

# SUSTAINABLE PRESERVATION PRACTICES AND THE RHIZOME ARTBASE

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Founded in 1999, the Rhizome ArtBase is an online archive of new media art containing around 2508 art works, and growing. The ArtBase encompasses a vast range of projects by artists from all over the world that employ materials such as software, codes, websites, moving images, games and browsers to aesthetics and critical ends. The paper documents the past, present and future preservation practices of the Rhizome ArtBase.

As laid out in our mission statement, Rhizome supports “artists working at the furthest reaches of technological experimentation.” A major part of this mission is the preservation of works of art, through our online archive, the ArtBase. There are two fundamental threats to this preservation: diffusivity, and digital obsolescence. We will explore these risks respective to works by artists JODI and Golan Levin, as a basis for approaching solutions that may mitigate these risks.

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## INHERENT VICE & ARCHIVAL MATERIALS

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Diffusivity is a term that refers to works whose content is not contained within one digital object. In some instances this can refer to works that reference external databases, or dynamic and real-time data sources but also refers to works that exist primarily as a series of actions over a variety of locations and platforms. [1] These works present a structural complexity that creates new problems for the archive. An early example of a static, non-diffuse work is Olia Lialina’s *My Boyfriend Came Home from the War* (1996). The piece consists entirely of HTML documents and GIF images contained in a directory that could be easily duplicated and stored in the ArtBase. A work that is diffuse presents a structure that is diametrically opposed to objectification and ownership. *Globalmove.us*, by seminal net.art duo JODI, is a glitch website that implements HTML, Javascript, and the Google Maps API. Through the combination of the API and home-brew Javascript, the artists have created a website that negates user interaction, and creates frenetic, drawings using Google Maps interface elements. Here, the functionality of the art object entirely hinges on an external element - the Maps API. Sooner or later, JODI’s Javascript will be rendered ineffective as a result of further development of the Google Maps API. What steps might be taken in order to mitigate this?

The primary mission of the archive is to stabilize the unstable/external element (the Google Maps API). Here, a need emerges for institutions such as Rhizome to collaborate with private sector institutions such as Google. It is simply a reality that corporations and other third parties create and control much of the materials that are used by the artists we support. While it would be unthinkable for Rhizome to host an archived instance of the entirety of Google Maps, a truncated version including the functions and data called by JODI’s piece could be created. With this action taken, the API is no longer an external element and its fixity is ensured.

Next, we will explore the inherent vice of digital obsolescence as illustrated by *Floccus* by Golan Levin. Digital Obsolescence is perhaps the most pervasive threat to digital works. New media at its very core is built, and manifested with tools and technology that are interdependent – no element of software is autonomous. There is no artist or programmer who is not dependent on (or limited by) infrastructure built by other programmers. An artist who writes software, relies on running within a specific

(or at least a finite range of) operating system(s), and therefore on specific hardware. A recent case of obsolescence was illustrated by Golan Levin's *Floccus*. This piece created in 1999, has to date witnessed two generations of obsolescence. Levin originally created the piece using the C++ programming language and OpenGL (Open Graphics Library). It was then compiled as a java applet capable of running either as a "stand alone" piece of software, or as an element embedded in a web page. In the intervening seven years after its creation in 1999, computer systems evolved and support for the applet began to disappear. In 2006, the artist found that the applet began to fail, and would no longer run on many contemporary systems. Levin remedied this by recreating the piece using Processing (a tool that emerged after the work's first iteration). This process also rendered an applet, which Levin embedded on a page of his website.

*Floccus* was once more rendered obsolete; until recently the web-based applet would not run, and visitors to Levin's site or the ArtBase would be presented with only a blank white box and error message. After investigating the issue, Levin found the problem to be that the applet was compiled to run on now obsolete 32 bit systems. Today, 64 bit systems are the predominant norm, and prior to its repair, the applet was likely unusable for the majority of visitors to his website. This particular case is a perfect example of the recurrent nature of obsolescence; once an obsolete art object is restored, it is only a matter of time before the solution is rendered obsolete. The most evident repercussion is the work of art no longer exists from the viewer's perspective. Without action, obsolescence creates an air of mythology – an inaccessible history. Levin's *Floccus* presents material gathering needs specific to compiled software. Unlike a web page's uncompiled markup language, readable by both machines and humans, once compiled source code forms a stand-alone applet or other form of software, accurate human analysis of the work is made impossible. Compiled applications do not allow for the ability to understand the artist's programming logic, structure, and style. In a restoration scenario, this information is integral. In the case of *Floccus*, there are five primary entities that must be gathered to form the archival package: the Processing source code, a font file that is used in the piece, the compiled Java applet, the compiled P3D Processing Applet, the original 1999 C++ source code, and the compiled software of the C++ version. With the description of the work, the images of its documentation, and analysis of the various formats of source code, there is ample information to inform accurate reinterpretation in a restoration scenario.

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## STRATEGIES AND METHODS OF RESTORATION

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Beyond gathering of archival materials for the stabilization of works, there are three commonly acknowledged forms of restoration: emulation, migration, and reinterpretation. This section will explore these established methods within the context of the previously discussed works. Through this theoretical exploration, and the findings of the Variable Media Network's case studies, an analysis of how relevant these methods are to the ArtBase will be provided.

Emulation is the simulation of the architecture and behaviors of an old computer system, within a contemporary system. [2] For instance, if an art object will no longer run on contemporary operating systems, a piece of software may be written that emulates the environment of the work's original operating system. This strategy is efficient insofar that the emulation of one operating system creates a solution for accessing all works that originally ran on that system. Still, it is only a temporary solution – with time the emulator itself will become obsolete and unusable on contemporary computer systems. While case studies have shown that emulation is effective at producing an aesthetically authentic iteration of art objects, these studies have also shown that it is fact quite a in-depth process best suited for circumstances that justify a high level of investment in a short-term solution. [3]

Thus it follows that the prerequisite for restoration efforts is not simply for a work to function outside of its original format, but to a broad base of rapidly evolving web browsers and operating systems. Deprecation and obsolescence is a necessary evil for an evolving Internet. Yet, software efficiency and the politics of emergent web standards is a concern secondary to our goal of having the ability to properly support a chronological legacy of internet based culture and creativity. This establishes the need for a “museum quality browser” – one that runs on contemporary infrastructures and provides legacy support for archaic protocols and markup of the early days of Internet art. Rather than adopting a policy of deprecation, such a browser would be built on a development philosophy that is additive, providing native support for emergent standards and preserving support for the old. Building upon open-source frameworks such as WebKit, or Gecko would be ideal as they come from a rich discourse and community of developers. This model is flawed however, in the sense that it would require the user to download and install an entirely new browser. As nearly all commonly used web browsers (i.e. Google’s Chrome, Apple’s Safari, Mozilla’s Firefox) are built upon the aforementioned open source frameworks, it would be ideal to initiate collaborations with these parties, so as to aid in the development of more preservation-friendly development practices. The realization of this model as a browser extension or feature native to these browsers would be a more sustainable model, as it asks less of the visitor, while theoretically offering the same result. While emulation is a term not often used when speaking of web content, that is essentially what the model proposes – an environment that will provide support and access to art objects that are otherwise inaccessible on contemporary systems. However, while previously it was posited that emulation was not a viable solution for the ArtBase, this model is feasible and sustainable, as it provides a singular solution for the majority of the collection.

Migration is the practice of converting digital objects from obsolete formats, to contemporary formats. For example, if the .JPG image format was in the beginning stages of deprecation, works in the ArtBase that employed use of this image format would be identified, and their .JPG assets would be converted to a more stable format. While migration does present a viable solution for the management of digital assets, it assumes a high level of access and interoperability. For example, migrating a format such as .JPG is viable only because it is a format that is interoperable with many different forms of image editing tools. Lossless migration from .JPG to a new standard does not require access to any sort of source code, so long as there are tools that can interpret it. This approach becomes more challenging when considering the whole of the ArtBase, as many works include less interoperable proprietary compiled formats, such as Shockwave Flash files (.SWF), and require access to specific editing software (Adobe Flash) and original source files (.FLA, Actionscript) in order to approach migration. While migration is a fundamental component of preservation, within the context of the ArtBase, it will over the long-term be best suited for application to simple digital objects such as images, sound, and video.

Where migration offers a simple process of continual upgrade, works whose primary form is a compiled piece of software, such as Levin’s Flocuss, require a more involved process – referred to as reinterpretation. [4] When a piece of software no longer runs on contemporary infrastructures, one cannot simply convert it. Reinterpretation calls for delving into the uncompiled source of the software, and repairing whatever is the root cause of its obsolescence. In some cases this may be as simple as altering the format of the compiled software, while in others it may call for a fundamental re-write of the software’s source code. In such cases, this is only made possible by having access to the software in its uncompiled format. In the most drastic of situations, documentation of the functional work, along with analysis of the work’s source can offer a path to creating a faithful reinterpretation. The sense in which emulation is not feasible for the ArtBase is applicable here – the thought of distributing emulators for visitors to the ArtBase to download in order to run the various software based works asks much effort on the users part.

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## MONITORING A GROWING COLLECTION

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With a rapidly growing collection currently containing over 2,500 works, each consisting of complex digital objects, an automated system for monitoring obsolescence is crucial. Although the ArtBase recently adopted a new collection policy that accepts only archival objects, it continues to suffer from the past acceptance of “linked objects.” These works exist solely as records, which link to the actual digital art object hosted by the artist, or third party such as a museum. In such cases, Rhizome has no control of the sustained access to these works; they exist in the ArtBase solely as catalog entries. If the artist removes the work from their server, stops paying for web hosting, or modifies the URL, access to the work from its ArtBase record is eliminated. Efforts are underway to transition these works to full archival records hosted by Rhizome. Fortunately, verifying a URL can be fully automated, yet monitoring anything more complex than a dead URL requires a more nuanced approach. Rhizome is currently researching the implementation of a tool (such as the UK National Archive’s DROID and PRONOM) that will allow for reports to be automatically generated on the digital object representation formats present in a work, which will in turn allow for the identification of works which implement an obsolescent format. The problem remains however that issues of browser support and obsolescence most often do not manifest themselves in a discrete manner that can be identified through automation; there is no way to write an algorithm that asks to search for anything that “doesn’t look right”. In the context of the ArtBase, the most effective means of identifying these complex problems is a human one. Providing users of the ArtBase with a simple and helpful means to report problems with an art object offers an effective means for identifying dysfunctional works. Once a user has reported a work as being in some state of dysfunction, it can be investigated for the root of the issue.

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## FUTURE INITIATIVES

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A major wealth of material not collected by the ArtBase is the ephemera produced by the artist. Whereas the artist working with physical materials produces ephemera such as sketches, plans, notes, unfinished works, and studies, these materials are typically not collected until after an artist passes, or late in their career. For the artist working in an entirely digital environment, what is the likelihood of these peripheral documents surviving? During the life of one artist, many computers will come under their command, and while their finished works may persist in archives, what is to come of the ephemera contained on the studio environment of their hard drive? By definition, ephemera fall outside of the scope of most collecting institution’s immediate interests. It simply constitutes far too much material when considering the sheer quantity and the inability to predict what will be worthwhile. It is undeniable that some day this material will be valued. A unique example where this was executed successfully (through a combination of good fortune, and expert digital forensics) is the Rushdie archive at Emory University’s Manuscript and Rare Books Library (MARBL). Here they preserved and emulated the personal computer of author Salman Rushdie. While Rushdie was not a digital artist per se, the computer was in fact his studio environment. MARBL preserved the ability to observe Rushdie’s digital manuscripts, drafts, notes, sketches, and correspondence. This is a teachable moment in the value of digital ephemera. What provisions can be made to ensure that future generations will have access to not only preserved art objects from our time, but the ephemera produced by these artists? It is in the best interest of stakeholders to strive for developing tools for the artist that will allow for some form of self-preservation, as well as integrating these materials into the scope of interest.

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## A DEMAND FOR COLLABORATION

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For Rhizome and other collecting institutions and repositories, the path forward is clear: interdisciplinary collaboration. Institutional and disciplinary boundaries often keep innovation and progress within their respective silos of knowledge. Within the field of technology there are powerful stakeholders far outside of the art world and museum community, who have made advances and built tools incredibly useful to collecting institutions such as the ArtBase. It is vital to expand collaboration and communication, and for institutions such as Rhizome to seek consultation from such fields. The model of collaboration forged by the Variable Media Initiative is a scalable one. The VMI was intentionally composed of diverse institutions at the top of their respective domains, be it Internet art, performance art, or collections of variable new media. Each institution offered their field specific knowledge, resources, tools, innovation, and research. This aggregation of wisdom is necessary on a broader scale, spanning public and private sector communities of computer science, digital forensics, software development, open source communities, information scientists, archivists and museums. In 2002, Richard Rinehart concluded his paper "Preserving the Rhizome ArtBase" with the following statement, "Rhizome will make a unique, significant and feasible contribution to digital preservation efforts by proposing and testing solutions for metadata and policy as outlined above." In a moment that sees the ArtBase transitioning to a truly standards based archive, this statement remains to be true. Rhizome continues to devote itself to the sustained preservation and universal access to the cultural history reflected by the intersection of art and technology.

#### **References and Notes:**

1. Ceci Moss, *The Diffusion of Current Internet-based Art and the Problem of the Archive*, (unpublished masters thesis, New York University, New York, NY, 2010).
2. Jon Ippolito, "Accommodating the Unpredictable: The Variable Media Questionnaire," in *Permanence Through Change: The Variable Media Approach*, ed. Alain Depocas, Jon Ippolito, and Caitlin Jones, 47-53 (New York: Guggenheim Museum Publications, 2003).
3. Jeff Rothenberg, *Renewing the Erl King*, 2006, <http://www.bampfa.berkeley.edu/about/ErlKingReport.pdf> (accessed September 10, 2011)
4. Dieter Daniels and Gunther Reisinger, ed., *Net pioneers 1.0: Contextualizing Early Net-Based Art* (Berlin: Sternberg Press, 2009).