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Contact tracing as an instrument for pandemic control

Central considerations from an ethical perspective

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Foreword

These are challenging times – for each of us individually and for our society as a whole. In a pandemic situation, the protection of life, justice, freedom, responsibility and solidarity remain central from an ethical perspective. Also essential is that the means employed to manage the crisis should be proportionate, and that public confidence in state institutions should be maintained by the best possible information and by sound justifications for any measures restricting liberty. One such measure currently under discussion is digital contact tracing. The aim of contact tracing is to identify individuals who have come into contact with a person infected with the coronavirus. These individuals are to be notified of the risk that they may have been infected so that they can take the necessary measures in good time. Digital contact tracing could potentially make a significant contribution to the interruption of transmission chains, which will be particularly important whenever the current restrictions are eased.

The collection, analysis and use of personal data has never been as easy as it is today. Digital access to the individual sphere poses particular risks, e.g. to privacy and personal liberty. Accordingly, such access requires special attention. The National Advisory Commission on Biomedical Ethics (NCE) was requested to express its views on contact tracing in the context of pandemic control. To the extent that this was possible in the limited time available, we have examined in detail the measures under discussion and their ethical implications. We hope that this Opinion will contribute to the decision-making process and to public debate.

Andrea Büchler

NCE Chair

1. Introduction and procedure

In discussions held on 22 March and in an e-mail sent on 24 March 2020, the Federal Department of Home Affairs (FDHA) requested the National Advisory Commission on Biomedical Ethics (NCE) to comment on the following questions:

«The existing method for the identification of contacts in accordance with the Epidemics Act (EpG, SR 818.101) involves personal interviews. The current process is highly time-consuming and labour-intensive. For this reason, discussions are now underway in Switzerland as to how contact tracing could be carried out or supported with the aid of electronic tools and/or mobile data. In the view of the FDHA, such approaches can only be considered if they have an appropriate legal and ethical basis. Against this background, as discussed by telephone yesterday, we are submitting the following questions, to which we would like to have a response by the end of March:

Under Art. 33 EpG, a person who is ill, suspected to be ill, infected or suspected to be infected, or who is shedding pathogens, can be identified and notified.

This provision represents the legal basis for so-called contact tracing, an instrument which is a key element of measures for the containment of communicable diseases. Up until 9 March 2020, contact tracing was also implemented by the Cantonal Medical Officers in connection with the spread of the coronavirus in Switzerland. However, in view of the number of cases and the limited personnel resources available for tracing social contacts, this had to be severely reduced or abandoned altogether.

Looking ahead to the abatement – hopefully in the near future – of the current wave of coronavirus transmission, Switzerland must again very soon

prepare itself for the implementation of contact tracing and switch to a strategy of containment.

Against the background of experience in Asian countries, but also in view of various ongoing projects in Europe, the following questions arise in particular for Switzerland:

- 1. For efficient and effective contact tracing in Switzerland, should residents' mobility data also – or primarily – be accessed, or can/should the use of electronic tools for the analysis of mobility data be dispensed with?*
- 2. What principles and general conditions should govern any use of mobility data?*
- 3. Is an app which is voluntarily fed and employed by users appropriate and justifiable?*
- 4. Is real-time data to be handled differently from historical data?*
- 5. Can the data be made available to the cantonal authorities responsible for contact tracing?*
- 6. For how long is the data to be retained?*
- 7. Is a state provider of a technological solution to be preferred to a private sector solution, or not?*
- 8. Do you have any other comments?»*

At its meeting on 26 March 2020, the Commission decided, as proposed by the Chair, to pursue the request; to appoint a working group (chaired by Andrea Büchler, including Samia Hurst, Ralf Jox, Frank Mathwig, Bernhard Rüttsche, Markus Zimmermann and Maya Zumstein-Shaha, and run by Simone Romagnoli and Jean-Daniel Strub); to interview ten experts at a meeting conducted by videoconference (participants: Bruno Baeriswyl, Cantonal Data Protection Commissioner, Zurich; David Basin, head of Information Security group, ETH Zurich; Abraham Bernstein, head of Dynamic and Distributed Information Systems Group and Director of Digital Society Initiative, University of Zurich; Edouard Bugnion, Vice-President, Information Systems, EPFL; Jean-Pierre Hubaux, head of Labora-

tory for Data Security, EPFL; Peter Rudin, founder of Bluewin.ch; Marcel Salathé, head of Digital Epidemiology Lab, EPFL; Peter Seele, Chair of Corporate Social Responsibility and Business Ethics, USI; Effy Vayena, Chair of Bioethics, ETH Zurich; Verina Wild, Deputy Director, Institute of Ethics, History and Theory of Medicine, LMU Munich); and to prepare a paper for submission to the FDHA by 6 April 2020. The FDHA was informed of the procedure adopted by the Commission. A concise version of the Opinion approved by the Commission was delivered to the FDHA on 3 April 2020. The present Opinion was unanimously adopted by circular resolution on 6 April 2020.

2. Aims and functioning of contact tracing

In the context of efforts to control the COVID-19 pandemic, the aim of contact tracing is to identify individuals who are likely to have been in such close physical contact with an infected person during the incubation period that a relevant risk of transmission of the coronavirus exists. Contact tracing is currently being discussed at the international level as one of numerous measures within a more comprehensive strategy for controlling the COVID-19 pandemic.¹

According to current virological knowledge of COVID-19, the relevant incubation period for the virus is up to two weeks. A risk of transmission by droplet infection is currently believed to exist in particular when an individual spends at least 15 minutes within two metres of an infected person.

Contact tracing can be conducted by interviewing infected persons. However, such “analogue” contact tracing requires considerable effort and is imprecise and incomplete. This is due in particular to the fact that, firstly, it is based on the person’s memories, which in this case have to extend back over a number of days, and, secondly, it requires a timeconsuming interview to permit the reconstruction of the person’s movements and any contacts not only with relatives, colleagues or friends, but also with strangers.

More accurate tracing of contacts and possible infection paths can be achieved using digital methods. One such method is based on the analysis of digital devices carried by infected persons. The data provides information on the proximity of infected individuals’ smartphones to other people’s smartphones, as measured by Bluetooth or other technologies. Here, the mobility data analysed can be made available via an app not only to users but also to the responsible authorities, so as to enable coordination of measures. Various approaches and applications are possible: some operate via real-time location tracking, which can also be used, for example, to monitor compliance with quarantine. Others use location data and individual movement profiles to identify contacts. Such methods have already been employed in several countries, particularly in East Asia. Others again do not rely on mobile phone geolocation data, but use the infected person’s contact history.² For example, one measure or system currently under discussion – PanEuropean Privacy-Preserving Proximity Tracing (PEPP-PT) – aims to use the Bluetooth function of mobile phones to determine anonymously whether individuals have been in epidemiologically relevant proximity (i.e. within two metres for at least 15 minutes) to an infectious person.³ In what follows, such contact tracing systems based on mobility data are to be assessed from an ethical and legal perspective.

1 Cf. Ferretti et al. (2020). Quantifying SARS-CoV-2 transmission suggests epidemic control with digital contact tracing. *Science* 10.1126/science.abb6936; Hellewell et al. (2020). Feasibility of controlling COVID-19 outbreaks by isolation of cases and contacts. *Lancet Glob Health*; 8: e488-96.

2 Cf. Kormann, Thier and Rittmeyer (2020). So kämpfen die Länder dieser Welt mit Smartphone-Daten gegen das Coronavirus, *Neue Zürcher Zeitung*, 3 April: <https://www.nzz.ch/technologie/so-kaempfen-die-laender-dieser-welt-mit-smartphonedaten-gegen-den-coronavirus-ld.1549986> (accessed: 4 April 2020).

3 As described, for example, in a paper on Pan-European Privacy-Preserving Contact Tracing (PEPP-CT, 2020, S. 2), apps of this kind create «an anonymous proximity history on a user’s phone. For this purpose, distances from other phones of [app] users are estimated via measured radio signals (Bluetooth etc.). The measurement and the anonymous identifier of the other [app] users are only recorded if there is sufficient proximity. This anonymous proximity history remains encrypted on the phone of the [app] user and can never be viewed by anyone, not even the [app] user. Only the proximity history that is deemed relevant for transmission is saved, and the part of the proximity history that dates further back is continuously deleted. Once an [app] user has been deemed SARSCoV-2 positive, the health authorities will contact them by phone or other means, depending on a country’s implementation of the system. The health authority will convey a code to the [app] user, with which the encrypted proximity history is transmitted – in encrypted form – to a national trust center.»

It should be noted that digital contact tracing is also subject to certain imprecisions. First of all, it is technically difficult or sometimes even impossible to determine the location of individuals to an accuracy of ≤ 2 metres (the distance relevant for transmission of the virus). In addition, only the contact between two devices is measured, which is taken as a surrogate for contact between two persons. The validity of such measurements thus also depends not least on whether people actually have their smartphones with them. Apart from the technical challenges, there are also imprecisions from a virological perspective: firstly, proximity to or even physical contact with an infected person does not necessarily mean that transmission will occur, although such contact, or close proximity, does involve a certain risk of infection.⁴ Secondly, contact tracing cannot capture those cases where transmission occurs without personal contact, via infected surfaces. Furthermore, the period during which a person poses a risk of infection cannot be precisely determined.

The effectiveness of digital contact tracing also depends on how many people in a pandemic-affected area voluntarily use the technology, or had their smartphone with them (with the localisation function switched on) when they were in the vicinity of other people. The greatest effect can be achieved when all smartphone-owning residents in an affected area actively participate in contact tracing – it is currently estimated that, if transmission chains are to be effectively interrupted, the function should be used by at least 60 per cent of all smartphones.⁵

Overall, current knowledge thus suggests that digital contact tracing could be one method for identifying possibly infected individuals in a very short time (≤ 2 days).⁶ It should, however, be borne in mind that, for the reasons mentioned above, the suspicion that a person may have been infected is relatively vague and, even if the method were universally adopted, by no means all possibly infected individuals could be traced as a result.

The question then arises how the information on infection paths and possibly infected individuals obtained via contact tracing can be used for pandemic control. The first option to be considered is a more targeted deployment of epidemiological control measures in areas or communities where an increased density of persons at risk of infection is determined. At the individual level, the aim is to alert possibly infected individuals, who – aware of the risk – can then be tested for infection, take hygienic precautions (e.g. wearing a mask) or self-isolate. Such measures may be adopted voluntarily or prescribed by the authorities. Whether the latter would be ethically justifiable and legally permissible will need to be examined.

Contact tracing as described above is to be distinguished from mobility data-based methods used to provide warnings about infected persons or even for real-time surveillance. Such tracking of those who are infected for warning or surveillance purposes is not under consideration in Switzerland and would scarcely be permissible from a legal viewpoint, as will be shown below.

4 On this point, the proximity tracing paper (PEPP-CT, 2020) seen by the Commission notes: «When a proximity history is uploaded to the trusted server, the server can match that with the proximity histories uploaded in the past. When a match is found, the probability is calculated that via that event the transmission occurred. Given that, the measurement parameters associated with the event can be used to estimate the risk of exposure using machine learning.»

5 Cf. Betschon (2020), «Wie eine Smartphone-App das Virus stoppen und den Lockdown beenden könnte», Neue Zürcher Zeitung, 2 April: <https://www.nzz.ch/technologie/wie-eine-smartphone-app-das-virus-stoppen-und-den-lock-down-beenden-koennte-ld.1549775> (accessed: 4 April 2020).

6 Cf. Soetens et al. (2018). Real-time estimation of epidemiologic parameters from contact tracing data during an emerging infectious disease outbreak. *Epidemiology*; 29(2): 230-236; Ferretti et al. (2020).

The question whether and how far the state may, under certain conditions, have recourse to contact tracing methods calls for an answer which acknowledges the ethical and legal primacy of rights to privacy and liberty. Specifically, it needs to be established

1. for what purpose (purpose limitation),
2. subject to what principles (proportionality),
3. on what basis (Epidemics Act, data protection legislation),
4. under what conditions,
5. to what extent (data integrity and completeness) and
6. for what institutions (entity responsible)

mobility data relating to infected persons may be collected and processed.

3. Legal goods and rights concerned

3.1 Protection of public health

Contact tracing is an instrument for epidemic control and can contribute to the protection of public health. Contact tracing is among the traditional methods generally adopted without delay in the event of an epidemic. What is seen as an advantage of digital contact tracing is the fact that it enables public health to be promoted more effectively than analogue contact tracing, since with the latter it is usually only possible to identify contacts who are known to and recalled by the index patient, i.e. the patient who is (believed to be) at the origin of a chain of transmission. Digital contact tracing, in contrast, would also make it possible to identify contacts who are not known to the index patient but have been in sufficient proximity to be exposed to a risk of infection – and to do so much more rapidly than analogue contact tracing.

Public health is a classic case of a public interest which can justify restrictions on the fundamental rights of individuals, provided that certain other requirements – a legal basis and proportionality – are met (Art. 36 Federal Constitution). When such rights are weighed against opposing rights, it should be borne in mind that public health ultimately also serves to protect fundamental rights – in particular, the rights to life and physical integrity (Art. 10 para. 1 and 2 FC).

3.2 Protection of other goods and rights

However, for the weighing of goods which must precede any use of contact tracing, the interest of the public in containing the pandemic is not, of course, the only interest at stake. Personal freedom is, in this context, a central good deserving protection, while the maintenance of a functioning economy, public institutions and healthcare facilities are central instrumental goods ensuring the protection of the fundamental goods. Also to be considered is the fact that, in connection with such technologies, scientific, economic,

political and personal interests (e.g. of developers, companies and authorities) are always also involved. Such interests not directly focused on the protection of public health may not only drive use of the technology during the pandemic, but also be aimed at further use of the technology after the end of the pandemic.

A pandemic on the scale of COVID-19 also leads directly or indirectly (on account of restrictions on freedom) to substantial economic damage. Control measures such as contact tracing thus also, insofar as they have an impact and represent an effective alternative to a lockdown, promote economic interests, especially since damage to economic interests is always associated with impairments to public health. The protection of public health is thus closely linked to the prevention of economic damage (cf. Federal Supreme Court ruling BGE 118 Ia 427 E. 6d).

The Commission emphasises that personal freedoms can also be significantly restricted by measures such as a prohibition of gatherings or using public spaces, or stay-at-home orders. These measures give rise to problems of social isolation, economic anxieties and lack of exercise already evident today – for example, increases in domestic abuse and in mental and somatic disorders. Against this background, digital contact tracing is not only to be seen as a measure which may jeopardise individual interests, but very much also as a means of curbing, or at least limiting the duration of, measures such as a lockdown, which are even more detrimental to these interests. Digital contact tracing may thus indeed help to safeguard individual legal goods – for example, by making possible (renewed) freedom of movement or the pursuit of economic activities.

3.3 Infringements of privacy

Effective contact tracing is associated, at least potentially, with infringements of the privacy of the persons concerned: firstly, it requires the use of personal data.

Secondly, contact tracing has to be combined with other measures – in particular, the testing and self-isolation which must be the consequence of infection or contact with an infected person. In this respect, digital contact tracing does not essentially differ from analogue contact tracing, although given the use of smartphone data it does entail more far-reaching possibilities.

Digital contact tracing requires the transmission of information concerning infected persons. Here, as in the case of analogue contact tracing, it must be ensured that confidentiality is maintained. For confidentiality is essential for various reasons: as the disclosure of confidential information contravenes individuals' right to control information about themselves, the maintenance of confidentiality is closely associated with the principle of informational self-determination. The disclosure of confidential information may, however, also harm people by exposing them to situations of shame. By protecting the intimate private sphere, confidentiality enables each person to develop his or her individuality. The importance of confidentiality thus also concerns other goods going beyond mere protection against possible damage to a person's health.

With analogue contact tracing, the right of those concerned to control the use of information about themselves is protected by the requirement that an index patient must consent to the notification of contacts. In some cases, this task is even assigned directly to the patient in question, which is in line with the principle of self-determination. Of course, in the case of analogue contact tracing, the handling of personal data collected (contacts, movements, etc.) is also subject to stringent requirements, and it is important to respect a refusal to make contact. Generally, however, index patients appear to be very eager to protect those with whom they have been in contact during the period concerned. If, having been comprehensively informed, they participate voluntarily in the identification of contacts, then the index patients' autonomy is preserved.

From a legal viewpoint, the fundamental rights to privacy and informational self-determination (Art. 13 FC and Art. 8 European Convention on Human Rights/ECHR) and the personality rights protected under civil law (Art. 28 Swiss Civil Code/SCC) are affected when, in connection with contact tracing, public or private entities access and process mobility data of the persons concerned. Since the persons in question are infected with the virus and may be ill, contact tracing also involves the management of health data – specifically, sensitive personal data as defined in data protection legislation (Art. 3 let. c no. 2 FADP). An infringement of privacy, however, only occurs insofar as mobility and health data can be linked to specific individuals. If this is not the case, i.e. if the data is anonymised, then privacy is not affected. If personal data is collected in an individualised form by the contact tracing operator but is passed on to third parties exclusively in an anonymised form, then, while this involves an infringement of privacy, it is less severe than in the case of disclosure of (non-anonymised) personal data to third parties.

If digital contact tracing is used to warn third parties about an infected person and if the person concerned can be individually identified by third parties, then this represents a separate, grave infringement of the privacy of the exposed individual. If public authorities further use digital contact tracing for surveillance of infected persons, then their freedom of movement (Art. 10 para. 2 FC) is affected as well as their privacy.

3.4 Provisional conclusions

In summary, it can be concluded that contact tracing, being designed to prevent the uncontrolled spread of a pathogen, is to be understood as one of several available measures for the protection of public health and other public interests and individual rights. However, in contrast to the analogue version, digital (e.g. app-based) contact tracing is particularly sensitive with regard to the protection of personal (health-related) data, privacy and informational self-determination.

4. Legal basis

In Art. 30–39 of the Epidemics Act (EpG, SR 818.101), provision is made for measures vis à vis individuals. In an extraordinary situation, such as that now prevailing, the Federal Council is responsible for ordering the requisite measures (Art. 7 EpG). However, even in an extraordinary situation, the constitutional principle of proportionality (Art. 5 para. 2 and Art. 36 para. 3 FC) must still be observed. In Art. 30 para. 1 EpG, it is explicitly specified that measures vis-à-vis individuals may only be ordered if «less radical measures are not sufficient or not appropriate to prevent the spread of a communicable disease» (let. a) and «the measure is designed to avert a serious risk to the health of third parties» (let. b). In addition, the measure must be «necessary and reasonable» (Art. 30 para. 2 EpG).

Contact tracing is a measure which may be considered in accordance with Art. 33 EpG: «A person who is ill, suspected to be ill, infected or suspected to be infected, or who is shedding pathogens, can be identified and notified.» This provision essentially permits the institution of a contact tracing system which identifies and notifies all persons who, during the infectious period, were in such close contact with an infected individual that transmission could have occurred. The persons thus notified can be deemed to be «suspected to be infected» as specified in Art. 33 EpG, even if the suspicion of infection may be relatively low.

Insofar as contact tracing also involves processing of personal data, data protection legislation is additionally to be observed. Processing of personal data by federal authorities and private entities is certainly permissible if consent has been given by the data subjects (Art. 13 para. 1 and Art. 17 para. 2 let. c FADP). This would be the case if participation in a contact tracing system were voluntary, although those concerned would need to be adequately informed in advance about the consequences of participation. In the absence of consent, a legal basis is required for the processing of per-

sonal data (Art. 13 para. 1 and Art. 17 para. 1 FADP). Art. 58 EpG represents such a legal basis for the processing of personal data in connection with digital contact tracing, insofar as the processing of such data is necessary, in accordance with the proportionality principle, in order to implement this measure. Under this provision, the FOPH, the competent cantonal authorities, and public and private institutions entrusted with tasks under this Act may process or arrange for the processing of personal data, including health data, insofar as this is required for the identification of persons who are ill, suspected to be ill, infected or suspected to be infected, or shedding pathogens, in connection with measures for the protection of public health, particularly for the detection, monitoring and control of communicable diseases.

For the successful implementation of digital contact tracing, open, continuous public information is essential (cf. Section 6.3). A legal basis for information of the public by the federal authorities is to be found in Art. 9 EpG. Under this provision, the FOPH is to inform the public about methods for preventing or controlling an epidemic or pandemic.

The desired effects of contact tracing depend crucially on the wide participation of persons in an affected area. If adequate uptake cannot be achieved on a voluntary basis, the question arises whether it would be permissible for participation in contact tracing to be mandated by the state, i.e. by the Federal Council. In this case, all persons in areas affected by the pandemic, possibly the entire population of Switzerland, would be required to have their smartphone with them, with the localisation function enabled, whenever they were in a public space. If contact tracing were app-based, the order would also have to include a requirement to download the app. Enforcement of such orders would be difficult, though possible to a certain extent – for example, via spot checks.

An official order for contact tracing would be of a universally binding nature and thus a measure vis-à-vis the population or certain groups of persons in accordance with Art. 40 EpG. Under this provision, the competent authorities order measures «to prevent the spread of communicable diseases in the population or in certain groups of persons» (Art. 40 para. 1 EpG). A contact tracing order could be based on this openly worded provision, but would likewise have to meet the test of proportionality. Art. 40 para. 3 EpG explicitly states that the measures may only remain in place for as long as is necessary to prevent the spread of a communicable disease, and that they are to be regularly reviewed.

In contrast, there is no basis in the Epidemics Act for the use of contact tracing to provide warnings about infected persons. While it is true that such a warning is addressed to an indeterminate number of people, i.e. to the public, it will always concern specific individuals, with whom contact is to be avoided. Such warnings are thus to be classified as measures vis à vis individuals in accordance with Art. 30-39 EpG. No legal basis can be found here which would allow warnings about infected persons to be addressed to those who are healthy. Nor does the Epidemics Act provide a legal basis for the real-time surveillance of infected persons via contact tracing (on the requirement for a specific legal basis for surveillance instruments, cf. the Federal Supreme Court ruling BGE 136 I 87 E. 8).

It is doubtful whether the use of contact tracing for warning and surveillance purposes in an extraordinary situation could be ordered by the Federal Council under its emergency powers based on Art. 185 para. 3 FC. Emergency ordinances and emergency decisions also have to meet the test of proportionality. In addition, warnings concerning infected persons, as well as surveillance based on real-time mobility data tracking, represent significant restrictions on their fundamental rights, particularly the right to privacy. Here, exceptions to a democratically decided legal basis (formal law) are only permissible in cases of serious, immediate danger which cannot be otherwise averted (Art. 36 para. 1 sentence 3 FC). This presupposes that

the measures are likely to be effective in averting the danger. However, warnings concerning, or the surveillance of, infected persons could probably only make a limited contribution to efforts to control COVID-19. Furthermore, there would be a risk that the mistrust of the population expressed by such measures could undermine public solidarity, personal responsibility and readiness to cooperate in managing the crisis, and that such measures could not be implemented on a voluntary basis (see below). Given the doubts concerning the effectiveness of the use of contact tracing for warning and surveillance purposes, even an order issued under emergency powers would scarcely meet the test of constitutionality.

In summary, it can be concluded that the Epidemics Act provides an adequate legal basis for federal measures associated with digital contact tracing; this includes Art. 9 (public information about contact tracing), Art. 33 (identification and notification of persons suspected to be infected) and Art. 58 (processing of personal data for the identification of persons who are infected or suspected to be infected). For legal reasons (cf. Art. 7 Epidemics Act) and to ensure sufficient political legitimacy, it is up to the Federal Council to decide on measures concerning the introduction and implementation of digital contact tracing; this could take the form of a supplement to the COVID-19 Ordinance.

5. The principle of proportionality

As digital contact tracing can both promote and jeopardise central legal goods and rights, we are confronted with the necessity of a weighing of goods. In this context, the legal and ethical justification of contact tracing requires that any risks to rights and goods are proportionate to the achievement of the specified objective, and that an appropriate framework is defined so as to keep these risks to a minimum. Proportionality in this sense means that the measure is indeed aimed at the protection of highly ranked goods and is suitable, necessary and reasonable for this purpose. The more it is directly designed to avert a proven, serious and immediate danger, the more it is likely to be justified. However, even if a measure is effective and restrictions are limited as far as possible, it may nonetheless be disproportionate, if the restrictions are still excessive in relation to the intended effects. Proportionality must therefore always be evaluated in the specific context in which the measure is employed. The risks may vary considerably from one context to another. This applies to both short-term (e.g. the risk of being stigmatised if relatives learn of a diagnosis) and long-term risks (e.g. that once a measure which does not exclude surveillance of citizens has been introduced by the state, it will not subsequently be reversed).

In order to assess the question of proportionality, therefore, one must first consider the current severity of the epidemiological situation, i.e. the mortality and morbidity rates associated with COVID-19 in the region concerned (Switzerland, in this case). A technology of this kind might, for example, only be necessary and justifiable from a certain degree of severity of an epidemic.

Secondly, the question of the appropriateness of digital contact tracing is of crucial relevance: does it reliably enable those close social contacts to be identified which are associated with a high risk of infection (i.e. contact at a distance clearly <2 metres for a certain time, physical contact, inhalation of droplets/aero-

sols)? It should also be borne in mind that the technology does not of course capture any hygienic precautions accompanying the social contacts (e.g. mask, gloves). Also to be considered is the fact that what is measured is only a surrogate for close physical proximity, namely the distance between mobile phones, not between persons. Especially when mobile phones are not carried close to the body (e.g. during recharging), such measurements misfire. Statistical evidence on the rates of false-negative and false-positive findings should therefore be available.

Thirdly, the (separate) criterion of benefit or utility needs to be considered. What is required is robust scientific evidence that such tracing systems have positive effects on the course of the epidemic, i.e. significantly reduce morbidity and mortality, or – the focus of attention in the current context – that they can contribute to the reversal or at least relaxation of existing measures such as a lockdown. The evaluation of a measure such as digital contact tracing also depends not least on how the technology is applied in practice – in particular, the consequences ensuing from knowledge about contacts.

Finally, in connection with proportionality, it must also be asked what the social/psychological consequences of digital contact tracing could be. Would there be a risk of resistance (e.g. mobile-free parties) or a false sense of security (e.g. reduced compliance with hygiene advice)? Such behaviour would certainly be counterproductive. To what extent would a sense of security or of surveillance (threat) arise, and would this be compatible with voluntary participation?

In summary, it is to be emphasised that the principle of proportionality requires that the measure adopted should be that approach, of all those available, which, in accordance with the subsidiarity principle, involves the most limited restrictions on rights. If, after a measure has been introduced, an approach involving more limited restrictions is developed, this must replace the

measure previously adopted. Accordingly, in the interests of proportionality, a measure such as digital contact tracing should only be adopted for the shortest possible period required to achieve the objective. This means that the period for which a measure is ordered must be defined in advance and reviewed at regular intervals.

In this connection, it should however be reiterated that the measures restricting freedom currently in force (ban on gatherings and use of public spaces, partial lockdown) also affect and in some cases contravene private and public goods and rights. This is not tolerable for society over the long term. In this sense, digital contact tracing could help to alleviate the current restrictions, in line with that aspect of the proportionality principle which calls for the employment of the mildest means available to achieve the desired end.

6. General conditions

In the light of the above discussion of the central principle of proportionality and its practical implications for the use of digital contact tracing, the Commission believes that compliance with the following general conditions is essential if the introduction of contact tracing to control the COVID-19 pandemic is to be ethically justified.

6.1 Integration into an overall strategy

Contact tracing must be part of a broad strategy for pandemic control, employing a variety of instruments which are to be effectively coordinated. These include, for example, testing but also self-isolation of those with positive test results and also of persons exposed to a risk of infection. Ideally, digital contact tracing will thus supplement, rather than replacing, traditional analogue contact tracing – also because the latter allows those persons to be identified who for example do not use a smartphone.⁷

In this context, it is vitally important that, prior to the introduction of digital contact tracing, it is clearly defined how this measure is to be integrated into the overall strategy for pandemic control, what information is to be collected and precisely what goals are to be achieved thereby. These points must form part of transparent, timely, comprehensive and regular public communication. The people addressed as potential users of the contact tracing app must be aware of and able to evaluate the goals, functioning, benefits, and expected consequences and implications of the use of contact tracing. They must know what event, i.e. a positive test for infection, triggers a search for and notification of contacts, what periods are covered, what data is collected and what happens to this data. They

must also be informed about how digital contact tracing stands in relation to other measures – for example, the fact that the authorities can today already detect gatherings of people, using anonymised data provided by Swisscom.⁸ Communication must meet various requirements: firstly, it must be defined and explained what is expected of the public in connection with the introduction of the measure (participation, self-isolation as a consequence, etc.).

Secondly, it must also be ensured that the necessary legal and political measures are taken so that persons discovered to be infected or exposed to a risk of infection are not subjected to discrimination. This means, for example, that it must in fact be possible for a person who is infected but asymptomatic to self-isolate without adverse consequences arising at the workplace, for example, and to benefit from the relevant protection provisions. It must also be established what testing strategy is to be used so that persons notified via digital contact tracing of a potential risk of infection can determine their infection status. Comprehensive information should also include unresolved questions on the scientific evidence for the actual effectiveness of the approach, which given its novel nature has, of necessity, been little investigated to date, and on the management of false-positive findings, which are likely to be common as a result of the inevitable imprecisions described above.

Approval is to be granted exclusively for the implementation of a measure justified by the extraordinary situation. Should digital contact tracing be introduced in the current crisis, it must therefore be automatically terminated when this situation has been overcome – another point which is to be transparently communicated.

⁷ Cf. Salathé et al. (2020). COVID-19 epidemic in Switzerland: on the importance of testing, contact tracing and isolation. *Swiss Med Wkly*; 150: w202205

⁸ Cf., for example, the information published by the Federal Data Protection and Information Commissioner (FDPIC) on 3 April 2020: https://www.edoeb.admin.ch/edoeb/de/home/aktuell/aktuell_news.html#1781027723 (accessed: 4 April 2020).

6.2 Voluntary participation

For ethical reasons, contact tracing must be based on voluntary participation and is thus subject to the requirement for informed consent: those who are prepared to use this method and to make their relevant data available for their own protection, but also as a measure for the protection of public health, must be able to do so without any external pressure and with a full awareness of the potential benefits and implications. Forcing the public to participate in contact tracing could not only undermine confidence in the measure and in the authorities ordering it, but also contribute to a decrease in social solidarity. From a legal perspective, the measure could then no longer be deemed to be reasonable or in conformity with the goal pursued.

At the same time, mandatory participation would not only represent an undue infringement of certain legal goods but also create a false sense of security among citizens. This in turn could lead to careless behaviour and thus be counterproductive overall. In addition, the enforcement of mandatory participation would require considerable effort and be relatively intrusive for those subjected to controls. An obligation to participate would, not least, tend to undermine public confidence in the authorities responsible and run counter to the idea of solidarity.

Particular attention needs to be given to the question of whether and under what conditions minors or persons lacking capacity, who cannot themselves give their consent, could participate in contact tracing. Excluding them would be undesirable both on the grounds of respect for autonomy and in terms of the effectiveness of the measure. Prior to the introduction of the relevant measures, it should be examined – taking into account existing legal requirements and procedures for proxy consent – how this specific issue can be addressed.

6.3 Transparency and responsibility

Given the exceptional nature of the current situation, the urgency of the decisions to be made and the recourse to little-tested technological innovations, the use of digital contact tracing is to be regarded as a technological, scientific and social experiment. To maintain public confidence in the measure, it should be borne in mind in the authorities' communication with the public that digital contact tracing can give rise both to anxieties (e.g. constantly waiting for a possible notification) and to a false sense of security (if no notifications are received).

This makes it all the more important that the public should be informed by the competent authorities in a transparent manner about the general conditions, goals, modalities and consequences of the introduction of digital contact tracing. In this connection, for example, the source code of the app used for this purpose must be made public and communicated to the authorities responsible for data protection.

It must also be defined (and open to public inspection) how the data collected is used in practice, what groups of people can access it and how they are permitted to use it. Lines of accountability must also be clearly defined. If – as in the case of PEPP-PT – machine learning (a form of artificial intelligence) is employed, it should be ensured that the algorithms remain intelligible and open to scrutiny.

The general conditions recommended here are certainly applicable if the federal authorities develop their own app or deploy in their own name an app developed by a private provider. However, the federal authorities also share responsibility for compliance with these conditions if they publicly recommend or advocate the use of a privately developed app.

Lastly, the authorities must also ensure that, if digital contact tracing is to be implemented under an international strategy – as is unavoidable given human mobility – the other countries employing and participating in the system guarantee data protection and individual liberties to the same extent.

As digital contact tracing essentially involves data processing,⁹ there is also a need for compliance with special requirements concerning transparency and responsibilities at the three relevant levels of data collection, data analysis and data retention/destruction.

6.3.1 Data collection

- Only historical contact data may be used, not real-time data – the latter is not necessary for the achievement of the goal (identification and notification of persons suspected to be infected).
- Only data absolutely essential for the achievement of the goal is to be collected, and this must be transparently communicated. Preference is to be given to the system where data collection is anonymised.

6.3.2 Data analysis

- Anonymity is crucial with regard to data analysis. If mobility and health data is not already anonymised when it is collected, then it should be anonymised as fully and as rapidly as possible. Transmission of personal data to third parties is to be excluded. Adequate data security measures are to be taken for this purpose.
- It is also to be ensured that there is no possibility of de-anonymisation (re-identification), e.g. as a result of location data being linked to the mobile phone number or the nighttime location, i.e. home address. This is the only way of preventing stigmatisation or discrimination of those particularly affected by the pandemic.

6.3.3 Data retention/destruction

- The data collected may only be retained for as long as is necessary. Here, the key factor is the interval between infection and the onset of symptoms (incubation period): during this period, there is a risk of transmission occurring without the infected person being aware of it. Whenever symptoms develop,

testing should be performed, and if the findings are positive, contact tracing is then triggered. Accordingly, a retention period is to be defined which, given the incubation period, is epidemiologically relevant (e.g. 14 days), and technical arrangements are to be made for the deletion of data after this period. If data is to be used for a longer period for research or other purposes, this requires – as well as appropriate ethical evaluation of the research project – the prior consent of the persons concerned, after receiving adequate information on the proposed change in purpose.

- After the end of the emergency situation, i.e. as soon as the pandemic has been controlled and has abated, the operation of the contact tracing system is to be terminated without delay.
- If contact tracing is operated by a private provider on behalf of the federal authorities, then the latter must ensure adequate supervision. In particular, it is to be ensured that a private provider does not use the data for other purposes (separation from any other business areas).

6.4 Justice

Contact tracing also raises questions of justice: the conditions must be the same for everyone, and the general framework must be designed so as to ensure that the rights and interests of all concerned are equally protected as far as possible. This may mean that vulnerable groups or persons require special protection. Firstly, it is a requirement of social justice that citizens less familiar with the use of mobile devices (which will tend to be the case particularly for COVID-19 risk groups) should also be able to participate in contact tracing. Secondly, the question of participation in contact tracing must not affect treatment options in the event of a crisis: for example, access to possibly scarce intensive care beds is not to be made dependent on participation in digital contact tracing, nor is participation to be made obligatory by third parties (e.g. employers).

9 Cf. Ienca and Vayena (2020). On the responsible use of digital data to tackle the COVID-19 pandemic. *Nature Medicine* 26, 463-464 (<https://www.nature.com/articles/s41591-020-0832-5>).

6.5 Procedural safeguards

Since an exceptional situation may be prolonged and lead to a “new normal” state, the approval of a measure must be limited to a specific period, even though the crisis might not have been overcome by that time. The measure could then be extended by the competent authorities, taking into account the same criteria that were decisive for its introduction. Wherever possible, however, decisions on the possible continuation of such measures should only be made in accordance with the mechanisms applicable outside of a crisis.

From the outset, the implementation of the measure is to be evaluated in depth with regard to effectiveness, subsidiarity and proportionality. To this end, accompanying research enabling a retrospective assessment should be initiated, and it should also be ensured that non-compliance with the general conditions will trigger appropriate interventions.

As a general rule, during a crisis, decision-making powers may have to be more concentrated than under normal conditions. These powers must, however, remain limited. Decisions made in an emergency must remain subject to oversight by the usual authorities, who must be appropriately informed at all times.

7. Conclusions and key requirements from an ethical perspective

In view of the above reflections, the Commission concludes that **ethical considerations do not pose a fundamental obstacle to the use of digital contact tracing**. Digital contact tracing may, however, affect important individual interests and legal goods, notably privacy. **Accordingly, digital contact tracing must be subject to the following conditions, which arise in particular from the principle of proportionality:**

- As contact tracing affects important individual legal goods and interests, and there is a risk that an obligation to participate would undermine public solidarity and willingness to cooperate in efforts to control the pandemic, it must be based on **voluntary participation**. Individuals must be able to consent to the use of a tracing app having been comprehensively informed and without any external pressure.
- **Real-time location tracking** of infectious individuals **is not permissible** and must not be used. Only an app which records contacts in an anonymised form is compatible with the principle of proportionality. Here, a tracing system which does not rely on location data, but “merely” records contacts, is clearly to be preferred.
- This measure can only be considered as part of a **broad strategy** for pandemic control, deploying a variety of instruments (in particular, the widest possible testing, but also the continuation of analogue contact tracing). Before the measure is introduced, it must be defined how contact tracing is to be integrated into the overall strategy.
- **Transparent, comprehensive and regular public communication** on the goals, functioning, benefits, and expected consequences and implications of the use of contact tracing is indispensable.
- The measure is to be **implemented for a limited period**. When the emergency is over, i.e. as soon as the pandemic has been adequately controlled and has subsided, the operation of contact tracing is to be terminated without delay and the data collected is to be completely deleted.
- Democratic oversight of the digital resources used must be assured. To this end, it must be ensured that an **open protocol** is employed, making the parameters of the tools used open to inspection.
- In the interests of democratic oversight and to increase acceptance of contact tracing, it should be examined whether the implementation of contact tracing should be entrusted to a non-governmental organisation or a consortium with a performance mandate subject to parliamentary control.
- Clearly defined lines of accountability must be assured. If contact tracing is operated by a private provider on behalf of the federal authorities, the latter must ensure **adequate supervision**. In particular, it must be ensured that data is only used for the previously specified purposes.
- Implementation should be **internationally coordinated**, so that people can also participate in cross-border contact tracing.

In the Commission's view, the fulfilment of these conditions must be assured from an ethical, legal, technological and resourcing perspective so that digital contact tracing can be used in Switzerland as an instrument for controlling the pandemic.

At the same time, it is of the utmost importance that authorities and users are aware – and this point is also to be communicated – that this is a technological and social experiment, which is being carried out in the context of an emergency situation. In view of this fact, the Commission strongly recommends, not only that the use of this measure should be subject to adequate supervision, but that a suitably qualified body, or appropriate committee, should be charged with conducting accompanying research. This must investigate, in various (ethical, social and legal) dimensions, both the effects of the measure, in terms of the desired additional containment benefits, and possible undesired side effects and harms.

This document was unanimously approved by the National Advisory Commission on Biomedical Ethics on 6 April 2020.

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