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One Terabyte of Documentation

The circulation of GeoCities : Annet Dekker and Katrina Sluis in Conversation with Olia Lialina

Dekker, A.; Sluis, K.; Lialina, O.

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10 One Terabyte of documentation

The circulation of GeoCities

Annet Dekker and Katrina Sluis in Conversation with Olia Lialina

This interview considers the work of net artists Olia Lialina and Dragan Espenschied and their efforts to preserve, study and ultimately recirculate homepages from GeoCities, a free web-hosting service founded in July 1995. GeoCities emerged as one of the most vibrant and popular places on the web and remained so until the late 1990s, when Yahoo purchased the site at the peak of dot.com fever for US\$3 billion. However, when users began drifting to a new generation of social networking sites, GeoCities became synonymous with old-fashioned aesthetics and dubious taste. In April 2009, with only six months' notice, Yahoo announced its plans to shut down GeoCities. In response, the Archive Team with the help of about 100 people, managed to download and rescue almost a terabyte of GeoCities pages. In October of the following year, in order to mark the first anniversary of GeoCities' demise, the Archive Team made available a 641 GB torrent file, containing approximately 1.2 million GeoCities homepages. Lialina and Espenschied were drawn to GeoCities as a perfect example of early 'amateur' web culture and began to download the largest BitTorrent file at the time on 1 November 2010.¹ They started unzipping the first files in January 2011, a process that continued until March 2011. Having downloaded, sorted and stored the 16,000 archived GeoCities sites – which took another year – they began documenting, studying and redistributing screenshots of the GeoCities homepages through the web.

In conversation with Olia Lialina, we discuss the process of restoring and curating GeoCities as part of their resulting project *One Terabyte of Kilobyte Age*. Our main interest concerns how *One Terabyte of Kilobyte Age* automates the distribution of screenshots of GeoCities homepages to raise awareness and generate an appreciation of a significant but much-derided part of Internet culture: web vernacular. Instead, by reflecting on the technical and cultural infrastructure of the project and its audiences, insights are offered into the cultural value of documentation and alternative strategies for conservation. In this respect, *One Terabyte of Kilobyte Age* offers a provocation that conservation is about practices rather than objects. This is underlined by Lialina and Espenschied who suggest that 'for artifacts to survive culturally, they need to become useful again in contemporary digital culture'.² As such the chapter proposes that in an Internet culture defined by perpetual circulation, a sustainable preservation can only be achieved through permanent dissemination.

What fascinates you about the history of the web, and GeoCities specifically? What motivated you to transform the GeoCities torrent into the online project *One Terabyte of Kilobyte Age*? How should we understand documentation in the context of the decay of the web?

The history of the web is interesting to me in terms of how it has been built and used, and how its infrastructure mutates and changes over time. Often, when we imagine the ‘ruins’ of the web, we think about a website that doesn’t exist anymore, and this evokes all kinds of nostalgic sentiments. However, there are different ‘ruins’ and different reasons for something becoming a ruin. Of course, some of this relates to technical progress and the way the web ultimately changes over time, but I would argue it’s not purely an historical or even a technical process of decay. For example, if a site you have linked to on your homepage moves, or a server which hosts your image files dies, they no longer appear on your webpage, and thus creates a ruin. This can happen at any moment, simply because you’re not in control of every connection you make.

There are also other ruins: pages that never really existed, or they were created but never seen or read. I’m thinking here of the scenario where someone has made a webpage to present their favourite pastime or to release a product, but because there were no links to or from other pages, no one knew they existed. Such a webpage is like a crater of a meteor! No one goes there and there is no life. The question of how to preserve this kind of homepage adds another layer of complexity. Are you going to repair it, and make it function even though it never really functioned in the first place – and how would you actually know this page exists at all? The ruin’s significance then is that it can be a trigger for the imagination. It might remind you of something or point to something that you didn’t know before. Or, put another way, a ruin is more than a website with broken links and images: it can also be something that is simply left and discarded. So, destruction is happening all the time, and it creates ruins in space and in time. This perspective, I think, is fascinating and crucial to understand if you want to think about the history of the web and how – and by whom – it is built.

When Dragan Espenschied and I developed *One Terabyte of Kilobyte Age*, we wanted to inject life back into a selection of these ruins. The project was a continuation of my work collecting elements of old webpages that I started in 2000. At that time, Dragan and I were also making art projects that glorified the culture of the early web, exploring the idea of ‘digital folklore’. These projects were about understanding web design, its elements and functional aesthetics, but also helped us to understand what we wanted to keep and how to show it to others. For instance, we noticed that certain elements, such as website backgrounds made of starry skies, water, velvet and silk were disappearing from the web. During this time, I remember, it was possible to say, ‘cyberspace is made of silk’. I also began looking for ‘under-construction’ signs and the persistence of certain navigation elements. I wanted to see how people relate to the web browser: do they trust it? Do they use the browser’s ‘home’ button or have they designed their own buttons to go backwards and forwards? It was interesting to see how some

navigational elements were vanishing very fast despite all the thought and skill that was invested in making them.

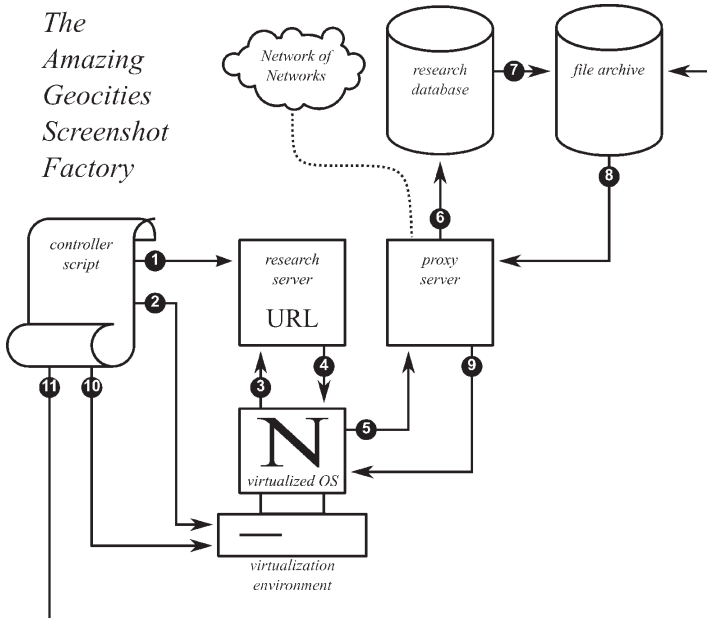
Our personal archive of the old web was growing in parallel to Archive.org's but in our case, we were not just grabbing stuff, but really looking for something particular and then saving it. So, while the amateur web and personal homepages were slowly dying and fading out, we were accumulating more and more material. However, in April 2009, Yahoo announced that they would stop GeoCities. Immediately after this announcement came the Archive Team with a call to save as much as possible. They released their torrent on 26 October 2010, which we then downloaded. It took us quite some time to download it and then to unpack and make everything accessible through a browser, using original URLs. Dragan managed to structure the data in a database that made it possible to look through it by neighbourhoods, chronologically, and to tag things.

Slowly the project took over our research into vernacular web cultures. Rather than focusing on the factual data or provide a fully restored version of GeoCities, if that is even possible, we decided to work from our memories and focused on analysing elements that attracted us to the old web. We began to document these homepages, transforming them into screenshots for dissemination on Tumblr. Over the last eight years, these screenshots have appeared on the *One Terabyte of Kilobyte Age* Tumblr every 20 minutes, which is a nice pace. In a sense we are feeding the Internet its own history. On this point it is perhaps a bit of a shame that we have GeoCities pages only, because this is how GeoCities becomes synonymous with the amateur web of the time. Essentially, *One Terabyte of Kilobyte Age* is about keeping the vernacular web alive by keeping its aesthetics, culture, and design in circulation.

Could you tell us something about the process: what were the key methodological challenges, and why did you settle on the screenshot as the vehicle to document the neighbourhoods of GeoCities and the homepages of their users?

The main challenges involved repairing and restoring the webpages so the links between them would function. There was a lot of work involved to clear what Dragan calls 'symlink-cancer'. Many files were copied hundreds of times in the archive due to circular file system references on the GeoCities server, and work was done to figure out at what URLs files were made available, and also address glitches in the process that created the torrent data from errors originally created by users. Another important problem was the arrangement of the sites. For instance, if organised as a timeline, what does chronology actually mean? How do you assign a date to a website? At its creation date or the date of last update? We decided to take the time of the last update, but realised that a page could be a day or eight years old, so you can't really draw any conclusions from such a chronological point in time.

We chose the screenshot since it is something 'stable'. This was necessary because we wanted to show the archive to others, and we didn't have the computer power to easily allow people to actually browse through it. Dragan refers to the workflow as the 'screenshot factory' because it is almost completely automated now (Fig. 10.1).



- ① Controller script pushes URL to be photographed to research server.
- ② Controller script restores virtualized OS to a state where a browser is idle, then simulates key strokes calling a bookmark. A timeout starts.
- ③ The bookmark makes the browser go to the research server.
- ④ The research server redirects the browser to the desired URL.
- ⑤ The browser accesses the URL through an intelligent proxy server.
- ⑥ The proxy server asks the research database for files or redirects that match requests related to the original URL.
- ⑦ The research database picks the best fitting data from the archive. (If no match can be made, the request is passed through to the next proxy node or the Internet.)
- ⑧ Data from the archive gets sent back to the browser via the ...
- ⑨ ... proxy server.
- ⑩ The timeout has passed. The controller script instructs the virtualization environment to take a screenshot of the virtualized OS.
- ⑪ A new screenshot is saved in the file archive!

<http://contemporary-home-computing.org/1tb/>

Figure 10.1 Dragan Espenschied, *The Amazing GeoCities Screenshot Factory*, 2013, <https://blog.geocities.institute/archives/3808>.

The screenshots were posted on Tumblr, which was a new platform that could be filled with content and was flexible. Perhaps Instagram could also have been our choice if we had started a few years later? Having said that, Instagram's downfall is that it doesn't disseminate posts in a strict chronological way. The platform's algorithms are disrespectful to this kind of temporal order and would mess up our system. Even worse, it often changes the resolution of images and thus their appearance. Tumblr also tries to make things 'smoother' but it is easier to adjust. And like GeoCities, Tumblr has also become a historical reference to an Internet 'past'. In order to reach other audiences over time we have posted on other platforms such as Twitter, and have discussed using Telegram.

In a message published on the Nettime listserv in 2003, you were concerned that your net art was to be exhibited in New York Digital Salon in the form of a screenshot.³ You criticised this move, arguing that screenshots are attractive to curators as they aren't interested in technical complications, cannot destroy a curatorial concept, and are easy and unpretentious. You conclude by proclaiming 'without the link, it's a screenshot. And the screenshot is not an exhibition. It's a documentation'. How has your stance or approach to screenshots as documentation changed over time?

Yes, at the time I wanted to sound the alarm on how the organisation was trying to exhibit net art; instead of presenting the website, they were merely showing a screenshot. However, in our project, we use the screenshots as artwork when it's shown in an art context. In Tumblr it is documentation – a reminder.

The screenshots are easy to make and distribute at this moment. They emphasise the proper pixels and dimensions of the pages, and also emphasise the browser itself, which we always include during capture. The screenshots started with the much beloved Netscape browser, however we eventually migrated to Internet Explorer because by 1999 Netscape was hardly used anymore. Interestingly, we discovered how even in 2004 many GeoCities pages were made to look good on 800 × 600 frames, even though the standard resolution had changed by then. The web is a reflection of the past and we were attentive to these details in the way we made the screenshots.

Do you think the translation of *One Terabyte of Kilobyte Age* onto newer platforms offers something quite different, or do you see this diversification primarily as a method for disseminating the work to new audiences?

When I began using Twitter, I was distributing images on my account that were part of the research, such as website backgrounds. I also posted screenshots that emphasised the difference in size moving from 800 × 600 to 1,024 × 768 browser resolution, in order to demonstrate how quickly the web changed. I later developed *Take Your Time!*, a series of Twitter posts which may be cryptic but served to point out how the web was never finished. These tweets contained screenshots from GeoCities which document webmasters making many promises to update their site but they never come true, perhaps due to homework or because it's a summer holiday and they don't have access to their school computers. There is now a community on Twitter around this series that closely follows and anticipates each new post. On the one hand, *Take Your Time!* shows how the web

is always in construction and how ‘time’ is a very elastic concept, but also – crucially – how the web is used in a social sense.

Was your goal to document a culture which was in the process of disappearing before your eyes rather than trying to preserve it?

It was about preservation. But 20 years ago, I didn’t realise that I’d need to make a copy to archive a webpage: the act of finding it was important, it seemed enough to save each link. Of course, I quickly learned that this wasn’t enough. We wanted to preserve and to bring attention to those things that had become nearly invisible or stopped existing because they were already overshadowed by the next big development in Internet culture. Our GeoCities screenshots are saved, so even when Tumblr stops, we will have the archive, but of course the Tumblr performance will be gone.

There is a difference between the everyday work we do on the project and the way *One Terabyte of Kilobyte Age* is ultimately presented. The everyday work is about going from page to page and tagging the websites according to their content or appearance and deciding if it’s interesting to classify a page in a special way (perhaps due to special navigation features or the use of frames, or no frames, etc.). So, it’s essentially about organising and categorising the pages so that they don’t disappear. We also tend to see *One Terabyte of Kilobyte Age* primarily as a research project. In this sense, everyone can use our archive, although the categories and tags that we came up with are clearly a subjective reflection of our interests. But as for the ‘real’ preservation of GeoCities, I think someone or an institution has to step in and keep it. Whilst storing on a hard drive is one solution, it would still be important to keep the circulation going and provide a way for researchers to continue working with the material.

The project resembles a mass (re)enactment, but it also highlights the interests of individual users. How important is the user to you, or are you more interested in the formal aesthetics and the design aspects?

I can’t really disconnect the two. For me, it’s about individual self-expression and how the GeoCities community used the web to express themselves. By looking at the range of sites, you really see how the web was changing by the end of the nineties and the early noughties. In the beginning, GeoCities users followed the format that was given, from the ‘welcome to my homepage’ banner, to the use of graphical rulers and the links page. This became the norm, and in a sense, it was revolutionary because it became the way to design your webpage. Over time, the ideas about establishing your own presence online shifted, and such social changes are connected to the design choices that are ultimately made. In those days, everyone was a designer: when creating your own website, you must make design decisions all the time. These decisions of what might be expressed and how it might be shared are inherently connected. For example, what navigation should someone use? If they are interested in music, does it make sense to use navigation in a metaphorical way, by using notes in a menu or a keyboard of the piano in the background? Or does someone want to go against the navigation idioms that were around, to confuse or emphasise certain aspects in their site? In this sense, the introduction of webpage templates when Yahoo took over GeoCities in

1999 is interesting. Some people obeyed and adopted the given templates, while others tried to change them or combine different ones. In the beginning this kind of resistance was still possible.

In the past, you've presented *One Terabyte of Kilobyte Age* in various formats and institutional contexts. In addition to Tumblr and Google Arts & Culture, the homepages have been presented on 35-mm slide projectors for museum installations at Hartware MedienKunstVerein (2015) and at the New Museum as part of Rhizome's exhibition *The Art Happens Here: Net Art's Archival Poetics* (2019). The project's homepages were re-animated as a video stream on the Media Wall at The Photographers' Gallery in 2013, and inspired a theatre performance, *Bear with Me* (2017) at Transmediale with Kevin Bewersdorf. These represent very different presentations and attract different kinds of audiences. What can a museum learn from these projects about exhibiting documentation?

We're always discussing new ways to present the findings of the project. We didn't want to present the webpages themselves online because it raises copyright and ethical questions. The exception is if we want to report the restoration results on our blog, for example, 'The Day Will Come We Will Fix the Snow'⁴ or 'The Anniversary Restoration'.⁵

We experimented by converting the pages into video, which allowed us to capture the movement of gifs and other design elements which animated GeoCities homepages. At Katrina [Sluis]'s invitation we streamed 10,000 pages in this format at The Photographers' Gallery on their Media Wall over a series of months in 2013. The next experiment was technically a step back in photographic history. We transformed a selection of screenshots into 35-mm film slides, which were shown on traditional slide projectors installed in the gallery space. We selected two sets of GeoCities homepages: the first by people promising to update their webpages, and the second by people saying they are not making webpages anymore. These two slide projections were shown next to each other: reflecting the optimism versus the frustration of creating webpages.

The installation *Give Me Time/ This Page is No More* (2015–present) resembles the form and experience of watching 35-mm slides: slowly, one after the other, they appear. The project's realisation as slide performance emphasises the dedication and efforts of how people created their pages and presented their personal lives. Traditionally, one would watch slideshows only on certain, often private, occasions and there is a ritual attached to it: you need to darken the room, prepare the equipment and the space. There is also an educational reference, if you consider that school children would also experience history in the classroom through a bunch of 35-mm slides. Like our screenshots, the slides are not 'live', they don't move like video; they are frozen objects, mementos of a certain time. However, even slide projectors are now also becoming obsolete – just like webpages the presentation format is also dying out. So, perhaps we should now digitise them or record the performance as a video.

To return to the screenshot as documentation, it is often seen as a promiscuous format, able to propagate and reproduce itself across networks and

platforms. While you have been very careful to link it to a history, a cultural politics of the web, there is a possibility that when they circulate, this context is lost. Once websites and now viral images, they can be fetishised in different ways. How do you deal with the transformation of very specific and contingent cultural expressions of the vernacular web into anonymous JPEGs?

They are. png not. jpg! And if there is one piece of advice I could give to preservation departments it is to never save screenshots as JPEGs.

If you search online for GeoCities or the early web today, you will find our screenshots. Our 4:3, 800 × 600 pixel PNGs – always shown inside a frame of Netscape or Explorer with a GeoCities URL on the top – are instantly recognisable in search results. They’re republished and circulate in different platforms and have become a dominant visual reference for the early web. We specifically chose this look because we didn’t like the way webpages had been clumsily shown as different sized JPGs without a browser frame, or presented inside a modern browser. I can imagine there are other ways to present snapshots of old webpages properly, but I don’t see it yet. I think nothing can compete with the products of Dragan’s ‘screenshot factory’. While I like the way they look, it isn’t necessarily the only look the past could have: there should be other URLs, we should see other old websites, not only GeoCities.

Concerning transformation and decontextualisation, I don’t think I would agree with your proposition. As I mentioned, the browser frame, URL, the scrollbar and the links are always preserved in the screenshot – these elements help provide context as they circulate.

How do you deal with copyright and ethical issues? This dimension would be crucial for other individuals and institutions who might, as you proposed, take on the conservation of GeoCities.

GeoCities had their own filters, so pornographic and other sensitive content generally wasn’t allowed. However, sometimes these images appear in the archive, and we try to catch them before they come up at Tumblr. And if we don’t, Tumblr will mark it as sensitive content. As for copyright, we have never asked any individuals if it’s OK to post their old site, and if someone complains we will immediately remove their site. At one point, we discovered a page from 1997 made by a teenage girl to complain about the movie *Titanic*: she couldn’t understand why anyone wanted to hear about *Titanic*, and offered a detailed analysis of the movie’s flaws, compared to *Star Wars*. It was a good example of a fan-hate production of that time. I managed to find her with the help of Twitter and interviewed her about it for our research blog.⁶ She recently contacted us asking to remove her name as she was concerned that employers undertake checks of personal historical content online, and this site could potentially damage her. Interestingly, a lot of GeoCities websites are anonymous: in the early days the culture was not about pushing *yourself*, it was about pushing the *content of your website*.

To date, it is more common for people to contact us asking for help finding their old website.

Recently, something interesting happened on our Tumblr. In the feed of *One Terabyte of Kilobyte Age* suddenly more than one hundred screenshots were

posted that all looked identical. It turned out that someone had put their collection of erotic images on GeoCities and made many galleries, but all were last updated around the same time. So, one after the other these images started to occupy our Tumblr. We considered stopping it, to not lose our followers, however a community suddenly formed around it. People were really waiting for the next image to appear, and a discussion developed which later migrated to a dedicated Discord server. This showed that there still is an interest and engagement from the audience on Tumblr. This example shows how optimisation is not always a good thing: it may be annoying sometimes if things like these are not ‘cleaned’, but it can also have its own life, even if only for a week.

GeoCities is now also being used in Digital Humanities projects where researchers algorithmically analyse content to show how different neighbourhoods are connected to each other, or what the most used animated GIF is, but these projects don’t explain anything about how and why these things are important. It seems like GeoCities is used *because it can be used*, and there is little real interest in the communities themselves. This problem, I think, more closely relates to the ethical dilemmas of using the archive. This is not to say that my research is perfect. There are also disadvantages in the way we make our choices, or the way I categorise and use tags, many of which are only understandable to me. For instance, when I tag something ‘torture’, it indicates the screenshot documentation is not animated, ‘torture to see it as a screenshot’ – which is painful because the original website is full madness with lots of animated gifs. However, someone else might think I used the tag to show the ugliness of the design, or worse.

You mention that in *One Terabyte of Kilobyte Age* your intention is to work with memory, mystification and subjective interpretations, to embrace loss and the web’s poetic ruins – which sits in opposition to most digital heritage research. How should we remember your project?

First, it’s important to remember that it was originally the duty of people to build the web: in the beginning people were excited about the web and felt responsible for it. It is also important to recognise that the beginning of 1996 was different from the end of 1996, and changes can happen in a short period of time. For this reason, I think it’s crucial not to homogenise the past. Sometimes, it seems that there are certain ideas about the early web, that it’s always ‘under construction’ or only has starry backgrounds, but it’s important to keep analysing what actually happened: to show again and again what people made, what people meant and wanted to communicate. It’s important to understand their design decisions, what elements they chose or made themselves, and what kind of ideology or beliefs and hopes they embodied, and the frustrations and anger that motivated them. It’s important, I believe, to not be overwhelmed by the visuals alone but to understand what lies behind them.

In my research I use the notion of ‘small, weak and stupid’. These words are not a strategy, they are my guidelines and reflect my intentions when I’m analysing the history of the web. While each of these is usually seen as a negative, for me they have positive values. A focus on the small sits in contrast to the big data and the algorithmic approach, which I previously mentioned. I’m interested in

small files: even our current GeoCities archive is small compared to most other archives. Small also relates to the insignificant, the ‘little man’, the webmasters who are often invisible and easily forgotten. I also embrace ‘weak’ in the sense of the weak subject that is used in postmodernism. In Russian literature ‘the little man’ is also somebody who is powerless; which has resonance if you consider the large corporations that are now controlling the web.

I want to stress the importance of what users say and what they do, and to encourage interpretation. In other words, I want to show how by analysing, interpreting and making connections between these small and weak JPEGs and GIFs can be very powerful within specific contexts. Also, I think it is important to not be afraid to ask ‘stupid’ questions. For instance, what type of dogs were the best webmasters? What’s the difference between a Cyber Realm and Cyber Lair? They can be a powerful and positive method to discover things you wouldn’t otherwise. All of them together show the importance of context, and how the various elements need to be researched in relation to each other.

Concluding remarks by Annet Dekker and Katrina Sluis

Since its launch, *One Terabyte of Kilobyte Age* has distributed over 300,000 screenshots of GeoCities homepages. Encountering these fragments of the early web through today’s shinier, more automated and surveilled web platforms offers important insights into the changing aesthetics, socio-technical imaginaries and humour that drive online culture. While *One Terabyte of Kilobyte Age* is not the only project to address the legacy of GeoCities, it shows how preservation is not necessarily always about maintaining and fixing the original. Instead of collecting the material purely for the purpose of preservation, the project questions what preservation could mean in the context of amateur digital preservation. By shifting the focus from the conventional method of restoration of the content and objects (i.e., the individual webpages), Lialina and Espenschied opted for the circulation of documentation by generating screenshots of every surviving home page. Similarly, by refusing to reduce URLs, neighbourhoods and web ephemera to a set of data points or addressing the scale of this terabyte ‘ruin’ by using the tools of data visualisation or machine learning, they subjected the archive to a socio-technical performance that required a sustained daily engagement – both on their part and their online audience – over a period of years. Their methods are underpinned by a solidarity with GeoCities’ users and a close attention to the minutiae of their confessions and creative expressions. This commitment is reflected in their tagging system where they introduced a new folksonomy to categorise and analyse digital material and content, as well as how they emphasised mass-circulation over individual authorship. Here their project offers a further critique of the concepts of metadata and provenance in digital culture and archiving.

Through Lialina and Espenschied’s documentation and standardisation process, the portability, accessibility and distribution potential of the individual GeoCities webpages has been secured to the point that researchers can (re)assess their value and artists can exploit the aesthetics of amateur web design. However, this is also

where the project is most precarious: commercial platforms such as Tumblr and Twitter will very likely experience a similar fate as GeoCities. For now, the work of the GeoCities community enjoys the second wave of Tumblr through which the screenshots enter the feeds of a new generation of web users.⁷ By accepting loss and embracing the generative and circulatory conditions of the web, *One Terabyte of Kilobyte Age* shows how amateur preservation can spawn new forms and interpretations, at times pushed forward by human users, at others driven by Twitter bots and other computational agents. In this way, the project could be described as a carefully designed mass re-enactment: demonstrating how visual documentation can be made performative once propelled by the users and the platforms that are used. In other words, while the documentation reflects a mere sliver of the experience that was once GeoCities, when networked it returns to a processual state in which users' interactions are driving the experience.

Notes

- 1 For more information about their research and findings, see Olia Lialina, "Still There. Ruins and Templates of GeoCities," in *Lost and Living (in) Archives*, ed. by Annet Dekker (Amsterdam: Valiz, 2017), 193–210.
- 2 Trevor Owens, "Digital Culture Is Mass Culture: An Interview With Digital Conservator Dragan Espenschied," *The Signal* (14 March 2014), <https://blogs.loc.gov/thesignal/2014/03/digital-culture-is-mass-culture-an-interview-with-digital-conservator-dragan-espenschied/>.
- 3 Olia Lialina, "New Steps: NY Digital Salon" (2003), <http://art.teleportacia.org/observation/ny/digital.html>.
- 4 Olia Lialina, "Seasonal Restoration," *One Terabyte of Kilobyte Age* (23 December 2019), <https://blog.geocities.institute/archives/6620>.
- 5 Dragan Espenschied, "The Anniversary Restoration," *One Terabyte of Kilobyte Age* (7 February 2014), <https://blog.geocities.institute/archives/4399>.
- 6 Olia Lialina, "Oral History: Jennifer," *One Terabyte of Kilobyte Age* (19 March 2019), <https://blog.geocities.institute/archives/6275>.
- 7 Kyle Chayka, "How Tumblr Became Popular for Being Obsolete," *The New Yorker* (14 January 2022), www.newyorker.com/culture/infinite-scroll/how-tumblr-became-popular-for-being-obsolete.