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Digital Epidemiology Lab

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Thoughts on Health & Privacy from COVID

Data vs Privacy
Goal vs Means

+ Sharing without sharing: Reaching a certain goal while ensuring that lot of sensitive data doesn’t get into the wrong hands.

+ **What is the goal?**
+ **What data do you really need to reach the goal?**

+ Not black and white - but balancing benefit and risks is part of any standard ethical consideration.

Data vs Privacy
Learnings from the pandemic

+ Pragmatism wins but gets no love

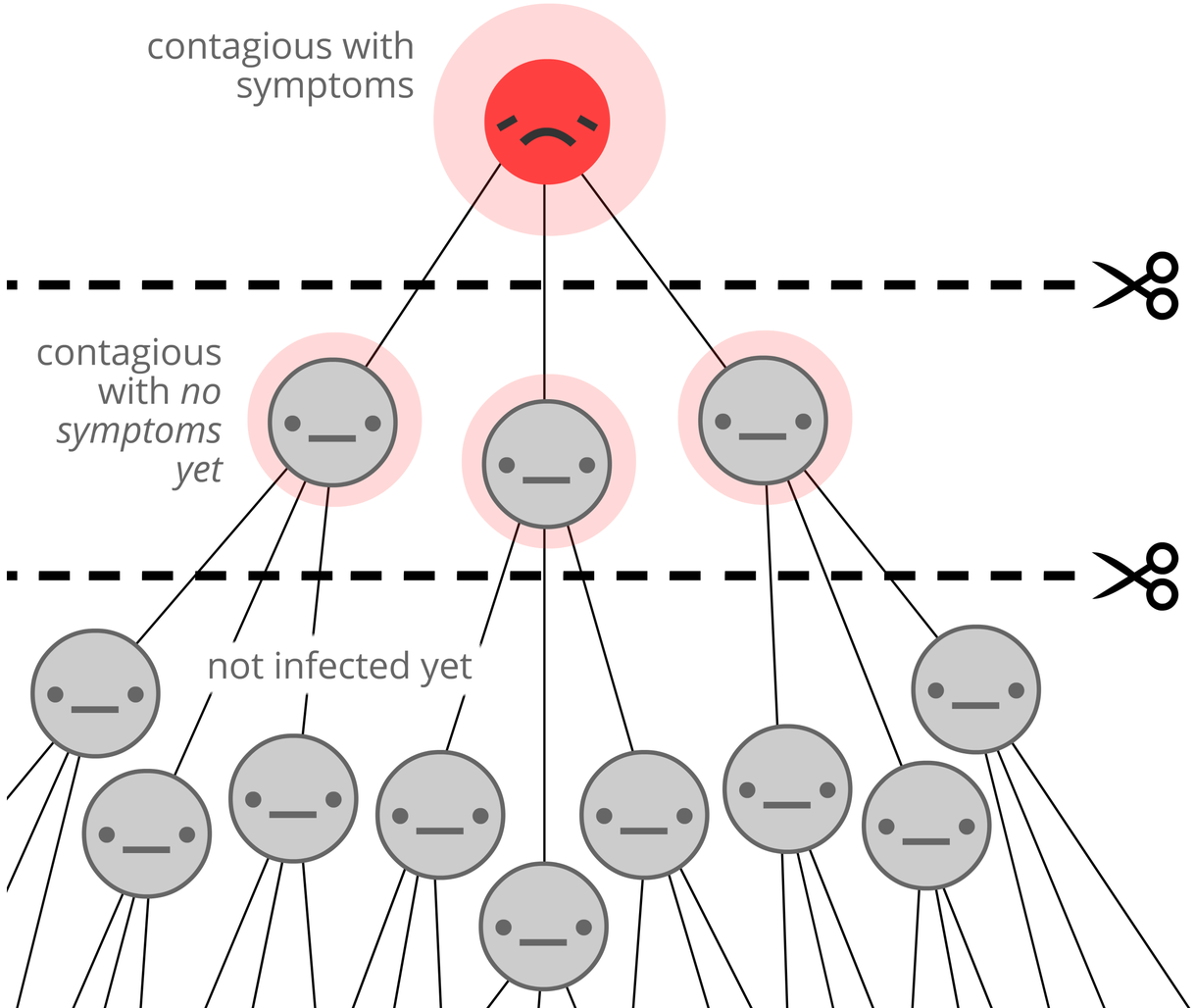
+ Privacy concerns are not where you think they are

+ The media is mostly of no help (or too late)

+ Surveys are of limited use

EPFL

COVID-19
The Importance of Contact Tracing



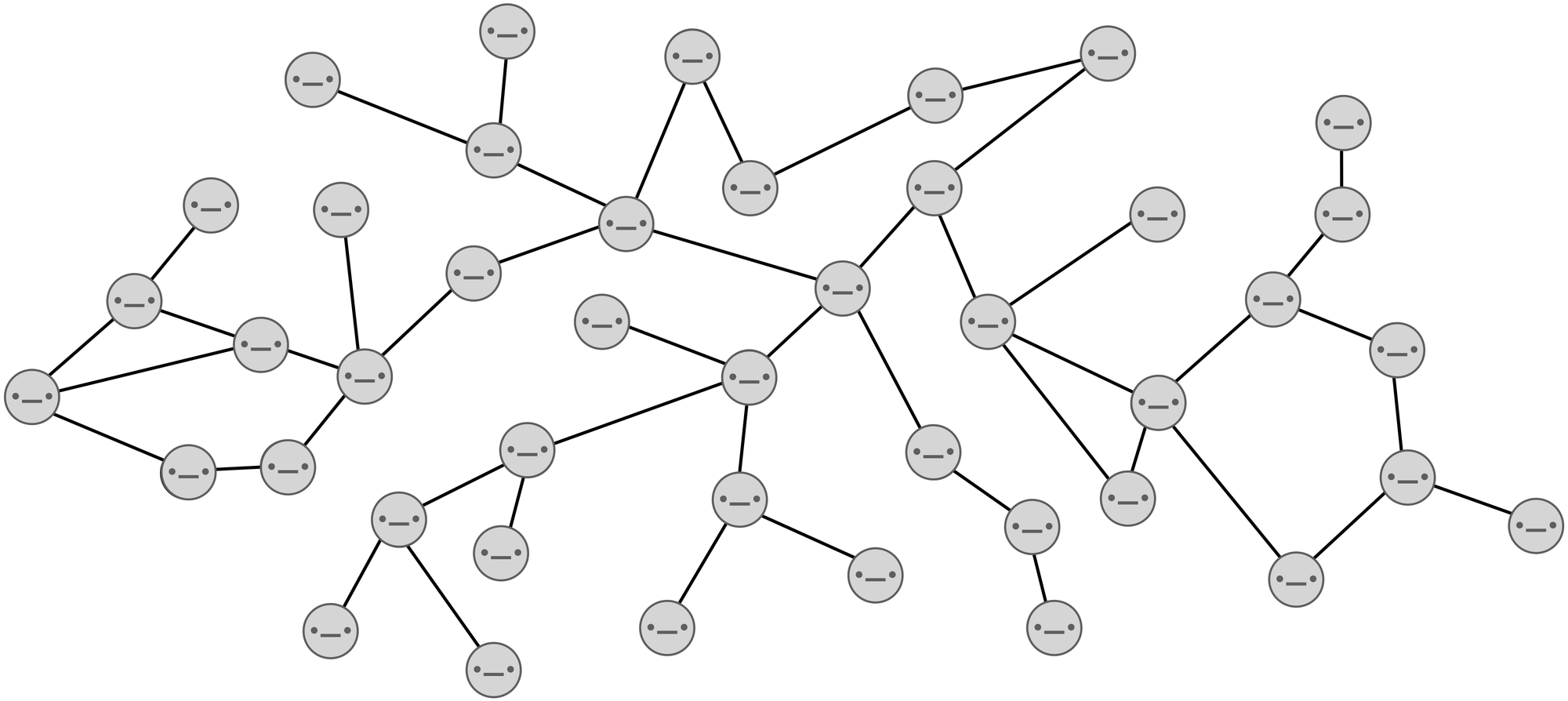
ONE STEP BEHIND

you self-isolate only when you know you're infected

ONE STEP AHEAD

you self-isolate when you *or a close contact* knows they're infected

Contact Tracing
Targeted Quarantine



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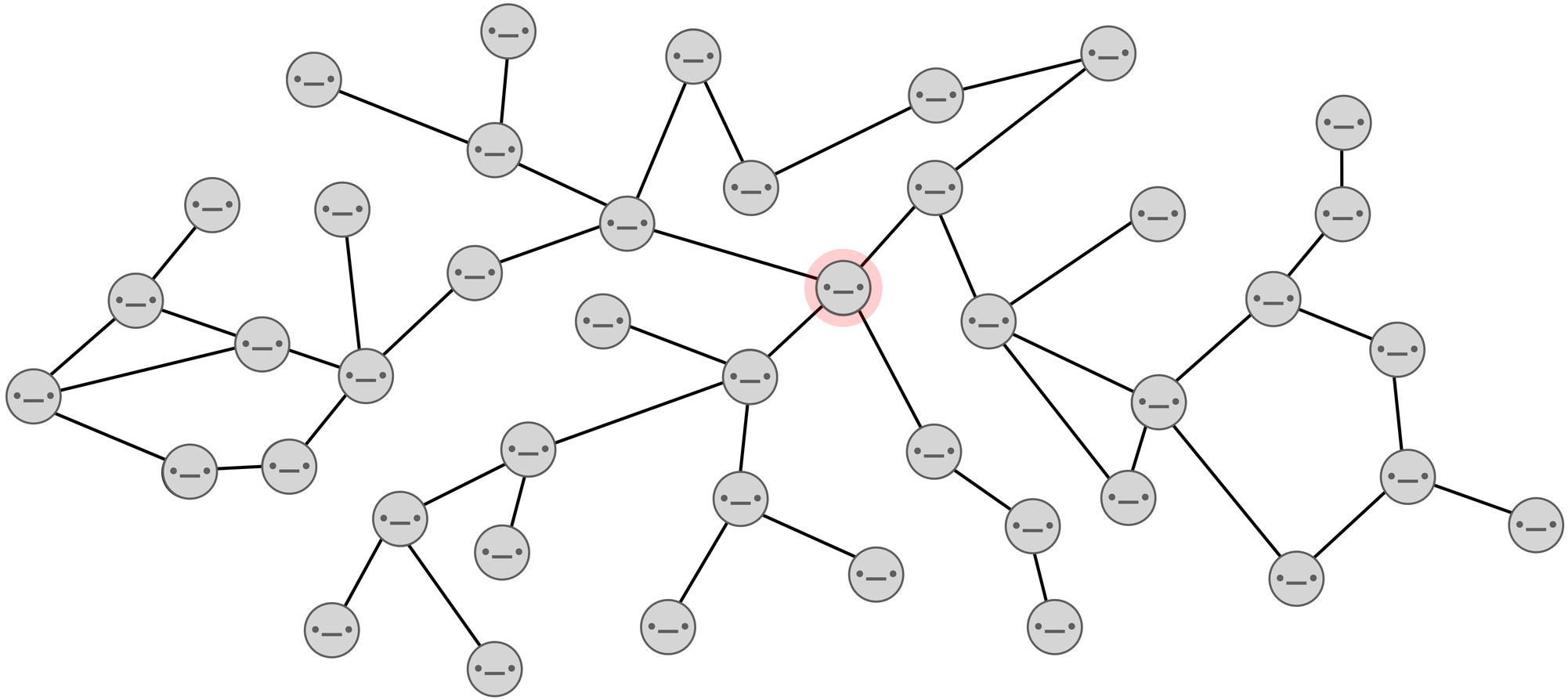

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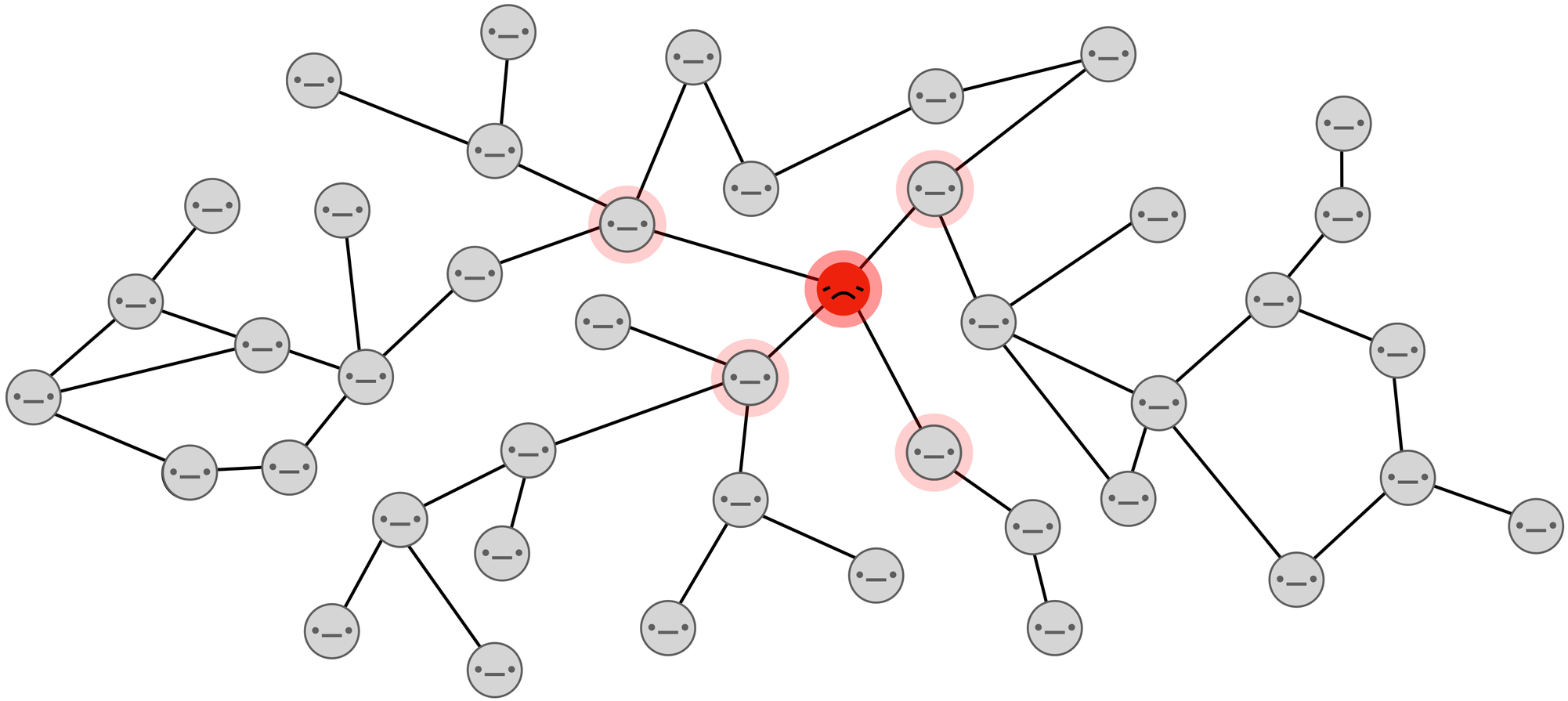

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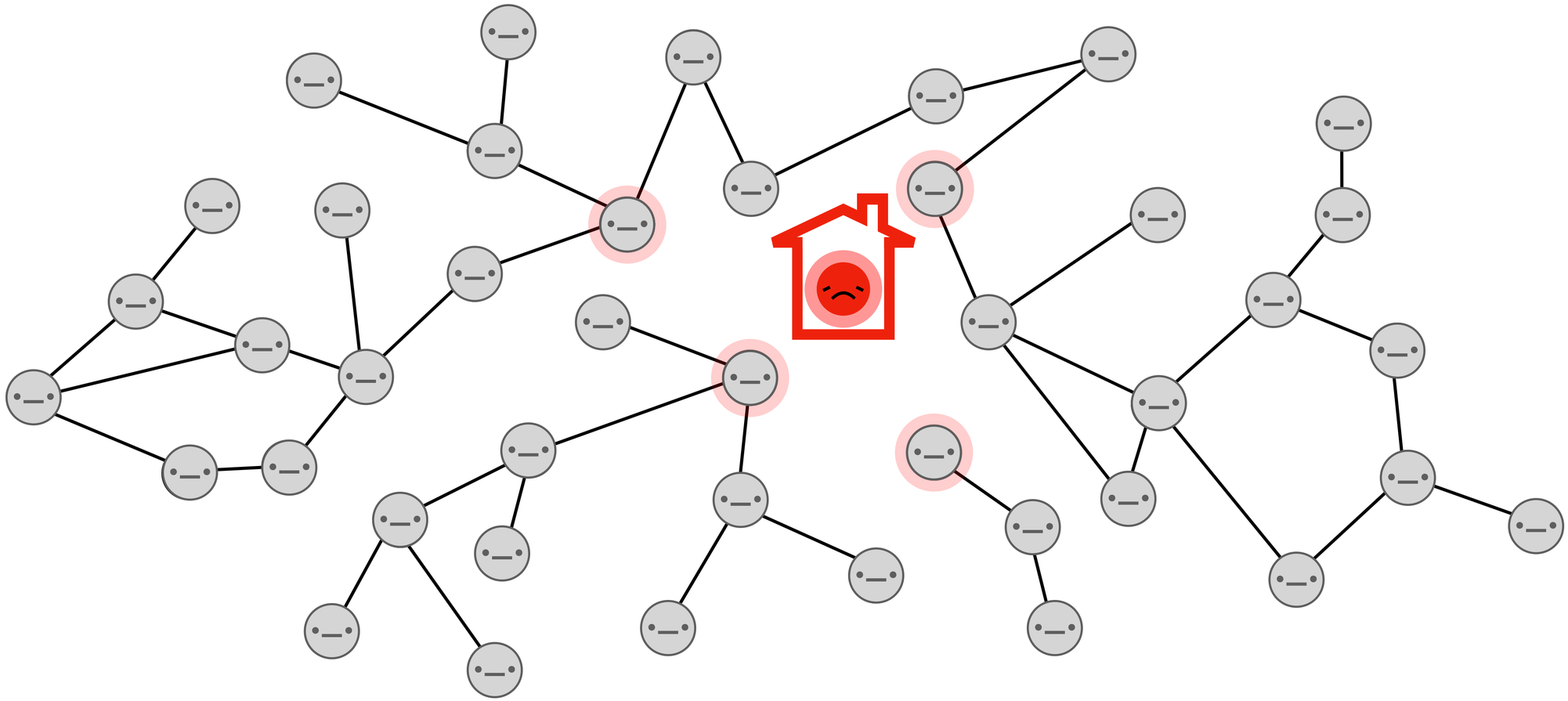

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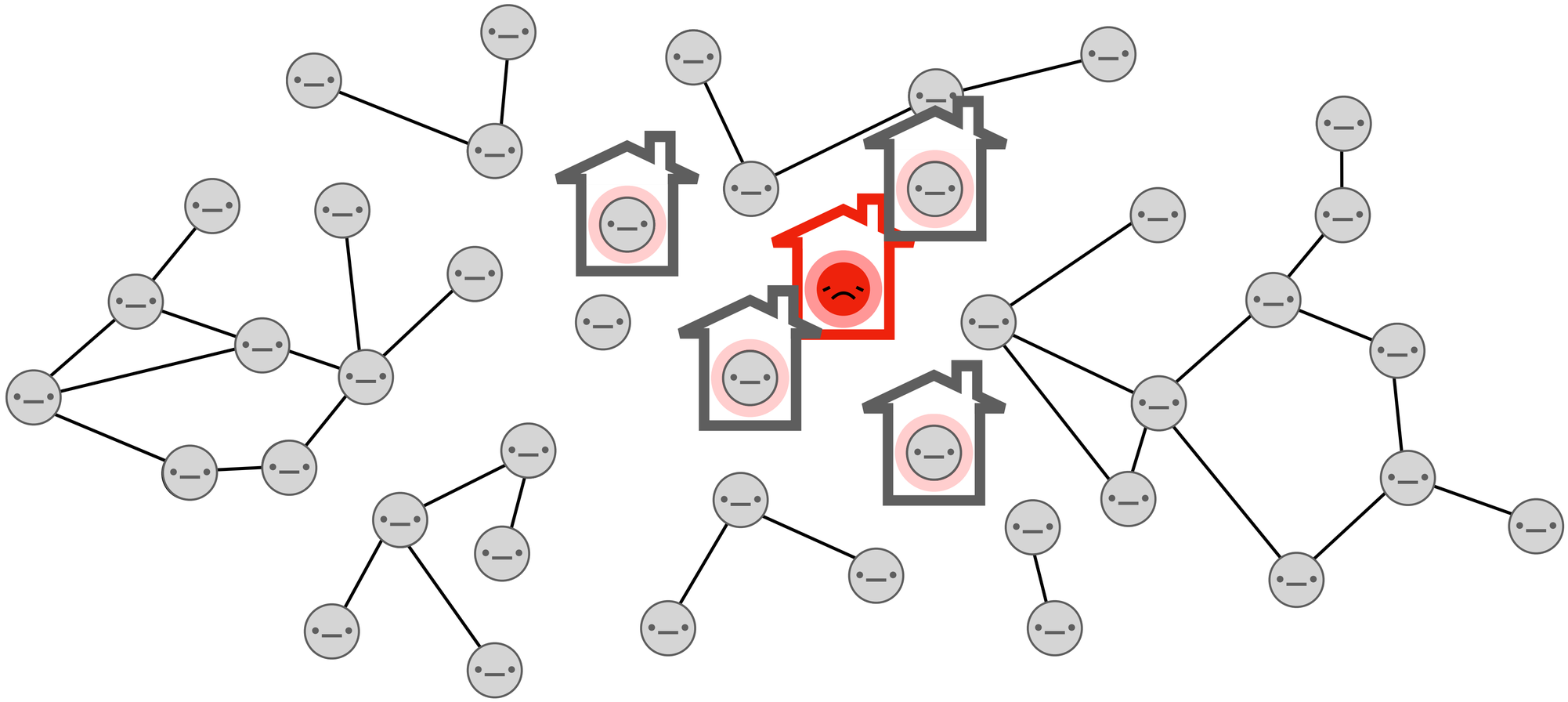
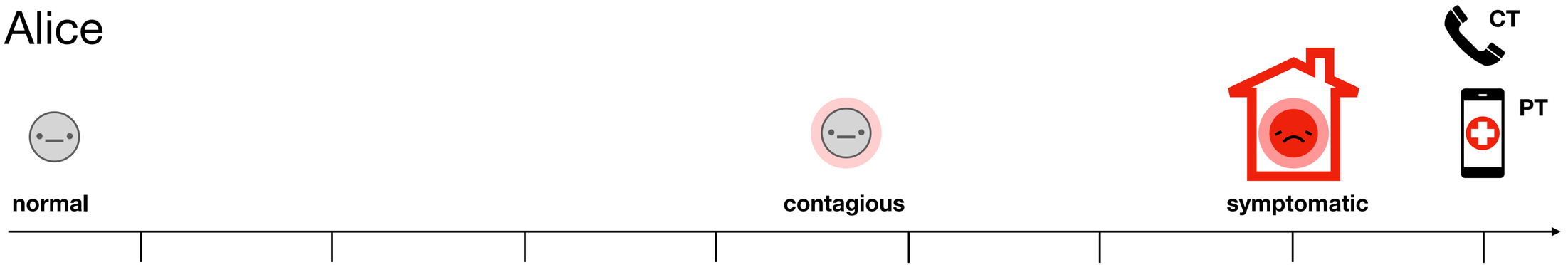


Contact Tracing
Classical and Digital



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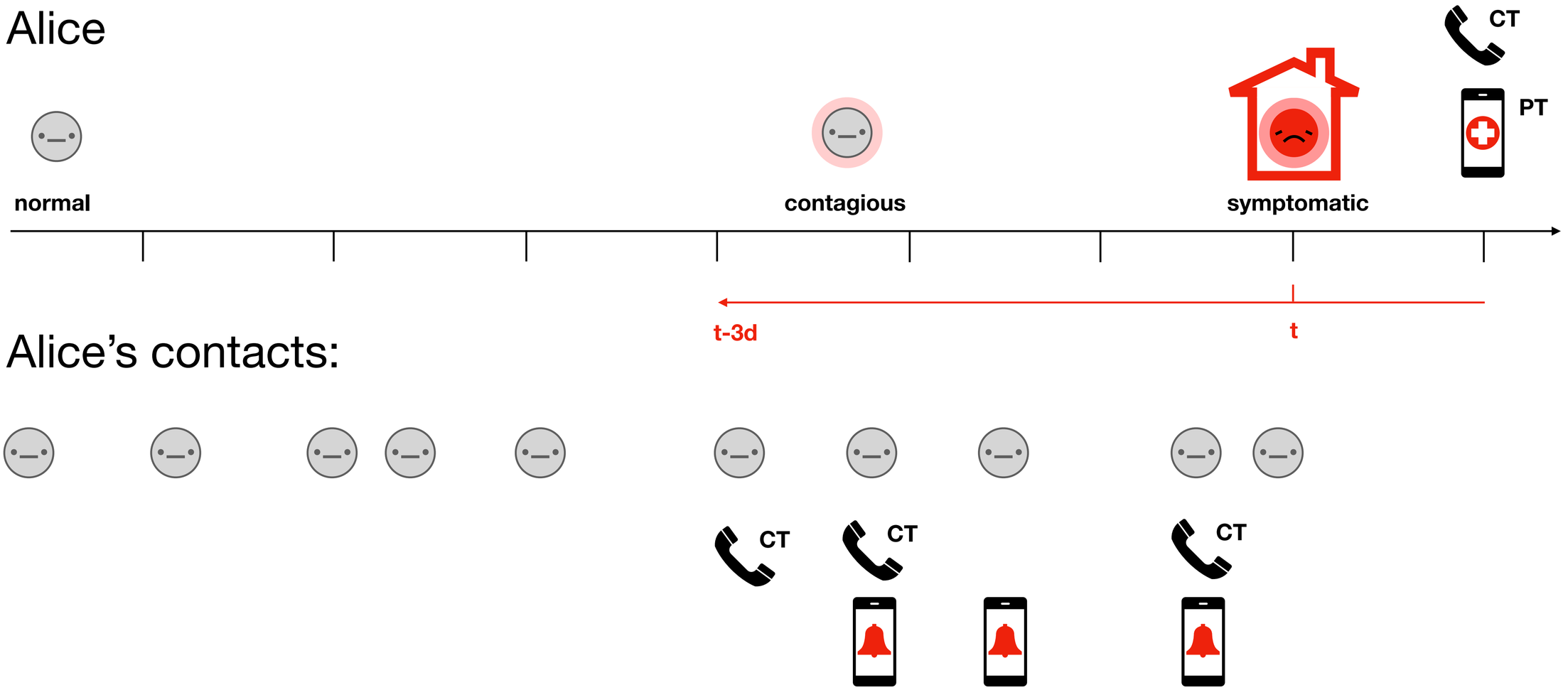

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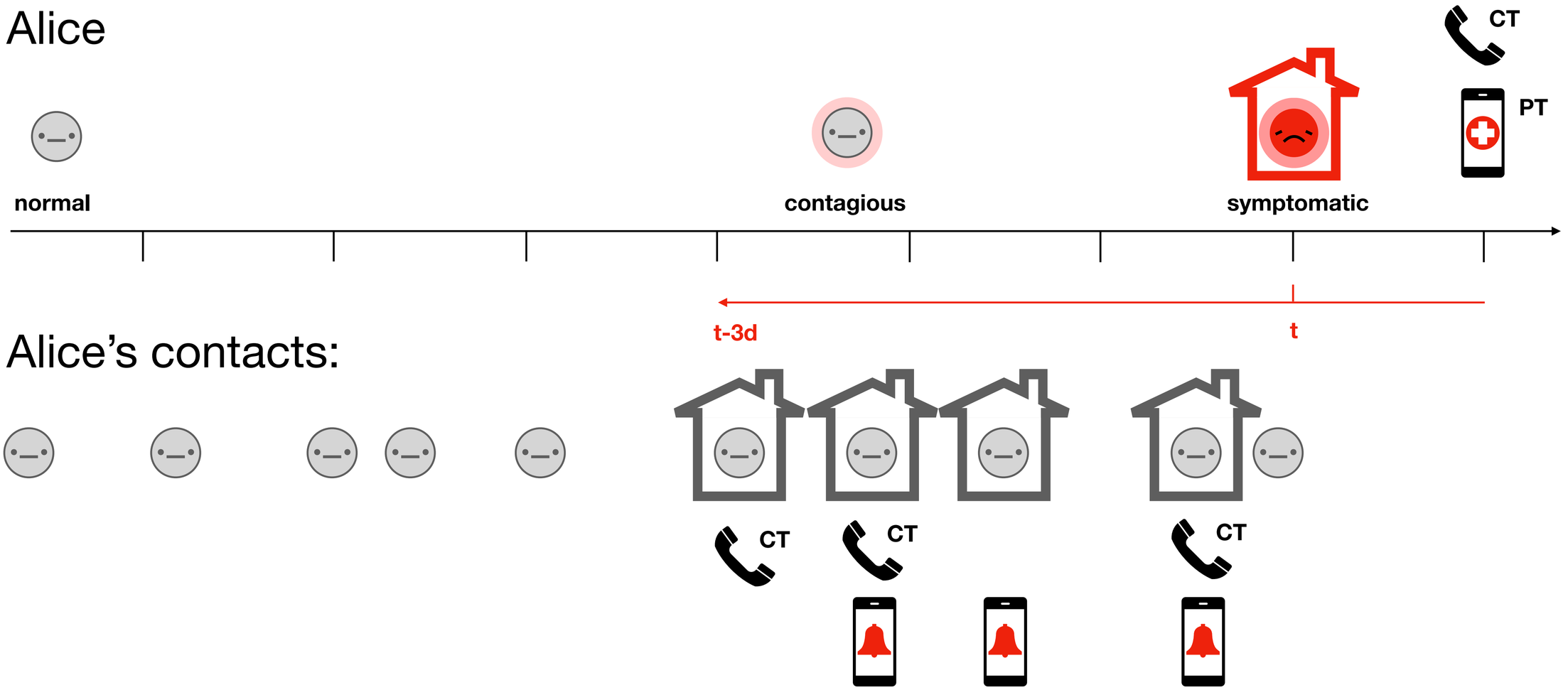

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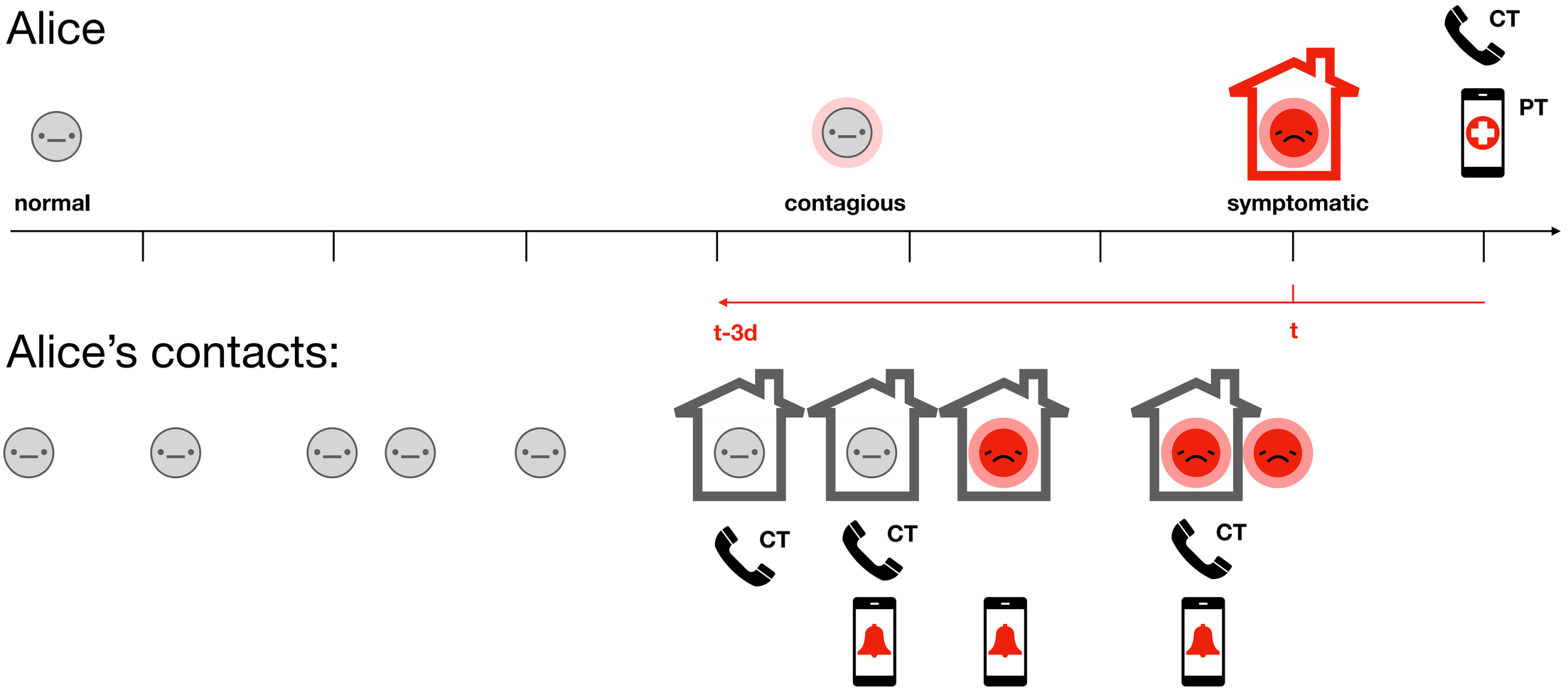


EPFL

Getting At Contact Networks Through Technology

+ no apps
+ no OS support
+ no data

RESEARCH ARTICLE

CORONAVIRUS

Quantifying SARS-CoV-2 transmission suggests epidemic control with digital contact tracing

Luca Ferretti[1]*, Chris Wymant[1]*, Michelle Kendall[1], Lele Zhao[1], Anel Nurtay[1], Lucie Abeler-Dörner[1], Michael Parker[2], David Bonsall[1,3]†, Christophe Fraser[1,4]†‡

The newly emergent human virus SARS-CoV-2 (severe acute respiratory syndrome–coronavirus 2) is resulting in high fatality rates and incapacitated health systems. Preventing further transmission is a priority. We analyzed key parameters of epidemic spread to estimate the contribution of different transmission routes and determine requirements for case isolation and contact tracing needed to stop the epidemic. Although SARS-CoV-2 is spreading too fast to be contained by manual contact tracing, it could be controlled if this process were faster, more efficient, and happened at scale. A contact-tracing app that builds a memory of proximity contacts and immediately notifies contacts of positive cases can achieve epidemic control if used by enough people. By targeting recommendations to only those at risk, epidemics could be contained without resorting to mass quarantines ("lockdowns") that are harmful to society. We discuss the ethical requirements for an intervention of this kind.

Coronavirus disease 2019 (COVID-19) is a rapidly spreading infectious disease caused by severe acute respiratory syndrome–coronavirus 2 (SARS-CoV-2), a betacoronavirus, which has now established a global pandemic. Around half of infected individuals become reported cases, and with intensive care support, the case fatality rate is approximately 2% (*1*). More concerning is that the proportion of cases requiring intensive care support is 5%, and patient management is complicated by requirements to use personal protective equipment and engage in complex decontamination procedures (*2*). Fatality rates are likely to be higher in populations older than in Hubei province (such as in Europe) and in low-income settings where critical care facilities are lacking (*3*). The public health cost of failing to achieve sustained

coming year. The only approaches that we currently have available to stop the epidemic are those of classical epidemic control, such as case isolation, contact tracing and quarantine, physical distancing, and hygiene measures.

The basic reproduction number R_0 is the typical number of infections caused by an individual in the absence of widespread immunity. Once immunity becomes widespread, the effective reproduction number R will become lower than R_0; once R is less than 1, the population has herd immunity and the epidemic declines. Immunity can only safely be obtained by vaccination. Here we use the term "sustained epidemic suppression" to mean a reduction of R to less than 1 by changing nonimmunological conditions of the population that affect transmission, such as social contact patterns.

The biological details of transmission of beta-

3) Asymptomatic transmission: direct transmission from individuals who never experience noticeable symptoms. This can only be established by follow-up, as single–time point observation cannot fully distinguish asymptomatic from presymptomatic individuals.

4) Environmental transmission: transmission via contamination, and specifically in a way that would not typically be attributable to contact with the source in a contact survey (i.e., this does not include transmission pairs who were in extended close contact, but for whom in reality the infectious dose passed via the environment instead of more directly). These could be identified in an analysis of spatial movements.

We acknowledge that boundaries between these categories may be blurred, but defined broadly these categories have different implications for prevention, responding differently to classical measures of case isolation and quarantining contacts (*9*, *10*) [for a specific application to COVID-19, see below (*11*)].

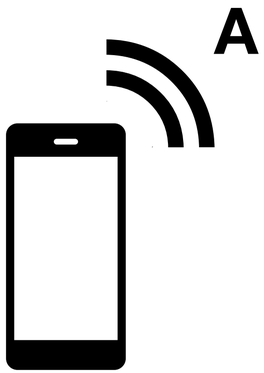
Evidence exists for each of these routes of transmission: symptomatic (*12*), presymptomatic (*13*), asymptomatic (*14*), and environmental (*12*). For prevention, the crucial information is the relative frequency of different routes of transmission so as to allocate finite resources between different intervention strategies.

Li *et al.* (*12*) presented self-reported data on exposure for the first 425 cases in Wuhan; some of these recorded visits to the Huanan Seafood Wholesale Market. The generalizability of transmission in that setting to other settings is highly uncertain, as this large-scale event seeded the epidemic in the absence of any knowledge about the disease. After closure of the Huanan Seafood Wholesale Market on 1 January 2020, of 240 cases with no exposure to any wet market, 200 individuals (83%) reported no exposure to an individual with respiratory symptoms. Inaccurate recall may explain some

Downloaded from http://science.sciencemag.org/ on September 2, 202

EPFL

COVID-19
Digital Proximity Tracing



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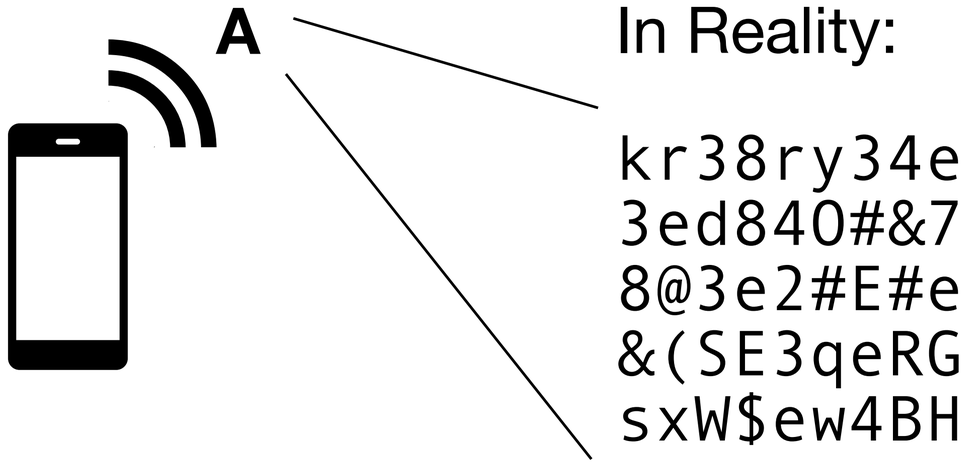

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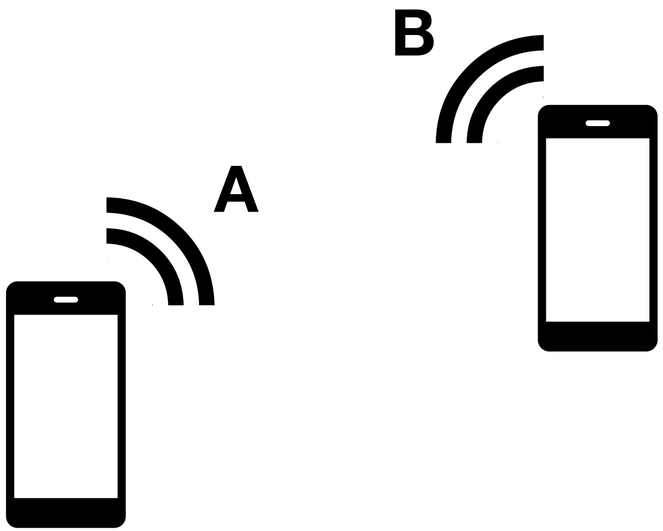

COVID-19
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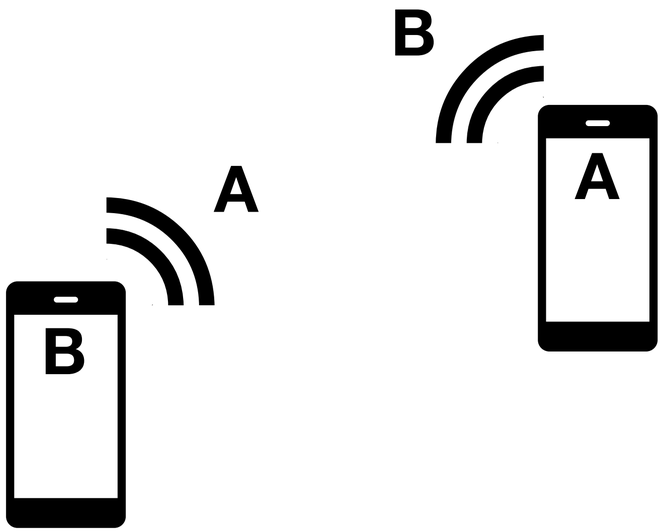

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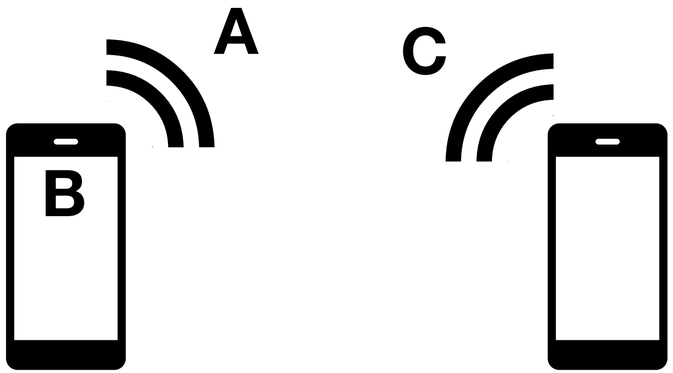

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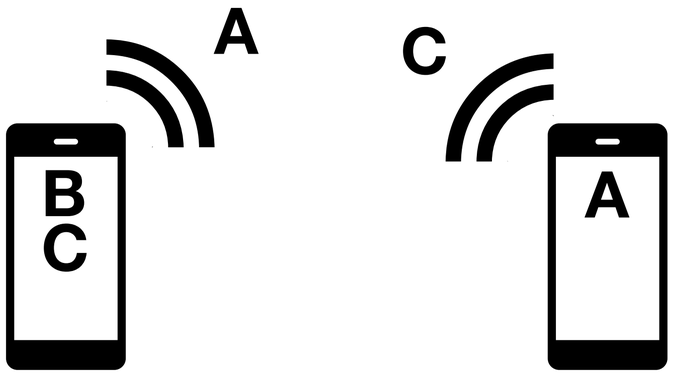

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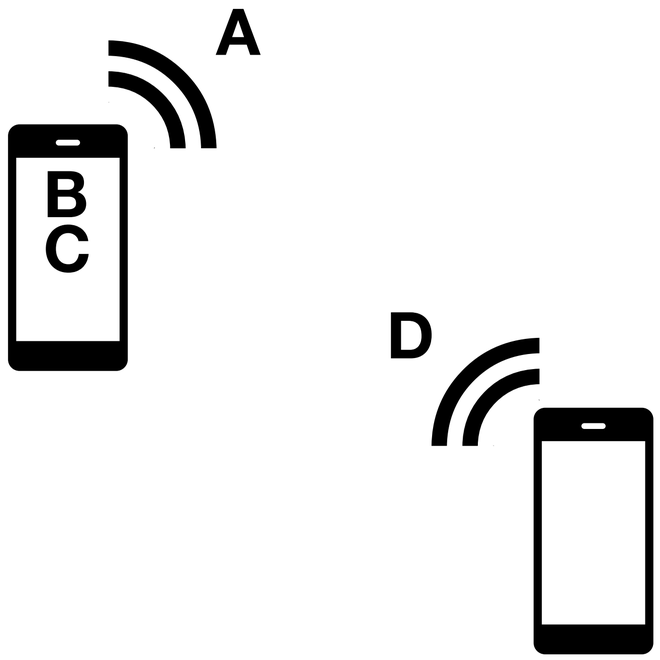

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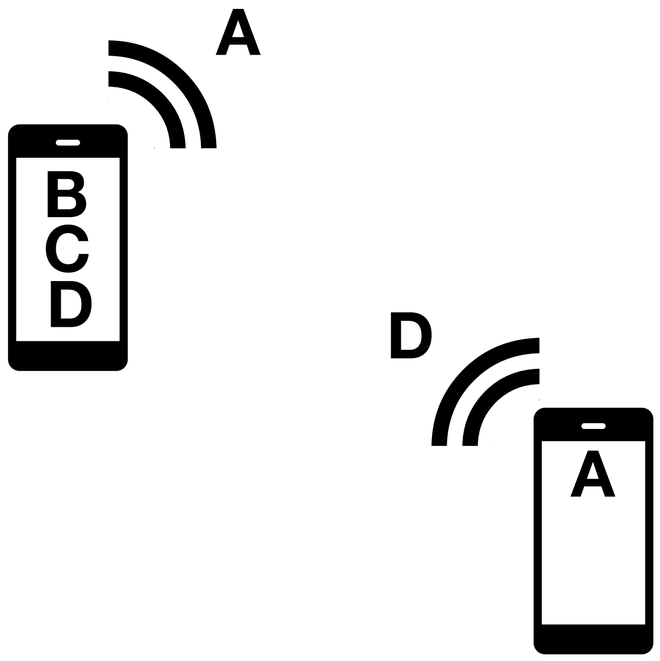

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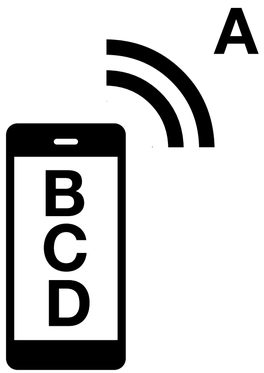

+ Data continuously deleted
+ IDs are ephemeral
+ Contact information stays on device
+ No other information is collected
+ Code is open source.

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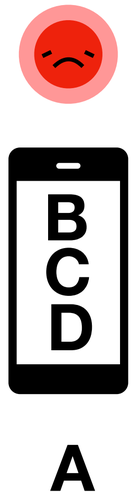
COVID-19
Digital Proximity Tracing

Central Model



COVID-19
Digital Proximity Tracing

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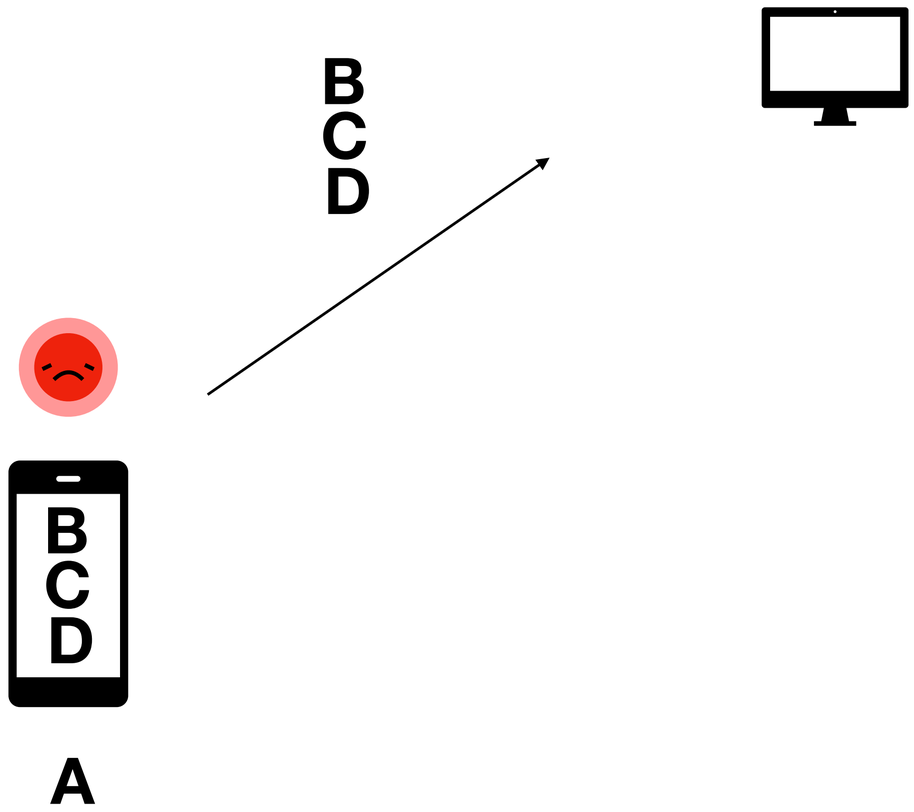

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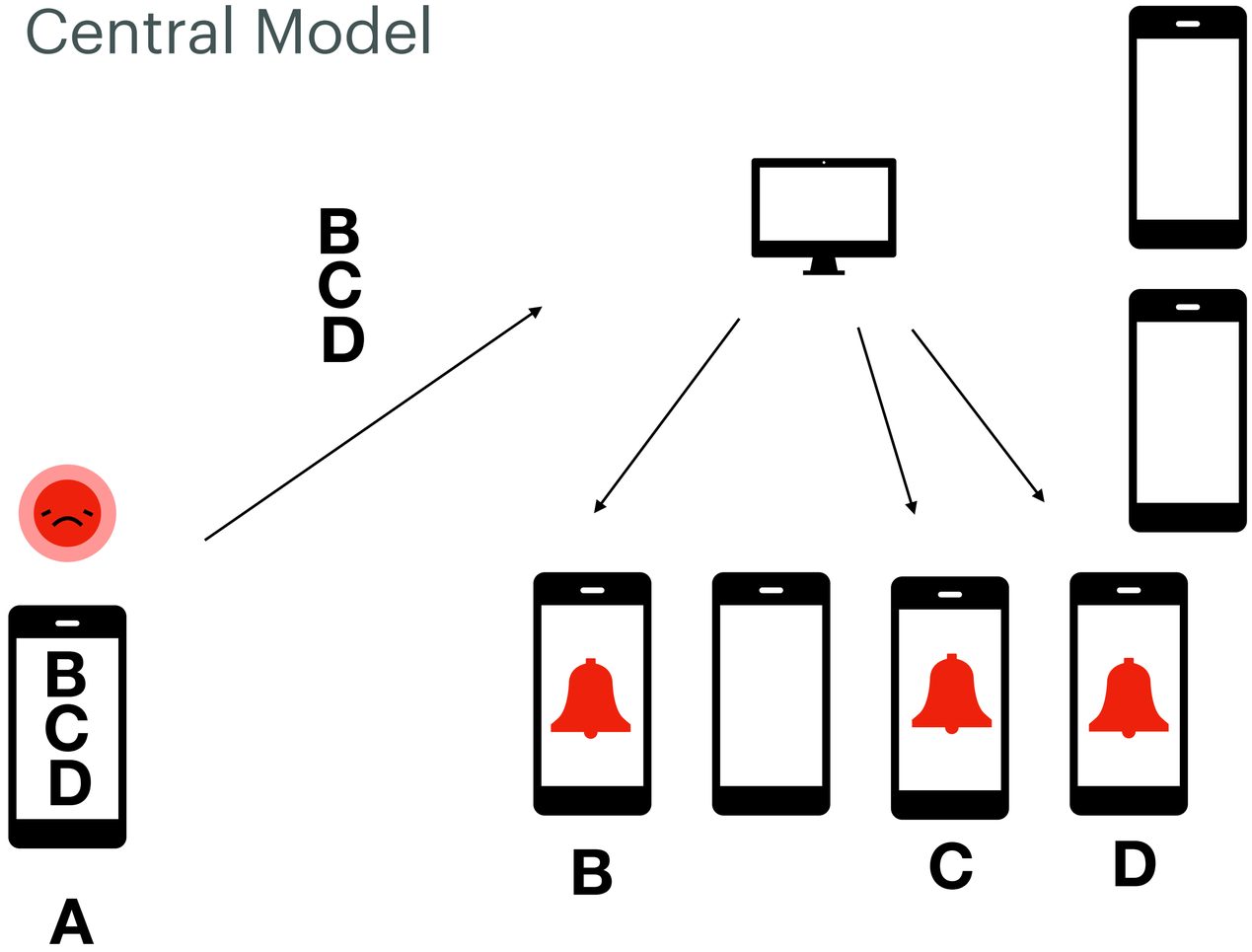

COVID-19
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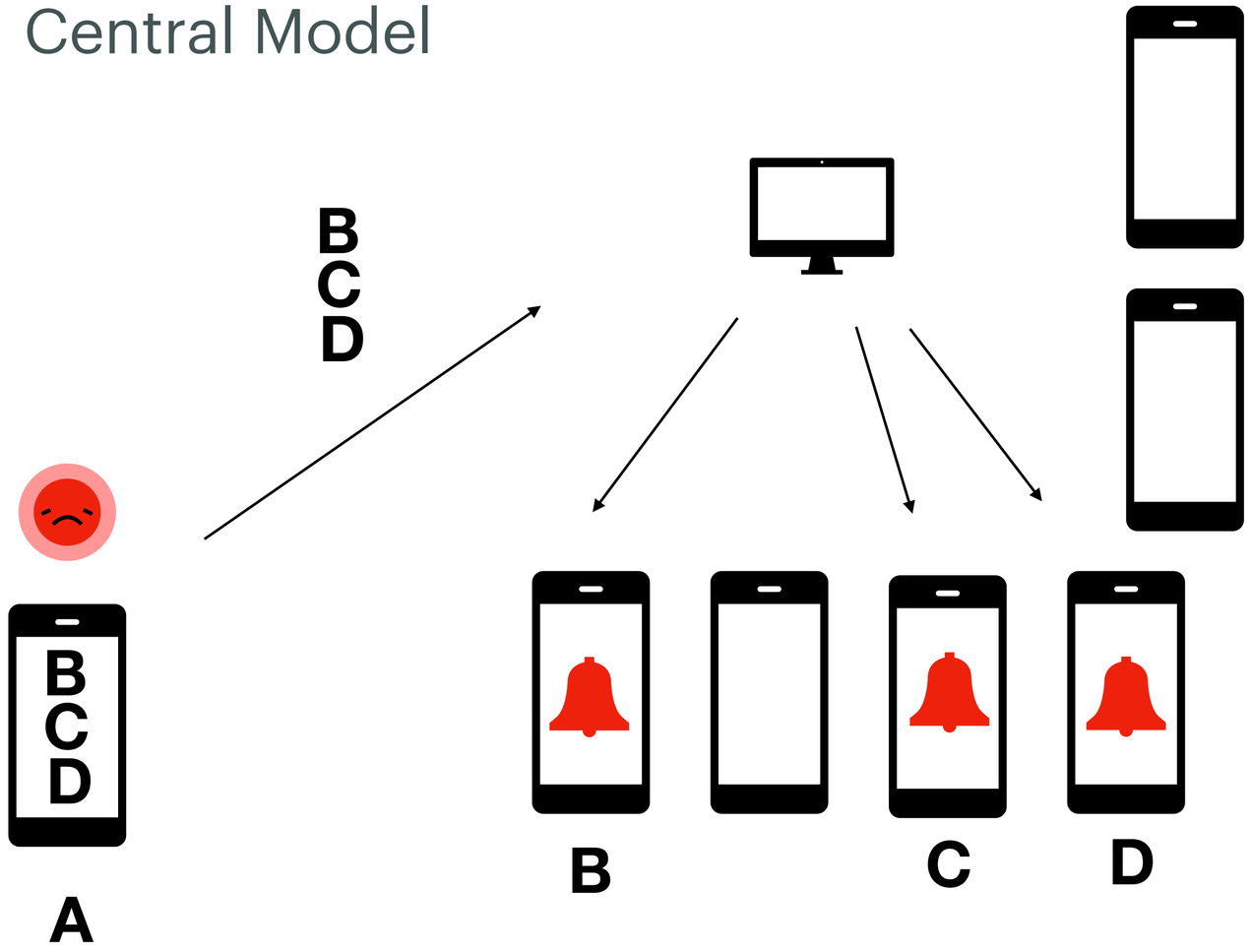
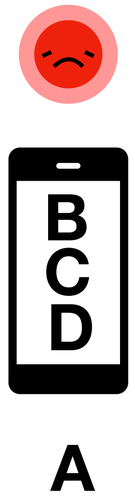


+ Central Server would know that B, C and D had contact with someone else.
+ Over time, contact networks could be derived, and data could be used for other purposes.
+ User lose control over data

COVID-19
Digital Proximity Tracing

Decentral Model



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COVID-19
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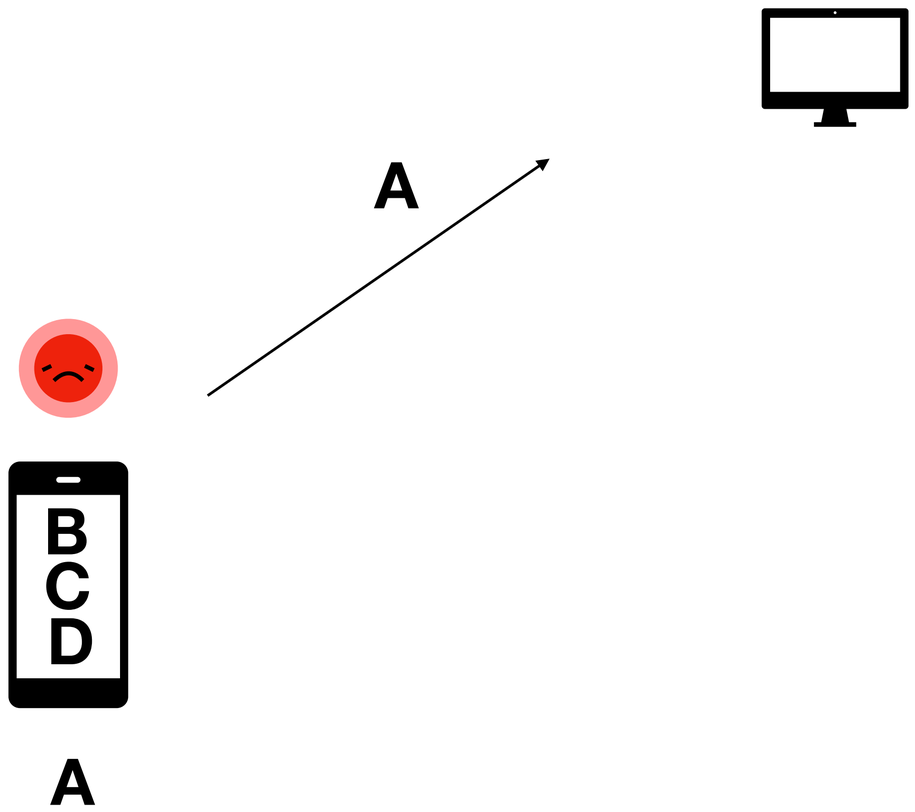

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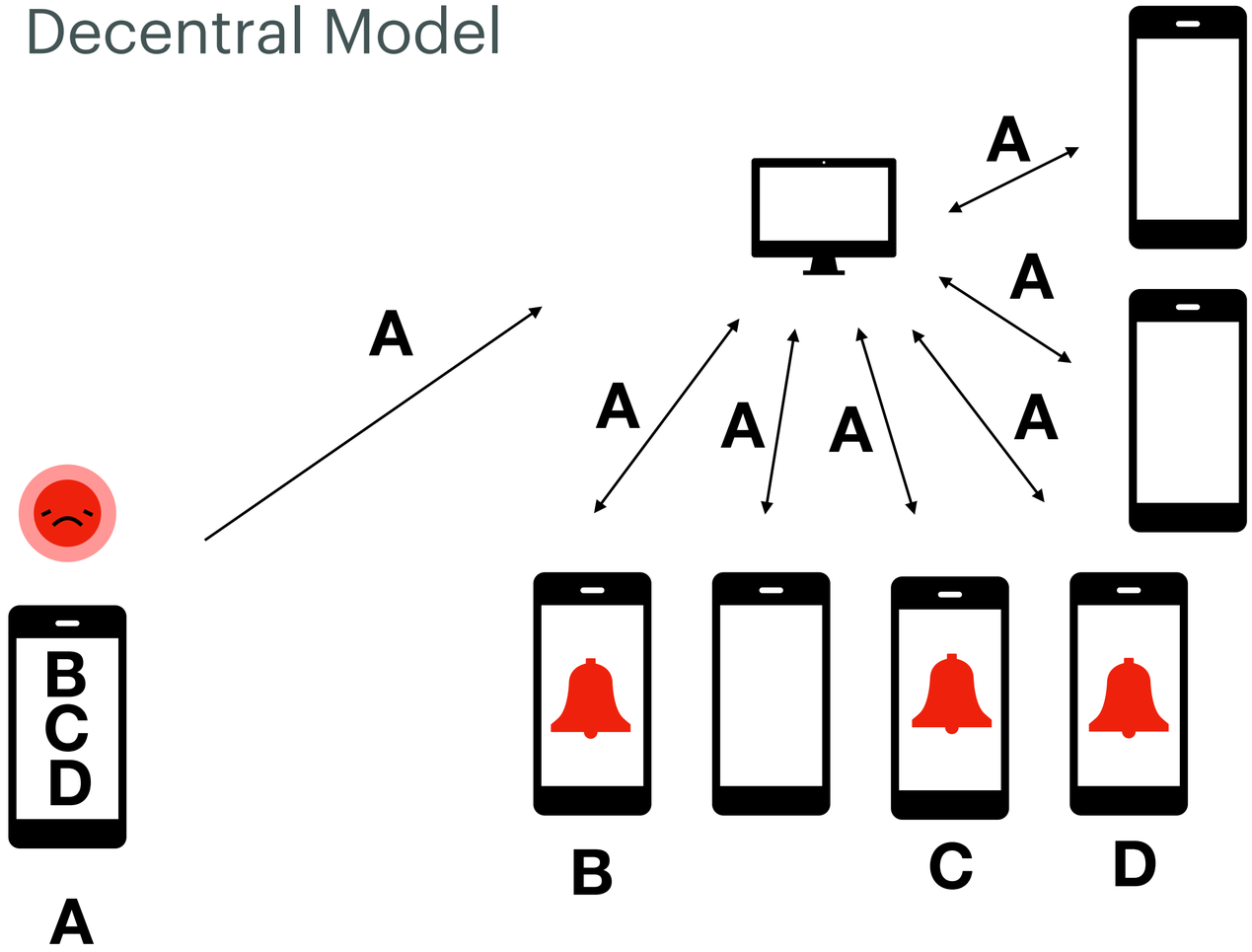

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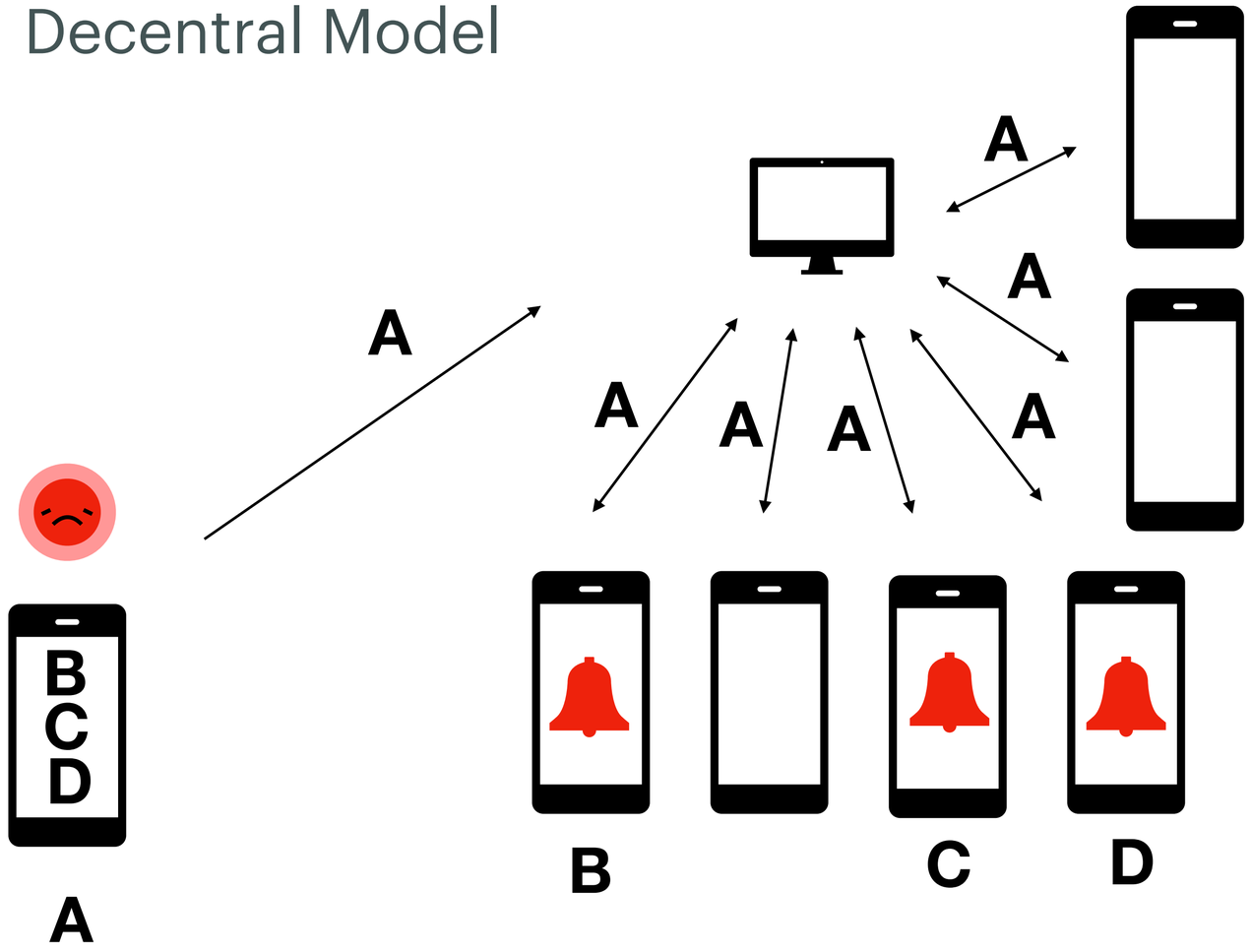
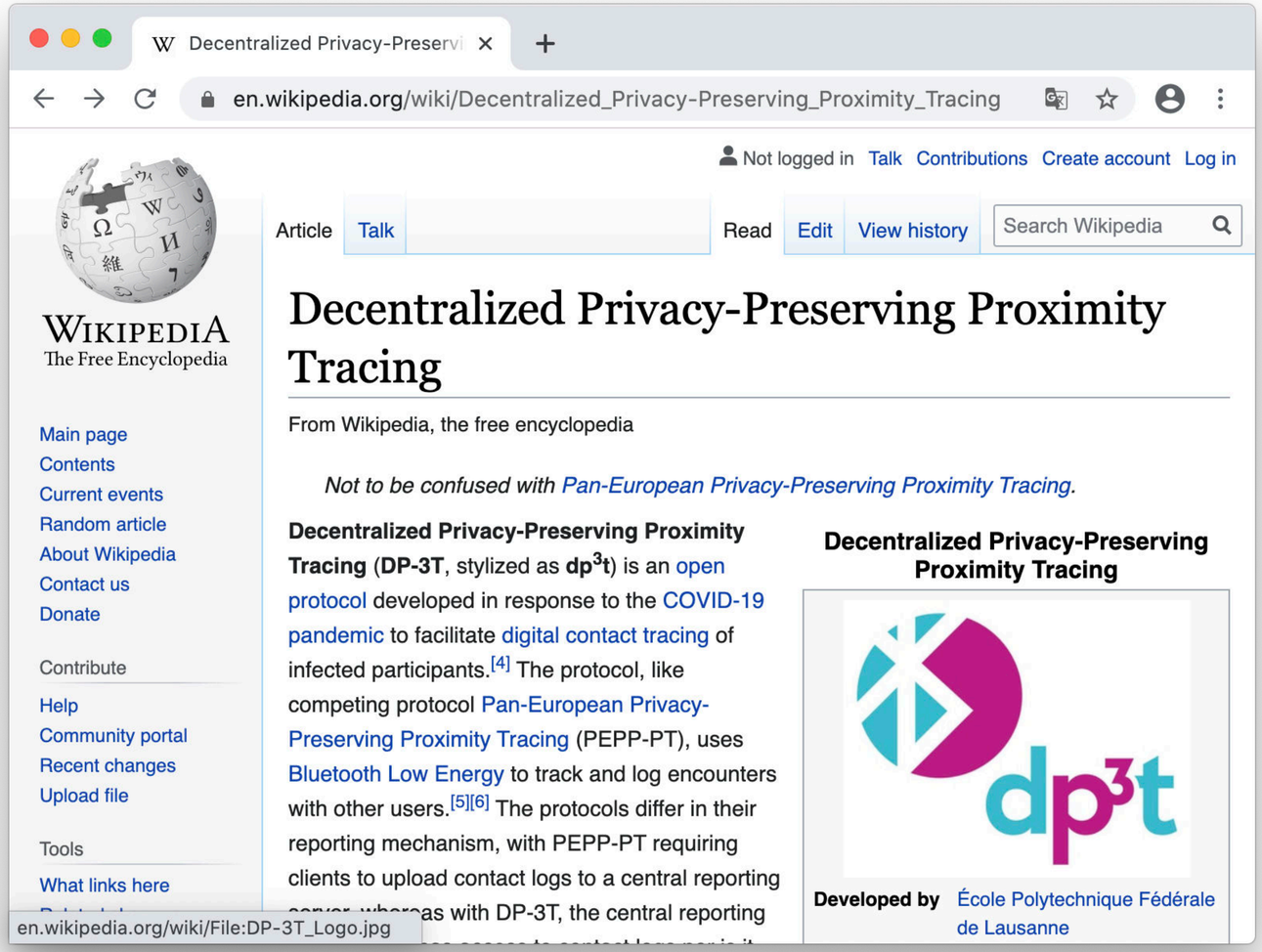
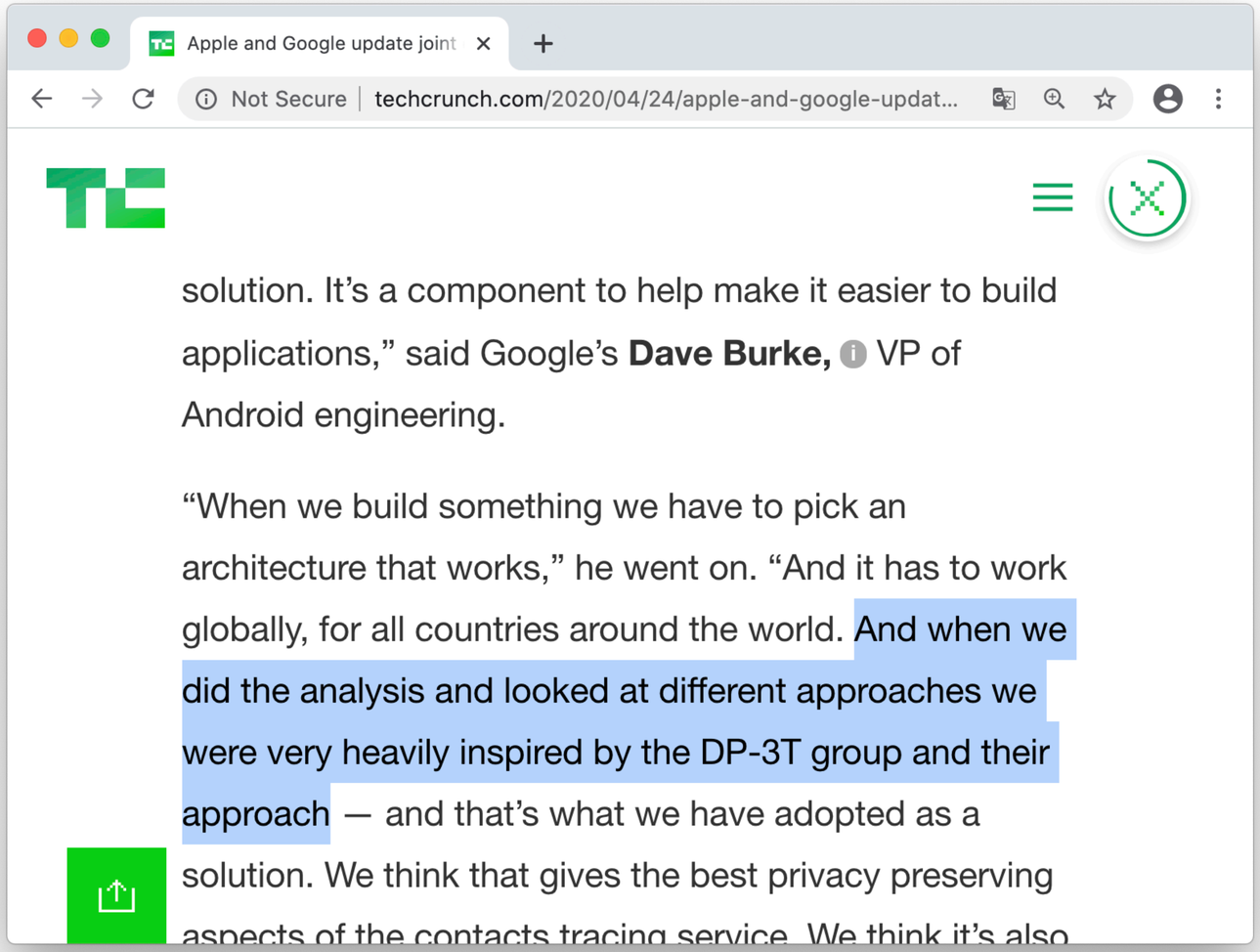


+ Contact data stays on device
+ Decision about notification is made locally, not on a central server
+ Server knows nothing other than which IDs were infected
+ Data continuously deleted

COVID-19
DP3T



COVID-19
DP3T



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COVID-19
Digital Proximity Tracing

Established in 1871

Swiss Medical Weekly

Formerly: Schweizerische Medizinische Wochenschrift

An open access, online journal • www.smw.ch

Original article | Published 16 December 2020 | doi:10.4414/smw.20457
Cite this as: Swiss Med Wkly. 2020;150:w20457

Early evidence of effectiveness of digital contact tracing for SARS-CoV-2 in Switzerland

Salathé Marcel[ab], Althaus Christian L.[c], Anderegg Nanina[d], Antonioli Daniele[b], Ballouz Tala[i], Bugnion Edouard[b], Čapkun Srdjan[e], Jackson Dennis[e], Kim Sang-Il[f], Larus James R.[b], Low Nicola[g], Lueks Wouter[b], Menges Dominik[h], Moullet Cédric[i], Payer Mathias[b], Riou Julien[c], Stadler Theresa[b], Troncoso Carmela[b], Vayena Effy[j], von Wyl Viktor[k]

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[i] Federal Office of Information Technology, Systems and Telecommunication, Bern, Switzerland
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COVID-19
Digital Proximity Tracing

Article

The epidemiological impact of the NHS COVID-19 app

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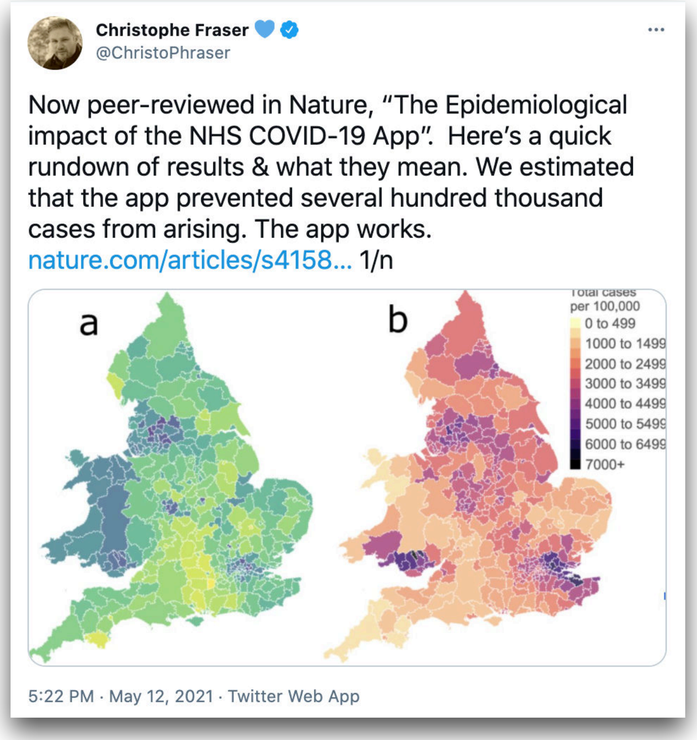
Check for updates

Chris Wymant[1,7], Luca Ferretti[1,7], Daphne Tsallis[2], Marcos Charalambides[3], Lucie Abeler-Dörner[1], David Bonsall[1], Robert Hinch[1], Michelle Kendall[1,4], Luke Milsom[5], Matthew Ayres[3], Chris Holmes[1,3,6], Mark Briers[3] & Christophe Fraser[1]

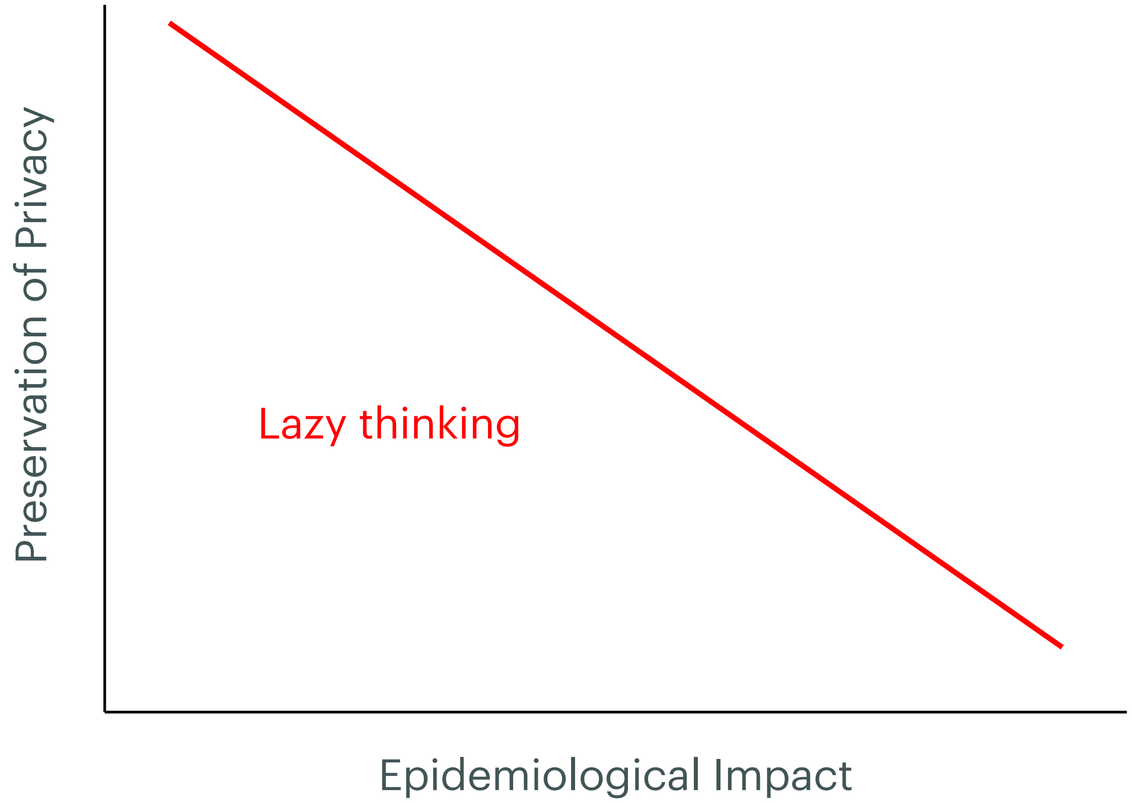
The COVID-19 pandemic has seen the emergence of digital contact tracing to help to prevent the spread of the disease. A mobile phone app records proximity events between app users, and when a user tests positive for COVID-19, their recent contacts can be notified instantly. Theoretical evidence has supported this new public health intervention[1–6], but its epidemiological impact has remained uncertain[7]. Here we investigate the impact of the National Health Service (NHS) COVID-19 app for England and Wales, from its launch on 24 September 2020 to the end of December 2020. It was used regularly by approximately 16.5 million users (28% of the total population), and sent approximately 1.7 million exposure notifications: 4.2 per index case consenting to contact tracing. We estimated that the fraction of individuals notified by the app who subsequently showed symptoms and tested positive (the secondary attack rate (SAR)) was 6%, similar to the SAR for manually traced close contacts. We estimated the number of cases averted by the app using two complementary approaches: modelling based on the notifications and SAR gave an estimate of 284,000 (central 95% range of sensitivity analyses 108,000–450,000), and statistical comparison of matched neighbouring local authorities gave an estimate of 594,000 (95% confidence interval 317,000–914,000). Approximately one case was averted for each case consenting to notification of their contacts. We estimated that for every percentage point increase in app uptake, the number of cases could be reduced by 0.8% (using modelling) or 2.3% (using statistical analysis). These findings support the continued development and deployment of such apps in populations that are awaiting full protection from vaccines.



Learnings from the COVID crisis
Pragmatism wins but gets no love

+ “Amateurs do strategy, professional do operations”

Learnings from the COVID crisis
Pragmatism wins but gets no love



+ Myth: “we need more data to solve the problem”.

Learnings from the COVID crisis
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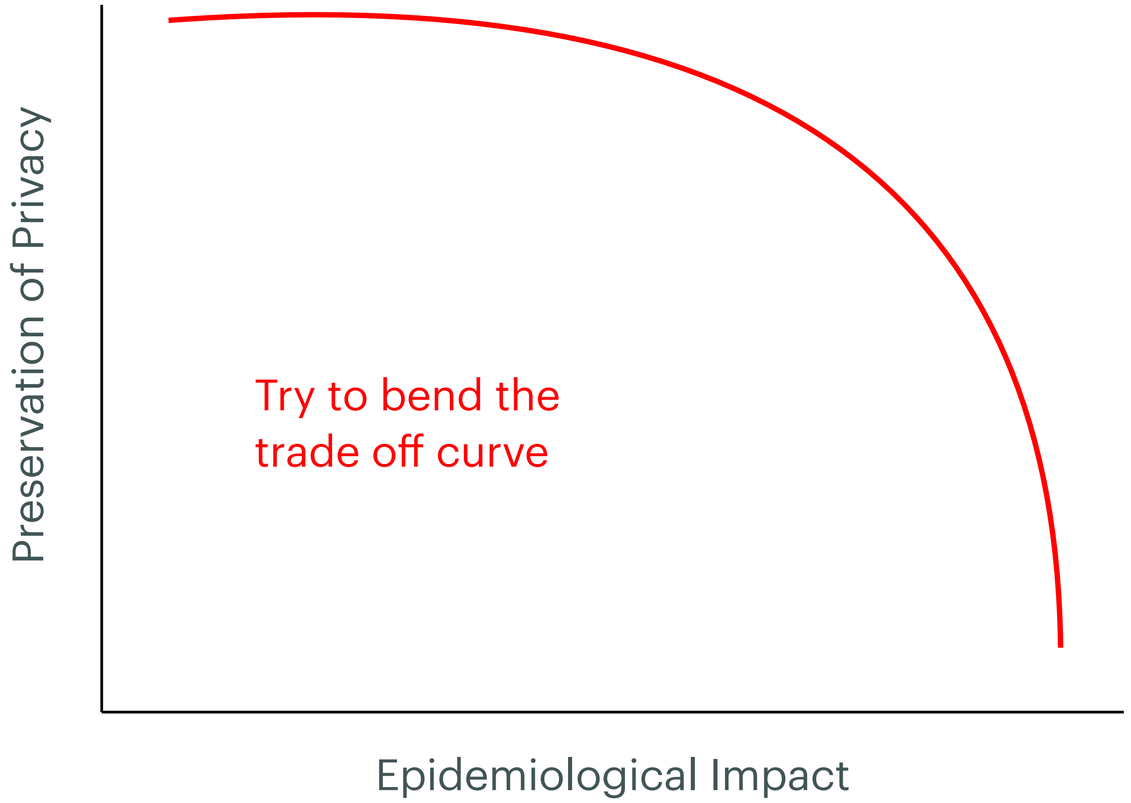

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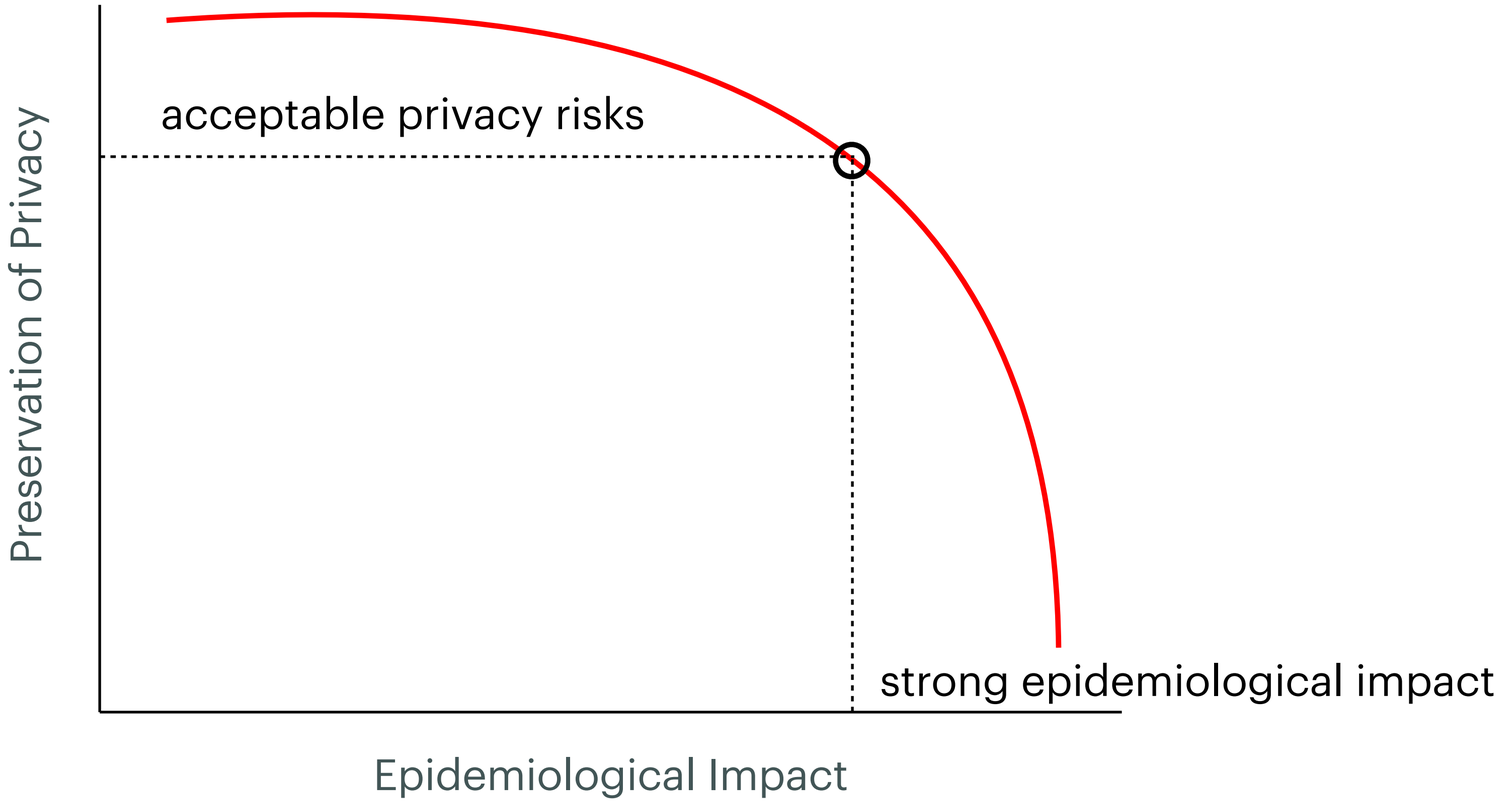

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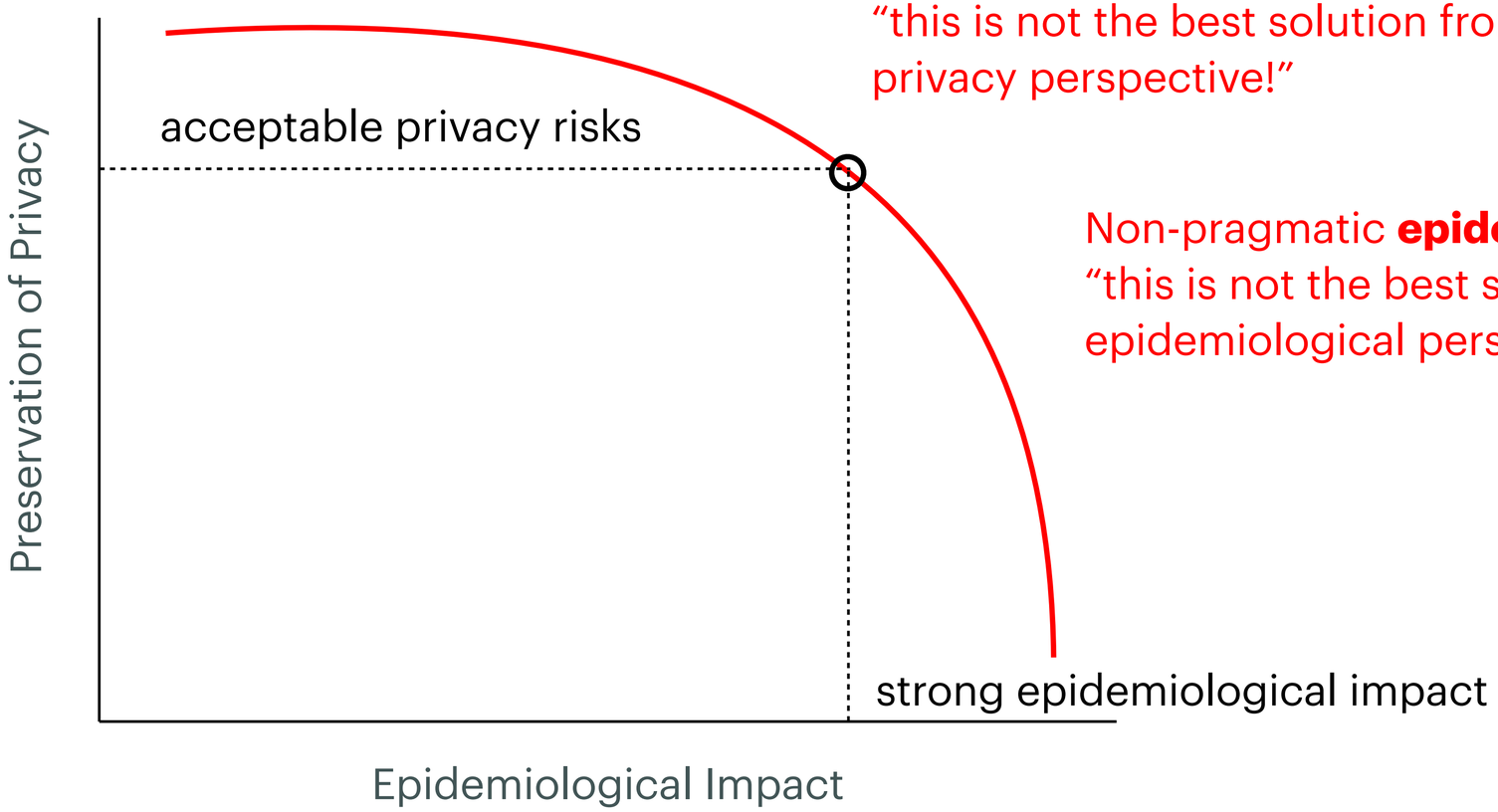


Non-pragmatic **privacy** community:
“this is not the best solution from a privacy perspective!”

Non-pragmatic **epidemiology** community:
“this is not the best solution from an epidemiological perspective!”

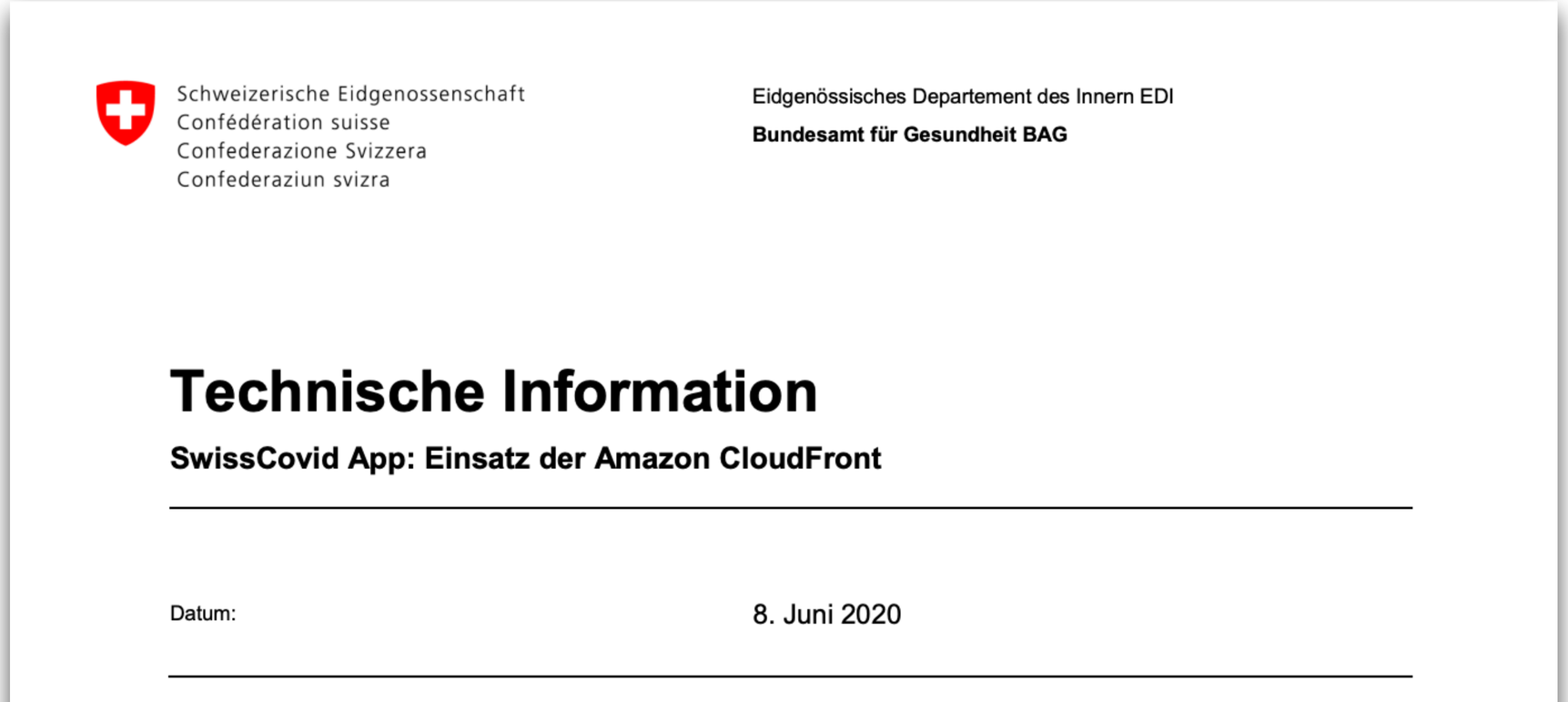
Learnings from the COVID crisis
Privacy concerns are not where you think they are

+ Saying “I don’t want SwissCovid to know where I go” on Facebook

Learnings from the COVID crisis

Privacy concerns are not where you think they are

+ Concerns about Amazon as CDN



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Eidgenössisches Departement des Innern EDI
Bundesamt für Gesundheit BAG

Technische Information

SwissCovid App: Einsatz der Amazon CloudFront

Datum: 8. Juni 2020

Learnings from the COVID crisis

Privacy concerns are not where you think they are

+ Concerns that the source code is on a platform owned by GitHub

SwissCovid ou GAFAMCovid ?

6 juin 2020 Solange Ghernaouti Non classé

Dans la mesure ou SwissCovid :

- N'est pas Open Source.
- Le code source est chez Microsoft (GitHub).
- Le protocole est contrôlé par Apple et Google.
- Certains serveurs SwissCovid sont chez Amazon.

Pourquoi le dispositif SwissCovid ne s'appellerait-il pas GAFAMCovid ?

Learnings from the COVID crisis
The media is mostly of no help

+ Prime time Swiss TV:

  Reporter: “Did you download SwissCovid?”

  Person: “Of course not! I don’t want the government to know where I go!”

  (end of message)

Learnings from the COVID crisis
The media is mostly of no help

+ Prime time Swiss Italian TV:

  Shows retired engineer demonstrating that Bluetooth signals can be received from up to 80m distance.

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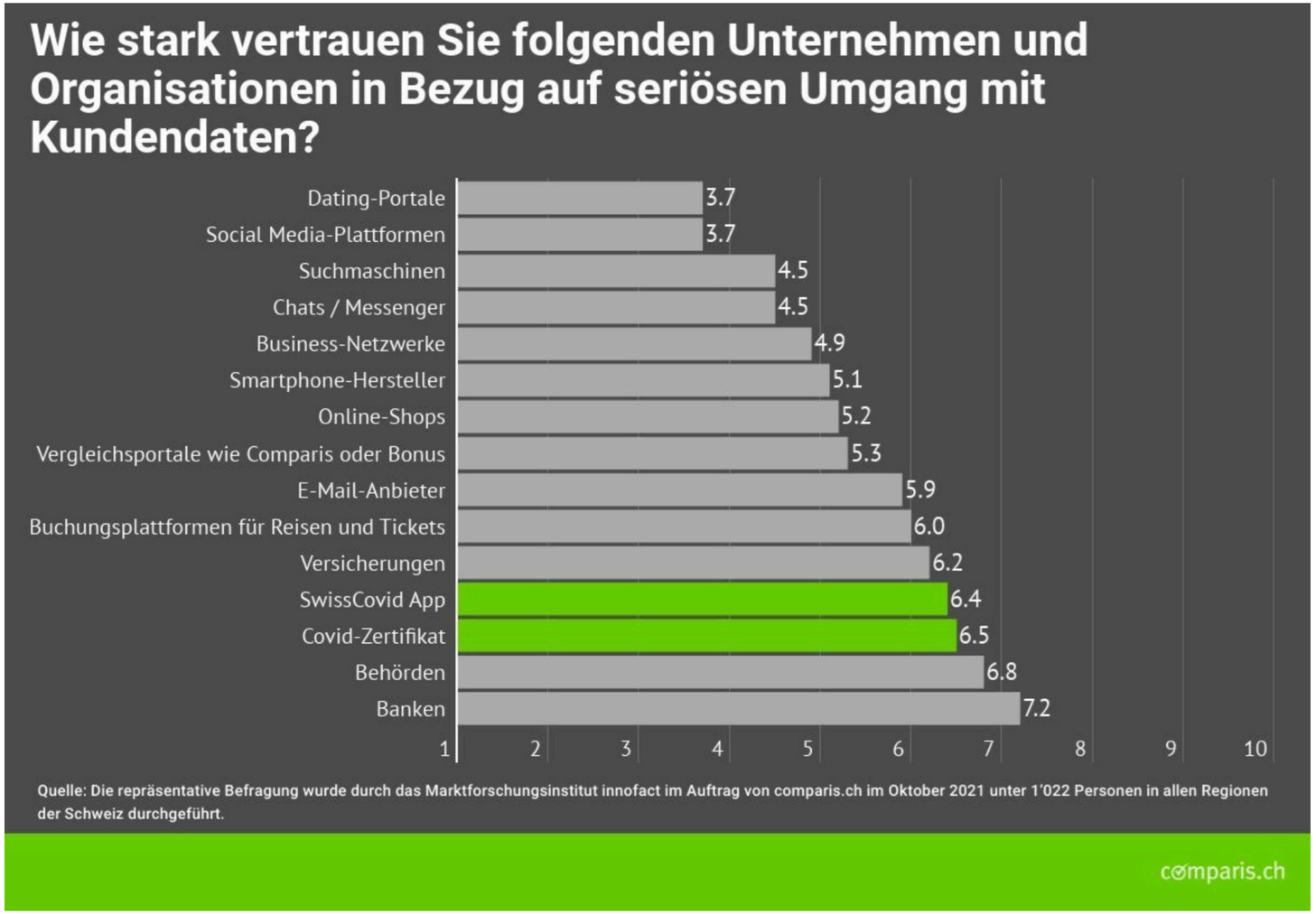
Surveys are of limited used



Learnings from the COVID crisis

Surveys are of limited used

Corona-Tracing 12.05.2020

Hohe Akzeptanz für Tracking-App

Die Chancen einer freiwilligen Tracking-App stehen gut: Weite Teile der Schweizer Bevölkerung sind bereit, eine solche App zu nutzen, wenn diese von Bund und Kantonen herausgegeben wird. Dies zeigt eine Umfrage bei über 1300 Personen.

Mehrheit dafür

Mit Blick auf die weiteren Lockerungen wollten wir wissen, ob und unter welchen Voraussetzungen Schweizerinnen und Schweizer bereit sind, eine Tracking-App auf ihrem Smartphone zu installieren. Das zentrale Ergebnis der repräsentativen Umfrage, die wir Mitte April durchgeführt haben, ist durchaus erfreulich: Im Wissen, dass eine Tracking-App ihre Standortdaten und Informationen über ihren Gesundheitszustand erfassen würde, gaben fast drei Viertel der Schweizerinnen und Schweizer (72 Prozent) an, dass sie bereit wären, eine solche App zu installieren.

https://www.news.uzh.ch/de/articles/2020/Corona-Tracing.html

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Thoughts on Health & Privacy from COVID