Welcome!

HEROS

Health Emergency Response in Interconnected Systems

Humanitarian Networks and Partnerships Weeks

29 April 2021

Hanken

Horizon 2020

Nordic Healthcare Group

Arttic

CBK PAN

Croce Rossa Italiana

PCPM

Project HOPE

Squadron

The Open University

TU Delft

VU Amsterdam

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003606

- **Topics**
  - Crisis governance
  - Local epidemiological spread
  - Medical logistics & supply chains
  - Misinformation & factchecking

- COVID-19 EU project (H2020, No. 101003606)

- www.heros-project.eu

Partners

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Health Emergency Response in Interconnected Systems (HERoS)

Crisis Governance

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HERoS/D1 Objectives and Methods

Objective: to provide a Governance Framework to analyse workflows, processes, coordination structures and governance arrangements in the response to Covid-19 and to learn from it.

Overall questions: How did various formal and informal stakeholders **govern** the COVID-19 crisis situation over time? How did they collectively **make sense** of the evolving situation and make joint decisions? How did the involved agencies **collaborate and coordinate** their activities?

COVID19 crisis governance goes beyond fighting the pandemic,but is also related to response to secondary crisis (poverty) and to finding new resources (restoring supply chains). A bottom up, **whole of society**, **inclusive governance approach** is needed.

Making sense of the covid19 crisis

The COVID-19 crisis can be considered:

1. a **slow-burning, creeping crisis**, which is: “a threat to widely shared societal values or life-sustaining systems that evolves over time and space, […]” (Boin et al., 2020, p. 7). The COVID-19 crisis **has a long incubation time**, and unlike a fast-burning crisis, it has no clear beginning or end, which means that it will remain undefined for a long time. It does not develop in a linear way.

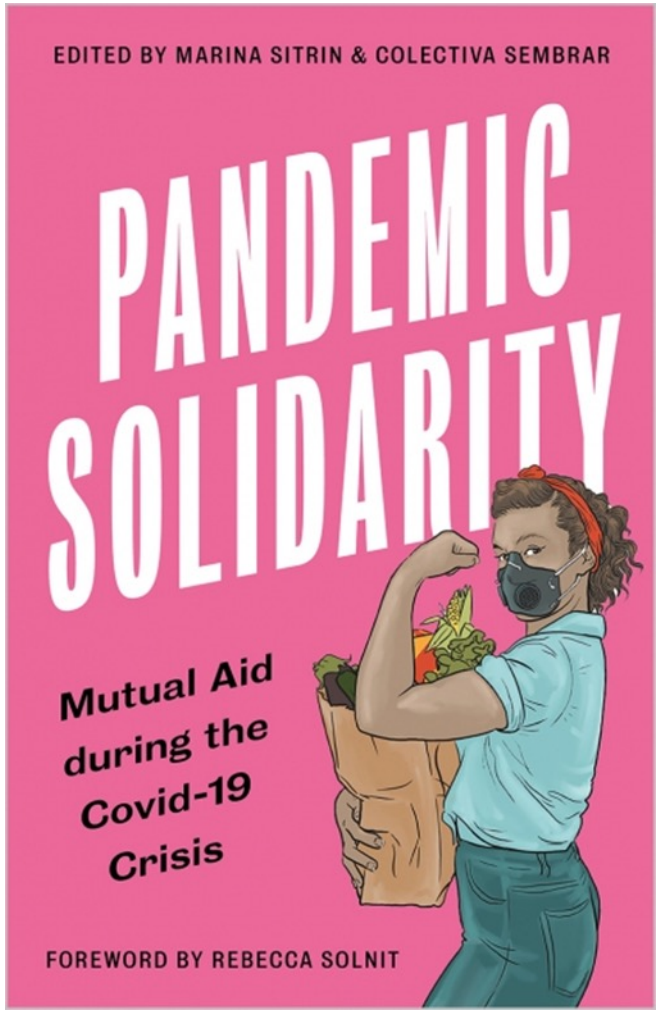
1. a **cross-border, transboundary crisis**: societies worldwide have been affected, and the crisis has compromised complex socio-technical systems that stretch across geographical, judicial, and administrative borders (Boin and Rhinard, 2014).

Typology of responding organizations

Types of organizations during disaster response		
	Old structure	**New structure**
Regular tasks	Established organizations	Expanding Organizations
Non regular tasks	*Extending Organizations*	*Emergent Groups*

Quarantelli and Dynes, Kendra and Wachtendorf:
Disaster Research Center at the University of Delaware

Emergent groups: spontaneous volunteers in the fight against poverty



Extending organizations

Social entrepreneurship or the Refugee Company's production of face masks

A broken supply chain

What became visible during the COVID19 crisis:

- the vulnerability of the global medical supply chain, such as for testing materials and personal protection equipment (PPEs)

- the chain lacked buffers (i.e. PPEs in stock), which are crucial to answer a sudden increase of demand during a crisis situation

- unexpected alliances and independent entrepreneurs became successful in domestically producing respiratory ventilators, face masks and hand sanitizers by companies that did not traditionally belong to the organizational field of medical equipment producers

The social entrepreneur: aims for value in the form of large-scale, transformational benefit that accrues either to a significant segment of society or to society at large.

Refugee company in action

Refugee Company is a social enterprise which was part of the Dutch organizational crisis response ecosystem **supporting refugees** during the “refugee crisis” of 2015–2017. Its current mission is to assist both asylum seekers in reception centers and status holders with their socioeconomic inclusion.

- In February 2020, with the impending outbreak of COVID-19 in the Netherlands, the management team began to consider the possibility of producing face masks.
- Loan from the Philips Foundation (reduce healthcare inequality by providing access to quality healthcare) and Qredits (micro financing)
- The client: the LCH (the Governmental Consortium for Medical Supplies), which was set up for the joint procurement of medical supplies and PPEs, guaranteed purchase of 1 million face masks a week.

Business opportunity and constraints

Certified 3-layer surgical masks, type IIR; regular hospital care, elderly care in nursing homes, home care.

Opportunities

- The market: contract with the Ministry of Health (negotiation about which type of mask to produce).
- Relatively easy certification process. Product is widely used in public transport, private venues, and the streets.
- Motivated work force

Challenges

- Setting up a production line
- Finding high quality material
- Quality control and consistency in production

Creative improvisation …

Refugee Company built the production line from scratch. With help from the company founder's sister who works as a KLM pilot, they were able to **import the production machines** from China in cargo space offered by the airline.

… in setting up the production line.

Because setting up a production line for the fabrication of face masks was complicated and outside the scope and expertise of the Refugee Company, Qing Engineering and Consultancy started to collaborate, offering some of their engineers to give advice:

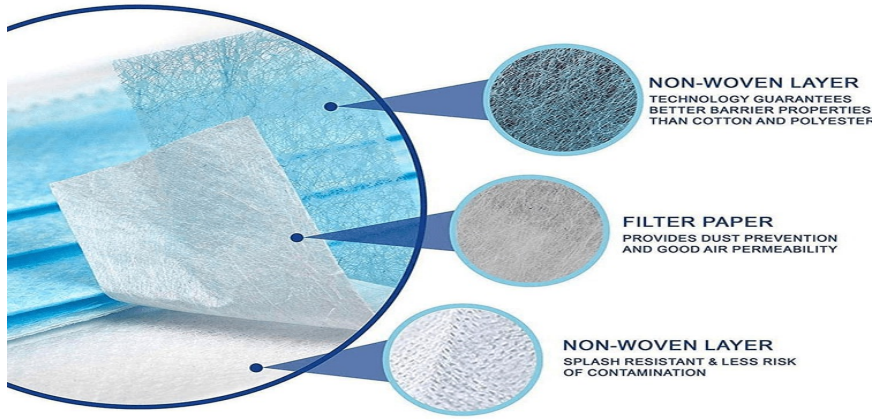
… because the machines, when they arrived here from China they did not comply with European regulation regarding safety. Not on any level [...] It was just, it was a hazard. So, the first thing that we that we had to do was modified machines to make them comply with European regulations. (Qing Engineering and Consultancy)

Using personal networks…

Difficulty of **obtaining raw material** for the masks and the lack of European suppliers :

> *We don't have a fixed supplier, so we buy what we can buy. But it's pretty ad hoc, pretty chaotic. We work sometimes with companies that don't speak English. So, Jaap's wife, she is Chinese. She then does the communication […] But there's a big risk that this whole venture could run out of supply if we cannot secure a more structured supply, supplier for our base materials.*

We have quickly come to realize that the necessary raw materials are not easy to obtain. […] My sister is a pilot for KLM and flies the 747 airplanes. She is flying to Shanghai today to pick up respiratory equipment for the Ministry. I will call her to ask if she can bring back a roll of cloth. I will explain to her what it is for.



… to enter a new market with high quality products

MMFactory could not start producing fully certified PPE until October 2020. The six-month delay was due to the certification process – the preparation, application, and final approval of the relevant certification necessary to sell their product to the Ministry of Health.

Every machine needs to be certified. Every packaging you do needs to be certified. Every fabric you work with needs a specific certification. So, if you change a supplier to another one, you need to certify this whole product again. (MMFactory director).

The product needs to be tested on several parameters and that needs to be done at an accredited test lab, which is not available in the Netherlands. (MMFactory production manager)

After a first round of tests; "*it turned out that something was still not 100 percent in order*". Small dust particles found in some of the masks. **Short term solution:** setting up a *white room* (a type of clean room).

Ready to produce …

Certification was obtained in October 2020, the MMFactory could honor its contract with the Dutch Ministry of Health for 50 million masks.

“It is great that it worked out [the whole venture]. Everything we make now, we will deliver to healthcare” (MMFactory director, quoted in Heller, 2020).

Long term solution: relocation to new production facilities (February 2021)

… with the help of some friends

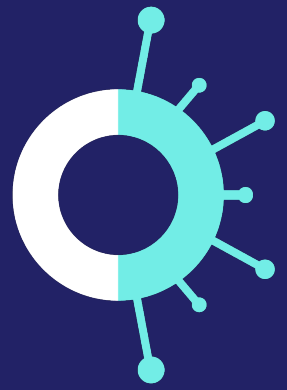
We are proud that we can contribute to a social enterprise that can make a difference in these times. Our form of social credit is a perfect fit for social initiatives such as these, which also create work experience places for refugees in the Netherlands. (commercial director of Qredits)

It is great that there will be a factory in Arnhem where face masks are produced. […] Thanks to the good collaboration between our municipality and Refugee Company, they were able to switch quickly and they managed to achieve this in a very short time. It is great that in this way inhabitants of Arnhem with a refugee background can contribute to fighting the corona crisis. (Alderman for the Municipality of Arnhem).

Discussion and conclusion

- the governance of a slow burning crisis such as COVID19 needs to be inclusive:
- there is great value in bottom-up generated initiatives
- there is great potential in recognizing the entrepreneurial activities from below (in strengthening supply chains) at times of crisis

Please write your questions in the chat or ask them in the end



Thank You

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TPM ResilienceLab

HEROS

Simulation modelling for decision-making in disasters

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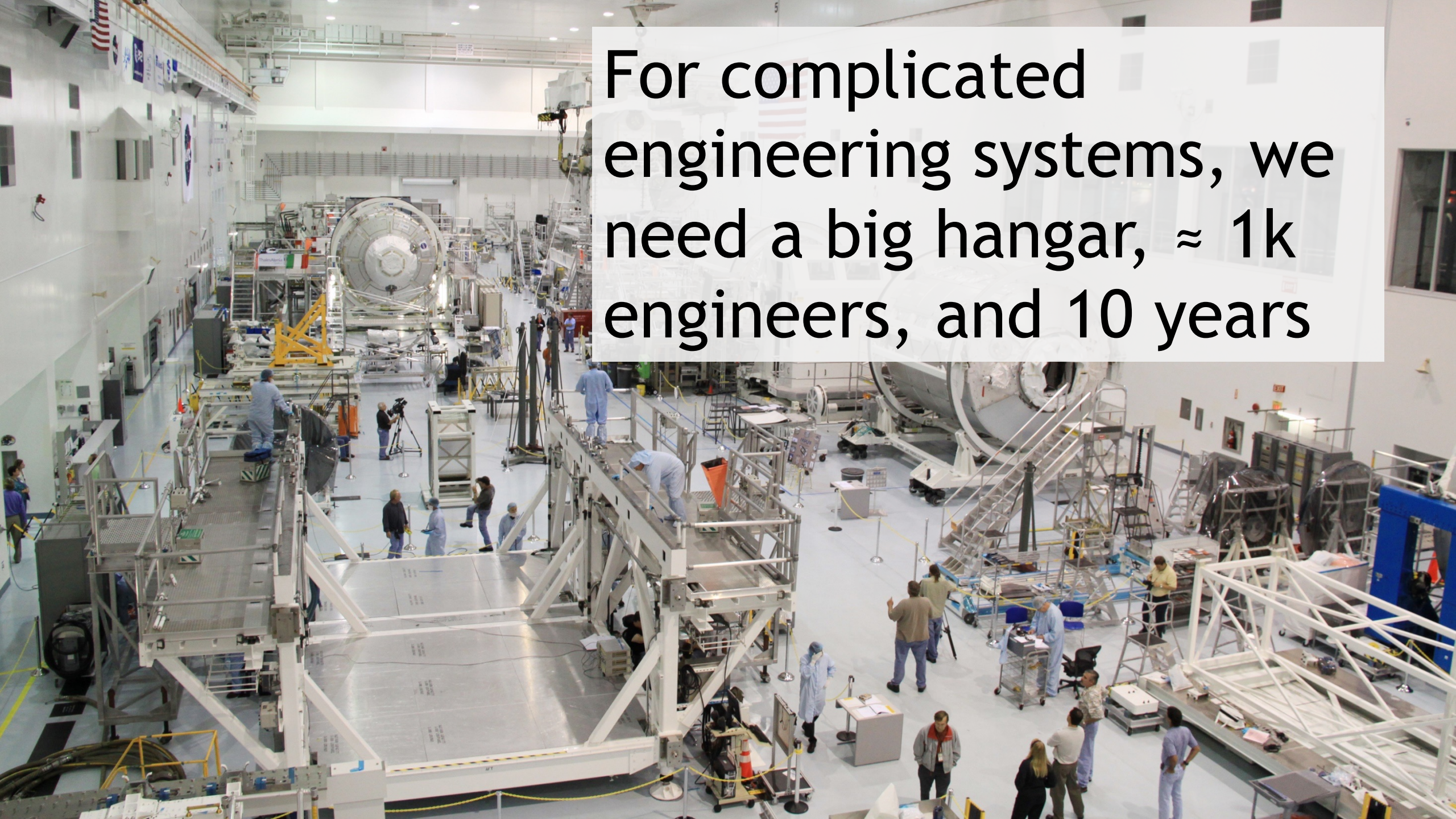
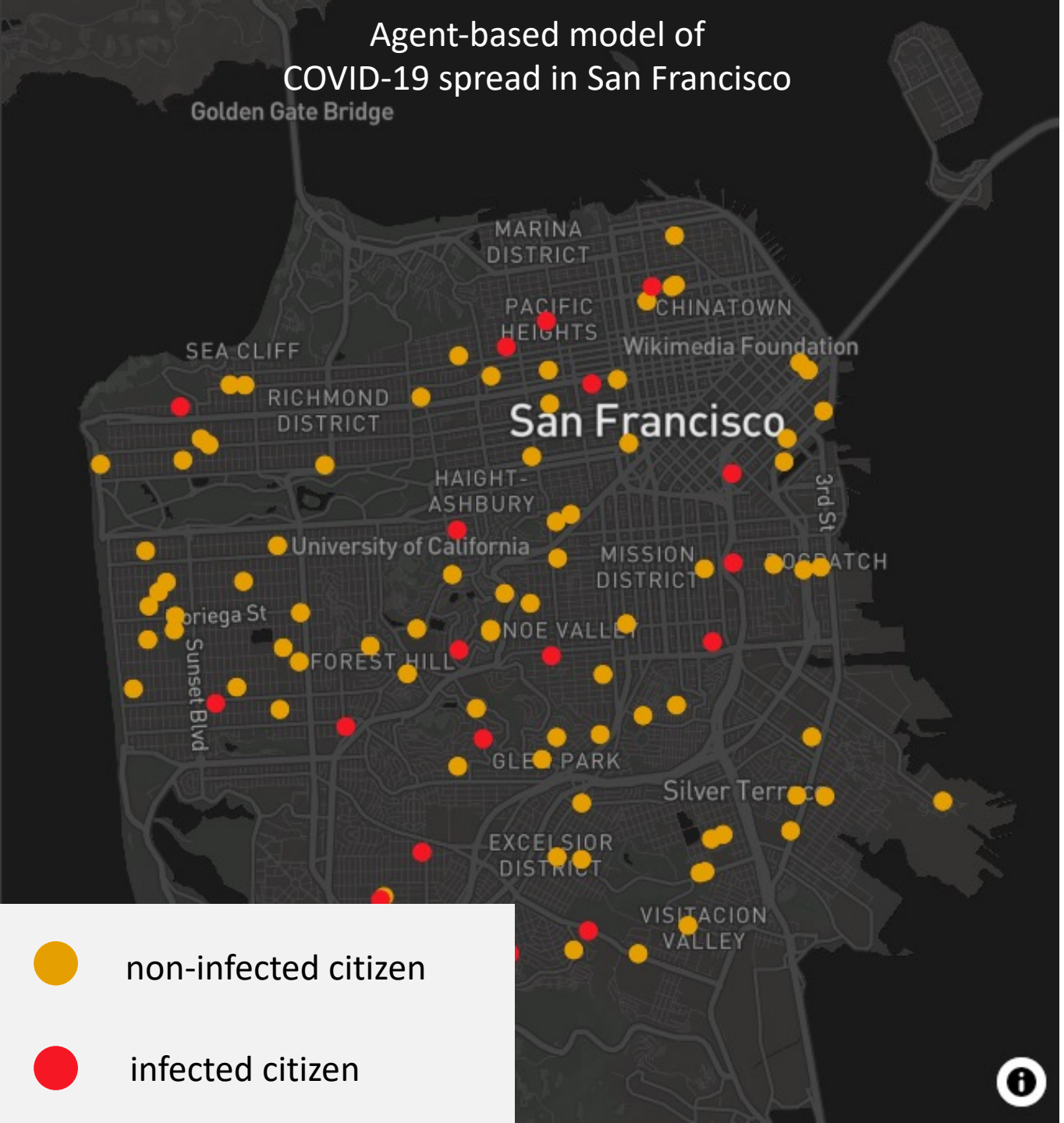
Mikhail Sirenko

```java
/** */
private static final long serialVersionUID = 20200919L;

/** the base path for the input files. */
private String basePath;

/** the GIS map. */
private GisRenderable2D gisMap;

/** the cached extent. */
private Rectangle2D extent = null;

/**
 * Construct the model.
 * @param simulator
 * @param propertyFilename String; the path of the property file name to use
 */
public HerosModel(final SimpleDEVSSimulatorInterface simulator, final String propertyFilename)
{
    super(simulator, propertyFilename);
}

/** {@inheritDoc} */
@Override
public Serializable getSourceId() { return "The Hague Model"; }
```

How to support rapid decision-making in complex and uncertain situations ?


For complicated engineering systems, we need a big hangar, ≈ 1k engineers, and 10 years



And for complex socio-technical systems, we use simulation modelling

Why simulate?

1. Minimize costs
2. Reduce risks to people affected
3. Use scenario thinking

https://www.heros-project.eu/


Tina Comes


Jin Rui Yap


Alexander Verbraeck


Sahiti Sarva


Mikhail Sirenko


Daan van Bilsen

Uncertainty about **local impact** of

Virus parameters

The Guardian

South African variant of Covid found in eight areas of England

Door-to-door testing launched as cases found in Hertfordshire, Surrey, Kent, Walsall, Sefton and three London boroughs.

1 week ago

Behaviour

The Guardian

Why countries with 'loose', rule-breaking cultures have been hit harder by Covid

All cultures have social norms, or unwritten rules for social behaviour. ... has led to thousands of unnecessary Covid-19 deaths in loose-leaning ...

3 weeks ago

National policies

NOS

RIVM: 'Als avondklok en bezoekregeling geen effect hadden zaten we nu in steile lijn omhoog'

Bij alle juridische perikelen deze week rond de avondklok ging de coronapandemie zijn eigen gang. En die is niet per se geruststellend.

10 hours ago

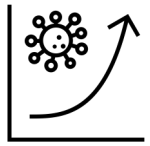
Source: https://news.google.com/

Need to have **scenarios** given these *uncertainties*

Given

- Government introduced policies,

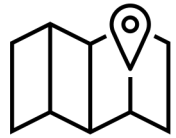
- **Virus** has **mutated**,



- People have **Covid fatigue** and tend to break the rules.

To find out

- What are the **new local hotspots**?



- Which **population groups** will be **affected** the **most**?

- What **actions** should be taken?

Model intuition

National policies

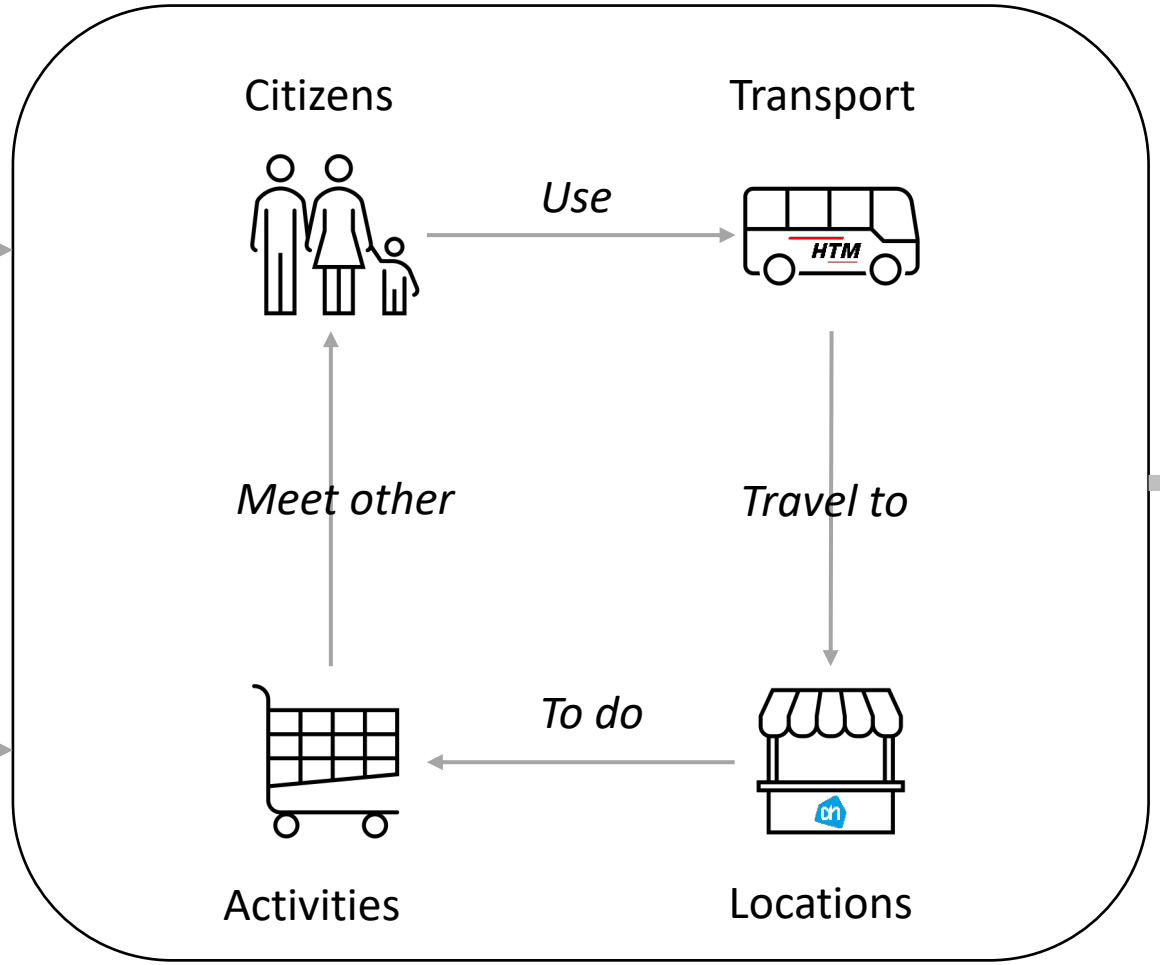
Rijksinstituut voor Volksgezondheid en Milieu
Ministerie van Volksgezondheid, Welzijn en Sport

Curfew

Local actions

Den Haag

Organize shop visiting hours



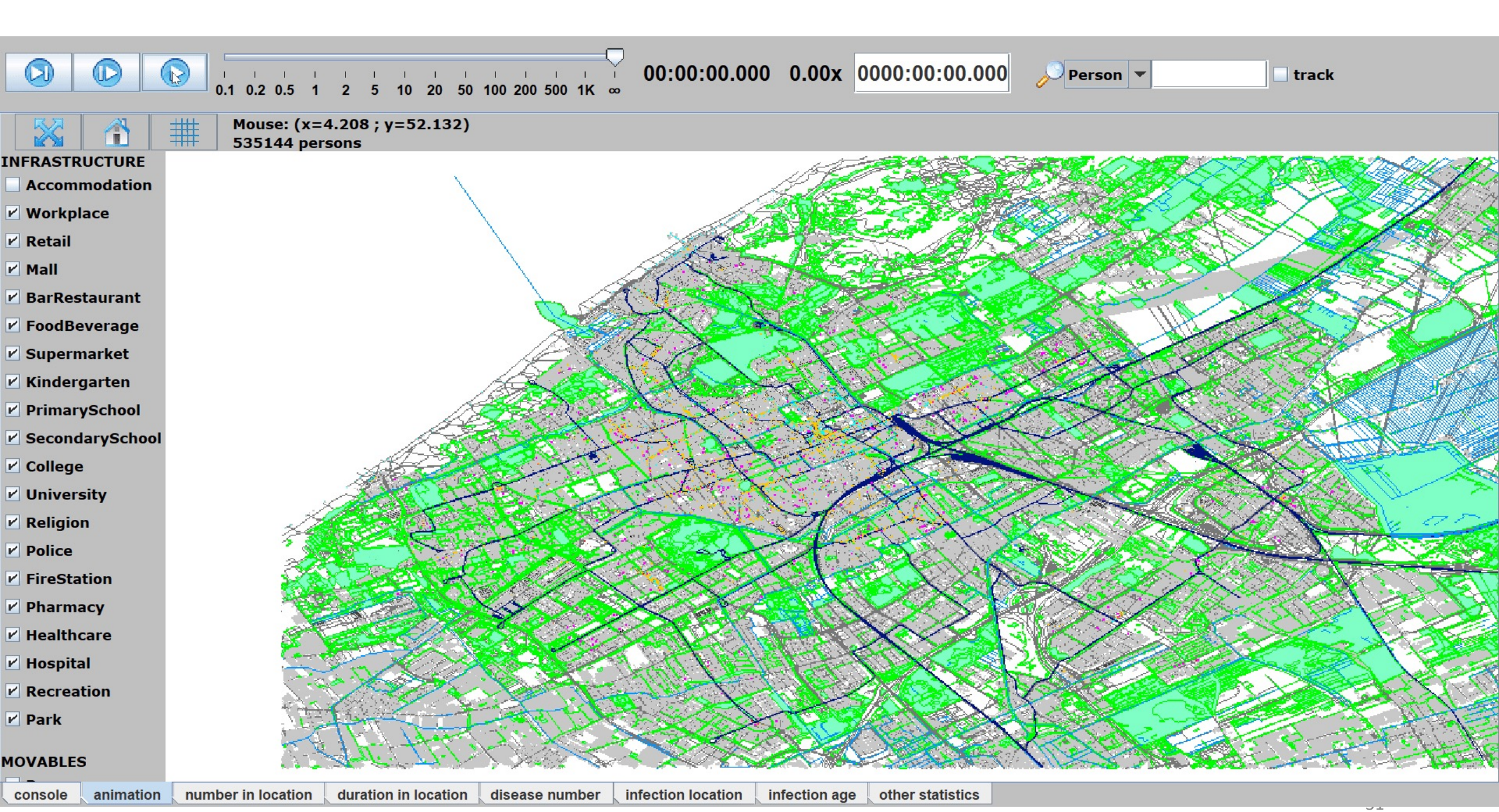
Local impact

Infections per neighborhood

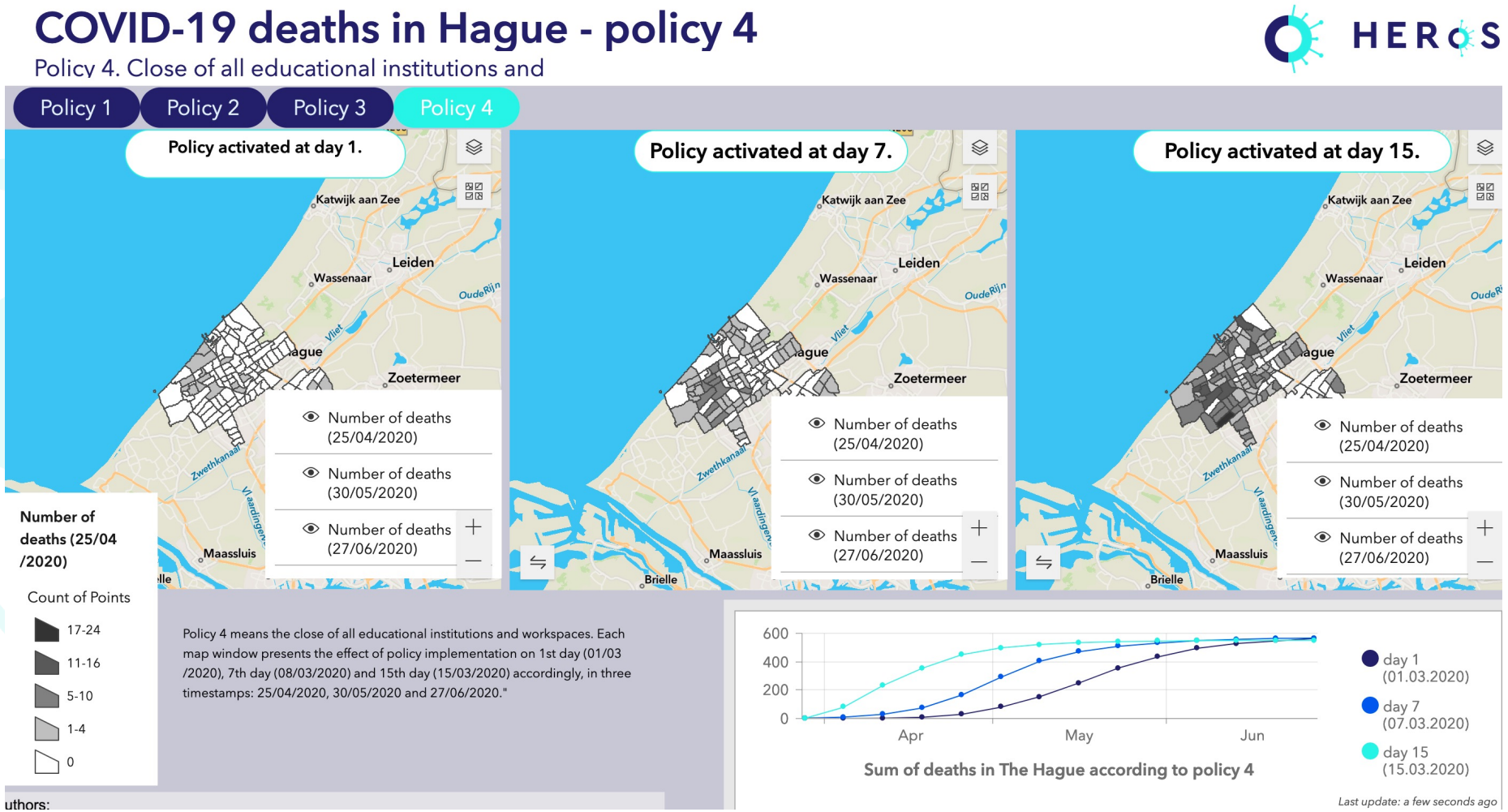
Artificial Den Haag

What we have built: *formally* A large-scale high-resolution data-driven DEVS agent-based-like model (Ge et al., 2014)

SEIR-like virus model parameterized based on scientific literature	**≈ 535 000 agents from open statistical data**	**10 behavioural profiles based on time use survey**	**≈ 200 000 locations from OSM and open statistical data**
- Incubation period - Probability of infection - Contagiousness …	- Age - Family size - Employment …	- Students - Workers - Pensioners …	- Schools & universities - Retail & supermarkets - Bars & restaurants …


0.1 0.2 0.5 1 2 5 10 20 50 100 200 500 1K ∞
00:00:00.000
0.00x
0000:00:00.000
Person
track
Mouse: (x=4.208 ; y=52.132)
535144 persons
INFRASTRUCTURE
Accommodation
Workplace
Retail
Mall
BarRestaurant
FoodBeverage
Supermarket
Kindergarten
PrimarySchool
SecondarySchool
College
University
Religion
Police
FireStation
Pharmacy
Healthcare
Hospital
Recreation
Park
MOVABLES
console
animation
number in location
duration in location
disease number
infection location
infection age
other statistics

Local epidemiological spread



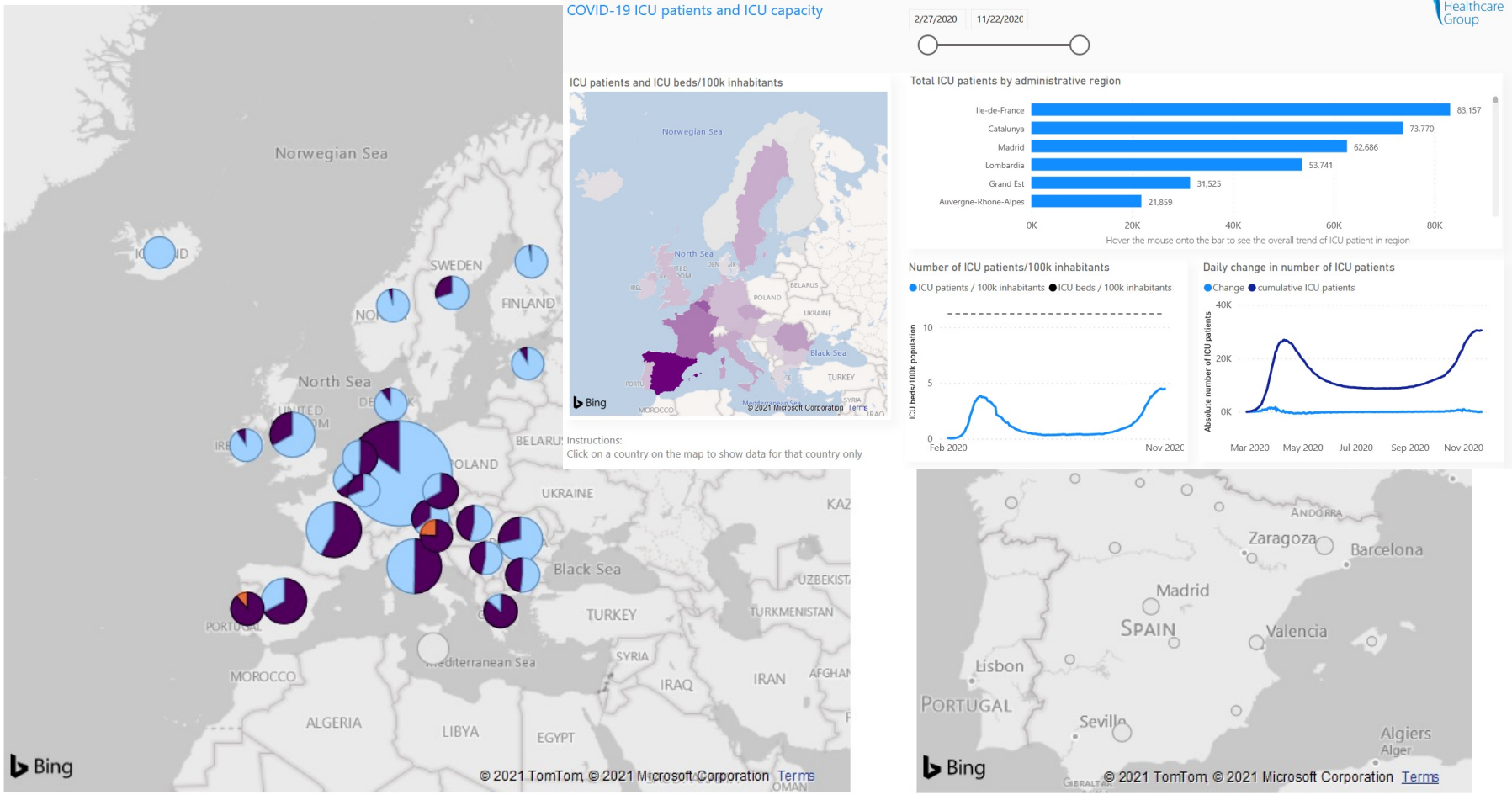
[Beta version at https://experience.arcgis.com/experience/42f1b02bb8de4ab3993b43914db567d1/](https://experience.arcgis.com/experience/42f1b02bb8de4ab3993b43914db567d1/)

Public health system analysis

- ICU bed capacity overflow
- COVID patients at the ICU
- Total ICU beds available
- Occupancy data not available

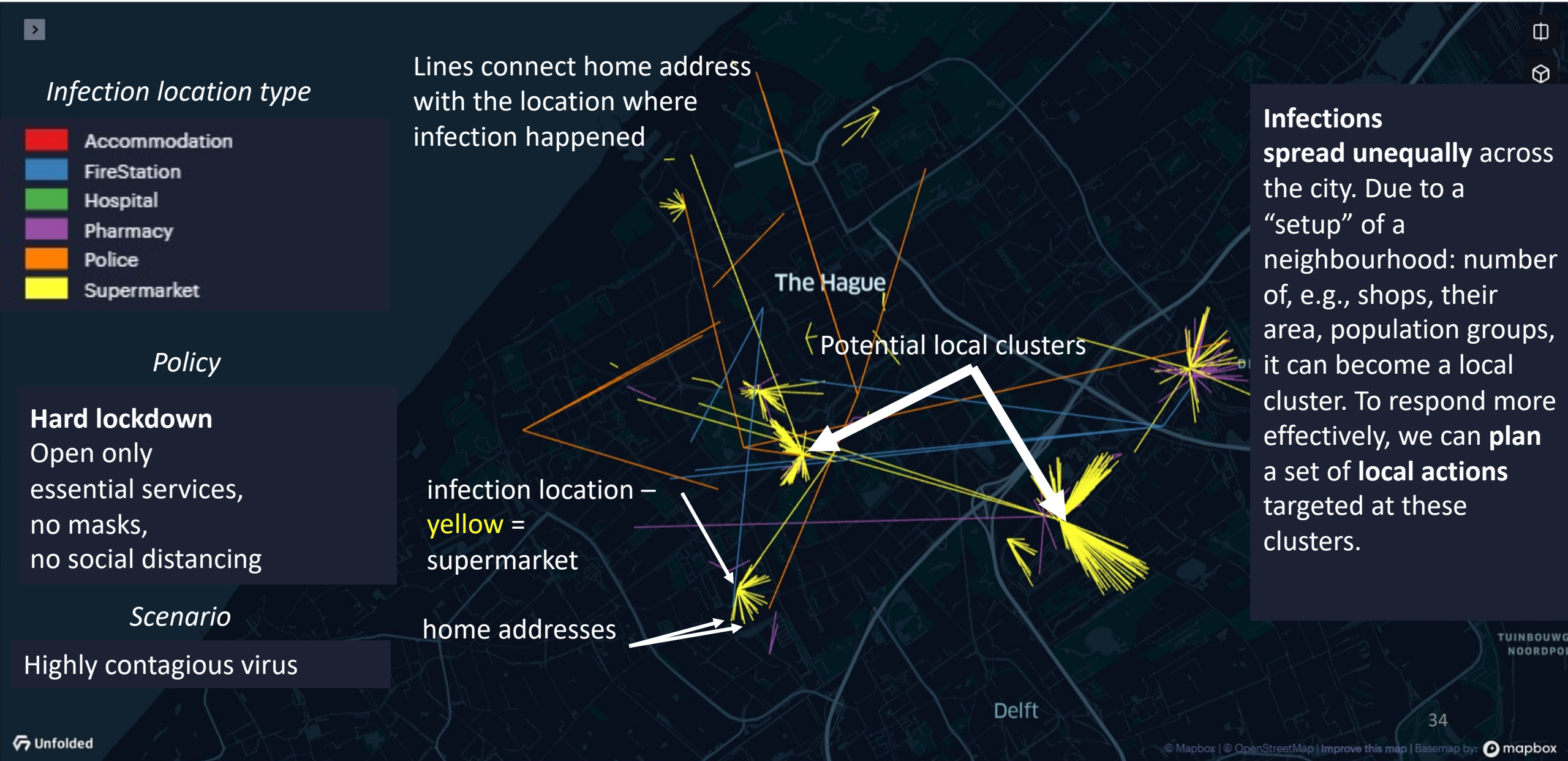
The ICU capacity showcased in this visualization represents the total ICU capacity available for all patients requiring intensive level care. It is estimated that in the normal state, nation-wide ICU capacity in use varies depending on the country between 50% and 80%. Therefore, when the number of COVID-19 patients at a given country on a given day is close to 50% of all available ICU beds, the ICU service can be considered to working at least close to full capacity, assuming that the demand for ICU level care is relatively inelastic.

Note: regional data are available on Austria, Finland, France, Italy, Spain, and Sweden up to April 30, 2020.



https://nhg.fi/en/covid19map/

Identify local clusters



Understand who is affected the most

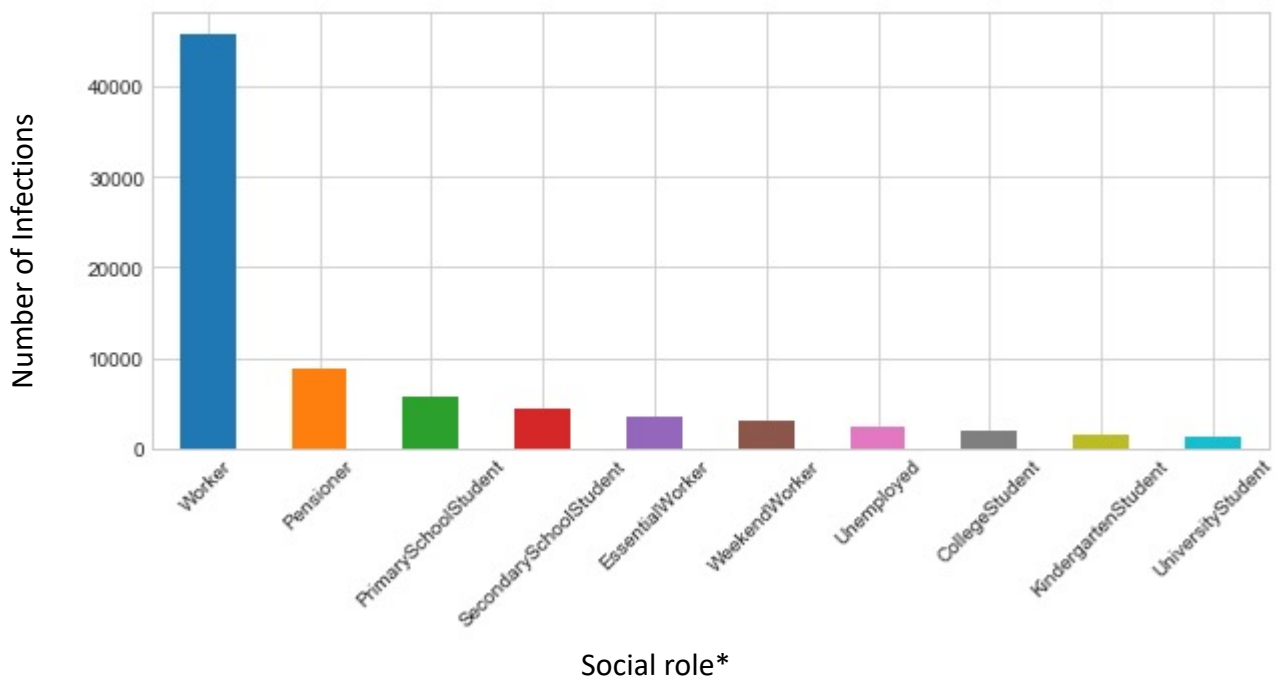
Policy

Hard lockdown
Open only
essential services,
no masks,
no social distancing

Scenario

Highly contagious virus

Infections by social role



Not everyone is affected to the same extent. Certain population groups may experience **higher infection rate because of what they do**: go work, shop, meet with friends or larger families. As result, more **vulnerable groups require extra attention**.

**Social role = Age + Primary activity + Supplementary activities*

Role of supermarkets

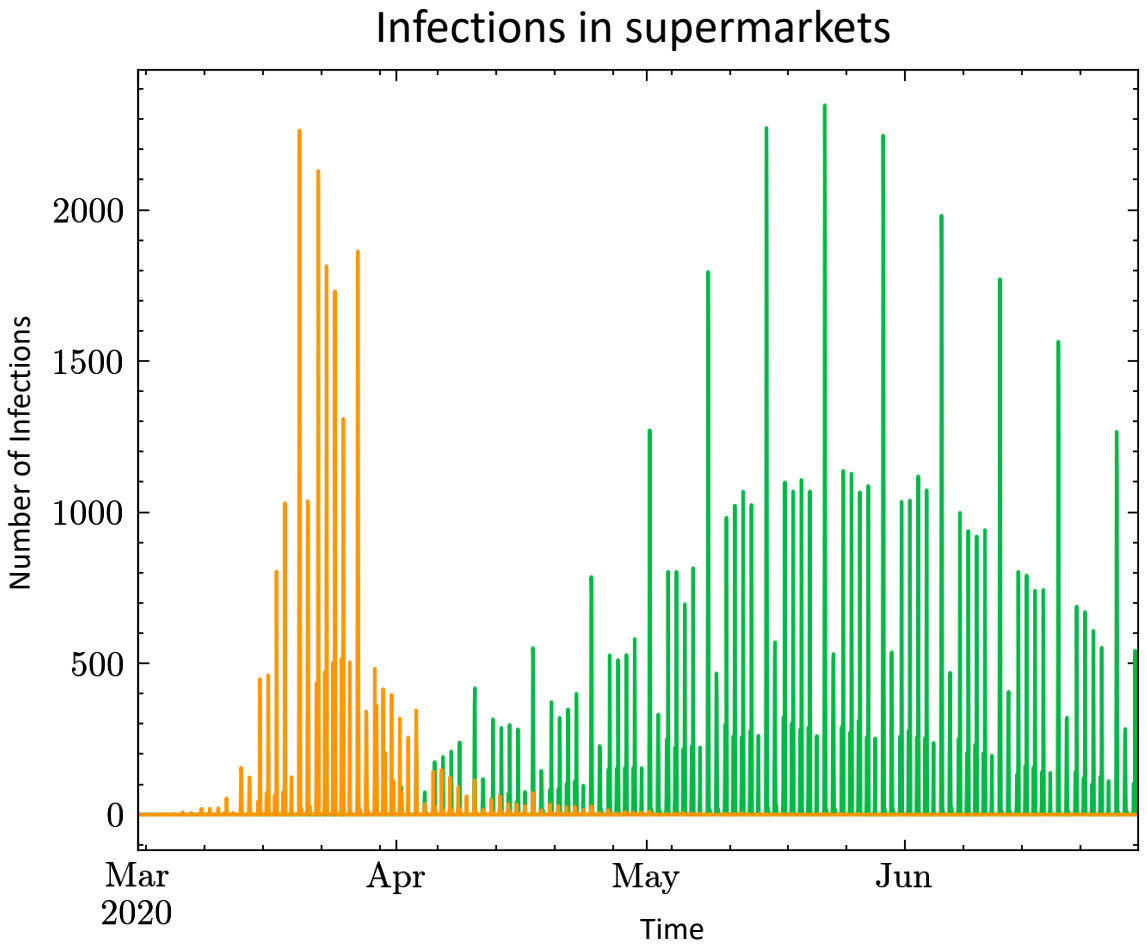
Policy

Hard lockdown
Open only
essential services,
no masks,
no social distancing

Do nothing

Scenario

Highly contagious virus

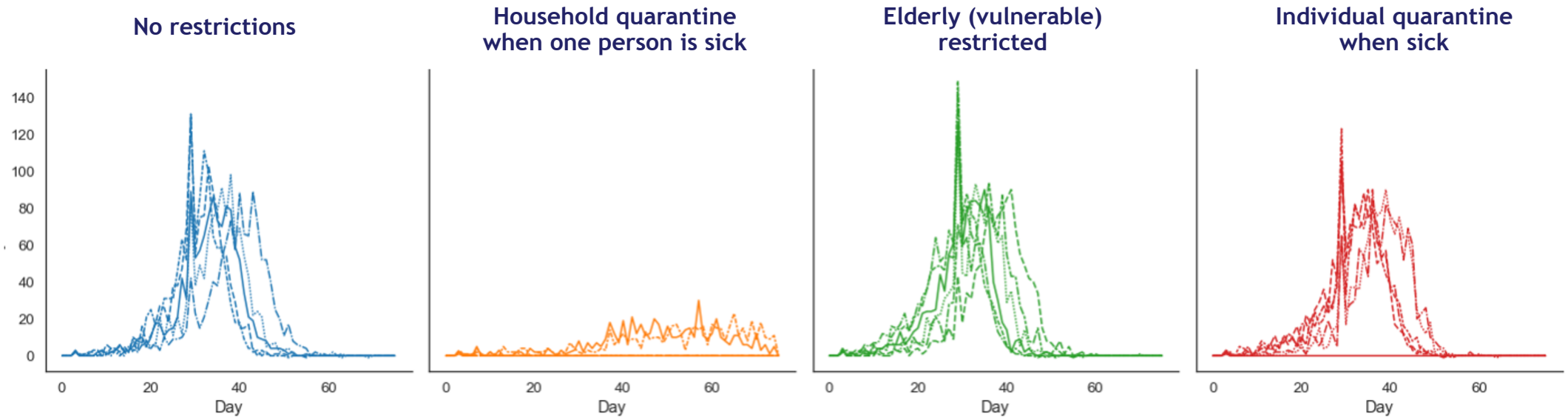


Prevent crowding, especially at supermarkets under a hard lockdown or curfew.
Supermarkets remain only places where people meet in large groups. Therefore, they can become *urban airports* and boost the spread of the virus within the city. **Thus, need to plan opening hours, allowed capacity**, etc.

Source: UNDESA

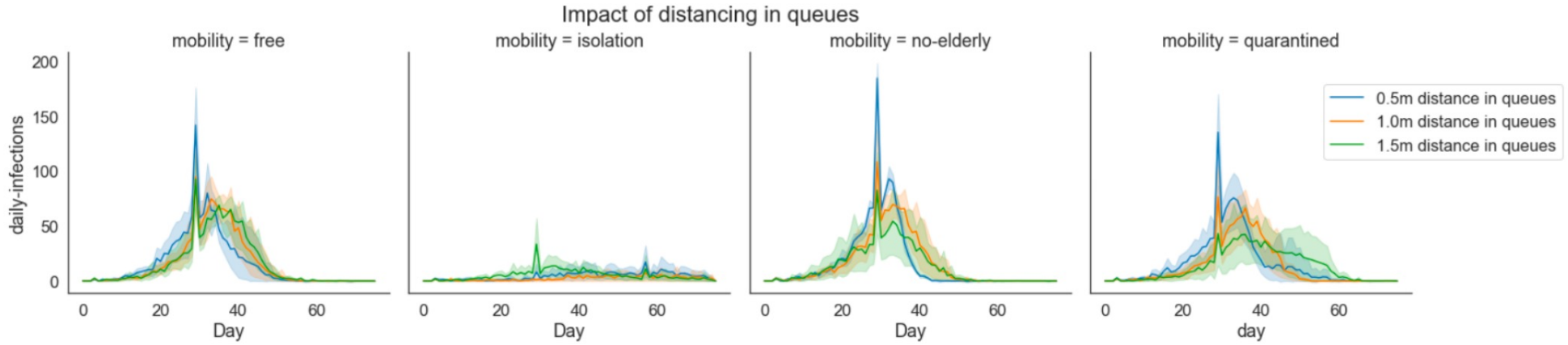
Restricting movement

Impact of restricting movement around the settlement



Isolating entire households *is effective to prevent COVID-19 spread*

Distancing in Queues



If isolating is difficult, ***distancing*** *(1.5 m)* ***helps flatten the curve***

Use simulation models to prepare more effectively

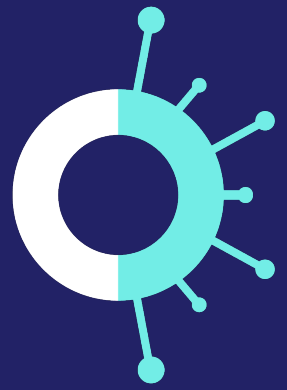
Given uncertainty about

- **Local impact** of national policies,
- How people will **behave**,
- How **contagious** is the virus.

Simulation model can help to

- **Find local clusters,**
- Understand **who is affected the most**,
- Prepare **local actions**.

Please write your questions in the chat or ask them in the end



Thank You

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Health Emergency Response in Interconnected Systems (HERoS)

COVID-19: Medical Supply Chain Disruptions

Gyöngyi Kovács

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Medical logistics / supply chain disruptions in the COVID-19 pandemic

In the first wave

- Global shortages of medical equipment (from PPE to ventilators)
- Quality issues vs product specifications
- Capacity constraints
- Suboptimisation, export bans and trade wars, travel bans, panic buying, bullwhipping, speculative pricing…

Vaccine supply chains

- Every vaccine needs temperature control
  - Ranges: cold, frozen, ultra-cold
- We don't know what we'll get (first) -> need to prepare for all options
- Capacity constraints
  - Consider the kit
  - Production changeover / licencing
- Export bans, quality problems, changes in vaccine administration (timing of boosters) in various countries…
- Supply chain security issues

Temperature control fact sheet at https://blogs.hanken.fi/humlog/2020/11/11/temperature-control-matters-fact-sheet-to-prepare-for-covid-19-vaccination-programmes/

Health Emergency Response in Interconnected Systems (HERoS)

Drones Deliveries

Grzegorz Trzeciak

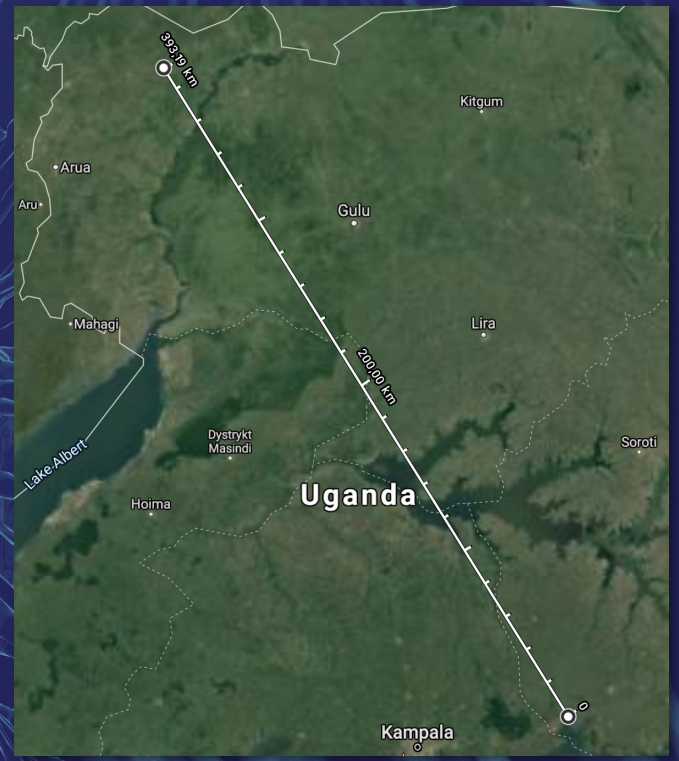
greg@squadron.pl

SQUADRON

WP3 Drone deliveries to quarantine zone

Initial concept:

Initial payload - 150 kg
Initial distance - 500 km
Initial airlift - 5 planes on the theatre



Geographical concept:

Uganda:

Kakira airfield to Bidi Bidi refugee area

APPROACH

1. Cargo UAV system concept

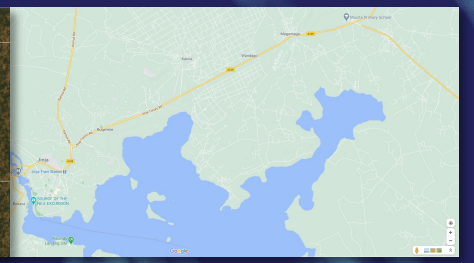
- Real ground control station
- Virtual UAV

2. Situation simulation

- Logistic hub simulation
- Delivery point scenery simulation
- Airfields simulation
- Distances simulation

3. Simulated UAV operations

- Pilots and GCS
- Airspace simulation
- Oprations calculations



Waypoint	Route	wDir	wSpd	TAS	Track	TH	MH	GS	Dist	ETE	ATE	Fuel	Fuel
	Altitude	Temp (dev)			WCA	Var				ETO	ATO	EFR	AFR
HUKK													
	⊕	180°	5	156	326°	325°	323°	160	3.2	1.2		0.0	
TOC	⁄	21°C (+14°)			-1°	-2°				1.2		100	
UserFix	⊕	166°	2	150	326°	325°	324°	152	73.5	29		0.0	
	3000	21°C (+12°)			-0°	-2°				30		100	
UserFix	⊕	215°	4	150	323°	322°	320°	151	53.6	21		0.0	
	3000	21°C (+12°)			-1°	-2°				52		100	
UserFix	⊕	212°	3	150	332°	331°	329°	151	81.4	32		0.0	
	3000	20°C (+11°)			-1°	-2°				1h24		100	
UserFix	⊕	216°	4	150	159°	160°	158°	148	72.0	29		0.0	
	3000	21°C (+12°)			+1°	-2°				1h53		100	
UserFix	⊕	231°	4	150	265°	264°	262°	146	20.0	8.2		0.0	
	3000	20°C (+12°)			-1°	-2°				2h01		100	
HUPA													

Delivery points database

1. Delivery points description

A. Hard Surface
B. Grass Surface
C. Flat terrain

2. Delivery points levels

1. DP known and used within last (month?)
2. DP known and used more than (month?)
3. DP checked but not used for landing
4. DP not checked

3. On spot personel presence

A. Medical personel on DP
B. Delivery handling personel on DP
C. Not trained personel on DP
D. No personel on DP

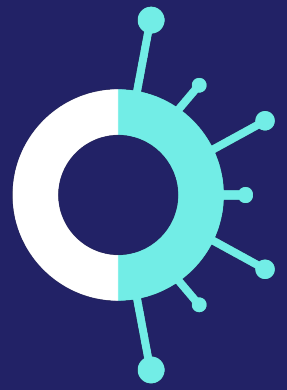
RESULTS

A – 1 - A

A – 3 - B

C – 4 - D

Please write your questions in the chat or ask them in the end



Thank You

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Health Emergency Response in Interconnected Systems (HERoS)

Social Media Analytics

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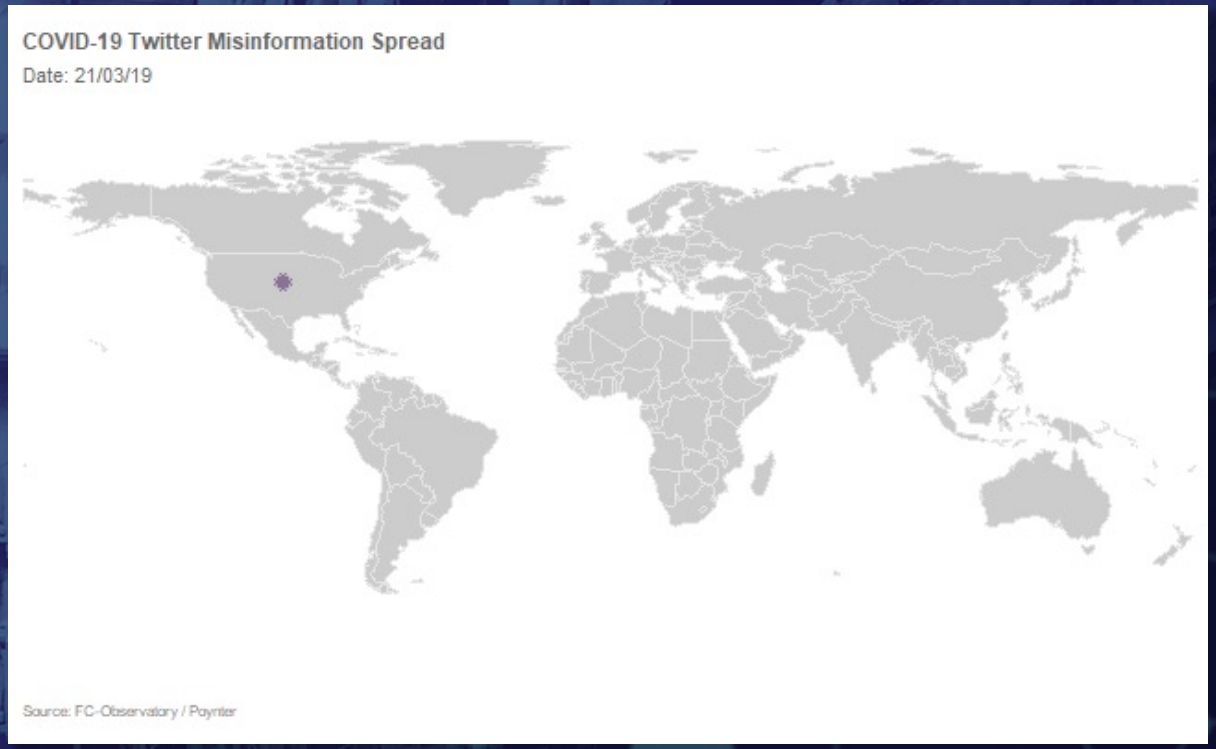
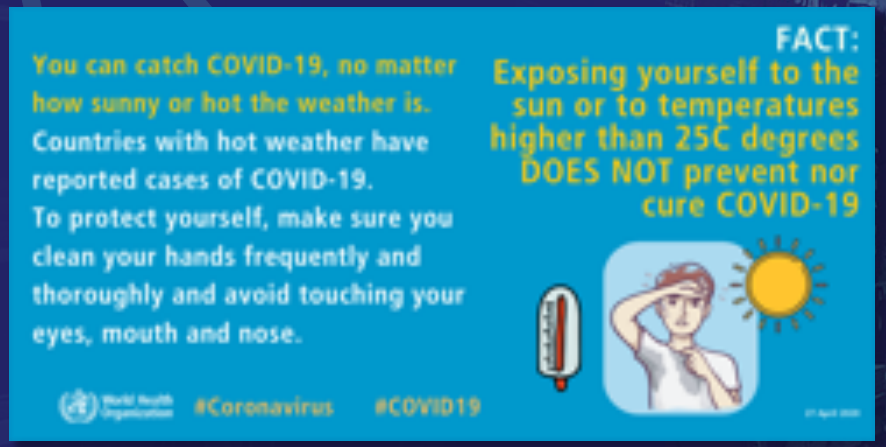
Open University

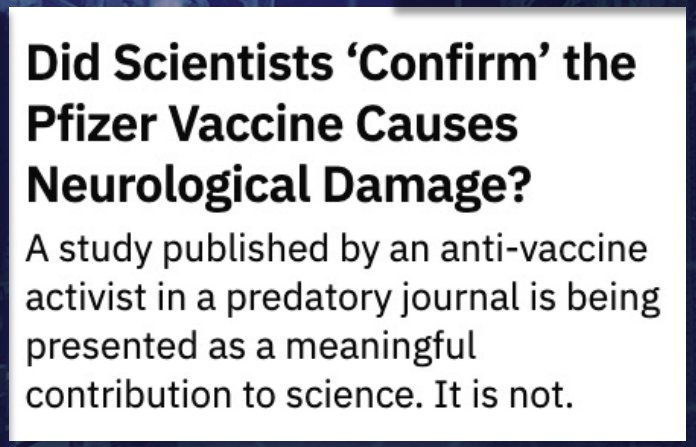
WP4 Social Media Analytics

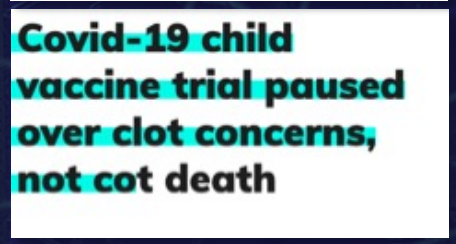
Tracking and analysis of Covid-19 misinformation

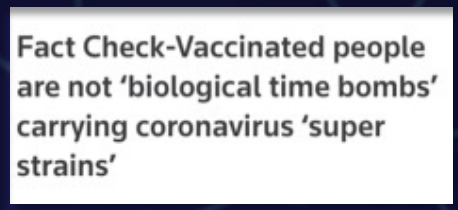
Spread of claims and their fact-checks

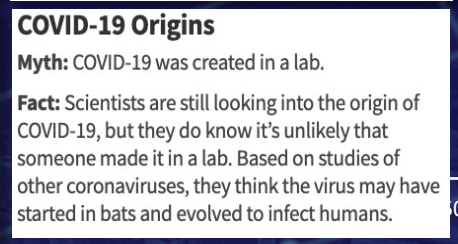




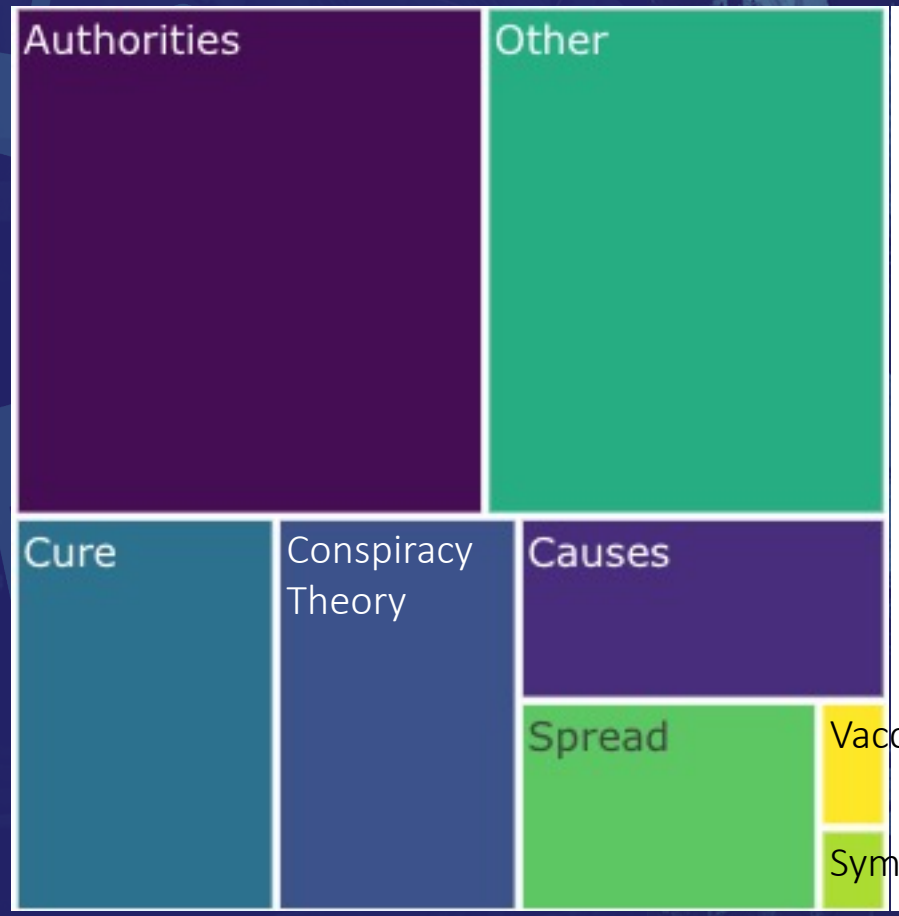


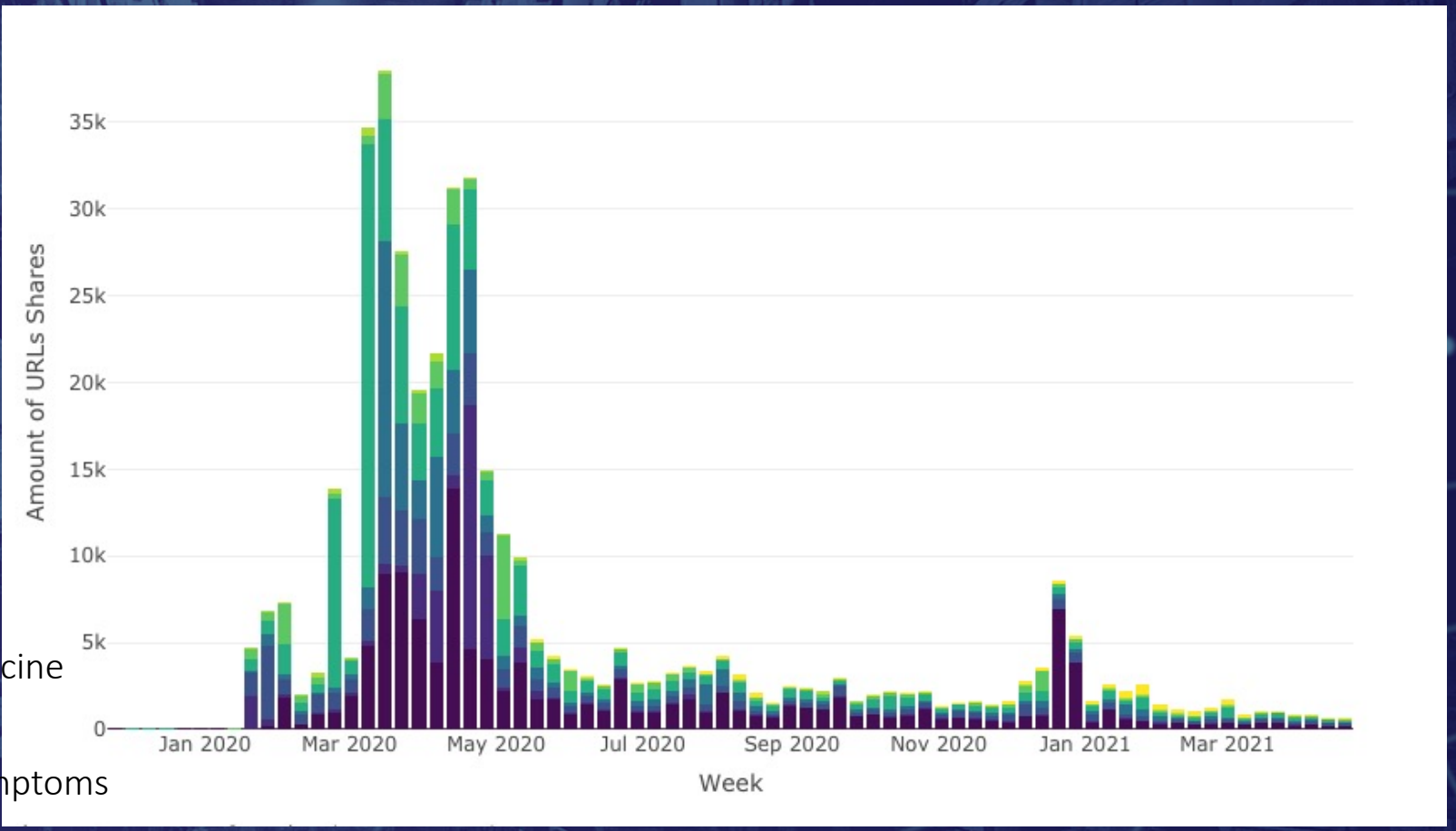






Spread of Covid—19 Misinformation on Twitter





Misinforming URL	Fact-check URL	Topic	Current Week	Previous Week	Total
[redacted]	Agencia Ocote	Authorities	161	221	31500
[redacted]	Estadão Verifica	Other	34	62	866
[redacted]	Correctiv	Conspiracy Theory	12	6	430
[redacted]	Détecteur de rumeurs	Other	7	9	1627
[redacted]	LeadStories	Conspiracy Theory	4	1	1951
[redacted]	CheckNews	Spread	3	0	335
[redacted]	Faktograf	Other	2	8	3770
[redacted]	AFP	Conspiracy Theory	2	1	32
[redacted]	Factcheck.kz	Conspiracy Theory	2	0	1418
[redacted]	Open	Cure	2	0	1305

Fact-check URL	Topic	Current Week	Previous Week	Total
https://factcheck.afp.com/video-shows-filming-music-video-moscow	Other	59	0	67
https://correctiv.org/faktencheck/2021/02/02/nein-die-who-hat-pcr-tests-nicht-als-unzuverlaessig-eingestuft/	Other	30	7	81
https://correctiv.org/faktencheck/2020/12/03/nein-waehrend-der-pandemie-wurden-nicht-nonstop-intensivbetten-abgebaut/	Conspiracy Theory	23	17	66
https://piaui.folha.uol.com.br/lupa/2020/07/01/verificamos-stf-bolsonaro-covid/	Authorities	13	23	962
https://politica.estadao.com.br/blogs/estadao-verifica/para-atacar-lockdown-blog-tira-de-contexto-entrevista-de-representante-da-oms/	Other	13	23	123
https://www.factcheck.org/2021/02/biden-hasnt-reduced-covid-19-testing-at-the-border/	Authorities	11	17	180
https://teyit.org/dr-bilgehan-bilgenin-maske-kullanimi-hakkindaki-iddialari/	Other	11	3	67
https://www.animalpolitico.com/elsabueso/es-falso-que-en-australia-frenaron-la-covid-porque-todos-toman-ivermectina/	Cure	11	0	23
https://www.politifact.com/factchecks/2020/dec/11/facebook-posts/chart-comparing-2020-us-death-toll-previous-years-/	Spread	9	1	659
https://infact.press/2020/06/post-6304/	Causes	9	0	296

HEROS

Monitor rise/fall in sharing false claims, and their corrections

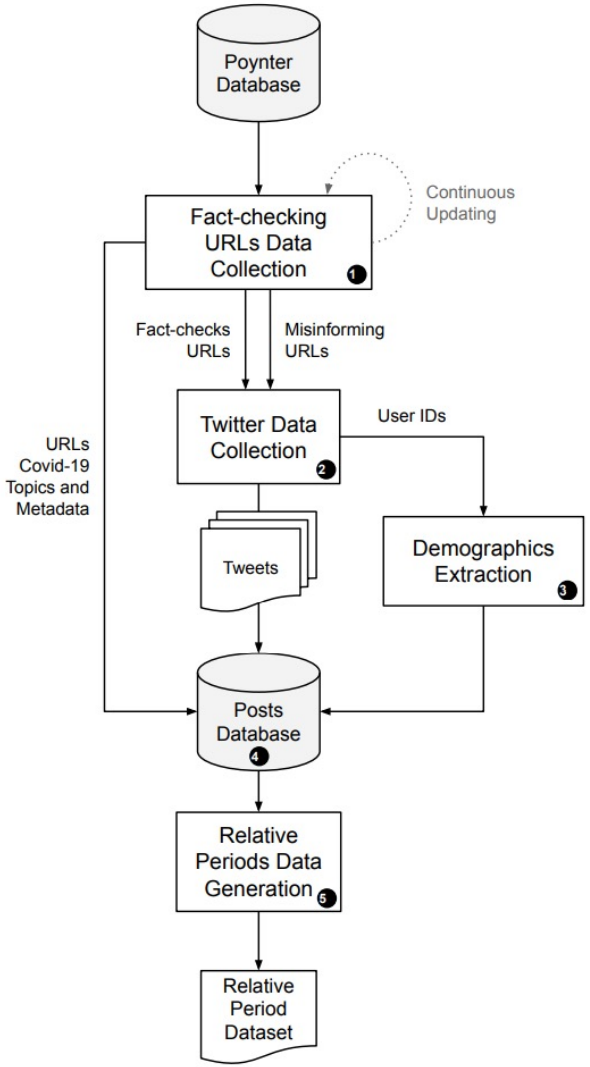
Identify most popular and persistent claims

Assess impact of fact-checks

Co-Spread of Misinformation and Fact-Checking

Research Questions:

1. **Do COVID-19 misinformation and fact-checks spread similarly** on Twitter?
2. **Do these sharing patterns differ with topics, demographics, and relative time?**
3. **How does the spread of fact-checks affects the diffusion of misinformation about COVID-19 for different topics?**



Data collected until 4th January 2021

7,370 Misinforming URLs
9,151 Fact-checking URLs

358,776 Tweets

twitter

Poynter.

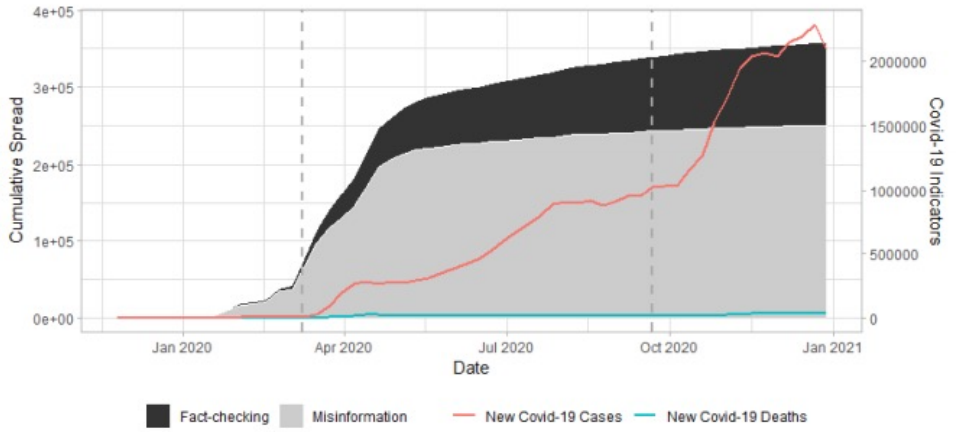
Data limited to misinformation URLs reviewed by fact-checkers

- General results:
  - **Misinformation spread can be predicted from fact-checking spread and vice versa**
  - **Spread behaviour differs in the initial (0-3 days) and late periods (>10 days), but similar during the early period (4-10 days).**
- Topic results:
  - **False claims about the *Cause* of Covid-19, and *Conspiracy theories* appear to be more persistent than other misinformation topics**
- Account types results:
  - **In the *initial period*, the spread of misinformation by organisations is similar to the spread of fact-checks by individuals.**
  - **Individuals, and not organisations, spread misinformation and fact-checks similarly after 10 days.**
- Gender results:
  - **Misinformation spread does not seem to differ between men and women on Twitter**

Analysis Level

Relative analysis: Data is aligned based on their initial sharing date and then divided in *initial*, *early* and *late* periods.

initial	*early*	*late*
0 – 3 days	4 – 10 days	10+ days



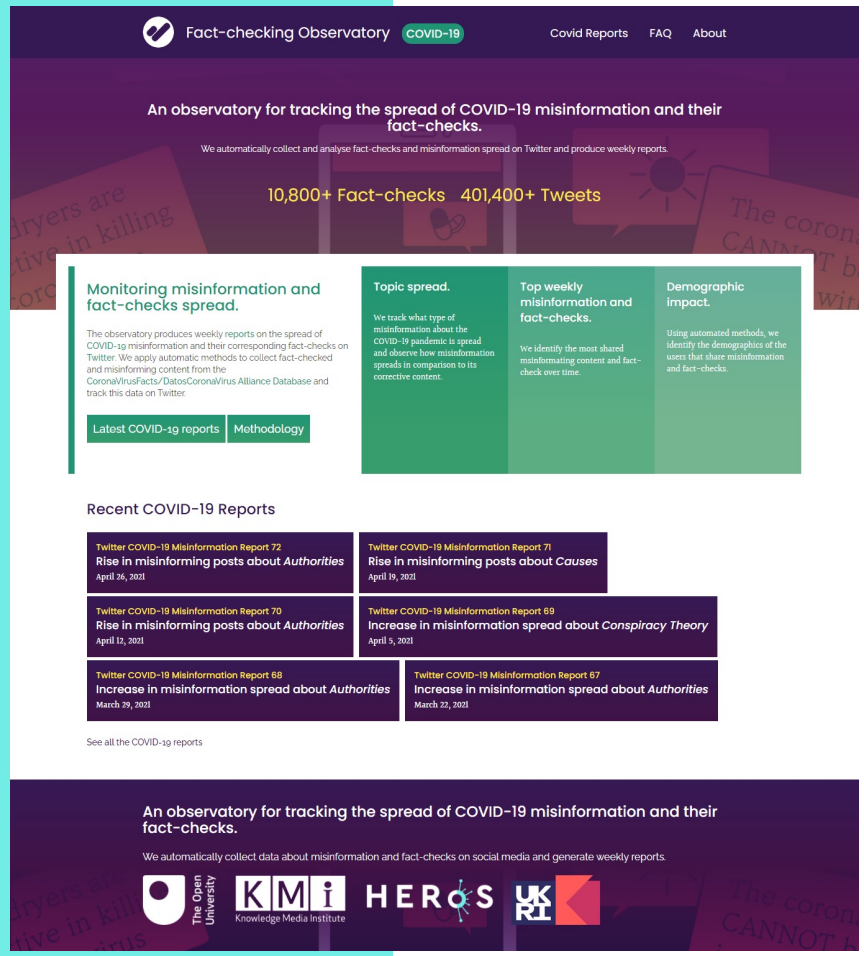
Fact-checking Observatory

1. An observatory for tracking the spread of COVID-19 **misinformation** and their **fact-checks**.
2. Automatically collect and process fact-checks and misinformation spread on Twitter and produce weekly reports.

Uses a constantly updated database of COVID-related fact-checks and continuously crawls Twitter for new posts.

https://fcobservatory.org

https://twitter.com/fc_observatory



Data collected until 26th April 2021

10,800+ Fact-checks

↓

401,400+ Tweets

twitter

Poynter.

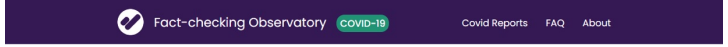
Weekly Reports

Each report contains:

1. **Key content and topics:** Statistics about the misinformation topics that were mostly shared in the given week

2. **Fact-checking:** Reports on who is providing the fact-checks, in which language, country, etc.

3. **Demographic impact:** Shows who shared misinformation and fact-checks the most, and their gender, age group and account type.



Twitter COVID-19 Misinformation Report 72

Rise in misinforming posts about *Authorities*

April 26, 2021

Between *Monday 19 April 2021* and *Monday 26 April 2021*, misinformation about *Authorities* has increased whereas misinformation about *Other* has reduced.

The Fact-checking Observatory is an automatic service that collects misinforming content on Twitter using URLs that have been identified as potential misinformation by fact-checking websites. Using this data, the Fact-checking Observatory automatically generates weekly reports that updates the state of misinformation spread of fact-checked misinformation on Twitter.

This analysis is limited to URLs identified by Fact-checking organisations. The collected data only consist of non-blocked Twitter content and may be incomplete.

270,050 Misinforming Tweets — New: +221 Trend: +47

131,329 Fact-checking Tweets — New: +435 Trend: -62

10,803 Fact-checks

98 Fact-checking Organisations

This report updates the status of misinformation spread between *Monday 19 April 2021* and *Monday 26 April 2021*.

Key Content and Topics

During the period between *Monday 19 April 2021* and *Monday 26 April 2021*, 221 new URLs have been identified as potential misinforming content. Out of the 9 topics identified by **Fact-checking organisations** (Figure 1), most of the new shared URLs were about *Authorities* with an increase of +260 compared to the previous total spread for the same topic. The topic that saw the least increase in spread compared to the previous period total spread was *Face Mask* with a change of +0 compared to the previous total spread for the same topic.

The topics used for the analysis are obtained from the **COVID-19 specific fact-check alliance database** and are defined as follows:

1. *Authorities*: Information relating to government or authorities communication and general involvement during the COVID-19 pandemic (e.g., crime, government, aid, lockdown).
2. *Causes*: Information about the virus causes and outbreaks (e.g., China, animals).
3. *Conspiracy theories*: COVID-19-related conspiracy theories (e.g., 5G, biological weapon).
4. *Cures*: Information about potential virus cures (e.g., vaccines, hydroxychloroquine, bleach).
5. *Spread*: Information relating to the spread of COVID-19 (e.g., travel, animals).
6. *Symptoms*: Information relating to symptoms and symptomatic treatments of COVID-19 (e.g., cough, sore throat).
7. *Other*: Any topic that does not fit directly the aforementioned categories.

In relation to the previous week, the topic that saw the biggest relative spread change was *Spread* with a change of +12 compared to the previous total spread for the same topic whereas the topic that saw the least relative change was *Spread* with a change of -14 compared to the previous period.

The all time most important topic is *Authorities* with a total of 121,982 URL shares and the least popular topic is *Face Mask* with 1 shares (Figure 2).

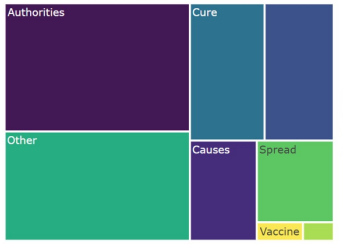


Figure 1: Topic Importance.

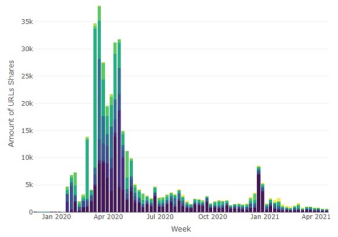


Figure 2: Amount of topic shares per week.

The top misinforming content and fact-checking articles shared since the last report are listed in Table 1 and Table 2.

Misinforming URL	Fact-check URL	Topic	Current Week	Previous Week	Total
https://www.worldometers.info/	Agencia Ocote	Authorities	164	136	31992
https://www.cdc.gov/mmwr/volumes/69/wr/mm693625.htm	Détecteur de rumeurs	Other	7	1	1642
https://vixra.org/pdf/2006.0044v1.pdf	Détecteur de rumeurs	Spread	6	2	162
https://www.whitehouse.gov/briefings-statements/remarks-president-trump-vice-president-pence-members-coronavirus-task-force-press-briefing-31/	AFP	Cure	5	0	778
https://www.the-scientist.com/news-opinion/lab-made-coronavirus-triggers-debate-34502	LeadStories	Conspiracy Theory	4	5	1965
https://www.alertadigital.com/2020/12/06/mike-yeadon-ex-vicepresidente-de-pfizer-no-hay-necesidad-de-vacunas-la-pandemia-ha-terminado/	Maldita.es	Conspiracy Theory	4	0	22
https://traugott-ickeroth.com/liveticker/	Correctiv	Conspiracy Theory	3	4	443
https://indeep.jp/found-hiv-in-wuhan-coronavirus/	BuzzFeed Japan	Conspiracy Theory	3	0	914
https://www.frontliner.com.br/oms-condena-lockdown-nao-salva-vidas-e-torna-os-pobres-muito-mais-pobres/	Estadão Verifica	Other	2	8	899
https://www.youtube.com/watch?v=p_AyuhbnPOI	Faktograf	Other	2	3	3781

Table 1: Top misinforming content.

Fact-check URL	Topic	Current Week	Previous Week	Total
https://correctiv.org/faktencheck/2020/12/03/nein-waehrend-der-pandemie-wurden-nicht-nonstop-intensivbetten-abgebaut/	Conspiracy Theory	17	31	176
https://teyit.org/analiz-asinin-icindeki-luciferase-enziminin-genlerimizi-degistirecegi-iddiasi	Conspiracy Theory	15	0	18
https://correctiv.org/faktencheck/2020/11/23/nein-christian-drosten-hat-2014-nicht-gesagt-dass-er-pcr-tests-fuer-untauglich-halte/	Other	10	10	71
https://facta.news/fuori-contesto/2021/02/24/linefficacia-delle-misure-anti-covid-non-e-scientificamente-dimostrata/	Authorities	10	0	12
https://www.factcheck.org/2020/04/social-media-posts-make-baseless-claim-on-covid-19-death-toll/	Authorities	9	1	639
https://teyit.org/analiz-bill-gatesin-asilarla-dunya-nufusunu-azaltmayi-amaciadigi-iddiasi	Conspiracy Theory	9	0	27
https://www.politifact.com/factchecks/2020/dec/02/blog-posting/former-	Spread	6	9	268

Fact-check URL	Topic	Current Week	Previous Week	Total
https://correctiv.org/faktencheck/2020/12/01/irrefuehrender-vergleich-der-daten-zur-auslastung-von-intensivbetten-2018-und-2020/	Other	6	2	43
https://politica.estadao.com.br/blogs/estadao-verifica/audio-de-medico-e-verdadeiro-mas-opiniao-sobre-origem-do-coronavirus-nao-tem-respaldo-cientifico/	Conspiracy Theory	6	0	18
https://www.factcheck.org/2020/09/cdc-did-not-admit-only-6-of-recorded-deaths-from-covid-19/	Authorities	5	9	2087

Table 2: Top fact-checked content.

Fact-checking

The data used for creating the Twitter dataset is obtained from the **Poynter Coronavirus Fact Alliance**. The alliance consists of 98 fact-checking organisation based in 635 countries and covering 46 languages.

The largest amount of fact-checked content comes from *English* (6,130 fact-checks) and the least is Finland (1 fact-checks). Most fact-checked content is in *Spanish* (3,367) followed by *Portuguese* (1,998) and *French* (963) (Figure 3).

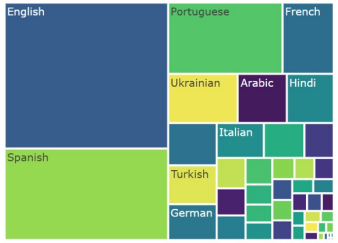


Figure 3: Amount of fact-checks by language.

Figure 4: Amount of fact-checked content per contry.

Determining a direct impact of fact-checking on the spread of misinformation is not easy. However, it is possible to determine how well a particular corrective information is spreading in relation to its corresponding misinformation.

Figure 5 shows how misinformation and fact-checking content has spread in various topics for the last two analysis periods and overall.

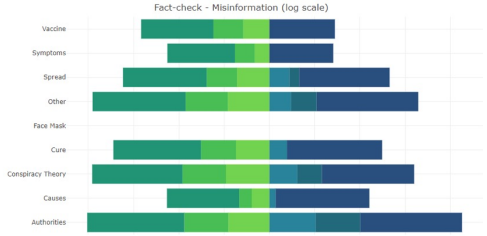


Figure 5: Topical misinformation and fact-checks spread.

Demographic Impact

Using automatic methods, Twitter account demographics are extracted for user age, gender and account type (i.e., identify if an account belong to an individual or organization).

Figure 6 displays how misinformation and fact-checks are spread by different demographics.

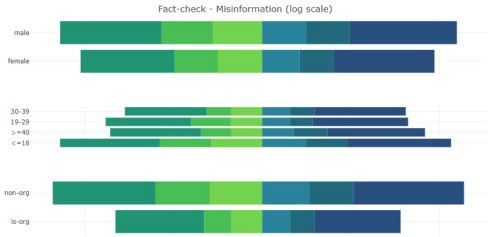


Figure 6: Misinformation and Fact-check spread for different demographics. Top: Gender, Center: Age group, Bottom: Account type.

Data Collection and Methodology

The full methodology and information about the limitation and dataset used for this analysis can be accessed in the [methodology page] (https://fcobservatory.org/faq/).

An observatory for tracking the spread of COVID-19 misinformation and their fact-checks.

We automatically collect data about misinformation and fact-checks on social media and generate weekly reports.

The Open University · KMi Knowledge Media Institute · HERoS · UKRI

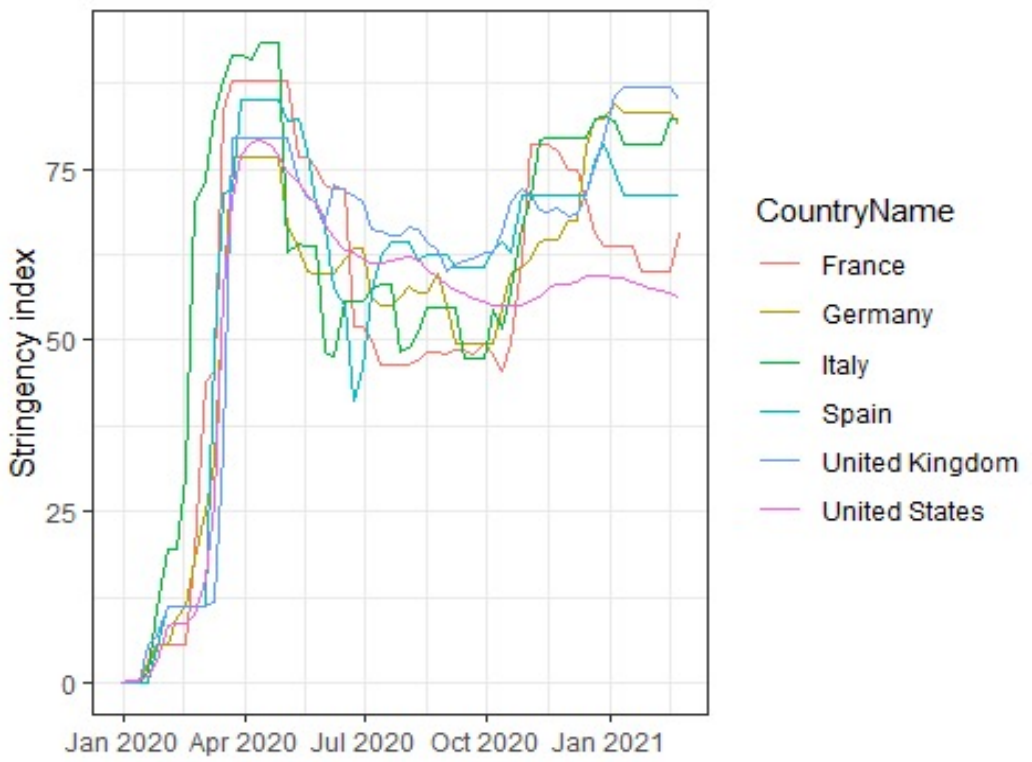
Cross-country Indicator Analysis

Research Questions:

- Do COVID-19 misinformation and fact-checks spread differently between countries?
- What is the relation between country-specific response indicators (e.g. school closure, travel restrictions) and spread of misinformation and fact-checks?

Stringency analysis methodology:

- **We compare the relation between the index and the normalised misinformation spread to see if stringency impacts misinformation and fact-checks spread.**
- **We use geolocation from users profiles for inferring their countries.**



Stringency Analysis

Global results:

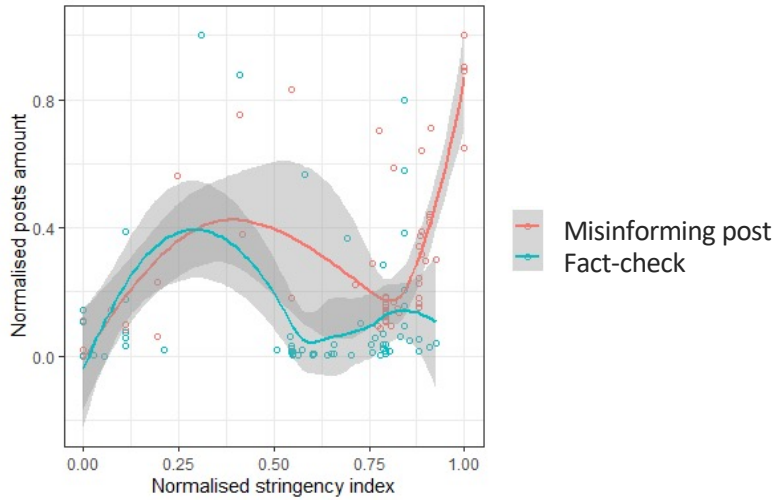
- Fact-checking spread increase as stringency peaks.
- Both misinformation and fact-checks spread increases as stringency measures rise.

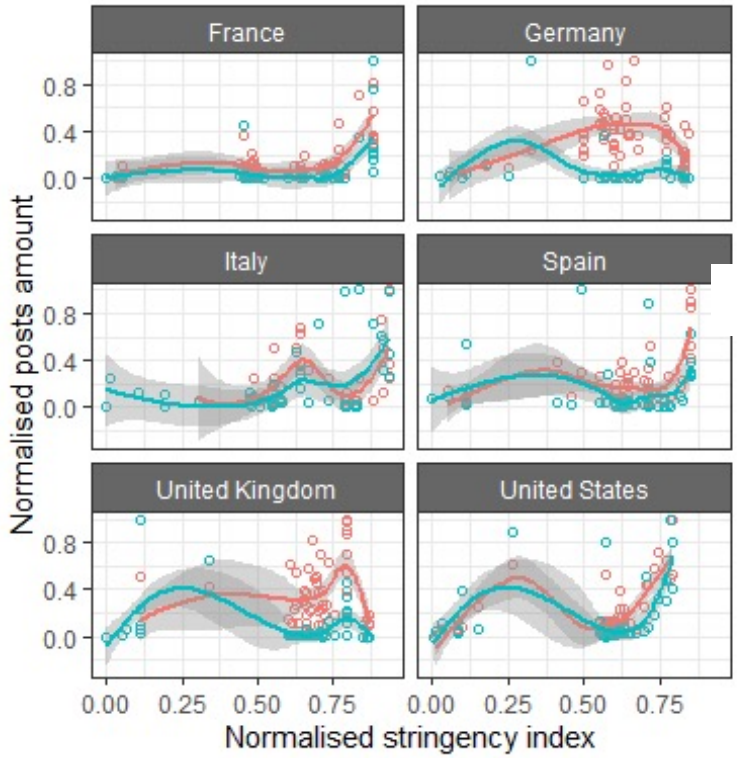
Country results:

- For Germany and the United Kingdom, fact-checking and misinformation spread decrease as stringency increase.
- Other countries show that misinformation and fact-check spread more when stringency increases.

Future work:

- Analyse based on specific stringency indices
- Improve geolocation of misinforming and fact-checks posts.
- Extend the analysis to additional developments indicators such as GDP, HDI, Healthcare Index.

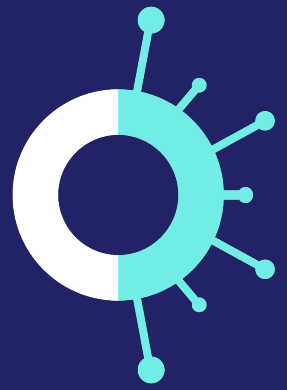




Project deliverables at https://www.heros-project.eu/output/deliverables/

Twitter: @HERoS_EU,
LinkedIn:
https://www.linkedin.com/company/heros-project/,
Facebook
https://www.facebook.com/HERoScovid19/

Questions?



Thank You

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