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E-JOURNAL ON ART, SCIENCE AND TECHNOLOGY

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ARTICLE

"MEDIA LIBRARIES AND ARCHIVES FOR THE 21ST CENTURY" NODE

# The Transfigurability of Digital Objects

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Submission date: November, 2010
Accepted date: December, 2010
Published in: December, 2010

**Abstract**
Due to the rise of the internet and digitality, an increasing degree of cultural heritage takes the form of ICT enabled operations contradicting the traditional practices of archives. Referring to these new forms as digital objects, the paper presents them as being transfigurable based on the dimensions of editability, interactivity, openness and distributedness and on the highly modular and granular texture of binary media and ICT processes. In other words, digital objects are technological operations rather than fixed entities. They are fluid, amorphous and ephemeral, rendered as momentary proxies of objects only. Within this context, a key challenge for cultural heritage institutions is the taming of digital objects. Juxtaposing two extreme examples – the search engine results page and the archival snap-shot of a web page – the paper will conclude with the argument that persistency does not come with the digital object, but needs to be imposed *ex-post* through second-order technologies which themselves are based on the paradigm of transfigurability. In other words, while the persistency of material objects has to be preserved, the persistency of digital objects has to be produced.

**Keywords**
digital objects, persistency, ephemera, archive, preservation

*El carácter transfigurable de los objetos digitales*

***Resumen***
*Debido al aumento de internet y de lo digital, cada vez hay más patrimonio cultural que adopta la forma de operaciones basadas en las TIC, lo que contradice las prácticas y archivos tradicionales. Al referirse a estos nuevos objetos digitales, el artículo presenta su carácter*

*transfigurable basándose en que se pueden editar, son interactivos, abiertos y se pueden distribuir, y en la textura altamente modular y granular de los medios binarios y de los procesos de las TIC. En otras palabras, los objetos digitales son operaciones técnicas más que entidades fijas. Son fluidos, amorfos y efímeros, son sólo representaciones momentáneas de objetos. En este contexto, un desafío clave para las instituciones de patrimonio cultural es la domesticación de objetos digitales. Al yuxtaponer dos ejemplos extremos, la página de resultados del motor de búsqueda y la instantánea archivada de una página web, el artículo concluirá con el argumento de que la persistencia no se presenta con el objeto digital, sino que tiene que imponerse después mediante tecnologías de segundo orden que también se basen en el paradigma del carácter transfigurable. En otras palabras, aunque debe conservarse la persistencia de los objetos materiales, tiene que generarse la persistencia de los objetos digitales.*

***Keywords***

*objetos digitales, persistencia, elementos efímeros, archivo, conservación*

## Introduction

Inscribed above its portal, the lost library of Pharaoh Ramesses II bore the warning that one was not about to step into an ordinary building but rather into "the house of healing for the soul" – a sacred place (Lutz 1978; Polastron 2007, p. 7). Being the oldest library known to mankind, the inscription reminds us that ignorance is a disease of the soul and accessing knowledge its remedy. In the so-called information society, the access to knowledge and information is of a lesser concern for a growing part of the world's population. The internet and all the services it affords are, to an increasing degree, integral aspects of our lives up to a point where information and communication technologies (ICT) interweave with the very fabric of the human condition. Cast into a digital format, knowledge is made to fit into an information environment of bits and bytes that is, above all, constantly updated and ephemeral (Kallinikos, 2006, 2009a). Enabling immense possibilities for access, these developments, however, also spawn new challenges to be addressed by the future houses of healing for the soul. Our digital cultural heritage takes forms that cease to resemble the physical and relatively stable artefacts we have been accustomed to for centuries. The new metaphors that are invoked for describing these artefacts tend to stress the fluid, hardly palpable and ephemeral characteristics of digitality and computational operations.

In our work at *The Information Growth and Internet Research* project,[1] we refer to the digital equivalents of material objects as *digital objects*. However, software applications, databases, computer files, digital images and so forth are objects only in a euphemistic sense. It is only for the eye of the user that they are rendered into an object-like appearance through computational operations (Ekbia, 2009; Kallinikos, 2009b; Faulkner *et al.,* 2010; Kallinikos *et al.,* 2010). In other words, digital objects come into existence through the networked arrangement of data by means of ICT processes and calculations which lead to a set of distinctive characteristics; that is, digital objects are highly *editable*, *interactive*, *open* and *distributed* as well as composited in a *modular* and *granular* fashion. Summarized under the term *transfigurability*, these characteristics and compositional textures raise serious problems for cultural heritage institutions in terms of how to preserve digital objects for future generations. The archival goal of granting persistent accessibility to authentic and persistent testimonies of our times needs to be redefined in order to address the diffusion of knowledge, that is, to a rapidly increasing degree mediated as digital objects (Brindley 2009).

## Digital Objects

Digital objects come in a vast variety of forms and functionalities – be it blogs, hypertexts, computer games, e-books, e-mails, operating systems, spreadsheets, the list goes on and on. However, the classification of these ICT embedded and enabled forms as digital objects relies on a common set of characteristics that can be used to describe and distinguish them from material objects. The proposition outlined in this paper presents digital objects as multidimensional operations along the characteristics of *editability, interactivity, openness* and *distributedness* (Kallinikos, *et al.*, 2010). Hence, digital objects can be more or less editable, more or less interactive and so forth. In what follows, each of the characteristics will be discussed briefly. The concept will then be illustrated by two extreme examples; the search engine *results page* and the digital *snap-shot* of web

1. See: <www.tigair.info>.

pages taken by the Internet Archive. The first exemplifies a highly transfigurable digital object; the latter shows a way through which the transfigurability of digital objects can be tamed.

## Editability

Digital objects are in a constant stage of flux as they are contingent to being modified and updated. Their content or elements can be changed or deleted, new elements or modules can be added *ex-post*. A telling example is a Wikipedia article page which can be edited and modified throughout its whole life-cycle (Aaltonen *et al.*, 2010). In this sense, a digital object is never finished but rather bears an inherent, built-in potentiality for being changed.

## Interactivity

While every object entails some degree of interactivity, digital objects can reach a level that, ultimately, results in a qualitative difference. Digital objects allow for an increased spectrum of possibilities contingent upon the choices made by a user who is invited into a potential space for exploration. A state-of-the-art 3d computer game, for instance, presents such a high level of visual immersion and navigation that the gamer literally can explore the world s/he is playing in. Of course there are limitations to the game-play, however from a visual perspective the computer game is open to the choices of the gamer and renders the appropriate visual graphics in real-time.

## Openness

In contrast to editability, openness refers to the potentiality of digital objects to be modified in ways unintended by the creators or designers. In this sense, digital objects can be tampered and experimented with, a notion that finds its clearest expression in the hacker culture that brought us the open source movement and Creative Commons licensing (Himanen, 2001). A well-known example is a digital image that can be manipulated by anybody with the appropriate know-how in specialized computer graphics applications.

## Distributedness

Digital objects mostly consist of modules or components which in turn can be other digital objects. Not packaged into a single entity as it is the case with a book, these components can be distributed and networked across various sources (Esposito, 2002, p. 299). Hence, a digital object is a momentary rendition – an assemblage – of various data sources brought into existence by IT operations. A hypertext document is a case in point. Not being bound to a single computer file, it may span across web pages and domains incorporating pictorial elements from an image folder or embedding a video hosted on YouTube. In this sense, the borders of a hypertext appear fuzzy defying practices based on clear-cut and bounded documents as, say, printed books provide for.

## Compositional Texture

The above described characteristics rely on a very distinctive tapestry —a texture composited in a highly modular and granular fashion. *Modular composition* refers to the generative nature of the interacting habitat in which digital objects are embedded. Relying on an end-to-end infrastructure such as the internet (Zittrain, 2008), digital objects are relatively autonomous self-contained building blocks that depend on being loosely coupled to other digital objects. In this sense, one should not confuse autonomy with autarky. To use the example of a hypertext document again, changing one web page would not have an effect on any of the other hyperlinked web pages. However, cutting the links between the web pages would mean the end of the hypertext document. The same principle applies to object-oriented programming that results in software consisting of contained and functionally related modules of code. It is the loose coupling between modules (which may or may not be digital objects themselves) that allows for the decomposition of a digital object into manageable parts that can be edited, reorganized and put together with other modules.

Of course, modules cannot be decomposed into other more elementary modules ad infinitum; a fact that leads to the second aspect of the compositional texture – *granularity*. Encoded into a binary-based medium, digital objects allow for immensely minute modifications and calculations down to the most basic level of 0s and 1s. Although it may require a lot of skill and know-how to do so, the high-level granularity of digital objects enables piecemeal interventions, ranging from the simple correction of a typo in an electronic document to sophisticated means of finding and fixing bugs in an operating system. One of the outcomes worth noting is that the crowd sourcing of tasks becomes a practical alternative of getting things done, since a lot of people can make small contributions, which combined can lead to surprising innovations such as Wikipedia (Benkler, 2006). To clarify, modularity and granularity are not the outcome of the rise of information technology but have been around for quite some time. Modularity, for instance, is a key element of mass production; that is, the assemblage of standardized parts into final products in a factory. In terms of granularity, phonetic writing enables the creation of a variety of literary forms through the combination of a very limited number of letters. However, the level of granularity and modularity the assemblage of digital objects is based upon truly marks a qualitative difference. A difference that is described with attributes such as fluid, amorphous, unstable, ephemeral, generative or, as it is referred to in this paper, transfigurable.

## The Search Engine and the Archive

Seeing digital objects the way outlined above raises the question of how they are brought into existence in different settings and contexts each consisting of very diverse expectations, objectives and practices. For instance, the current generation of algorithmic search engines, such as Google, owe their whole existence and functionality to the transfigurability of digital objects and the compositional texture they are embedded into. One of the main digital objects search engines bring forth – the results page – is a case in point. Basically containing a list of web pages deemed relevant in relation to a user's search query, it is the result of sophisticated algorithmic calculations taking into account various aspects within and between mostly web pages and other web sources. The search engine results page, however, only exists as a momentary rendition. The moment the window displaying the results page is closed, the digital object disappears only to be recalculated and constructed anew when the user launches a new search. Even when the user types in the very same search terms as before, the results page is created again in real-time, hence the search engine algorithm may present different results between searches due to the constant updating of the underlying database and its evolving search index. Given the high impact the ranking by a search engine, especially Google, has on the traffic to a web page, web consultants offer their services in terms of search engine optimization, which should push a web page up the ranks in relation to specific search terms. Web hosts adapt their web pages to the ranking mechanism which, in turn, may lead to search engines changing their mechanisms. As a result, a feedback cycle emerges between the search engine and the respective conglomeration of web pages and, ultimately, the WWW as well as other internet services (Fortunato, Flammini *et al.,* 2006). The search engine results page, thus, is in a constant stage of flux cast into an object-like existence through algorithmic calculations (Morville, 2005). It is an interactive, radically open and distributed artefact that is not easily delineated from the web resources it represents. What remains constant, in this constellation, is not the digital object, it is the algorithm (Esposito, 2002).

In stark contrast to a search engine's functionality, archival practices revolve around the maintenance of cultural artefacts and/or their documentation. One of the main key terms is persistency – be it the persistency of the archived artefact or the persistency of its documentation (Cox, 2007). Because of their transfigurable make-up, digital objects contradict the institutionalized archival practices of memory institutions which rely, with a few exceptions such as performance art, on the material stability and boundedness of the artefacts the archive organizes and preserves (Weinberger, 2007; Schnapp, 2008; Márton, 2010). Within this context, the Internet Archive[2] epitomizes an organizational attempt to bring persistency into the ephemera of bits and bytes and, thus, to preserve digital objects for future generations (Lyman *et al.*, 1998). Besides many other projects, it is mostly known for archiving the WWW by means of making snap-shots of millions of web pages. Stored in a database, they are made findable according to their URL and the time the snap-shot was taken (Howell, 2006). The snap-shot, however, is not a complete and perfect copy of the actual web page but rather a different kind of digital object altogether. In order to document provenance and authenticity, merely the content and layout of the respective web page is being copied but not its underlying functionalities and processes. As a result, the digital object is cut from the information environment the original web page is embedded into. One can find, for instance, an early version of Google's web search interface from the 11th November 1998 preserved in the Internet Archive, however one cannot make a search query that would deliver search results from that period of time. Still, the archival snap-shot remains to be a digital object. Hence, the possibility, say, to edit the snap-shot is still available but denied by rigorous security protocols. In other words, the persistence of the archival artefact does not come with the snap-shot, but rather needs to be imposed through information technological operations in order to tame the transfigurability of digital objects.

## The Computational Redefinition of Persistency

As the two extreme examples of the search engine results page and the archival snap-shot illustrate, digital objects are to be seen as objects only in a euphemistic sense. The feedback loop between the results page and the WWW as well as the imposition of persistency onto the snap-shot are the results of sophisticated and, more importantly, continuously running computational operations. They basically process data to be presented to a user in the form of an object-like momentary rendition. Hence, digital objects are not fixed entities but rather technological operations emulating proxies of objects (Manovich, 2001; Ekbia, 2009; Faulkner *et al.*, 2010).

The constant mutation of bits and bytes is, on the one hand, the driving force behind as well as the source of most of the remarkable services the internet has brought forth. Especially search engines have emerged as primary information service providers thanks to the transfigurability of digital objects. On the other hand, the clear cut definition and persistency of a document, upon which archives have relied for centuries, have become less evident and need to be redefined by technological means (Hjorland, 2000). The snap-shot as such is a digital object, but its transfigurability is limited by the Internet Archive in order for the snap-shot to become an archival and quasi-persistent document. Persistency is the result of *ex-post*

2. See: <www.archive.org>.

software processes achieved through second-order technologies which are based on the same paradigm of transfigurability (Márton, 2009). In other words, while the persistency of material objects has to be preserved, the persistency of digital objects has to be produced.

As presented in this paper, the framework of digital objects confronts and, thus, illuminates the fluid and amorphous existence of ICT enabled and digitally infused social practices. The attributes of editability, interactivity, openness and distributedness as well as the modular and granular constitution of digital objects unfold a vast horizon of potentialities which may empower users in terms of accessing information or providing far-reaching channels for self-expression and creativity (Zittrain, 2008). However, one also needs to take into account the underlying technological operations going beyond the discretion and perception of the user; a complex environment of distributed and networked functionalities growing into an ever mutating information habitat (Kallinikos, 2006). Stepping into this fluid and ephemeral environment, archival institutions will need to take care of digital objects which are not able to "take care of themselves" like material artefacts (Russell *et al*., 1999). Should the custodians of our *digital* cultural heritage inscribe a warning onto their (digital) portals, it certainly should say "from ephemera to persistency". Only then will we retain a remedy for ignorance.

## Acknowledgement

I would like to thank LABoral Centro de Arte y Creación Industrial for the invitation to present at the *First Symposium of Medialibraries and Archives for the 21st Century* which, ultimately, led to the authoring of this paper. I am specifically very grateful to Rosina Gómez-Baeza Tinturé, Benjamin Weil and Pau Alsina for making me feel very welcome at the event. I would also like to thank my advisor, Jannis Kallinikos, for taking me on his journey into the theory of digital objects and my fellow PhD candidate, Aleksi Aaltonen, for his constructive contributions during that very same journey. The presentation and, as a result, the paper was made possible by José-Carlos Mariategui, another fellow PhD candidate, who introduced my research to the team at LABoral in the first place.

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## Recommended Citation

MÁRTON, Atilla (2010). "The Transfigurability of Digital Objects". In: "Media Libraries and Archives for the 21st Century" [online node]. *Artnodes.* No. 10. UOC [Accessed: dd/mm/yy].
<http://artnodes.uoc.edu/ojs/index.php/artnodes/article/view/artnodes-n10-marton/artnodes-n10-marton-eng>
ISSN 1695-5951

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