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Reproducing Copyright: The Modular Mobility of Mp3

In 2001, Apple launched an advertising campaign (Figure 1) promoting its new iMac computers with the slogan, "Rip, Mix, Burn" (Marshall 2011). The slogan expressed a disposition toward digital media as infinitely replicable and modifiable. Until Apple's iMac campaign, the enthusiasm for digital reproduction had been focused on file-sharing software and the ubiquitous mp3 audio file format. The iMac campaign redirected this enthusiasm for digital reproduction towards Apple's new line of computer hardware, pre-loaded with Apple's iTunes music software, which allowed users to organise and play music files and make copies of them on recordable CDs.

For copyright owners, the iMac campaign appeared to be an endorsement of digital piracy. In February 2002, Michael Eisner, then CEO of Disney, told the United States Senate Commerce Committee that Apple and other electronics firms were profiting from "piracy" by selling devices which facilitated unauthorised reproduction. Eisner argued that electronics firms had no economic interest in helping the entertainment industry curb unauthorised reproduction; it was up to lawmakers to compel such firms to integrate copy restrictions into digital devices. Eisner advised lawmakers to present electronics firms with an ultimatum: "I believe if you say to these people, 'You get U.S. a system by December 31 or we'll do it for you,' you'll be surprised at how innovative they'll become" (Harmon 2002).

Although Eisner drastically underestimated the power that Apple would be able to draw from Internet users and copyright owners, he did have one thing right: copyright law has increasingly become a key site for the organisation of relations between users, firms and digital media objects. Instead of law regulating particular uses of media objects, firms increasingly use law to bolster regulatory functions that are built into media objects by design.

In media studies, legal studies and other fields, critical scholarship on mp3, file-sharing and copy restrictions has tended to focus on the construction of file-sharing as a social problem in journalistic, legal and educational discourses (McCourt/Burkart 2003; Leman-Langlois 2004; Yar 2005; Gillespie 2009). In this literature, mp3 is often understood to be a fundamentally democratic format because it enables users to bypass commercial systems of cultural distribution and ownership. In contrast, copy control techniques, or digital rights management (DRM) systems, are often derided as undemocratic restrictions on technical and cultural innovation.

Rip. Mix. Burn.

The new iMac.
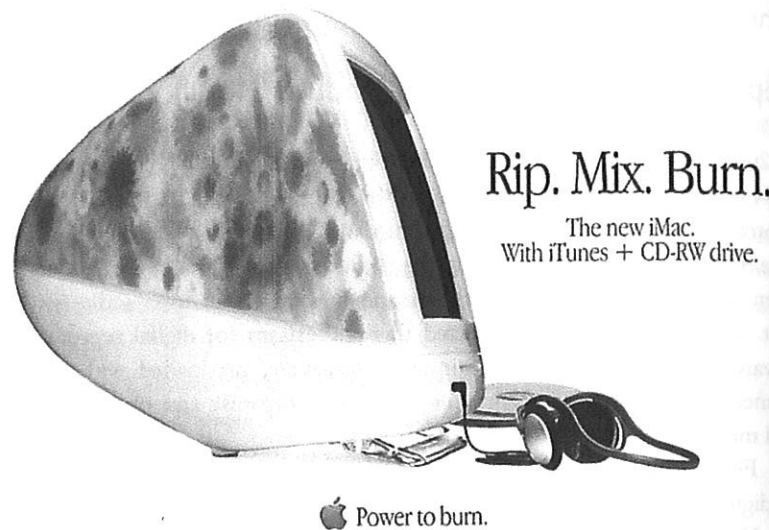With iTunes + CD-RW drive.

 Power to burn.

Figure 1: Apple's 2001 iMac campaign.

Although the literature offers important insights about competing discursive frameworks for understanding mp3 and other new media objects, too often such analyzes neglect the processes through which media technologies are designed and standardized. With a few notable exceptions, such as Jonathan Sterne's (2006) analysis of the mp3 format, critical media scholarship in this area overlooks the crucial role of design and standardization in the organization and enforcement of relations between people and things.

I argue here that mp3 and DRM have important commonalities: these new media objects indicate a broader shift in the mode of organising online activity from moral and rational persuasion to socio-technical configuration. Although mp3 and DRM differ in many respects, they demonstrate the manner in which new media objects are designed to regulate the actions of their constitutive parts, as well as their relations with other objects and users.

In order to understand the dynamic unity of new media objects like mp3 and DRM, I draw from actor-network theory (ANT). ANT departs from the conventional notion that objects are passive things which are acted upon and suggests instead that, historically, objects have become increasingly active in processes of social ordering and transformation. The process by which people and things are activated is conceptualised in ANT as *translation* – the transformative movement and connection of different entities, places and times. Thus, rather than treating ANT as a social theory with certain uses or applications in media studies, I suggest that ANT is a theory of how techniques, practices and objects produce and transform relations between people and things. In this sense, ANT is a theory of media.

In the first part of this paper, I discuss the concepts of translation and immutable mobility in actor-network theory. There are important overlaps between ANT and Harold Innis's theory of media and power. However, ANT avoids the pitfalls of technological determinism by focusing on the strategies through which diverse materials, representations and claims are "black-boxed" in technological design. My case study of technical innovation focuses on the ways in which engineers and firms attempt to represent diverse entities, including copyrights, digital networks, Internet users, and models of human hearing, and delegate roles to these diverse entities in the design of mp3 and DRM. I retrace the strategies of regulatory organisations in their attempt to make the reproduction of digital artifacts more predictable. The sequence of regulatory techniques from public relations and litigation to programming follows a broader pattern identified in actor-network literature, from provisional ties established through signs to durable ties formed through the socialisation of things. Copy protection systems can be understood as part of the general process of involving and activating the nonhuman in social life. Media studies needs a concept of agency which encompasses the nonhuman in order to account for Apple's dominance and for the broader realignment of social regulation with technological innovation.

Media and power

ANT's approach to the question of how certain objects hold diverse people, places and times together parallels Harold Innis's (1949) theory of media and power. According to Innis, the extension of society in time or space depends on the characteristics of the communications resources that it is able to mobilise. Innis demonstrated how actors generate the power to define reality and to control the way others act by monopolising knowledge and accumulating as many bearers of knowledge as possible (money, experts, documents, etc). Communication media are particularly important in explaining power relations, according to Innis, because of their capacity to distribute or monopolise knowledge. Innis's theory of media suggests that the crucial aspect of any given medium is the degree to which it is capable of transmitting information over space or time in comparison with other media. Innis demonstrated how the spatial and temporal characteristics of a medium (or in ANT terminology, the medium's mobility and immutability) have historically shaped the structure of societies (e.g. decentralised or centralised them).

Innis's approach to the technical mediation of knowledge recognises the manner in which social skills or the capacity to reinforce and act upon links between social actors can be transferred to artifacts or devices. In some sense, Latour's (1986) concepts of translation and immutable mobility provide a more concise version of Innis's notion of media bias. "The durability of the definition of the clan," Latour (1986: 275) writes, "depends upon the duration of the resources used to make it hold together." Latour's version leaves out the typologies and the dense comparative historical analyses of media technologies and political structures in Innis's work. However, there are significant parallels between Innis's medium theory and the notion of translation in ANT. In particular, Innis's concept of "the medium" was distinct from technology; "medium" is a more inclusive term that was not based on a strong division of social and technical elements. This corresponds with ANT's very inclusive notion of "mediation" or the process through which successive translations of interests, capacities, skills and so forth across the human/nonhuman divide enable the development of larger and more durable collectivities. As Latour (1986: 276) writes,

> The exact composition of the list is not important for the present argument. What counts is that *it is open ended*, that the so-called social elements are simply *items among* many others in a much longer list; that they cannot be used to *replace* all the other elements; or even used as their headings.

Innis's critique of contemporary obsessions with transmission and portability, which lead to present-mindedness and historical amnesia, along with his argument that more attention needs to be given to the communication of knowledge over time, is echoed in Latour's argument that scholars need to reconsider the constitutive role played by nonhumans in social life. "By involving nonhumans," Latour (1994: 61) writes, "the contradiction between durability and negotiability is resolved." Society is held together through the distribution of social skills and tasks to nonhumans in order to form a hybrid network or collectivity which absorbs the tendency toward disagreement, opposition and continuous (re)negotiation. As Callon and Latour (1992: 361) write in their analysis of hybridity in the case of a speed bump,

> To claim that only the humans have meaning and intentionality and are able to renegotiate the rules indefinitely is an empty claim, since this is the very reason why the engineers, tired of the indiscipline and indefinite renegotiability of drivers, shifted their program of action to decrease this pliability.

The concept of translation radicalises medium theory by drawing ethical questions out of the history of human-nonhuman partnerships, demanding some sort of institutional recognition of the agency of "missing masses" and suggesting that nonhumans deserve much of the credit for stabilising social negotiations (Law 1991; Latour 1994).

My intention here is not to turn Innis into a proto-ANTian, but rather to suggest that ANT's notion of nonhuman agency, which alarmed many sociologists when its translation theory was developed in the 1980s, can be understood as an extension of Innis's medium theory from communication media to technical mediation more generally. ANT may break ranks with the "clash of civilisations" approach used by Innis, but ANT's reconceptualisation of society in terms of techniques that stiffen relations and interactions stems from notions of communication technology as constitutive of a society's structure and of the problems to which it "chooses" to attend. Both ANT and Innis recognise that the "choice" societies make with respect to their belief systems and structural organisation cannot be attributed exclusively to human agents. Rather, these choices, and the actions which follow from them, are a property of the collectivity of humans and nonhumans. In Innis's work, the nonhuman consists of the dominant medium's material meanings, or the medium's propensity towards dispersion or concentration of people, knowledge and power in comparison with other media. In ANT, the nonhuman consists of any material or conceptual entity which has the capacity to perform social roles, such as linking or binding together people, things, places and times.

This intersection between Innis's media theory and ANT has a number of important implications for critical communications and media research. Among those implications is the manner in which scholars trace back and attribute choice, decision and action to actors. ANT thematises a key idea in Innis's work: that any actor which is capable of defining a program of action and carrying it out on a large scale is always impure or hybrid. Rather than assuming that choices, decisions and actions have their origin in ideology, norms or discourse, Innis and ANT provide a strong theoretical basis for rethinking the "prime mover" in any instance as an assemblage of human and nonhuman entities.

In light of this discussion of ANT's affinity with key ideas in Innis's work, it is clear that at least two aspects of the way scholars often approach digital reproduction and its regulation need to be rethought.

First, the enthusiasm for digital reproduction, the anxiety about what this enthusiasm means for copyright and the cultural industries, and the decision to regulate unauthorised reproduction in particular ways, are often attributed to social groups (e.g., youth culture, copyright owners, policy makers). It is often assumed in critical media studies that the objects in question (digital media,

copyrights, cultural works, etc.) and the desires, interests, capacities and choices of social groups with regard to those objects have their origin in social forces and structures. ANT reminds us (and provides a helpful set of concepts and a terminology for exploring Innis's insight) about the manner in which patterns of thinking, choosing, and acting emerge out of institutionalised associations of people and things. The actor is a hybrid collectivity. Strictly speaking, it is not humans who enthusiastically embrace digital reproduction or worry about it; both are born out of the association and attachment of human entities to particular things. It is therefore crucial to explore the process through which hybrid actors are composed, and the entities – both human and nonhuman – which make particular ways of thinking, choosing and acting possible.

Second, the contemporary anxiety about rampant online "piracy", and the parallel anxiety about overly restrictive measures designed to curb unauthor-ised reproduction, point to a broader uncertainty about the agency of digital things. Rather than focusing on how social groups inscribe their interests in mp3, copy controls and other digital media objects, ANT suggests that re-searchers concentrate on how power is drawn from a heterogeneous array of entities. Uncertainty about the "thingishness" of things such as digital objects like mp3 opens opportunities for actors to construct new problematisations of reality and courses of action which reconfigure the collectivity. Uncertainty, instability and localised disorder give rise to new translations of the human and the nonhuman. The next section focuses on translation, which is key to ANT's explanation of how media objects and other dynamic unities emerge out of an "impure" array of constituents.

Media in ANT: Translation, mediation and immutable mobility

The concept of translation opens new avenues for the analysis of the struggle to define identities and relations between people and things in the design of new media objects. Rather than regarding design as a process through which already-powerful actors impose their interests and values onto passive objects, the concept of translation suggests that power requires an active collectivity of people and things. As defined by Latour (1994: 32), translation refers to "dis-placement, drift, invention, mediation, the creation of a link that did not exist before and that to some extent modifies two elements or agents". Translation highlights the mediated nature of all action, knowledge and experience, and in this respect ANT parallels critical approaches to realism in studies of photog-raphy, cinema, television and digital media (Bolter/Grusin 1999). Translation emerges from the same insight about the inescapable condition of mediation, but it does not assume in advance that the camera, the telephone, the com-puter and other widely used devices which are conventionally placed in the category of communication media are more important than the specialised practices and devices used by scientists.[1] As Latour (1990: 35) writes:

> Anything that will accelerate the mobility of the traces that a location may obtain about another place, or anything that will allow these traces to move without a transformation from one place to another, will be favored: geometry, projection, perspective, bookkeeping, paper making, aqua forte, coinage, new ships.

Understood as the production of links and exchanges between people and things, translation enables researchers to explore the strategies through which a particular definition of the relations holding diverse entities together acquires the black-boxed form of a self-contained medium. The important point here, according to the theory of translation, is that all media can be traced back to a set of claims about the relations between people and things. If successful, these claims enable exchanges of skills, roles and functions across the human/nonhuman divide. A medium is an institutionalised settlement of the identities of humans and nonhumans. Thus, as Latour (1993: 41) puts it, "the mediation, the technical translation, that I am trying to understand resides in the blind spot where society and matter exchange properties."

In the process of developing the theory of translation, ANT reconceptu-alised agency – intentionality, goal-oriented behaviour, and other aspects of the capacity to act – as properties of human-nonhuman collectivities. The con-struction of hybrid collectivities hinges on the socialisation of nonhumans, that is, the "extension of social skills to nonhuman" or the delegation of social roles to objects (ibid.: 48). The socialisation of nonhumans transforms action both qualitatively and quantitatively, since the continuous work that is neces-sary to discipline humans into shutting doors behind them, reducing their driving speed, returning hotel keys and so on, can be replaced by the discon-tinuous work of delegating tasks to nonhumans.

Once translation or the linking of humans and nonhumans is understood as the basic building block of organised action, and once agency is defined in such a way as to recognise the organisational capacities and resistances of non-humans, it becomes possible to rethink the politics of media technologies. Translations begin as problematisations, or zones of uncertainty (and, quite

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1   Cultural histories of media, such as Jonathan Sterne's (2003) *The Audible Past*, have also troubled the conventional category of "communication media" by exploring the historical relationship between expert cultures (e.g. medicine) and the devel-opment of the devices (e.g. the stethoscope), the principles of which were later in-corporated into popular media technologies (e.g. the phonograph).

often, of anxiety), which are designed to enlist and mobilise diverse entities in a program of action. Every attempt to problematise an aspect of reality, no matter how mundane or specialised, is political in the sense that the problematisation imposes identities on a multitude of entities (redefines their interest, goals, desires, etc.); establishes a constraining network between those entities (it tells them how to act and what their relationship is to other entities); and persuades representatives of the multitude to accept a particular definition of social and natural reality. Communication media are crucial to modes of mapping the relations between entities in science, and in many other organisational cultures, and also crucial to the subsequent "funneling" of entities' interests into a coordinated program of action (Callon/Law 1982). Moreover, by demonstrating how scientific problematisations are built through the assemblage of claims about social, technical and natural worlds, ANT suggests that engineering, design and programming are rich sites for exploring the politics of media technologies.

Media do not suddenly acquire political importance when they are marketed as commodities, regulated by the state, or used in subversive ways by consumers. Rather, the politics of media precede the formation of the technical device that is later marketed as the medium. It begins with the attempt by engineers, firms, standardisation organisations and programmers to enlist each other in particular problematisations and courses of action. Thus, the mundane media of expert cultures (conference papers, journal articles, PowerPoint presentations, and so forth) are extremely important in tracing back black-boxed sedimentations of translated roles, identities, interests and capacities.

An important historical trend identified in ANT research on scientific power is the increase in both the mobility and immutability of inscriptions. The hegemony of science in contemporary societies depends on moving inscriptions over vast distances while simultaneously increasing their fixity. This requires the development of techniques which reduce "textual drift" and other possibilities for modification through successive reproductions of inscriptions. The dynamic unity of technical objects, from documents to digital file formats, is summarised in Latour's concept of the *immutable mobile*, a term which captures this process of moving inscriptions into diverse contexts while regulating the relation between the inscription and its contexts.

At times, Latour's notion of immutable mobility seems to echo a tension in Innis's work between a relational approach to media analysis (e.g. Innis's space and time bias refers to the medium's capacities in relation to other media) and a notion of media rooted in the material properties of techniques, practices and devices. ANT's materialism sometimes seems to veer close to technological determinism. However, in most cases, the unit of analysis (translations) directs analysis away from explanations based on technological causes. For example, John Law (1986) argues that the ships built during the Portuguese imperial expansion depended upon a "protective envelope" composed of astronomy, maps and other documents, and ship design to maintain the ships' integrity in uncharted waters. As Law (ibid.: 154) puts it,

> the right documents, the right devices, the right people properly drilled – put together they would create a structured envelope for one another that ensured their durability and fidelity.

It was only in conjunction with mariners drilled in astronomy and with modifications in ship design that printed documents acquired such tremendous importance in the way the Portuguese mapped, navigated and dominated far-flung territories. Thus, Law modifies Innis's suggestion that societies based on print and other space-biased media have a tendency towards military conquest and imperial expansion. Law suggests that imperial expansion cannot be explained by print media alone; analysts seeking to explain the process of domination need to consider the broader distribution of knowledge and roles across human bodies, documents and devices.

Similarly, Latour (1990: 23) suggests that research should abandon the all-encompassing social explanations derived from medium theories and "consider in which situations we might expect changes in the writing and imaging procedures to make any difference at all in the way we argue, prove, and believe". In scientific culture, Latour (ibid.: 36) notes "how little we are able to convince when deprived of these graphisms through which mobility and immutability are increased." To convince, enlist and mobilise people, science used print media to develop cultural forms which enabled many diverse elements to be represented in the same space and practices of collecting, moving, and merging inscriptions so that the diversity of the world could be simplified. The "cascade" of increasingly simplified inscriptions allows the scale of mobilisation to be increased. Scientific inscription is enabled by representational practices characteristic of print media, including linear perspective, optical consistency, flat representational spaces, modifiable scale, reproducibility, recombination and superimposition. While this configuration of material and representational traces is key to persuasion and mobilisation in science, Latour (ibid.: 43) stresses the importance of the ritualistic performance of activities around inscriptions:

> it is possible to overestimate the inscription, but not the setting in which the cascade of ever more written and numbered inscriptions is produced [...] the *staging* of a scenography in which attention is focused on one set of dramatized inscriptions.
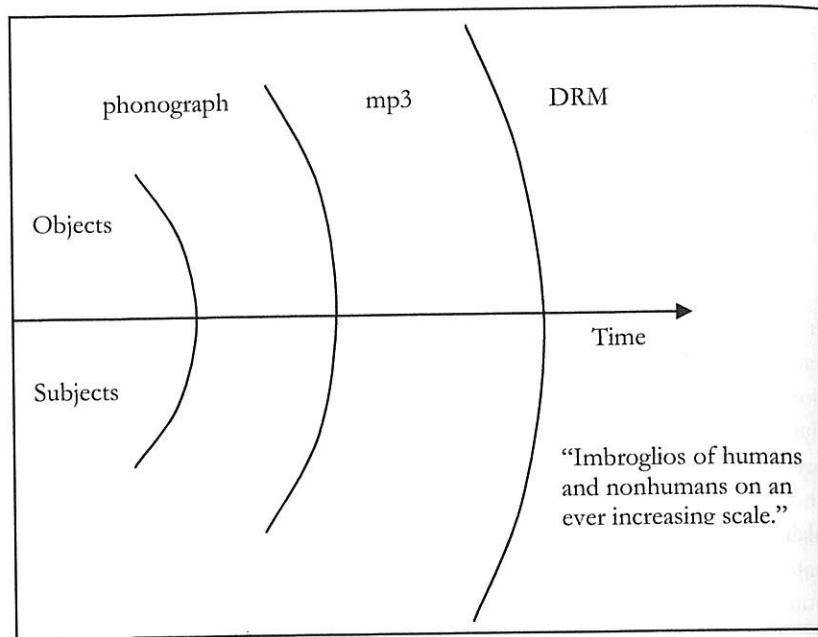
Figure 2: The production of subjects and objects through translation in an expanding set of hybrid collectivities. Adapted from Latour (1993: 201).

This is important, because persuasion in science depends upon the process of steadily shifting the focus from setting or staging to the inscriptions themselves, thus gradually erasing the mediations which produced the inscriptions.

Latour thus offers a theory of the historical relationship between media and power. Scientific techniques of inscription, which drew from and reorganised print media, aim to increase the simplicity of representations so as to increase the scale of mobilisation. This process of making inscriptions increasingly immutable (less open to qualification and disagreement) is achieved by reducing the presence of the staging or mediation of inscription, and thus making a few inscriptions stand for many actions and events. By increasing the scale of mobilisation, immutable mobiles allow a few actors to speak on behalf of diverse and absent others. As Latour (1990: 55) writes,

> Corporation, State, Productive Forces, Cultures, Imperialism, 'Mentalities,' etc... these entities could not exist at all without the construction of long networks in which numerous faithful records circulate in both directions – records which are, in turn, summarised and displaced to convince. A 'state', a 'corporation', a 'culture' or an 'economy' is the result of a punctualisation process that obtains a few indicators out of many traces. In order to exist, these entities have to be summed up somewhere.

ANT case studies tend to narrate scientific and technological innovation by focusing on the challenges of enlisting, delegating and mobilising a multitude of human and nonhuman others with conflicting interests, trajectories and propensities. The concept of translation is the basis for ANT case studies of technology, which tend to focus on the strategies that actors use to enrol and control people and things in an increasingly tight network of delegated roles. Like the broader theory of translation, however, the idea of the immutable mobile also provides a framework for analysing subversion, or what Callon (1986) refers to as "deviation" and Latour (1992) calls "anti-programmes." The rich notion of media as institutionalised translations of human and nonhuman agents, and the repertoire of terms for describing the role of objects in social ordering, still require some conceptual work in order to address more adequately the tactics of subversion and the production of counter-networks of translation. Nevertheless, the theory of translation and the concepts of technical mediation and immutable mobility underline the distribution of agency across the array of associated entities; each step in a sequence of translations is pivotal and can lead to detours, resistance, and the formation of counter-networks. Indeed, since contemporary modes of social ordering delegate so many tasks to inscriptions, devices and other objects, domination is, as Latour (1990: 56) writes,

> not a given but a slow construction and it can be corroded, interrupted, or destroyed if the records, files, and figures are immobilized, made more mutable, less readable, less combinable, or unclear when displayed.

In what follows, I demonstrate how translation theory works as a theory of media. To do so, I use the case of the mp3 digital audio format and the attempt by copyright owners to control its reproduction through digital rights management. The media objects in each section can be mapped onto Latour's (1993) mythic-history of technical mediation to emphasise the trajectory towards increasingly large-scale and heterogeneous collectivities (see Figure 3). Instead of the modernist notion that science introduces a disjuncture between subject and object after which humans and nonhuman grow increasingly distant and alienated, my analysis focuses on the growing "intimacy" of humans and nonhumans and the exchange of properties between them. While "intimacy" between the human and nonhuman may seem like a euphemism for a constraining network of media objects, corporations, laws, and users, I demonstrate how projects which aim to control people and things often unintentionally increase the scale of sociality and form actors that have the properties of objects and subjects.

Struggles to problematise digital reproduction in law and technology

Digital rights management (DRM) is an umbrella term for a wide range of techniques that are designed to limit the production of useable copies of a file by adding a layer of code which communicates "copyright information" about those files. In practice, DRM systems protect digital content through digital encryption and by controlling the distribution of encryption keys which "unlock" or decrypt the file.

As Karen Coyle (2003) points out, DRM relies on a "technique of tying a digital file to a particular piece of hardware." While DRM is popularly derided as downgrading digital reproduction with the limited reproductive capacities of audio and video tape, this image of DRM can divert attention from the unprecedented precision over reproduction enabled by digital formats. As Coyle explains, DRM does not simply limit the number of copies that can be made from a given file but rather determines which files can be accessed and copied by a particular user via a particular device. By identifying and binding together files and devices, DRM enables more extensive and precise control over the uses of content than copyright law can offer. In DRM systems, each use of a file is regulated by sets of "usage rights" as defined in the licence or "voucher" that is transferred with the file by online retailers. It is this sort of licence (or lack thereof) that is referenced in the t-shirt motif shown in Figure 3:
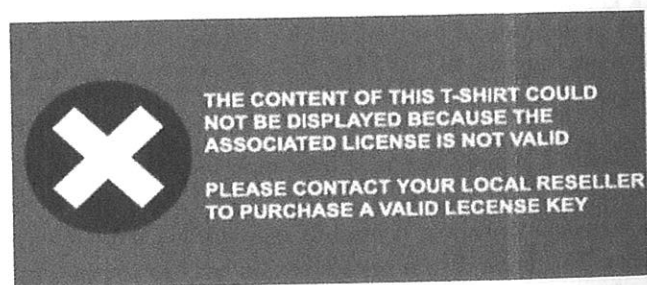

THE CONTENT OF THIS T-SHIRT COULD NOT BE DISPLAYED BECAUSE THE ASSOCIATED LICENSE IS NOT VALID

PLEASE CONTACT YOUR LOCAL RESELLER TO PURCHASE A VALID LECENSE KEY

Figure 3: Mark Lindhout, "The Content of This T-Shirt Could Not Be Displayed". The design won the anti-DRM t-shirt design contest organised by the file-sharing website torrentfreak.com, http://torrentfreak.com/anti-drm-t-shirt-design-contest-the-winners-are, 01.05.2013.

Like all computer code, DRM is vulnerable to leaks, hacks and bugs. Anticipating this problem, the World Intellectual Property Organisation's (WIPO) 1996 Copyright Treaty requires its member states to provide legal protection to DRM. Signatories are required by Article 11 of the Treaty to pass laws that prohibit *circumvention* or the bypassing of "technological measures". Further, Article 12 requires laws to prohibit interference with DRM systems by making

it a violation of copyright law to "induce, enable, facilitate or conceal an infringement" (WIPO 1996). "Interference" includes the unauthorised removal or modification of "rights management information", that is, "information which identifies the work, the author of the work, the owner of any right in the work, or information about the terms and conditions of use of the work, and any numbers or codes that represent such information" (ibid.). The much-criticised U.S. Digital Millennium Copyright Act implements the obligations of the United States under WIPO. In this way, copyright owners successfully acquired internationally recognised legal instruments which protect DRM.

One of the most common criticisms of DRM is that it overprotects digital content by preventing unauthorised reproduction altogether. In many jurisdictions certain instances of unauthorised reproduction are considered lawful and in fact necessary for democratic cultural exchange and public discussion. As Jonathan Weinberg (2002: 283) writes,

> When copyright owners ramped up their interest in access control in the 1980s, copyright law provided them with no assistance. It spoke only to copying, public performance, public distribution, and the creation of derivative works – not to access simpliciter. Thus, content owners relied on other tools. In the satellite scrambling context, the first tool was technological. Scrambling the signal made it impossible for viewers to get a usable picture using the technology normally available to them. The second was legal. 47 U.S.C. 605 (a non-copyright statute) made it illegal for users to view the programming even if they were able to descramble it.

Weinberg (ibid.: 284) concludes that protective codes "thus offer the opportunity to restrict copying beyond the limits prescribed by the copyright law." Anti-circumvention provisions required by the WIPO Treaty go a step further by requiring lawmakers to render certain kinds of technical innovation and tinkering illegal. The treaties and statutes which demand compliance with DRM support the regulatory fantasy of overcoming the need for "moral suasion" and litigation by perfecting pre-emptive access controls (ibid.: 285). It may eventually become feasible to integrate more sophisticated analytic techniques into DRM systems which account for variations in the context of access and use in order to minimise overprotection. Nevertheless, the more fundamental concern underlying Weinberg's critique is that technologies which prevent unauthorised reproduction lack the interpretive flexibility which courts are meant to provide in cases of intellectual property infringement.

A second criticism of DRM is that it pushes law towards increasingly indirect modes of regulation. If copyright provides blanket protection to any system, technique or line of code that in some way limits copying, this gives engi-

neers and firms a great deal of discretion in determining how copy protection is achieved. Alex Cameron (2009) notes that surveillance is built in to most DRM systems and that, if copyright law requires compliance with such systems, the function of copyright suddenly expands to ensure continuous surveillance of cultural products. The goal of copyright can in this way be altered by the goal of DRM systems. DRM systems are also vulnerable to "function creep" since information gathered by DRM systems about who is accessing and sharing certain books, musical works, films, etc. can clearly be used for many diverse (and potentially undemocratic) purposes other than curbing "piracy".

While these are valid criticisms of DRM, what is missing from this picture of an increasingly "technologised" mode of regulating copying is the manner in which the copy protection techniques mediate and thus modify the goals of actors seeking to increase their control. In order to extend the order, "Do not copy without authorisation" to digital media, copyright owners must modify the prescribed action from a sign that addresses human subjects to lines of code that govern the operation of devices. This shift is legible in the wording of the WIPO Treaty, particularly in the designation of "rights management information" (rather than "copyrights" or "copyrighted works") as the good that must be recognised and protected. In this way, DRM shifts the goal of copyright from limiting the reproduction of copyrighted works to protecting the integrity of information required for the effective operation of software-based copy restrictions.

As discussed above, anti-circumvention provisions in U.S. copyright law prohibit individuals from tinkering with or attempting to bypass copy controls on digital devices or software. Such provisions have made it difficult for researchers, programmers, hackers and others to publish information about how copy controls work. Since information about how copy controls actually work is scarce, court cases which discuss the inner workings of these technologies are important resources for the analysis of copy control systems. In the process of opening up the black box of digital copy controls, courts attempt to fit digital processes and artifacts into legal categories. Not surprisingly, these techno-legal translations often seem awkward and muddled. Yet, as I demonstrate below, these translations offer insight into the novelty of digital techniques.

Under U.S. copyright law, mp3s can be "originals" and mp3 players do not "record". That is what the United States Ninth District Court decided in *Recording Industry Association of American v. Diamond Multimedia Systems Inc.* (RIAA v. Diamond 1999), a key decision in the status of mp3 players in American copyright law. The case concerned the Rio, a portable mp3 player. The RIAA attempted to persuade the court to prevent Diamond from distributing the Rio

on the grounds that the device violated the United States' *Audio Home Recording Act*, which requires manufacturers to include the Serial Copy Management System (SCMS) in all "digital audio recording devices" (17 U.S.C. §1002, 1994). The RIAA, which represents the largest record companies in the U.S., argued that the Rio was a "digital audio recording device" as defined by the Act and thus should be equipped with SCMS to limit the number of copies that can be made. Diamond argued that the Rio was not a "digital audio recording device". As defined by the Act, a "digital audio recording device" is "any machine or device [...] capable of making a digital audio copied recording for private use". While the RIAA argued that the Rio can make "digital audio copied recordings", the court found that the device cannot record audio/visual "transmissions" and can only receive and store copies transferred from the hard disk of a computer. Finally, the court argued that, even if the Rio fell within the Act's definition of a digital audio recording device and was equipped with SCMS, the mp3s on the Rio would have to be encoded as "original". Referring to a technical reference document for this section of the *Copyright Act*, the court found that:

> the incorporation of SCMS into the Rio would allow the Rio to copy mp3 files lacking SCMS codes so long as it marked the copied files as 'original generation status.' And such a marking would allow another SCMS device to make unlimited further copies of such 'original generation status.' (RIAA v. Diamond 1999)

The court in *RIAA v. Diamond* had trouble reconciling SCMS with definitions of original, copy and recording in copyright law and rejected the RIAA's claim that files on the Rio should be encoded with SCMS. Thus, instead of acting as a speed bump for slowing down many different forms of digital copying, SCMS seemed to only apply to a narrow spectrum of activities which involve recording. The Rio, like the iPod, is designed to store and playback existing recordings and does not "record" or "re-record" in the sense of converting sound (or image) into signal. *Diamond* provided electronics manufacturers with a legal basis for steering around the SCMS speed bump. As I discuss below, copyright owners would soon develop more comprehensive DRM systems and push legislators and courts to support those systems on both recording and non-recording devices.

Although digital audio recording techniques have been used in the music industry since the 1970s, it wasn't until the non-proprietary standard of mp3 gained popularity among Internet users in the 1990s that digital audio recording seemed to pose a considerable threat to copyright owners. These concerns came to a peak with a series of legal disputes in the late 1990s, including the widely publicised lawsuit brought by the recording industry against the

Napster file-sharing service. However, DRM preceeds the popularization of mp3 in file-sharing networks. Engineers responded to the call for software-based solutions to unauthorised copying and produced systems such as the SCMS well before the file-sharing boom. While the music business is often criticised for failing to anticipate and respond to trends in media consumption, it was with great foresight that copyright owners and record companies lobbied lawmakers in the U.S. to make copy restriction codes mandatory in digital audio devices. In seeking this type of control, the industry recognised the potential of code to regulate its own reproduction.

As my discussion of *RIAA v. Diamond* suggests, digital techniques have the potential to alter the relationship between original and copy. More importantly, the difference between original and copy is conceptualised in *RIAA v. Diamond* (1999) as an effect of software. As the court noted, "with analog recording, each successive generation of copies suffers from an increasingly pronounced degradation in sound quality" (para. 3). Digital copies of non-digital originals are also arguably "degraded" since digital techniques represent sonic events in discrete bits rather than in continuous traces. However, in the music industry, "originals" (i.e. master recordings) are often produced in digital format and subsequent copies can be encoded so that they are indistinguishable from the original. This apparent collapse of the original/copy dualism in sound reproduction was interpreted by the designers of the SCMS and similar copy protection schemes as a technical problem with technical solutions. The difference could be reconstituted by adding lines of code marking first and second generation copies and by instructing devices not to make copies of latter.

This solution was limited in its ability to contain the problem of digital reproduction. As the decision in *RIAA v. Diamond* (1999) noted,

> mp3's popularity is due in large part to the fact that it is a standard, non-proprietary compression algorithm freely available for use by anyone, unlike various proprietary (and copyright-secure) competitor algorithms [...]. By most accounts, the predominant use of mp3 is the trafficking in illicit audio recordings, presumably because mp3 files do not contain codes identifying whether compressed audio material is copyright protected. (Para. 4)

The problem facing the engineers of SCMS was not so much how to stop rampant unauthorised reproduction of originals as how to ensure the faithful reproduction of SCMS code so that the original/copy dualism persisted in the multiplication of digital objects.

Persuasion, programming and copyright law

Once it became clear that the portability of mp3 was attracting far more Internet users than SCMS-supported formats, and that manufacturers could not be held liable for copyright infringement by facilitating the use of mp3s, copyright owners launched public relations campaigns which targeted users of file-sharing networks. In Canada and the U.S., market research led to the construction of online piracy as a social problem and policy issue in communications campaigns (Gillespie 2009; Leman-Langlois 2004; Shade et al. 2005). The Canadian recording industry formed the Canadian Value of Music Coalition (CVMC), which conducted focus groups and surveys in order to analyse perceptions of the music industry among Canadian youth. One of the primary aims of the research was to determine the extent to which young people empathised with people who worked in music industry. The data showed that young people did not find very compelling the statistical evidence that supposedly proved that file-sharing was the cause of declining revenues in the music industry (CVMC 2003: 4). Copyright owners were a long way from producing an indisputable set of facts about unauthorised reproduction.

In the U.S., the MPAA used a method similar to that of CVMC for measuring empathy among Internet users. America Online posted a survey on the welcome screen of its Internet service for the MPAA's PR council, and the results showed that the average Internet user (represented by a sample taken from 170,000 AOL users) "did not believe [...] that 'swapping' movies online was illegal" (MPAA 2003). Likewise, CVMC's research found that the average young person was not persuaded by the argument that downloading music for free was "in any way similar to their walking into a record store, pocketing a CD and leaving without paying for it" (May 2003: 32).

Both the MPAA and the CVMC determined that complacency and dissent stemmed from a vast misunderstanding about the "realities" of the contemporary digital marketplace and about the impact of online consumption habits on artists and workers. The solution was sought in education. In Canada and the U.S., copyright owners poured money into quasi-educational advertisements, websites and videos, such as the Keep Music Coming (2003) DVD, copies of which were distributed to thousands of schools across Canada. The Canadian approach was to communicate to the average young person that musical creation depends on "respect for copyright". The MPAA's communication plan, on the other hand, was designed to reestablish the connection between theft of material goods and unauthorised copying. In its anti-piracy advertisements, the audience was told that downloading robs creative labourers of their livelihoods.

By 2003, anti-piracy campaigners were confident that they had found a way to steer users back to paid musical consumption. Universal's David Ring suggested at the 2003 Consumer Electronics Show in Las Vegas that "This year it is about making sure that legitimate content works better than pirated content" (Hermida 2004).

The renewed optimism of industry executives stemmed in part from the success of Apple's iTunes Music Store. The focus of anti-piracy campaigns shifted from problematising file-sharing through public relations to generating a seamless user experience between the catalogues, file formats, devices and services of different companies. Users' interests were defined in terms of the ability to "port" or copy files between machines and programs. As Scott Kaufmann, CEO of MusicNow, put it,

> The key drivers [of online music services] are interoperability and the ease of transition from one device to another. The extent to which these services can port music to a portable device will be a key driver. (Ibid.)

As I discuss below, Apple's competitors continue to associate interoperability with portability and consumer choice, and use this association to distinguish their devices and services from those of Apple.

Several years after Napster, actors in the music industry finally understood the importance of modelling services according to what Innis would call the spatial bias of mp3. As retailers began experimenting with online distribution, they discovered that the mp3 had redefined users' expectations about musical recordings; the value of a digital object for users lay to a great extent in its portability.

The challenge facing Apple and other online retailers was not so much to persuade users to abandon file-sharing through moral, economic and legal discourses, but to translate the interests of users and copyright owners. Instead of modifying the way people think about uses of mp3, DRM could be used to reconfigure mp3 so that the format translated the seemingly conflicting desires for portability and protection.

Modular mobility

If digital objects are infinitely replicable because they lack the material characteristics of other media which lead to generational loss and distortion, then one way of resolving this "problem" is to install "virtual" fences or locks. As Cosentino (2006: 199) argues, DRM exploits and remediates inefficiencies in old systems of distribution and reproduction. In other words, DRM shifts the

limited reproductive capacities of other media such as audiotape into code. In this sense, DRM can be described as a virtualisation of previous modes of technical reproduction. As discussed above, one of the ways we can see this occurring is in the reconstitution of the original/copy dualism in digital media.

In response to the overemphasis on the impact of digitalisation in the study of cultural reproduction, Latour and Adam Lowe (2011: 288; in this book) argue that "there is nothing inherently 'virtual' in digital techniques". There are many reasons to be weary of the term "virtual" in the study of digital techniques. In the context of mp3, "virtuality" normally refers to the mp3's apparent lack of a material "container". Indeed, the apparent absence of material constraints more generally (e.g. the "play only" consumer equipment that characterised phonography) alarmed copyright owners and was a crucial element of the industry problematisation of digital reproduction.

As Jonathan Sterne (2006: 836) argues, however, the seemingly disembodied mp3 does not support the notion of digitalisation-as-virtualisation:

> The embodied mp3 stands in stark contrast to the concept of 'the virtual', which has received so much play in cultural analyses of digital media. Countless scholars have treated virtuality as an ontological dimension of digital media or their necessary consequence. Virtuality is supposed to separate the subject from the body – and digital media are supposed to be the most radical form of mediated disembodiment yet invented.

Mp3 challenges virtuality because "of its direct and sensuous interaction with an embodied, sensing, unthinking subject" (ibid.). Sound is produced in part by the listener's ear (and head, jawbone, chest, etc.), along with the techniques of converting signals into vibrations. The body is thus actively producing sound in the process of sound reproduction. Hearing (and sensory perception more generally) is an embodied event, carried out by the materials and movements of machines and bodies.

The mp3 is thus not virtualised in the sense of being cut loose from materiality and embodiment. Nevertheless, citing Latour, Sterne suggests that mp3's ability to compress large amounts of data into relatively small files is due in part to the delegation of certain listening tasks to software. As I discuss elsewhere, the mp3 format is premised on a model of human hearing imported from psychoacoustics (Shiga 2006). Mp3 encoding and decoding converts code into signal and vice versa in correspondence with this model of hearing. In this sense, the mp3 imposes a degree of regularity on sound and redistributes hearing across the human/nonhuman divide. A part of the (unconscious) hearing process is performed by software.

The "decomposibility" or, in Lev Manovich's (2001) terms, "modularity" of digital objects was initially regarded by copyright owners as one of the most problematic aspects of mp3. The ease of decomposing recordings into mp3-encoded tracks allowed users of file-sharing networks to bypass the cultural form of the album and search for and download only the tracks that appealed to them. The flexibility of mp3 seemed to work in favour of users rather than copyright owners.

But digital objects are not, as record industry executives once thought, inherently opposed to regulated exchange. Don Slater (2002) highlights the manner in which Internet users attempt to exchange and give value to digital objects that can, in principle, be infinitely reproduced. Under "conditions of extreme dematerialization", Slater finds that users tend to treat objects "as if" they were "real" (material artifacts). Despite the image of mp3 as an unruly file format, mp3s are typically placed, arranged and ordered so that they operate as discrete artifacts rather than as information flows. Indeed, as Cosentino (2006: 197) argues,

> The single-choice ['a la carte'] system, as opposed to the subscription-based models, has proved effective [for Apple] because it catered to the preference models of music consumption established by file-sharing services.

Electronics manufacturers, online retailers, file-sharing networks and users tend to treat mp3s as songs, tracks, albums and collections that transfer certain organisational properties and formal elements of sheet music, vinyl, audio tape and CD to mp3. Nevertheless, struggles to problematise mp3 and to imbue it with the values of older media objects must contend with the fact that the primary design principle of mp3 is, as Sterne argues, portability, not fidelity. Mp3 is designed to increase the mobility of traces by sacrificing a degree of immutability in the audio data and in "copyright information".

Mp3s are notoriously malleable; they can be compressed, re-compressed, burned onto various media, converted into other formats, transferred between machines, cut up, remixed and so on. Yet the doctrine of portability according to which mp3 was designed carries with it several subprograms for human and nonhuman actors. Sterne (2006: 839) articulates these subprograms as follows: "Eliminate redundancies! Reduce bandwidth use! Travel great distances frequently and with little effort! Accumulate on the hard drives of the middle class! Address a distracted listening subject!"

Thus, to stave the user off from mp3, copyright owners have found themselves in a confrontation with these entangled subprograms. It is not that mp3 is inherently hostile to regulated reproduction, but that it guides users away from long-standing assumptions about the relation between the interests of copyright owners and listeners. Over the course of the last decade, anti-piracy campaigns have attempted to control unauthorised copying by "re-educating" users in the production/reproduction dualism and legislating ownership relations into digital objects. DRM takes a different route, targeting the subprograms of mp3 and attempting to modify the goals of mp3's code. In what follows, I suggest that the gradual displacement of signs by digital things reduces the promiscuity and portability of mp3 by intervening in the mp3 as cultural artifact.

iTunes as a protective envelope

The success of DRM systems, such as Apple's FairPlay, hinges on the number of people and things which can be induced to perform identities and roles delegated to them in a definition of reality. Increasing the number of actors in the performance of that definition of reality, whether it is a world regulated by DRM or a DRM-free world, will tend to increase the variability of that performance.

The attempted translation of the interests of copyright owners, users, machines, and information into DRM is instructive about the durability of digital things. The blank fields for usernames and passwords, the "I agree" button in "click-wrap" contracts, as well as the lines of code exchanged between computers and Apple's servers, are arranged as a sequence of scripted actions. "The result of such an alignment of set-ups," Latour (1988: 308) suggests, "is to decrease the number of occasions in which words are used; most of the actions become silent, familiar, incorporated (in human and nonhuman bodies) – making the analyst's job so much harder."

The iTunes Music Stores is an excellent example of the translation of legal, technical and social entities. First, in developing the iTunes Music Store, Apple enrolled users of file-sharing services by borrowing elements of file-sharing interfaces and, more importantly, the mp3 format favored by file-sharers. It thus continued to present itself as the embodiment of file-sharing values, as expressed in its 2001 iMac campaign slogan, "Rip, Mix, Burn." Apple also problematised a key aspect of file-sharing services: the increasingly uncertain legal status of such services. In a partnership with Pepsi, the iTunes Music Store was presented in a 2004 Super Bowl television advertisement called "I Fought the Law" as the solution to the legal entanglements of those facing fines for using file-sharing networks (Apple 2004).

The second translation was just as precarious as the first. Apple needed to convince distraught copyright owners that its digital download service would

not be one more avenue for unauthorised reproduction. This was particularly difficult given the decision in *RIAA v. Diamond* (1999) and the fact that the iPod does not prevent users from storing and playing files that lack DRM. Apple assured copyright owners that all music files available through the iTunes Music Store would be encoded with FairPlay DRM. It thus translated the interests of copyright owners in protecting content while simultaneously promising users the portability they had become accustomed to via mp3 and file-sharing networks. In Cosentino's view, Apple's key strategy here was to design FairPlay DRM so that all files and all users were managed through this system of usage rights, while at the same time ensuring that it would possible for users to find detours around this system (e.g., by programming iTunes and the iPod to store and play mp3s regardless of whether or not the mp3s are encoded with DRM. "It can be argued," Cosentino (2006: 188) writes,

> that most iPod owners use it to store, and possibly even share, unlawfully downloaded files. To prevent this possibility, it could be further argued, Apple has set up the iTunes store to provide the iPod with a 'legal' skin.

iTunes can be regarded as a "legal skin" or a protective envelope composed of technical, legal and economic knowledge, which enables Apple to expand into zones of digital reproduction previously occupied by file-sharing networks. However, writing in 2006, Constantino perhaps did not yet have the chance to see the pivotal role that the iTunes Music Store played in the delegation of copyright functions to DRM (even if "weak") through millions of FairPlay-protected files. The translation of the interests of file-sharers and copyright owners into Apple's iTunes Music Store is most evident in way Apple designed its devices and software to work with mp3 (thus enabling users to store, organise and play mp3 obtained through file-sharing networks) and its retailing of audio files encoded with DRM, which communicates information about the user (account and transaction information as well as device identifiers) and limits the number of devices on which the mp3 can be played back.

The popularity of mp3 became a key element in subsequent problematisations drawn up by technologists to interest a wider array of actors. MPEG-2 was an attempt to maintain the interest of electronics firms by updating MPEG-1 with "a lot of new concepts", as Karlheinz Brandenburg (2000) put it. MPEG-2 enabled support for interlaced video, surround sound and more efficient compression. But the most visible update to the MPEG format in the ISO's description of the second generation standard was Digital Storage Media Command and Control (DSM-CC). DSM-CC specifies protocols for applications in networked and non-networked environments and "defines a logical

entity called the Session and Resource Manager (SRM) which provides a (logically) centralized management of the DSM-CC Sessions and Resources" (Chiariglione 2000). Enrolling these concepts into the compression standard enabled the digital object to communicate with networks and other software, enabling "session, connection and configuration management and control" (ibid.).

The publication of MPEG-2 shaped the actions of subsequent designers and users, as demonstrated by Apple's FairPlay system, which exploited this new set of command and control features; by the millions of users who purchased FairPlay-protected files and used them "as is," without converting them to a less restrictive format; and by the hackers who set up new problematisations (and, indeed, businesses) that focused not so much on bypassing FairPlay but on increasing FairPlay's interoperability with non-Apple devices.

One of Apple's key business strategies since the 1980s has been to maintain strict control over the devices that can work with its software. The same principle of restricted interoperability (the degree to which different devices and software can operate together), which Apple has successfully used to increase the value of Apple-branded devices, has shaped the design of the iTunes music store, the iPod and the FairPlay DRM system. Apple defined the user in mp3 and file-sharing terms: all users really want is the ability to obtain specific songs in a highly portable format and to be able to choose from a database that is as large as possible. As Cosentino (2006: 198) notes,

> Apple believed that the only way to establish a market for digital music was to cater to the needs of the users in the simplest way possible, according to the distribution models initiated by file-sharing services.

This definition of the user's interests also assumes that the user will tolerate the restricted use of these files on Apple-branded mp3 players.

Apple is reluctant to release any detailed information about the system. It is thus difficult to know the exact composition of actors in the FairPlay system. But a paper written for Microsoft by Peter Biddle, Paul England, Marcus Peinado and Bryan Willman (2002) provides some insight into the design of DRM frameworks in general.

> DRM systems strive to be BOBE (break-once, break everywhere)-resistant. That is, suppliers anticipate [...] that individual instances (clients) of all security-systems, whether based on hardware or software, will be subverted.

Since the FairPlay system generates a random encryption key for each song owned by each user, it appears to fit the category of "BOBE-strong" DRM (Sharpe/Arewa 2007). Biddle, England, Peinado and Willman are skeptical of BOBE-resistance given the pace at which "darknets" innovate and circulate techniques of subversion. But FairPlay's system of keys and codes has configured the actions of users, devices and files since the launch of the iTunes Music Store in 2003. FairPlay enables users to be enrolled and controlled by turning an element of file-sharing systems (client-server networks) into a regulatory system that staves off to some extent the anti-programs of file-sharers and hackers.

Apple has diligently repaired FairPlay after each hack, updating the iTunes Music Store and requiring users to install software updates to purchase more content. It comes as somewhat of a surprise that, after years of overseeing the development and maintenance of FairPlay, Apple CEO, Steve Jobs, suddenly adopted a critical stance toward DRM in his "Thoughts on Music", an open letter to the music industry posted on Apple's website in February 2007. After explaining that Apple used FairPlay to appease content providers, Jobs outlined three possible ways for Apple to sell music in the future. First, Apple could continue with its existing distribution system, encoding music files with FairPlay DRM. This option is undesirable in Jobs' view because DRM is an ineffective anti-piracy tool. Second, Apple could allow other companies to use FairPlay so that non-Apple devices and software could be used to access the iTunes Music Store. Jobs dismisses this option as well, because it would mean that Apple would have to share FairPlay encryption secrets with other companies, and this would increase the number of leaks of FairPlay secrets, provide opportunities for hackers to work around the locks, and thus drive up the cost of fixing those locks. The only viable solution, according to Jobs, is the third option: a DRM-free world. In Jobs's (2007) words,

> Imagine a world where every online store sells DRM-free music encoded in open licensable formats. In such a world, any player can play music purchased from any store, and any store can sell music which is playable on all players. This is clearly the best alternative for consumers, and Apple would embrace it in a heartbeat. If the big four music companies would license Apple their music without the requirement that it be protected with a DRM, we would switch to selling only DRM-free music on our iTunes store.

Approximately two years after Jobs published his "Thoughts on Music", all four major music companies agreed to distribute their digital catalogues through iTunes without DRM.

It is tempting to view Apple's sudden abandonment of DRM as a victory of hackers and activists who have continuously publicised and repurposed the secrets employed by Apple in FairPlay, making Apple's job of managing encryption keys, software updates, and databases increasingly difficult and expensive. But Apple's (2008) financial reports suggest that the DRM-free world that Apple now promotes is a response to changes in the techno-economic conditions of Apple's business. In particular, Apple's attempt to distance itself from its own DRM system and from the broader logic of content protection emerged from Apple's expectation of intensified competition in the coming years if other companies are able to imitate Apple's closed ecosystem approach. Another possibility mentioned in Apple's 2008 report is that other companies may band together and offer consumers relatively open systems in which the devices, software and services sold by different companies would work together. If Apple's competitors successfully collaborated to produce a more "consumer friendly" and portability-oriented platform, this would pose a significant threat not only to the dominance of the iPod and the iTunes Music Store (which would seem overly-restrictive by comparison) but also to Apple's position as an obligatory passage point in online distribution for consumers, artists, and copyright owners. While few observers in 2008 expected any imminent challenge to Apple's dominance of the online music and mp3 player markets, it seems that Apple's sudden embrace of DRM-free music files was in part a strategy to ward off competition in the very near future. As Apple states in its report, "Some of these current and potential competitors have substantial resources and may be able to provide such products and services at little or no profit, or even at a loss, to compete with [Apple's] offerings" (Apple 2008: 10).

Shortly before the release of Apple's 2008 financial report, a new DRM system called the Digital Entertainment Content Ecosystem (DECE) was announced by a consortium of retailers, device manufacturers, and rights-holders led by Sony (Rosenblatt 2008). Whereas FairPlay is a proprietary DRM system which Apple refuses to license to competing media and content firms, the DECE is based on the "rights locker" model, wherein firms share a common database of user identities and "permissions" (or usage rights). The rights locker allows interoperability between the devices and services of those firms and would thus undermine a core component of Apple's FairPlay system, namely the non-interoperability of Apple devices and services with those of other firms, which has contributed to the success of the iPod and iPhone. FairPlay effectively excludes rival firms from digital media distribution, since FairPlay makes it difficult for users to play files purchased through the enormously popular iTunes Music Store on devices that are not made by Apple. In response, Apple's competitors developed the rights locker platform and promised protocological freedom, that is, connectivity with minimal interfer-

ence. Apple's push for DRM-free music on iTunes coincides with the unveiling of DECE by Apple's rivals. However, Apple continues to distribute video files with FairPlay, pointing to the film studios' ongoing demand for DRM protection.

While there are many types of DRM that could be analysed in terms of the problem of maintaining the "thingness" of intellectual property, Apple's Fair-Play has been the focus of public debate about DRM and the role it plays in anticompetitive business practices. In combination with copyright legislation such as the American *Digital Millennium Copyright Act* (1998), which prohibits the circumvention of DRM, and other technological control mechanisms, Apple has also been accused of restricting consumer rights. These developments highlight the notion that code can be, and perhaps should be, neutral with respect to use. It suggests that, without FairPlay or any other kind of DRM, digital files would be neutral, free for use by anyone for any purpose.

Code's regulatory power does not end with DRM. Further research into the politics of digital techniques could interrogate the translation of interests in articulations of protocological purism by Apple's rivals and, now, by Apple itself.

Conclusion

This chapter explores the strategies through which Apple constructed iTunes, and FairPlay DRM in particular, in order to link a subject (the user) to an object (audio files) through an obligatory point of passage (Apple), producing an assemblage of interests, laws and code that did not exist before. FairPlay performs the connections and transformations once performed by copyright, translating legal rights into permissions, restrictions and keys. FairPlay's durability derives from its capacity to link particular uses of files to particular machines without a "master key", thus anticipating subprograms (e.g. clever hackers who periodically succeed in subverting FairPlay) and transforming the dangerously portable mp3 into an object with a finite number of "shells" (authorised devices). More than just a downgraded digital format, DRM-protected files aim to make reproduction more predictable by shifting discretion from users and courts to machines and code. While Apple now claims that FairPlay was not successful in rendering reproduction more predictable, FairPlay accomplished what early DRM systems failed to do: translate the conflicting interests of users accustomed to file-sharing networks and copyright owners obsessed with content protection, and maintain a protective envelop around digital files by exploiting anti-circumvention provisions in copyright law so that the files gradually begin to regulate their own reproduction.

DRM's goal is nothing short of the production of autonous objects. SCMS failed because the reproduction of digital objects still depended on electronics manufacturers and users to communicate "copyright information" based on a sense of legal or moral obligation. In contrast, FairPlay's objects are designed to be autonomous in the sense that they follow their own rules regarding reproduction and do not require (or allow) the user to decide what is appropriate to copy what is not.

As discussed in this chapter, translation theory is very useful for critically exploring the autonomy of digital things because translation theory makes room for and, indeed, emphasizes the agency of the nonhuman. Media scholars' growing interest in ANT suggests that media studies is once again ready to engage with "the technical" after several decades of recalcitrance toward frameworks which echo medium theory, which has, somewhat unfairly, been characterized as technologically deterministic. ANT offers a theory of media in which technical objects do indeed matter, not because they are somehow inscribed with social relations but because objects are both products and mediators of the exchange of capacities and roles between the human and the nonhuman.

While media scholars have developed sophisticated models for understanding how power is exercised by media institutions such as regulatory agencies and corporations, in the case of DRM, engineering plays an important role in configuring the relations between people and things which constitute new media objects. Thus, the politics of DRM, as with any other media objects, do not begin with the object's entry into legal, journalistic and popular discourses. Rather, as I have suggested in this chapter, the study of the politics of new media should also consider definitions of objects and subjects, and of the "proper" relations between them, in engineering, programming and standardization. Here, too, in the analysis of inscriptions and discussions in engineering and other expert cultures, media studies stands to benefit from the conceptual and methodological tools of ANT which has, since the 1980s, understood science and technology as a particular kind of politics of representation.

By reconceptualizing power in terms of the capacity to define socio-techical reality, it is possible to look more closely at the role of new media objects in building and enforcing particular definitions of reality. If power depends on the ability to translate the interests and capacities of a multitude of people and things into increasingly simplified and costly inscriptions, then it would seem that in the case of DRM very few actors outside of Apple and emerging corporate consortiums are authorised to see, read and alter the actions inscribed in code, or are even capable of doing so. Since digital objects operate as regulatory agents, enabling and constraining their own reproduction and performing certain kinds of perceptual processes, reengineering widely used formats like

mp3 so that they regulate their own reproduction is a significant intervention in the circulation of cultural works and in socio-technical relations more generally.

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