

SCREEN IMAGES

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Screen Images

In-Game Photography, Screenshot, Screencast

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Foreword

This book takes the phenomena of screen photography, screencasts and in-game photography as its starting point and goes on to investigate their status as everyday photographic practices carried out within the digitised and digitally produced realities we inhabit, which are themselves largely mediated via screens and screen-like surfaces. The onset of the recent Covid-19 pandemic prompted an even greater turn towards screens, thereby rendering the observations made in this book all the more evident.

To this day, the practices and phenomena examined here have rarely been the subject of scientific investigation. In fact, there continues to be a noticeable dearth of aesthetic, cultural, technical and historical analyses as well as a significant lack of theories and theory production in relevant disciplines.

Screenshots are not only a form of camera-less photography; they also serve to document events that have taken place on a computer screen. Usually they are images of images (second-order images), and sometimes they are images that contain images. These images have the status of visual proofs; they provide evidence of glitches and disruptions, but they also document the history of computational interfaces, in-game achievements and anything that happens on the screen in general. The act of photographic capture is also simulated *within* computer games, such as via game mechanics and implemented functions, including photo-modes in which camera operations and filters are replicated on dedicated interfaces in an attempt to merge the act of playing with the act of photographing. Furthermore, photographic materials lie at the core of textures and digital 3D models that populate computer desktops as well as architectural simulations and computer game environments.

Last but not least, artistic practices and computer games offer a hybrid interplay between the camera and the screen, for example, in the act of capturing visual outputs on a computer screen by means of a real camera or using augmented-reality technology to mix the camera input with corresponding computer-generated images.

The goal of this book is to foster the development of a new line of enquiry from the perspective of media studies, media aesthetics and media history as well as from the viewpoint of image studies, photography

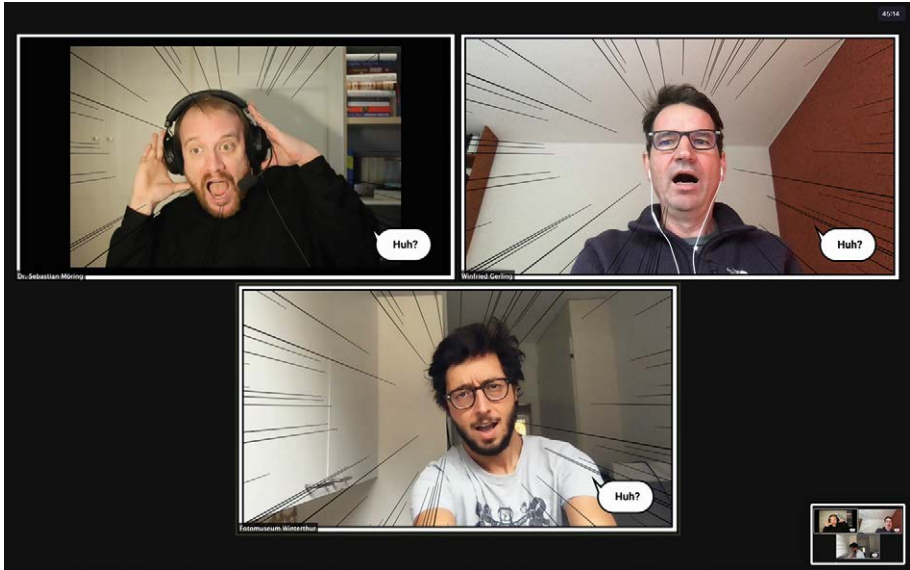
theory and game studies. Our aim is to define and describe screenshot (and screenshot-like) practices and phenomena, but also to ask questions regarding the status, ontology and aesthetics of such practices and phenomena as well as to explore their cultural and artistic significance. This volume investigates the potential for a new area of future research – one that stands at the intersection of a range of disciplines, including media studies, media aesthetics, media history, image studies, photography theory, game studies, media art and game art. This publication reflects on the photographic practices *of* and *within* screen images, including video games, computer desktops, crt-tubes, mobile devices and others. Indeed, be they screenshots, screen photography, virtual camera systems, photo modes, photographic game modifications or screencasts, many of these phenomena present a considerable challenge to our traditional understanding of the photographic apparatus, photographic processes, the act of capturing and photographic media in general.

We first experienced several of the phenomena examined in this book in the form of images and works of art. As we are committed to the idea that theory is driven in equal measure by text-based work and media practice, we also invited contributions in the form of artistic practice, each of which provides a unique perspective on contemporary image practices. These contributions, together with the image material quoted in the articles, make this volume a multifaceted experience for both the intellect and the eyes.

Our authors were also free to contribute short or long articles, most of which are essayistic in style. We hope this speaks to an audience with an academic and artistic background just as much as to members of the general public interested in historical and contemporary practices in visual and digital media.

This publication is the result of two workshops attended by the authors and held at the Brandenburg Centre for Media Studies (ZeM) in July 2017 and at the Lucerne University of Applied Sciences and Arts in October 2018 respectively. The genesis of the book was quite lengthy, especially as the Covid-19 pandemic broke out just weeks before we had scheduled to hold the third authors' workshop in Milan in March 2020. As one can imagine, the pandemic brought a whole new level of complexity to the publication process. We would therefore like to thank each one of the authors, artists and individuals who participated in our workshops for their enthusiasm, commitment and substantial contribution to a topic that has received little attention to date. We would also like to thank Julie Hagedorn for her careful proofreading of the texts and Lars Pinkwart for his invaluable work on the manuscript formatting.

Special thanks go to the ZeM and the Lucerne University of Applied Sciences and Arts for funding and supporting the workshops and especially to the ZeM for making this publication possible.



WINFRIED GERLING, SEBASTIAN MÖRING AND MARCO DE MUTIIS

Introduction

The iconic and pictorial turns proclaimed in the early 1990s suggested an increasing awareness among Western cultural and media scholars that culture is, to a great extent, constituted pictorially. More than a mere recognition of the “increasing importance of visual phenomena of everyday culture”, these turns represented “a new epistemological awareness of images in the study of culture”.¹ Although visual media such as painting, photography and cinema had long since established themselves in the first half of the 20th century, the second half of that century saw an enormous added increase in the number of screens entering the homes and daily lives of many people. Initially, these screens appeared in the form of TVs (1950s), later as computer monitors (1980s) and more recently as touchscreens on smartphones and tablets (2000s). In particular, the growing normalisation of screen-based work (*Bildschirmarbeit*) and the emergence of smartphones and tablets have called increasing attention to a specific kind of image practice, namely the *screen image* in its different forms, which include photographs of screens, screenshots and even in-game photography. The images resulting from these practices are usually so inconspicuous and incidental that they are often overlooked and have, up until now, hardly been considered as constituting a category of their own.

Our aim in this introduction is to establish an effective gateway to this collected volume by paving a path through the various phenomena, technologies, histories and practices associated with screen images. On this brief journey, we will also include very brief introductions to the chapters submitted by our authors. We will begin by providing a working definition of the term *screen image* and continue by suggesting a possible mode of classifying these images, thereby drawing on many examples from the history of both screen images and in-game photography. Depending on their thematic focus, some chapters in this volume will be introduced by means of more general remarks regarding screen images, while others will be mentioned as belonging to one of the categories of

¹ Doris Bachmann-Medick: *Cultural Turns. New Orientations in the Study of Culture*, Berlin 2016, p. 245.

our classification. Since the screen image is such a rich phenomenon and still new to theoretical discourse, it simply cannot be grasped by means of texts alone. For this reason – and in order to provoke further thought on the subject – we are delighted to be able to complement the text-based chapters in this volume with 11 artistic contributions that inhabit a space between screenshot theory and screenshot practice and explore the intriguing world of in-game photography.

A working definition of screen images

In simple terms, the concept of the screen image used in this book describes the visually captured or fixed state of a constellation *on* or *in front of* a screen – no matter whether it depicts a moving image or a still image. In the context of photography research exploring the screenshot as a photographic practice, this fact has received very little to no attention so far. Screen images are not written with light; instead, electrical charges are copied, except, of course, in the case of a so-called screen-photograph (German: *Schirmbild*), which describes a photograph of the screen with a camera in front of it. Yet the photographic context is central to understanding what the screenshot means as a practice in our digital cultures.

There are many studies in cultural and media history that explore displays and/or (computer) screens², and most of them usually refer to the materiality of the screen (often synonymous with the screen) and its references to art (history) – whereby they also refer, time and again, to Alberti's concept of the window and Lacan's scheme of eye and gaze. In spite of these studies, however, there is still hardly any work being done on how to deal with the (photographically) captured images of these screens. Screenshots are images that scientists and academics handle every day, but the origin of these images is rarely questioned or even communicated. For their own part, in-game photographs range from an

² To name a few:

W. J. T. Mitchell: "Screening nature (and the nature of the screen)", in: *New Review of Film and Television Studies*, 13/3 (2015), pp. 231-246.

Jens Schröter and Tristan Thielmann: "Display I: Analog", in: *Navigationen. Zeitschrift für Medien- und Kulturwissenschaften* 6/2 (2006).

Jens Schröter and Tristan Thielmann: "Display II: Digital", in: *Navigationen. Zeitschrift für Medien- und Kulturwissenschaften* 7/2 (2007).

Lev Manovich: "An Archeology of a Computer Screen", in: *Die Zukunft des Körpers I. Kunstforum International* 132 (November 1995 - January 1996), pp. 124-135.

Erkki Huhtamo: "Screen Tests: Why Do We Need an Archaeology of the Screen?", in: *Cinema Journal* 51/2 (Winter 2012), pp. 144-148.

everyday practice to forms of artistic expression and practice.³ And yet, only in very recent years has it been possible to observe a growing discourse on these kinds of images. Today, newspapers display screenshots just as often as they are used in scientific and academic publications. Hints like *film still* and *screenshot* implicitly point to their origin. Indeed, these are images we look *through* rather than *at*.⁴ Their processuality is still so dominant – even in the form of the fixed still image – that we ignore their genesis and materiality.

Covid-19 is clearly not the sole reason for the increasing interest in screen images. However, the Corona pandemic has certainly accelerated the awareness of the phenomena and helped to shed more light on them. With the introduction of lockdowns and remote working, a hitherto unimaginable number of employees suddenly found themselves spending the entire day in front of a (computer) screen. Indeed, even their private lives were mediated by screens (smartphone, tablet and television) to an extent unheard of prior to the pandemic. These circumstances provide an outstanding breeding ground for an examination of the screen-image practices we wish to shed light on in this volume.

Screen(shot) – Development of meaning

The etymology of the screenshot is complex, since it refers, on the one hand, to the screen (French: *Écran*) and thus to a long conceptual history of the screen (Middle Dutch: *Scherm* or Old High German: *scerm*) as a canvas. On the other hand, it also refers to the shot, and here primarily to the snapshot; in the context of photography, this is the word used to describe a quick photograph, whereby it has no verb form and is referred to in German as *knipsen*⁵ The meaning of the word *shot*⁶ is relatively clear. It describes the act of shooting and that which is unloaded or shot out during the shot. In her chapter in this volume, Birgit Schneider takes the literal figure of *shooting a screen* as an entry point to investigate whether screenshots can reveal their own mediality and also whether there are

³ Eron Rauch: “Virtual Light: Exploring In-Game Photography and Photo History”, in: *videogametourism.at*, August 28, 2012, <http://videogametourism.at/content/virtual-light-exploring-game-photography-and-photo-history> (last seen: April 25, 2022).

⁴ Paul Frosh: *The Poetics of Digital Media*, Cambridge / UK, Medford 2019, p. 62.

⁵ See Winfried Gerling: “Knipsen”, in: Heiko Christians, Matthias Bickenbach, Nikolas Wegmann (ed.): *Historisches Wörterbuch des Mediengebrauchs* Volume 2, Cologne, Weimar, Vienna 2015, pp. 412–428.

⁶ (Art.) “Shot”, in: *Online Etymology Dictionary*, no date, <https://www.etymonline.com/word/shot> (last seen: June 29, 2022).

historical precursors to screen images that suggest the concept of second-order observation.⁷

Ecran is the Old French version (Northern France 8–14th century, borrowed from Middle Dutch *scherm*)⁸ of the French word *écran* and describes, in the broadest sense, a material shield against heat or light.

The Brothers Grimm's *German Dictionary* attributes the following origins and meanings to the word *Schirm*: *schirm*, m. murus, clypeus, defensio, protectio, protector.⁹

The noun *scree* already existed in Middle English, and from the end of the 15th century onwards, the verb *to screen* was also used to indicate the “process of filtering and excluding unwanted effects”.¹⁰

The *screen* or *Schirm* (German), to which reference is made here, is thus suitable for separating two spatial areas from one another and nevertheless connecting them through its possible transparency. From the 18th century onwards, so-called wall screens (German: *Wandschirme*) increasingly became image carriers and thus the predecessors of the screen that would go on to become a projection screen for the images of the magic lantern and early cinema. In this context, the term *screening* is still used today to refer to the showing of a film.¹¹ During the Second World War, the term was expanded to include the use of radar screens as performing the act of screening.¹²

It will not be possible here to delve into the long history of terms used synonymously with the *screen*, such as *Bildschirm* (German), or to explore the understanding of the term to mean protection against radiation, as a *display*, that is, as something unfolding, and as a monitor, that is, as something controlling and observing.¹³ What is essential for our purposes in this volume is the etymological relationship of *screen* and

⁷ Birgit Schneider: “‘Shoot(ing) the image’ – A look at screen images from a meta-pictorial and media-archaeological perspective”, in: Winfried Gerling, Sebastian Möring and Marco De Mutiis (ed.): *Screen Images – In-Game Photography, Screenshot, Screencast*, Berlin 2022, pp. 53–76.

⁸ Doris Bravo: “Screen”, in: *The University of Chicago – Theories of Media – Keywords Glossary*, Winter 2003, <https://csmt.uchicago.edu/glossary2004/screen.htm> (last seen: June 29, 2022).

⁹ (Art.) “Schirm”, in: *Grimm online*, no date, <http://woerterbuchnetz.de/DWB/>, no date, (last seen: June 29, 2022).

¹⁰ Ursula Frohne and Christian Katti: “Screen”, in: Jörn Schaffaff, Nina Schallenberg and Tobias Vogt (ed.): *Kunst-Begriffe der Gegenwart: von Allegorie bis Zip*, Cologne 2013, p. 255–263, here p. 257, quote translated by the authors.

¹¹ Cf. *ibid.*: p. 257 ff.

¹² Screening is also a systematic procedure for mass screening of a defined cross-section of the population.

¹³ For the complex history of the computer display and its related products see Tristan Thielmann: “Der einleuchtende Grund digitaler Bilder. Die Mediengeschichte und Medien-

Schirm as an object that simultaneously shields¹⁴ and shows something, thus distinguishing two processes and two spaces.¹⁵ An example of this can already be observed in the phantasmagorias that emerged in the 18th and 19th centuries, whereby images were projected onto a screen using rear projection in such a way that the projection apparatus (*Laterna Magica*) was deliberately concealed; at the same time, the origin of the image that appears is not visible, thus separating the apparatus-based production of the image – i. e., the technology – from the image itself.

Screen recordings and screenshots emerged as a result of the need to capture a moving and rapidly changing screen image directly. In this sense, it is very close to photography as a practice of recording, and perhaps photography arose from a similar need, namely the capturing of an image that is already an image before it is captured. In other words, it is possible that the matte screen of the camera obscura was the reason for a key part of photographic developments in the 19th century. Michel Frizot speaks in this context of the “copy of views in the camera obscura”.¹⁶ Indeed, as early as January 7, 1839, François Arago stated the following about the invention of the daguerreotype at a meeting of the Academy of Sciences in Paris:

The whole world [...] knows the apparatus called Camera Obscura or Darkroom, whose invention belongs to J.-B. Porta; the whole world has noticed with what sharpness, with what truth of shape, colour and sound the external objects will be reproduced on the *matte screen* placed in the focus of the lens that constitutes the essential part of the instrument; all the world, after admiring these pictures, was moved by the regret that they could not be captured. This regret will no longer be relevant: M. Daguerre has discovered special *plates* on which the optical image leaves a perfect imprint; *plates* on which everything that surrounded the image is reproduced down to the most minute details, with incredible accuracy and fineness.¹⁷

praxistheorie des Displays”, in: Ursula Frohne, Lilian Haberer and Annette Urban (ed.): *Display und Dispositiv: Ästhetische Ordnungen*, Paderborn 2019, p. 525–575.

¹⁴ Man’s relationship to their screens changed as a result of the pandemic. The screen now also functions as a means to protect against infection. See: Olga Moskatova: “Networked Screens: Topologies of Distance and Media Regime of Immunization”, in: *imgjournal* 2/3 (2020), pp. 282–305.

¹⁵ Perhaps two peculiarities of the early days of the computer should be mentioned here. Firstly, the ENIAC computer, whose display (10x10 pixels) showed the direct output of a calculation process as a non-readable representation of continuous symbolisations of numerical values, thus introducing the principle of individually controllable discrete light points into display development, and the Manchester Mark 1, in which modified cathode ray tubes (CRTs) actually served as displays and as main memory. *ibid.*, p. 548.

¹⁶ Michel Frizot: *Neue Geschichte der Fotografie*, Cologne 1998, p. 21. Quote translated by the authors.

¹⁷ Original text: “Tout le monde [...] connaît l’appareil d’optique appelé chambre obscure ou chambre noire, e dont l’invention appartient à J.-B. Porta; tout le monde a remarqué

The French protocol equates the matte screen of the camera obscura with the plate that records the image at the place where the matte screen is otherwise located as “écran”; this appears essential to the argument that the images were already there and admired before they were recorded, that is, before they could be recorded and the plate of the daguerreotype could take their place. This is also true for in-game photographs, which are screenshots that rely on the pre-existing image of the computer game.¹⁸

Henry Fox Talbot once noted the special speed with which photography was able to record an image: “[...] however numerous the objects – however complicated the arrangement – the Camera depicts them *all at once*”.¹⁹ In doing so, he also points to the instantaneous – the shot-like – nature of photography.

Still, the screenshot as a digital process is a copy of an image, a representation of digital data, not a photograph taken with a camera that reduces a three-dimensional space to two dimensions. Digital screenshots are pixel-exact positive copies (raster graphics) of the constellation of programme windows found on the respective screen – or an actively selected part of it – at the moment of the screenshot. Their edges are arbitrarily determined, and today the cursor is mostly hidden.²⁰ They are usually rectangular (orthogonal) and have no central perspective characteristics.

The screenshot is the capture of a temporary state in the graphical interface. This includes different concepts and visualities appearing simultaneously in screenshots: texts, images, software interfaces, 3D simulations, games etc. With its clear two-dimensionality, it is closer to the photogram as a form of camera-less photography than to photography. It

avec quelle netteté, avec quelle vérité de forme, *de couleur* et de ton, les objets extérieurs vont se reproduire sur *l'écran* place au foyer de la large lentille qui constitue la partie essentielle des cet instrument; tout le monde, après avoir admire ces images, s'est abandonné au regret qu'elles ne pussent pas être conservées. Ce regret sera désormais sans objet: M. Daguerre a découvert des *écrans* particuliers sur lesquels l'image optique laisse une empreinte parfaite; des *écrans* où tout ce que l'image renfermait se trouve reproduit jusque dans les plus minutieux détails, avec une exactitude, avec une finesse incroyable”, Dominique François Arago: “Protocol of the meeting of January 7, 1839”, in: *Comptes rendus hebdomadaires des séances de l'Academie des Sciences* 8 (1839), pp. 637–668, here p. 4. Emphasis in the quote by Gerling, Möring, De Mutiis.

¹⁸ See also these chapters in this book: Cindy Poremba: “Ansel and the (T/M)aking of Amateur Game Photography”, in: Winfried Gerling, Sebastian Möring and Marco De Mutiis (ed.): *Screen Images – In-Game Photography, Screenshot, Screencast*, Berlin 2022, pp. 223–243. Sebastian Möring: “The Conditional Cyberimage – On the Role of Gameplay in Artistic In-Game Photography”, in: Winfried Gerling, Sebastian Möring and Marco De Mutiis (ed.): *Screen Images – In-Game Photography, Screenshot, Screencast*, Berlin 2022, pp. 263–282.

¹⁹ See “Plate III. Articles of China”, in: Henry Fox Talbot: *The Pencil of Nature*, London 1844. Emphasis in the quote by the authors.

²⁰ It wasn't always so. Today, the operating system allows you to set whether the cursor is displayed in the screenshot or not.

is noteworthy that some of the earliest attempts to produce photographs were designed as copies: Niepce's first heliographies consisted of contact copies of prints and texts. Talbot was also still experimenting with the direct copying²¹ of printed texts and the photography of lithographs.²² In a recent study of in-game photography, Seth Giddings has drawn similar conclusions regarding the ontological status of the in-game photograph.²³

Much like capturing images from the camera obscura, the copy as a photographic process for the improvement and / or simplification of the printing technique stood at the beginning of the history of photography. In other words, rather than pursuing originality, one of the key goals was to achieve the ability to copy already printed pictures. This two-dimensional practice is thus very close to the pixel-identical copies of the screenshot. Like the photogram, the screenshot is an image on a scale of 1:1 and has no perspective characteristics. Unlike optical photography, the screenshot and the photogram do not show a section of potentially infinite elements; instead, they show an image of elements that are arranged in a special way towards the section, even though the chosen section can be very arbitrary.

This image is not like the image of a camera, i. e., it is not the two-dimensional section of an infinite three-dimensional space. It is not generated by a *virtual camera* and thus does not originate from an optical paradigm. It is the image of a two-dimensional space whose organisation explicitly refers to the visible section. This clearly distinguishes the screenshot from the photograph. Theoretically and arithmetically, the space behind the monitor is now infinite, and something can be shifted off-screen at any time. In the early Graphical User Interfaces (GUIs), this was not yet the case.²⁴ Due to memory limitations, it was impossible to move the windows over the edge of the monitor. The resulting screen photographs and screenshots were fitted into the frame of the monitor in a different way than today. They do not show a supposed detail, but consequently everything that was on the monitor, and they do not refer beyond its edge. This is figuratively also a testimony to the closed nature of earlier personal computers, which disappeared in the course of their development due to their networking. In this sense, the screenshot also documents the changes to the systems on

²¹ See "Plate IX. Fac-Simile of and old Printed Page", in: Henry Fox Talbot: *The Pencil of Nature*, London 1844.

²² See "Plate XI. Copy of a Lithographic Print", in: Henry Fox Talbot: *The Pencil of Nature*, London 1844.

²³ See also Seth Giddings: "Drawing without Light", in: Martin Lister (ed.): *The Photographic Image in Digital Culture*, Abingdon, Oxon 2013, pp. 41-55.

²⁴ For example in the Xerox Star (1981) or Apple Macintosh (1984).

which it can be executed, that is, from non-networked desktop computers and computers with internet access to today's mobile systems, laptops, tablets and smartphones into which this function has been integrated.

Taking a screenshot is a photographic practice that was implemented as a function in these computers in the early 1980s with the establishment of the personal or home computer. When "computers became domestic",²⁵ it was apparently important to be able to record what was visible on the screens. Especially when the multitasking arrangements appeared in different programme windows on the screen, and before the introduction of the screenshot, it was only possible to export image formats from one programme at a time, at least as long as it was a graphics or image editing programme and never everything that appeared on the screen.

This need to record on-screen activity was then extended to computer games. Computer games entered households and living rooms alongside televisions and computing devices ranging from gaming consoles to personal computers and have since become an indispensable part of everyday life. As a result, the practice of in-game photography has emerged and, just like real-world photography, it also ranges from an everyday practice to an acknowledged form of artistic expression.²⁶ Yet only in recent years can one observe a slowly growing theoretical discourse about these practices and related kinds of images.

From this point on, we develop one possible method of classifying screen images categorised according to the prepositions *on*, *in*, *through*, *beneath* and *in front of*.²⁷

On (#materiality, #physicality):

This category contains all images / cases that consciously or unconsciously make the materiality of the screen visible. These include scratches, fingerprints, reflections and curvatures, but also the screen as an object

²⁵ See Sophie Ehrmantraut: *Wie Computer heimisch wurden – Zur Diskursgeschichte des Personal Computers*, Bielefeld 2019. Quote translated by the authors.

²⁶ Rauch: "Virtual Light: Exploring In-Game Photography and Photo History", in: *videogame-tourism.at*, op. cit.

²⁷ This classification is the result of a longer work with students of the European Media Studies Program at University of Potsdam and the University of Applied Sciences Potsdam over a series of seminars whose contribution shall be acknowledged: Joana Bußmann, Malin Drosihn, Fynn Jedrysek, Sina Jurkowlanec, Juliette Fonfara, Pia Naomie Herrmann, Isabelle Knispel, Nicole Krüger, Kira Huth, Isis-Victoria Rampf, Leni Roller, Konstanze Stoll and Rebecca Vaßen.

that stands as an object that resists the repeatedly claimed immateriality of the digital.

When in use, a screen itself, in its materiality, is rarely perceived. Instead, it acts as a window to other worlds. When the screen is turned off, it is rarely given any attention. A switched-off medium is hardly noticed, because it usually does not communicate anything. At best, it finds a temporary new usage as a black mirror. On the other hand, screens are constantly being touched and remain in close contact with the users at all times: they are carried around as smartphones, smartwatches, laptops, tablets, etc. Users also take care of their screens and have a strong affective physical relationship with them.



Fig. 1: for example: Penelope Umbrico: *TVs from Craigslist*, 2008.

Screenshots have a photographic history that goes hand in hand with the standardisation of the photographing of screens (screen photography or *Bildschirmfotografie*) or radiological luminous screens, the development of the so-called “*Schirmbildfotografie*” (screen photography).

In the context of tuberculosis screening, the Brazilian medical doctor Manuel Dias de Abreu²⁸ developed a standardised procedure (1936) that made the large-scale, expensive X-ray film obsolete by directly photographing the fluorescent screen of an X-ray machine using a device with an integrated 35 mm camera, thus generating only one hundredth of the

²⁸ Manuel Dias de Abreu (Januar 4, 1894 - January 30, 1962). This technique was then called *Abreugraphy*, see “*Chest photofluorography*”, in: *Wikipedia*, no date, https://en.wikipedia.org/wiki/Chest_photofluorography (last seen: June 29, 2022).

cost of an image.²⁹ This represented a major step forward for the health system, as the so-called mass screening of tuberculosis became easier to implement.

“Schirmbildfotografie” (screen photography) has been developed further for various scientific visualisation techniques, e. g., for recording images of the cathode ray tube (CRT) screen of an oscilloscope or of computer monitors that function accordingly. For this purpose, separate camera types and devices were developed, which since the 1950s have primarily used the Polaroid method to obtain and archive direct recordings of the measured values. This equipment is needed because the images to be recorded cannot be reproduced or stored by the data-generating technology themselves.

What distinguishes these practices from screenshots is that they capture the front of the monitor, with its complex materiality, whether or not it comes to the fore. “Schirmbildfotografie” or “Bildschirmfotografie” (screen photography) was established to denote the photographic recording of a luminous screen, i. e., the “external” photographing of a screen with a camera, as opposed to the “internal” recording (screenshot), which is actually a storing. “Schirmbilder” (screen pictures) show the front of the device, while screenshots capture an internal process as a copy.

The photographing of computer screens began systematically in the early 1960s as a way of making the work being done on the first CAD computers visible to a wider audience. At that time, it was mainly computer scientists and developers who were using these expensive computers in a few scientific and military laboratories, where it quickly became apparent that they were going to have to find a method to make this kind of knowledge production visible and communicable. Matthew Allen describes this process as a conventionalisation of the screenshot, even though at that time it was still generated analogously with a camera in front of the screen as a screenshot.³⁰ Here, it becomes of utmost importance that it is clear where the images come from: “The sense of it being ‘from the screen’ was the most important content of the image.”³¹ Thus the new technology was also communicated as a new ideology. In his short intervention in this volume, Jacob Gaboury suggests that we consider early computer

²⁹ The first Schirmbildaufnahme (Screen Photography) was published by J.M. Bleyer in 1896. But the method was not suitable for mass investigations. See Dorothee Romberg: *Die Röntgenreihenuntersuchung (RRU) als Mittel der Tuberkuloseprävention in Deutschland nach 1945*, PhD Thesis, University of Cologne 2011, p. 30 ff.

³⁰ Matthew Allen: “Representing Computer-Aided Design: Screenshots and the Interactive Computer circa 1960”, in: *Perspectives on Science* 24/6 (2016), pp. 637–668, here p. 656.

³¹ *Ibid.*, p. 658.

plots as precursors – but also as essential parts – of the history of visual computational output, such as screens and screenshots.³²

The momentary state of a visual output is to be recorded as a singular, spontaneous photo-graphical recording and, if possible, not processed further, making it possible to store and permanently save the image of a temporary reality – as a document – in order to be able to archive it and communicate it to others. Screen photographs are thus strange hybrids; they create the image of a clear, two-dimensional order by means of an optical system, but their access is materially limited to the surface of the apparatus. This means that they bring the materiality of the screen to view – including curvatures, opacities, scratches and fingerprints – without pointing it out. It is noteworthy that most of these early images were chiefly recorded on Polaroid material. This was due to the fact that such an image was seen more as a copy or backup copy of the image shown on the screen – a copy that could be filed immediately – rather than some kind of photographic testimony. In fact, evidence of one of the most formative developments of the 20th century is still available today as a series of small Polaroids photographed by hand: the development of the Apple Lisa interface and the first graphical programmes like “Quick Draw” was documented by computer scientist Bill Atkinson in roughly 1979–1982.³³

Stephan Günzel makes metaphorical use of the materiality of the screen in his chapter in this volume, ruminating on the “nature of images” while discussing different characteristics of television-screen photography.³⁴ Along a similar line, in his brief essay in this volume, Friedrich Tietjen focuses on two very distinct screen photographs and their roles as historical witnesses.³⁵ Artist Gareth Damian Martin further complicates this separation between screen and image in their project *The Continuous City*, where they take analogue photographs of screenshots taken in computer game architectural environments.³⁶

³² Jacob Gaboury: “Paper Computing and Early Screenshot Cultures”, in: Winfried Gerling, Sebastian Möring and Marco De Mutiis (ed.): *Screen Images - In-Game Photography, Screenshot, Screencast*, Berlin 2022, pp. 87–92.

³³ See Andy Hertzfeld: *Revolution in the Valley*, Sebastopol/ Calif. 2005, pp. 89–97.

³⁴ Stephan Günzel: “Image Reflection: Television-Screen Photography”, in: Winfried Gerling, Sebastian Möring and Marco De Mutiis (ed.): *Screen Images - In-Game Photography, Screenshot, Screencast*, Berlin 2022, pp. 145–159.

³⁵ Friedrich Tietjen: “Documenting Witnessing: Two Cases of TV-Screen Photography”, in: Winfried Gerling, Sebastian Möring and Marco De Mutiis (ed.): *Screen Images - In-Game Photography, Screenshot, Screencast*, Berlin 2022, pp. 301–306.

³⁶ Gareth Damian Martin: “Pathways (Extracted from *The Continuous City*)”, in: Winfried Gerling, Sebastian Möring and Marco De Mutiis (ed.): *Screen Images - In-Game Photography, Screenshot, Screencast*, Berlin 2022, pp. 79–85.