**Hello Amiga, Goodbye and Then Hello Again**

**Andrew James Paterson**

*Commodore Amiga.* Well, what is in a name? Commodore suggests failed military, but then again what is in a name? And then Amiga—Spanish feminine for friend.

The first Commodore Amiga model was launched in 1985. Compared to 8-bit predecessors such as the Commodore 64, the Amiga was hot. It offered unprecedented graphic design possibilities, also a seemingly limitless range of sonic capabilities, and it could be used in cahoots with much other highly useful software. IBM was for business; the Amiga was for artists and misfits. In 1985, the Commodore Amiga arrived with the ability to display 640×480 near-photorealistic 4096-color graphics that could be exported via the NTSC standard. Eventually this capability was used by Disney animators in movies such as *The Little Mermaid* and by TV producers in shows such as *SeaQuest* and *Babylon 5*. [1]

The first Amiga model was named the Amiga 1000 soon after its introduction. The Amiga 500 was introduced in 1987 for home use, while the Amiga 2000 was introduced for high-end graphics. The Amiga 500 was renowned as a gaming machine, but it did in fact become popular among hobbyists and artists because of its graphics, its creative software, and its relative affordability. It was intended to compete directly against the Atari 520ST, and its list price was lower than those of its Apple-McIntosh and IBM-PC counterparts for the home-computer market. And yes, the Commodore Amiga has its artistic alumni. Andy Warhol himself used an Amiga. Andy was a great believer in machine production but he was also a compulsive doodler. I watch a highly edited clip of Warhol "painting" chanteuse Debbie Harry.[2] Andy grabs a Polaroid of Debbie, and then fills in the colours from the palette at screen right and… voila there's Blondie!

The painting materials on the artist's screen right are served up by a graphics programme called Deluxe Paint, or D-Paint. D-Paint is a Bitmap Graphics Editor developed by Dan Silva for Electronic Arts (EA).[3] The original D-Paint was created specifically for the Commodore Amiga in November of 1985—later it could be ported to other platforms but it only had industry standard status on the Amiga.

When introduced in 1985, D-Paint became the de facto graphics and then animation editor for the Amiga series. D-Paint was deployed in the making of Amiga animations, games, and demoscene productions.[4] It was originally oriented towards bitmapped and bit-planed modes of the native Amiga chipset." The Amiga natively supports indexed colour, where a pixel colour value does not carry any RGB hue information but instead is an *index* to a colour palette (a collection of unique colour values) that will always adjust the colour value in the palette. All pixels with that palette value can be changed simultaneously in the image or animation. Creative artists could use this in their animation by using "colour cycling."[5] D-Paint had to be entered into the computer by means of a floppy disc on which the programme was stored, as the Amiga 500 did not have a hard drive.[6]

There were six versions of Deluxe Paint—one through five and including 4.5. Deluxe Paint Three added editing modes permitting the stencilling of particular colours and permitted blurring and other forms of hands-on image alteration. Deluxe Paint Three was also one of the first programmes that could support *animbrushes*, which encouraged copying a section or component of an animation and then pasting it into another area or another animation. Also, cel-animation was now possible. Silva disappeared before Version Four, which did include non-bitplane-indexed Hold and Modify support (HAM). Version Four was plagued by stability issues (it was prone to crashing), so an interim Version 4.5 addressed the stability issue and also offered a revamped screen mode interface. Version 4.5 appeared in both Commodore-bundled and standalone versions. The final version, D-Paint Five, could support true 24-bit RGB images; but, with the normal AGA (Advanced Graphics Architecture) native chipset, the 24 bit colour could only be held in computer memory, as the on-screen images still appeared in indexed colour.

D-Paint was and still is an editing mode in which one can also make animations. The Commodore Amiga made use of a display mode called Hold-And-Modify (HAM), which, while expressing the colour of pixels, could allow many more colours to appear on screen than would be otherwise possible. HAM could be used to display digitized photographs, video frames, bitmap art and occasionally animation. The original HAM mode would allow a staggering 4,096 colours (the original chipset only permitted 32 colours!) using only six bitplanes. This full colour display could be achieved through modification of the previous colour encountered on the scanline or, with the first playfield pixel for each scanline, modification of the first entry in the colour palette. Two colour components are held and one of those two is modified, hence the acronym.

But HAM did have its intrinsic limitations. In order to render two arbitrary colours adjacent to each other, it often required up to two intermediary pixels to change to an intended colour (when the red, blue, and green components all demanded modification). This would in turn severely reduce the horizontal chroma resolution. Also, HAM tended to resist arbitrary animation of a display. If a random portion of a display was to be moved to another on-screen position, the Hold-And-Modify values frequently had to be recomputed on all source and target lines in order to correctly display the intended image. This, needless, to say, was highly labour-intensive and time-consuming.

“Thinking back, I’m struck by the excellence and innovation shown by third-party Amiga products. Electronic Arts shipped a powerful image editor called Deluxe Paint that would make my short list of the greatest applications of all time. NewTek’s TV-studio-in-a-box, the Video Toaster, was a famous piece of vapourware for years, but when it finally arrived it changed the way television was produced. Using an app like Sculpt 3D, you could do raytraced 3D animation on the Amiga—as long as you didn’t mind waiting a few hours for each frame to render. And games, such as the multimedia epics from a company called Cinemaware, were often eye-popping. Basically, the companies that built Amiga apps and add-ons seemed to understand the machine’s potential far better than Commodore’s executives ever did.” [7]

The Amigas featured three special integrated chips nicknamed Paula, Denise, and Agnus (not Agnes, AGNUS is an acronym for Astonishingly Great Nostalgia and Utilities Site). Agnus

controlled memory, Denise handled graphics, and Paula was for sound. The names changed throughout the Commodore's fluctuating or fluttering history—Paula became known as Portia, Denise as Daphne, and Agnus as Alice in 1992. This sounds like boys' club with their revolving-door girlfriends, but that's too simple. Even the Amiga's defects were part of its lore. The multitasking operating system lacked memory protection; so errant apps could crash the whole machine in the spectacular meltdown known as a Guru Meditation—one of the greatest error messages of all time. [8]

Well, yes, considerable commitment and patience were required in order for each frame to render. But I look at clips from animated films of artists like the Hungarian/Canadian artist Paul Fierlinger (since 1990 in collaboration with his wife Sandra) and I see an artist for whom there is no such thing as a passing frame. The Fierlingers strongly prefer drawing directly on screen, whether making commercials, episodes of Sesame Street, or other commissioned animations. *My Dog Tulip* (2009) deployed a graphics-editing programme called TV-Paint, which the Fierlingers consider to be a worthwhile successor to D-Paint.

**Paul Fierlinger:**

I experimented with several emerging animation applications such as AXA and Crater, both in the $4,000 range but they still required drawings on paper. I couldn't see why I shouldn't be able to draw directly on the screen as the previous version of D-Paint would let me do. This version of D-Paint had by now departed from the world with the bankruptcy of the Amiga computer.

One day I was told that there's software very much like D-Paint now working on the PC platform, which was called Aura, and I bought it without testing anything. It had just one layer and a light table like feature that gave you 50% transparency—way too strong for meaningful inbetweening, but a tweakable pencil gadget with which I just might be able to draw some upcoming Sesame Street spots (I had earlier already made several professional TV spots with D-Paint). I contacted Aura's developers and asked if the strength of the light table could be brought down to just 15 % transparency, that if they could do that for me, I could use Aura professionally, which led to Sebastien's invitation to have me become a TVPaint beta tester.

(TV Paint's Development: Interview with Paul Fierlinger, downloaded 13/8/12)

I observe a clip from Fierlinger's one-hour documentary *Drawn By Memory* (1993) and I see a highly poetic silent animation in which the artist's images oscillate between recognizable figuration and abstraction. Paul Fierlinger was an Amiga user.[9]

Alex Poruchnyk is a Winnipeg video and installation artist. He has been teaching at the University of Manitoba's School of Art since 1989. Alex's research focuses on issues of multi-media, both 2-D and 3-D spaces expressed through video, 3-D animation, and sculptural constructions. These become the backdrop to investigate destructed/restructured narrative. I watch a clip of his short video *Dock-Watch-Bay* (2002), which both realistically and magically portrays a clash of nature and civilization using the elements of nature such as wind, waves, and overflowing rivers. Alex Poruchnyk was one of the last of his group of practitioners to convert to Mac.[10] I also watch James MacSwain's *Amoeba Culture* (1989), made at Halifax Nova Scotia's Centre for Art Tapes in tandem with a residency programme called *New Tools For Imaging*. This

wittily queer work is a clear example of an artist holding images and then modifying them. The artists in this residency used Amigas.[11]

Organizations such as Toronto Community Videotex (TCV) (which used the Telidon system which in turn anticipated the Net) sprang up in in the nineteen eighties. Early conceptions of electronic art placed TCV within the production cooperative system in Canada. "TCV's members created artworks which fell within the more systems-based notions of art production, rather than the beaux-arts"[12] There are parallels with video-cooperatives, at which many of the members were working outside of museum or even parallel-gallery structures. Also, video art and electronic art were developing in a relative vacuum of critical criteria. While video art soon found itself engaging with serious film and visual arts theory, electronic art still seemed to exist in a relative void, yet artists persevered.[13] Why should there necessarily be a distinction between the "commercial" and non-profit communities? Why are electronic games of lower cultural capital than the fine arts? Many artists rejected these sorts of binaries.

Artists working within and outside of the broadcasting industries were attracted to the Amiga and to D-Paint and its relative affordability. The Amiga was also the preferred computer for the NewTek Video Toaster, which was released as a commercial product in 1990. This editing and production system was released in tandem with the Amiga 2000, which hosted the requisite video-friendly characteristics. The Amiga's system clock was precisely double that of the NTSC colour carrier frequency, which led to a simple synchronization. The initial generation system was basically a real-time four-channel video switcher. The Video Toaster included Light Wave 3D, a three-dimensional modeling, rendering, and animation programme. In 1994 Light Wave 3D became available as a standalone product separate from the Toaster system. The Toaster offered a wide variety of character-generation, overlay, and switching effects performed with the assistance of the native Amiga graphics chipset, which were synchronized to the NTSC video signals. "As such, during the early 1990s the Toaster was used quite widely by many Amiga, desktop video enthusiasts and local television studios and was even used during *The Tonight Show* regularly to produce special effects for comedy skits."[14]

I have cited examples of Amiga-using artists working inside the broadcasting industry and outside of it, working in Canadian artist-run-centres in which the productions and post-productions are at least theoretically non-profit. Amigas have also been deployed by major television networks and by independent cable stations. Toronto's own Rogers' Cable has used Amigas and Video Toasters for editing, titling, and overlays.

The usage of "community channels" or community anything begs questions around the definition of that word. "Community channel" carries a sense of locality, referring to community in the sense of neighbourhood sharing. "Art community" itself means many different things to many different practitioners. Many artists practice and exhibit or distribute in different and often contradictory formats and circumstances. Many animators make their living in the commercial broadcasting industries and make other works as "hobbies" or gifts for friends and contemporaries. In contrast, some make both industry-commissioned work and self-initiated works and don't differentiate or discriminate. Some animators position themselves in an experimental film community (which is of course a multitude of communities) and some see no

affinities between their own practices and experimental film or video art or even different animation practices. There are many individuals and also groups or collectives making animations, films, videos, and even still images who do not necessarily perceive themselves as being “artists” or participants in art economies, whether market-driven or state-subsidized. Artists, perhaps somewhat more than other people, oscillate between being social and non-social people. Definitions of who or what is “social’ have also been profoundly affected by the omnipresence of The Internet.

The Commodore Amiga preceded the Internet (and its social-media outlets), at least for the vast majority of the world’s population. Enthusiasts and practitioners formed clubs or Amiga societies, who met and exchanged programmes and art works. By what means? Well, Amiga enthusiasts made creative uses of Bulletin Board Systems, or “BBsing”

What is BBSing? Prior to the Internet in 1978: The First Computer Bulletin Board System, CBBS, and Goes Online. Ward Christensen and Randy Suess develop the Computerized Bulletin Board System (CBBS) in Chicago. CBBS starts the first online cyberspace community or bulletin board system allowing the general public users of CBBS to post messages online a computer system for others to view there by creating cyberspace. The name of the hobby is called BBSing. [15] (downloaded from Urban Dictionary 10/8/12)

Here we have what are generally referred to as communities or clubs. A membership is required to access the board, as are code words and linguistic familiarity. A bulletin board system or BBSing is a computer system running software that allows users to connect to the system creating a virtual cyberspace. BBSing was in many ways a precursor to the modern form of the World Wide Web and other aspects of the Internet.[16]

Between the mid 1970s into the early 1990s, most BBS systems were run as a “hobby” free of charge by a Systems Operator (SysOp). Akin to the Internet, BBS systems generally permitted text messaging for making appointments and organizing events and so forth. But visual exchanges did take place by means of BBsing. BBS systems were generally text-based, rather than GUI-based and early BBS systems conversed using the simple ASCII character set. However, some home computer manufacturers such as Atari and Commodore extended the ASCII character set to take advantage of the advanced color and graphics capabilities of their systems. BBS software authors included these extended character sets in their software, and terminal program authors had the ability to display them when a compatible system was called. Atari’s native character set was known as ATASCII, while most Commodore BBS systems supported PETSCII. PETSCII (Per Standard Code of Information Interchange) was also supported by the nationwide online service Quantum Link. Bulletin Board Services or Systems were initially local. Users had to dial into the BBS with a phone line and long-distance charges were required for contacts outside of a zone. Initially BS users tended to be geographically close while sharing interests and thus forming sub-communities within a larger community. By the mid-nineteen eighties, many SysOps were moving away from IBM to Commodore to save costs, and many artists and animators (and also Software Pirate groups) were using Commodore Amiga models such as the 500, 1000, and 1200 (which required external hard drives) and also the Amiga 2000, 3000, and 4000, which already contained hard drives.

BBS operators deployed ASCII art to aestheticize or at least decorate their systems.[17] Thus a "scene" or "community" of artists grew and expanded so that BBSs could be made distinct from one another. But ASCII text-based art wasn't enough, so to speak; therefore colours and graphics were necessary and now possible for BBSs. With the introduction of the Commodore Amiga in 1985, now it was possible for artists to display 640 x 480 near-photorealistic colour graphics capable of being exported to the NTSC standard. Text artists now added serious flexibility to their ASCII art by adding colour to the text or animating the art by means of their cursor control codes. Thus, another acronym: ANSI (American National Standards Institute) Art.

With a significant increase of popularity for the BBS, ANSI art also increased its profile. ANSI artists formed into groups or posses, not unlike graffiti artists. Groups such as the inaugural Aces of ANSI Art (AAA), ACiD (ANSI Artists in Demand) and iCE (Insane Creators Enterprises) formed and began releasing their work in monthly "ARTPACKS". These were collections of packages of art by group members as well as news and membership lists.[18] ARTPACKS were widely distributed by means of BBS and its users. However, this "art scene" remained detached from mainstream BBS and later Internet culture (let alone art galleries etc.), largely due to the art scene's early association with hacker and software piracy (warez) organizations.[19] The line between members of art scene and warez practitioners was blurry, as many artists played both sides of that fence. People had developed huge communities that were totally erased without a trace. There was a lot of factioning, groups of hackers and artists formed groups with distinct design and art works. Pay-service BBS groups were very big business at the time. These were darker communities mostly used for distribution of porn and WAREZ (pirated software) [20]

Also, members of this underground art scene cultivated a sense of belonging or not belonging. There was a sharp class division between "newbies" and veterans; and a dialect called Leetspeek created a language barrier for outsiders. Here are some key words from the Leetspeek Lexicon:

- **Colly:** A collection of multiple works of ASCII art compiled and presented as a single text file.
- **Collab:** A collaborative artwork between two or more artists. The artists exchange the file and work on it, creating unique works.
- **Compo:** A competitive event which can take place either physically at a demoparty or on-line.
- **Rip:** Artwork created in the RIPscrip format, or an act of plagiarism.
- **Scroller:** An ANSI artwork, which is longer than 25 lines, is called a "scroller" because it scrolls down the screen on an MS-DOS machine as it is being displayed.
- **Stylerip:** To borrow someone else's artistic style. [21]

Here one detects a modernist emphasis on originality and technical facility—not unlike in the music world or even "the art community." Competition is a priori, but so is physical presence. And serious players respect each other, once individuals have earned that respect.

The Amiga's cadre was higher in Europe than in North America during the late eighties and early nineties, largely due to the Amiga demoscene and the prevalence of Amiga graphics in a

multitude of games. Many have dismissed the Amiga as being a games-computer, yet again many art scene players and even gallery artists did not make absolute distinctions between art meant for being looked at and art meant to be used. The Demoscene flourished in a period when borders seemed to be collapsing. And many of the games are decidedly militaristic, yet they were made and marketed at a time when world political alliances were shifting both wildly and unpredictably.[22]

Commodore had been struggling for years when the company finally went bankrupt in 1994. Mismanagement and an inability to realize just what the line's best assets were, coupled with IBM-PC and Apple/McIntosh finally beginning to catch up with the Amiga's multi-tasking capabilities, forced the crash. From 1994 the Amiga was passed from company to company, all of who seemed not to know what to do with it. The German company Escom had major plans but they went under in 1996. Direct-market PC giant Gateway was next—they devised their plans, which came to no fruition, and then gave up in 1999.[23]

Except that The Amiga did not die.

Amiga User groups meet regularly in numerous countries. I scan a listing and I see pretty well all "Western" countries (no Greece, no Russia). I also notice that there are Amiga User groups in Japan and in Turkey. Great Britain, the United States, and Canada are well represented. In Toronto there is Toronto PET Users Group—for Amiga as well as Commodores 64 and 128 enthusiasts. This group was established in 1979 and is the second-oldest Commodore-users group in the world. I explore a link to Commodore World in Mississauga.[24]

**The Toronto PET Users Group (TPUG) is pleased to announce the World of Commodore! TPUG would like everyone to join us for a weekend of all things Commodore!**

- Information about and displays of a variety of Commodore computers
- Demonstrations of new hardware and software projects using Commodore equipment
- Screenings of Commodore related videos
- Vendors selling the latest hardware and software available for Commodore computers as well as classic hardware, accessories, applications, games and much more
- The always-popular freebie table! Please feel free to drop off any items you no longer want and help yourself to some goodies. You never know what you'll find!

The events get underway on Friday evening while our vendors set up and we welcome our guests from out of town. Everyone is welcome to attend. After the formal show ends on Saturday the festivities continue with an informal evening of socializing, hacking, gaming and other things, so please feel free to make a weekend of it.

When Commodore went broke, its chips also tended to disappear. Today's Commodore enthusiasts need to find those chips—one might say retrieve them. Archaeology is an appropriate scientific metaphor here. Delegates to the TPUG event last December are attempting to nab the MOS 6502 chip.[25] These explorers must strip down the layers of the chip in order to ascertain

how exactly these chips were made in the first place. I look at images of these chips and I see very detailed and layered grid paintings. And artists experimenting with Amigas and even earlier Commodore models are also exploring the machinery. What *can* be made from a system so expansive and yet so limiting?

I try out a Commodore 500 in TAIS's office. I watch my host insert a floppy disc containing the Operating System followed by another floppy hosting D-Paint Four. A screen comes up, with a selected colour palette. I choose primary colours and draw intersecting lines and decide to sustain this image for ten frames. At five frames I insert an alteration, and I keep doing this for five more frames until ten meets ten. Then it's time to save this little animation onto… a blank floppy disc. I haven't saved anything onto a floppy for years. But… the rendering doesn't take that long at all. I've had fun. Working without pre-rendered images is challenging but not intimidating. It's not unlike in-camera editing with Super 8 film, or other similar options. It's good to have a plan, but probably not a storyboard.

TAIS has commissioned six artists to produce new works using the Amiga. The six artists are: Alex McLeod, Amy Lockhart, Barry Doupé, Daniel Barrow, Lorna Mills, and Mark Pellegrino. All six of these artists share a familiarity with digital media and a fondness for low-resolution imaging.

Mark Pellegrino's digital practice utilizes antiquated video equipment, experimental software, manipulated electronics and 3D animation to explore the discourse, structure and anomalies of the video medium. Lorna Mills' multi-disciplinary practice includes obsessive animated GIFs incorporated into restrained installation work. Mills has often used game designs.“ I am doing 7 to 9 looping animations (for separate playback on their own screens) making collages of old Amiga war game graphics that I found in my research and making re-mixes with found animated gifs.” [26] Alex McLeod constructs hyper-realistic 3D environments, which recall the wide-open vistas of Romantic landscape painting while simultaneously staging otherworldly dystopias. Amy Lockhart is a filmmaker, animator, and artist. She is a classically committed hands-on animator, yet no stranger to digitalized image making. Barry Doupé has made a variety of acclaimed animations, which adeptly create very strange universes where stasis and erratic movement coexist to an alarming effect. His films “use imagery and language derived from the subconscious; developed through automatic writing and drawing.” [27] Daniel Barrow uses obsolete technologies to present written, pictorial and cinematic narratives centering on the practices of drawing and collecting. Since 1993, he has created and adapted comic and tragicomic narratives to “manual” forms of animation by projecting, layering and manipulating drawings on overhead projectors. He has combined live drawing, image manipulation, and storytelling into a simultaneously sincere and ironic mise-en-scene.

**Barry Doupé**:

“For the piece that I'm working on, I decided early on to use Deluxe Paint 5 to do a hand drawn animation. I tried a few other programs, including some 3D ones, but found more interest in what DP could do. I'm making a straight-ahead, single frame (at 24fps) loop. It's a formal exploration of line, shape, morphing (by hand) and colour. I've set up a rule for myself that nothing can stay still in the image from frame to frame; everything has to move at least one pixel. I've noticed

that the complexity of the image is compounded by the two different experiences of time, thereby creating a compressed, and complex viewing experience." [28]

**Daniel Barrow**:

"When I took VIDEO ART class with Al Poruchnyk in the 90s, we all were trained on Amigas. I still think it's one of the most fun platforms, but I've always preferred to work within a set of prescribed limitations. There are still many things I would do on Deluxe Paint IV that I can't imagine how to do in Photoshop, and I don't know a thing about After Effects." [29]

**Amy Lockhart** succinctly sums up her attraction to the Amiga:

"I have just begun my relationship with the Amiga. At this moment, what attracts me to this out-dated and temperamental technology is its implicit experimental nature. Animation is prone to planning, (which can lead to rigidity). Luckily, Amiga technology is unreliable to a point that one needs to enter it expecting no fixed outcome and hoping for the best. It fights the inclination to control, opening up a space for true experimentation." [30]

Electronic arts are now prevalent in many galleries in addition to the initial specialists. These works are displayed with state-of-the-art technologies, as many electronic artists have built international careers. But state-of-the-art should never be referring to the latest or newest and denigrate everything else as "obsolete." Artists are by nature archaeologists—undertaking excavations and researching original materials and "chips." The Amiga computers were ahead of their time during their day, so one might say that time has caught up to them. Future and past tenses exist in symbiotic rather than linear relationships.

The Amiga is dead, so long live The Amiga!

**Andrew James Paterson** is an interdisciplinary artist working with performance, video and film, musical composition, and both critical and fiction writing. His videotapes and performances have been presented and exhibited locally, nationally, and internationally. He has previously curated media-art programmes for Trinity Square Video, A Space, Mercer Union, Cinematheque Ontario, Pleasure Dome, Available Light (Ottawa) and YYZ Artists' Outlet. Andrew has written on media-art and cultural politics for FUSE, PUBLIC, IMPULSE, and FILE, as well as contributing to anthologies published by Gallery TPW, Pleasure Dome, and YYZBOOKS. He is the co-editor of *Money, Value, Art*, published by YYZBOOKS.

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[1] Computer Art Scene, Wikipedia, downloaded 11/8/12.
[2] This event took place at The Lincoln Center in New York, in July 1985. Warhol is using an Amiga 1000.
[3] The current whereabouts of Dan Silva are unknown, according to "What Happened to Dan Silva (Deluxe Paint), Wet Canvas, 9/4/06. *Electronic Arts, Inc. (EA)* (NASDAQ: #HYPERLINK http://www.nasdaq.com/symbol/ea) Electronic Arts (EA) is an American developer, marketer, publisher and distributor of video games. Founded and incorporated on May 28, 1982 by Trip Hawkins, the company was a pioneer of the early home computer games industry and was notable for promoting the designers and programmers responsible for its games. Electronic Arts

is the world's third-largest gaming company by revenue after Nintendo and Activision Blizzard. Wikipedia entry for "Electronic Arts" downloaded 11/8/12

[4] Thanks to its multimedia capabilities, the Amiga computer was immediately embraced by the demoscene, and in turn it gave prominence to the scene and to its culture. If you are not familiar with demoscene productions, you can think of a demo as a compact, self-contained piece of software that combines and demonstrates art and technical excellence. To better appreciate a demo keep in mind that everything you see and hear in a demo is generated in real time by computer code (there is no pre-rendered animation), and that the code itself is relatively compact (which is part of the challenge). Unlike in a game, there is no interaction in a demo: just start the demo, and sit back and enjoy it (Amiga Forever—Amiga Demoscene Productions) downloaded 12/8/12

[5] Deluxe Paint, Wikipedia, The Free Encyclopedia

[6] It is amusing that the Amiga 500, introduced in 1987, became referred to as "Rock Lobster" after the 1979 B-52s song. The Amiga 600, introduced in 1992, was named after a 1989 B-52s song called "June Bug". The B-52s are somewhat like Amigas—simultaneously retro and futuristic.

[7] Amiga: 25 Years Later, Harry McCracken, posted Friday July 23, 2010, at 10:53 AM

[8] McCracken, ibid.

[9] I would like to thank Lynne Slater for this information. "At that time, he worked on paper, and he captured the drawings into the Amiga. Pencil testing drawings was a very common use of the Amiga among animators at the time, which was what I used my Amiga for, but Paul also used paint software to colour his hand-drawn animation and he was involved in the development of the Aura paint software on the Video Toaster. The programmers implemented his suggestions and requests, which made this software very animator friendly. The Aura software ran directly on the Video Toaster. It was more like a precursor to After Effects and it was used for things like rotoscoping live action and compositing animation with live action. Since the old Video Toasters received hard use, they eventually stopped." (email correspondence with Lynne Slater, 9/8/12)" "Animator Paul Fierlinger liked his Amiga so much that he bought stock in the company. Paul Fierlinger told me about this when I met him at the Ottawa International Animation Festival." (Slater, 9/8/12)

[10] Thanks to Daniel Barrow for this information. (email correspondence with Daniel Barrow, 6/8/12)

[11] James MacSwain, email, 13/8/12. The residency was coordinated by the artist and designer Doug Porter. "Amiga is the fusion of Alpha and Omega," Susan Gibson Garvey, Notes towards a definition of Computer Culture, ArtsAtlantic 41, 1989, p.43

[12] Kevin Dowler, Interstitial Aesthetics and the Politics of Video at the Canada Council, incl. Mirror Machine Video and Identity, ed. Janine Marchessault, pub. YYZBOOKS 1995, pp.35-50

[13] Electronic art of course didn't exist in a complete critical vacuum—for example see Susan Gibson Garvey, Notes towards a definition of Computer Culture, ArtsAtlantic 41, 1989, pp. 40-43. This essay was published in tandem with the New Tools for Imaging residency.

[14] Video Toaster, Wikipedia, downloaded 13/8/12

[15] Urban Dictionary, downloaded 10/8/12

[16] Ibid.

[17] : **ASCII art** is a graphic design technique that uses computers for presentation and consists of pictures pieced together from the 95 printable (from a total of 128) characters defined by the ASCII Standard from 1963 and ASCII compliant character sets with proprietary extended characters (beyond the 128 characters of standard 7-bit ASCII). The term is also loosely used to refer to text based visual art in general.
[18] Scott, Jason. *"BBS: The Documentary"* (DVD). Boston, MA, USA: Bovine Ignition Systems, 2005.
[19] Hacker (hobbyist), who makes innovative customizations or combinations of retail electronic and computer equipment. (I am not using the term to refer to Wikileaks or Julian Assange and so forth. "Warez" is a mutated spelling of wares—"warez" refers to copyrighted works distributed without royalties or financial compensation. It refers to unauthorized releases by organized groups and not to file sharing.
[20] e-mail correspondence with Mark Pellegrino, 19/8/12
[21] Computer Art Scene, Wikipedia, The Free Encyclopedia
[22] "I'm interested in the time period where Amiga games and the cold war intersect". e-mail correspondence with Lorna Mills, 17/8/12
[23] Amiga 25 Years Later, Harry McCracken, July 23, 2010.
[24] http://www.tpug.ca/index.php?option=com_content&view=article&id=75:world-of-commodore- 2011&catid=39:world-of-commodore&Itemid=58
[25] The **MOS Technology 6502** is an 8-bit microprocessor that was designed by Chuck Peddle and Bill Mensch for MOS Technology in 1975. When it was introduced, it was the least expensive full-featured microprocessor on the market by a considerable margin, costing less than one-sixth the price of competing designs from larger companies such as Motorola and Intel. It was nevertheless fully comparable with them and, along with the Zilog Z80, sparked a series of computer projects that would eventually result in the home computer revolution of the 1980s. The 6502 design was originally second-sourced by Rockwell and Synertek and later licensed to a number of companies. Soon after the 6502′s introduction, MOS Technology was bought outright by Commodore International, which continued to sell the chip to other manufacturers. (Wikipedia, downloaded 15/8/12)
[26] e-mail correspondence with Lorna Mills, 17/8/12
[27] e-mail correspondence with Barry Doupé, 17/8/12
[28] e-mail correspondence with Barry Doupé, 9/6/12
[29] e-mail correspondence with Daniel Barrow 7/9/12
[30]e-mail correspondence with Amy Lockhart 10/6/12