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The article is devoted to a critical analysis of the agency of technology through the example of smartphones. Starting from infrastructural studies and empirical material recording user practices, the authors show how smartphones, as central elements of contemporary communication networks, shape both intimate and social aspects of life. Photography here makes it possible to reveal the invisible—and sometimes simply deliberately concealed—connections between technology and everyday life. It thus acts as a research tool that attempts to overcome the limitations associated with the lack of transparency of the area under analysis. English translation will follow soon.

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Who Has the Agency? A Photoessay on Metropolitan Smartphones

Photo Paweł Starzec

Warsaw's cityscape would not be the same without PASTA—one of the city's most characteristic and best-known buildings. Its symbolic importance for the inhabitants of Poland's capital grew during the intense street-to-street combat between Polish Home Army insurgents and German forces in August 1944. The famous photographs of PASTA show the building on fire or torn apart by explosions. Therefore, it comes as no surprise that the building, almost completely destroyed during the Warsaw Uprising, was rebuilt in the late 1950s and early 1960s, and its roof currently holds masts displaying red-and-white Polish flags and a six-meter high *kotwica*, a wartime emblem of the Fighting Poland and the country's struggle to regain independence. But let us take a close look at the photograph. A little further, the roof of a modern office extension is dotted with various structures, mostly antennas and masts. Resembling structures present on other tall buildings, they form

an integral part of the urban mobile phone mast landscape. Although in this location, they have been installed to prevent their immediate visibility from the street level, they continue to function alongside other, less prominent historical continuities. Wartime narratives largely obscured the origin of the abbreviation PAST (Polska Akcyjna Spółka Telefoniczna), which referred to a Polish telephone company jointly owned by the Polish government and a Swedish joint-stock association connected to Ericsson, a company still active in the telecommunications industry today. In the building on Zielna Street, telephone operators connected thirty-five thousand numbers using an Ericsson switchboard. In those days, the building's owners appreciated its sturdy reinforced concrete structure for its ability to hold the necessary equipment and cabling. Today, the building's location and height are key, as the once tallest building in the Tsarist Empire still allows for the effective transmission of radio waves. The roof of the PASTA building provides a view of antennas belonging to three different operators. In addition to the ones next door, we can see more on the roofs of two neighboring structures.

These technical installations stand next to symbols that have enormous power in the Polish public space—and by no means merely due to national conservatism, as the *kotwica* symbol on PASTA's roof was installed in 2003, during the left-wing government's rule. This juxtaposition in the form of twenty-first-century antennas and base stations enabling efficient data transmission in the very heart of the capital and a twentieth-century logo that still constitutes a vital element of the symbolism present in the public sphere in the twenty-first century is a perfect illustration of one of the most important themes of Manuel Castells' trilogy *The Information Age: Economy, Society and Culture*. Castells' books not only highlight the change caused by the development of communication technologies with the internet at the forefront, but they also remind us that the causal

power of global flows leads to local reactions. The power of flows remains in tension with identities that stabilize life in a world that is a source of stress for the individual, as the logic of the networked economy escapes the perceivable horizon. Despite his declarations, Castells fails to entirely free himself from his Marxist roots: the economy serves as the foundation here, but its transformations influence social relations. In this way, everything changes, and a new era, the Information Age, dawns. The new order does not alleviate social tensions because this new world also has its winners and losers. This time, however, everyone uses new communication tools. Even social movements built around religion, the nation, and symbols such as that of Fighting Poland employ devices like those mounted on the roof of the PASTA building.

Therefore, the story of a place that functioned as Warsaw's telephone exchange for over a century, where technical and symbolic spheres intertwine, is not just a scholarly account, even if we also mention the role of narrative construction. It is also an approach that considers the interweaving of change and continuity. After all, the role of antennas and masts in the city center resembles the Swedish headquarters' role but on a high level of generality. Let us look at the classic photograph of a telephone tower taken in Stockholm at the end of the nineteenth century. Here, the cables have not yet dissolved into thin air, as that would happen a century later, and have not yet been hidden beneath the ground.

Telephones themselves, which such masts connect together, have also changed in both technical and societal sense. All things considered, comparing landline telephones with today's smartphones seems close to impossible. Smartphones have long evolved beyond the phones' original purpose as simple communication devices. They have become central to managing both relations with other people and our daily lives. The ability to install apps allows us to continually customize our phones'

features to fit our changing lifestyle needs. This being said, we steer clear from invalidating the changes brought about by the first phones in Warsaw, especially as these stories are linked. In 1939, Warsaw's telephone network had seventy thousand users, and switchboard operators inside the building on Zielna Street handled most of their calls. While this number set an absolute record among major Polish cities, it proved less impressive when compared to the average for the less developed part of Europe. The average, which included Italy, Portugal, Greece, Hungary, Yugoslavia, and Poland, was a dozen or so percent higher. The number of phone lines in developed countries, such as Germany and Sweden—where Ericsson comes from—was several times higher.[1]

All these connections are why we begin our story here. We view the act of revealing the hidden or the overlooked—simply because it has become a part of our everyday life—as an essential step in starting a discussion on how to study media today and about reasons that make such a study challenging.

Frosted telephone tower. Stockholm, 1890s. author unknown / Tekniska museets arkiv, public domain.

Network Society Infrastructures

Early theories of social transformations brought about by the development of the internet, with Manuel Castells' concept of network society at the forefront, emphasized the change that the decentralization of communication would entail. This change found its reflection in the idea of "individualized mass communication" indicating that the possibilities to control communication on a mass scale, which were previously reserved for the privileged few, have undergone democratization.[2] Although large fragments of Castells' research have stood the test of time, from today's perspective, it is difficult not to reproach him for overestimating the ability of the internet to flatten hierarchies, with the internet originally designed as a decentralized communication network. We can attribute part of the blame to the prevailing Zeitgeist, as the idea of blurring the boundaries between senders, once primarily large companies, and receivers, namely ordinary users, has been constantly reiterated in the era of rapidly expanding network services. However, we should also remember that the internet of the turn of the millennium was a somewhat different medium to that of today, and not just in terms of the social reach, the devices themselves, or even the services that the network offered. Business models have also changed, with the focus shifting from the exchange of content to the commodification of data, which the individuals produce often involuntarily.[3] Finally, infrastructure has changed, with the modern internet being much more centralized. Accordingly, media studies have seen a critical reassessment in the last decade or so. During this time, various events have shown that the internet is increasingly becoming a tool for surveillance and manipulation rather than a space for individual empowerment. The material turn, a key element of such a reassessment, contests the story of malleable technologies, which businesses and users shape on equal terms.[4]

On the one hand, this is a return to the classic, not to say Marxist, questions of ownership and control, and on the other, an interest in infrastructure, which, although sometimes invisible, organizes the possibilities of the technologies that use this infrastructure. It is about looking at the material background of social processes' functioning, both in practical and symbolic terms, as well as seeking answers to questions about how what is "often invisible and taken for granted" warrants "the status quo of culture and society."[5] The works of John Durham Peters, which Christian Meyer cites, lie at the heart of this approach. Peters takes a broad view of infrastructure, but unlike some scholars in this tradition, he focuses on media infrastructures. He also points out that infrastructure today is no longer just "large, heavy systems."[6] Building on this perspective, we will shift our focus from masts and antennas to telephones—an element of the communication infrastructure that we regard as the most immediate and tangible.

Phones constitute an essential part of the changes associated with the internet, mainly because of their mobility and built-in sensor technology, which modified the ways in which people use the web. It is no coincidence that mobile technologies were one of the first impulses for the criticism of Castells, who did not pay enough attention to the functioning of hybrid spaces.[7] Paul Levinson also highlights this aspect, describing the telephone as a "little big blender," combining physical and digital space.[8] At this point, we might be more interested in another aspect of these devices' functioning methods. "They have altered the texture of everyday life just about everywhere, digesting many longstanding spaces and rituals in their entirety, and transforming others beyond recognition," writes Adam Greenfield, who notes that phones dematerialize many elements of our everyday life, which aligns with the major historical shift signaled above.[9] Moreover, Greenfield emphasizes that phones enforce data sharing to a greater extent than other platforms

created for the smooth functioning of our lives. Therefore, we find ourselves in a situation where "black boxes" prove central to how we function, communicating with other devices in ways that remain both hidden from view and outside our field of vision. We can understand this field of vision in more than just the literal sense. Since we are not interested solely in "large, heavy systems," to cite Peters, not only the masts located away from the streets on top of tall buildings play a vital role—the software developed around particular design specifications also does. Such software remains not only hidden from the view of users but also inaccessible to independent experts due to the legal measures protecting businesses.

Before we proceed to the practical part of our assumptions, first, let us close an even bigger image. Since the impetus behind our research is a belief in the importance of infrastructure and, simultaneously, concern about its increasing centralization and invisibility, we should recall the concept of "platform society" that José van Dijck, Thomas Poell, and Martijn de Waal put forward. "The term refers to a society in which social and economic traffic is increasingly channeled by an (overwhelmingly corporate) global online platform ecosystem that is driven by algorithms and fueled by data."[10] Although the book cited above mentions Manuel Castells only once when referring to a group of theorists writing about the possibility of grassroots mobilization in the network, we can quickly notice a critical rewriting of the "network society" vision in the proposed concept. Such a vision insists on recognizing hierarchical inequalities between service providers and service recipients.

Since we have outlined an overall picture, let us consider how to examine and critically analyze the agency of platforms.

Social Practices and the New (Infra)Structuralism

The article below results from a research project dedicated to smartphones. As part of the project, we monitored the media practices of both female and male users, and, inspired by the infrastructural turn, we tried to identify the agency of the devices themselves, the sensors they contain, and the applications they feature. Therefore, we combined an infrastructural method with a study of media practices according to Nick Couldry, which involves a focus on what people do with smartphones and how they talk about their activities.[11] We found it helpful to use the approach of Elizabeth Shove and her colleagues, which combines research into practices with reflection on their infrastructural background.[12] However, these measures did not solve all the problems. The proposed research framework is clearly better suited to "large, heavy systems," utilities understood as pipes transmitting electricity, gas, or water, where physical manifestations are easier to see, but also simply solutions based on less complex business models. Shove considers demand as an important category—a marker of relations between an operator managing the transmission network and the user. However, in the platform economy, this relationship becomes opaque and highly complex. Each operation involves multiple parties. Even the simple act of playing a video on the phone may affect not only the exchange of data within the infrastructure of the mobile network operator but also the content creator, the company on whose platform that content is made available (for example, YouTube), and the phone manufacturer who controls access to the application. Powerful technology corporations can produce value in different ways, so it becomes difficult to trace the entirety of demand–supply relationships. Importantly, this problem does not stem from the choice of smartphones, as

we can make the same observation about other devices connected to the network.

What gives our phones additional value is the fact that, although connected to an infrastructure consisting of antennas and masts, they seem close to us, even intimate, because they are inscribed in the network of our social relations. Therefore, they constitute both a technological infrastructure and an infrastructure of intimacy.[13] When appreciating the intimate or even sensual aspects of our contact with phones, we sought inspiration from Sarah Pink's sensory ethnography. In her book, the researcher shies away from defining this approach as a consistent method of data collection. Instead, the idea is to incorporate sensory aspects into all stages of the study. Importantly, different techniques for recording experiences are to play a vital role in capturing these fleeting moments.[14] Although the senses have always belonged to the ethnographic process, as Pink herself mentions, we felt that the proposed techniques, such as video recording, photographs, and reviewing this material together with the study subjects, could prove cognitively meaningful. Such a decision was not only about the detail or assisting the subjects' memory but also about the moments of demonstrating changes in perception and showing the depth to which technology penetrates us all. We can find an excellent example of the above in an interview from a team project on cyclists, cited by Pink elsewhere, when respondents talk about how monitoring their body measurements serves as their only way to gain complete knowledge about themselves and improve their performance.[15] Therefore, to some extent, it is about a sensory nature activating not only the human senses but also external sensors that allow us to contact each other and ourselves.

When tracking smartphones, we knew that while it was relatively easy to see what people were doing with their devices,

it seemed much more problematic to pinpoint what these devices did with the people. How could we defend the critical and engaged nature of research in such a situation? We necessarily focused on the visual character of our interaction with smartphones. We did not treat photography as a voyeuristic tool but rather as a method of presenting the complexity of various gaze trajectories that combine both human and non-human perspectives. Accordingly, our project required us to use visual sociology tools in addition to interviews and observations. Despite conducting more than a hundred interviews, a reflection of the agency of phones was almost absent from the accounts of our respondents. We made smartphones our point of departure—a central hub that controls other devices and a line of contact. A smartphone also functions as an eye that is enhanced with an easily revisited repository when compared to a human eye. We were interested in images of practices involving mobile devices and those seemingly distant from them. In some of these situations, the trajectory of the mutual influence of the devices and their users results from makeshift, unnamed rules, and the entanglement itself is shaped in an unconscious way, stemming from the assumption of the smartphone's invisibility. This device can serve as a frame that formats the vision of everyday life after taking a photograph, but, at the same time, it impacts the activities performed. By keeping track of these situations, we hoped to get closer to the role that the telephone infrastructure plays at a practical level: the program interfaces, overlooked details, and conventions that are imposed and reproduced.

Visuality in Research Activities

The photographs' role in the project changed with time. At the outset, the photographs were mainly intended to accompany the research, make the data that the team collected look more visually attractive and easier to grasp when published, or maybe even encourage readers to click on the article. Quite quickly,

however, it became apparent that research dedicated to phones and devices that remain in contact with them, primarily focused on infrastructure and materiality, refers to several interesting processes related to the visibility and interweaving of devices and users.

Consequently, photography's role in the project became drawing attention to the invisible backstage and points of contact between digital and analog areas of interaction. We were interested in how the internet of mobile devices exists in analog space: how it affects the space and how it affects the bodies of users. Moreover, we wanted to discover the types of visuality that the medium produces. During the project, the absence of reflections on this topic among the majority of our respondents made our task of grasping the nature of the interlaced infrastructures and practices more difficult. Furthermore, upon becoming acquainted with articles on the infrastructural paradigm, we discovered that other teams also experienced similar problems, including teams researching the "ethnography of encounter" of bodies developing technical interfaces. Not all decisions are agreed in the open, and the lack of unique expertise makes it difficult to read the hidden consequences of particular decisions.[16] Therefore, we felt that, at least in some aspects of phone use, analyzing the visual angle and the inclusion of photography in the research process would give us more advantages than if we had limited our research to observations and interviews.

In what they themselves considered a revolutionary movement, Marek Krajewski and Rafał Drozdowski draw attention to the role of photographic processes in social life. This role is not restricted to a product in the form of a single photograph that serves as the focus of scholars' interest and instead comprises everything that leads to that photograph's production: the set of conscious and unconscious practices and social norms that condition how we look both toward and through the lens.[17] The focus on the

phone enables what Krajewski and Drozdowski, following Terence Wright, call "looking behind the photograph": although the phone appears to be a transparent window into social life, with smartphones becoming a universal repository of daily life notations, representations of this life are contained in diverse app interfaces, while people take photographs and use them within a variety of social practices. Above all, however, we consider a phone an object that substantiates technological and social entanglements as a tool that literally and metaphorically formats our outlook on the world and that, at the same time, can itself be the focus of photographs in its various uses. We find it easier to build narratives and highlight any escaping connections with images of phones, infrastructure, and people taking advantage of this infrastructure.

The technological development that has taken place since the publication of Krajewski and Drozdowski's monograph has led to the gradual commodification of smartphones as devices for both active and passive visual experiences of the world. The camera in the phone is much more than a tool for reflective photographic practice directed toward the surrounding world and users themselves. Over time, it has also acquired auxiliary and functional properties, supporting processes related to accessing information (scanning of QR codes) or authenticating identity (confirming bank transactions with one's facial image). In a broader sense, the visual capabilities of the phone serve to extend individual identity or memory.[18]

On the other hand, in interaction with the outside world, the development of smartphones and the mobile internet has enabled and popularized a range of increasingly elaborate methods of sharing visual material. The process of sending and sharing photos has become a standard, everyday practice, implemented as part of subsequent social media platforms such as Instagram, Facebook, and Snapchat. They allow users to have individual profiles and interact with other users, over time

influencing both the social reality[19] and the norms of visuality itself.[20]

The 2017 report of the Royal Society for Public Health focused on the measurable effects of social media on the mental health of British adolescents. Although the report lists a sense of belonging or having access to mental health information among the positive consequences, it points to generally adverse effects of staying connected, which include anxiety and distorted self-perception. In turn, Napoli's research focuses on Instagram's impact on a change in the gaze itself, talking about changing the framing orientation from horizontal to vertical. In principle, we can assume that the relationship between the user and the medium is interconnected. This relationship will influence not only the shape of the media adapting themselves to the user but also the practices applicable in the world on the other side of the screen. A large share of this amalgamation has its basis in the intensely visual nature of communication, with the phone acting as a tool for looking at oneself and others.

Nathan Jurgenson, who considers the social dimension of photography's existence as a distinguishing feature, expresses a similar thought in the title of his monograph *The Social Photo*. According to Jurgenson, in analyses of the contemporary role of photography in the environment of social media, the context of photo sharing is not so much a supplementation but rather the meaning of their existence.[21] Jurgenson states that this process is supposed to change the nature of photography itself, which, in turn, should condition a change in the research framework that would allow us to understand it correctly. The social photo should not be a target of criticism, together with its entire set of characteristics that contradict "good" photography, such as ephemerality, informality, and sometimes banality. Jurgenson argues that arranging the world by means of photographs featured in posts that we make public is not a dilution of art but rather an act of communication enhancement. Jurgenson

adopts a similarly critical approach to describe the attempt to maintain a strict dualism, a separation between the real world and the networked world. According to the author, this boundary proves artificial, and the two worlds create a common ground for photographing and making public.

As the increase in the intensity of such practices is constant, Instagram has gone from being a medium judged as spontaneous to being an image tool, enabling the emergence of subsequent means of communication geared toward "authenticity" or "spontaneity." In this sense, the emergence of the BeReal platform, which, under penalty of not displaying new posts, requires the user to take a photo at a set time using the main and front camera, was supposed to allow the creation of an authentic, "unfiltered" world in the plane of digital visuality. In practice, these guidelines prove to be ignored, nonetheless. Researchers did not fail to notice the relationship of panoptic concepts with the mandatory practice of making oneself and one's environment visible to others right here and right now.[22] Jessica Maddox demonstrates that BeReal's assumptions favor authenticity as something real rather than as a performance to the camera, using spontaneity and time windows for posting to limit the time in which one can publish. Authenticity as a reality is a complex concept. The readiness to immediately make oneself visible to others relies much more on the ability to self-control one's image. In this sense, the BeReal platform acts as a panopticon because the sudden requirement to publish something here and now ensures that its users always remain prepared.

Aspects that technical requirements in the form of guidelines and interfaces fail to establish become apparent due to the application of soft and not always explicitly stated social norms governing how people should communicate using visual social media. In turn, these norms differentiate between diverse user groups, highlighting differences in visual communication

practices. Our research, which included people from different social groups, clearly demonstrated that such differences do not result solely from identity aspects, which are linked to the need to build diverse, community-specific behaviors. Such variation can arise from dissimilar levels of competence and the associated class dimension. After all, not everyone has access to similar resources, and the ability to mobilize them often depends on wealth, among others.

In our project, we wanted to analyze various behaviors connected to phone use to the broadest extent possible. Having conducted a pilot series of interviews and observations, we detailed five areas of social activity that became the focus of our research. We did so within a very wide framework of social practices, at least in part related to mobile devices, namely smartphones and their extensions. While this division did not exclude the possibility that one social practice could involve several spheres of life, it allowed us to adopt several points of view and possible scenarios of interpretation. The practices we observed were often carried out simultaneously, using the same tools, such as cameras, social media, and chats, and just as often assumed at least a partially intentional relationship between what is private and what is public. These areas include: the practices of the individual (*self*), social practices (*self* in contact with others), economic practices, political practices, and the material dimension relating to infrastructure.

If we accept the argument of Krajewski and Drozdowski, which states that the process of taking photographs and the subsequent integration of its product into social practices is as important as the photograph itself and its content, then what can we observe in the points of contact between these practices, the infrastructure, which includes its devices and those to which smartphones connect, and different areas of people's lives?

Five Areas of Visuality in Digital Nexuses: Case Studies

Photo: Paweł Starzec

The phone unlocks on seeing my face. The first step of setting up a new device is to teach it my features by moving my head according to the cues. From now on, my identity, in a visual sense, will confirm that this is me, allowing me to pay with a card or recover a forgotten password. This is only the beginning, as my face can also be photographed through the eye of the same frontal camera and then edited or changed using filters. Such filters can prove extremely helpful when our identity is the subject of an experiment. A filter will allow us to look not only better but also different. At the touch of a button, a filter can make our complexion perfectly smooth or add some charming freckles. Self-practice tools also enable the blurring of binary boundaries in gender expression; trans people describe these tools as an essential element of identity self-determination.

Another dimension of practicing oneself is health and sport: the phone reminds us of our next glass of water, quantifies our physical effort (how many steps have you taken today?), but also places a dot in the central point of the interface that moves across the map with the subsequent kilometers that we cycle. Although the road is empty and there is no one around, we enter a race against someone who covered this route several hours earlier, and an increasingly internalized way of looking at ourselves is through the lens of a machine, or at least its interface. From above, the cyclists' movements will resemble the movement of the dot on a physical tracking app. Peripherals

connected to both the phone and the cyclist monitor the effort itself. At the end of the route, inside a café that exists in the real world, in addition to a restorative meal, cyclists will take advantage of the available chargers, allowing the digital part of this nexus to regenerate as well—phones, watches, or simply those parts of the infrastructure that are necessary for the individual to stay motivated to work on themselves, to strive more effectively to become their targeted true self, and to better understand the workings of their body. An alternative order is where the interface wanders through a pleasantly changing landscape while we are watching it at home, pedaling on a stationary bike. Without the worry of getting cold or incurring unnecessary travel expenses, we can climb a mountain pass that a Zwift online training program displays on the screen. Although the route is virtual, the physical effort takes place in the real world, which places the individual in a hybrid space in between. That does not stop the nexus from closing—whether following a suburban loop or climbing over virtual mountain passes, over time, digitized cyclists begin to talk about their efforts in terms of watts that their interfaces calculate.

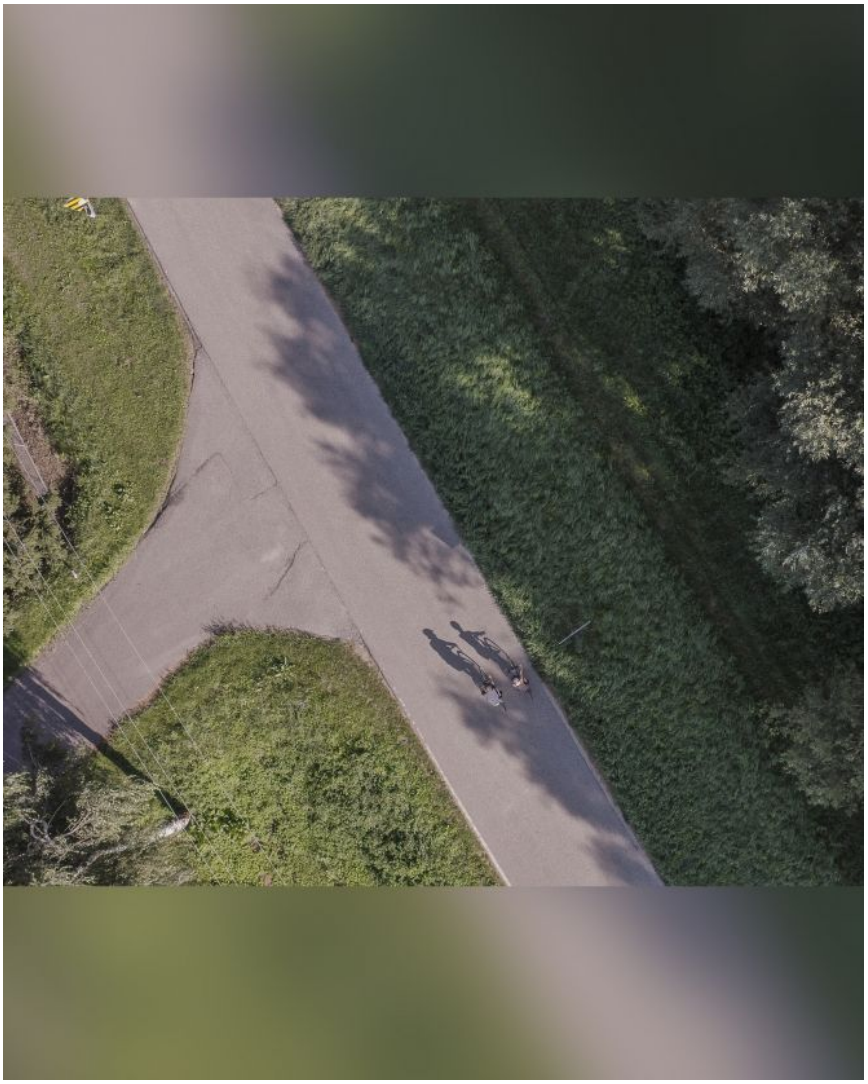

Photo: Paweł Starzec

Facebook invites individuals to join the singles community in the city of Warsaw. The etiquette of digital dating is wide-ranging. If someone finds it overly challenging, they can always get support in the real world, with one of Warsaw's photographers offering sessions dedicated to Tinder. On the other hand, Grindr is based on proxemics, as its interface distinguishes information about the actual distance of the person with whom we are communicating. Romantic relationships exist at the center of social life in the interlacing of individuals and their digital devices. Starting with the opening screen, which may seem like a contemporary interpretation of medallions worn a century earlier carrying a photo of a loved one, all the way to the listing of a contact

marked with a red heart in the raw database that is the phone book. This process includes unwanted photos of genitalia, the ovulation date marked in a different color on a shared calendar, but also practices covered by unwritten social rules, such as the "soft reveal" of a new partner within our Instagram account, which is the digital equivalent of going for a walk in the real world. There are also new rituals of seduction, including harassment and ghosting, with the latter being easier in a world where contact often depends on an app rather than a shared network of friends who could punish us with ostracism. Yet another practice is managing the visual legacy of shared photos after a break-up—from deleting shared photos from an individual phone's memory to removing tags from the photos that exist in the public sphere. Mostly more innocent in the context of erotic adventures and flirtation, more often marked by a sense of failure when "displaying intimacy"[23] and forming an intrinsic part of being together in today's world, such photos become a burden and a visible record of complex adjustments in our "life project."

Families will also have an entirely different structure of family life, and patchwork families serve as a good example. Two houses, two children's rooms, and a charger left on the bedside table in each room, just in case. The only things that circulate between locations together with the child are their most beloved cuddly toy—more manageable than the "stationary" spare elephant in the photo—and the phone. From the digital perspective, the entire process management for the still non-standard family model will use WhatsApp interfaces in the form of a family communication group or Instagram posts and stories.

Photo: Paweł Starzec

Also photos, as during our interviews, we collected information about patchwork families in which illiterate children wish to participate in non-voice communication. This expansion with imagery recurred in conversations about the pandemic, as a generation of grandparents quickly mastered their teleconferencing skills so they could read fairy tales to their grandchildren without risking infection. In the case of patchwork families, pictorial communication occurs both in space and in time—family profiles from before the divorce and all those shared holiday snaps are now actively concealed so as not to upset others and ourselves. This also applies to the publication of new photos from new life projects, which should not meet the controlling gaze of our "exes" or lead to other types of tension (like a phone call from an ex-mother-in-law: since you are in the pub, who is looking after the kids?). Next to the class dimension, patriarchy formed the most explicit element of the traditional order that we observed in the course of our interviews. New communication tools help with the logistics of a spatially dispersed family and make it easier to perform emotional work remotely. However, these activities belong almost exclusively to women, even if their former partners have better technical skills. Paradoxically, the service infrastructure and the way subscriptions are structured sometimes prove to be conservative as well: if someone circulates between two locations, are they a family member or a sponger using someone else's account in an unauthorized way to stream movies for free?

Photo: Paweł Starzec

The economic dimension of practices at the nexus of man and technology consists of strong colors—a map of the city has a colored rectangle informing Uber drivers of increased traffic as well as orange and green backpacks of food delivery couriers, green-and-white dots signifying electric scooters, red warnings, and blue arrows indicating where couriers are to wait for their goods. The work encapsulated within the smartphone seems to emphasize most strongly the invisibility of infrastructure in the real world, even if we are aware that there is a human being hiding behind the icon, earning a modest salary using the power of his muscles. From the user's level, apps provide services relevant to the material world, including transport or food

delivery services, through aesthetically pleasing, automated interfaces. Wolt lets us follow in 3D the deliveryman circling around the estate with our pizza. Uber changes the color of its vehicles to blue and yellow as a gesture of support.

From an employee's perspective, the phone–workplace is devoid of people; instead of interaction, it provides task lists, geolocates the next scooter that needs to be charged, and relays messages from the dispatcher. The pandemic tested the invisibility of couriers in the real world, with backpacks of one food delivery company sold on online auctions as a supposed pass allowing its wearers to leave their homes during the lockdown.

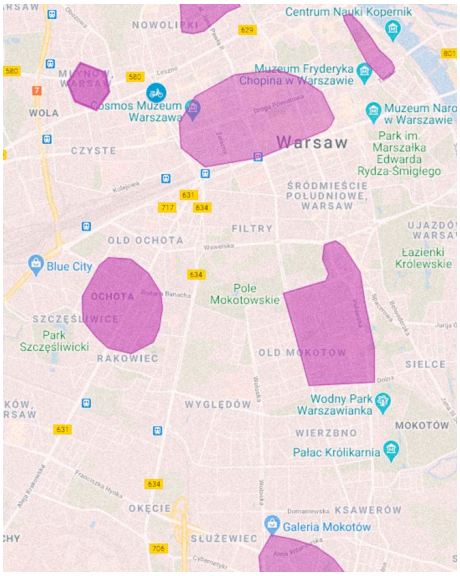

Photo: Paweł Starzec, Mateusz Halawa

Electric scooters function as a high-tech service, profiled as a modern solution to an old problem. The back rooms of their existence are garages hidden in various backyards, where "juicers," employed as part of the "gig economy," top up the batteries before returning the vehicles to designated locations. The technological glamour of the digital world relies on trucks with trailers and distribution switchboards, continuously facing challenges of the real world–one company is currently pulling its business out of Warsaw because its vehicles regularly lose their batteries.

Dark stores constitute the other extreme in the real visual dimension. With their shop windows concealed with film, they are only accessible to couriers providing a shopping delivery service. They serve as another infrastructural anchor in the real world, enabling services that are only accessible through the digital world. These outlets deliberately remain as invisible as possible, making it seem that the groceries materialize spontaneously in

the courier's basket. A seemingly similar phenomenon is shadow kitchens—restaurants that exist only as a back-office to provide services through a food ordering app. The largest cluster of its kind in Warsaw, bringing together more than twenty shadow kitchens at one address, can be found in an inconspicuous building on Dolna Street.

Photo: Paweł Starzec

At the intersection of work and politics, on the other hand, are media workers reporting live on protests with multi-window cameras built from smartphones, power banks, and image stabilizers. The continuity of reporting requires adapting the working tools to the realities of intensive use. A journalist shows us how he prepares himself for work—in addition to a high visibility jacket labeled PRESS, knee pads, and a supply of batteries, he packs a smartphone hidden inside a protective case. We soon discover that he has every reason to be cautious when he shows us his previous phone, which was completely smashed during the efforts of the police to pacify a protest.

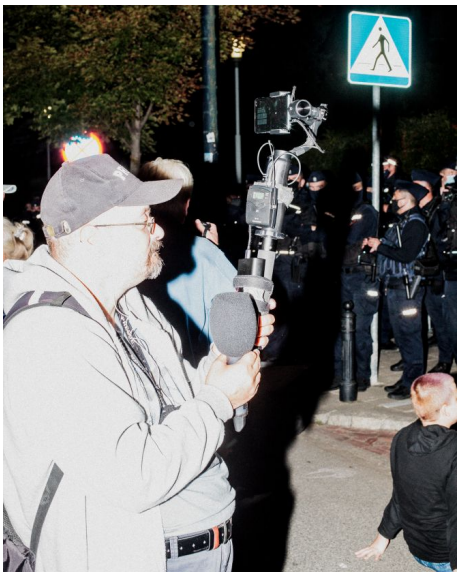

Photo: Paweł Starzec

In the political sphere, visibility as an aspect has several layers. One is the struggle for transparency in the actions of the authorities, which journalists and activists cover in the event of protests. Another dimension of political life in the interweaving of users and their devices is the issue of visibility, which takes the shape of a manifest outlining political beliefs through visual social media. Here, we will find profiles of politicians, activists, and commentators on Instagram, as well as a backstory in the form of selfies. The authors of these photos may be opposition representatives standing outside the parliament or photographers documenting a solidarity demonstration at a police station. Their work provides a backdrop in the sense that their images will then find their way into digital news feeds designed to sustain interest in the protests in the real world. The end of the 2021 Women's Strike protests generated a specific type of relationship between the analog and virtual dimensions of demonstrations. Some of those participating in the protests might have been perceived as giving a performance to the camera with a view to widely reproducing images representing the social discontent they were demonstrating.

Political issues will take a different form in the nexus associated with organizing aid activities on the Polish–Belarusian border. Here, we can observe the building of a support infrastructure based on digital tools, such as maps, pins, direct messages, and encrypted messaging apps. Such forms result from the need to act unnoticed and devoid of institutional support or even with the authorities actively attempting to disrupt relief efforts. The dark forest is illuminated by red

headlamps, which are harder to spot from afar, but in the digital space the whole attempt to provide assistance has a dimension visible to the initiated. Media outlets publish photographs taken by refugees themselves, which depict the damage that border guards inflicted on their phones' charging ports.

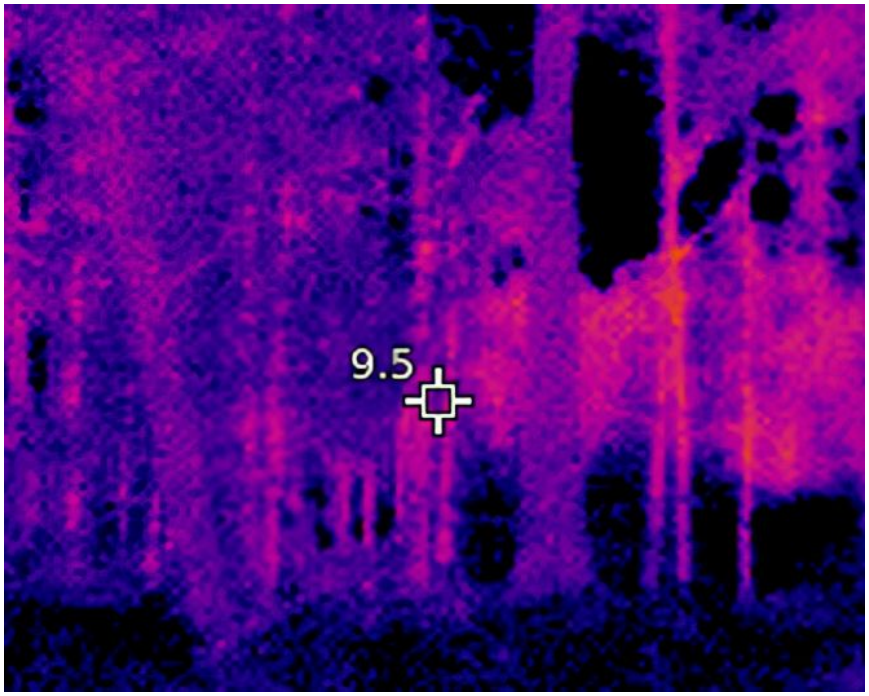

Photo: Paweł Starzec

The phone is no longer working. The charging port is damaged, and there is a large crack running across the center of the screen. The materiality of the devices themselves constitutes the last area of visibility in the interlacing of humans and mobile devices. Designed to be transparent and to serve as a metaphorical and practical frame for viewing the world through the interfaces they offer, smartphones are not immortal. Despite security features like Apple's Pentalobe screws, which have been in place for a decade to prevent the unauthorized opening of iPhones, smartphones are gaining a second life even after significant failures. We watch a technician replacing a damaged touch screen, testing the front and rear cameras, and disassembling tightly packed components on a table. The

camera briefly shows his enlarged hand holding the device.

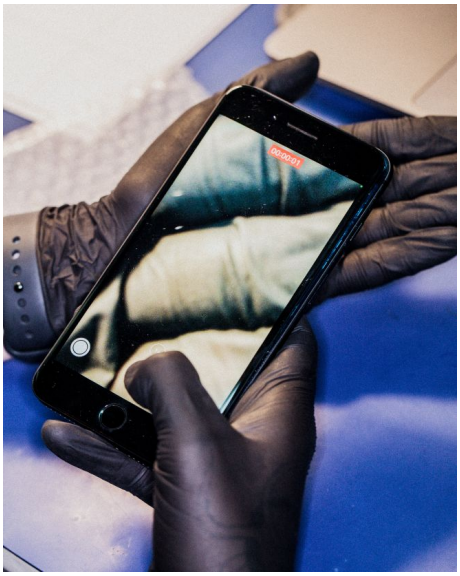
Photo: Paweł Starzec

The material nature of the smartphone is also its presence in the space that belongs to everyday life; changes to gestures reflect this as well: the "I'll call you later" gesture has changed from an extended thumb and little finger to a tab formed with the entire hand placed against the ear. Then there are reports of the "smartphone neck," where the upper part of the spine is placed under strain from looking at a screen, or the "smartphone pinky," where the small finger changes shape from holding the weight of the device while typing. Another vital aspect that seems crucial to understanding the intricacies of the nexus we are analyzing is the moment of transferring reality from the screen to the real world, or rather, the gradual blurring of the boundaries between these two areas. The vision of augmented reality assumes the form of a menu as a QR code, a shared location, and a point symbolizing a courier wandering around a real-life estate. Of paramount importance is understanding that all these layers, including personal, social, economic, political, and material, function co-dependently as part of the same devices and the same social and technological nexuses. Infrastructure provides an invisible backstage to social aspirations, enabling but also shaping them.

In Place of a Conclusion

In 1999, Susan Leigh Star published the classic *The Ethnography of Infrastructure.* To show its impact, let us use another Google service that we involved in the creation of this article—Google Scholar sees over 5,000 citations of this book.

In it, Star writes about the ethnographic study of infrastructure as a study of "boring things" but also as a "study of the unstudied" that may contribute to an understanding of the entire ecosystem of connections, both material and social, between infrastructure and the human order.[24] Although Star also writes about researching IT infrastructure, it would be difficult not to consider that the text has indeed become outdated. Considering access to data and knowledge as self-evident, she focuses more on the problem of scaling and oversimplifying conclusions. A quarter of a century ago, it must have been challenging to predict the extent of the internet's future commercialization, but also that the internet would become a monoculture subject to the domination of several large players. From today's perspective, Star's declaration that the study of infrastructures faces similar problems as the study of other forms of social organization seems only partly convincing. The level of complexity and the market valuation render monitoring the agency of technological infrastructures extremely difficult at the present time. Today's world is no longer a place of small teams of IT professionals who are happy to share stories about how their products operate. Nonetheless, a fragment of Star's book that should stay with the contemporary reader describes infrastructure research as immanently relational. We consider this approach as synchronous with our project, as part of which we introduced another device—the camera—into the dense web of relations between devices, software, and people. The camera serves both as a tool and an object of study that is controllable and reflexive, but to a much more profound degree than most of the objects that our respondents and individuals devoid of academic training used. However, it is not a question of their disempowerment but of introducing an element into the network of correlations that enhances the visibility of what is barely visible or not at all.

The infrastructural turnaround has rekindled hopes of

"catching the authorities in the act" and discovering the secret mechanisms that govern the world. According to Rob Kitchin, many different hands without a clearly defined liability handle technology, while the corporate decision-making processes are complex.[25] Therefore, our project had a more modest objective: we wanted to demonstrate the moments in which we can see the variously understood agency of technology affecting different spheres of social life without pointing to one specific area where power is concealed. Its nature resembles the character of symbolic power—we are unable to point to its exact location, and, at most, we can approximate the mechanisms of its empowerment. Doing this against attractive marketing narratives and the language of benefits constitutes didactics that are poor-quality and, above all, ineffective.

Perhaps displaying tensions appearing on the margins of images is a better idea? We often overlook how much we have normalized different interfaces and how the operating methods of a single app can create a highly subjective view that we use to define ourselves and communicate who we are to others. Let us pay attention to how other tools and associated conventions, such as the map, are evolving under the influence of phones, but also how work, couple dynamics, and the family model continue to change. Therefore, let us be mindful of the overlooked infrastructure, even if we cannot fully understand the ways in which it functions. To notice something, we must look first. We should not look away, even when the various methods of naturalizing and masking our gaze make this task increasingly difficult.

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1 See https://www.statista.com/statistics/1240163/europe-phone-lines-per-thousand-people-by-region-historical/.

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3 Shoshana Zuboff, *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power* (Profile Books, 2018).

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