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Research Journal of the ooi Junior Academy, Transactions on ……..……

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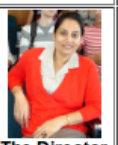
  The Director	  The Director	  The Director	  The Director
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Research Journal of the ooi Junior Academy, Transactions on ……..……

IN THIS ISSUE

- **DIGITAL ART**

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A Blind-peer-reviewed Refereed Multidisciplinary Research Journal

DOWNLOADING THE COMMONS: ITS ROLE IN THE DISTRIBUTION OF ART IN THE DIGITAL ERA

John Charles Ryan
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ABSTRACT

The Internet and other forms of new media have assumed an increasingly important role in the production of art. Although a tool for creating works, the Internet, also provides a crucial means for locating and distributing digital artworks and digitized versions of distribution, as well as the manner in which new technologies have reconfigured the relationship between the production and consumption of art. In particular, the Internet's impact on the emergence of global, interactive audiences is explored. The wider adoption of Internet-based technologies for arts production, consumption and distribution includes peer-to-peer file sharing; revolutionizing the way in which audiences access music, video and graphics. Peer-to-peer sharing also raises issues surrounding access to art in the public domain. The rise of Internet technologies, in many instances, has resulted in the disappearance of some traditional, non-Internet or print-based forms of distribution. In this context, the debate about the democratization of art through digital practices becomes a central theme in the discussion of art production in the present era.

1. IMMEDIATE RESEARCH IMPACT STATEMENT

The findings of this research study were used to train university arts students in techniques for marketing digital artworks following graduation. The findings were also used to introduce practicing artists in Western Australia to new technological platforms for reaching global audiences for their work.

2. INTRODUCTION

This article contains three sections. The first section presents theoretical perspectives that can be leveraged to understand the distribution of art in digital environments. The key concepts addressed include "the database" and "metadata" as cultural and artistic forms (Manovich, 2001, 2003), the distinction between "free" and "permission" culture in the digital era (Lessig, 2004), the notion of the "prosumer" as a creative consumer (Kotler, 2010) and the "folksonomy" as a participatory structure for categorizing data in the digital commons (Yi, 2008). Together, these concepts provide a critical framework for understanding the production, categorization, distribution and accessibility of digital art. In order to theorize the distribution of digital art further, the article briefly addresses the French philosopher Jean Baudrillard (1981)'s "simulacra," particularly his three orders, and German critic Walter Benjamin (2006)'s essay "The Work of Art in the Age of Mechanical Reproduction" (originally published in 1936). The writings of Baudrillard and Benjamin can be applied to the conceptualization of access and originality in particular. The second section sketches the crucial historical moments in the evolution of digital arts distribution since the early 1990s, specifically the emergence of peer-to-peer (P2P) file sharing, Web 2.0 interactivity and Creative Commons licensing. Web 2.0 social networks have spurred the development of mainstream free market commerce in digital data, supported also by advances in Creative Commons-based access to artworks. The third section highlights key technological developments influencing digital arts access and distribution, returning again to peer-to-

peer file sharing software but also outlining high quality audio, video and image file formats and digital compression technologies.

Through various artists, projects and new media developments, this article underscores the most significant factors that have enhanced or diminished "user access" to digital artworks. The Internet has become an audiovisual medium in its own right (one used to create art), along with new markets and modes of distribution. In some cases, consumers and users drive technological innovation towards novel forms of distribution and access to digital works. While a cause of legal concern for some companies, institutions and copyright holders, illegal peer-to-peer file sharing (exemplified by Napster) has promoted direct links between artists and their global online audiences. Such technological innovations have also triggered the development of frameworks for copyright and definitions of intellectual property in digital environments. Four case studies featured in this article include Napster and online music piracy, Flickr as "the world's photo album," the use of YouTube by leading art museums and Video Data Bank as the premier archive for video-based art. Project examples used in the discussion of the theory, history and technology of distribution consist of DeviantART, Facebook, Myspace, Sound Cloud and textz.com. Mark Amerika, interactive media artist George Legrady, German photographer Thomas Ruff, contemporary artist Alexei Shulgin, German artist Sebastian Luetgert, Russian Internet artist Olia Lialina and Internet artists Eva and Franco Mattes are the practitioners featured in this article.

3. FILE SHARING: CREATIVE CULTURE IN THE DIGITAL ERA

This section presents key theoretical perspectives that enable researchers to think contextually and analytically about searching, downloading and distributing digital art. Firstly, new media theorist and computer scientist Lev Manovich (2001)'s commentary on the narrative role of the database in the digital era provides an opportunity to sketch out examples of digital artworks that exploit the functionality of the database through tags, keywords and other forms of metadata. While a medium for creating digital art, the database is also an essential means of categorization and distribution. Secondly, writer and futurist Alvin Toffler's portmanteau "prosumer" raises questions over the production and consumption of art while also pointing to the creative digital consumer as, increasingly, the norm. Thirdly, political activist and co-founder of Creative Commons Lawrence Lessig (2004)'s distinction between "free" and "permission" culture presents a framework for the broader consideration of copyright and intellectual property in terms of digital art. The work of Jean Baudrillard (1981) and Walter Benjamin (2006) furnish theoretical cornerstones to this discussion. In particular, Baudrillard (1981)'s three orders of simulacra and Benjamin (2006)'s analysis of the reproduction of artworks provide critical concepts for approaching the relationship between "copy and paste" culture and the methods of digital artists. The section revisits the argument that the production and consumption of digital art involves the democratization of artistic practices.

The rapid distribution of digital artworks (photography, music, images, video and multimedia projects) through search and download functions highlights the authenticity and duplicability of works. In his seminal essay *"The Work of Art in the Age of Mechanical Reproduction,"* German theorist and critic Walter Benjamin (2006) examines the relationship between technology, art and "cultural reproduction" (Kellner & Durham, 2006, p. xviii). In particular, he conceptualizes the impact of capitalistic methods of producing and reproducing art. For Benjamin, the reproduction of an artwork results in the loss of the aura of the original (Benjamin, 2006, p. 20). "Aura" refers to the work's authenticity, originality, uniqueness and presence in time and space. However, rather than a largely negative historical

evolution, the decline of the aura has resulted in a more discriminating public able to discern critically between cultural manifestations. Benjamin comments:

> *In principle a work of art has always been reproducible. Man-made artifacts could always be imitated by men. Replicas were made by pupils in practice of their craft, by masters for diffusing their works, and, finally, by third parties in the pursuit of gain. Mechanical reproduction of a work of art, however, represents something new. Historically, it advanced intermittently and in leaps at long intervals, but with accelerated intensity.* (Benjamin, 2006, p. 19)

Technical reproduction results in a multitude of copies and the loss of the authority of the aura. Mechanical copies are not dependent on the original (to the degree that a manual reproduction would be). Instead, mechanical reproduction transports a representation of the original object (e.g., a tree in a photograph) into new domains (Hullot-Kentor, 2003, p. 161). The techniques of computerized reproduction (copying, cutting, pasting, clicking, dragging and dropping) raise questions about the aura of digital artworks and whether Benjamin's critique is relevant to the digital era.

The duplicability of digital artworks is, in part, a function of databases. Databases are fundamental to all aspects of searching, downloading and distributing work. In his book *The Language of New Media* (2001), Lev Manovich describes the database as the epicentre of creative processes for the new media age (Manovich, 2001, pp. 218-243). According to Manovich (2001), the database is both a cultural form and a technological apparatus or a "structured collection of data…organized for fast search and retrieval by a computer" (p. 218). The database is the digital correlation of existing forms of narrative, specifically the novel and cinema (Manovich, 2001, p. 218). However, it is also the "natural enemy" of these forms. Key differences between the database and the literary or cinematic narrative bring to light the exact nature of database technologies. As an unordered domain, the database impels users, including digital artists, to create, rather than merely interpret or accept, meaning in the world:

> *As a cultural form, the database represents the world as a list of items, and it refuses to order this list. In contrast, a narrative creates a cause-and-effect trajectory of seemingly unordered items (events). Therefore, database and narrative are natural enemies. Competing for the same territory of human culture, each claims an exclusive right to make meaning out of the world.* (Manovich, 2001, p. 225)

Moreover, new media favours the algorithm-like behaviours intrinsic to the database (e.g., executing a number of tactics in a gaming environment in order to advance to the next level). Advocating digital arts practices that engage the database as a mode of cultural expression, Manovich (2001, p. 219) calls for a "poetics, aesthetics, and ethics" of the database.

Olia Lialina's *Anna Karenin Goes to Paradise* (1994–1996) (www.teleportacia.org/anna) is an Internet-based narrative work underpinned by the database functionality of the search engine. The comedic project contains references to the vintage pre-Google search engines Yahoo (1995 – present), AltaVista (1995–2011) and Magellan (1995–2001). Based on Leo Tolstoy's classic novel, *Anna Karenin* (1878), Lialina's re-interpretation of the themes of love and adultery hinges on three prearranged search terms: "love," "train" and "paradise." With the humor and irony representative of early Internet art or net.art, Lialina reconfigures the narrative structure of the source text through Anna's newfound "dialogue" with search engines. Instead of finding human affection, the famous

protagonist falls deeply in love with a train (Deseriis, 2012). In light of Manovich's theory of new media narratives, *Anna Karenin Goes to Paradise* can be viewed as the semi-ordered middle ground between database anti-narrative and the cause-and-effect narrative structure of literature and film. Lialina's net.art project subverts the narrative authority of literary works, here represented by the source material of the novel.

Other digital artworks and artists make explicit use of the database form as a medium for creative expression. A notable project was *textz.com* (2002) ("an open archive of sometimes closed works of authorship") (Greene, 2004, p. 189). Founded by Sebastian Luetgert, the project was an open-access "warez" database of texts. "Warez" is a corruption of the word "wares." The term refers to infringing copies of copyrighted works, predominantly computer software, music and video. In the case of *textz.com*, illegal content included texts from different sources and genres, such as fictional works, theoretical treatises, song lyrics and political manifestos. The copy-protection mechanisms of warez files have been inactivated or "cracked." They are, therefore, distributed in breach of copyright and without royalties or reproduction fees returning to the creators or publishers. Organised warez collectives like textz.com source the illicit materials, which are then released into the public domain in violation of copyright law. According to the website Monoskop, texts were sourced in a number of ways: "submitted by the authors themselves, supplied to the *textz.com* database by various online collaborators as freely circulating texts on the Net, or they were scanned in from printed media page by page, processed via a text recognition program, and transformed into ASCII files" (Monoskop, 2013).

Whereas the *textz.com* project depended on an Internet platform for its meaning, other database-oriented digital artworks exist offline, such as the installations of George Legrady. In the view of Manovich, Legrady has engaged intensively with the artistic possibilities of databases and metadata. Legrady's works include *The Anecdoted Archive* (1994), *[the clearing]* (1994), *Slippery Traces* (1996), *Tracing* (1998) and, more recently, *Pockets Full of Memories* (2003–2006). Legrady develops site-specific and interactive installations drawing upon algorithms. Commissioned for the Centre Pompidou Museum of Modern Art in Paris, *Pockets Full of Memories* was a participatory installation that involved a data collection kiosk and addressed notions of the archive, memory and audience involvement in the production of digital works. Legrady involved the audience in the development of the database, *"inviting them to scan their personal possessions and then to ponder the concept of a communal archive and the way in which collective memory functions"* (Wands, 2006, p. 165). Participants took digital photos of objects, then labeled the properties of the images with keywords or tags. This kind of user-generated data expanded over the exhibition's duration. The collection of semantic descriptions became the basis for the artist's generation of images and patterns through a *"Kohonen self-organizing map algorithm"* (Greenberg, 2007, p. 18). A self-organizing map (SOM) or a Kohonen map (named for Finnish professor Teuvo Kohonen) makes possible the visualization of complex data. In *Pockets Full of Memories*, the data consisted of keywords and tags or what is known as "metadata." Manovich (2003, p. 13) characterizes metadata as *"data about data: keywords assigned to an image in a media database, a number of words in a text file, the type of codec used to compress an audio file."* Metadata allows *"computers to 'see' and retrieve data, move it from place to place, compress it and expand it, connect data with other data"* (Manovich, 2003, p. 13). Legrady's digital artworks creatively work with metadata, resulting in visualizations based on the tags and keywords assigned to photos by participants in the installation.

Legrady's *Pockets Full of Memories* evidences the breaking down of the division between producer and consumer, symbolizing the capacity of digital technologies (e.g. images, databases, metadata) to

democratize the creation and distribution of art. Legrady's viewers are active participants in and contributors to the installation; they had unique roles. Pockets also shows how digital art practices can catalyze a shift from the creator's absolute control of the art object to a joint responsibility for the artwork that is negotiated between creator and participant. The distribution of Internet-based works (beyond the constraints of place and venue) contributes to a process-based and networked form of art linked to democratic ideals and notions of "the commons" explored later in this article. Internet artworks, such as Anna Karenin Goes to Paradise, exist in the highly visible public sphere of the Web. The content of the project is available to any viewer at any time and from anywhere. Furthermore, digital artworks (including those now based on Web 2.0 technologies) depend on the agency of users to generate metadata and navigate an installation (Pockets Full of Memories), locate and upload warez (textz.com) or take on the role of central participant, as evident in Ed Bennett and Eduardo Kac's Ornitorrinco in Eden (1994). Explored in mail artist Chuck Welch's landmark book, *Eternal Network: A Mail Art Anthology (1995)* (Welch, 1995), email art often incorporates notions of user agency towards the democratization of art through digital practices. Importantly, the digital artwork and its manner of distribution are inseparable, in such case.

The practices of searching, downloading and distributing digital art point to the relationship between consumption and production of digital art. For example, in Legrady's *Pockets Full of Memories*, the viewer (consumer) is also a participant (producer) of the installation. In many other examples, digital artists are both consumers and producers of artwork. In the 1980s, Alvin Toffler and Heidi Toffler (Toffler, 1981) attempted to reconfigure the consumer-producer binary through "prosumer," a term describing a creative consumer who engages in both consumption and production. In *The Third Wave* (1980), Alvin Toffler attributes the emergence of "the consumer" to the Industrial Revolution (1760–1840) or what he refers to as the "second wave." Whereas the "first wave" involved prosumptive agricultural societies, the "third wave" of modern times is characterized by deindustrialization. Toffler asserted that the prosumer would continue to serve a vital role in the context of Information Age knowledge economies (Kotler, 2010, pp. 51-52). Echoing Toffler, in the early 1990s, artist and design theorist Stephen Wilson (1993) distinguished between creators (authors, directors, composers) and consumers (readers, listeners, viewers). For Wilson, interactive media experiences, particularly those made possible by the digital arts, "break down this distinction by providing authoring opportunities to the consumer" (Wilson, 1993), '*What Is Interactive Media*.'

Since its inception, the Internet has triggered debates over copyright and intellectual property in online environments. One of the most vocal advocates for new models of copyright is American law scholar and political activist Lawrence Lessig. In *Free Culture* (2004), Lessig draws a distinction between "free" and "permission" culture. The adjective "free," for Lessig, relates to "free speech," "free markets," "free trade," "free enterprise," "free will" and "free elections" or, in other words, the dimension of a society that "supports and protects creators and innovators" (xiv). A free culture advocates for the value of intellectual property rights, but only in defense of both the creator and future follow-on creators. For Lessig, free culture is maintained "by limiting the reach of those rights, to guarantee that follow-on creators and innovators remain *as free as possible* from the control of the past [emphasis in original]" (xiv). In contrast to a free culture, a "permission culture," as Lessig further describes, is "a culture in which creators get to create only with the permission of the powerful, or of creators from the past" (xiv). In his view, permission culture weakens creativity, burdens innovation and increases costs related to the constant need for the expertise of lawyers and expensive legal processes (pp. 173 and 192).

How does access to digital art relate to Lessig's notion of free and permission culture? Sharing and collaborating are significant elements in the production of digital artworks. For example, the projects *life_sharing* and *Frequency Clock* call attention to the practice of sharing within a free culture as an underlying premise. *Life_sharing* (2000–2003) was commissioned by the Walker Art Center (WAC) and founded by Eva and Franco Mattes, who are also known as 0100101110101101.ORG. *Life_sharing* is a variant of the term "file sharing" (Walker Art Center, n. d.). The project utilized emerging file sharing software, which, for the first time in the digital age, allowed users to exchange the contents of their hard-drives.0100101110101101.ORG made the files on their server publicly available through the WAC website. The artists granted users free, unchecked permission to *"rummage through archives, search for texts or files they're interested in, check the software, watch the 'live' evolution of projects and even read"* the artists' email (Walker Art Center, n. d., 2013). The metaphors of the archive and database central to *life_sharing* foreground the tension between the public and the private, as well as access to digital artworks generally, through complete, uncensored admittance to the artist's private virtual life (Grzinic, 2011, p. 155). Clearly, *life_sharing* reflects the ethos of Lessig's "free culture," ensuring that *"follow-on creators and innovators remain as free as possible."* As a similar example from digital sound art, Honor Harger and Adam Hyde of the Australian collective Radioqualia founded the global participatory FM network *Frequency Clock* (1998–2003) as *"a geographically dispersed independent network of Net radio stations, broadcasting on autonomously owned FM transmitters."* The aims of *Frequency Clock* included *"the incorporation of more open systems for determining content [making possible] the abatement of centralized program administration"* (quoted in Lovink, 2003, p. 146) (also see http://soundcloud.com/radioqualia).

As Lessig suggests, searching, downloading and distributing digital art bring to the fore debates over free and permission culture, specifically in relation to digital copyright and intellectual property online. Works such as *life_sharing* and *Frequency Clock* defy conventional models of copyright and intellectual property. These productions used open peer-to-peer (P2P) software as an integral part of the process of design and distribution (Greene, 2004, p. 189). Digital arts practices, including the use of P2P networks and cut and paste protocols, inherently run against the grain of the copyright conventions of a "permission culture." New models, represented by Creative Commons licensing discussed in the next section, have been developed in response. In general, copyright grants the owner of a work, who may not necessarily be the creator, exclusive permission to publish, manage and alter the work, as well as total control over copies or derivatives of the original. Importantly, the reach of copyright reflects the spectrum of rights granted to the creator under law (Lessig, 2004, p. 136). Intellectual property (IP) is a generic legal term for intangible assets, including copyright, patents, trademarks, trade secrets and design rights (Cornish, 2004, p. 1). Intellectual property law grants owners rights to these assets. As Lessig argues, the Internet and other forms of digital technology have fostered a "cut and paste culture" (Lessig, 2004, p. 105). However, rather than being questionable practices, cutting, pasting and other forms of duplication are essential to the digital arts and the maintenance of the digital commons.

DeviantART (or deviant ART) is a web portal and social network dedicated to the sharing of artworks and ideas (www.deviantart.com). Founded in 2000 by Scott Jarkoff, Matthew Stephens and Angelo Sotira, DeviantART provides a platform for artists to display, discuss and share their productions. The website allows artists to exchange digital duplications of traditional works, as well as online and digital works. The left-hand side of the homepage contains a list of categories, including digital art, traditional art, photography, literature, film and animation, motion books, cartoons and comics, fan art and community projects. By 2009, nearly 11 million artists, writers and viewers became members of the

community. By late 2010, DeviantART received 100,000 new submissions each day (McHaney, 2011, p. 44). As of 2013, it is now billed as the *"world's largest online art community"* with 261 million artworks from over 27 million artists and contributors (DeviantART, 2013). Social media interfaces through Twitter, Facebook, Tumbler and Google have expanded the capacity of DeviantART for user interactivity and exchange. Users have the option to post comments about artworks and respond to polls on a variety of art-related topics. The way in which you can access DeviantART works ranges from open to very specific.

The "free culture" capacity to create art by manipulating the commands "copy," "paste," "send" and "print" triggers discussion over the originality of digital artworks. Digital artist Bruce Wands observes that *"some artists choose to print only a single original of a work; many issue limited editions; and others produce open editions. Some artists even provide a copy of the digital file in case an original print should become damaged or faded"* (Wands, 2006, p. 34). As we have seen through a number of examples and case studies, many digital artworks are derivative and rely extensively on source material, such as novels, emails, news feeds and photos. In his extended poem *"Source Material Everywhere"* (republished in *Remix the Book* (2011)), American author and artist Mark Amerika reflects on the relationship between source material and artistic meaning, as well as the identity of a digital artist as a "remixologist:"

> *As we have already acknowledged*
> *the remixologist is a novelty generator*
> *one who performs in the immediate present*
> *as a way of establishing the mysterious resonance of*
> *social relatedness within the context of*
> *a fluctuating currency in the always-emergent market*
>
> a market that is fueled by this same sense of novelty (Amerika, 2011, p. 17)

Jean Baudrillard's theory of simulacra provides a perspective for further considering the proliferation of digital works, particularly images, as well as the relationship between an artistic object and the reality it represents. As a theoretical framework, the three orders of simulacra outlined by Baudrillard allow us to comprehend the visual representation of the world over time. In Symbolic Exchange and Death (1993), Baudrillard (1981) proposed three orders of simulacra in order to characterize the various ways artistic objects have been produced and distributed historically (Toffoletti, 2011, p. 17). The evolution of the first-order simulacrum begins during the Renaissance to the Industrial Revolution period and predates the economic or aesthetic value of images. During this time, artistic objects were indeed valued, but for sacred purposes, according to Baudrillard. The Industrial Revolution stimulated the rise of the second-order simulacrum in which mass production altered the value of objects. Images shifted from ritualistic to aesthetic value according to commercial demands and accrued *"meaning relative to a capitalist economy of value exchange"* (Toffoletti, 2011, p. 21). Baudrillard argues that industrial scale reproduction interferes with the relationship between the artistic object (including images) and the reality represented; instead, objects are understood in relation to their multiplications rather than to the actual world. The third-order simulacrum marks the emergence of hyper-reality and simulation, triggered by consumer culture, mass media and communication technologies (Toffoletti, 2011, p. 24). Examples of third-order hyper-reality include brands, advertising, icons, graphics and labels in which images proliferate without tangible associations to real world phenomena.

The theory of simulacra is particularly germane to the analysis of music sharing sites. In 1999, Shawn Fanning, a 19-year-old university student, launched Napster, a digital music company and real-time platform that enabled computer users to exchange MP3 music recordings through its peer-to-peer file sharing software MusicShare (Ferrell & Hartline, 2008, p. 373). Napster is the precursor to many peer-to-peer file sharing formats (Ramey, 2003, p. 253), discussed later in this article. The project was groundbreaking because it granted users access to the music files on the computers of its members. Napster members were able to search according to artist or song and then download MP3s to their computers. As the third section of this article explains, MP3s are digital formats that compress a sound structure into a relatively small file (Ramey, 2003, p. 253). Napster combined the technological innovation of file sharing with community and social features. The platform included a search engine, file sharing capability without the need for a central server and IRC (Internet Relay Chat) for synchronous chatting with users. Other features of the Napster forum included instant messaging and user-generated bookmarks. During the height of its popularity, Napster was estimated to have between 26 and 70 million subscribers.

By 2000, Napster was taken to court by the Recording Industry Association of America (RIAA) on behalf of key music companies Sony Music, BMG and Warner Music Group (Ferrell & Hartline, 2008, p. 374). Also during 2000, the heavy metal band Metallica accused Napster of copyright violation and racketeering, leading to the landmark lawsuit *Metallica, et al. V. Napster, Inc*. Copyright became the central issue of the Napster legal debate as the company was eventually found liable for violation. In many ways, the Napster controversy initiated the discussion of intellectual property and the Internet. When the company was sued for copyright violation by various parties including Metallica, digital rights became a contested issue, opening the way ahead for pioneering work by Lawrence Lessig and others on Creative Commons licensing. On a technological level, the Napster platform made possible the exchange of copyrighted material between users. Rather than hosting files, the Napster server optimized the MP3 search function, streamlining the transfer of files directly between the computers of Napster users. Although the company benefitted from the copyright infringements of its users, it never charged fees for the content it enabled users to access (Lessig, 2004, pp. 34 and 60). Later acquired by the American software company Roxio and the digital music service Rhapsody, Napster has now become an online music store, effectively shedding its controversial identity as a rogue peer-to-peer sharing platform.

4. DOWNLOADING THE COMMONS: THE HISTORY OF DIGITAL ARTS DISTRIBUTION

You paint a landscape. Your work is displayed as part of a gallery exhibition. A viewer purchases a print of your landscape. You compose a song. You perform the song at a venue. Listeners purchase a CD copy of your music. You write a poem. The poem is published in an anthology. Your admirers buy print copies of the book. Traditional (that is, non-digital) works of art are distributed in these ways. Such forms of art are accessed through galleries, exhibition halls and performance spaces. However, the digital era has shifted the fundamental structure of arts distribution, bringing to light a variety of issues surrounding copyright, intellectual property, access and originality, as discussed in the previous section. As early as 1936, French poet and philosopher Paul Valéry in his book *Aesthetics* (published 1964) (Valéry, 1964) predicted that images and sounds would become plentifully available to the public. This section examines some of the developments leading to the cornucopia of digital material we know today. Featured events include the emergence of netcasting, peer-to-peer sharing, Web 2.0 technologies and Creative Commons licensing. Interactivity and user participation define these

historical landmarks. The notion of a "folksonomy"is explored in the context of an extended case study of Flickr as the "world's photo album."

Between 1997–1999, new online platforms and formats emerged for music distribution, effectively blurring the distinction between the Internet and mainstream or non-Internet-based forms of broadcasting (Greene, 2004, p. 110). In particular, these platforms set the stage for a proliferation of experimental music and micro-radio initiatives. Online broadcasters or "netcasters" populated the Internet with new stations, set up quickly and simply with encoders and servers. Notable early art radio websites, including Heath Bunting's *Radio 90* (1999) and Radioqualia's *Frequency Clock* (1998–2003), enabled users to program play lists Greene, 2004, p. 110). Online broadcasting took advantage of developments in the MP3 (also known as MPEG-1 or MPEG-2 Audio Layer III) as a compact format for distributing audio. These kinds of digital technologies provided new ways of sharing and customising music recordings.

Emerging technologies triggered the growth of alternative radio communities broadcasting through the Internet, but also provoked debates about regulation and copyright.In response to questions surrounding sharing and authorship, Alexei Shulgin's *386* DX (1998–2005) was a cyperpop project and perhaps the world's first cyberpunk rock band. *386* DX actually refers to a computer that uses text-to-speech software to play songs by popular artists. In 1998, Shulgin delivered real-time rock performances using a 386dx processor computer and Windows 3.1 operating system (see http://www.easylife.org/386dx/). The project included versions of popular songs like California Dreaming, House of the Rising Sun, Smells like Teen Spirit and Purple Haze "performed by *386* DX / 4Mb RAM / EGA / 40 Mb HD [with] synchronized text-to-speech and midi synthesis" (*386* DX, 1998).

One of the principal historical events influencing the searching, downloading and distributing digital art was the emergence of peer-to-peer (P2P) technologies about ten years after the introduction of the World Wide Web. In most P2P networks, a user has digital media files to exchange with other users. These files are categorized according to title, artist, date and format. The files are then downloaded from the peer to the local hard drive of another user. Following the Napster controversy, Gnutella (or GNUtella) (2000), BitTorrent (2001) and FastTrack (2003) were released as second-generation peer-to-peer protocols lacking central directories. All file transfers and searches of these P2P protocols occurred through users or "peers."Founded by Justin Frankel and Tom Pepper, Gnutella is a "distributed search" protocol in which every "peer" acts as both a user and server (Taylor, 2005, p. 102). Ian Taylor in *From P2P to Web Services and Grids* observes that Gnutella "provided a mechanism that offered a much more tolerant structure, where no single entity could be isolated to bring down the entire network."

Computer programmer Bram Cohen developed BitTorrent in 2001 as a P2P service lacking search functionality. The open source BitTorrent software uses a strategy known as "swarming" to circulate large digital files, such as video, between users simultaneously (Werbach, 2008, pp. 102-103). Swarming divides massive files into smaller chunks, which are then reassembled from different locations simultaneously when downloaded, thereby enhancing ease of access to digital content. The BitTorrent approach avoids the common P2P problem of "free riding" where a peer uses the file-sharing platform but without contributing content back to other peers (Buford, Yu, & Lua, 2009, pp. 1-3). Despite such technological breakthroughs in the history of digital distribution, P2P sharing has

become synonymous with content piracy. Indeed, P2P networks are often weighed down by spyware, malware and corrupted content.

The emergence of Web 2.0 technologies has also affected the distribution of digital art. The term "Web 2.0" connotes the evolution of the World Wide Web toward more interactive and dynamic services. In 2004, Dale Dougherty, a vice president of O'Reilly Media, first used the term "Web 2.0." His manifesto *What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software* (2005) further outlines the scope and capabilities of Web 2.0 technologies. Web 2.0 comprises blogs, wikis, podcasts and social networks as well as the free circulation of information via email, instant messaging and RSS (Really Simple Syndication) feeds. All of these technologies underpin a socially interactive online environment where users can contribute to and influence information in the public sphere. Web 2.0 has been marked by the rapid growth of the social media and content sharing platforms YouTube, Facebook and Flickr, all of which begin as small start-up businesses in the early 2000s. Web 2.0 is both a technological and social movement. Its key ideals include social participation, user interactivity and online community. More specifically, O'Reilly proposed 7 principles of Web 2.0, including rich user experiences through friendly interfaces and collective intelligence harnessed through social media (Anderson, 2012, pp. 1-9).

In 2001, Lawrence Lessig, Hal Abelson and Eric Eldred founded Creative Commons (CC) in partnership with the Center for the Public Domain and Stanford University. The CC project aimed *"to develop a rich repository of high-quality works in a variety of media, and to promote an ethos of sharing, public education, and creative interactivity"* (quoted in J.-A. Lee, 2012, p. 37). As a not-for-profit US-based organization, Creative Commons facilitates the free, public and legal use of creative works through a variety of fair use licensing agreements (Creative Commons, 2010). The CC initiative was the outcome of debates over Internet copyright, pointing to the need for a convenient legal standard to provide creators a way to grant public rights to use their online content. Before CC licensing emerged, an Internet user would need to identify and make contact with the rights-holder for a digital artwork in order to request permission. In some cases, prohibitively expensive transaction fees would have been required before reproduction, modification or redistribution of a work could go forward legally. As Lessig comments:

> *By developing a free set of licenses that people can attach to their content, Creative Commons aims to mark a range of content that can easily, and reliably, be built upon. These tags are then linked to machine-readable versions of the license that enable computers automatically to identify content that can easily be shared. These three expressions together, a legal license, a human-readable description, and machine-readable tags, constitute a Creative Commons license. (Lessig, 2004, pp. 282-283)*

According to digital commons theorists, the CC strategy operates on legal and social levels (Abelson et al., 2012).

On a legal level, CC licenses permit the distribution and use of works within fair use conditions. The licenses supply creators an infrastructure for giving users permission to access, copy, edit, distribute and remix their works. Different forms of Creative Commons licensing attract different conditions of use. Attribution, Public Domain Dedication, Founder's Copyright and No Derivative Works are categories of CC licensing. For example, an Attribution category grants conditional permission to use a work with proper attribution given to the creator and with no derivative works or commercial gain to

the public. Through a Public Domain Dedication, the creator surrenders complete rights to the work, whereas Founder's Copyright permits the creator to retain copyright over the work for a fourteen-year period (Ratliff, 2009, p. 52). On a social level, CC initially attempted to influence digital platforms to reduce transaction costs for works given public rights by their creators.

Creative Commons refers to the growing reservoir of public domain content as a "digital commons." Indeed, "the commons" is a crucial notion across studies of culture, law, economics, philosophy, literature, history and landscape. Anthropologist Donald Nonini defines the commons broadly as

> *"the great variety of natural, physical, social, intellectual, and cultural resources that make human survival possible…those assemblages and ensembles of resources that human beings hold in common or in trust to use on behalf of themselves, other living beings, and past and future generations of human beings"* (Nonini, 2007, p. 1).

The term "digital commons" could be described as the digital content held in common or in trust, providing a cultural resource and facilitating the legal distribution of intangible digital assets.

Since its founding, Creative Commons (CC) licensing has grown exponentially and has transformed the digital copyright environment through its ethos of sharing and interactivity. In 2002, CC released its first copyright licenses, known as Version 1.0, to the public domain. Version 2.0 appeared in 2004 with nearly 5 million licensed works were available by the end of the year. In 2008, the American industrial band Nine Inch Nails (NIN) released the album *Ghosts I-IV* under the CC scheme, demonstrating the influence of new licensing standards on the mainstream music industry. By 2009, approximately 350 million Creative Commons licensed works were publicly available, a 700 percent explosion since 2004. By 2011, Flickr reported 200 million photos licensed within its repository under CC guidelines (Creative Commons, 2010).

Co-founded in 2004 by Caterina Fake and Stewart Butterfield of the company Ludicorp, Flickr is an online image and video hosting and sharing community that was acquired by Yahoo! for $35 million in 2005. Flickr is now considered one of the first and most successful Web 2.0 platforms. Flickr began as a feature in Ludicorp's *Game Never ending*, an online role-playing platform based on social interaction. Ludicorp was a small game development company started in 2002 by Fake. By 2003, the company identified a need for a browser-based photo sharing platform. Flickr integrates Web 2.0 functions, such as social networking and community open APIs (Application Programming Interfaces), as well as tagging and algorithms that optimize a range of content. Flickr users can create profiles, upload photos and chat to one another. An article in the English newspaper *The Telegraph* calls Flickr *"the world's photo album"* as well as the premier website for exchanging photos (Telegraph Media Group, 2013). In 2011, Flickr had 51 million members and 80 million different users, as well as 6 billion images, a 3 billion increase in content since 2009.

The way in which images are located on Flickr demonstrates the use of innovative socially based technologies. Dedicated users sort Flickr content for the benefit of the public. "Tags" are search terms that describe the contents of an image, whereas "geotags" are marked on a map to indicate the place where the photos were taken. Themed groups of images are also available for categorizing Flickr content (Fake, 2007). Flickr makes use of a "folksonomy" approach to image categorization. Developed by information architect Thomas Vander Wal, a folksonomy is a non-hierarchical *"informal, collaborative taxonomy"* (Telegraph Media Group, 2013). More specifically, a folksonomy

is a *"collective set of keywords used by participants...more keywords can be assigned by more people to the same digital resource"* (Yi, 2008, p. 322). Yi further defines a folksonomy as a vocabulary developed by systems users or information consumers, created collaboratively and growing as more users take part. In a folksonomy, the suite of tags assigned to a digital resource is developed by the user base (Yi, 2008, p. 322). In 2008, the United States Library of Congress, the Smithsonian, the National Library of New Zealand, the Imperial War Museum and other institutions began adding untagged images to the Flickr repository, engaging the general public in the identification of these heritage assets (Telegraph Media Group, 2013).

5. DISTRIBUTING DIGITAL ARTWORKS: THE IMPACT OF KEY TECHNOLOGIES

Searching and downloading are closely related to distribution. This section outlines some of the key technologies that have impacted the distribution of artworks. A brief overview of digital compression technologies includes lossy and lossless standards. The psychoacoustic process of perceptual coding has been the basis for the evolution of ubiquitous file formats (JPEG, MP3, MPEG) through digital compression. Sound Cloud is an exemplary model of an audio sharing platform using social media to facilitate the distribution of sound files. An extended case study highlights the emergence of YouTube in the context of video compression. The increasing use of YouTube as a platform by major art museums demonstrates a dialogue between mainstream and digital arts practices that has become gradually more commonplace. The article ends with another extended case study of the Video Data Bank project.

As one of the most influential technologies in the digital age, compression has significantly increased the accessibility of digital artworks. "Compression" refers to the process by which complex data are converted into compact and readily downloadable forms. Compression reduces file sizes before they are transferred or stored in media. Certain kinds of compression involve the removal of redundant data components, while all forms utilize the implementation of decompression algorithms (Pu, 2006, pp. 1-2). There are two principal classes of compression: lossy and lossless. Lossy compression formats, JPEG, MP3 and MPEG-4, for example, reduce quality but enhance the storage and delivery speed of a file, making it possible for websites like YouTube to deliver high-quality and easily accessible video streaming (Kratochvil, 2013, p. 48). Lossy compression shrinks audio file sizes by permanently erasing extraneous information. Most lossy audio file formats, including MP3s and MP4 (.mp4 or .m4a), employ a process known as "perceptual encoding" (discussed below) to reduce file sizes with minimal impacts on overall quality (Hosken, 2011, pp. 81-82).

By comparison, lossless compression is less efficient and was designed initially for text (e.g., ZIP files). Developed in 1952, Huffman coding was the first modern compression algorithm to use lossless compression. For audio, Huffman coding increases compression by substituting shorter codes for recurring sound patterns, particularly applicable to most musical compositions, in which patterns are easily identifiable (Fries & Fries, 2005, p. 174). The advantage of lossless compression is that the original data structure (i.e., before compression) can be restored. In other words, the decompressed data is identical to the original uncompressed data. A resurgence of interest in lossless compression technologies during the last twenty years has paralleled the proliferation of digital file formats, including text, video, audio and graphics where it is essential that compressed and decompressed data remain the same (Sayood, 2003, p. xix).

The image file formats PNG (Portable Network Graphics) and GIF (Graphics Interchange Format) support lossless data compression, whereas other file formats, such as JPEG-2000, employ both lossy and lossless standards. For digital audio, lossless and lossy compression allow the distribution of a smaller quantity of audio data at a faster rate of transfer. Advantages of audio compression also include extended playing time, "miniaturization" (equal playing time with smaller hardware), reduced storage density (involving less maintenance of equipment), reduced bandwidth, more efficient transmission and better signal quality in relation to bandwidth (Watkinson, 2001, p. 275).

Former employees of the e-commerce portal PayPal, Chad Hurley, Steve Chen and Jawed Karim, launched the YouTube website in June 2005. Through the YouTube initiative, they aimed to foster the global exchange of online video. With little technical knowledge of file sharing protocols, YouTube users can upload and access streaming video from around the world. Moreover, video can be embedded into other websites through YouTube's URLs and HTML codes, promoting interactivity and exchange between users. In 2006, Google purchased YouTube for $1.65 billion US. Shortly after the acquisition, YouTube became one of the most visited websites in the world. Co-founder Jawed Karim attributes the success of the project to four features: "video recommendations via the 'related videos' list, an email link to enable video sharing, comments (and other social networking functionality), and an embeddable video player" (Burgess & Green, 2009, p. 2).

Exemplary of online participatory culture, YouTube embodies the ideals of Web 2.0, chiefly the value of user-driven innovation (Burgess & Green, 2009, p. 2). Along with other social networking sites, including MySpace and Flickr, YouTube provides a space for digital art and fosters linkages between artists. In this context, art museums worldwide have been using YouTube to promote, support and provide a medium for the creation of art. For example, the Museum of Modern Art (MoMA) began posting videos to YouTube in 2007, featuring speakers who had given real-time lectures at MoMA (www.youtube.com/user/MoMAvideos). Moreover, the Guggenheim Museum's project *YouTube Play* (2010) solicited videos of any genre from around the world. The competition aimed to showcase the Internet as a catalyst and disseminator of digital media, such as online video. In other words, *YouTube Play* foregrounded the relationship between emerging technologies and creativity. For example, *Birds on the Wires* (2009) by Brazilian artist Jarbas Agnelli is an audiovisual orchestration evoking the connections between birds and sound through images of music notation and overhead power lines set against the sky.

Closely related to compression technologies, the introduction of new file formats has molded the evolution of digital art and its distribution. In 1991, the Fraunhofer Institute in Germany pioneered the MP3 digital audio compression format (Wands, 2006, p. 211). The MP3 has now become the most common medium in the world for distributing recorded sound. Media theorist Jonathan Sterne in *MP3: The Meaning of a Format* observes that *"more recordings exist and circulate in MP3 format than in all other audio formats combined. A single file on a single network may be available simultaneously in dozens of countries, without regards for local laws, policies, or licensing agreements"* (Sterne, 2012, p. 1). The compactness of MP3 file sizes explains their popularity. MP3s are typically 10 percent of the original file size of other audio formats, including WAVs. The condensed MP3 structure makes use of compression, which streamlines the audio file through the removal of superfluous segments. MP3 technologies maximize the quality of digital recordings in relation to the complexities of human hearing, while maintaining relatively small file sizes.

Audio compression technologies take into account the normal range of human hearing. The psychoacoustic process known as *"perceptual encoding" (also known as "perceptual coding") discards redundant and irrelevant components of the audio signal that the human ear does not perceive (Sterne, 2012, p. 2). This process also minimizes or avoids losses in sound quality at the same time. "Psychoacoustics"* refers to the scientific and psychological study of acoustic phenomena, an important framework for compression technologies (for further reading, see Howard & Angus, 2012). "Encoding" refers to the conversion of uncompressed digital audio data to a compressed format. Moreover, a "CODEC" is a mathematical process for encoding and decoding information.

Perceptual encoding employs lossy compression, but is used by MPEG (Moving Picture Experts Group) files and other formats, in conjunction with lossless compression, to reduce the audio file size further. Since 1989, the MPEG has been developed by the International Organization for Standardization (ISO). The goal of the organization was to develop a standard for audio and video compression for use in CD-ROM applications. The committee has since released MPEG-1, MPEG-2, MPEG-4 and MPEG-4 AVC or H.264. Despite technological advances, such as the MPEG format, variability between the hearing of listeners and the quality of acoustic environments (e.g., the introduction of background noise) mean that perceptual encoding and, consequently, digital file formats are not always efficient.

Compression technologies underpin the widespread availability of digital music, as evident on audio portals like SoundCloud. Created by Alex Ljung and Eric Wahlforss in Berlin, Germany in 2007, SoundCloud (http://soundcloud.com/) is an online platform that allows sound artists to record and distribute audio. By November 2011, SoundCloud's user base reached eight million. Ljung and Wahlforss originally envisioned an audio sharing service comparable to Flickr for photography and Vimeo for video. SoundCloud is a highly interactive audio distribution service. Designed to integrate Twitter, Facebook and other social media, SoundCloud makes it possible for users to follow the activities of one another as members of a global audio community. It also incorporates the use of waveforms that track member comments across segments of the audio, creating what is known as "timed comments." User feedback is uniquely referenced to specific parts of an audio track. SoundCloud also allows the use of widgets and apps. Newly uploaded tracks can be tweeted via widgets placed on the personal websites of users. Moreover, the SoundCloud API enables users to upload and download audio files with their smart phones.

Digital compression technologies have also inspired a number of artists and works. German photographer Thomas Ruff engages with JPEG compression, particularly the erasure of data through lossy compression. Ruff's works critically interpret the notion of "artifacts," data errors resulting from the discarding of information through compression algorithms. His oversize photography book *jpegs* (2009) (Ruff, 2009), published by the Aperture Foundation with commentary by curator Bennett Simpson, features a series of online JPEGs, downloaded from the Internet and enlarged, resulting in pronounced pixelation. The series calls attention to the inconsistencies and imperfections of digital technologies, exemplified by compression errors. Cataclysmic sites, ruined landscapes and uncanny places feature in Ruff's works (Lee, 2012, p. 103). Like Ruff, American artist Jason Salavon also makes use of compression algorithms. In particular, Salavon's *Every Playboy Centerfold* (2002) exploits the creative potential of image compression. Salavon sourced *Playboy* magazine centerfolds, beginning in the 1960s, compressing them digitally into a single image roughly resembling a woman. The outcome is a "shroud-like" feminine figure composed of blurry colours (Salavon & Hill, 2004, p.

14). Salavon's work represents the synthesis of visual data through the overlaying and arranging of the original imagery, in the form of Playboy centerfolds.

As already noted in the discussion of Napster, peer-to-peer (P2P) networking enables the sharing of resources between computers. In 1969, formative P2P concepts were proposed Steve Crocker, co-founder of the ARPANET protocols that would serve as the basis for the Internet. Some precursors of P2P include Usenet (1979) and FidoNet (1984). For example, Usenet was created by computer scientists Tom Truscott and Jim Ellis as a democratic platform. Usenet aimed to enhance public access to digital resources and "to remedy the inequities in the distribution of computer tools" (Pfaffenberger, 2003, p. 24). It was designed as the "poor man's ARPANET" through software innovation and "bottom-up democracy" (Pfaffenberger, 2003, p. 24). By 1984, nearly 1000 sites were participating in Usenet through newsgroups that enabled users to retrieve and post messages.

Designed by Tom Jennings in 1983 and made public in 1984, FidoNet supported email and bulletin board systems (BBS) in a similarly democratic fashion. Both Usenet and FidoNet provided the groundwork for later P2P evolutions that would decentralize the distribution of information through the use of "peers" or network nodes. Peers as producers and consumers of data reflects Toffler's notion of the prosumer, explored earlier in this article. P2P networks differ to client-server paradigms of information technology in which servers control the flow of data to clients. Hence, P2P epitomizes the ethos of Web 2.0 interactivity, in which the division between the consumption and production of art becomes increasingly blurred.

Video Data Bank (VDB) is the premier platform and archive for video work by contemporary artists. Founded in 1974 by Kate Horsfield and Lyn Blumenthal at the School of the Art Institute of Chicago (SAIC), VDB is now the leading resource for video created by and featuring contemporary practitioners. The project was co-founded at the beginning of the video arts movement when Horsfield and Blumenthal began recording interviews with female artists (see Juhasz, 2001). The history of VDB is linked to the larger feminist arts movement and is hence a precursor to cyber feminism. VDB comprises an impressive collection of work by 550 artists across 5,500 video art files. It is a national and international video art distribution service that promotes understanding of the genre. One of the aims of VDB is to forward the preservation of historically momentous video artworks, both analogue and digital, as well as writings about video art.VDB publishes *Surveying the First Decade: Video Art and Alternative Media in the U.S. 1968–1980,* a 17-hour compilation of experimental video. First released in 1995, the two-volume compilation surveys the history of experimental video art, including 68 titles by 60 artists classified according to the following genres: conceptual, performance-based, feminist, image-processed, documentary and community-based works (Video Data Bank, 2013). For more information, see http://www.vdb.org.

6. CONCLUSION

This article discussed searching, downloading and distributing digital art using case studies and key examples, bridging art and technology. As exemplified by P2P file sharing, the distribution of digital art is underpinned by democratic, interactive and participatory ideals. The development of distribution channels has paralleled the emergence of digital technologies and social media platforms. A theoretical approach to digital arts distribution discussed in this article encompasses four major concepts: Manovich's argument that the database is the centre of digital creativity, Lessig's distinction between creative and permission culture, Toffler's notion of the prosumer as a creative consumer and Vander

Wal's concept of the folksonomy as a non-hierarchical user-driven way to categorize data in the public domain. Benjamin's reflections on the reproduction of art and Baudrillard's three orders of simulacra provide theoretical lenses for analyzing digital art in terms of its duplication in the context of our "copy and paste" culture. Creative Commons licensing reflects debates over copyright and intellectual property in the digital era. The emergence of Web 2.0 technologies and peer-to-peer (P2P) file sharing have facilitated access to digital artworks extensively. Compression technologies, including lossy and lossless forms, underpin the proliferation of file formats for digital video, audio and graphics, including JPEGs, MP3s and MPEG-4s. In sum, the democratization of art through digital interventions is exemplified by the theory, history and technology of digital arts distribution.

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