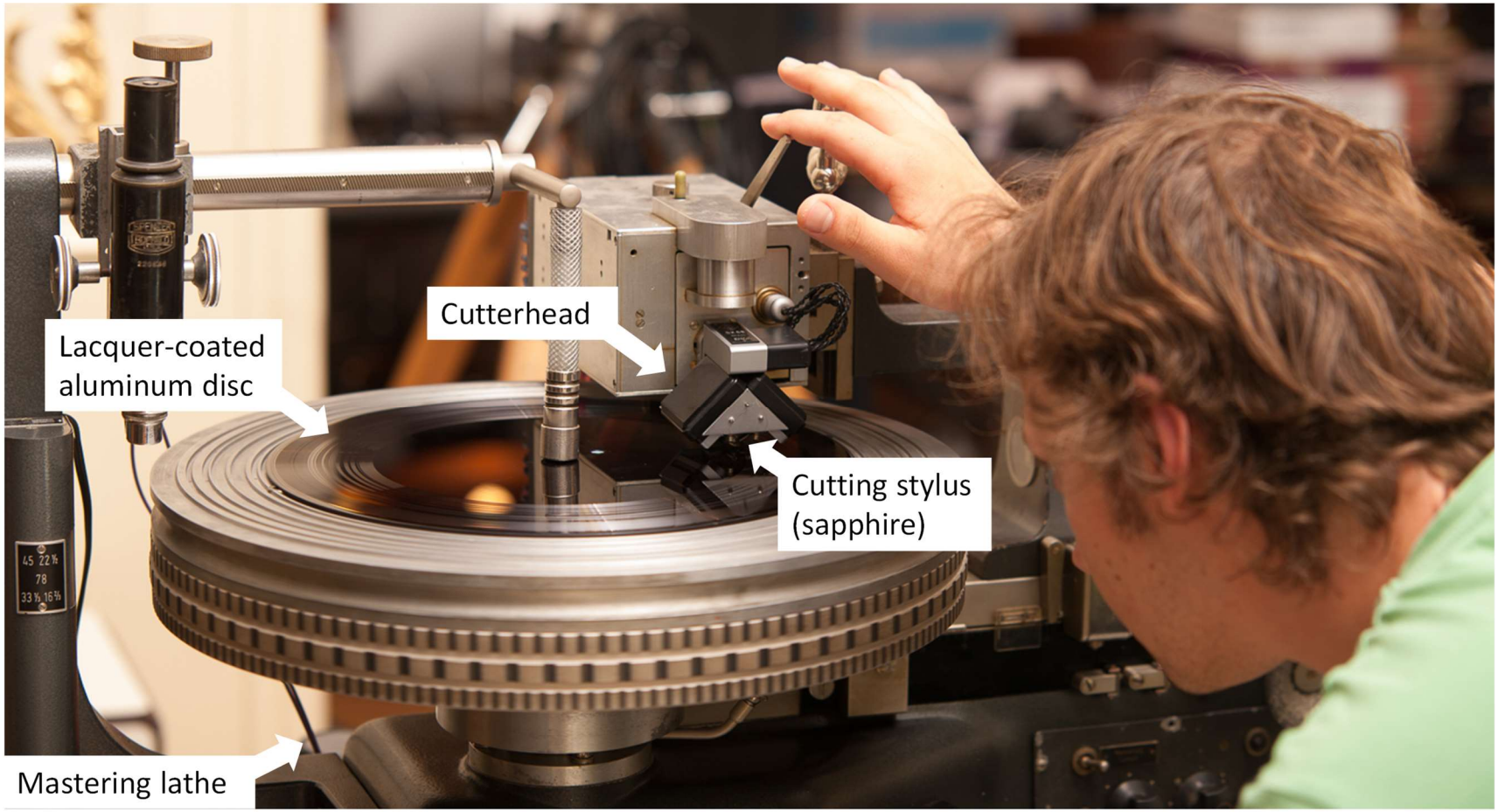


Figure A2: Hijiri Okuda, President of Public Records Co., Ltd, holding a lacquer-coated aluminum disc

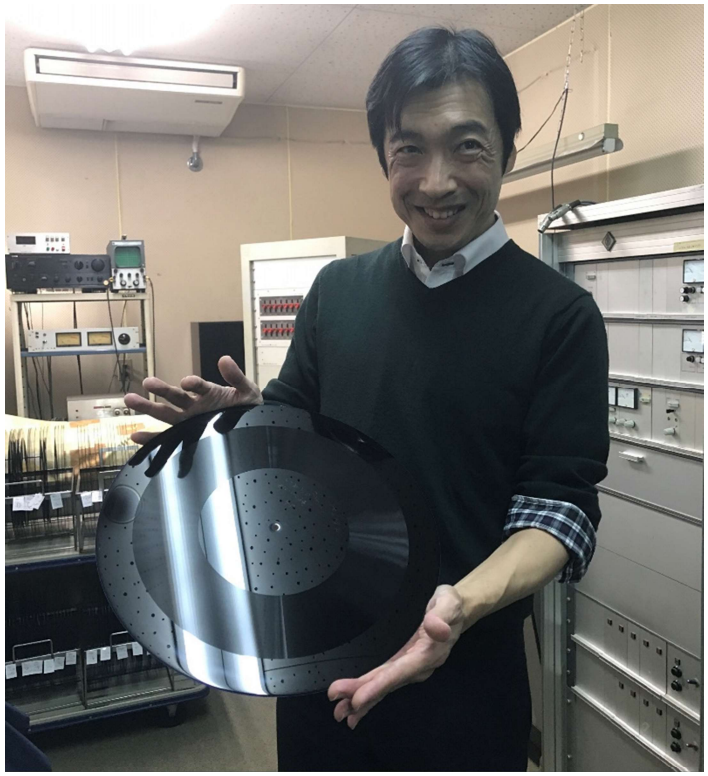


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Figure A3: A polished sapphire stylus used for cutting grooves into lacquer-coated master discs

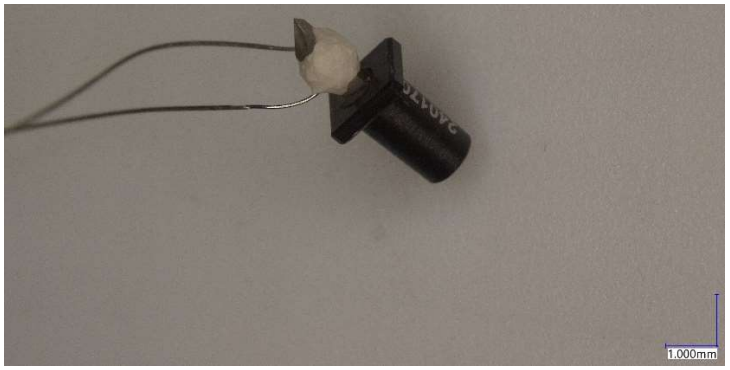

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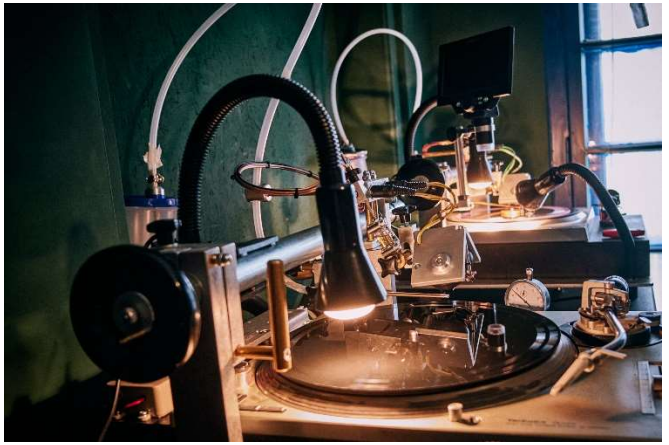
Figure A4: Modified 'T560 vinyl recorders' used for cutting into PETG discs

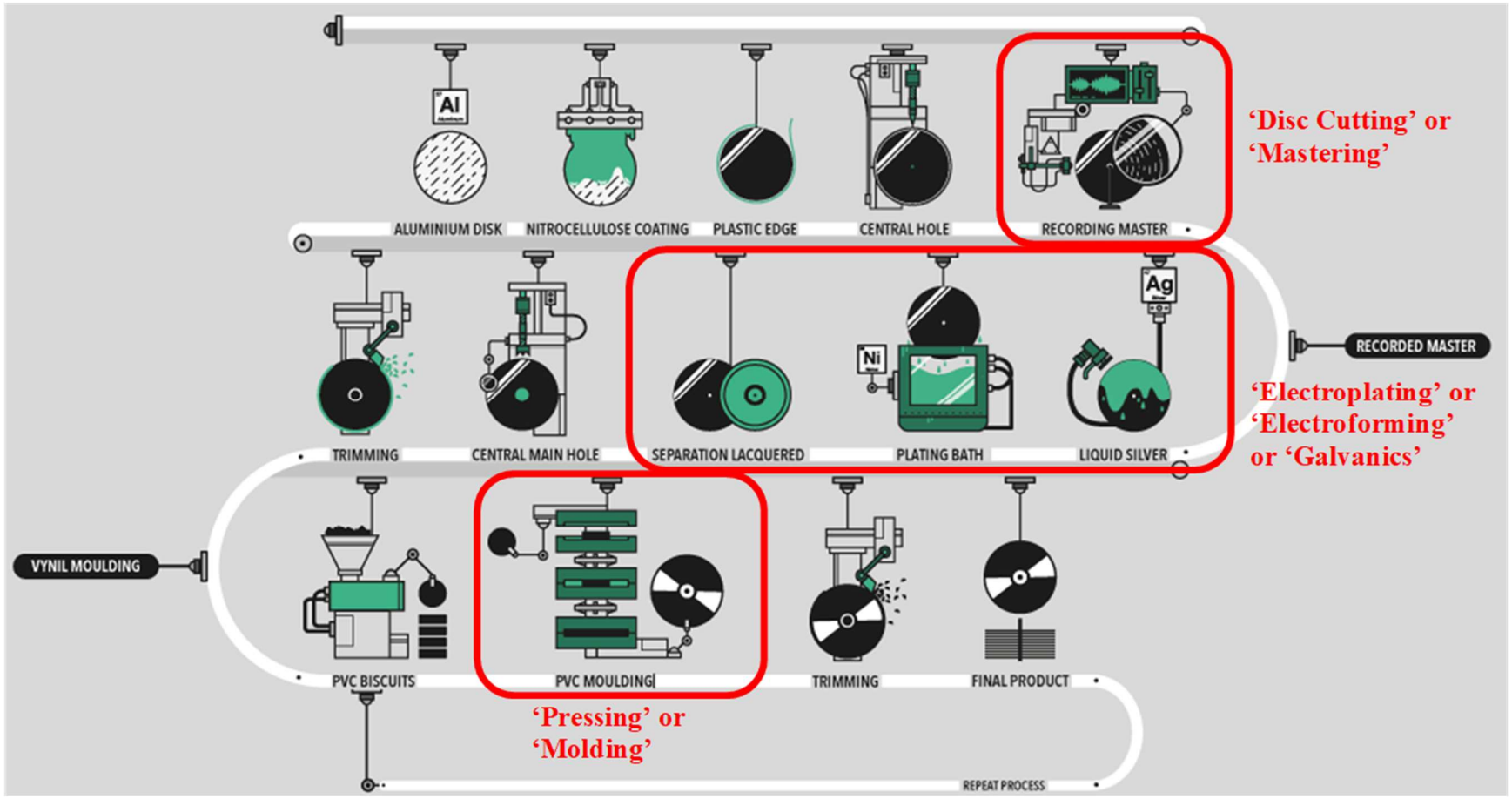


© Matt Martin (Pressure Mastering); photo taken by Bozhidar Asenov

Figure A5: Paul Rudeforth (creating a stamper) in front of galvanic baths at Stamper Discs, Ltd.

Figure A6: Thomas Bernich next to vinyl record pressing machines at the Brooklyn Phono pressing plant

Figure A7: Activities that comprise the traditional variant of the vinyl record manufacturing practice



Note: This image was created during "DensityDesign Integrated Course Final Synthesis Studio" at Polytechnic University of Milan, organized by DensityDesign Research Lab in 2015 and annotated by the authors. Image is released under CC-BY-SA license. Attribution goes to "Marta Mandile, DensityDesign Research Lab". - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=37081368

Table A1: Selection of available vinyl record sales and production data (millions of units) over time

Year	Global sales LPs only (IFPI data)	USA LPs+ vinyl single sales (RIAA data)	Germany Vinyl LP sales (BVMI; GfK; IFPI)	UK 12" production output (BPI data)	UK 7" production output (BPI data)	UK LP sales (BPI data)	UK LP trade delivery (BPI data)	France LP sales (SNEP; GfK; IFPI)	Japan LP sales (IFPI)	Japan 12" pro-duction (RIAJ)	Japan 7" pro-duction (RIAJ)	Australia LP sales (ARIA; IFPI)
1977		534.0	98.4	122.8	83.2		81.7	68.4	73.8	92.4	91.7	25.0
1978	1725.0	531.1	112.5	129.8	93.9		86.1	75.3	74.4	93.1	103.1	21.3
1979		502.0	111.2	113.6	102.7		74.5	64.9	70.7	88.5	110.3	16.1
1980		465.0	109.5	91.7	95.4		67.4	64.3	72.4	90.6	104.4	16.5
1981	1140.0	449.9	97.9	86.7	90.3		64.0	63.6	64.3	80.8	87.7	14.7
1982	900.0	381.1	87.4	88.5	86.3		57.8	58.5	58.4	73.2	78.7	13.2
1983	850.0	334.4	76.8	91.3	80.0		54.3	48.0	55.2	69.5	79.2	10.7
1984	800.0	336.1	71.1	91.6	71.1		54.1	41.2	53.4	68.2	71.1	10.1
1985	730.0	287.7	74.0	90.6	71.1		53.0	33.9	46.5	62.4	62.1	10.1
1986	690.0	219.1	68.8	87.4	65.5		52.3	28.0	34.2	45.5	60.6	9.1
1987	590.0	189.0	66.3	92.0	63.6		52.2	20.4	20.8	27.7	46.3	8.6
1988	510.0	138.0	57.6	74.2	52.2		50.2	19.4	8.7	12.0	27.4	7.5
1989	450.0	71.2	48.3	64.0	39.3		37.9	16.2	1.7	2.4	7.7	5.1
1990	339.0	39.3	44.7				24.7			0.7	1.6	
1991	157.0	26.8	23.8				12.9			0.9	0.1	
1992	115.0	22.1	5.1				6.7			1.0	0.0	
1993	81.0	16.3	1.6				5.0			0.8	0.1	
1994	42.0	13.6	0.7			1.5	4.5	0.1		0.6		0.0
1995	31.0	12.4	0.4			1.4	3.6	0.1		0.5		0.0
1996	21.0	13.0	0.4			1.1	2.4			0.9		
1997	18.0	10.2	0.5			0.8	2.5	0.2		1.0		0.0
1998	23.0	8.8	0.5			0.6	2.2	0.3		1.2		0.0
1999	16.0	8.2	0.6			0.7	2.3			3.0		

2000	14.0	7.0	0.8			0.8	3.2			1.9		
2001	11.8	7.8	0.6			0.8	2.6			1.3		
2002	8.5	6.1	0.6			0.7	2.2			0.7		
2003	3.0	5.3	0.6			0.6	2.0			0.6		
2004		4.9	0.5			0.5	2.0			0.9		
2005		3.3	0.4			0.4	1.5			0.3		
2006		2.4	0.3			0.3	1.2			0.2		
2007		1.9	0.4			0.2				0.3		0.0
2008		3.3	0.5			0.2				0.2		0.0
2009		3.8	0.5			0.2				0.1		0.1
2010		4.5	0.6			0.2				0.1		0.1
2011		5.9	0.6			0.3				0.2		0.1
2012		7.3	0.7			0.4				0.5		0.1
2013		9.7	1.4			0.8				0.3		0.2
2014		10.8	1.8			1.3				0.4		0.3
2015		14.2	2.1			2.1				0.7		0.4
2016		15.2	3.1			3.2		1.8		0.8		0.7
2017		16.0	3.3			4.1		3.2		1.1		0.8
2018		17.0	3.1			4.2		3.8		1.1		0.9
2019		18.8	3.4			4.3		4.0		1.2		0.9
2020		24.1	4.2			4.8		4.5		1.1		1.1
2021		40.5	4.5			5.0		5.2		1.9		1.1
2022		41.6	4.3			5.5				2.1		1.1

Table A2: Interviews

Name	*Organizational affiliation*	*Main role/domain*	*Year*	*Method*	*# of interviews*	*Country*
Jędrzej Kubiak	(freelance)	service engineer	2022	phone	1	Poland
Konstantin Tokarev Assatiani	(freelance)	tool manufacturer	2023	video call	1	Mexico
Ian Mark Perry	Aaahh!!! Real Records	label owner	2016	face	1	UK
J.I. Agnew	Agnew Analog Reference Inst.	multiple	2016; 2022	phone	2	Greece
Ray Staff	Air Studios	mastering	2016	phone	1	UK
John Webber	Air Studios	mastering	2017	phone	1	UK
Barry Grint	Alchemy Mastering	mastering	2016	face	1	UK
Martin Sukale	Ameise; Sukale Medientechnik	multiple	2016; 2022	face; email	2	Germany
George Frehner	Analogue Media Technologies Inc.	broker	2016	phone	1	Canada
Malin Johnson	Analogue Media Technologies Inc.	mastering	2016	face	1	Canada
Terry Carlson	Apollo	materials supplier	2016	phone	1	USA
Tyler Bisson	Audio Geography	mastering	2023	video call	2	USA
Michael Papas	AV Corp	multiple	2016	video call	1	Australia
Ivan Bookwar	Bookwar Machine	mastering	2016	video call	1	Russia
Will Socolov	Brooklyn Vinyl Works	pressing plant	2017	face	2	USA
Thomas Bernich	Brooklynphono	pressing plant	2017; 2020	face; phone	2	USA
Frank Kirschner	Celebrate Records	pressing plant	2016	phone	1	Germany
Simon Atkinson	Cut and Paste Records	label owner	2022	video call	1	UK
Roberto Barbolini	Cutter Head Repair	service engineer	2016	email	1	Italy
David Zanfrino	Cutting and Galvanoforming	electroplating	2017	face	1	France
Todd Mariana	DeepGrooves Mastering	multiple	2016	phone	1	USA
Mex Wieshofer	DrDub	mastering	2016	face	1	Austria
Nik Soder	DrDub	mastering	2016	face	1	Austria
Andy Eppensteiner	DrDub	mastering	2022	phone	1	Austria
Maarten de Boer	Emil Berliner Studios	mastering	2016	phone	1	Germany

Fabio Negri	ENNEBI	tool manufacturer	2016	phone	1	Italy
Ma Nerriza dela Cerna	Erika Records	pressing plant	2017	phone	1	USA
George Alexandrovich	Fairchild	service engineer	2023	video call	1	USA
Darrel Sheinman	Gearbox Records	mastering	2016	face	1	UK
George Thumwood	GK engineering	tool manufacturer	2020	phone	1	UK
Magdalena Karas	GM Records	pressing plant	2016	email	1	Poland
Crispin Murray	Guilde Productions	multiple	2017	phone	1	UK
Jiri Zita, Zybnek Lebr	GZ Media	pressing plant	2016	face	1	Czech Rep
Michael Sterba	GZ Media	pressing plant	2016	face	1	Czech Rep
Claudio Canova	Hamilton Records	pressing plant	2016	video call	1	Argentina
Len Horowitz	History of Recorded Sound	service engineer	2016	phone	1	USA
Jacob Horowitz	History of Recorded Sound	service engineer	2023	phone	1	USA
Sean Rutkowski	Independent Record Pressing	pressing plant	2017	phone	1	USA
Eric San	Kid Koala	musician	2022	video call	1	Canada
Lewis Durham	Kitty, Daisy & Lewis	multiple	2017	face	1	UK
Mike Dixon	LatheCuts; PIAPTK; StereoDisk	mastering	2016	phone	1	USA
Diego Ili	Mamafunk Records	mastering	2016	video call	1	Chile
anonymous	[mastering studio]	mastering	2023	face	1	UK
Antoine and Guillaume	M'COM Musique	pressing plant	2016	phone	1	France
Aidan Foley	MLV; Masterlabs	pressing plant	2016	video call	1	Ireland
Andreas Bauer	My45	pressing plant	2016	phone	1	Germany
Steven Chouet	Myshank	tool manufacturer	2016; 2020	video call	2	France
Larry Boden	Nashville Record Productions, JVC	mastering	2016	phone	1	USA
Matthew Rozeik	Necro Deathmort; Relevant Records	multiple	2016	face	1	UK
Dr Thomas Licht	Neoplastik GmbH	materials supplier	2016	phone	1	Germany
Kees de Jonge	Newbilt	tool manufacturer	2016	video call	1	Switzerland
Tom Gross	NiPro Optics	electroplating	2017	phone	1	USA
Peter Runge	Optimal	pressing plant	2016	phone	1	Germany
Bernd Altmann	Optimal GmbH	pressing plant	2016	face	1	Germany

Koji Yoneyama	Orbray	materials supplier	2023	email	1	Japan
Holger Neumann	Pallas Group	pressing plant	2016	face	1	Germany
Peter King	Peter King Records	mastering	2016	phone	1	New Zealand
Filippo de Fassi Negrelli	Phonopress	pressing plant	2016	phone	1	Italy
Nick Strang	Plates Records	mastering	2016	phone; face	2	UK
Shawn Johnson	Precision Record Pressing	pressing plant	2016	face	1	Canada
Matt Martin	Pressure Mastering	mastering	2023	video call	1	Bulgaria
Hijiri Okuda	Public Records	materials supplier	2023	face	1	Japan
Jan Freund	RAND	pressing plant	2016	phone	1	Germany
Ben Pike	Rare Tone Mastering	mastering	2023	video call	1	UK
Günther Loibl	Rebeat	tool manufacturer	2016	phone	1	Austria
Arthur Joly	RecoHead	mastering	2016	video call	1	Brazil
Anouk Rijnders	Record Industry	pressing plant	2016	phone	1	Netherlands
Steve Espinola	Secret Society of Lathe Trolls	platform admin	2017	face	1	USA
Stevan Krakovic	Shock & Awe; Electronic Memory	mastering	2016	face	1	UK
James Sillitoe	Sillitoe Audio Technology	tool manufacturer	2020	video call	1	Australia
Cesare Marchesini	Soundfan	service engineer	2016	email	1	Italy
John Zippro	Soundstre@m	mastering	2023	phone	1	Netherlands
Daniel Krieger	SST Brüggemann	mastering	2016	phone	1	Germany
Martin Frings	Stamper Discs	electroplating	2023	face	1	UK
Lukas Obwaller	Supersense	mastering	2016-2023	face; phone	5	Austria
Chris Muth	Taloowa Corp; Dangerous Music	service engineer	2016	phone	1	USA
Wesley Wolfe	Tangible Formats	mastering	2016; 2023	video call	2	USA
Frank Merritt	The Carvery	mastering	2016	phone	1	UK
Graeme Durham	The Exchange	mastering	2016	face	1	UK
Simon Davey	The Exchange Vinyl	mastering	2017	phone	1	UK
Broc Barnes	Third Man Records	pressing plant	2023	video call	1	USA
Jukka and Sami	Timmion Records	pressing plant	2016	email	1	Finland

Peter Inker, John Rooke	Transco Blanx / Micro-Point	materials supplier	2016	phone	1	UK
Josef Krümmling, Thomas Krümmling, Marion Regal	TZO Leipzig	materials supplier	2023	video call	1	Germany
Michel Nath	Vinil Brasil	pressing plant	2016	face	1	Brazil
Adam Teskey	Vinyl Factory	pressing plant	2016	face	1	UK
anonymous	Vinyl Plant	pressing plant	2016	email	1	Estonia
Flo Kaufmann	Vinylium; FloKaSon	multiple	2016; 2022	face; email	2	Switzerland
James Hashmi, Rob Brown, Chad Brown	Viryl Technologies	tool manufacturer	2016; 2018; 2022	face	3	Canada
Chris Mara	Welcometo1979industries	multiple	2016	video call	1	USA
Chris King	Worldwide Phonographic Services	multiple	2016	face	1	UK
Paul Rigby	Zenith Records	pressing plant	2016	video call	1	Australia

Table A3: Data sources

Type	Volume/Details
Semi-structured interviews with practitioners	107
Conversations with journalists and others (non-academics) researching the industry	4
Field observations (Site visits, including tours of pressing plants, workshops and analog audio museums; days at practitioner conference)	31
Videos (documentaries, interviews with practitioners, workshops, guides and demonstrations about elements of the vinyl record manufacturing practice)	>25 hours (predominantly via Vimeo and YouTube)
Podcasts	>40 hours (predominantly Women in Vinyl podcast)
Forum posts	>8,000 of approx. 60,000 Secret Society of Lathe Trolls Forum posts reviewed
Forum usage data	Statistics include number of users, visits and posts per year (2005-2014)
Facebook group posts	>500 posts reviewed across Analog Audio Engineering (est. 2015); Record Cutters Guild (est. 2017); Disc Mastering Engineers (est. 2019)
Blog posts	>90 (predominantly from https://www.flokason.ch/blog and https://agnewanalog.com/blog/)
Articles in trade journals and trade magazines	>300 pages (predominantly from Copper Magazine and analog Magazin)
Articles in newspapers and popular magazines	>200 pages (predominantly via Nexis Uni database and MINT magazine)
Books on the vinyl record manufacturing practice, the industry, and history	14 (incl. academic and popular)
Historical vinyl record revenue and unit volume data	1977-2022 (RIAA, IFPI, BPI, RIAJ, GfK; other sources via Statista)
Technical information, instruction manuals, research reports, and sales brochures	>900 pages (predominantly from Boden, 2012 and Audio Engineering Society)

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