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DATA

Exploring the
Footprint of Data
on Our Planet
and Beyond

Paul Cournet
Negar Sanaan Bensi

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THIS WAY: E

THIS WAY: EXPRESSIVE SELF-TRACKING AS CREATIVE PRACTICE

Joost Grootens

In the early 1960s, Suriname-born Dutch conceptual artist Stanley Brouwn (1935–2017) approached random pedestrians and asked them to draw directions to a particular place on a piece of paper. The resulting maps consist of sometimes clumsily drawn loops, lines, circles, arrows, crosses and street names. Subsequently, Brouwn stamped the text 'This Way Brouwn' on the drawings and exhibited them as his works of art.¹

In the above description of the work of art *This Way Brouwn*, several themes emerge that I will address in this article about self-tracking as creative practice: navigation, drawing, mapmaking, expression, appropriation and the role of non-specialists. I will explore how evolving digital technologies influence how we use, measure and display our surroundings, and draw comparisons between Brouwn's work of art and a map drawn some 60 years later by a Dutch cyclist, to analyse the technological, economic, political, sociological and theoretical dimension of fitness apps and GPS navigation. The article will focus on the material side of these technologies and the visualization practices they enable.

Self-Tracking as a Creative Practice

Self-tracking is the recording and monitoring of specific features of one's own life. It is also called lifelogging, personal analytics, personal informatics and the quantified self.² These practices go back to the keeping of a diary, but have changed with the dispersion of mobile digital devices. Activity tracking or fitness tracking is a specific kind of self-tracking. Using the Global Positioning System (GPS) and other functionalities of mobile and smart devices, the position and duration of sport activities are recorded as well as the condition of the body in terms of heart rate and blood pressure. Fitness apps keep track of the recorded data and combine these to give users insight and comparison through infographics and maps.

Writing a text or drawing an image making use of satellite navigation is called GPS drawing. Individuals run, cycle, swim, drive, boat or fly a preplanned route to create a large-scale image. Using smart devices with GPS functionality, and software such as fitness apps, to capture the drawing in a GPS exchange format (GPX), the image is then visualized as a line on a map. Other names for GPS drawing are GPS art and Strava art, the latter named after the widely used fitness app and social network for athletes Strava, about

which more later. Below, I will describe a specific GPS drawing and identify and untangle the various aspects of the map.

Giro d'Italia

In the spring of 2020, at the height of the first wave of the Covid-19 pandemic, René Koppert (1960) gets on his racing bike to cycle through the south of the Netherlands. The carefully planned trip is recorded on his Garmin GPS device. The resulting drawing is a map of Italy, approximately at a scale of 1:50, projected onto the landscape of the province of North Brabant. Koppert, a former professional cyclist who raced in Dutch and Italian cycling teams in the 1980s, is based in the Netherlands but has children living in Italy.³ In the spring of 2020, the world was in the grip of the corona virus. Italy was particularly hard hit during the first months of the pandemic. National borders were closed, events were cancelled, or postponed. The Giro d'Italia, the annual three-week Italian cycling race usually held in May, was postponed to October. After having cycled the contour of Italy, Koppert sends a screenshot of his GPS drawing to his children in Italy by WhatsApp.

In addition to the closed borders that prevented him from visiting his children, and the cancelled cycling race in which he once participated, Koppert indicates that he was also inspired by the Strava Art movement to create his map of Italy.⁴ According to Koppert, GPS drawing gained popularity during the corona pandemic when it was no longer possible to exercise in groups. Making a drawing through a sporting activity and sharing it online became a substitute social activity.

Koppert designs the route of Italy's contour by opening the Strava and Google Maps websites side by side on his computer, the first zoomed in on the map of the south of the Netherlands, and the latter on the map of Italy. On the map in Strava, Koppert looks for parts that correspond in form to the characteristic outline of Italy. He starts by looking for the shape of the heel of the boot of Italy, the regions of Puglia, Basilicata and Calabria, and finds it in the road pattern around the towns of Heeswijk Dinther, Veghel and Schijndel. The drawing that is thus created is sent as a GPX-file to the Garmin GPS device on his bicycle that transforms the drawing into an itinerary. While cycling, Koppert adjusts the route, removing illogical parts and avoiding traffic lights. The line that Koppert cycles is recorded in the Strava app and opened again on his computer, after which the route is further refined, optimized and brought closer to the shape of the map of Italy. This goes back and forth five or six times between designing and cycling until the map is done.

The final route, with the shape of the outline of Italy, is about 100 km long. The northern Italian border is formed by the Maas River, the Zuid-Willemsvaart forms the Adriatic coast, the surroundings of the village of Liempde pass for Sicily, the Tyrrhenian coast is formed by the road between Schijndel and Vught, while the city of 's-Hertogenbosch forms the north of Italy, from the provinces of Liguria and Emilia Romagna upwards. Koppert's map is missing Sardinia, but this will be added later by others as the map makes its way on social media after being shared on Strava by former pro cyclist Erik Dekker⁵ and reported in a local newspaper.⁶

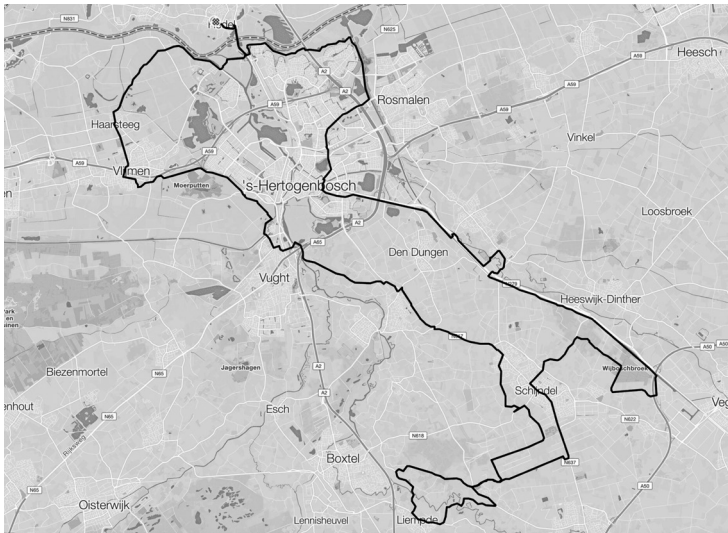


Fig. 1 René Koppert, *Giro d'Italia in The Netherlands*, Map, published on Strava, 2020.

Satellite Navigation

The technology underlying GPS drawings, such as that of René Koppert, is satellite navigation. A network of satellites and ground stations provide users with a portable receiver with accurate information about their location—anywhere, anytime and in all weather conditions. Today there are several global navigation satellite systems: GPS (United States), GLONASS (Russia), BeiDou (China) and Galileo (European Union). GPS, the oldest of the networks and the first to open its signal to all users, consists of 32 satellites circling the Earth in six orbits at an altitude of 20,200 km.⁷ The satellites carry atomic clocks that are synchronized with each other and with ground stations. A GPS receiver monitors multiple satellites and calculates the exact position by measuring the time it takes to receive the different signals. A minimum of four satellites must be in ‘view’ of the receiver to calculate its three-dimensional location (latitude, longitude and altitude).

GPS was initially developed as a military technology, but its signal was gradually made available for civilian use as well. Releasing the signal to all sparked a commercial GPS equipment and service industry. The early GPS receivers were large, heavy and expensive. Take, for instance, the first portable consumer GPS device, the NAV 1000, manufactured by Magellan from 1989 and widely used in the first Gulf War (1990–1991). The NAV 1000 measured 22.2 × 8.9 × 6.3 cm, weighed almost 700 grams, and had a retail price of \$3,000. Over time, GPS receivers became smaller, lighter, cheaper and more widely available. The Garmin Edge 530, a device similar to the one with which René Koppert made his drawing of Italy, is one tenth of the dimensions, weight and price of the NAV 1000: measuring 5.8 × 11.4 × 1.9 cm, weighing 75.8 grams and costing just under \$300. Over time, GPS tracking became a feature on other devices as well, such as digital cameras, adding location coordinates to digital photos, cell phones, smartphones, where GPS tracking is a standard feature, and wearable technology such as fitness trackers and smartwatches.

While GPS technology offers individuals possibilities to compile the ‘intimate particularity’ of their ‘personal plots’, satellite navigation also provides opportunities for commercial enterprises and the state, in their quest for ‘total knowledge’.⁸ ‘Surveillance

capitalism⁹ and 'liquid surveillance'¹⁰ are terms used to describe these monitoring practices in which the user's behavioural data is the source of new economic value, respectively the ubiquitous technologies and apps that constantly check, monitor, test, assess, value and judge us.

Strava

To design his drawing of Italy and later share it with others as itinerary, René Koppert uses the Strava app. Strava is a social network for runners, cyclists and triathletes.¹¹ With the Strava website and mobile app, users can track their activities and share and compare their performance with other Strava users. The app, used by both professional and amateur athletes, is free but offers paid subscriptions with additional features.

Founded in San Francisco in 2009, Strava is one of the last independent fitness trackers. Other trackers are developed or purchased by technology companies such as Apple (Apple Health), Fitbit (Fitstar), Google (Google Fit), Microsoft (MSN Health & Fitness), Nokia (Nokia Sports Tracker) and Samsung (Samsung Health), or sportswear companies such as Adidas (Runtastic), Asics (RunKeeper), Nike (Nike Training Club) and Under Armor (Endomondo, MyFitnessPal, MapMyFitness). For technology companies, it is lucrative to collect behavioural data from their users as they can link this data to saleable advertising space. For sportswear companies, it is lucrative to know where which sports are practiced, by whom and in what way. As Kevin Plan, CEO of Under Armour, said in an interview with *The Financial Times* in 2015 after his company purchased three fitness apps: 'We now have the world's largest digital health and fitness community. We believe ultimately this will help us sell more shirts and shoes, reach more athletes, and make them better.'¹²

Strava is not yet profitable and has raised venture capital to compensate its expenses.¹³ The company adopts a different economic strategy than its competitors with roots in technology and sportswear. In 2013, Strava published a Global Heatmap showing the aggregated and anonymized activities of its users. The map sparked the interest of city planners and transport services, for whom it provided a unique insight into cyclists' movements through their cities. Traffic movement recording is a common method used by planners, but Strava's dataset provided a unique opportunity to access many movements, at different times of the day, including routes and speed. In 2014, this culminated in the creation of a new company: Strava Metro sells Strava users' data to work with cities to improve infrastructure for cyclists and pedestrians.¹⁴ With the commercial venture Strava Metro in mind, Strava's Global Heatmap is more than a map that allows users to 'discover new places to be active',¹⁵ above all it presents a showcase of the technical and commercial capabilities of the company and the data it can offer.

René Koppert uses the Strava Global Heatmap for sports activities. In his case, if he goes to unfamiliar places, he uses the Heatmap as a source of information to discover popular bicycle routes. On the other hand, for local cycling tours, he uses the Heatmap to help him avoid roads frequently used by other athletes.

Not only does Strava passively track data for Strava Metro, it also actively encourages users

to collect data outside of their leisure activities and share this information. In 2016, Strava invited cyclists to participate in the Global Bike to Work Day Challenge. It also launched the #CommutesCount campaign. A short animation accompanying this includes the message: 'Traveling with Strava makes cities better.'¹⁶ While Strava encourages its users to collect and share data, users have the possibility to opt out. The app's default setting, however, is to accept sharing of user data and users have to make a real effort to disable tracking in the app's settings—which most do not.

The Strava Global Heatmap became controversial in January 2018, when a military analyst discovered that the map displays the location of secret military bases.¹⁷ Ironically, GPS—the technology that lies at the basis of fitness apps like Strava—was originally a closed-off military technology that was later made available for civilian use, partly to support the developing US commercial GPS equipment and service industry. After the discovery of the sensitive information about the locations of secret military bases, the discussions in the news media focussed on the privacy of users of social media and the power of technology companies like Strava, Facebook and Google to track our behaviour and use it to control our lives.

Expressive Self-Tracking

Not all self-tracking practices are taken up voluntarily. Deborah Lupton, professor of sociology at the University of New South Wales, Sydney, identifies five different modes: private, pushed, communal, imposed and exploited self-tracking.¹⁸ In the case of the Strava app, a variety of these types can be observed. Many individual Strava users will use the self-surveillance app to collect information about themselves, raise self-awareness and optimize their lives.

Since Strava is both a fitness tracking app and a social medium, the focus of the tracking goes beyond the individual user. Users are part of a community of trackers. The platform enables the comparing and sharing of data with other members. Another form of communality is the message Strava puts forward in its Commutes Count campaign. In an animation for the 2017 campaign, users are persuaded to take responsibility for their city and take part in an event: 'Every time you commute on Strava you create anonymous data. The data show urban planners how to improve your city. Commuting by bike is good for you anyway. Now it's good for your city too.'¹⁹

As mentioned above, the Strava Global Heatmap revealed the locations of secret military bases because the personnel on those bases were recording their activities. It is ironic that some military personnel were given the devices to track their activities by the army itself. In 2013 the US Army provided some of its personnel with fitness trackers to promote a healthier lifestyle.²⁰ Lupton calls this mode of self-tracking, where the initial incentive does not come from the user, pushed self-tracking.²¹ Or even imposed self-tracking if the benefit is only to the advantage of others than the user.²²

Exploited self-tracking are those practices where personal data of users are repurposed for the (commercial) benefit of others. This is the case when Strava Metro sells the behavioural data of

users to cities. One could argue that in the anonymized aggregated data it is not possible to find the data patterns of individual users. However, hacking practices and instances where datasets have been combined to uncover secrets show that the boundary between personal small data and anonymous big data is blurry at best, and non-existent at worst.

Where should we situate René Koppert's self-tracking practice in Lupton's categorization? The recording of leisure activities to track and improve his physical well-being could be classified as private self-tracking. Since Koppert uses Strava and shares the activities with other users of the fitness app, it can also be classified as communal self-tracking. Although Koppert does not have an open profile where his activities can be accessed by everyone, he does share his activities with a small group of followers that he has given permission to do so. If Koppert does not feel the pressure of fellow athletes to keep track of his data, then his practice cannot be classified as pushed self-tracking. And if Koppert has not given Strava permission to use his data, then exploited self-tracking is not the correct classification either.

Koppert's GPS drawing fits into a larger group of practices aimed at expressive self-tracking. There are specialized practices like that of artist Jeremy Wood, who has been using GPS technology to create drawings since 2000.²³ But also practices of non-specialists who express their ideas through GPS drawing in their leisure and fitness activities. The American Claire Pisano, for instance, publishes on Instagram under the moniker @dick_run_claire GPS drawings of penises projected on urban cityscapes that she draws through running. Her drawings are both an expression of fitness culture, the position of Western women in the twenty-first century, and contemporary US urbanity.²⁴ The website strav.art lists more than 3,000 GPS-drawings categorized by subject in categories such as Elephants, Food & Drink, Plants, Sport and Words & Numbers.²⁵ The Geography section lists about 75 drawings of the contours of countries and continents, including nine maps of Italy, among which that of René Koppert.²⁶ Another category on the strav.art website is Burbing, drawing all of the roads of a suburb.²⁷

Lupton's categorization feels limited in situating GPS drawing practices. The public nature of the drawings shared on social media, either by the original creator or by followers who recreate the drawing, extends so much further than the term community suggests in communal self-tracking. Koppert's Italy drawing also received attention outside the group of cyclists he is part of when it was shared online and reported in a newspaper.²⁸ In the case of GPS drawings, there is also the aspect that these self-tracking practices aim to create an image, or write text, that expresses a thought or feeling intended by the creator to be seen by others. For these practices, I would suggest extending Lupton's classification with the category expressive self-tracking.

Post-Representational Cartography

In the text above I have addressed Koppert's practice but not yet his map. It could be argued that the contour of Italy that Koppert cycled is not a map but an illustration, a picture. This reading ignores that the drawing is a 'diagrammatic representation of a piece of land'²⁹ and that the image, and digital GPX file behind the drawing, can be used as an itinerary or to navigate an environment.

With the mere red line on the Open Street Map base map, Koppert's contour of Italy perhaps lacks the visual qualities of the rich cartographic heritage. It is more the action that made the line, and the skill with which it was created, that are appealing. Understanding and appreciating Koppert's map requires an approach that places less emphasis on what the map shows visually and more on the process behind it.

To situate René Koppert's Italy contour drawing as a map, I propose to use a post-representational approach. Post-representational cartography, a term coined by British-American geographer John Pickles, understands a map as a process rather than an object.³⁰ According to this approach, maps are never fully formed and their work is never complete, they are in a constant state of becoming. A map is constantly being made and remade, every time a user engages with it. According to this approach to cartography, the binary division between making and using no longer applies.³¹ Since Koppert first shared his map on Strava in 2020, the route has been cycled 650 times.³²

When approached as a process, it is interesting to consider at what moment the production of a map ends.³³ Is it when it is conceptualized, when it is embedded in other content on a page, when it is loaded on the screen of a digital device, when it is read, or maybe never? Similar considerations can be made when contemplating the use of maps. When is it first used? During the process of creation, the moment when the map-maker sees the whole through the fragments? Or, in the case of Koppert's map, the consideration is whether the map was created when it was designed on the computer, or when the route was cycled? This also applies to the use of the map, was Koppert the first user when he saw the contour line appear on the map in Strava, when the map was shared as an image via WhatsApp, or when the route was cycled by himself, or others?

As the term 'post' in post-representational cartography suggests, it is a phase in the thinking about maps. Earlier stages are representational and more-than-representational cartography. Representational³⁴ or cognitive cartography,³⁵ developed after the Second World War, has as its premise that the world can be objectively known and truthfully mapped. Cartography develops by using controlled scientific experiments to improve the way a map communicates.

At the end of the 1980s, ideas from poststructuralist thinking, social constructionism and actor-network theory caused a shift in the thinking about maps. In more-than-representational³⁶ or critical cartography,³⁷ maps are seen as the product of power, but also as producing power themselves. Mapping is not objective or neutral but charged with power, where knowledge is not revealed but created.

The early 2000s saw a third shift in thinking about maps. In post-representational cartography, the fundamental status of a map is questioned. Maps are seen as a process and never fully formed. In previous ways of thinking the map was regarded as diverse, rhetorical, relational and complex, but nevertheless a stable product. The terms ontological and ontogenic have been used to describe the difference between post-representational thinking about mapmaking and the two earlier approaches.³⁸ Ontological refers to how things are, ontogenetic to how things become. The map has an ontologically safe basis

in representational and more-than-representational cartography: a map is a map, and it is constant. Post-representational cartography questions that ontological basis and looks at the entire mapmaking process. This approach, which examines the entire process of production and use, and all its overlap and intermediate forms, makes it particularly suitable for considering maps in the digital age, in which the distinction between making and using is sometimes vague and often non-existent.

The three different approaches to cartography described above are based on distinct epistemological methods. Representational cartography uses quantitative methods from cognitive psychology. Methods from textual and linguistic deconstruction are used in more-than-representational cartography. The process-based approach to post-representational cartography uses a variety of methods, including genealogies, ethnographies, ethnomethodology, participant observation, observant participation and deconstruction, to capture the full scope of how a map is created and produced, and how social, embodied, political and economic relations play a role in this messy process.

This Way

There are clear parallels between Stanley Brouwn's work of art *This Way Brouwn* and the GPS drawing of the contour of Italy that René Koppert created. Both are maps that involve non-specialist mapmakers. Both projects are intended to be shared with a larger audience, one in an art exhibition, the other on social media. Where the projects differ is the authorship and degree of completeness. Brouwn's work has a clear author: Brouwn himself. From stamping the work, giving it a title with his name in it, and by displaying it in a context that matches his position as an artist, it becomes clear that he is the creator of the map, even if he did not put the lines and street names on the sheet of paper. The work can be repeated, and Brouwn has done that several times, but after it is stamped and exhibited it is complete. With Koppert's map, the issue is more ambiguous: there is no final version of the map, the map is recreated every time someone views the image or travels the route. This also makes its authorship less clear. Not only because there are several GPS drawings of Italy in circulation, but mainly because the map is an ongoing process and not a finished product.

This makes Brouwn and Koppert's projects typical of the technological periods in which they were made: the analogue era in which Brouwn worked, and the digital era in which Koppert created his map. Ambiguity of authorship and degree of completeness are aspects of both maps. But where Brouwn's work is limited to questioning these aspects, with Koppert's map the ambiguity about the creation and status of the final object is fundamental and total because the map is an open process without a clear beginning or end. That is not to say that Koppert's map has only advantages over Brouwn's analogous version. The openness of process and the ambiguity between making and using has downsides. The digital tool will eventually limit and constrain the user.

American social scientist and professor emerita at Harvard Business School Shoshanna Zuboff formulated three laws of surveillance.³⁹ First, everything that can be automated will be automated. Second, everything that can be informed will be informed. And third, every digital

application that can be used for surveillance and control will be used for surveillance and control, irrespective of its original intention. It is especially this third law that comes into play in the practices of GPS drawing where technology companies share apps and services with users in return for behavioural data. Knowledge about where and when athletes do which activity is profitable when you sell advertising space or sneakers, and this explains why tech and sportswear companies are providing fitness tracking apps to users for free or for a small fee. It is not yet fully clear how venture capital-funded Strava will exploit user data. The app with which Koppert made his Italy drawing might be acquired by a tech or sportswear giant, or by a completely different type of company with more problematic intentions than selling ads or sportswear.

More generally, the use of mobile devices is vulnerable to all kinds of surveillance practices. Documents leaked in 2014 by former National Security Agency contractor Edward Snowden show that US and UK intelligence agencies intercept and store Google Maps searches on smartphones with the location information from where the search was made. This was so successful that a 2008 document points out that it basically means that anyone who uses Google Maps on a smartphone is working in support of the intelligence services.⁴⁰

In addition to these surveillance issues, users of self-tracking tools only have freedom within the limits set by technology companies. There are several examples of tech companies choosing to restrict the capabilities of their products for economic reasons or under pressure from states.⁴¹ Every tool reflects the choices of its maker and their thoughts about how it should be used. The more extensive the tool, the more drastic the curation of its functionalities and thus limiting the possible outputs. This calls for awareness and for developing strategies to undermine and hack the digital tools that we use in our lives. In that respect we can learn from Stanley Broun who, by not picking up the pencil himself, was able to circumvent the conventions of his field, and thereby hack the work of art as format.

The powerful technology companies monopolize and centralize the technologies that enable us to find our way, to express ourselves by recording our activities and to share these with others. Self-tracking technologies control how we view the world and the data we thus generate is exploited as raw material for economic gain. By being aware and developing subversive strategies, we can determine our own ways, otherwise we will become casualties of the tools that we can no longer do without.

- 1 For more information on the work of Stanley Brouwn, see: Antje von Graevenitz, "We Walk on the Planet Earth": The Artist as a Pedestrian: The Work of Stanley Brouwn, translated by Ruth Koenig. *Dutch Art and Architecture* (June 1977), <https://www.impossibleobjectsmarfa.com/fragments/stanley-brouwn>, accessed 12 June 2022.
- 2 Deborah Lupton, 'Self-Tracking Modes: Reflexive Self-Monitoring and Data Practices', paper for the 'Imminent Citizenships: Personhood and Identity Politics in the Informatic Age' workshop, 27 August 2014, ANU, Canberra, https://www.academia.edu/76659435/Self_Tracking_Modes_Reflexive_Self_Monitoring_and_Data_Practices, accessed 12 June 2022.
- 3 René Koppert cycled for TI-Raleigh (1982), Termolan-Gali (1983) and Santini-Conti-Galli (1984), and was the winner of the prologues in Tour de Romandie and Critérium du Dauphiné Libéré and a stage in the Tour of Germany.
- 4 Interview with René Koppert on 15 April 2022.
- 5 Erik Dekker (1970), professional cyclist from 1992 to 2006, winner of four stages in the Tour de France, Amstel Gold Race, Clásica San Sebastián, Paris-Tours and Tirreno-Adriatico.
- 6 Ties Cleven, 'Oud-prof Erik Dekker en zoon David rijden Giro d'Italia, maar dan in Brabant', *Brabants Dagblad*, 6 May 2020, <https://www.bd.nl/brabant/oud-prof-erik-dekker-en-zoon-david-rijden-giro-ditalia-maar-dan-in-brabant-ac80b4ae4/?referrer=https%3A%2F%2Fwww.google.com%2F>, accessed 12 June 2022.06.06.2022.
- 7 For more information on GPS and satellite navigation, see: Joost Grootens, 'The Strava Global Heatmap', in: Joost Grootens, *Blind Maps and Blue Dots: The Blurring of the Producer-User Divide in the Production of Visual Information* (Zurich: Lars Müller, 2021), 96–119; and Laura Kurgan, *Close Up at a Distance: Mapping, Technology, and Politics* (New York: Zone Books, 2013).
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- 9 Shoshana Zuboff, 'Google as a Fortune Teller: The Secrets of Surveillance Capitalism', *Frankfurter Allgemeine Zeitung*, 5 March 2016, <http://www.faz.net/aktuell/feuilleton/debatten/the-digital-debate/shoshana-zuboff-secrets-of-surveillance-capitalism-14103616.html?printPagedArticle=true>, accessed 2 April 2018.
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- 11 Strava, 'About Us', <https://www.strava.com/about>, accessed 12 June 2022
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- 13 Joseph B. Lassiter III, William A. Sahlman and Sid Misra, 'Strava: Harvard Business School Case 814–055', February 2014 (Revised August 2016).
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