

The Oxford Martin Programme on

DIGITAL PANDEMIC PREPAREDNESS



A brief history, and where next

Christophe Fraser and Michelle Kendall



Digital contact tracing apps using Bluetooth proximity detection were developed during the COVID-19 pandemic to be:



fast (short incubation period & pre-symptomatic infectiousness)



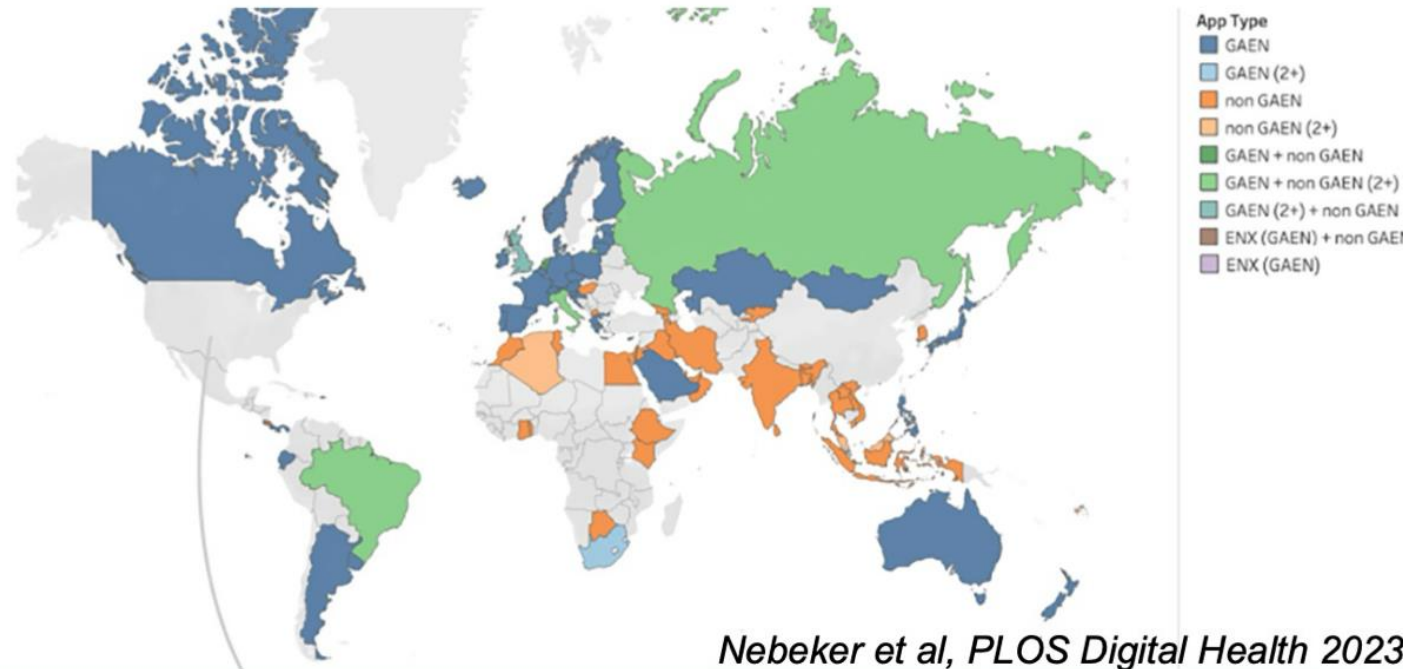
scalable (important when prevalence may get high)



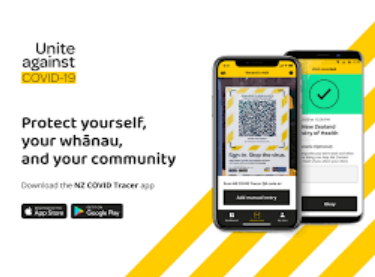
anonymous (important for avoiding stigma and alerting strangers)

Wymant and Ferretti et al., *Science*, 2020

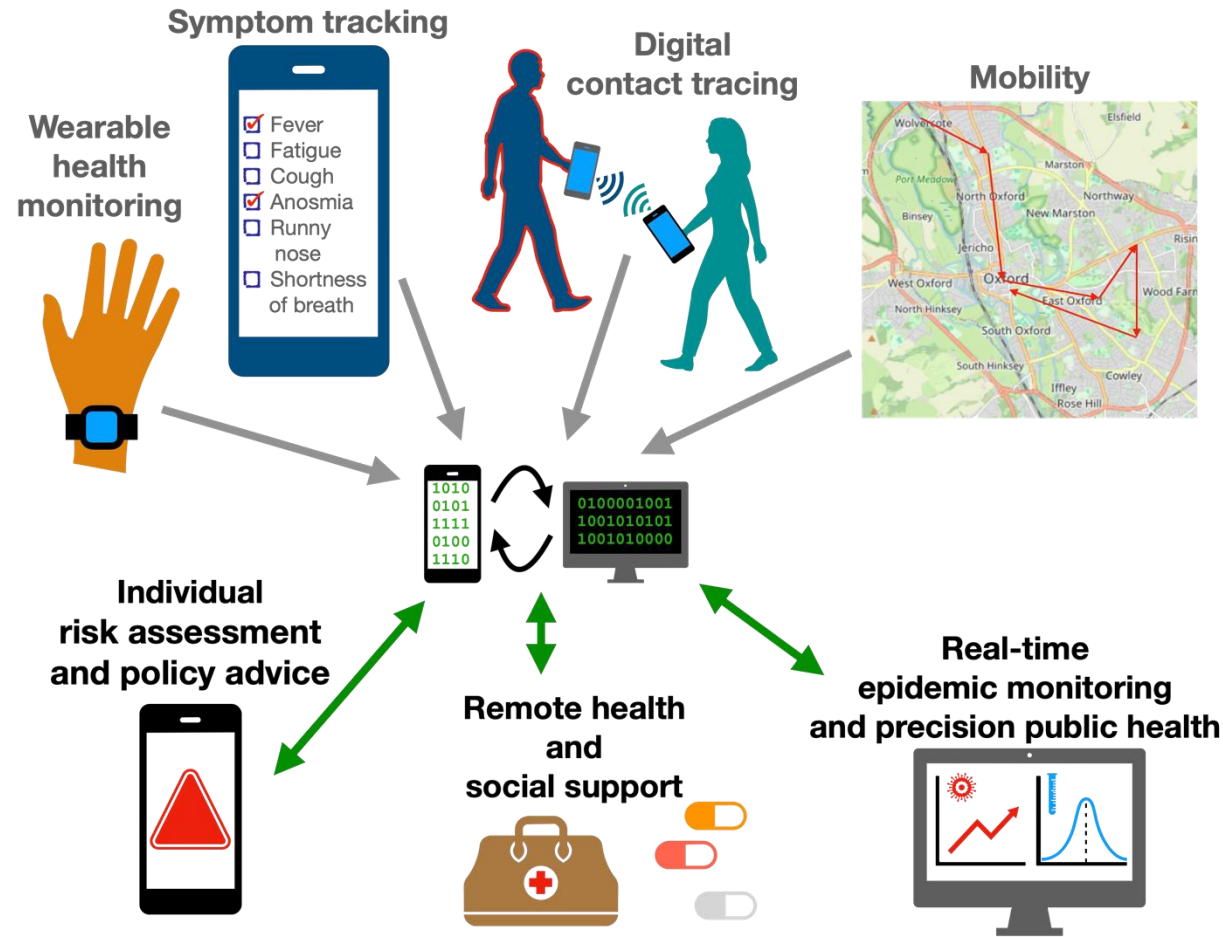
COVID-19 contact tracing: implemented in >80 countries, >500 million users



- Internationally, the impact of digital contact tracing was highly varied
- Everywhere, challenges and delays prevented it from realising its full potential



Beyond contact tracing



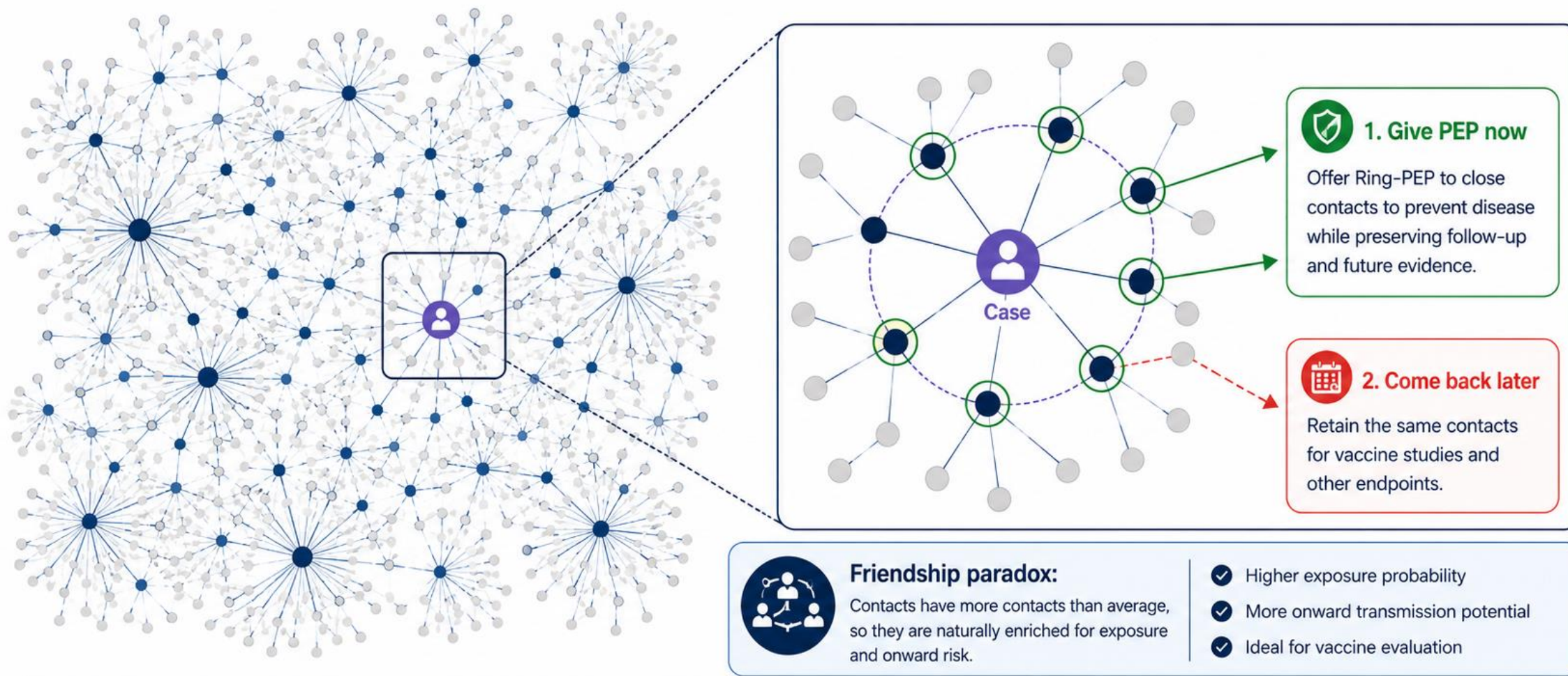
- The use of digital technologies in public health has been under-explored
- Being ready for a crisis requires peacetime investment and active deployments

Digital tools for Ring Post Exposure Prophylaxis (PEP) and early treatment (Tx)

- Some countries are developing stockpiles of broad-spectrum antivirals, against influenza viruses, coronaviridae. Some antivirals are hypothesized to have even broader range (see Ebola 2026).
- Ring PEP and early treatment have long been planned as emergency first-line response, bit logistically challenging.
- Proximity exposure app: practical solution for how the question of how to deploy stockpiles for ring PEP and targeted early treatment.
- Easily understood, personal incentives: rather than “self-isolate” the message could be “priority code for accessing diagnostics / care / PEP / vaccines”.



Ring-PEP creates a risk-enriched cohort for later vaccine trials



Find contacts

Contacts are enriched for near-term risk



Offer PEP

Prevent disease while preserving follow-up



Retain for vaccine evidence

Same contacts can inform later endpoints

'Peacetime' uses

Aims:

- Building and testing the technology, keeping warm
- Trustworthiness and trust, familiarity
- Direct public health value (alongside proven interventions, if tech is experimental)

Deployments:

- can be small, embryonic
- ready to scale

Examples

Elderly care, assisted living

Seasonal influenza

Hospital-acquired infections (Proxximos)

Citizen science

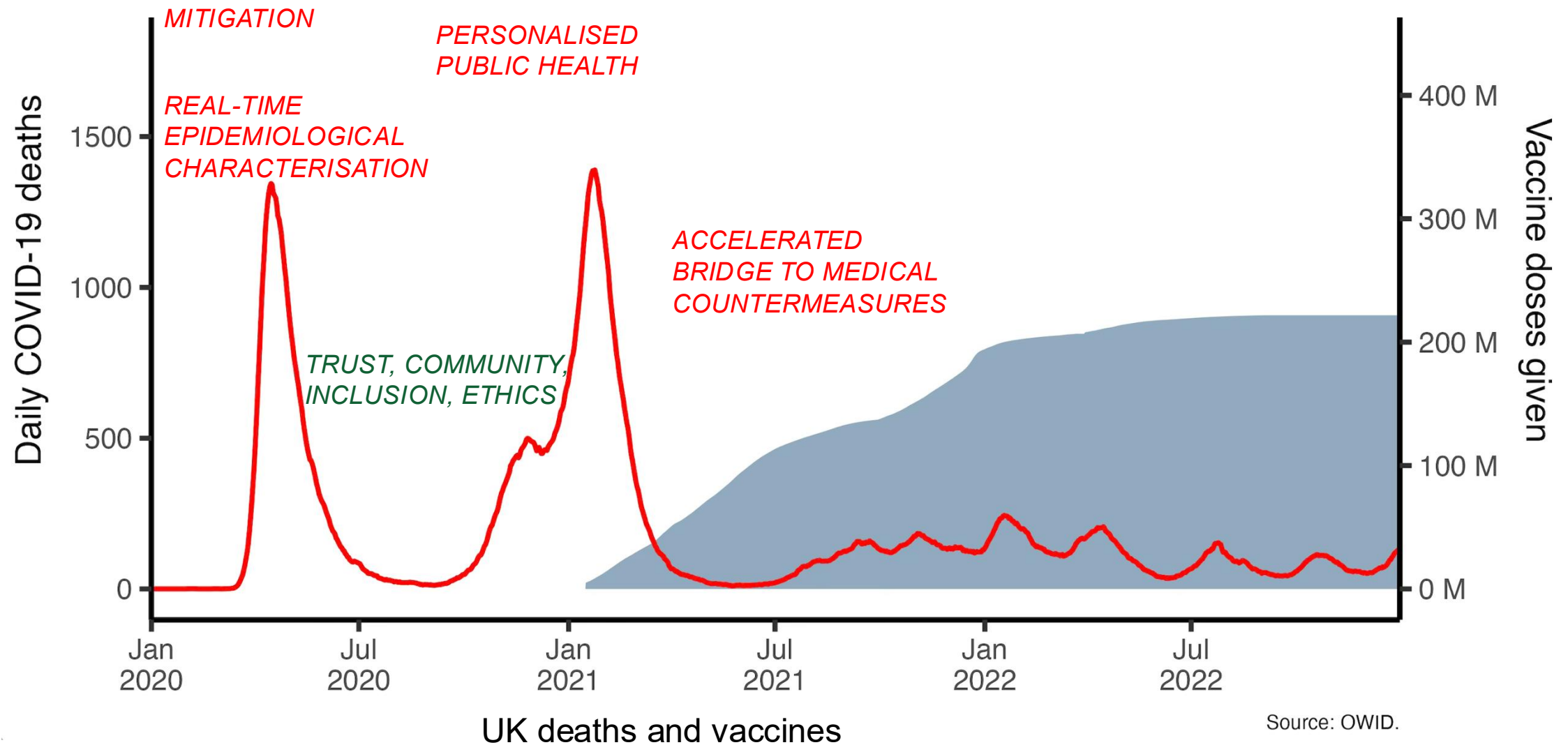
Epigames (Epidemica)

Social-mixing studies (ISI Foundation)

Exposure measurements for vaccine efficacy (Oxford and CEPI)

...

What could digital tools deployed on Day 1 add to management of the next pandemic?



Evidence for mitigation potential: NHS COVID-19 app's first year

~1M

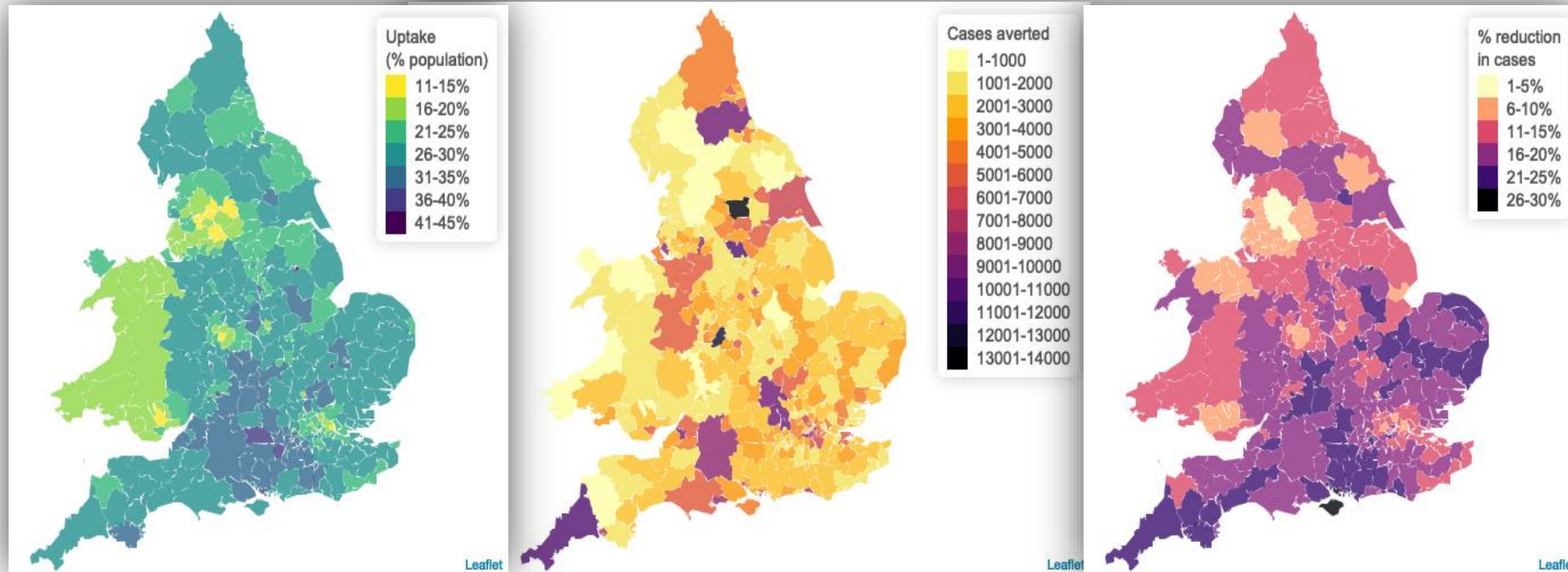
cases averted

44k

hospitalisations averted

10k

deaths averted



Its impact continued far beyond its first year but quantifying its life-saving impact in isolation from other interventions is challenging.

Kendall et al., *Nature Communications*, 2023

Evidence for real-time epidemiological characterisation: unprecedented epidemic intelligence

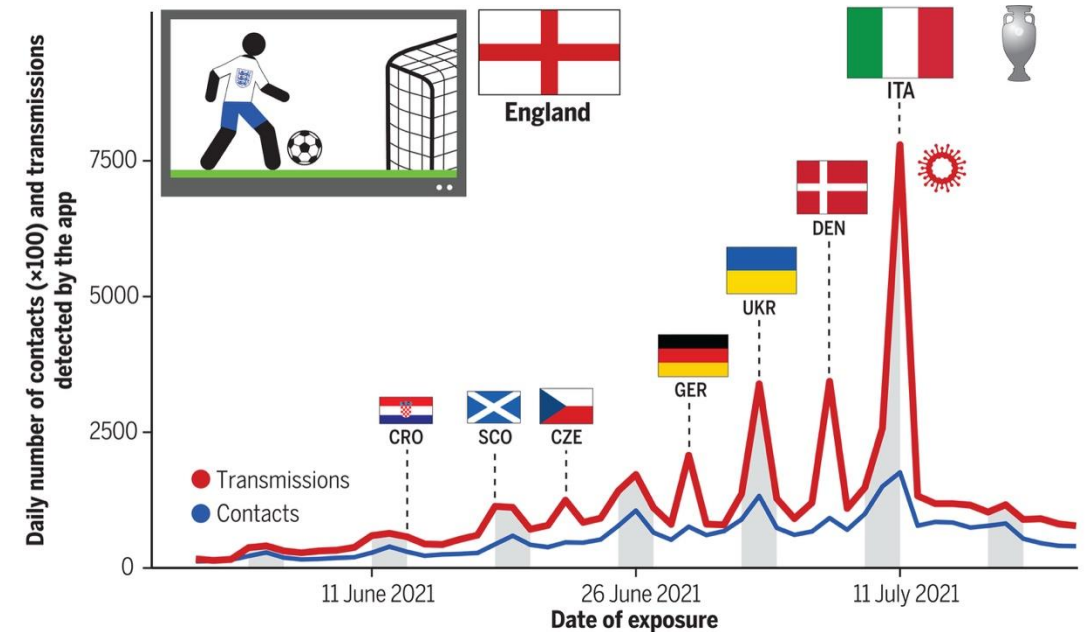
Anonymous NHS COVID-19 app data measured exposure duration, proximity, infectiousness and behavioural change with speed and accuracy that conventional surveillance could not match.

6 hours

median length of contact that led to a transmission

6x higher

numbers of transmissions on Euro 2020 football match days



Integrating epidemiological insights into policy would make a profound difference to **right-sizing** public health interventions.

Ferretti et al., *Nature* 2023; Kendall & Ferretti et al., *Science* 2024

Digital tools can – and should – be deployed early

The NHS COVID-19 app for England and Wales showed what is possible but took 7 months to develop, launching only 10 weeks before vaccines.

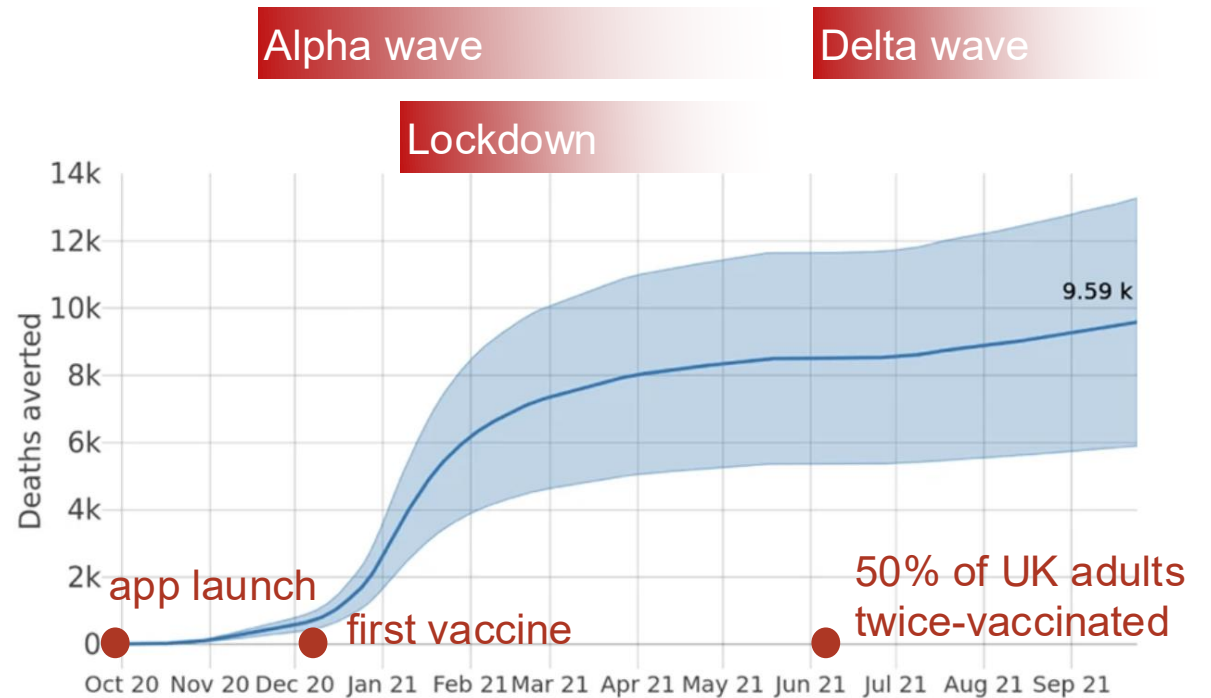
1000

deaths averted per week at peak

1%-2%

reduction in cases per 1% increase in app downloads

Digital public health tools can protect users and non-users, enhancing and refining all aspects of public health response.



The same digital product would have had radically different value if it had been ready for the first wave.

Day 1 deployment



The Oxford Martin School programme on Digital Pandemic Preparedness is working towards making this possible, with your help.



Oxford Martin School programme on Digital Pandemic Preparedness

- “The Oxford Martin School brings together the best minds from different fields to tackle the most pressing issues of the 21st century.”
- 3-year multi-disciplinary programme
- Reflecting on past successes, missed opportunities, and lessons learned
- Researching future possibilities
- Writing a White Paper and a community-led Blueprint for future Pandemic Preparedness
- Establishing a Digital Public Health Foundation





Work packages

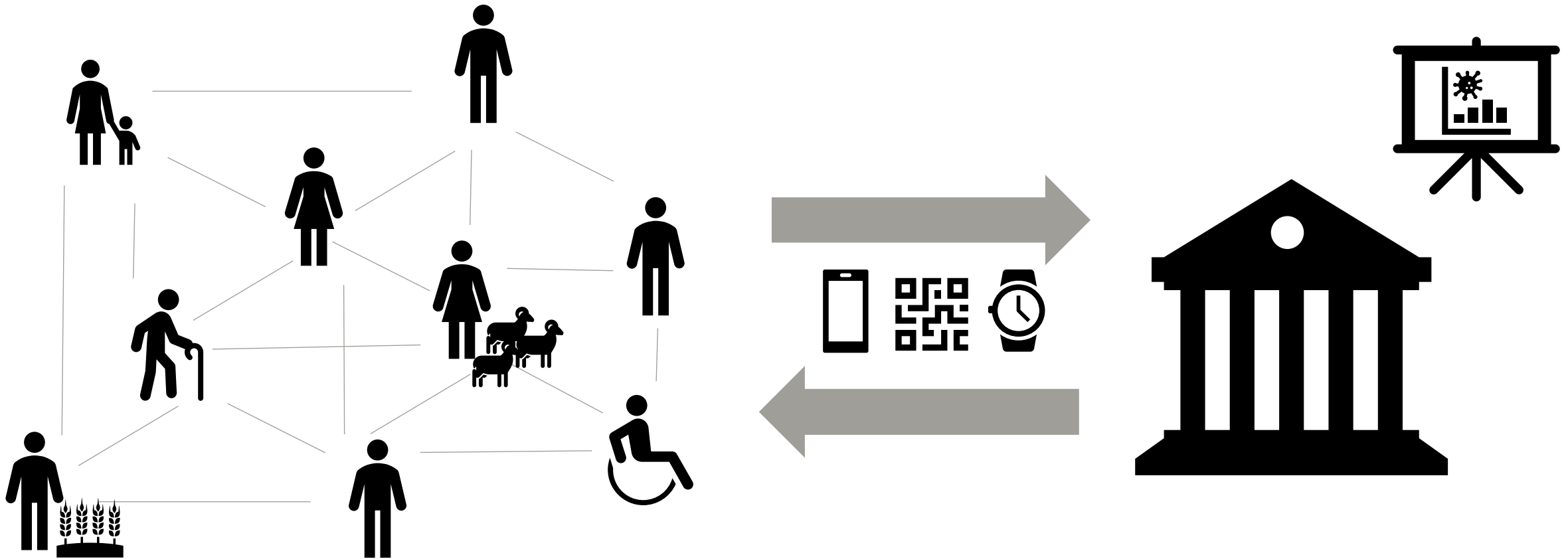
1: Potential impact of digital interventions on epidemic risk and public health
> Luca Ferretti and Christophe Fraser

2: Future analytics for epidemiological inference and epidemic monitoring
> Christl Donnelly and Moritz Kraemer

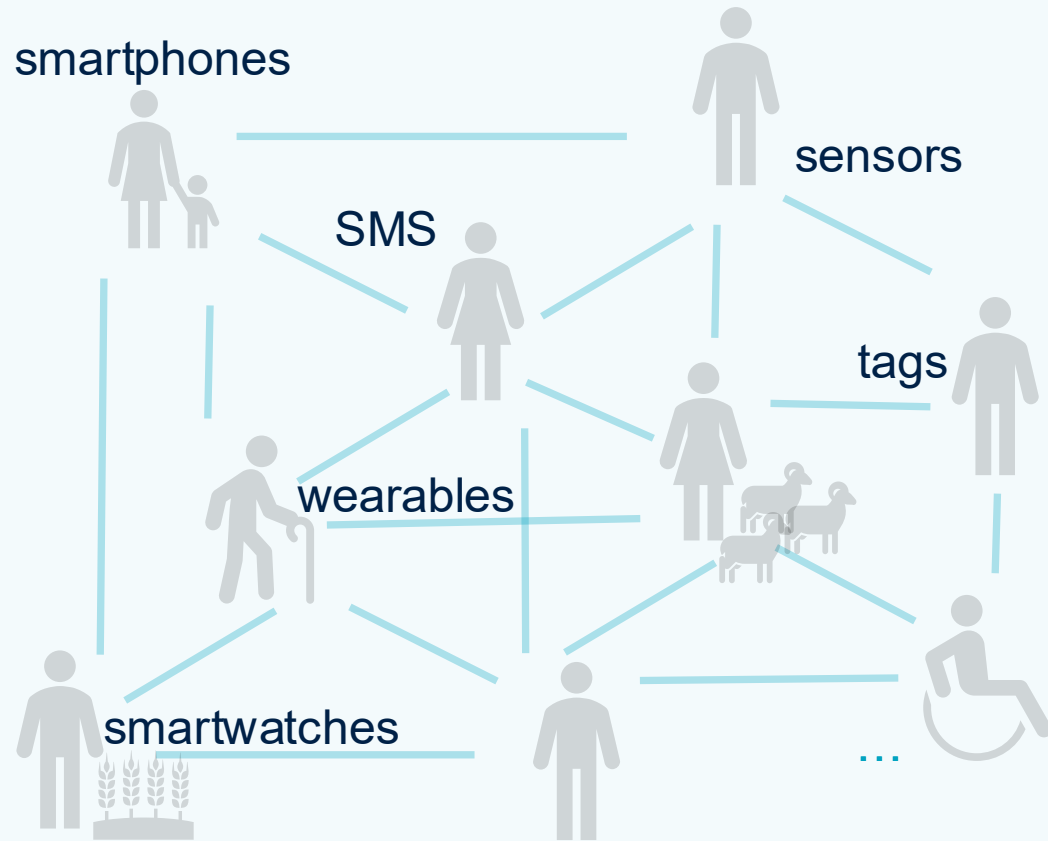
3: The ethical and social aspects of the digital response to emerging infections
> Michael Parker and Melinda Mills

Digital Pandemic Preparedness: Scope

*digital tools enabling direct, ethical & trustworthy communication
between individuals and Public Health agencies*



Digital Pandemic Preparedness: Scope



'pings' with individual instructions / guidance
public dashboards & accessible information
diagnostics
therapeutics
vaccines
national policy

Public Health Agency

precision, trusted public health
real-time, accurate insights
detailed epidemiological analysis
targeted, right-sized interventions
refined public health messaging

Years 1 and 2 highlights

Data sharing: contact tracing data from German CoronaWarn app and Singapore Ministry of Health

Methods development: federated privacy-preserving learning

Insights: modelling effectiveness and demographic effects

Publications and manuscripts in preparation

Governance: ethics of AI in pandemic response

Training: Infectious Disease Modelling and Analytics for Pandemic Preparedness: A focus on Latin America (short course)

Gaps: identifying need for and remit of a Digital Public Health Foundation

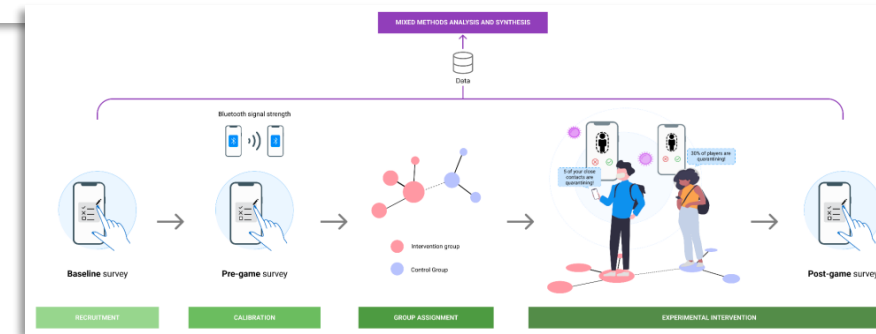
Collaborations: underpinning all of the above, especially with CEPI, GAEN, UKHSA, RKI Germany, South Korea KDCA

Comment | Published: 24 February 2026

Understanding human behaviour for pandemic preparedness with epigames

[Andrés Colubri](#) , [Dmitri Williams](#), [Thomas Valente](#), [Chris T. Bauch](#), [John M. Drake](#), [Melinda C. Mills](#), [John Drury](#), [Christophe Fraser](#), [Luca Ferretti](#) & [Jasmina Panovska-Griffiths](#) 

[Nature Health](#) (2026) | [Cite this article](#)



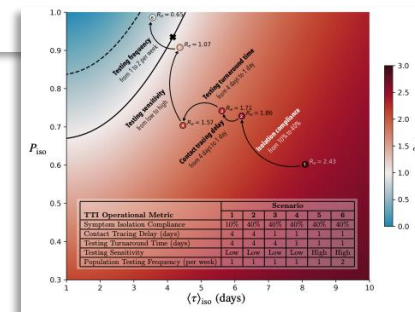
medRxiv

THE PREPRINT SERVER FOR HEALTH SCIENCES

Transmission Waiting Time: A Unifying Metric for Outbreak Controllability

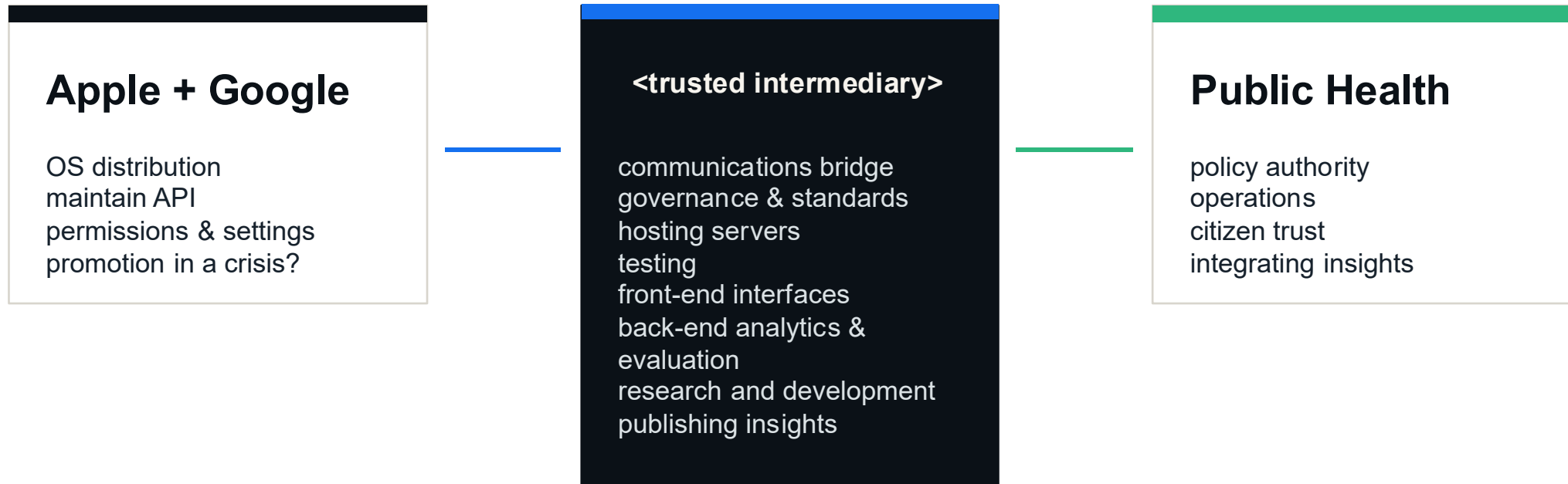
 Christopher Y. Shin,  Sang Woo Park,  Cécile Viboud,  Pardis C. Sabeti,  Christophe Fraser,  Kaiyuan Sun

doi: <https://doi.org/10.1101/2025.10.18.25338292>



Need a trusted international intermediary

Reducing burdens for platforms and public health while preserving public trust



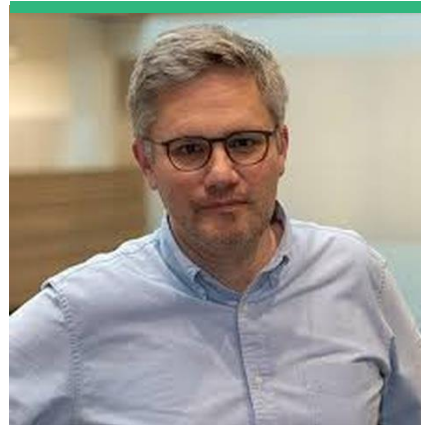
Introducing the Digital Public Health Foundation

Privacy-preserving tools for infectious disease control,
ready before the next emergency.



Randy Marsden

Founding Technology Lead



Christophe Fraser

Founding Chief Scientist



Michelle Kendall

Executive Director

DPHF: building and deploying digital tools in 'peacetime' and ready to scale in a crisis

Vision

Equitable access to digital public-health tools for infectious disease management.

Mission

Lead research and innovation, remove operational barriers, and ensure low-cost tools are available when needed.



How you can get involved

We are at the founding stage and would value your expertise via:

- Informal discussions
- Discussing funding opportunities
- Writing Letters of Intent to collaborate
- Spreading the word!



Please talk to us during the workshop or email: info@dphf.org

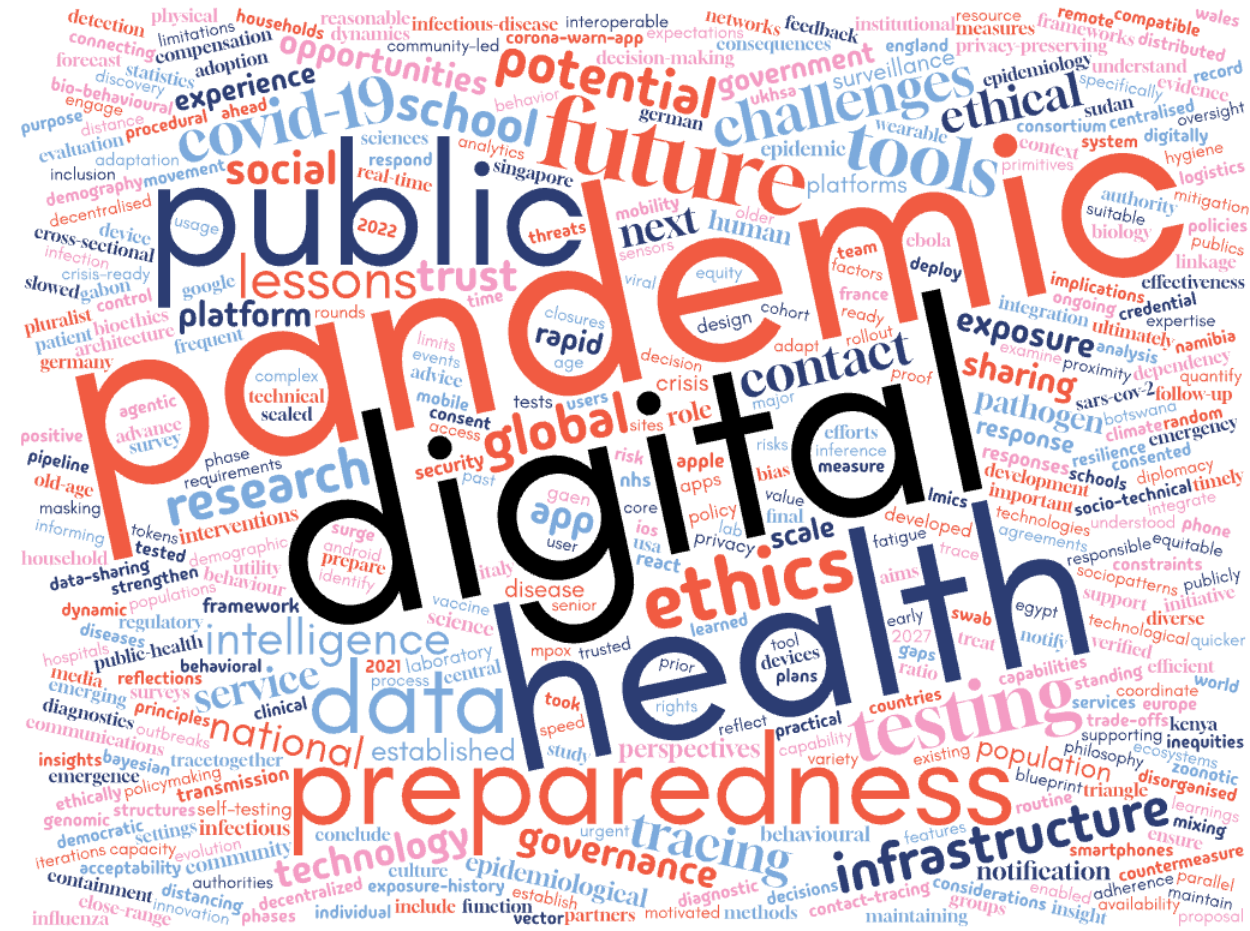
OMS-DPP: Plans for Year 3

- Publication of a White Paper (2026)
- A community-led Blueprint for Digital Pandemic Preparedness (2027) < *More about this on Wednesday* >
- Progress and publications from the individual workstreams < *More about these in the lightning talks* >
- Progress with establishing DPHF
- Deeper understanding, collaboration and progress towards Digital Pandemic Preparedness, starting now!



Priorities for DPP workshop 2026

- Sharing expertise and building a community with deep, multi-disciplinary understanding
- Identifying gaps and under-explored questions
- Detailed discussion of the difficult trade-offs and decisions required
- Planning how to make progress together





Next: Lightning talks

*Introducing others from the
OMS-DPP programme team*

Thank you.

Any questions?