TraceTogether, Safer Together

The world's first national digital contact tracing programme

Jason Bay
TraceTogether creator

17 August 2022

The views, thoughts and opinions expressed in this presentation are made in a personal capacity and do not necessarily reflect those of any other group or individual.

how it all started

Singapore

Singapore confirms first case of Wuhan virus

Employees at Singapore's National Centre for Infectious Diseases putting on protective gear before carrying out testing for the novel coronavirus.

Source: Channel NewsAsia

JAN 24

WhatsApp with MOH official

Happy new year! (Kinda) Got a question for you.

Are you aware of any contact tracing mobile app solution currently?

If you think this is worth looking into, some of my devs are trying to figure it out.

how it all *actually* started

WORLD NEWS JUNE 1, 2015 / 3:22 PM / UPDATED 7 YEARS AGO

South Korea fights to contain MERS outbreak, considers tough measures

By Jack Kim 3 MIN READ

SEOUL (Reuters) - South Korea struggled to contain an outbreak of Middle East Respiratory Syndrome (MERS) on Monday as health authorities announced three more cases, bringing the number of infections to 18 in just over 10 days.

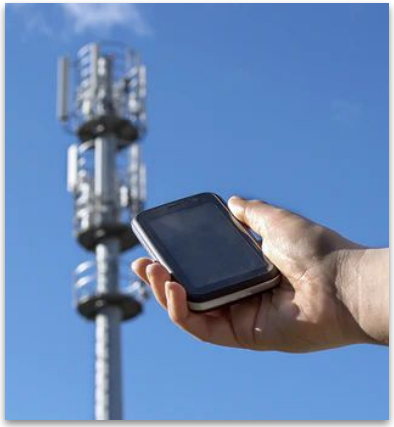
Source: Reuters

Smart Nation SINGAPORE

MINISTRY OF HEALTH SINGAPORE

Ministry of Communications and Information

iDA INFOCOMM DEVELOPMENT AUTHORITY OF SINGAPORE



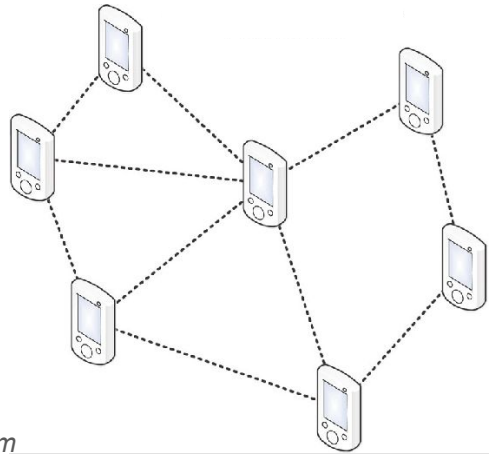
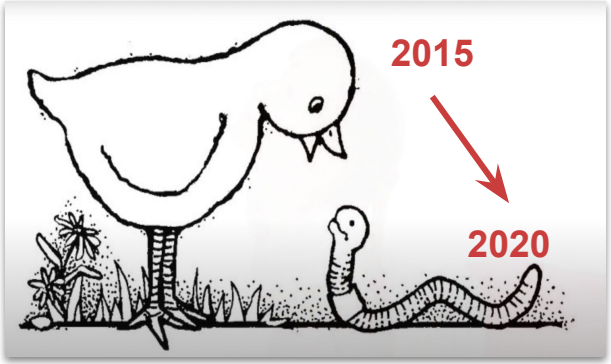


Image: https://www.signalbooster.com

how it all *actually* started

Ministry of Communications and Information

Government Digital Services
hive.gov.sg



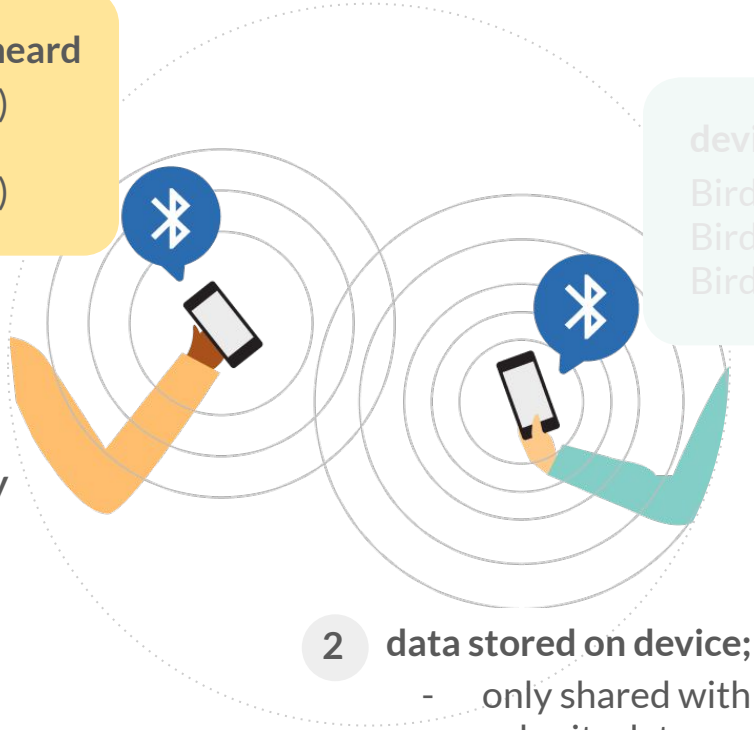
Source: Camilla Schaeffer

A team of thinkers and doers working with code, pixels and people

how TraceTogether works

device A said
Apple
Apple
Apple
Pencil
Car
x94nfY
...

device A heard
Bird (near)
Bird (far)
Bird (near)



device B said
Bird
Bird
Bird

device B heard
Apple (near)
Apple (far)
Apple (near)

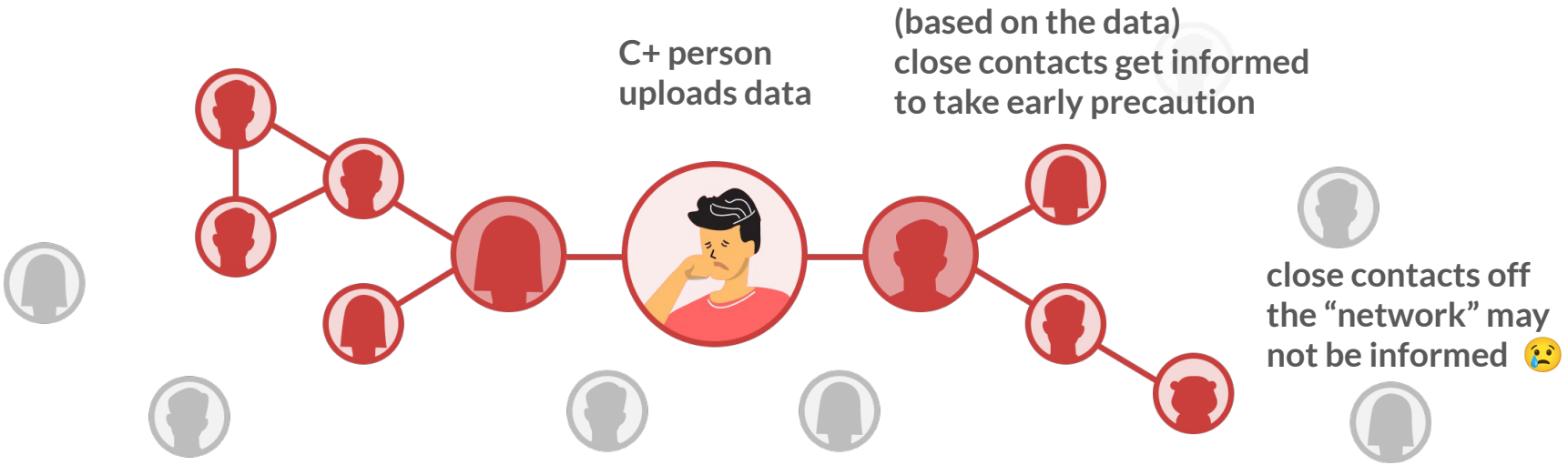
1 **“nicknames” are temporary**

- prevents tracking
- only MOH can match nicknames to users

2 **data stored on device; wiped after 25 days**

- only shared with MOH when user actively submits data

how TraceTogether works



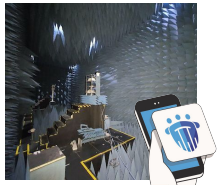
privacy-preserving, community-driven contact tracing

the TraceTogether journey

2020

JAN — Work begins

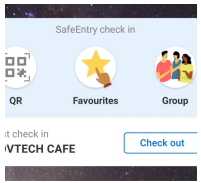
FEB — 1st prototype



MAR — MTF launches TT

JUN — Tokens to be produced

JUL — SafeEntry integration



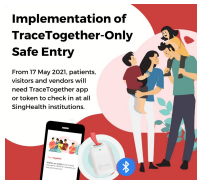
OCT — 70% adoption target

2021

JAN — TT parliament debate

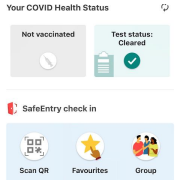
APR — Vaccination integration

MAY — TraceTogether-Only SafeEntry

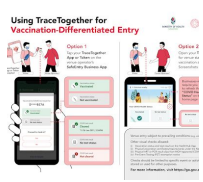


JUN — ~100% adoption; >½ of close contacts from TT

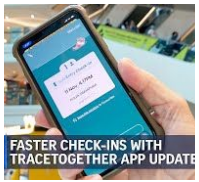
AUG — Test result integration



OCT — Vaccination Differentiated SMM



NOV — Green pass / oTTer



recognition for TraceTogether

Gartner

Eye on Innovation Awards 2020
(Government)

WITSA
World Innovation, Technology and Services Alliance

Global ICT
Excellence Awards 2020

SINGAPORE COMPUTER SOCIETY

IT Leader Award 2021
(Pathfinder)

OPEN GOV

Recognition of Excellence 2021

IDC

Smart City Awards 2021
(Public Health & Social Services)

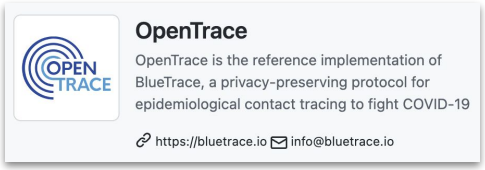
SINGAPORE GOOD DESIGN

Singapore Good Design 2022
(SG Mark - Digital Solutions)

thought leadership

BlueTrace manifesto

BlueTrace technical white paper



OpenTrace reference implementation

Linux Foundation Public Health's open-sourced Project Herald

Cases

Harvard Business School

TraceTogether

Singapore Management University

Digital Product Management under Extreme Uncertainty: The Singapore TraceTogether Story for COVID-19 Contact Tracing

Classrooms

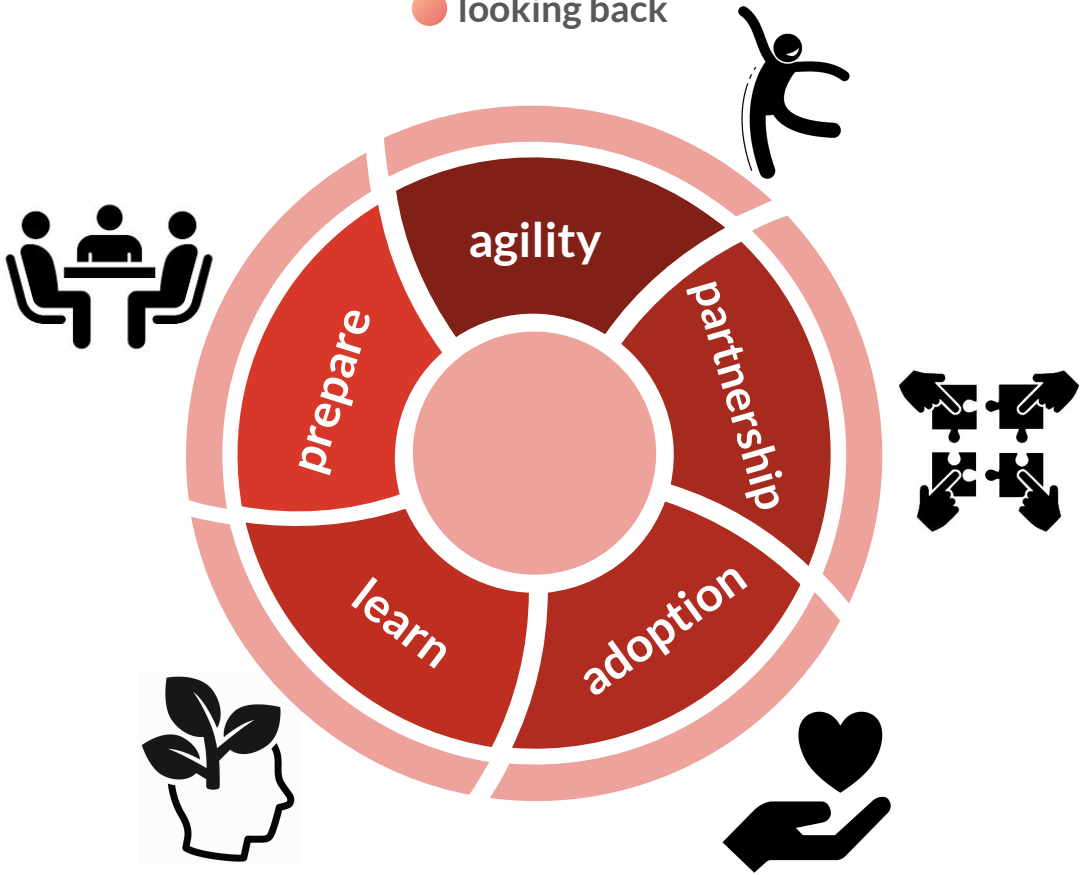
HARVARD Kennedy School

MPP – Policy Design and Delivery
MPP – Digital Government: Technology, Policy and Public Service Innovation

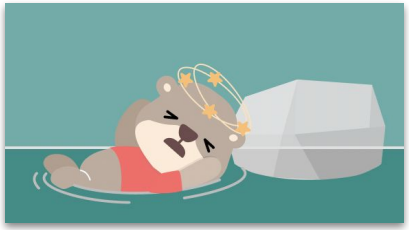
Harvard Business School

MBA – Public Entrepreneurship

looking back

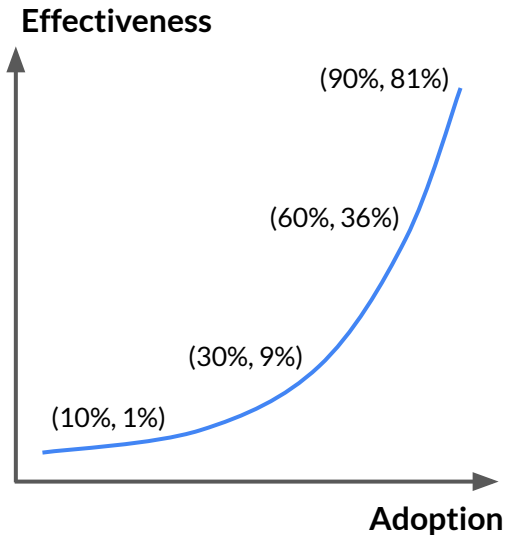


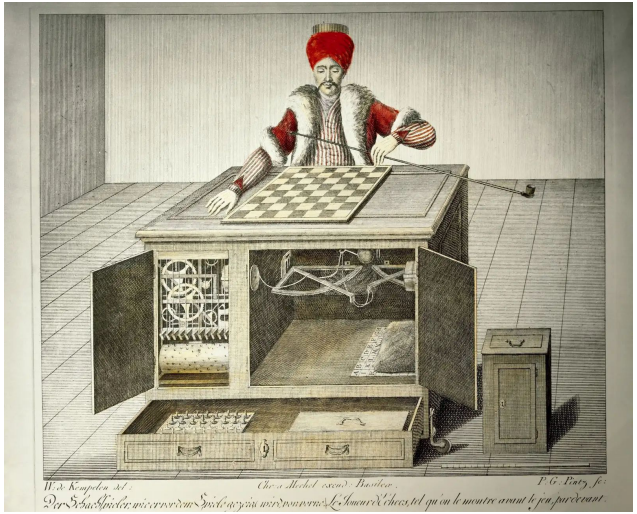
agility



Outbreak duration	3 months (i.e. SARS)	Almost 3 years
Objective	Proof-of-concept Socialise people to unfamiliar tech	Fully operational capability Key pillar of pandemic response
Adoption / coverage	40k-400k after 1 week 500k (10%) / 1% (targeted)	500k in 24 hours 5.7m (~100%) / >50% (actual)

agility



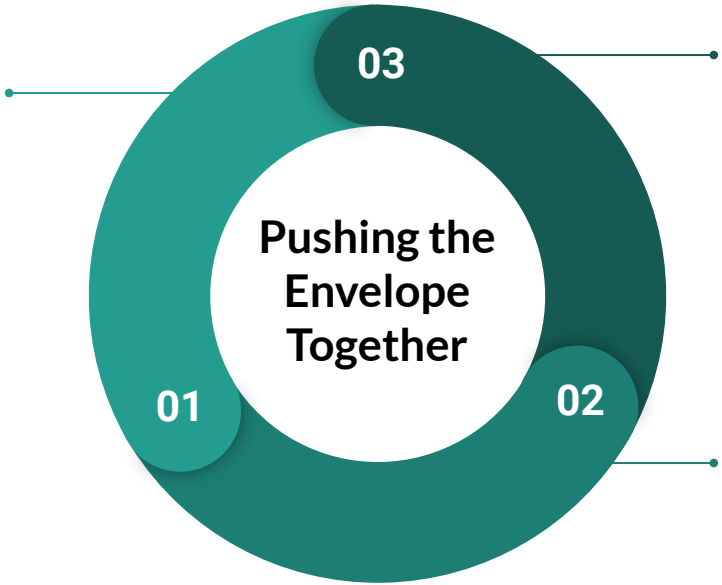


Images: Sergiu Pocan, INTERFOTO/Alamy

inter-disciplinary partnership

Bluetooth ranging

using heterogeneous mobile devices to accurately measure and log duration and proximity of interactions between users; balancing false negatives with false positives to “do no harm”



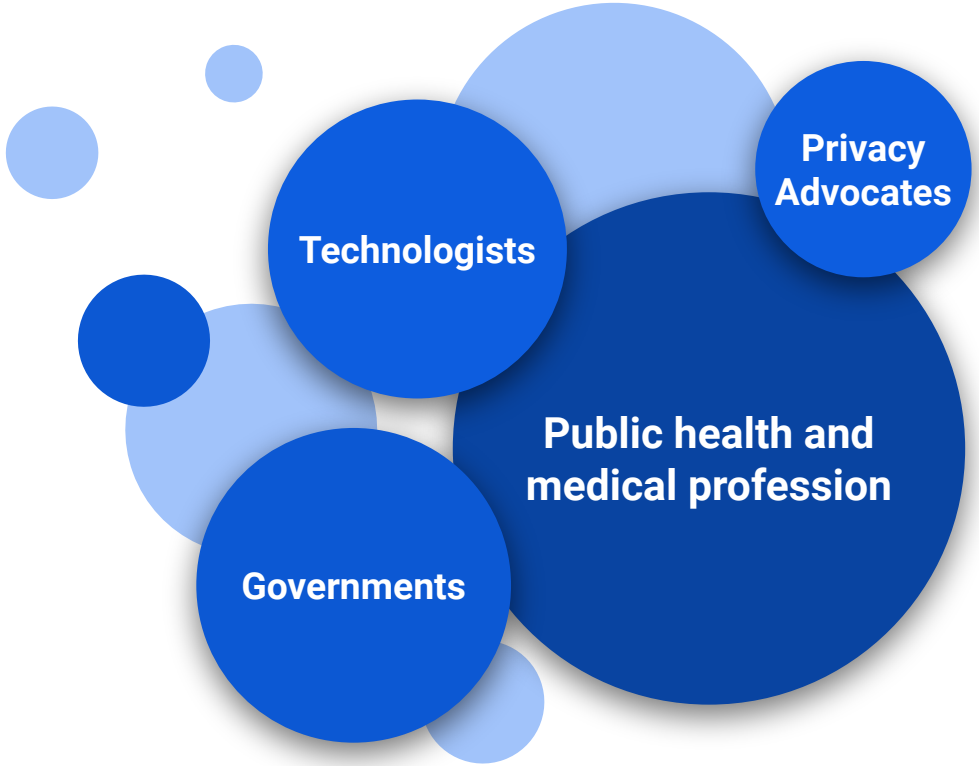
Integration with core outbreak systems

Automating interfaces with evolving MOH systems, streamlining contact tracer workload, enhancements to support changing protocols/policies

Privacy

Protecting user data from malicious attackers; obtaining valid consent and allowing withdrawal from system; balancing between privacy and public health

inter-disciplinary partnership



“Any sufficiently advanced technology is indistinguishable from magic”

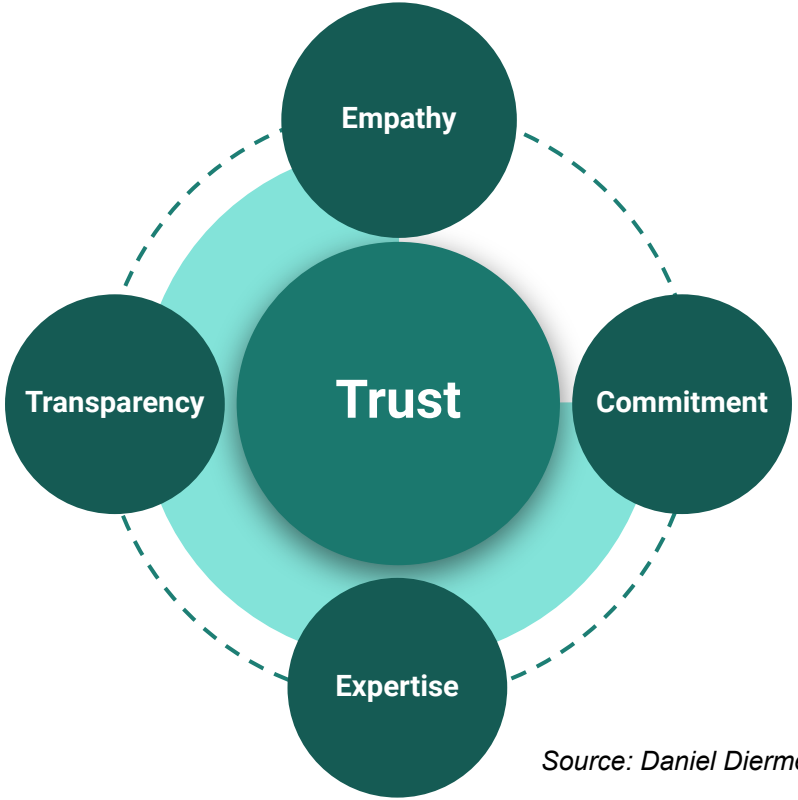
- Arthur C. Clarke

we were doing something unprecedented, unfamiliar and unproven

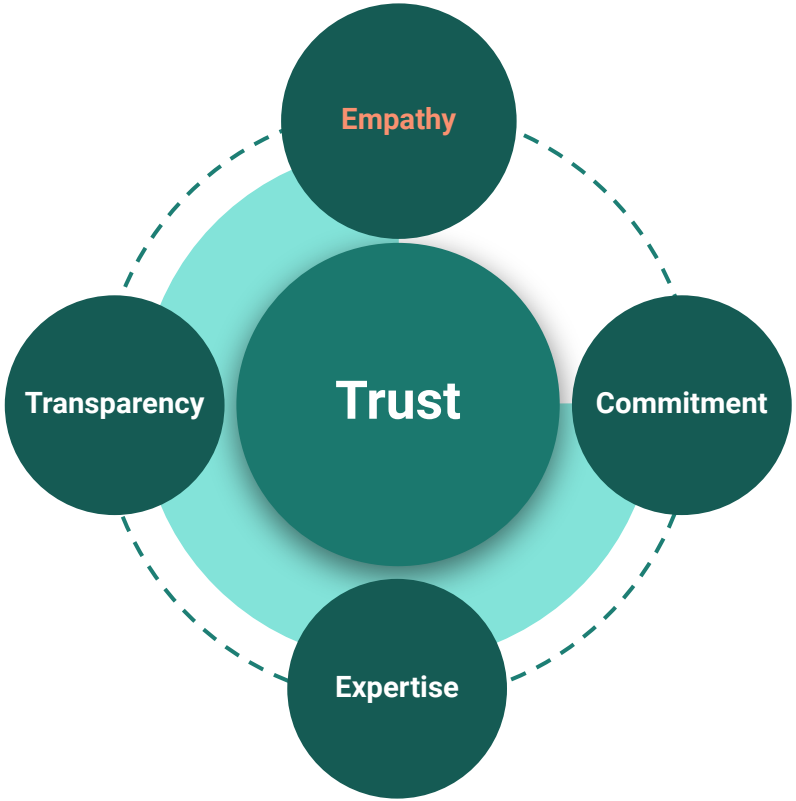
so why did so many people download and use TraceTogether?

trust

Hope requires trust/faith…



Source: Daniel Diermeier



trust

To the people of Singapore, with love

Tap letter to open

Dear people of Singapore,

Like you, we wish that this crisis would be over so our lives can go back to normal. Unfortunately, we're still seeing new COVID-19 clusters in our community 😢

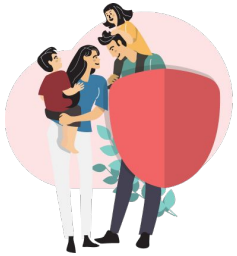
Fortunately, there's more we can do to stop the spread.

And the way back to normal starts with all of us, here.

Change language

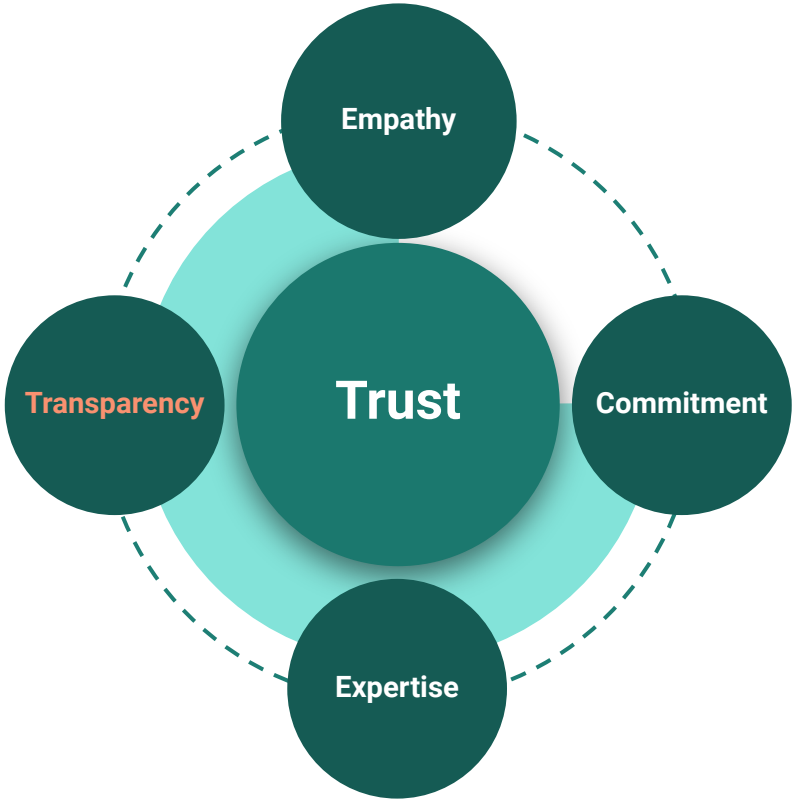
中文 | Melayu | தமிழ் | हिंदी
বাংলা | ဗမာ | ไทย

Protect ourselves

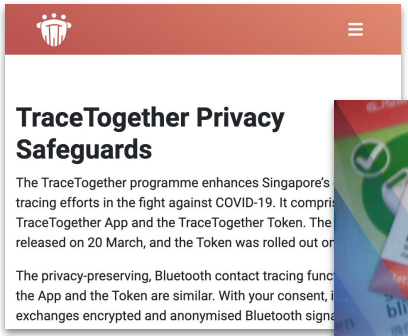


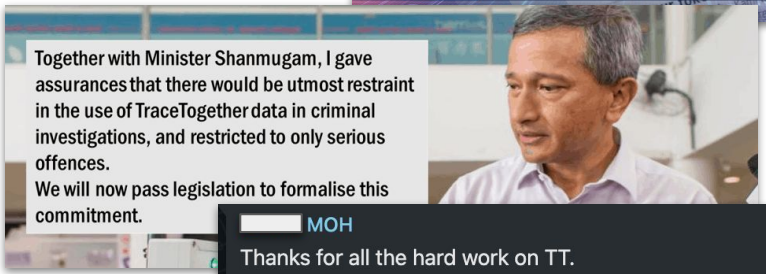
Protect our loved ones and friends

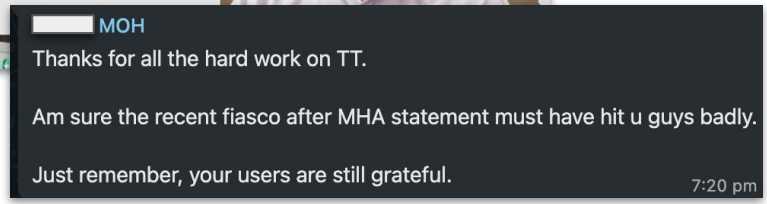
Protect our community



trust

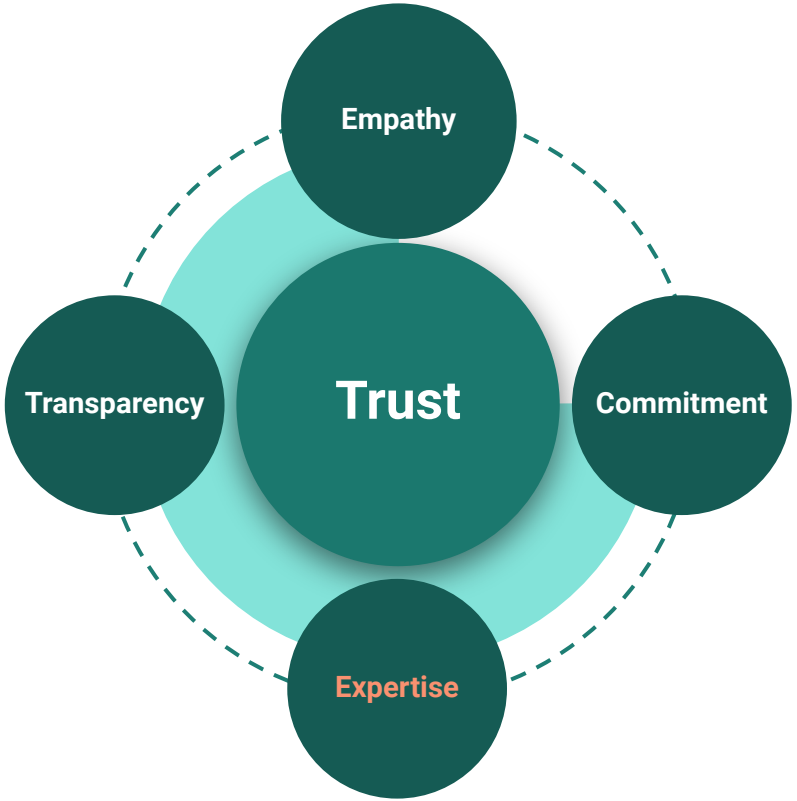


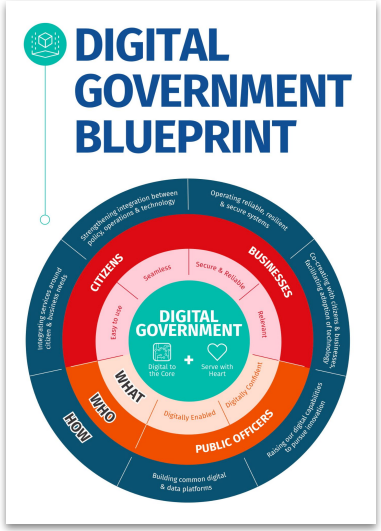




Images: Straits Times, sgmatters.com

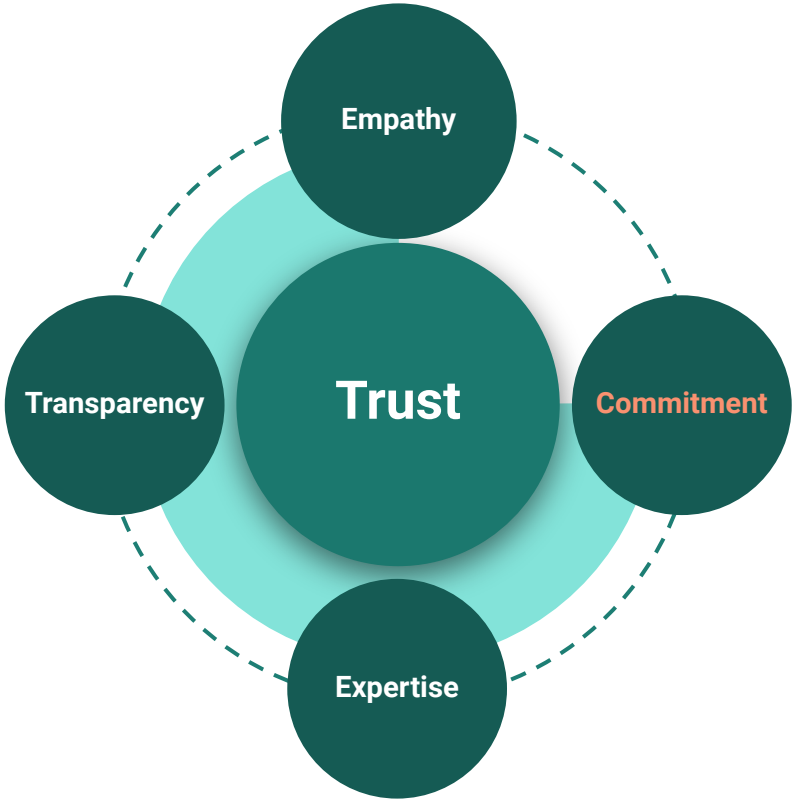
trust

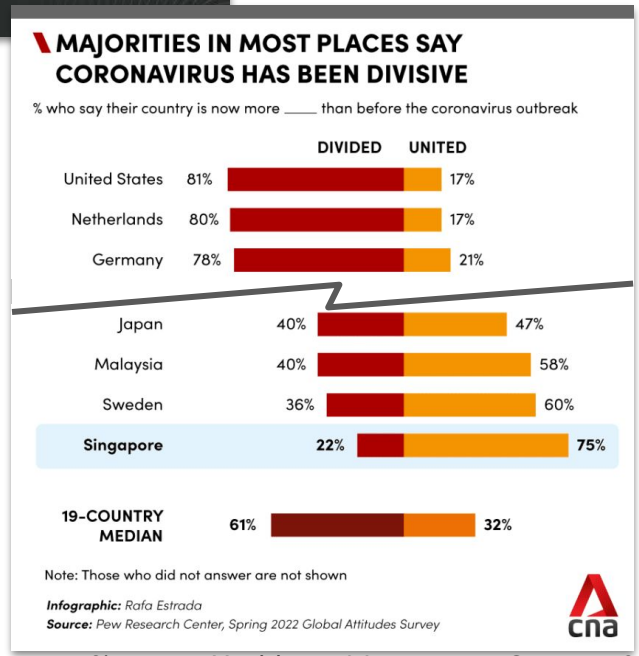




Images: Smart Nation & Digital Government Office

trust





Images: Edelman, Channel NewsAsia

learn

TraceTogether will help us contact trace strangers who were exposed to COVID-19 patients, and might otherwise become unlinked cases.

Coronavirus Contact tracing

Time taken to trace contacts of Covid-19 patients halved

Contact tracers say technological tools have made the process easier and faster

Actually, manual contact tracing is pretty comprehensive, but takes time.

We learnt that the real value proposition for TraceTogether was not coverage, but speed. So, we tweaked the upload process to nudge users to upload sooner.

Source: Straits Times

learn

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

Luca Ferretti, Chris Wymant, Michelle Kendall, Lele Zhao, Anel Nurtay, Lucie Abeler-Dörner, Michael Parker, David Bonsall, Christophe Fraser

doi: https://doi.org/10.1101/2020.03.08.20032946

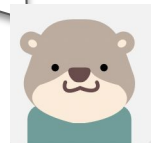
Now published in *Science* doi: 10.1126/science.abb6936

Posted March 31, 2020.

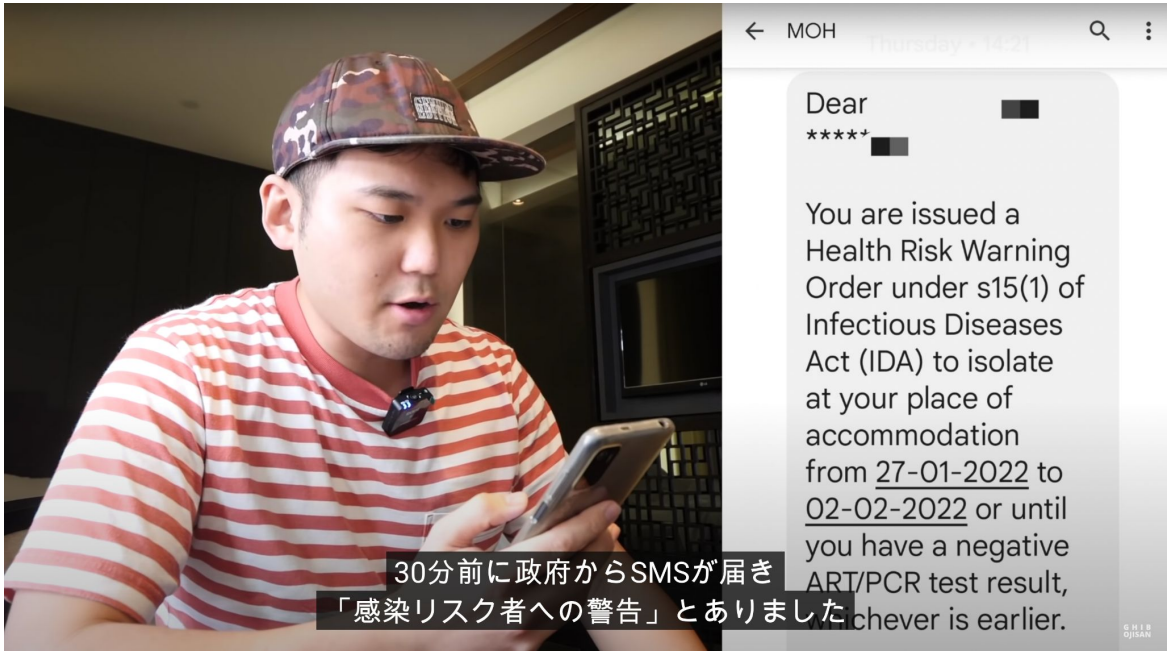
To estimate the requirements for successful contact tracing, we determined the combination of two key parameters needed to reduce R_0 to less than 1: the proportion of cases who need to be isolated, and the proportion of their contacts who need to be quarantined. For a 3-day delay in notification assumed for manual contact tracing, no parameter combination leads to epidemic control. Immediate notification through a contact-tracing mobile phone app could, however, be sufficient to stop the epidemic if used by a sufficiently high proportion of the population.

The median time elapsed
from a positive COVID-19 test result
→ app users uploading data
→ identification of close contacts
→ to notification SMSes being sent
to the user's close contacts
… was only about 30min.

This led to much more timely isolation of infected persons, potentially even before they begin to shed virions!



Source: Luca Ferretti, et al



Source: Ghib Ojisan (https://youtu.be/-MLqE6PWdLA)

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prepare

feature

Safer Together: TraceTogether and the future of digital contact tracing

A pioneer of digital contact tracing discusses the considerations that went into building the world's first national contact tracing app and ponders the future of the technology.

By Jason Bay

DOI: 10.1145/3522695

OPEN ACCESS

Has this been done before in any other country?" I scanned the audience in the room and considered the question. Taking a deep breath, I replied, "We are aware of research projects that have explored using Bluetooth to perform contact tracing. But, no, I don't think a national effort using this technology has ever been undertaken."

Association for Computing Machinery article

Community of international digital contact tracing experts

My wishlist for digital contact tracing

- **Steward the Technology**
  - Preserve trust above all
  - Adopt emerging technologies appropriately
- **Public Health Comes First**
  - Adapt as medical knowledge evolves
  - Avoid tech push, especially dogma/triumphalism
  - Privacy is a constraint, not the goal
- **Engage Stakeholders Across Domains**
  - Values encoded in system design should reflect sovereign preferences – not those of tech firms
  - Promote open standards, frameworks, and modular implementations
  - Global multi-stakeholder governance model

some thoughts on digital transformation

leading digital transformation

You are CEO of a company that makes widgets, and sells to retail stores. You want to transform the sales organisation, to take advantage of digital channels to improve sales yield. You must choose one of the following candidates to lead this transformation.

William

Company insider with 12 years of experience in marketing, through in-person visits to retail stores, but readily admits to not knowing much about digital.

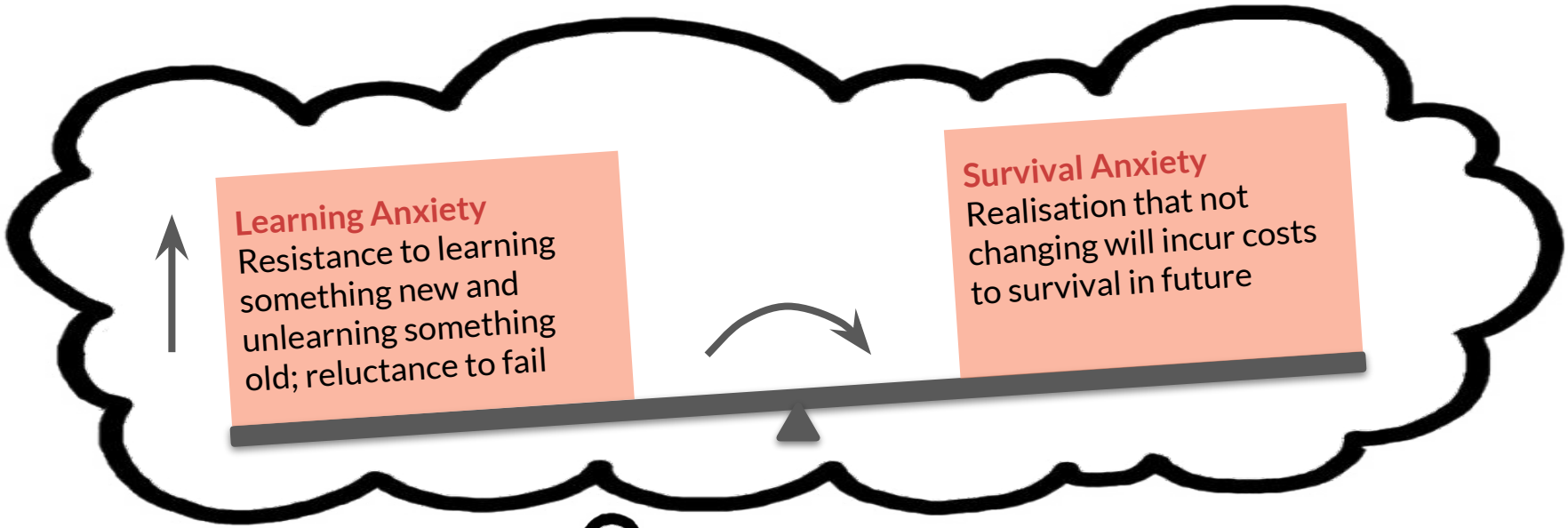
Sarah

Young digital guru with 7 years experience working for Amazon, leading successive product category expansions and tailoring business models to customer journeys.

Sophia

McKinsey associate partner who has consulted and advised companies on digital transformation across a range of industries.

a model for transformation



Principle 1
Survival anxiety/guilt must be greater than learning anxiety to "unfreeze" behaviour

Principle 2
Instead of increasing survival anxiety, reduce learning anxiety

Sources: Edgar Schein, Kurt Lewin

sarah's experience

Harvard Business Review

Change Management

Don't Put a Digital Expert in Charge of Your Digital Transformation

by Nathan Furr, Jur Gaarlandt, and Andrew Shipilov

August 05, 2019

- Sarah's transformation vision scared engineers and engendered resistance
- Became impatient with mainstream
- Started standalone innovation unit outside of main business lines
- Resources diverted to skunkworks team, which showed early promise
- Bifurcation with core business resulted in incoherence and inability to proliferate mindset changes
- Transformation effort eventually failed

william's experience

Harvard Business Review

Change Management

Don't Put a Digital Expert in Charge of Your Digital Transformation

by Nathan Furr, Jur Gaarlandt, and Andrew Shipilov

August 05, 2019

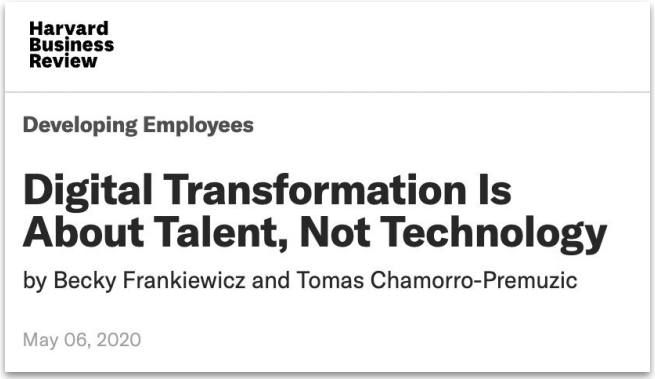
- William had in fact fiercely resisted digital, and had a feisty personality, but was driven
- Kept Sarah's entire digital team, and connected the tech with the needs of customers and the company
- Redesigned the digital strategy to balance sales across traditional and online
- Brought digital as a tool to empower incumbent sales force to hit their own targets
- Worked with each product manufacturer client to push products through both channels
- Companies that pick insiders to lead transformation succeed 80% of the time (N=50)
- Insiders have credibility to tip the balance towards survival anxiety, whilst also having the empathy for, and the tools to reduce learning anxiety and create psychological safety

not about digital nor technology

Digital Transformation

"Digital transformation is often less about a radical rethinking of the business than about learning how to use digital tools to better serve customers…

"It is as much about organisational change and leadership as it is about digital."



Empathy > Technical skills

Reduce learning anxiety

Reduce power-distance

Find William

TraceTogether, Safer Together