

Human Centred Computing at Oxford

NORTHLab Panel
15 April 2020

What can HCI research do for COVID-19?

Max Van Kleek
Associate Professor of Human-Computer Interaction
Department of Computer Science



Rasmus Kleis Nielsen

@rasmus_kleis



Now I start my days reading the news and going through my social feeds.

Then more and more it's wipe away the tears and try to get on with things.

Could get used to going back to just reading the news and going through social feeds, then getting on with things.

7:50 AM · Apr 12, 2020 · [Twitter for Android](#)





we aren't key workers but ...

we have a tremendous responsibility as **HCI researchers**:

we have informed the design of the digital systems that are currently keeping society running through this crisis - and shape its outcome both directly and indirectly .

covid-19 data, workflow, and model sharing
vaccine design and discovery
large scale supply chain and logistics management systems
systems for coordination and response
hospital information systems & healthcare automation systems
large-scale knowledge and information dissemination systems
remote work tools that keep society going

In a sense, when these systems fail or there are gaps, it is our isn't it responsibility to help identify fixes?

"HCI is the informed, creative spirit of computer systems design research ...to bridge an understanding of the human condition with that of the technical means of changing that condition"



PHYSICIAN, Eighty Three - 03000083 Opened by OkoloTEST MD, Emmanuel Obiora

Task Edit View Patient Chart Links Notifications Navigation Help

Message Center Patient List Physician Handoff Quality Measures Summary Dynamic Worklist MyExperience UpToDate Sign: 0 Propos: 0 eRx R: 0

Tear Off Suspend Exit Calculator Communicate Patient Education Add Patient Pharmacy

PHYSICIAN, Eighty Three

PHYSICIAN, Eighty Three DOB:05/01/66 Age:51 years Dose Wt:63.000 kg (05/08/2017) Sex:Female MRN:03000083 Attending:Zavala MD, Enrique Diaz Guzman

Allergies: Penicillins Inpatient FIN: 0003010083 [Admit Dt: 05/04/2017 7:00 Disch Dt: <No - Discha... Loc:5C Med Sura: 5324: 0

Hospitalist View

Workflow Inpatient Summary Quick Orders Discharge Calculators + No-Severity

Output ml 300

Fluid Balance 200

Intake (1)

Output (1)

Counts (0)

* Indicates a day without a full 24 hour measurement period

Subjective/History of Present Illness

Tahoma 9

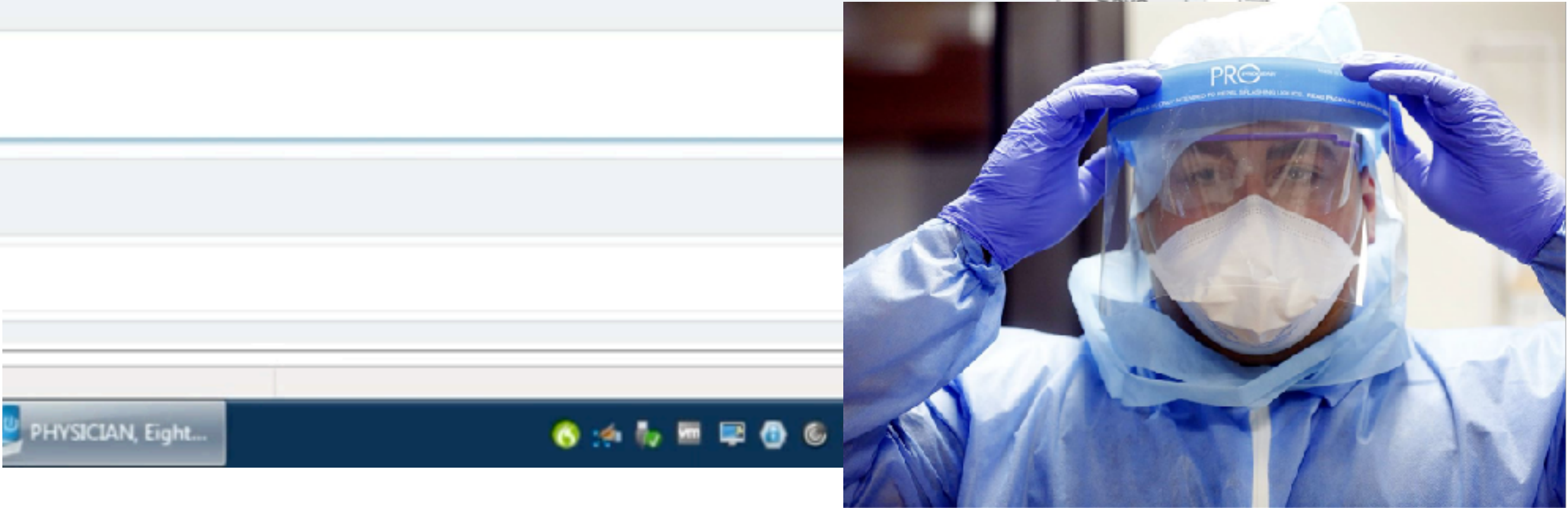
51-year-old female presented to the emergency department with crushing substernal chest pain, diaphoresis, nausea, vomiting, pain radiating to her left shoulder and the left side of her neck. She was evaluated in the ED and determined to have an ST elevation MI. She underwent cardiac catheterization and had a bare-metal stent placed. She is currently doing well

Review of Systems

Font Size

Cerner Millennium Chosen for NHS Nightingale Hospitals

Cerner Millennium: A Day in the Life
<https://www.youtube.com/watch?v=1-SPZUTfA1I>



but how?

Longer term:

CSCW Working remotely

Information exposure effects,
sensitivity & behaviour

Ethical Data Architectures


Dark spots

Shorter term:


Lockdown Exit Strategy ?

Zoom Meeting ID:

Speaker View




Josh Witty




Elizabeth Swan



Lynna Hu




John Mensik



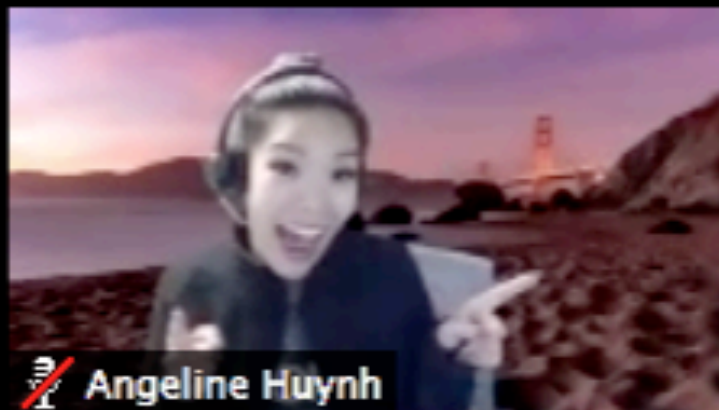
Jeff Bechtel



Rob Rinsky




Mitchel Mayes




Angeline Huynh




Tamara Pitts




Zhenghang Gu



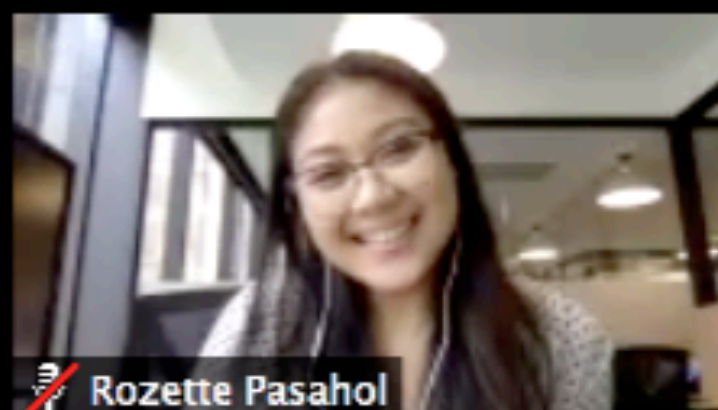
Shari Clare




Winston Twu



James Desmond- Denve...



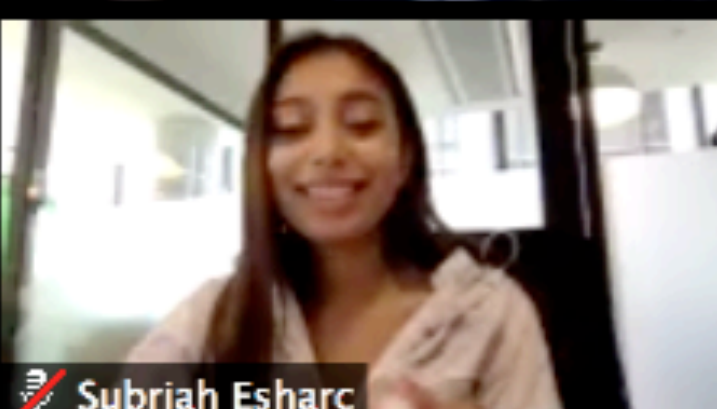
Rozette Pasahol



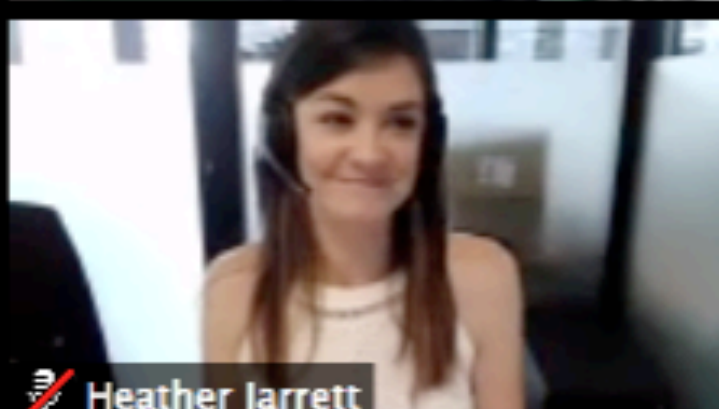
Huey Le - Zoom CSM



Jenny Eggimann




Subriah Esharc



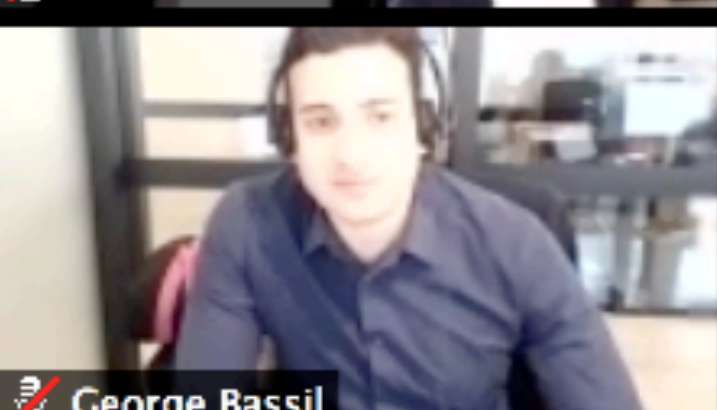
Heather Jarrett



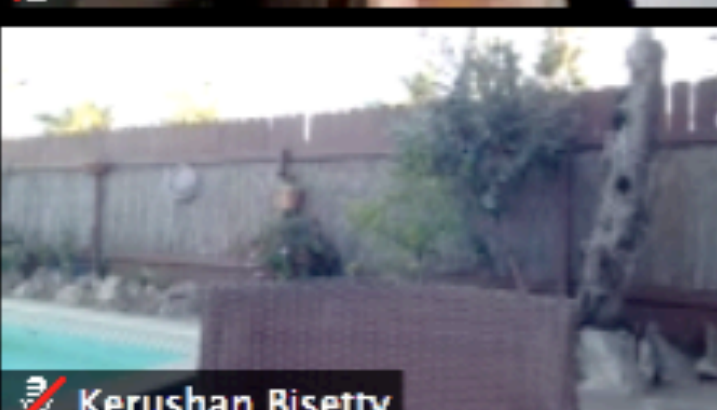
Justin Henry



Matt Caballero



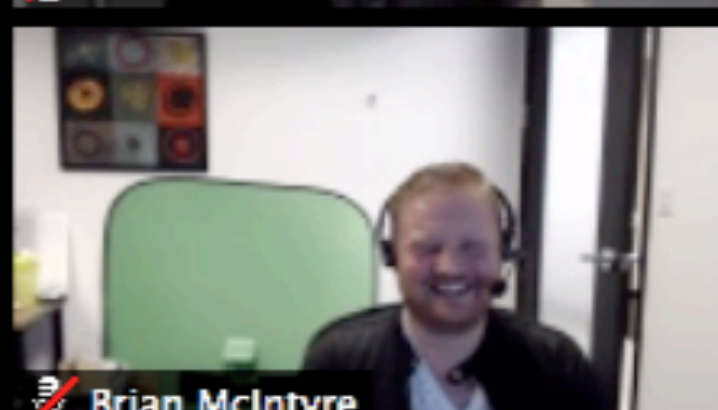
George Bassil



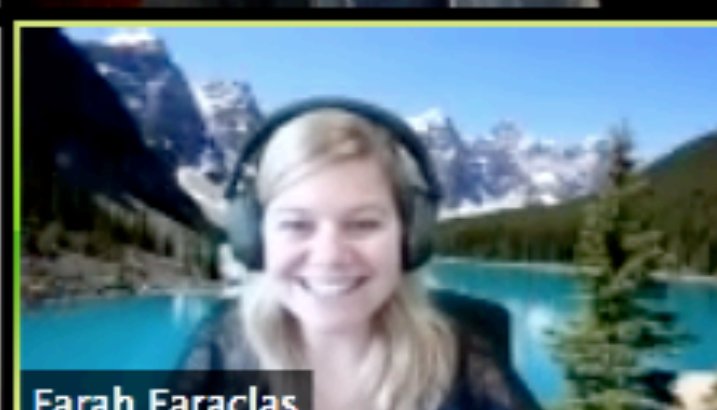
Kerushan Bisetty




John Poje



Brian McIntyre




Farah Faraclas




Mute




Stop Video



Invite




28
Manage Participants




Polling




Share Screen



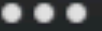
Chat



Record



Breakout Rooms



More

End Meeting




```

H:INTRO  PAGE 1 LINE 9 COL 11          INSERT ON
      <<<  MAIN  MENU  >>>
--Cursor Movement--  -Delete-  -Miscellaneous-  -Other Menus-
^S char left ^D char right ^G char  ^I Tab  ^B Reform (from Main only)
^A word left ^F word right DEL chr lf ^V INSERT ON/OFF ^J Help ^K Block
^E line up  ^X line down  ^T word rt ^L Find/Replce again ^Q Quick ^P Print
      --Scrolling--
^Z line down ^W line up      ^N Insert a RETURN
^C screen up ^R screen down  ^U Stop a command
!-----!-----!-----!-----!-----!-----!-----!-----R

```

1. Introducing WordStar

Contoso Electronics Sales Proposal - Word

File Home Insert Design Layout References Mailings Review View Tell me what you want to do...

Share

Invite people

Can edit

Include a message (optional)

Share

Automatically share changes: Always

Katie Jordan
Editing in real time

Garth Fort
Editing in real time

Robin Counts
Editing in real time

Get a sharing link

Executive summary

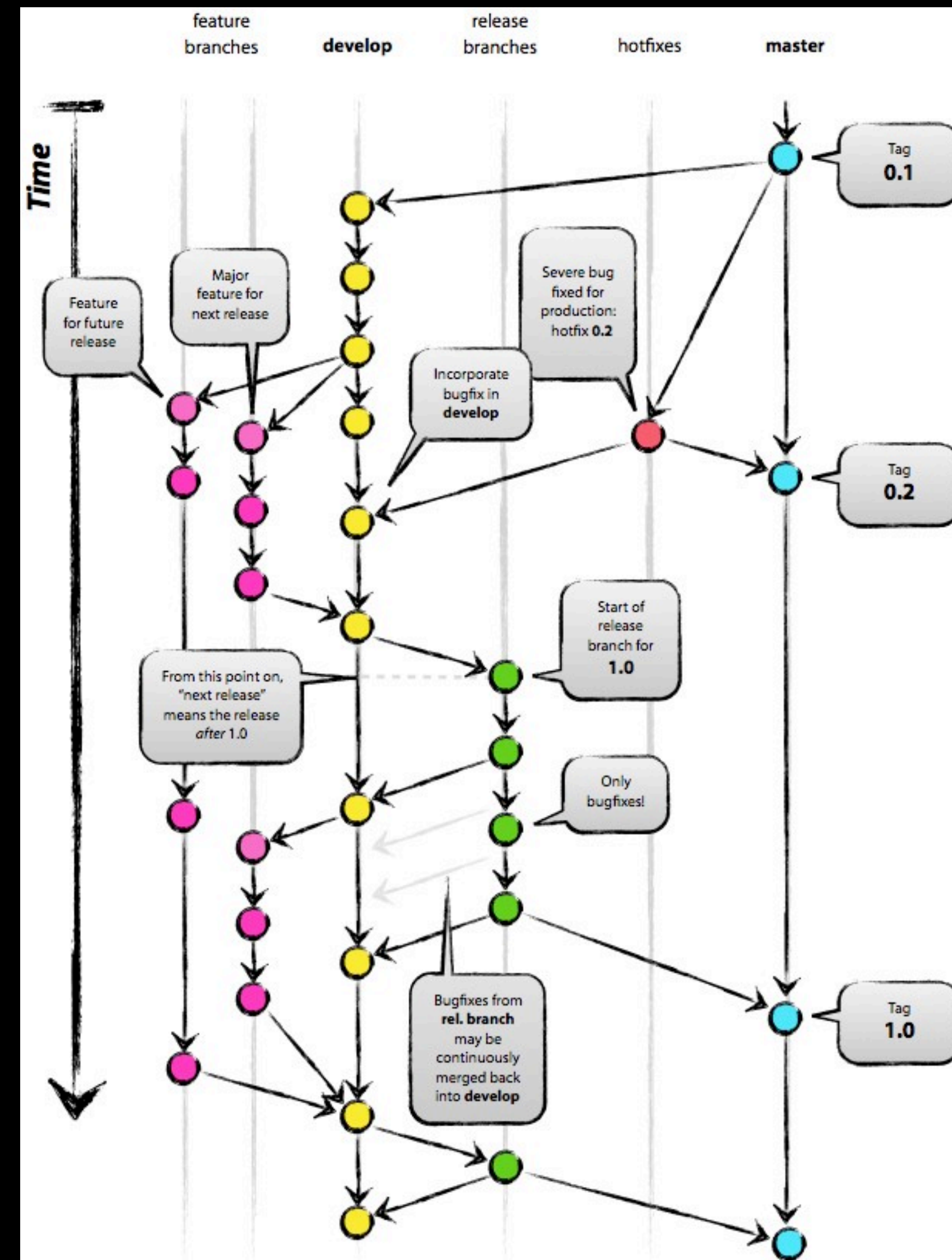
The current consumer electronics market is experiencing unprecedented change—and with that changes comes great opportunity. Together, Litware and Contoso are ideally poised to take a market leadership position and deliver quality, consistency, and innovation to their customers.

Increasingly, people live with their devices in hand. They are always on and always connected, so they require more from these devices—more power, more speed, more seamless integration. The industry challenge remains clear: Understand your customers, anticipate their future requirements, and deliver above their expectations.

That's why a Litware-Contoso partnership makes sense. No one in the consumer electronics market has a better understanding than Contoso of its long history of exciting innovation, turbulent disruption, and remarkable growth. And no one in the market consistently navigates through these changes and empowers its partners like Contoso. What

Why Contoso?

Of all the companies that Litware can work with, what makes Contoso different? Four key points, discussed in more detail below, prove how our partnership would be unique and powerful:



(decentralised) version control

collaborative document editing

low level

human factors of remote work tools

poor accessibility/ understandability

bad psychoacoustics exhaustion, yelling

degradation with network traffic

low-latency, full-duplex interactions, speak over

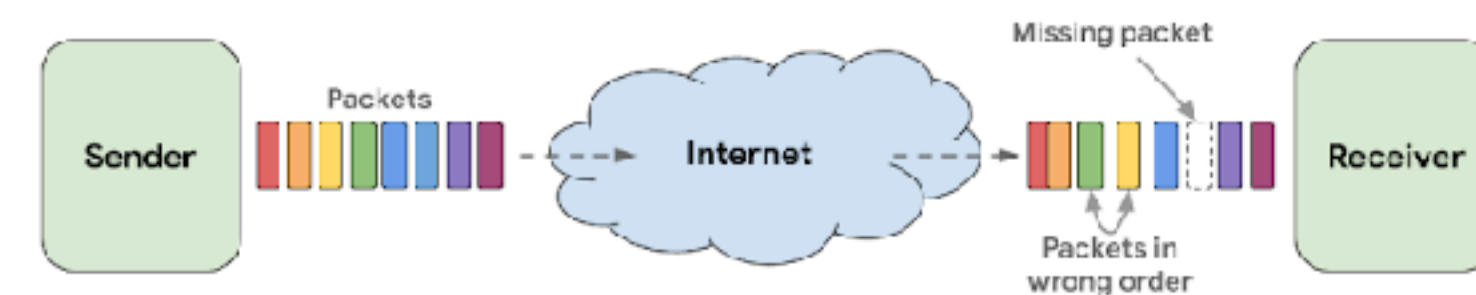
body language

Improving Audio Quality in Duo with WaveNetEQ

Wednesday, April 1, 2020

Posted by Pablo Barrera, Software Engineer, Google Research and Florian Stimberg, Research Engineer, DeepMind

Online calls have become an everyday part of life for millions of people by helping to streamline their work and connect them to loved ones. To transmit a call across the internet, the data from calls are split into short chunks, called *packets*. These packets make their way over the network from the sender to the receiver where they are reassembled to make continuous streams of video and audio. However, packets often arrive at the other end in the wrong order or at the wrong time, an issue generally referred to as *jitter*, and sometimes individual packets can be lost entirely. Issues such as these lead to lower call quality, since the receiver has to try and fill in the gaps, and are a pervasive problem for both audio and video transmission. For example, 99% of [Google Duo](#) calls need to deal with packet losses, excessive jitter or network delays. Of those calls, 20% lose more than 3% of the total audio duration due to network issues, and 10% of calls lose more than 8%.



Simplified diagram of network problems leading to packet loss, which needs to be counteracted by the receiver to allow reliable real-time communication.

In order to ensure reliable real-time communication, it is necessary to deal with packets that are missing when the receiver needs them. Specifically, if new audio is not provided continuously, glitches and gaps will be audible, but repeating the same audio over and over is not an ideal solution, as it produces artifacts and reduces the overall quality of the call. The process of dealing with the missing packets is called [packet loss concealment](#) (PLC). The receiver's PLC module is responsible for creating audio (or video) to fill in the gaps created by packet losses, excessive jitter or temporary network glitches, all three of which result in an absence of data.

To address these audio issues, we present WaveNetEQ, a new PLC system now being used in Duo. WaveNetEQ is a [generative model](#), based on [DeepMind's WaveRNN](#) technology, that is trained using a large corpus of speech data to realistically continue short speech segments enabling it to fully synthesize the raw waveform of missing speech. Because Duo calls are end-to-end encrypted, all processing needs to be done on-device. The WaveNetEQ model is fast enough to run on a phone, while still providing state-of-the-art audio quality and more natural sounding PLC than other

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higher-level
human factors of remote work tools

social mixing/mingling

situated awareness

interruptibility

invisible work

semi-synchronous collaboration

Humans and technology

Lockdown was supposed to be an introvert's paradise. It's not.

Calendars cleared by coronavirus are filling up with virtual happy hours, and some people are starting to feel exhausted.

by **Abby Ohlheiser**

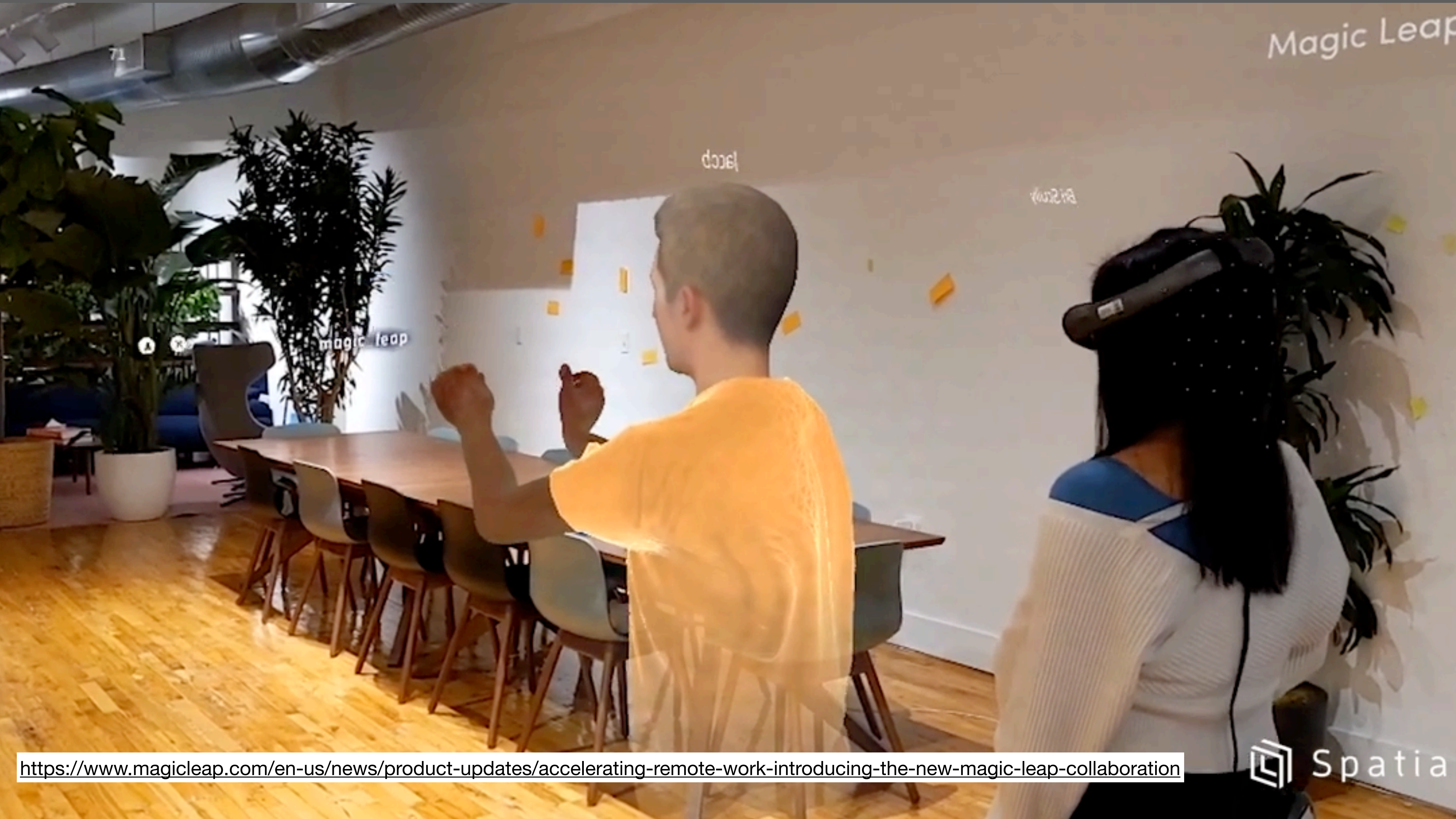
April 2, 2020

This was supposed to be the moment for introverts—the disaster preppers of our new, covid-ravaged social lives. Those who cherished their time alone at home were already experts at voluntary self-isolation. Once, backing out of happy hour at a bar to read a book made you a bad friend. Now it's patriotic.

In a TikTok from early March with 1.8 million views, an introvert watches the news, singing along with Phil Collins ("I've been waiting for this moment for all my life") as the media tells him to stay home and avoid people. Introverts have published expert guides to staying at home and meditations on the joy of "flaking" on social plans. In the Atlantic, Andrew Ferguson wrote that covid isolation has "relieved considerable pressure on the introvert community," the longtime "hopeful practitioners of antisocial distancing."

You can read our most essential coverage of the coronavirus/covid-19

<https://www.technologyreview.com/2020/04/02/998440/lockdown-was-supposed-to-be-an-introverts-paradise-its-not/>



Magic Leap

magic leap

magic leap



use of ML "deep fake"/synthesis

for low-bandwidth accessible/readable communications



Reference

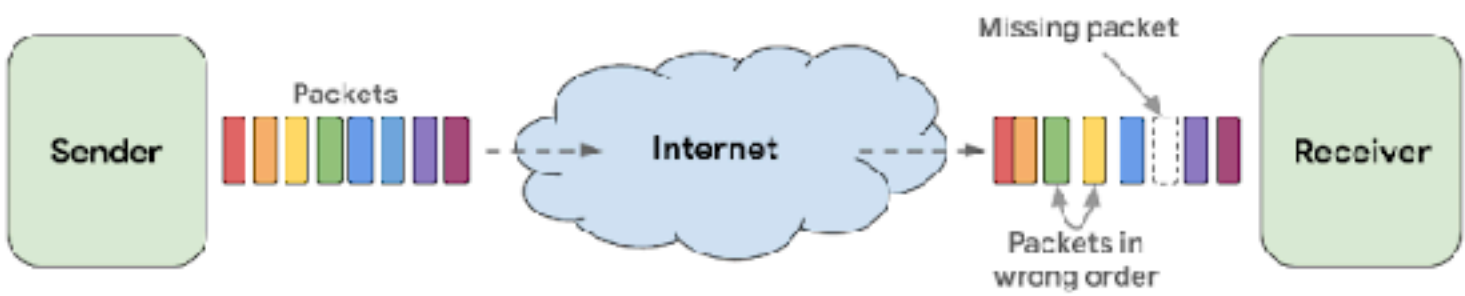
Our Result

Improving Audio Quality in Duo with WaveNetEQ

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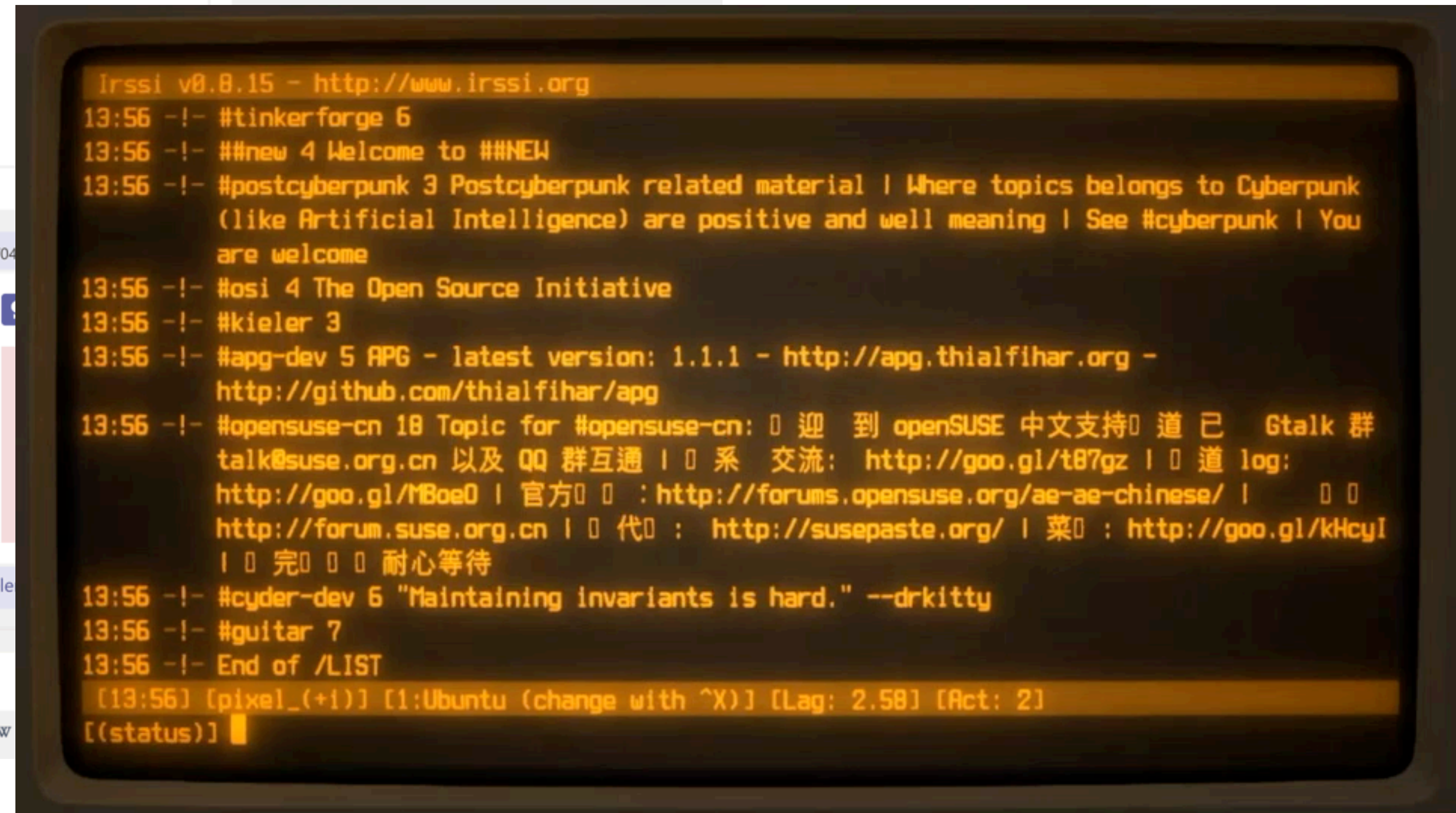
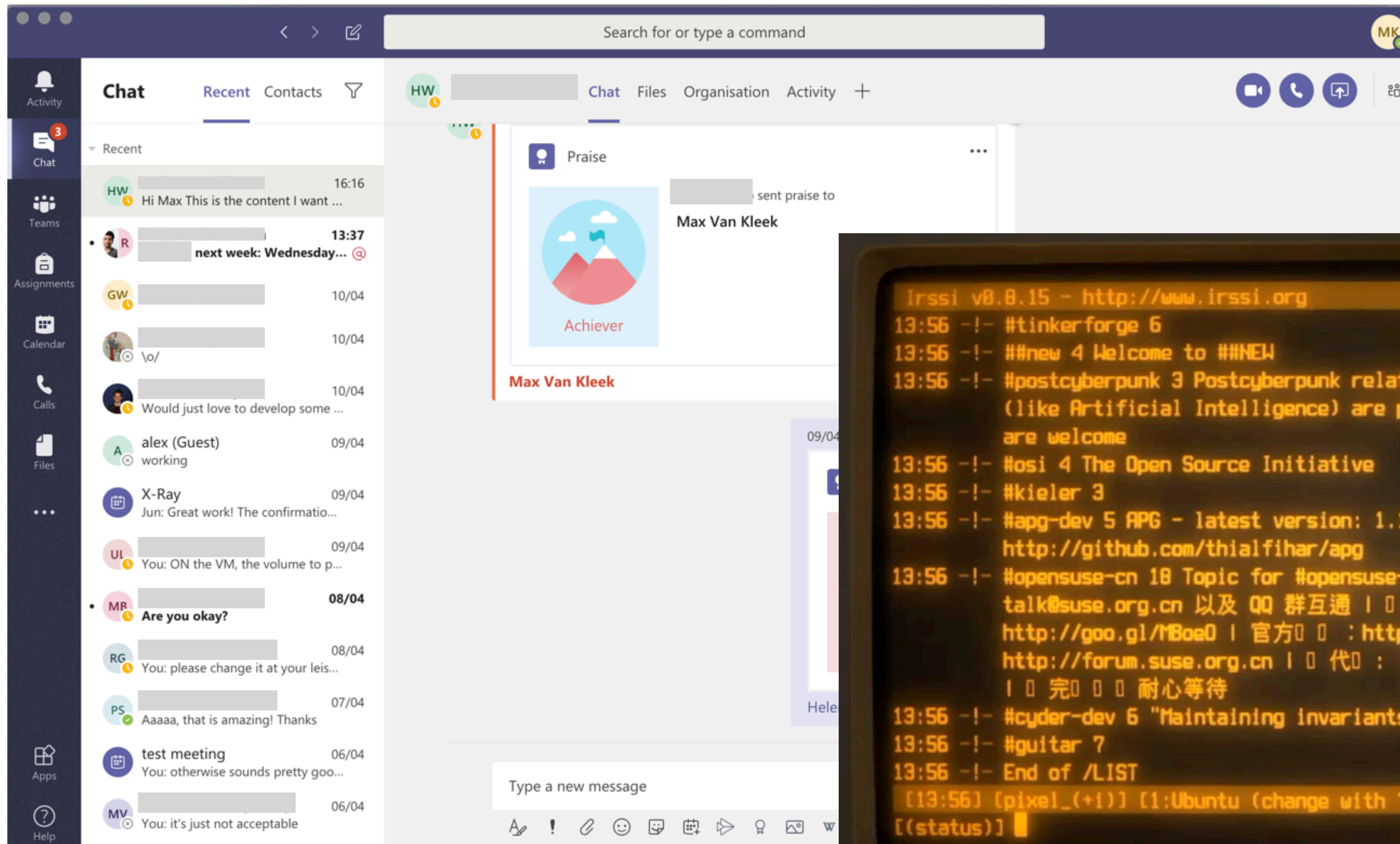
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groupware

has gotten worse, not better -



via <https://www.youtube.com/watch?v=iC3MtOSQQgs>

information exposure

sensitivity, emotional effects
and human behaviour
and the need for ethical architectures



loss and pain

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Coronavirus: New York nurse cries uncontrollably as she describes finding dead patients

'I'm tired of calling families and telling them that news'

Justin Vallejo New York 3 days ago



An intensive care nurse in New York's emergency field hospital broke down and cried uncontrollably describing the scale of the coronavirus tragedy.



Critical care nurse Dawn Billbrough, 51, from York, urged the public to stop stockpiling food amid the coronavirus crisis

d ER nurse D'neil -19 patients in a pandemic.

leil said in the video, oor and cried for an it two weeks.

are dead. You just walk I of calling families and

i like, 'Ma'am are you al this job is. I was sful.'

on 30 March to help portant for people to eight to 11 miles in a 13 to 15-hour shift, five to six days a week, on only four to five hours of sleep.

"If you have ever felt any time would be appropriate to have compassion for each other, right now is the time when we should all have compassion for each other, and try to at least acknowledge what the other person is



offering \$950 video calls

<https://www.independent.co.uk/news/world/americas/coronavirus-new-york-nurse-breaks-down-cries-dead-covid-patients-a9460301.html>

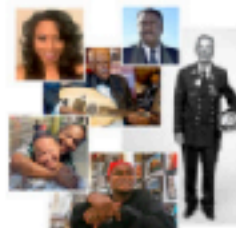
THOSE WE'VE LOST TO THE CORONAVIRUS

The New York Times

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Those We've Lost to the Coronavirus

This series tells the stories of people who have died in the pandemic.



VIA HARVARD LAW SCHOOL

THOSE WE'VE LOST

Lila Fenwick, Who Broke a Barrier at Harvard Law, Dies at 87

She was the first black female graduate of the school and went on to a career at the United



VIA CLAYTON FAMILY

THOSE WE'VE LOST

Sam Clayton Jr., Sound Engineer With a Global Ear, Dies at 58

Mr. Clayton, who died of the coronavirus, worked with reggae musicians from Jamaica and countries far from the music's birthplace.

17h ago · By DANIEL F. SI OTNIK

THOSE WE'VE LOST

Israel Sauz, Gas-Station Worker and New Father, Dies at 22

He graduated from high school in Tulsa, Okla., four years ago. He worked at QuikTrip and his son was born a month ago. Then he died of the coronavirus.

17h ago · By MANNY FERNANDEZ



THOSE WE'VE LOST

Rabbi Yaakov Perlow, Head of Hasidic Dynasty in Brooklyn, Dies at 89

He was the third Novominsker Rebbe and also led



fear

Coronavirus: 13-year-old boy dies, says London hospital trust

31 March 2020

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Coronavirus pandemic



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Chancellor says "our p
amid warnings UK eco
by record amount.

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5 hours ago

UK economy 'coul
record 35%' by Jul

29 minutes ago

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80% of NYC's coronavirus patients who are put on ventilators ultimately die, and some doctors are trying to stop using them

Sin  ad Baker Apr 9, 2020, 11:56 AM

Italians over 80 'will be left to die' as country overwhelmed by coronavirus

Hardest-hit region drafts new proposals saying who will live and who will die

By Erica Di Blasi TURIN
14 March 2020 • 4:38pm



fear

News > World > Europe

80,000 EU citizens stranded abroad from coronavirus travel shutdown

European Commission advises stuck passengers to make contact with their national consulate

Jon Stone Policy Correspondent | @joncstone | Wednesday 18 March 2020 14:58 | 16 comments



U.S. Food Supply Chain Is Strained as Virus Spreads

Disruptions are expected in the production and distribution of products like pork, and localized shortages could occur.



As workers in the industry fall ill, food shortages that started with consumer hoarding could reduce choices for weeks. Tamir Kalifa for The New York Times

By Michael Corkery and David Yaffe-Bellany

April 13, 2020



The nation's [food supply chain](#) is showing signs of strain, as increasing numbers of workers are falling ill with the coronavirus in [meat processing](#)

09.04.20 STATE SCRUTINY > HEALTH

DRUG SHORTAGES PUT WORST-HIT COVID-19 PATIENTS AT RISK

We tell the stories that matter. To help defend quality reporting and spark change, please support

Countries around the world are scrambling to source more ventilators for patients infected with coronavirus but doctors fear that these will be useless without essential drugs to keep patients comfortable, the Bureau



Economic meltdown after COVID-19 set to end MORE lives than disease itself – dire warning

CORONAVIRUS-inflicted economic effects on the UK economy could see more lives lost than the deadly virus will claim itself, warned Professor of Risk Management at Bristol University Philip Thomas.

By [ALESSANDRA SCOTTO DI SANTOLO](#)

PUBLISHED: 14:43, Wed, Mar 25, 2020 | UPDATED: 14:45, Wed, Mar 25, 2020

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5

Coronavirus: UK to 'lose more life than it's restoring' says expert



BBC Radio 4 World One

Britain

Apr 11th 2020 edition >

Recession looms

**Covid-19
economic**

**Government
deficit**

Editor's note: covid-19 pandemic coverage, see here

LENIN V
when h
are weeks i
economic
chancellor
(\$15bn). Ju
decree, the
governme



hopelessness + despair

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United Nations

Covid-19 to wipe out equivalent of 195m jobs, says UN agency

UN Labour body expects 6.7% of working hours to be wiped out globally in second quarter

- [Coronavirus - latest updates](#)
- [Latest US updates](#)
- [See all our coronavirus coverage](#)



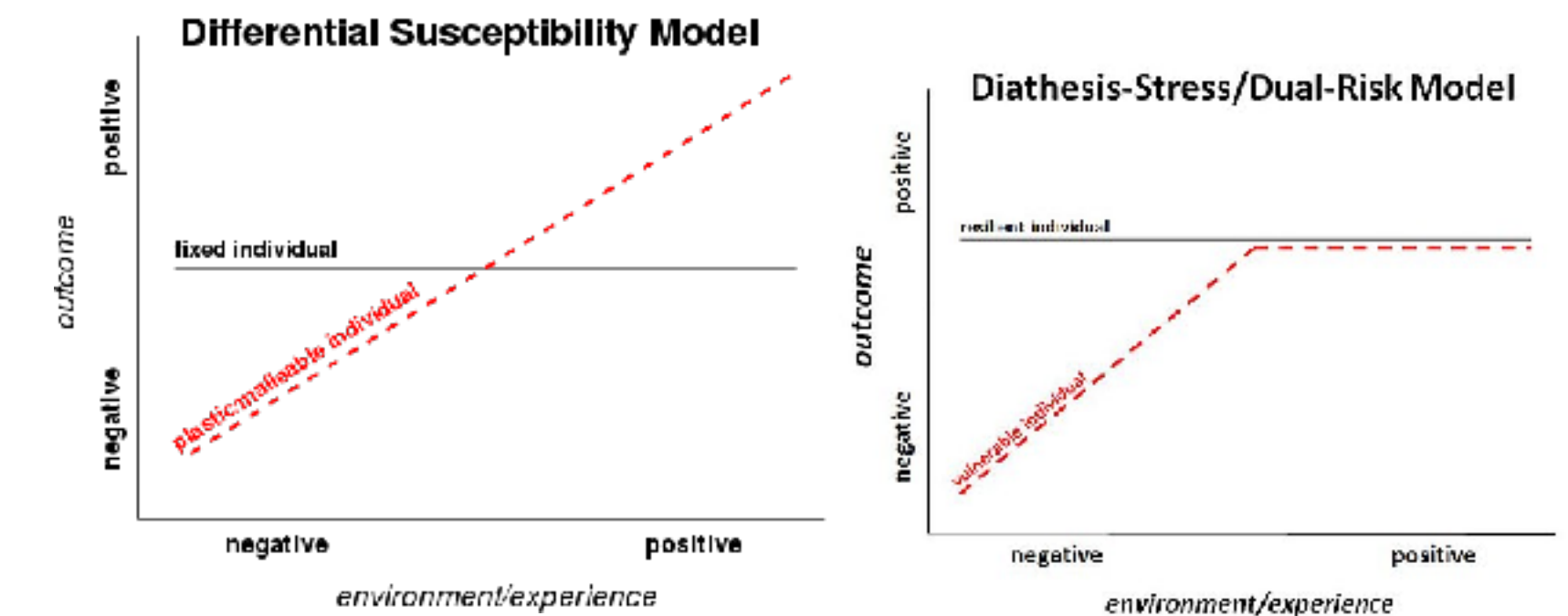
Q: Do people *need* to suffer during devastating and tragic crises?

after all, *pain* and *fear* can be powerful motivational forces

But people don't all suffer (or recover) equally...



<https://www.tandfonline.com/doi/full/10.1080/15213269.2019.1608257>



https://en.wikipedia.org/wiki/Differential_susceptibility_hypothesis

some can experience long-term harms - and beyond a certain threshold, even those who are most resilient can be led to *despair and hopelessness*

beyond 'healthy' individuals, those suffering from mental illness or sensitivities:

PTSD

hypochondria

anxieties

phobias

as well as other factors stemming from neurodiversity

can influence how much people are affected by information they're exposed to -

yet everyone accesses the *same* social media

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Facebook

Facebook told advertisers it can identify teens feeling 'insecure' and 'worthless'

Leaked documents said to describe how the social network shares psychological insights on young people with advertisers

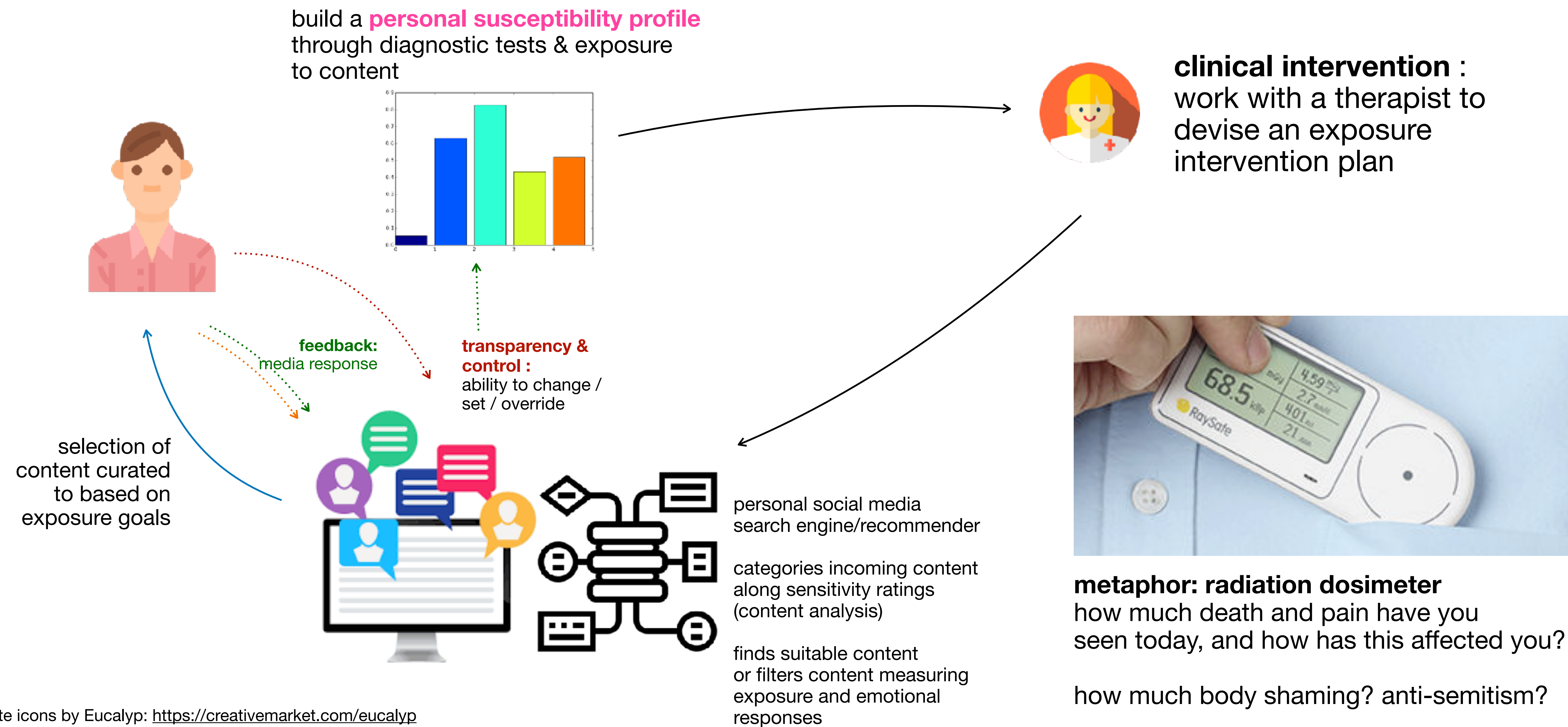


▲ An internal report produced by Facebook executives reportedly states the company can monitor posts and photos when young people feel 'stressed', 'defeated' and 'useless'. Photograph: Paul Sakuma/AP

even worse, platform newsfeed algorithms have been designed to *exploit* users' vulnerabilities for profit

what *might* a different world look like?

a little design fiction based on work with
DPhil researcher Claudine Tinsman



ethics of data architectures

bad actors are benefitting massively
from the lockdown during a global crisis

app and platforms designers exploiting those who are
being forced into using new tools for work (e.g. slack, zoom),
socially pressured by friends (e.g. houseparty)

the digital ad delivery and auction business seeing
huge torrents of new data from smart home IoT devices
and apps

to less ethical app, game, and content designers creating
shell adware, DLC-ware, clickbait

and cybercriminals looking to exploit the vulnerable
at a time when people are particularly susceptible

some of these systems hold
no pretences about not caring
about user privacy
(slack, houseparty)

others provide lipservice and
use deceptive tactics (zoom)

how can we help right now?

we created a huge table of remote work tools — and their privacy guarantees


bit.ly/oxhcc-remote-work-privacy - please see and contribute :)

Privacy and Security Analysis of Popular Remote Work / Meeting Tools (Covid-19 crisis)

Work led by : [University of Oxford Human Centred Computing \(Dept of Computer Science\)](#) and friends!

This is a preliminary analysis of the Privacy and Terms of Use for popular video conferencing tools people are starting to use for remote work during the Covid-19 crisis.

Please submit content and suggestions to this document anonymously [using this form](#) (Google Forms) or email any HCC PI.

| Software | Platforms | Privacy Policy / Terms | Third party integrations & disclosures | Encryption (E2E?) | Data retention policy | Business model | Known Privacy and security issues | Open Source (client/server) | Articles See Also: | Summary |
|----------|--------------------------------------|---|---|---|---|----------------|---|-----------------------------|---|--|
| Zoom | Web, Native (Win, Mac, iOS, Android) | <p>Zoom's Privacy Policy (Updated 31 Mar 2020)</p> <p>"On zoom.us and zoom.com we use third-party advertising service providers (like Google) to deliver tailored ads to our users about products visitors may find interesting. [...] However, this only pertains to user activity on the zoom.us website. No data regarding user activity on the Zoom platform – including video, audio, and chat content – is ever provided to third parties for advertising purposes."</p> <p>Old privacy policy:</p> <p>Zoom itself retains all data you provide, including Facebook profile information (if you sign-up with Facebook), IP addresses, and device information.</p> <p>Sign-up opts-in to newsletters (illegal under GDPR)</p> <p>May use "use identifiers, employment information, payment information, Facebook profile information, technical information, demographic information, usage information, and user-generated information" for marketing purposes.</p> <p>This is true whether you have Zoom account or not.</p> | <p>Shares data with advertising companies and analytics firms, including at least Google, but they do not specify publicly whom the rest of their partners are.</p> <p>According to privacy policy, for they offer opt-out in settings ("do not sell link") for Californian users</p>  | <p>No - No E2E Support, despite use of the phrase "end-to-end encryption" which caused confusion</p> <p>Data encrypted in transit (TLS).</p> | <p>For as long as required or permitted</p> <p>Servers in US, data sharing with EU enabled through Privacy Shield</p> | Ads, Pro Plans | <p>Long list, see Tidbits Article</p> <p>Privacy issues beyond data capture</p> <p>Most known problems have been fixed except:</p> <p>Attention tracking feature - meeting hosts used to be able to be alerted to when participants were no longer paying attention using app focus tracking (not eye tracking) — now disabled</p> <p>Meetings can be recorded - and participants may not realise they're being recorded because it's optional to ask for consent.</p> <p>M</p> | No/No | <p>9 April: The Lesson We Are Learning From Zoom</p> <p>8 April: Update on Zoom's 90-Day Plan to Bolster Key Privacy and Security Initiatives</p> <p>Tidbits: Every Zoom Security and Privacy Faw So Far, and What You Can Do to Protect Yourself</p> <p>Buzzfeed: Google Bans Zoom Videoconferencing Software From Employees' Computers</p> <p>Citizenlab.ca: Move Fast & Roll Your Own Crypto: A Quick Look at the Confidentiality of Zoom Meetings - Zoom rolled their own encryption, xmits keys through Chinese servers; displays deceptive s2e notice</p> <p>1 April 2020: New Zoom Windows Security Vulnerability</p> <p>Cryptography Engineering: Does Zoom Support E2E Encryption?</p> <p>Zoom: Zoom.com : A Message to Our Users</p> <p>The Guardian: 'Zoom is malware': why experts worry about the video conferencing platform</p> <p>TechCrunch: Maybe we shouldn't use Zoom after all</p> <p>Reuters : Elon Musk's SpaceX bans Zoom over privacy concerns: memo</p> <p>NYT: NY Attorney General Locks into Zoom's Privacy Policy</p> <p>Dark Patterns in Zoom's Installer: Felix on Twitter: "Ever wondered how the @zoom.us macOS installer does it's job without you ever clicking install? Turns out they (ab)use preinstallation scripts, manually unpack the app using a bundled 7zip and install it to /Applications if the current user is in the admin group (no root needed)... https://t.co/qX61GJ9qLT"</p> <p>Vice: Zoom iOS App Sends Data to Facebook Even if You Don't Have a Facebook Account</p> <p>The Star: Zoom needs to clean up its privacy act</p> <p>BBC: Zoom is in everyone's living room - how safe is it?</p> <p>ConsumerReports: Zoom Calls Aren't as Private</p> | <p>Score: 1/5 - based on iffy software practices and abundant security problems. But we are hoping that with current popularity and efforts to improve the client things will get better.</p> <p>Better than Skype in that they don't have third-party trackers in the client, worse because they use shadowy malware-like practices and creepy privacy-invasive features</p> <p>Pros</p> <ul style="list-style-type: none">+ Lots of features people like, high quality video and scalable webinar features+ Company has high visibility. Security whitepaper+ Recently has been revamping privacy policy and eliminating trackers in response to public outcry <p>Cons:</p> <ul style="list-style-type: none">- No E2E- Dodgy security practices - some which were reminiscent of malware- Inadequate responses to security problems in the past, now quickly reversing- They do not fully disclose who third parties are- Opt-out, not opt in to default settings and newsletter.- Closed source client and server- No external security audits published online |

easier-to-digest
summary of key
findings in progress!

Short term:

Lockdown Exit Strategies

There are several possibilities of lockdown exit strategies and they're rapidly converging on the use of digital tools in new unprecedented ways:

Immunity Passports/Certificates - based on self-testing and held in digital form

Contact Tracing - relies on a majority (60%+ of the population) participating by downloading a national contact tracing app that will help notify others who have been proximate to someone later found to be infected

huge privacy implications of a poor implementation
potential concerns even with a proper implementation
what about the digital divide?

quality of data
self-report vs lab test basis

Additional unknowns :
Lots of unknown factors for epidemiologists

Once a person has recovered how long will immunity last
Viral load re-exposure?
Risk calculation - how much of a risk is it for a given individual based on their physiological characteristics?
Testing strategy - how will they roll these out?

References:

<https://www.telegraph.co.uk/news/2020/04/11/when-coronavirus-lockdown-end-exit-strategy-uk/>

<https://www.ft.com/content/d48f0438-7b1b-11ea-af44-daa3def9ae03>

Decentralized Privacy-Preserving Proximity Tracing

This repository contains a proposal for a secure and decentralized privacy-preserving proximity tracing system. Its goal is to simplify and accelerate the process of identifying people who have been in contact with an infected person, thus providing a technological foundation to help slow the spread of the SARS-CoV-2 virus. The system aims to minimise privacy and security risks for individuals and communities and guarantee the highest level of data protection.

By publishing this document we seek feedback from a broad audience on the high-level design, its security and privacy properties, and the functionality it offers; so that further protection mechanisms can be added if weaknesses are identified. The [white paper document](#) is accompanied by an [overview of the data protection aspects of the design](#), and a [three page simplified introduction to the protocol](#).

Open source implementations for iOS, Android, and the back-end server is available on the [other DP-3T repositories](#). An explanatory comic [is also available in many languages](#).

If you have a similar project and you believe it would be beneficial to collaborate or exchange ideas drop an email here: dp3t@groupe.epfl.ch.

The following people are behind this design:

DP3T is looking for HCI expertise
github.com/DP-3T/documents

Human Centred Computing blog:
<https://hcc.cs.ox.ac.uk>



please stay in touch &
take care of each other!

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