

FRANKFURTER  
KUNSTVEREIN

EVA & FRANCO MATTES



14.07\_10.09.2023

FAKE VIEWS

## ART DESCRIPTIONS

### Fake Views – Eva & Franco Mattes

14.07. – 10.09.2023

*Personal Photographs November 2007, 2019*

#### Installation

Customized cable trays from OBO Bettermann, ethernet cables, digital images, single-board computers, metal cases, micro SD cards, USB flash drives, ethernet adapters, own-developed software

Dimensions variable

Courtesy the artists and Apalazzo Gallery

*Personal Photographs November 2007* is a self-contained network between two Raspberry Pi microcomputers connected by cables and constantly exchanging files with each other. The cables and cable trays create a temporary site-specific sculpture. As the title of the installation suggests, 101 personal photos of the fellow artists circulate in the closed system. The image files, however, remain deliberately invisible to the visitors – images without viewers, yet always there. Like most images nowadays.

The installation is based on the code developed with David Huerta and available on the Github open-source platform. Huerta is a digital security trainer at the Freedom of the Press Foundation, where he works on ways to train journalists to take advantage of privacy-enhancing technologies to strengthen a free press. Open sourcing allows developers and artists worldwide to use, extend and adapt the code.

The image files circulating in the *Personal Photographs* system were taken by Eva & Franco Mattes in November 2007. The selection gives an impression of the huge quantity of images that accumulate on mobile phones, computers and data centres as communication and interaction increasingly take place in the form of digital images and are uploaded in vast quantities.

Since the public internet first emerged, there have been significant phases of development. Initially used as a read-only instrument – i.e. purely for accessing information – it became an interactive communication network. Direct user participation became possible from 2004 on with the introduction of Web 2.0, enabling anyone to generate and publish content themselves. In

subsequent waves, image platforms became the trend, replacing each other in ever more rapid succession: the image host Flickr (2004), the photo blog Wordpress (2005), the social network Facebook (2004), the microblogging service Twitter (2006), Instagram (2010) or TikTok (2016) as well as instant messaging apps like WhatsApp (2009), Snapchat (2011) and BeReal (2020).

The vast majority of images nowadays do not exist in the form of printed photographs, hung on a wall or featured in a book, rather as ubiquitous files that are constantly copied and transferred between devices, from one data centre to another, via miles of cables or through thin air.

The voluntary participation of all users worldwide offers the few global internet corporations the possibility of using the totality of published content as data sets. On the one hand, little awareness exists of the corporations' access to the data. On the other hand, the accumulation of information by the small number of major corporations is so frighteningly high that they can use big data management to make predictions about collective behaviour – and also to exercise control over societies. Politics and democratic structures lag behind.

Digital images reveal additional information via the metadata: the date and time the picture was taken, geographical coordinates, but also details about the technology used. Thus, when images are shared, additional information is unwittingly passed on to the public. Furthermore, since its creation, social media content has also been used as data sets for machine learning without the knowledge of the users.

While users upload content on social media for entertainment and leisure, this accessible information is used and monetised by companies to generate revenue with no concern for authorship.

Long before the advent of social media, Eva & Franco Mattes explored the sharing of personal information. In their performance titled *Life Sharing*, which took place from 2000 to 2003, the artists published all the contents of their computer: all their artworks, as well as private material – including emails, texts, photos, and bank statements – were freely available for viewing through their website. Considered a radical – and paradoxical – gesture at the time, today this act of excessive sharing is perceived as acceptable, even desirable, on social media.

Through their installation *Personal Photographs*, the artists revise this practice and exhibit a private archive to which outsiders have no access. Only the support structure, the hardware, remains in the space as a sculptural manifestation.

What is revealed here is not their private space, rather the infrastructure of data. The materiality creates a presence in the space, reminding us that digital content and images require a material infrastructure to be stored, sent and shared. The physical fragility of digital networks is transformed into sculpture. Adapting to the pre-existent architecture, it influences the way visitors move in the space. In this case it only channels physical movements, but of course technology shapes our behaviour, emotions, memories, expectations, fears and dreams, too.

*BEFNOED*, 2014 (ongoing)

Video installation

Five videos, monitors, customized wall brackets, cables

Dimensions and duration variable

Courtesy the artists and Apalazzo Gallery

*BEFNOED* is the title of an ongoing series of videos that Eva & Franco Mattes have been producing since 2013. These short films are published online, on obscure, peripheral or forgotten social networks around the world, in Cambodia, Russia, China or Pakistan, without comment and without reference to any art project: places where the works are meant to be found almost by chance.

The videos show people carrying out seemingly meaningless actions that they have received as instructions from the artistic duo. Eva & Franco Mattes have hired these performers anonymously via online marketplaces for digital services, so-called crowdsourcing platforms. The people film themselves without knowing who the instructions come from, which audience the films are intended for or what goals are to be pursued with them. Different workers interpret the same performance with slight variations: a military salute with a bucket on one's head, standing on a ladder, licking a car rim, two people connecting their heads through a tube.

For the exhibition, these films are spatially staged in such a way that the viewers, if they want to see the works, also have to perform a physical act that contradicts behaviour normally found in museum spaces.

The visitors have to lie on the floor under a monitor tent or lift each other up in order to look at one of the monitors that points to the ceiling above their heads. If they wish to see the images, they are obliged to squeeze between the monitor and the wall. This creates a physical interaction with the artwork that reveals a correlation between the unaware performers on the net and the unaware performers in the room. In the same way that the digitally recruited workers bow to a request from the artists, so too the visitors must adapt their behaviour to the artwork. Both actions, the digital and the analogue, celebrate absurdity, which at some points can bring to mind Erwin Wurm's Living Sculptures. 'We become what we behold. We shape our tools and then our tools shape us' (Marshall McLuhan). The repetition of externally determined actions online is a highly common and successful practice, upon which the platform TikTok, for example, has built an entire business model.

As with numerous other works by the artistic duo, *BEFNOED* also works with irony, whereby the user's behaviour in front of and behind the screen is humorously caricatured.

Eva & Franco Mattes address the mechanisms of labour in the digital world, which trade workforce as a commodity on an internationally digital labour market. The title *BEFNOED* is an acronym for 'By everyone, for no one, every day'. Thus, the central question in this video series concerns gig workers, the people in the crowdsourcing economy, their work, authorship and individuality. Someone on the other side of the screen is fulfilling our requests, whether they be

clicks, likes, online shopping. An action that seems immaterial to us has a direct impact on someone's work on the other side of the world.

Crowdsourcing platforms function as anonymous marketplaces for employees and employers looking for short-term jobs for HITs (Human Intelligence Tasks). This concerns all services that can be outsourced online and are summarised by the term 'human as a service'.

So-called contractors are often interposed between the employee and the employer for the purpose of ensuring the latter anonymity. The advantage of this work model is that it represents a quick and easy way to earn money flexibly. The disadvantage is the risk that workers' rights and non-wage labour costs are circumvented. As a Facebook content moderator aptly describes in Eva & Franco Mattes' work *The Bots*, it creates 'a digital proletariat and a digital factory that produces no concrete products and is driven by profit alone'.

The first crowdsourcing platform for micro-labour (gigs), Mechanical Turk, was set up by Amazon in 2005. This marked the beginning of an increasingly deregulated labour market or labour pool. Mechanical Turk is the best-known and largest example of a platform where micro-tasks that cannot (yet) be performed using computing power are commissioned at low cost. There is a sense that this is a transitional period in which humans are still doing these kinds of jobs until they are taken over by algorithms. An important point is that it is still much more profitable to exploit low-paid human labour than to pay engineers to develop software. According to estimates, the turks' average wage is around 2 dollars per hour. The micro work offered is often remunerated with credits on Amazon accounts - thus representing a double profit for the platform. Mechanical Turk was followed by numerous other crowdsourcing platforms such as Clickworker or Appjobber.

The original Mechanical Turk (1770) was a seemingly ground-breaking invention: a chess playing machine commissioned by Empress Maria Theresa of Austria in the early days of the Industrial Revolution. Externally, it resembled the other automata of the time. The machine could imitate the movements of a human playing chess, but a person was hiding inside it. For almost a century, the trick led viewers to believe that a machine could play chess. So the name of the Mechanical Turk platform is intended to suggest something that feels like a machine but has humans behind it. Humans work to fill the gaps of algorithms while training the latter to do a better job in future. For this reason, their work serving algorithms is less and less considered actual work and takes place invisibly in the background. The work *BEFNOED* provides visibility to these otherwise invisible workers, allowing them to engage in creative actions that are sometimes humorous and occasionally even poetic.

### *The Bots*, 2020

Video installation

Actors and actresses: Irina Cocimarov, Jesse Hoffman, Jake Levy, Alexandra Marzella, Ruby McCollister, Bobbi Salvör Menez

Six customised OKA desks, monitors, videos, headphones, cables

Dimensions and length variable

Courtesy the artists and Apalazzo Gallery

For *The Bots*, Eva & Franco Mattes collaborated with investigative journalist Adrian Chen and actors and actresses Irina Cocimarov, Jesse Hoffman, Jake Levy, Alexandra Marzella, Ruby McCollister, and Bobbi Salvör Menuez. They present anonymous testimonies from content moderators who have worked for Facebook in Berlin. Six videos have been created. In the room, visitors observe raised tabletops that form a minimalist installation. These tabletops are a reference to the furniture found in the Berlin moderation centre where the interviewees worked. The videos become visible to viewers only when they step behind the erected barrier and look behind the surface of the work.

What do we know about the mechanisms and regulations of social media channels that we use daily? Which contents remain visible and which are filtered out? And are there clear guidelines according to which content is deleted?

The films were executed with the typical aesthetic and features of online make-up tutorials. The statements in the films are derived from investigative research and interviews conducted with numerous witnesses employed as service providers for Facebook. The films were interpreted by actors so as to anonymise the statements of the content moderators. They perform the role of influencers addressing their followers directly. They recorded the videos using smartphones, for which reason the images are in portrait format. Advice on make-up products alternates with distressing descriptions of moderators' work.

Content on social media channels is subject to restrictions and is thus scrutinised and monitored. Platforms claim to regulate their content through community guidelines. Some channels like Telegram also allow uncensored and problematic content. The guidelines cannot prevent thousands of 'prohibited' content from being posted online daily, however: violence, sexual assaults, hate speech, terrorism and pornography are just some of the categories of unwanted content on social media. Most of this content we cannot see, as it is deleted beforehand. This critical review is always carried out by human beings, i.e. it is not an automated cleansing process performed by algorithms. While programs filter content that appears to violate the guidelines of the respective platform, they cannot usually provide an independent interpretation of a post's specific context.

In their work *The Bots*, Eva & Franco Mattes explicitly draw attention to the fact that critical content is seen and processed in large quantities by individuals. They are not bots, nor programs, but humans. They are called 'content moderators', and their profession falls within the category of 'unregulated' jobs that have emerged with the rise of tech companies (e.g. Amazon's Mechanical Turk).

In the case of crowd-sourced job placement, content moderators often do not know themselves which companies they are working for. They are employed by so-called contractors who broker between tech giants like Google, Meta, YouTube, Twitter and the employees. In this way, the anonymity of the companies is preserved, their legal responsibility minimised and protected by

non-disclosure agreements. Working conditions are neither publicly debated nor politically regulated. Services are governed by temporary employment contracts and are minimally paid.

Thanks to investigative journalism, reports on misconduct have nevertheless repeatedly reached the public domain in recent years. Journalist Adrian Chen was the first to shed light on the topic with his 2014 article in Wired titled 'The Laborers Who Keep Dick Pics and Beheadings Out of Your Facebook Feed'. Eva & Franco Mattes have been collaborating with Chen for years.

One of the main problems is that content moderators have to review thousands of posts daily before deleting them. Beheadings, child pornography, explicit violence of all kinds, fanatical hate speeches, and many other expressions of the depths of human depravity, as well as the sheer flood of banal uploads, leave in their wake trauma and profound disturbance in people.

While guidelines exist on the classification of objectionable content, these are not made public and must be kept secret by content moderators. The regulations are subject to daily changes. In order to quantify the moderators' performance, a minimum deletion rate of 95% of the contributions must be achieved, otherwise the employee is sacked. According to anonymous statements made by employees, workers are monitored and under intense pressure to perform.

In many cultures, the rules are adapted to fit the locally prevailing conception of morality. Also, content moderation is often carried out by workers in the Global South, Asia and former colonies. The reason for this, apart from unregulated labour law, is a command of Western languages and an awareness of Western moral sensibilities.

However, even moderators are not objective filters. Despite guidelines, the process is subjective, influenced by individual interpretations. Content is removed, for example, when it is deemed politically or ideologically inappropriate. One's own political leanings can potentially influence moderation decisions.

Through their choice of aesthetic, Eva & Franco Mattes create a deliberately jolting break with the content. They employ the staging of make-up tutorials for their artistic work. Political content is camouflaged to avoid censorship. This approach derives from activists who use this method to bring political messages and human rights violations in autocratic states to the public's attention. It was the young TikTok user and activist Feroza Azis who filmed herself putting on make-up a few years ago in order to circumvent the censorship of the Chinese government. This enabled her to speak freely about the systematic repression and surveillance of Uyghurs in northwest China before she was blocked from the platform.

At the same time, make-up as a subject is to be understood symbolically. As the artists themselves say: 'Make-up is a way of concealing imperfections in our faces, not much different from content moderation, which beautifies the surface of the internet by removing unwanted content.'

*Abuse Standards Violations*, 2016, 2018, 2021

Wall mounted Plexiglas panels with content moderation guidelines  
UV print on plexiglass, various insulation materials, spacers, screws  
100 x 100 cm / 150 x 100 cm  
Courtesy the artists and Apalazzo Gallery

The presentation of *The Bots* is added to by the nine-part work *Abuse Standards Violations*, which marks the beginning of Eva and Franco Mattes' research on the subject of content moderation. It takes as its theme the issue of the morality of social media and the tech giants associated with it.

Nine wall plexiglass frames, filled with insulation materials, present corporate guidelines, for example excerpts from the Facebook Community Standards, which are not intended for public viewing but for internal purposes only. The companies that have produced these guidelines are almost all unknown, as they wish to remain anonymous. Most of the time even the moderators themselves do not know who their employer is – one of them told Eva & Franco Mattes: 'I'm pretty sure I work for Google'. The guidelines against violations of abuse standards set moral boundaries for what the companies consider questionable content on social media, laying down what is defined as racist, hateful, controversial, terroristic, pornographic or violent and thus to be removed. 'Clean' or 'OK to show' refers to images that are considered proper and therefore can circulate on social media, like 'Shirtless but wearing pants or shirts (and not more than the top band of their underwear is visible)'; 'inappropriate' images may include politics and controversial social issues and so should be filtered. 'Safe' content includes fine art and celebrity gossip. Despite set guidelines, there is confusion as to when content should be removed, and who gets to decide what to remove. At this point interpretation made by humans is required, an algorithm-based assessment being insufficient.

The policies of large social media platforms change daily. They adapt to current social and political events. Since most IT companies are based in California, they mostly follow the guidelines of US laws and US 'morality', yet strive to be sensitive to local and culturally specific morals. The difficulty lies in exercising content moderation for all cultural contexts in a way that avoids the danger of allowing cultural biases to become political interpretation.

### *Up Next*, 2023

Video installation, raised floor like in data centers  
24:04 min  
Courtesy the artists and Apalazzo Gallery

The Frankfurter Kunstverein is premiering Eva & Franco Mattes' new video work, *Up Next*. This piece takes as its subject the fate of Fatemeh Khishvand (\*2001, Tehran, Iran), who became known as Sahar Tabar on Instagram. Her story turned into a phenomenon of internet culture. The case of Fatemeh Khishvand touches on many themes that Eva & Franco Mattes explore in their

work: visibility, misinformation, the dissemination of images, meme culture, virality, exploitation and manipulation.

Since 2019, the artist duo has been following the case of the Iranian social media celebrity and archiving thousands of related photos and articles. For the video slideshow, which is conceived entirely without sound, the artists have selected a hundred images: Tabar's selfie photos alternate with unverified quotes from articles about the blogger, primarily clickbait articles that have spread mostly derogatory, contradictory, and at times false information about the Instagrammer.

In between the individual images, the artist duo inserts black frames, empty pauses. These are meant to give viewers time to reflect on the veracity of what they have seen. This stylistic device breaks with the speed of the mode on Instagram that sets the time limit for Stories and Reels. These may not exceed a maximum duration of 15 and 90 seconds respectively and are continuously played back without interruption. This is all part of a strategy inherent to social media. It was designed to generate neural reactions resembling addiction, triggered by the constant flow of new visual stimuli. This phenomenon is part of the so-called attention economy prevailing in the social media world and has permanently changed our viewing habits.

During peak periods, up to 486,000 people followed Tabar's Instagram profile. She posted selfies showing herself with exaggerated lips, a pointed, snub nose, pale skin, brightly coloured hair, dark circles around her eyes and bony arms and legs. The resulting aesthetic drew similarities to costumes, zombies, or animated characters, such as Tim Burton's *Corpse Bride* (2005).

Although the blogger mainly simulated this aesthetic by means of makeup, Photoshop, and filters, she was accused of using lip fillers, liposuction and rhinoplasty by the clickbait press and internet public. This led to a wave of outrage and scandalisation. These speculations were backed up by the citing of dubious sources.

Tabar's profile garnered significant attention, especially when online gossip sites pointed out her resemblance to actress Angelina Jolie, dubbing her 'Zombie Angelina Jolie'. They even claimed that she underwent up to 50 medical procedures to resemble the actress. This was just one of the many confusing statements that online tabloids posted, which then went viral.

Many of the media outlets reporting on the case never questioned whether it could be a parody and so a media hoax. Rather than discussing the plausibility of the case itself, the tabloid public became indignant over the young woman. It was precisely this outrage, surprise and uncritical attitude on the part of the online audience that turned Tabar into a global phenomenon.

What can be symbolically observed in this case is the power of misinterpretation and fake news as fuel for an online economy of excitement and scandalisation. Tabar herself declared her appearances as online selfie performances in the tradition of Cindy Sherman.



The staging of fictional identities is a recurring element in art. Cindy Sherman, for example, assumed the appearance of mostly female characters in her works from the 1970s to the early 2000s by arranging clothing, hairstyles and different visual contexts. On her current Instagram account, Sherman posts self-portraits that take the alterations of reality through modern filters to extremes. Younger artists, too, such as Amalia Ullman, have invented fictional identities on Instagram, confusing and entertaining an online audience in equal measure.

Historically, playing with pseudonyms has a long tradition: artists like Marcel Duchamp, whose alter ego was called Rose Sélavy, Lynn Hershman Leeson with numerous fictional personalities, as well as Eva & Franco Mattes with the invented artist Darko Maver in 1998. His fictional life and works spread through the media and the art world. Maver's career reached its media peak in 1999 with his invitation to the 48<sup>th</sup> Venice Biennale. Later, the artist duo declared publicly that both Maver's life and his works were invented.

In their modern and contemporary form, these staged performances have developed into collective online performances in which millions of people participate every day on Instagram, in the form of photos and reels, stories and selfies, make-up tutorials and 'outfits of the day'.

The media phenomenon surrounding the figure of Tabar led to a dramatic turn of events in real life. On October 22, 2019, the Iranian news agency Tasmin reported that Fatemeh Khishwand had been officially charged and arrested in Tehran on charges of 'blasphemy, incitement to violence, illegal acquisition of property, violation of the national dress code and encouraging young people to corruption'.

This is not an isolated case. Since 2016, Iranian female influencers have been increasingly arrested for their online activities.

At the time of Khishwand's arrest, Instagram was still permitted as a social media platform in Iran. Twitter and Facebook were already blocked by the government. However, anonymity and freedom of speech were not guaranteed on Instagram either. Given the current backdrop in Iran and the protests for women's rights, Tabar's story has gained in importance in the context of the significance of social media channels. From the Arab Spring onwards, these channels have played a central role in enabling civil disobedience, the networking of protesters and the dissemination of independent news.

Since 2011, social media has provided the opportunity for an open-source investigation that aims to document and denounce human rights violations. In autocratic states, such investigations are observed, restricted or blocked. At the same time, the Iranian government has learned how to use social media to its advantage, transforming it from a tool of information to one of disinformation, control, surveillance, and political manipulation – a means of restricting freedom. Sahar Tabar's Instagram account was deleted at the time of her arrest. While her online persona remains visible, it is overshadowed and unrecognisable due to numerous fake news and fake profiles superimposed upon it.

Why do Eva & Franco Mattes take on this phenomenon? The two artists repeatedly raise broader questions about the authenticity of images and information, the staging and ambivalence that prevail in the digital sphere. The overarching theme is the manipulation of identity online and the way these fakes feed back into real-life society. Digital and analogue communication today form a single unit, indivisible and interwoven.

### *P2P, 2022*

Server sharing artworks by Nora Al-Badri, Simon Denny, Do Not Research, Olia Lialina, Jill Magid and Jon Rafman through the P2P file sharing network

Server cage, server cabinet, rack server, file, Torrent software, internet connection, neon lights

Dimensions variable

Courtesy the artists and Apalazzo Gallery

In the last room of the exhibition tour is the new work *P2P*. With their installation, Eva & Franco Mattes take as their theme the phenomenon of peer communities that have emerged over the last twenty years for the exchange of works and knowledge. The central element of the installation is a mobile server standing in a grid cage. Its design was developed jointly with the Italian architectural firm Salottobuono and is based on existing data centres, of which Frankfurt has the highest concentration in Europe.

The server is connected to a peer-to-peer network and the internet via the infrastructure of the Frankfurter Kunstverein. It is part of a network in which six digital artworks by Nora Al-Badri, Simon Denny, Do Not Research, Olia Lialina, Jill Magid and Jon Rafman circulate. The six works include choral music supported by Artificial Intelligence, a collective 409-page PDF book created in a Discord channel, a new caption for a famous painting, a screencast of a long-defunct website, a series of animated gifs inspired by tech conferences, and a 3D scan and poster that challenges the colonial notion of ownership. These never before shown works were created by the six international artists for the exhibition at the Frankfurter Kunstverein to be distributed online. They belong to the community around Eva & Franco Mattes, at whose invitation they created the works. The result is an exhibition within the exhibition, one that takes place within the peer-to-peer network community run by the artists. The Frankfurter Kunstverein, and so more generally an art institution, becomes a data centre that hosts and shares content, making it accessible to an extended, global community of users.

For visitors in the Frankfurter Kunstverein, the artworks remain hidden to begin with. The server has no output modules such as monitors or speakers. The only indication of the functioning system are the flashing lights and the noise of the fan. In order to view the works, viewers must join Eva & Franco Mattes' peer-to-peer network, to which they are invited. In this network, the artworks are distributed across different locations, accessible to all those who become part of the system and actively share the files with others.

Unlike conventional servers, peer-to-peer networks store data in a decentralised way. The networks are anonymous, free from commercial interest, data mining and surveillance.

Participants in these communities, known as peers, take part by connecting their computers to the system. This makes them clients and servers at the same time - meaning, users and hosts. They are all authorised to upload files to or download files from the network. They interact with each other on an equal footing by sharing resources such as files, bandwidth or computing power directly with one other. This increases the efficiency of the individual and at the same time the resilience of the system. Peer-to-peer networks are also resistant to failures because there is no single central component that can bring down the entire network. Potentially, the system is infinitely scalable due to the number of new participants.

The peer-to-peer network creates a horizontal structure in which all participants are equal actors. The work *P2P* contemplates the impact of the digital age on the art world and introduces new possibilities of artistic exchange, distribution and preservation of digital works. Moreover, *P2P* takes as its theme the value of collaboration, equal access to content and, in the case of Eva & Franco Mattes' work, to art and the democratisation of the creative process. By hosting the work, the Frankfurter Kunstverein, as a public institution, contributes directly to the dissemination and preservation of art on the internet.

At the same time, the *P2P* installation stands for the conceptual approach of the artist duo. Content, form and material are mutually dependent. The additional empty space is a common feature that implies further endless expansion to accommodate more data. The monolith in the cage, simultaneously covered and framed, becomes the formal centre of the artworks and proof of the pervasiveness of their content, which invites active and decentralised participation in the torrent network.

What is a peer-to-peer network and how did these distributed work communities come into being? The use of peer-to-peer networks began in the early 2000s. At the same time, technologies like the file-sharing protocol BitTorrent and software like Napster and eDonkey2000 spread. They revolutionised the exchange of digital content, as for the first time they bypassed dependence on centralised servers and bandwidth limitations. For many artists, for example, this meant being able to share their artwork directly with a wide online audience without having to rely on established distribution channels. The technology was groundbreaking in the field of music production especially. A well-known example was the band Radiohead, who offered their album *In Rainbows* as a free download via their website in 2007 and gave fans the opportunity to set the price themselves.

Parallel to this, peer-to-peer networks were also used for illegal activities such as sharing copyrighted content. The uncontrolled distribution of files led to significant copyright infringements and financial losses for artists and rights holders. At the same time, it toppled the entire music publishing industry, which had to completely rethink its income source as a result. There have been numerous legal battles and restrictions to curb the illegal distribution of content via peer-to-peer networks.

As often the case with the emergence of new technologies, traditional business models come under pressure and others emerge. Peer-to-peer networks have played a significant role in

democratising information sharing and creating communities of like-minded people. Peer-to-peer technology has become the foundation of cryptocurrencies and blockchain networks, which once again herald radical change.