D5.6 – Webinars and MOOC

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PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Executive Summary

The Health Emergency Response in Interconnected Systems (HERoS) project integrates behavioural dynamics in epidemiological models under the resource constraints of public health providers. It brings together governance, information, and logistics support to prepare for and respond to the COVID-19 pandemic. HERoS consists of three phases: a rapid response phase (M1-M6), lessons learned phase (M7-M30) and a dissemination phase (M31-M36). This deliverable (D5.6) is the second report pertaining to a task (Task 5.5: Training of end users and other stakeholders) in the dissemination phase.

D5.6 reports on several dissemination activities carried out during the project period to present the HERoS project results to a wider audience. A series of webinars were organised throughout the project, and a dedicated training session for end users (reported in D5.5) formed the basis of a massive open online course (MOOC). D5.6 reports on three joint HERoS webinars, of which the one on Oct 27, 2020 was used to present the joint findings of the rapid response phase of the project, and two others were presented during the Humanitarian Networks and Partnerships Weeks (HNPW) of 2021 and 2022. A further in-person seminar was presented during HNPW 2023. All webinars and seminars were used to bring together the findings and results across the HERoS work packages, namely WP1: Governance, WP2: Behavioural models in epidemics, WP3: Supply chain management, and WP4: Social media analytics. Each webinar is available on the HERoS project website and YouTube channel.

The HERoS end-user training also brought together results from all these WPs, as does the MOOC presented here, which is entitled "Health Emergency Response to a Pandemic". Both have been developed based on the specific needs of HERoS end users. However, while the training (see D5.5) presented results to end users directly, the MOOC is geared towards a wider, global audience. The MOOC's target audience includes policy-makers and decision-makers not only in public health but also governance, companies and individuals working with medical supply chains, first responders, medical humanitarian organisations, students aspiring to work in a health emergency context, as well as the general public. D5.6 reports on the MOOC contents and post-course learners' feedback. MOOC launched on February 6, 2023, and facilitated between March 20 and April 16 2023, on the FutureLearn platform.

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List of acronyms

Abbreviation / acronym	Description
COVID-19	Novel Coronavirus Disease
CRI	Croce Rossa Italiana
DP	Delivery Point
EADRCC	The Euro-Atlantic Disaster Response Coordination Centre
EU	European Union
FOB	Forward Operating Base
GCS	Ground Control Station
HAN	Hanken School of Economics
HERoS	Health Emergency Response in Interconnected Systems
HNPW	Humanitarian Networks and Partnerships Weeks
HUMLOG Institute	Humanitarian Logistics and Supply Chain Research Institute
ICU	Intensive Care Unit
ICRC	International Committee of the Red Cross
JDR	Japan Disaster Relief Team
MOOC	Massive Open Online Course
NATO	North Atlantic Treaty Organization
NHG	Nordic Healthcare Group
UN OCHA	The United Nations Office for the Coordination of Humanitarian Affairs
OU	The Open University
RAI	Resident Assessment Instrument
TU Delft	Technische Universiteit Delft
UAV	Unmanned Aerial Vehicle
UK	United Kingdom
UNDSS	United Nations Department for Safety and Security
UNICEF	United Nations International Children's Emergency Fund
URL	Uniform Resource Locator
VUA	Vrije Universiteit Amsterdam
WHO	World Health Organization
WP	Work Package

1. Introduction

The COVID-19 pandemic has had an unprecedented scale, impact, and complexity. Thus, it has required comprehensive understanding, collaboration and a variety of different response methods. The experience of the COVID-19 outbreak revealed many gaps in the skills of epidemic management, information sharing and collaboration around the world. Project HERoS, therefore, integrates behavioural dynamics in epidemiological models under the resource constraints of public health providers and brings together governance, information, and logistics support to prepare for and respond to the COVID-19 pandemic.

The HERoS project is nearly complete, and most of the deliverables have been submitted. The deliverables integrated different perspectives and extracted lessons and recommendations for policymakers and healthcare professionals. Results and recommendations have been presented at various conferences, published in scientific outlets, as well as purposefully disseminated at various events and seminars, through social media etc. Deliverables and publications can be found on the HERoS project website: www.heros-project.eu.

A series of HERoS webinars have been held to bring together findings and results across deliverables and work packages (WPs). In addition, the project resulted in training sessions to end users and a broader audience. Together, these form the parts of Task 5.5, training of end users and other stakeholders. Of these, the dedicated training to end users has been reported earlier in HERoS deliverable 5.5, while this deliverable (D5.6) focuses on the webinars and the massive open online course (MOOC) called "Health Emergency Response to a Pandemic" that has been developed as targeted dissemination mechanisms of this project.

2. HERoS Webinars

A webinar is a blend of web and seminar, held virtually and participated by an online audience. Participants can listen to the webinar and ask questions to the speakers. D5.6 reports on three joint HERoS webinars, of which one was used to present the joint findings of the rapid response phase of the project (on Oct 27, 2020), and two others were presented during the Humanitarian Networks and Partnerships Weeks (HNPW) of 2021 and 2022. All webinars were used to bring together the findings across the HERoS work packages, namely WP1: Governance, WP2: Behavioural models in epidemics, WP3: Supply chain management, and WP4: Social media analytics. Each webinar is available on the HERoS project website and YouTube channel. It is worth noting that HERoS has also been presented at numerous other events including webinars that various HERoS partners have participated in. Here, the focus is on the joint ones, however.

2.1. Webinar 1: Results of the rapid response phase

The first joint HERoS webinar was held at the end of the project's rapid response phase. While all WPs in the project had submitted the first deliverables during these initial six months of the project, the webinar was used to bring together the results of each WP as well as to integrate and highlight joint findings across them. The webinar was held on Oct 27, 2020, as agreed with the HERoS project officer and DG SANTE.

This webinar was organized collaboratively by the HERoS coordinator and the other partners. The participants were invited by (e.g., the project officer, project PIs, COVID-19 first responders, and other stakeholders), and each partner called its stakeholders network to attend online (through Microsoft Teams). The webinar took one hour for the presentations, questions, discussion and wrap-up.

2.1.1 Webinar overview

The first six months of the HERoS project were designed as a rapid response phase, with exploratory analyses for fast recommendations on the basis of
- Analysis of governance arrangements in the ongoing Covid-19 response
- Local behavioural model and recommendations for local COVID-19 response
- Public health system analysis and recommendations
- Gap analysis and recommendations for securing medical supplies, and
- Covid-19 misinformation spread analysis
with case studies from Italy, the Netherlands, Finland, and more.

The webinar presented findings from the following deliverables (the lead organisation is in brackets):
- D1.1 Recommendations for governance and policies in the COVID-19 response (VU)
- D2.1 Local behavioural model and recommendations for local COVID-19 response (TUD)
- D2.2 Public health system analysis and recommendations (NHG)
- D3.1 Gap analysis and recommendations for securing medical supplies for the COVID-19 response (HAN), and
- D4.1 Assessment of the online spread of coronavirus misinformation (OU).

Most importantly, the webinar integrated the findings and also presented joint results across the different WPs of the project.

One hundred eighty people had registered for this first HERoS webinar, of which 128 also attended and the others received the presentation by follow-up email. Attendees included people from 24 countries (apart from several EU countries also, from countries such as Bosnia Herzegovina, Brazil, Canada, Macedonia, Switzerland, and the USA) from an array of stakeholders such as:

- Policy-makers (e.g., DG SANTE, European External Action Service, Finnish Ministry of Foreign Affairs),
- Humanitarian organisations (e.g., World Health Organisation, World Food Programme, UNICEF, Norwegian Refugee Council, and various members of the Red Cross Movement),
- Researchers from 28 universities and 6 research institutes across various disciplines, and
- Representatives of think tanks, consultancies, health insurance organisations etc.

The webinar video is available through the HERoS website https://www.heros-project.eu. It has been watched 154 times on YouTube by Dec 31, 2022 [161 times by May 31, 2023].

HERoS webinar - Rapid Response Phase Results (27/10/2020)

Figure 1 HERoS webinar - Rapid Response Phase Results

2.1.2 Summary of the webinar presentations

The first presentation was on governance crisis modelling and policies during COVID-19. The presentation provided a **whole-of-society COVID-19 crisis governance framework** for analysing workflow, process, coordination structure, and governance arrangement in response to COVID-19 and learning from it. Table 1 demonstrates the developed governance framework.

Table 1 Whole-of-society COVID-19 crisis governance framework

Whole-of-society COVID-19 crisis governance framework			
	States and institution	**Network of organizations**	**Resilience and participation**
Alignment Process	Boundary work	Coordination by mutual adjustment	Deliberative, consensus-oriented
Primary Focus	Formal decision-making	Orchestration via linkages	Collective ownership
Form Of Influence	Bureaucratic	Negotiation	Emergent
Communication	Hierarchical	Mutual understanding	Reciprocal

The framework highlights the importance of transparency, accountability, predictability and the need to create a shared understanding among interdependent and interacting actors. The following lessons were learned from D1.1 (Recommendations for governance and policies in the COVID-19 response):

- The various stakeholders involved in formal and informal decision-making need to **collectively make sense** of and co-create a shared understanding of the crisis.
- Involving a broad and diverse group of interacting stakeholders helps avoid tunnel vision, assists in breaking down decision-making silos, enhances **collective ownership of the societal response** and allows creative solutions to emerge.
- Capacity building in crisis governance means investing in people, building capabilities and **trustful relationships** among diverse and inclusive communities of interacting and interdependent societal actors.

The second presentation showcased the findings of D2.1 (Local behavioural model and recommendations for local COVID-19 response). This deliverable had modelled an artificial city (see Figure 2), in essence, a large-scale high-resolution agent-based model of two cities based on open data from The Hague, the Netherlands, and Helsinki, Finland. This was done to understand the spread of COVID-19 at an urban scale, looking at the behaviour of citizens and their spatial contacts.
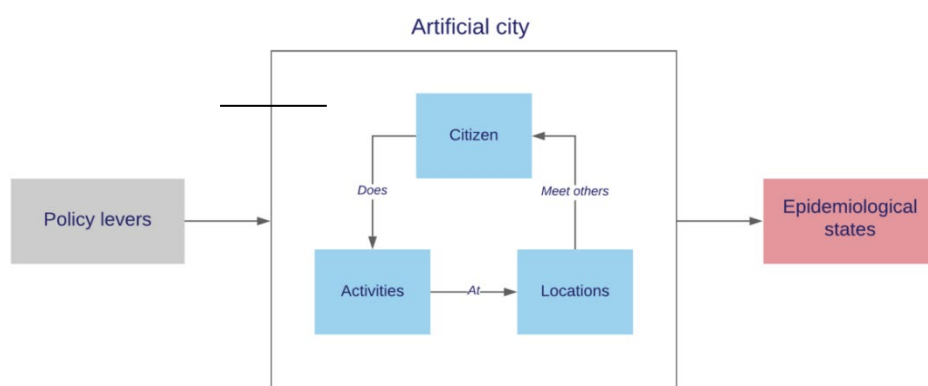
Figure 2: Conceptual model of the artificial city

The model was tested under four uncertain parameters (asymptomatic fraction, probability of fraction, contagious factor, and the number of initially infected individuals) to capture epidemiological and behavioural uncertainties; and under three policies: "do nothing", "soft lockdown" (closure of educational institutions and entertainment), and "hard lockdown". The presentation of D2.1 concluded with the following findings and recommendations:

- **Behaviour is important.** When, where, and what citizen defines the spread of the disease.
- **Area matters.** Locations with a small area but a high number of visitors (e.g., bars) significantly speed up the spread of the virus.
- **Timing matters.** The earlier the policy is implemented, the better.

- **Soft measures may not work.** Closure of educational institutions and recreation/entertainment is not as effective as complete lockdown. The number of spatial contacts happening at the places that are still open is high enough to fuel the pandemic.
- **Prevent crowding, especially at supermarkets** under full lockdown. Supermarkets can become "urban airports" and spread the virus across the city.

The third presentation focused on the results of D2.2 (Public health system analysis and recommendations), i.e. on the healthcare system and services required by COVID-19 patients. It reflects the outcomes of a statistical model for COVID-19 spread (a linear mixed effect model that allows each country its own intercept), hospital intensive care capacity utilisation, and behaviour of the healthcare professionals, besides the existing preparedness assessment and diagnostics strategies. Based on the model, an interactive tool was developed to view hospital intensive care unit (ICU) utilisation, recording the total ICU capacity for all patients requiring intensive care in different countries during the first wave of the pandemic (see Figure 3).
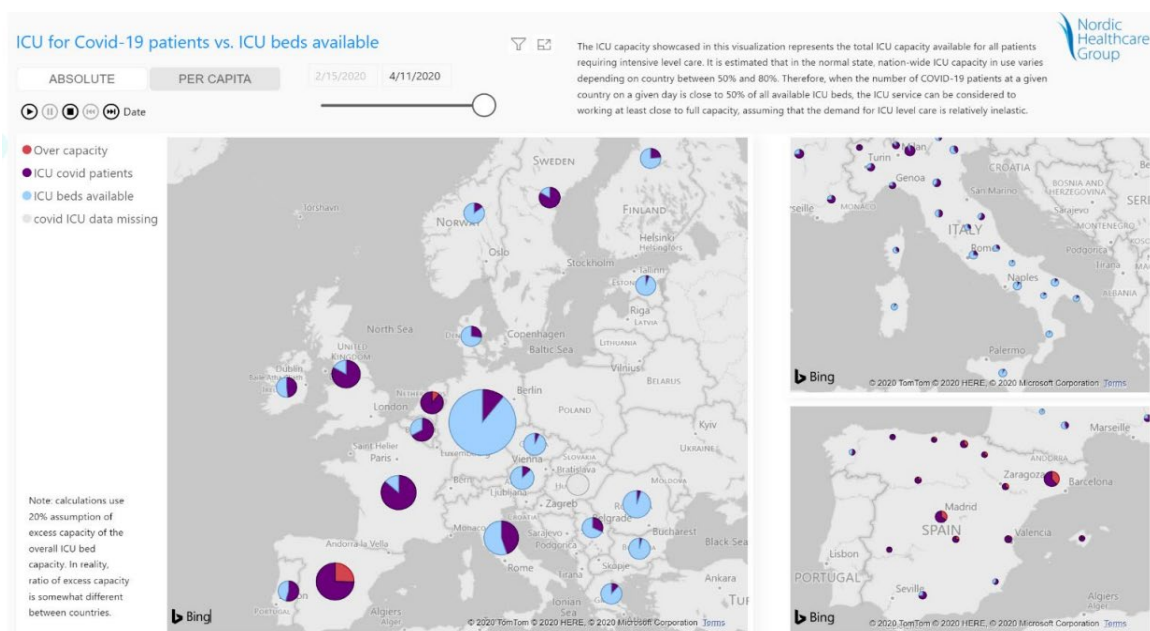
Figure 3 Interactive tool to view hospital intensive care unit (ICU) utilization
(Source: https://nhg.fi/en/covid19map/.)

The presentation further highlighted that ICU capacity was not to be equalled with beds only. Yet, adding further healthcare professionals to already overwhelmed units was difficult due to their lack of absorptive capacity at that very moment. Importantly, the presentation further problematised seeing ICU capacity confined locally or by country rather than considering the closest hospitals also across EU borders. The interactive tool is further explained in this dedicated YouTube clip:

ICU capacity map

Figure 4 ICU capacity map

The fourth presentation showed the results of D3.1 (Gap analysis and recommendations for securing medical supplies for the COVID-19 response). It presented an analysis framework of operational, financial, and strategic medical supply chain disruptions. The following gaps were found in D3.1:

- **Bullwhipping** for PPE, but also for, e.g. paracetamol,
- Sudden large **capacity constraints in transportation**, with enormous price hikes due to the stop of air (passenger) traffic,
- Lack of **due diligence** leading to quality issues, non-deliveries or long lead times
- **Single sourcing** but also "China+1" strategies causing disruptions
- Lack of understanding of **interdependencies**, thereby removing one constraint leading to the highlight of another (e.g. test swabs, reagents)
- Lack of global certifications and **quality standards**

Table 2 groups the recommendations to mitigate disruptions in medical supply chains in four themes.

Table 2 Key recommendations for medical supply chains

Theme	Mitigation strategies against supply chain disruptions
Preparedness	Pre-positioning Framework agreements, including supplier vetting Training Multiple sourcing
Collaboration	Joint procurement also across countries Public-private partnerships and cross-sectoral collaboration Incentives for production changeover (also for transportation capacity)
Regulation	Price regulations/rationing of critical items Global product and quality standards Assurance of cargo movement in lockdown Non-earmarked funding for disaster incl. pandemic response
Innovation	Kitting of interdependent items Non-person-dependent transportation (e.g. UAVs) Structural flexibility in production, transportation, and sourcing End-to-end supply chain visibility

The fifth presentation summarised the findings from D4.1 (Assessment of the online spread of coronavirus misinformation). The objectives of this deliverable were to measure the co-spread of misinformation and their corresponding fact-checks, to better understand their patterns and correlations by comparing the diffusion of misinformation and fact-checking URLs about COVID-19 on Twitter. The data for this task has been collected from tweets mentioning misinformation and fact-checking URL. Figure 5 shows the data collected on misinformation and fact-checking.
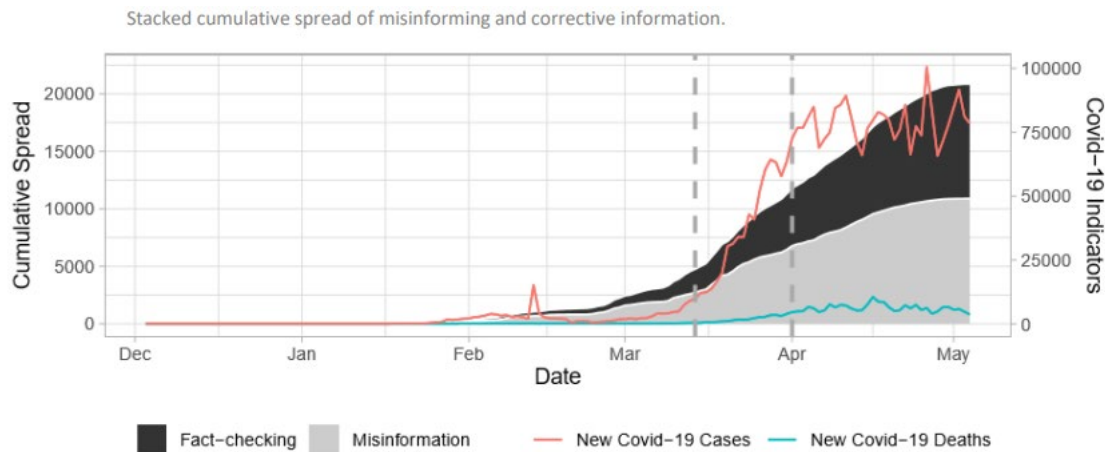
Figure 5 Data collection on misinformation and fact-checking

The analysis confirmed that **misinformation spread is influenced by fact-checking:**
- Misinformation spread can be predicted from the fact-checking spread, but not the other way around.
- Fact-checking impulse generates a slow downward trend in misinformation spread.
- Misinformation impulse generates a delayed fact-checking spread response.

D4.1 also contributed to the establishment of a Fact-Checking Observatory (at https://fcobservatory.org/) that continues to publish COVID-19 reports. One hundred fifty-four of such reports have been published by Dec 31, 2022.

The webinar concluded with three key results grounded in several deliverables from the first wave of the COVID-19 pandemic. These are as follows:
- Effectiveness of policies that reduce social interaction (D11, D2.2, D2.2)
- The two-edged sword of stopping air transportation: reduced spread (D2.2) but large gaps in medical supply chains (D3.1)
- Local capacity constraints of ICU doctors and nurses, not just materials (D2.2, D3.1)

2.2.   Webinar 2: Results of the first year of the HERoS project

One year into the HERoS project, the project organised a webinar at the Humanitarian Networks and Partnerships Week (HNPW) 2021 that is organised yearly by the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA). In 2021, HNPW was held completely online. The webinar was held as part of HNPW to maximise HERoS' outreach especially to humanitarian organisations, since HNPW is one of the largest annual humanitarian conferences of it is kind.

This webinar was held on April 29, 2021 (again via MS Teams). HERoS was also presented in other sessions of the event, but this particular webinar again brought the findings across several WPs together.

The webinar was open for public access, allowing anyone interested to sign up to attend the session in the online event programme. Besides, HERoS involved partners, end-users or HNPW members who have received invitations. The webinar presentations, discussion, and wrap-up took one and a half hours.

2.2.1. Webinar overview

The first year of HERoS included the rapid response phase of the project and the first six months of the "lessons learned" phase. HNPW brings many humanitarian organisations and their partners together, constituting a somewhat different target audience from the first webinar. Thus, the webinar also included findings from the rapid response phase and all WPs, focusing on
- Governance crisis modelling and policies during COVID-19
- Behavioural models in epidemics
- Supply chain management in pandemics
- Drones deliveries, and
- Social media analytics during COVID-19.

Apart from the results that had been part of already submitted deliverables, this webinar included the first results from ongoing research in the following tasks:
- Tasks 1.2 Governance Arrangements – best practices and lessons learned (later reported in D1.2, lead organisation VU),
- Task 2.3 Coupled epidemiological models and scenario analyses (later reported in D2.3. lead organisation TUD),
- Task 3.2 Secure delivery methods to quarantined environments in the last mile (later reported in D3.2, lead organisation HAN), and
- Task 4.2 Crowdsourced information clustering (later reported in D4.2, lead organisation OU).

It must be noted that while the first webinar included results from the first wave of the COVID-19 pandemic, the situation had changed significantly by the time of the second webinar, with a shifting focus towards COVID-19 variants but also vaccine development.

One hundred and forty-one people had registered for the webinar, of which 49 attended it, whereas others received the presentation by follow-up e-mail. This being HNPW, there was a global spread amongst participants, who represented 48 countries and a variety of humanitarian organisations. The webinar video is available through the HERoS website (https://www.heros-project.eu). It has been watched 175 times on YouTube by December 31, 2022 [184 times by May 31, 2023].

Figure 6 HERoS project presentation at HNPW 2021

2.2.2. Summary of the webinar presentations

The first presentation focused on providing a governance framework to analyse workflow, process, coordination structure, and governance arrangement in response to COVID-19 and learn from it. In this context, the presentation addressed how various formal and informal stakeholders governed the COVID-19 crisis over time? And how did the involved agencies collaborate and coordinate their activities? Therefore a typology of organizations during a disaster response is proposed in Table 3.

Table 3 Typology of organisation during disaster response

Typology of organization during disaster response		
	Old structure	New structure
Regular Tasks	Established organisations	Expanding organisation
Non-regular tasks	Extending organisation	Emergent groups

Initial conclusions were presented as follows:
- The governance of a slow-burning crisis such as COVID-19 needs to be inclusive.
- There is great value in bottom-up generated initiatives.
- There is great potential in organizing entrepreneurial activities from below (in strengthening supply chains) at times of crisis.

The second presentation focused on simulation modelling for decision-making in response to disasters. It addressed how simulation and scenario building can support rapid decision-making in complex and uncertain situations. The simulation model was updated with three certainties: new policies, virus mutations, and Covid fatigue (see Figure 7).
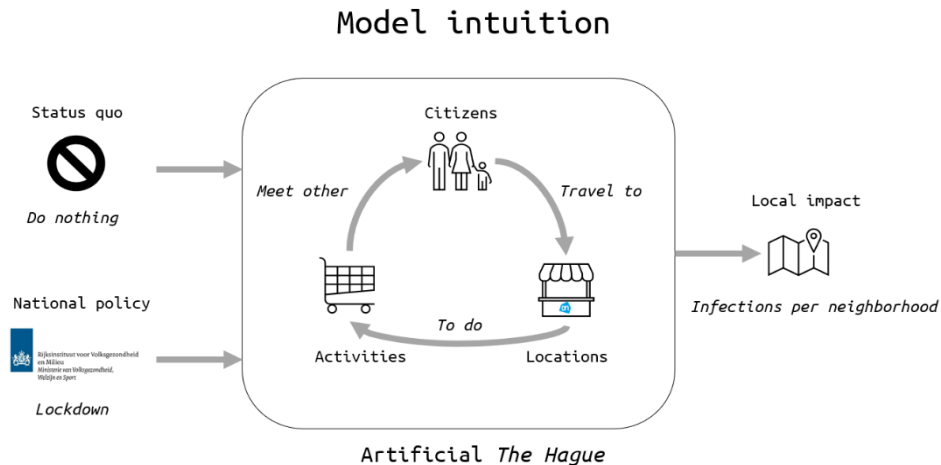
Model intuition

Figure 7: Improved model intuition (conceptual model) of the build agent-based model.

Results were shown for different types of lockdowns and their effects on local spreads in supermarkets, movement restrictions such as isolating households, and physical distancing in queues to prevent local COVID-19 spread and flatten the curve. Conclusions were presented for the use of simulation models overall:

- Simulation models can be useful tools to prepare more effectively, given uncertainty about the local impact of national policies, how people will behave, and how contagious the virus is.
- Simulation models help to **find local clusters**, understand who is affected the most and plan better local actions.

The third presentation on medical supply chain disruptions focused on considerations for the COVID-19 vaccine supply chains. The presentation introduced the temperature control fact sheet for COVID-19 vaccination programme. Initial conclusions for COVID-19 vaccination programmes are shown in Figure 8.

Figure 8 Medical supply chain disruptions in the COVID-19 pandemic

The fourth presentation focused on the potential use of drones for medical deliveries to quarantine zones. Figure 9 demonstrates initial and geographical concepts for workflow development.

Figure 9 Drone deliveries to a quarantine zone

The workflow development identified the need for various degrees of attended deliveries for different medical items. For example, medical materials/supplies or vaccines may require a certain degree of temperature along with a person for loading and unloading or may require the presence of a trained or authorized person (e.g., a doctor). Depending on these requirements, delivery point descriptions, levels, and on spot presence will need to be carefully considered (see Table 4).

Table 4 Delivery points database

Delivery points description	Delivery points levels	On-spot personnel presence
Hard surface	DP known and used with last (month)	Medical personnel in
Grace surface	DP known and used more than (month)	Delivery handling personnel on DP
Flat surface	DP checked but not used for landing	Not trained personnel on DP
	DP not checked	No professional on DP

The fifth presentation focused on the tracking and analysing COVID-19 misinformation and the spread of claims and their fact-checks. Since the COVID-19 pandemic started, around 10,000 false claims have only been articulated about COVID-19. All misinformation can be harmful; therefore, many governments have set up measures to curb the spread of misinformation about some of the claims. Table 5 presents the results of WP4 which are classified into four groups: general results, topic results, account types results, and gender results.

Table 5: Results of the analysis of the co-spread of misinformation and fact-checking

General Results	Topic results	Account types results	Gender results
Misinformation spread behaviour can be predicted from fact-checking and vice versa (I.e., they influence each other) Misinformation and fact-check spread behaviour differs in the initial (0-3 days) and late periods (>10 days) but are similar during the early period (4-10 days).	False claims about the cause of COVID-19 and conspiracy theories appear to be more persistent than other topics.	In the initial period, the spread of misinformation by organizations is similar to the spread of fact-checks by individuals. Individuals, and not organisations, spread misinformation and fact-checks similarly after ten days.	Misinformation spread does not seem to differ between men and women on Twitter.

2.3.   Webinar 3: Results of the second year of the HERoS project

A third webinar was organised at HNPW 2022 to disseminate the results of the second year of the HERoS project. The webinar was held on May 10, 2022 as a hybrid event, joined by people online as well as in person at HNPW in Geneva, Switzerland. Apart from the humanitarian organisations that attend HNPW regularly, HERoS' partners and also the people who had by then signed up for the HERoS mailing list have received invitations to join online or in person. The webinar presentations, discussion, and wrap-up took one and a half hours.

2.3.1 Webinar overview

The second year of HERoS included focused on "lessons learned" from the pandemic. As the webinar was held at HNPW, they were again targeted at humanitarian organisations primarily. The focus was on disseminating results on the topics of
-    COVID-19 crisis governance: responding to challenges in nursing homes in Europe
-    Do we need to violate people's privacy to build better models and predictions?
-    Changes in the health status of the elderly in long-term care during COVID-19
-    Assessing the economic impact of COVID-19
-    Drone simulation of delivering emergency goods, and
-    Monitoring, understanding, and influencing the co-spread of COVID-19 misinformation and fact-checks

The presentations combined results from already submitted deliverables, such as
-    D1.3 Integration of surveillance data to the minimum data set of EMTs (lead PCPM);
-    D3.2 Adaptation of workflows for drone deliveries to quarantines (lead HAN);
-    D3.4 Methodology for economic impact assessment of supply chain disruptions (lead HAN);
-    D4.2 Classification approaches of crowdsourced information on Covid-19 (lead OU);

and ongoing research in Tasks 1.2 Governance Arrangements – best practices and lessons learned (later to be reported in D1.2, lead VU), Task 2.3 Coupled epidemiological models and scenario analyses (later to be reported in D2.3. lead TUD), Task 3.3 Using drones for secure deliveries to quarantines (later to be reported in D3.3, lead SQU), and Task 4.3 Misinformation countering (later to be reported in D4.3, lead OU).

The webinar was attended by 59 participants online from 25 countries, plus some people attending offline at HNPW (no demographics provided). Online participants included representatives of humanitarian organisations but also ministries of health and national emergency services. The webinar video is available through the HERoS website. It has been watched 105 times on YouTube by Dec 31, 2022 [116 times by May 31, 2023].

Figure 10 HERoS briefing session at HNPW 2022

2.3.2 Summary of the webinar presentations

The first presentation focused on selected studies from the upcoming D1.2 (Crisis governance lessons learned and best practices). It aimed to identify lessons learned for effective COVID-19 crisis governance in nursing homes based on ethnographic fieldwork conducted in 5 nursing homes in Helsinki, Amsterdam, and Dublin. Table 6 indicates specific policy recommendations based on these lessons learned.

Table 6: COVID-19 crisis governance and lessons from nursing homes and policy recommendations

Lessons learned	Policy recommendations
Lack of infection control expertise among staff	Provide better infection education
The focus on the hospital at the beginning of the crisis led to silent disasters in nursing homes	Include nursing home provisioning in the national healthcare system
Social isolation due to the visitor ban in nursing homes led to a serious decrease in older people's cognitive and physical conditions.	Avoid visitors, ban and/or explore digital possibilities for visitors
COVID-19 led to rapid and highly unpredictable deterioration of the elderly, of whom many died alone	Rethink future infection control during end-of-life care
The pandemic has put tremendous pressure on the nursing home employees of the already overburdened care sector	Nursing education and profession have to be made more appealing

The second presentation addressed the question of whether we need to violate people's privacy to build better models. It problematised the trade-offs between data privacy and model precision and accuracy. The presentation showed that, at some point, microdata does not increase the precision of

the model. To preserve privacy and given that the future is uncertain, policymakers must focus on using open data and designing robust policies that account for numerous plausible scenarios.

The third presentation addressed the question of what the change in the health status of the elderly in long-term care in Finland during national social distance restrictions was due to the pandemic in comparison to the health status pre-COVID-19. The data analysis carried out by the Risk Asessment Index (RAI) instrument measures: the functional cognitive, social and mental health and well-being of the elderly. The presentation displayed the variables with negative or no effect for several indicators of well-being in figure 11. This gives important nuance in the various dimensions of the findings of the nursing home study in D1.2.

	Variables with negative effect	**Variables with no effect**
Activity	Physical activity outside of facility	Walking, Independent use of toilet, Personal hygiene
Mood and behavior	Decline in social activities	Depression, Mood swings, Sleeplessness, Complains, Pain, Sadness
Psychosocial well-being	Involvement in life of facility, Establishes own goals, Personal contact with family or friends	Conflict, Aggression, Preforms activities independently
Memory	Cognitive skills for making everyday decisions	Remembers staff names, Confused, Short term memory, Long term memory
Treatments	Therapy, Emergency room visits, Hospital stay	Changes in medicine prescription

Figure 11 Effect for several indicators of well-being

The fourth presentation showed a causal loop diagram for the cascading effects of supply chain disruptions in the COVID-19 pandemic and introduced a difference-in-differences analysis comparing economic activities over time between a treatment and a control group as a methodology for assessing the economic impact of such supply chain disruptions. For example, workplace closures (lockdowns) resulted in a swift, ca. 3 % sales growth decrease in the affected quarter, but no investment growth decrease in the affected nor consecutive quarter.

The fifth introduced the concept of ground control station (GCS) programming and construction for the use of unmanned aerial vehicles for delivering medical items and showed the current state of the simulation of such drone deliveries. A first version of standard operating procedures, and a draft convention, were shown for using heavy-load long-range UAVs in humanitarian and medical aid in the context of disasters and crises.

The sixth presentation is about misinformation, understanding, and influencing the co-spread of COVID-19 misinformation and fact-checks. The aim was to understand how citizens share or are subject to misinformation and whether fact-checks may help reduce the spread of misinformation. In this context, fact-checking has been seen as a way to verify misinformation claims as led to the publication. The data has been collected from Twitter based on three factors: monitoring, understanding, and influencing. For purposes of influencing, a Twitter bot was introduced that would send messages to users spreading misinformation (see Figure 12).
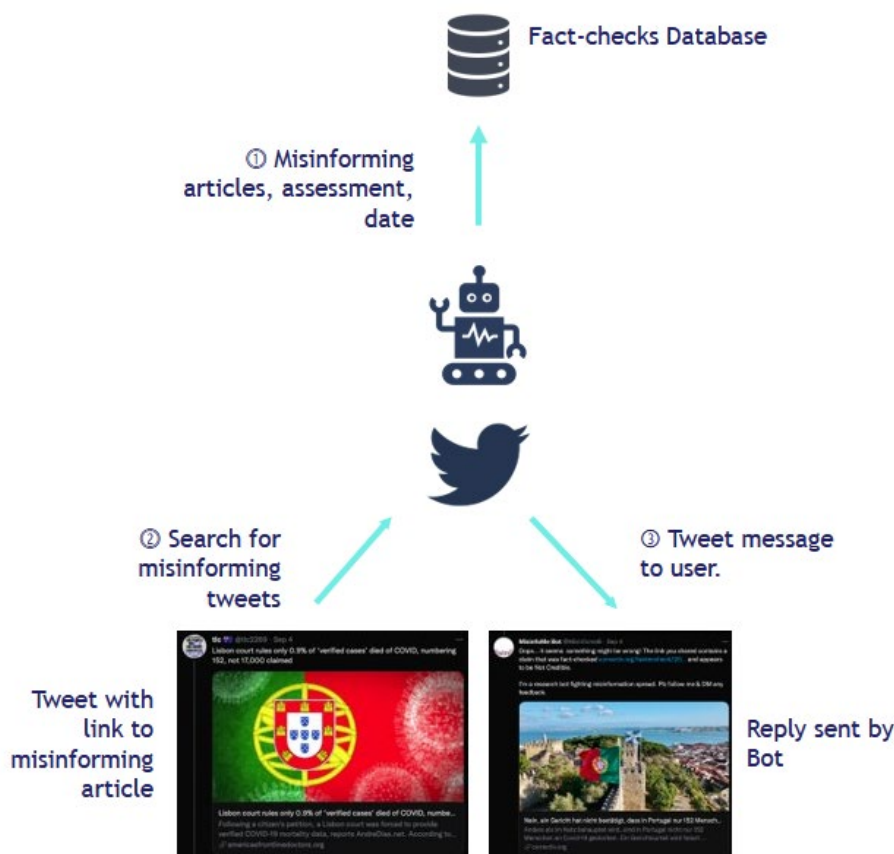
Figure 12 Countering misinformation with a bot

The results of the relative analysis for the period between December 2019 and January 2021 showed that misinformation and fact-checks spread differently as in the following points:

- As time increases, topical behaviour converges.
- Caused and conspiracy theory topics as the outliers (e.g., misinformation and fact-checks spread about causes remain different in the late period).
- COVID—19 caused conspiracies that need to be treated differently compared to other topics.

2.4. Seminar at HNPW 2023: Results of the third year of the HERoS project

Following up on the dissemination events at HNPW 2021 and 2022, in 2023 a face to face seminar was organised at HNPW on Apr 26, 2023, 14:00-15:00 in Geneva, Switzerland. The seminar was also streamed to facilitate participation, with the main discussion taking place amongst participants in the room. As before, apart from the humanitarian organisations that attend HNPW regularly, HERoS' partners and also the people who had by then signed up for the HERoS mailing list have received invitations to join in person or follow the seminar online.

2.4.1 Seminar overview

The third year of the HERoS project focused on lessons learned from the pandemic, and later on training and dissemination. (This very deliverable reports on the latter.) The focus in this seminar differed somewhat from earlier ones in that it did not recap all the deliverables during the year but

highlights specific learnings that had not been presented earlier, combined with HERoS partners being invited to also present their other work in the area of pandemic response. The topics at the seminar included:
- Simulation modelling in a data-scarce environment (from WP2)
- Automatically countering misinformation on social media with fact-checks (from WP4)
- Drone deliveries to quarantine zones (from WP3)
- The HERoS MOOC: Health Emergency Response to a Pandemic: An Integrated Social Science Perspective (from WP5)
- Supply chain training and experience at Project HOPE (HERoS partner)

As the seminar was held at HNPW, the target audience included health and humanitarian organisations.

The webinar was attended by 41 participants from 26 countries, including representatives of UN agencies (e.g., WHO, WFP, OCHA), governmental organisations (e.g. disaster management centres, ministries of health), consultancies, and non-governmental organisations.

2.4.2 Summary of the presentations

The first presentation facilitated a discussion on decision-making in a data-scace environment. It reflected on the results from D2.3 "Coupled epidemiological models and scenario analyses", levels of detail of the data and the use of web-based GIS analyses for epidemiological spread in particular. Most importantly, it highlighted that more data, or more granular / higher resolution data, does not necessarily result in better analysis or decision-making. However, in case of a lack of data, we may use "surrogate" models to replace initially desired high-resolution models. Thereby the coupled model in D2.3 managed to make predictions of larger areas with less data based on models generated from smaller areas with rich data.

Presentation 2 showed early results from D4.3 "Correcting misinformation with efficient explainability methods" that will be submitted at the end of the HERoS project in parallel with the amended version of this deliverable. It introduced the MisinfoMe Bot [@MisinfomeB] that was used to counter COVID-19 misinformation on twitter. The bot used seven different templates for responding to misinformation, using factual / alerting / identity / suggestive / empathetic / alarming / friendly language. User responses to getting a fact check from the bot were then evaluated for their reactions, further attributing whether these reactions were positive, negative or neutral. Common responses are summarised in Figure **13**.
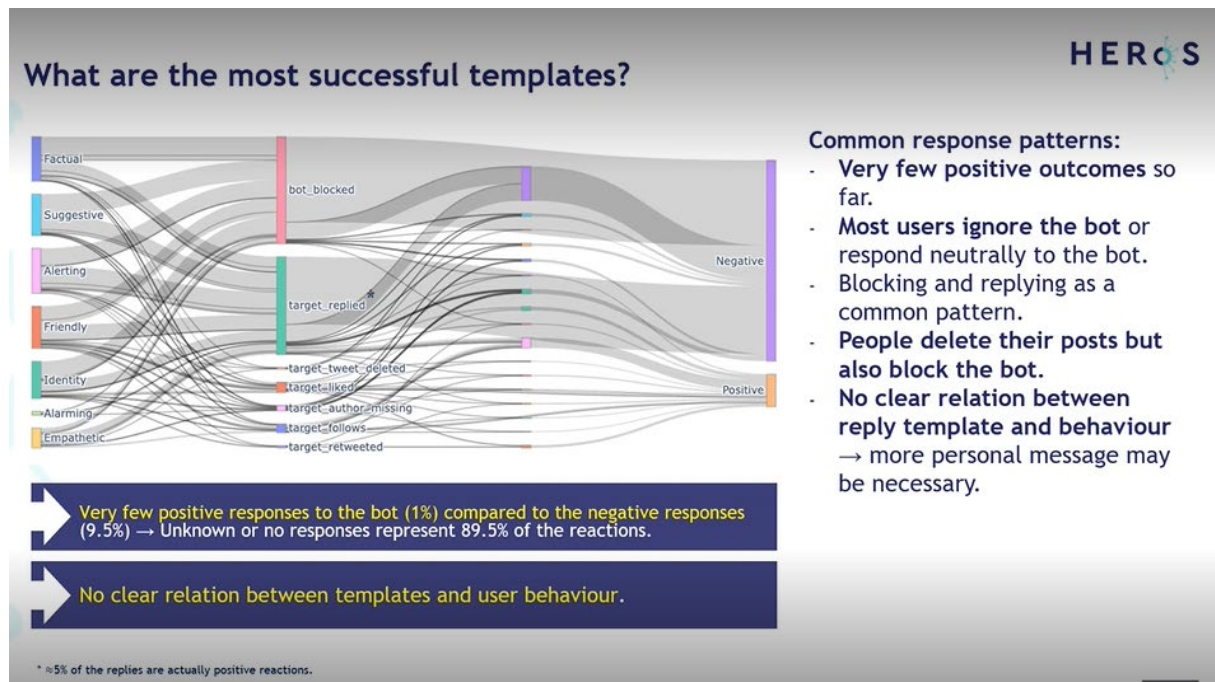
Figure 13 Common response patterns to the MisinfoMe fact-checking bot

The third presentation focused on results from D3.3 "Demonstration of drone deliveries to quarantines on the UAV full mission simulator" and in particular on their recommendations for international and local UAV delivery rules that must take into account:
- Uniform rules of air traffic connectivity
- Standard definitions of the customs duty system
- Specifications of the liability system for aviation
- Specifications of the applicable laws to the flight

Presentation 4 showed the HERoS MOOC, which is also presented in section 3 of this document.

Finally, HERoS partner Project HOPE presented their COVID-19 response around the world, showing a frontline perspective. This included training nurses, healthcare worker training (together with Brown University) for over 100 000 healthcare workers in 40 countries, with modules on
- Infection prevention and control
- Surveillance and screening
- Triage and stabilization
- Diagnosis and management
- Health facility operations and surge capacity
- Risk communications and public health messaging
- Case studies and simulations for practice

More details were presented about Project HOPE's COVID-19 response in India in the second wave (April 2021) and to Nepal's second wave (April 2021). Figure **14** summarises Project HOPE's supply chain experience and challenges from the COVID-19 response.
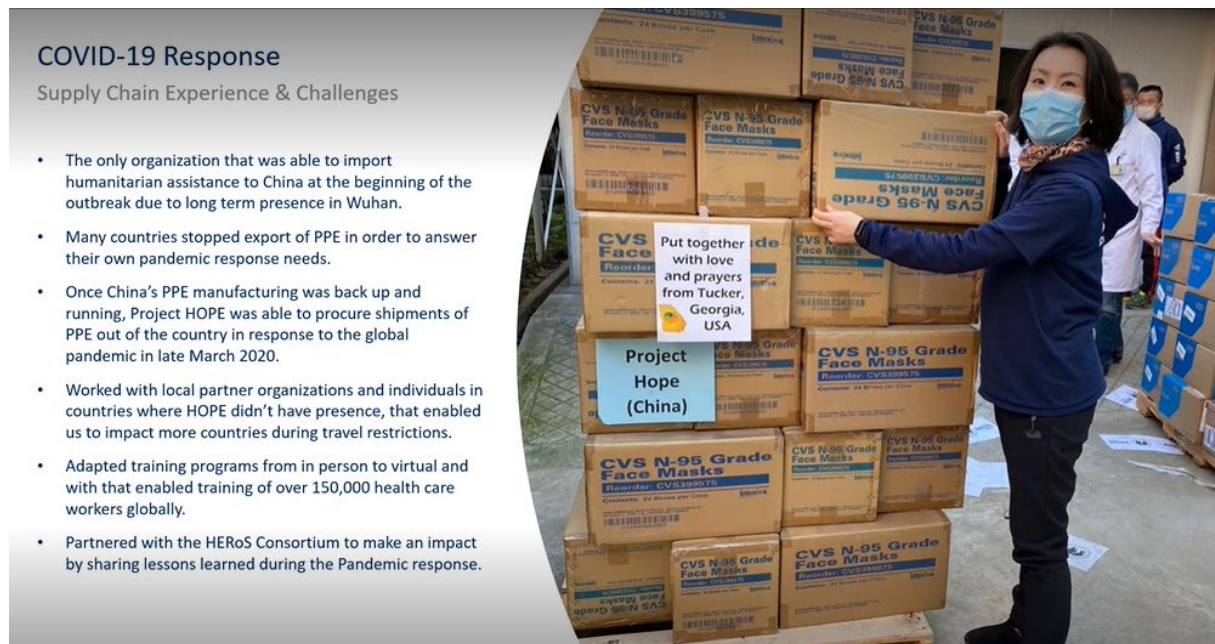
Figure 14 Project HOPE's supply chain experience and challenges from the COVID-19 response

2.5. Final conference

The HERoS project invited to a final conference and seminar on May 25, 2023 in Gdansk, Poland. This was held as a full day face to face seminar with 45 registered participants, and brought together the presentations from all deliverables and outputs of the project. Invitations were extended to sister projects, and three of them also presented their current status and results as relevant to pandemic response:
- sCience and human factOr for Resilient society (CORE, No. 101021746)
- RESpondIng to outbreaks through co-creaTIve sustainable inclusive equality stRatEgies (RESISTIRÉ, No. 101015990)
- Improving the Preparedness of Health Systems to Reduce Mental Health and Psychosocial Concerns resulting from the COVID-19 Pandemic (RESPOND, No 101016127)

Furthermore, apart from HERoS' results, the ICM epidemiological model of Poland was presented to complement the WP1 panel. In the exhibition space, HERoS partners and also sister projects could show their COVID-19 pandemic response-related activities. HERoS also had stands to demonstrate the Fact-Checking Observatory (from WP4), the drone simulation (WP3), and participatory research using visual methods (WP1).

The following lessons learned cases from WP1 were presented more in detail at the final conference:
- Decision-making at Dutch nursing homes during the COVID-19 pandemic
- Joint procurement of vaccines
- International deployment of Emergency Medical Teams (EMTs)
- Local solidarity networks: Municipio Solidade Roma

The conference was filmed, and the film will be available on the HERoS website shortly.

3. MOOC – Health Emergency Response to a Pandemic

A massive open online course (commonly known in short as MOOC) is a course that is available for anyone to enrol via the Internet. In contrast to traditional courses, which are limited to a particular class size, a MOOC can be taken by anyone from any part of the world. The course content is available online, and learners can complete the course at their own pace. There are different types of MOOCs: some are "always online", whereas others are facilitated during specific time periods. The HERoS MOOC is both: it has an always online version that launched on February 6, 2023 but facilitated for the first batch from March 20 – April 16, 2023.

The massive open online course (MOOC) "Health Emergency Response to a Pandemic" brings together the lessons learned in combating this unprecedented global crisis in the areas of epidemiological and behavioural modelling, governance, medical supply chain management, and social media analytics. It combines findings and results from all the WPs in the HERoS project and draws on the previous training session that had been developed for HERoS end users. The HERoS end user training has been previously reported on in D5.5. Notably, given the interest of end users in training, it has since been given another time to Project HOPE members in November 2022.

The MOOC targets a wider audience and intends to reach out to relevant policy-makers and decision-makers in a wide array of organisations, including local and national governments, public healthcare actors, but also companies relevant to healthcare supply chains, disaster management organisations, humanitarian organisations, etc. As a MOOC, it is designed to embrace learners from very different backgrounds and enable cross-learning among them. During the course, the learner will be introduced to different concepts relevant to an appropriate health emergency response during a pandemic.

The HERoS MOOC is designed as a four-week long course[1] with the following learning objectives:
- To assess different pandemic scenarios and make decisions under uncertainty (Week 1)
- To discuss crisis governance strategies and various elements that contribute to an effective pandemic response (Week 2)
- To discuss issues and potential solutions in medical supply chains during a pandemic (Week 3)
- To identify the negative effects of misinformation during emergency response situations (Week 4)

In the first week of the course, the learner will learn about different models to tackle uncertainty and how to make objective decisions under uncertainty. In the second week, the learner will be introduced to the concepts of crisis governance, societal resilience, and vulnerability. The third week will discuss the medical supply chain, including its special characteristics, disruptions experienced, economic impact and innovative logistics solutions that can be used during a pandemic. In the final week of the course, the learner will learn about the information environment in a pandemic, how to fact-check and tackle misinformation, and various trends and patterns of online information.

FutureLearn has been selected as the online platform for the MOOC[2]. The platform provides learners with the opportunity to receive a certificate of completion from the MOOC. Apart from this, the MOOC

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[1] Learners should manage to go through the course within four weeks, regardlless on whether they opt for the always online, or the facilitated version of the course.

[2] FutureLearn is the platform supported by the Hanken School of Economics and used across its current MOOCs.

is also integrated in a course at the Hanken School of Economics (the HERoS consortium lead) where participants can get study credits upon completing the MOOC and additional assignments. The course description can be found here. The course is provided as an optional course to all MSc students at Hanken.

The following sub-sections report the MOOC development process as well as present a summary of the content and structure of the MOOC. The MOOC was launched on February 6, 2023; its trailer is already available on the HERoS website and YouTube channel (https://youtu.be/cbyQ5lsvyF0).

3.1   The MOOC development process

The development of the HERoS MOOC is led by the Hanken School of Economics (HANKEN) but co-developed with Technische Universiteit Delft (TU Delft), Vrije Universiteit Amsterdam (VU Amsterdam), and the Open University (OU). All other project partners, such as Nordic Healthcare Group (NHG), Space Research Centre (CBK), Squadron Sp. z o.o.(SQU), Associazione Della Croce Rossa Italiana (CRI), Project Hope, and Polish Center for International Aid (PCPM) actively participated in the creation of the MOOC content, while ARTTIC helped with the project management, communication, and visualisation. The project management part of ARTTIC involved setting up meetings for MOOC discussions as well as checking thoroughly the visual aspects of MOOC such as certificate and videos so that they align with the HERoS project guidelines as well as the EU requirements.

The MOOC development process for the HERoS MOOC can be divided into three phases: preparation phase, content creation phase, and content evaluation phase. The timeline for each phase, along with the tasks involved, are presented in Table 7.

Table 7: HERoS MOOC development tasks and timeline

Phases	Tasks	Timeline
Preparation phase	• Getting to know MOOC and FutureLearn platform • Introducing MOOC and FutureLearn to project partners • Development of course template • Deciding on the course content • Expression of interest to FutureLearn about the course	February 2022-May 2022
Content development phase	• Course structure creation • Content creation and putting the contents into meaningful steps of articles, discussions, quizzes, and polls • Recording and editing videos	June 2022—November 2022
Evaluation phase	• Checking the contents' appropriateness for the MOOC • Aligning it for the MOOC and FutureLearn Platform • Uploading the content to the Future • Final adjustments and finetuning • Sending the content to FutureLearn • Incorporating feedback from FutureLearn	December 2022-January 2023

In the preparation phase, the main concern was getting to know the requirements to create a MOOC. The preparation phase required not only constant discussions with the project partners but also with FutureLearn and the Hanken Teaching Lab. Though it was the first MOOC for some HERoS project partners, it was not a first for Hanken Teaching Lab. Therefore, the teaching lab at Hanken provided

relevant expertise and knowledge to make the content and structure of the course more suitable for MOOC and FutureLearn.

In the development phase, the focus is shifted towards distilling the research conducted under the HERoS project and putting it in a meaningful manner into various steps and activities to match the requirements of the FutureLearn platform. Here it is worth noting that in the FutureLearn platform, the course contents are designed in a week format. The weeks are then divided into different activities. Each activity addresses one particular topic and can be further divided into several steps. For instance, an introduction to a week is an activity which can have two steps: introduction to the week's content and introduction to the week's educators. Each step can take any form, such as an article, a discussion, a video, an audio, a poll, a quiz, or an exercise.

The HERoS MOOC is structured into four weeks of course content (see Appendix-1). Each WP leader (e.g., Hanken, VU, TUD and OU) developed one week of content. Week 1 is led by TU Delft but developed with the help of NHG and CBK. Week 2 content is developed by VU Amsterdam. Hanken, together with Squadron, developed week 3 content. Week 4 is developed by The Open University. In addition, data, videos, case studies and various activities came from all other HERoS partners.

The topics covered matched the research conducted under the HERoS project in WPs 1 – 4:
- Week 1 Making sense of COVID-19 data, models and their visualisation (from WP2)
- Week 2 Governance in pandemics (from WP1)
- Week 3 Securing medical supply chains (from WP3)
- Week 4 Social media analytics of misinformation spread in pandemics (from WP4)

The detailed steps and activities covered in each week are described in subsections 3.2 - 3.6.

The evaluation phase involved a lot of checks and balances to align the course content and fit into the FutureLearn platform. Each MOOC platform (e.g., edx and Coursera) comes with its own set of constraints, boundaries and challenges. FutureLearn is no different. Therefore, even after the course content is fully developed, constant adjustments are made to fit into the mould of the platform. Hanken's Teaching Lab provided much of the support with regard to uploading the content and checking the content's suitability for the MOOC.

All three phases involved lots of coordination between partners, which required regular meetings as well as numerous email exchanges with the project partners. Appendix 2 shows the meetings that were held during the development process. Even though the content development is led by Hanken, each WP leader, as well as project partners who are not WP leaders, participated actively during the development process. For instance, for Week 3, Squadron was involved in recording a video related to drones. All the end users CRI, Project HOPE and PCPM, have also recorded videos for the MOOC. One of the team leads of Project HOPE in India even recorded a podcast to be shared in the MOOC.

Thus throughout the development process of this MOOC, it was ensured that all partners of the HERoS project cooperate, collaborate, coordinate and communicate regularly for the successful completion of the MOOC's development. The entire process took around a year from start to finish.

3.2   Week 1: Making sense of COVID-19 data, models and their visualisation

The first week of the MOOC is developed based on WP2. WP2 aims to develop robust policies that are efficient and effective in combatting the outbreak of epidemic disease. The content of week 1 in the MOOC has been represented in five main components as follows.

3.2.1 Introduction to the week

As with many other crises, the COVID-19 pandemic resulted in enormous amounts of data. These data range from the number of positively tested individuals to socio-demographic, economic and travel data. Researchers, public health authorities, companies and volunteers have started building models, dashboards and visualisations on top of them. However, very often, it is not clear how to interpret such a model, especially if data is conflicting and uncertain. How should we navigate the plethora of models and information portals? What do we need to be aware of when someone's model is "predicting" the pandemic will be over in a few weeks?

The goal of Week 1 is to familiarise learners with the basics of healthcare data, models and data visualisations.

3.2.2 Learning outcomes

After successful completion of this week, the learner will
- Know what healthcare data is and how to use it,
- Be familiar with healthcare data's regulatory environment and how it can be managed,
- Know what a model is, how to represent complex models, the types of models, and how to make them,
- Be aware of the role of uncertainty in computational models and the instruments to address it,
- Know the ways to visualise data and factors making it good, and
- Distinguish the types of data that can be investigated with COVID-related interactive dashboards.

3.2.3 Topics covered

Week 1 includes the following topics:
- Making sense of COVID data, models and their visualisation.
- Healthcare data.
- Computational models and how to use them.
- Visualisations of COVID-19 data and models.
- COVID-19 dashboards and reflects on how useful they are.

3.2.4   Activities and steps

Week 1 contains the following activities and steps:

Activity 1: Welcome to the course!
In this activity, the learner will be introduced to the course's "health emergency response to a pandemic" content and educators.
- Step 1.1: Introduction to Health Emergency Response to a Pandemic
- Step 1.2: Meet the lead educators
- Step 1.3: Introducing yourself

Activity 2: Making sense of COVID data, models and their visualisation
In this activity, the learner will be introduced to this week's educators and also will be introduced to COVID data, models and their visualisation.
- Step 1.4: Introduction to COVID data, models and their visualisation.
- Step 1.5: Introduction to this week's educators.

Activity 3: Healthcare data
In this activity, the learner will learn about healthcare data, considerations with COVID-19 health data and utilisation, and healthcare data use case.
- Step 1.6: What is healthcare data?
- Step 1.7: Considerations with COVID-19 health data and utilisation
- Step 1.8: Healthcare data use case

Activity 4: Computational models and how to use them
In this activity, the learner will learn about those models. How do they work? Are they magic "crystal balls"?
- Step 1.9: What is a model
- Step 1.10: Complex models of complex systems
- Step 1.11: All models are wrong or the role of assumptions in modelling
- Step 1.12: Uncertainty and its role in computational models
- Step 1.13: To model or not to model?

Activity 5: Visualisations of COVID-19 data and models
This activity will guide the learner through various visualisation techniques that transform data into actionable information.
- Step 1.14: Data and models visualisation techniques: chart types
- Step 1.15: Data and models visualisation techniques: thematic maps
- Step 1.16 Visualisation dashboards to enhance situation awareness of COVID-19 pandemic
- Step 1.17: Design a visualisation
- Step 1.18: What makes a visualisation good?
- Step 1.19: COVID-19 data visualisation – dos and don´ts?

Activity 6: Wrap-up of Week 1
This activity will provide a short recap and a quiz on what the learner has learned during the week.
- Step 1.20 What did you learn this week?
- Step 1.21 Summary of the week

3.2.5 Summary of the week

During Week 1, learners meet educators and introduce themselves. In terms of content, learners familiarise themselves with various types of healthcare data and learn about diverse examples of how such data can be quantified and visualised. Learners engage with different models, and are made aware of how these models are constructed, and how they deal with uncertainty and its quantification. Finally, during the last activity of the week, learners make use of COVID-related interactive dashboards and create their own visualisations.

3.3   Week 2: Governance in pandemics

Week 2 of the MOOC is developed based on WP1. WP1 aimed to analyse workflows, processes, coordination structures and multi-layered governance arrangements in response to the COVID-19 pandemic. Research in this WP is related to establishing governance principles and protocols that enable seamless coordination between sensemaking and decision-making locally, nationally and internationally. The content of week 2 in the MOOC is represented in five main components as follows.

3.3.1   Introduction to the week

The focus of week 2 is on crisis governance theories and their applications in the context of pandemic response, and what aspects contribute to tailoring such a crisis response to societal needs. The week introduces the concepts of crisis governance, the whole-of-society governance approach, societal resilience, compliance theory, vulnerability, and slow-burning crises.

3.3.2   Learning outcomes

After successful completion of this week, the learner will:
- Gain a general understanding of crisis governance theories,
- Learn about different forms of crisis responses during the COVID-19 pandemic,
- Learn about varying elements of crisis responses, such as collectivity and collaboration,
- Gain a general understanding of societal resilience theory,
- Know the difference between a slow-burning and acute crisis and how resilience and vulnerability have diverging manifestations in crises,
- Learn about visual methods and their contribution to community engagement, and
- Be able to formulate policy recommendations for crisis response strategies within the learner field of work.

3.3.3   Topics covered

Week 2 includes the following topics:
- Crisis governance and sensemaking
- Societal resilience in times of crisis.
- Using visual methods
- What can we learn from Covid-19 crisis governance?

3.3.4   Activities and steps

Week 2 contains the following activities and steps.

Activity 1: Introduction to Week 2
In this activity, the learner will be introduced to the content of week 2 of the course and the week's educators.
- Step 2.1 Introduction to crisis governance
- Step 2.2. Introducing this week's educators

Activity 2: Crisis governance and sensemaking
In this activity, the learner will be introduced to the theory around crisis governance, sensemaking and decision-making during a pandemic.

- Step 2.3 Theoretical framework on crisis governance – Part 1
- Step 2.4 Theoretical framework on crisis governance – Part 2
- Step 2.5 Sensemaking and decision-making during a pandemic
- Step 2.6 Sensemaking and decision-making during crises

Activity 3: Societal resilience in times of crisis
In this activity, the learner will be introduced to the theory around societal resilience and vulnerability in crisis governance. The learner will also learn about different manifestations of resilience in a slow-burning crisis compared to an acute crisis.

- Step 2.7 Societal resilience and community engagement
- Step 2.8 How to strengthen crisis response through societal resilience
- Step 2.9 Resilience in an acute crisis
- Step 2.10 Resilience in a slow-burning crisis

Activity 4: Using visual methods
In this activity, the learner will be introduced to a case study about the COVID-19 pandemic in Dutch secondary schools. The learner will first learn how visual methods can contribute to community engagement. Then, the learner will watch an ethnographic film and reflect on this.

- Step 2.11 Community engagement and visual methods
- Step 2.12 Ethnographic film 'We thought it would be fun'
- Step 2.13 Ethnographic Film reflection

Activity 4: What can we learn from COVID-19 crisis governance?
In this activity, the learner will be asked to put the theories from previous activities to use in formulating policy recommendations within the learner field of work, learning from the case study of Dutch secondary schools.

- Step 2.14 Policy recommendations: responding to diverging vulnerabilities in crisis governance
- Step 2.15 Policy recommendations for the learner field of work

Activity 5: Wrap-up of Week 2
This activity will provide a short recap, and a quiz on what the learner has learned during the week.

- Step 2.16 What did you learn this week?
- Step 2.17 Summary of the week

3.3.5 Summary of the week

This week, learners have got an overview of crisis governance theories, and learned about collaborative crisis governance and its relation to collective sensemaking and collaborative unlearning processes. They have also learned the importance of considering societal resilience and vulnerability as crucial elements in crisis response. Finally, the learners have analysed several case studies about vulnerability during crises and ultimately learned how to form policy recommendations based on considering these vulnerabilities.

3.4 Week 3: Securing medical supply chains

Week 3 of the MOOC is developed based on WP3. The WP3 focuses on medical supply chains for supporting the response to a public health emergency to improve the security of supply of critical items. This includes using novel delivery methods to quarantine zones, as well as assessing the local and global economic impact of supply chain disruptions due to the COVID-19 outbreak. The content of week 3 in the MOOC has been represented in five main components as follows.

3.4.1 Introduction to the week

The main focus of this week is medical supply chains. This week, the following topics are discussed
- What is a medical supply chain?
- What are the different kinds of flows in a medical supply chain?
- Who are the stakeholders?
- What are the special characteristics of a medical supply chain?
- What types of disruptions can hamper a medical supply chain?
- Differences between preparedness and response
- What was the economic impact of COVID-19?
- Challenges and potentials of using technologies such as drones for pandemic response

The topics are presented in the form of videos, articles, discussions, and podcasts. In the end, learnings of the learners are tested by a quiz.

3.4.2 Learning outcomes

After successful completion of this week, the learner will:
- Understand medical supply chains,
- Identify flows and stakeholders of medical supply chains,
- Assess the impact of disruptions on the medical supply chain,
- Discuss innovative solutions for last-mile deliveries in the medical supply chain, and
- Understand the economic impact of the COVID-19 pandemic.

3.4.3 Topics covered

This week covered the following topics:
- Understanding medical supply chains
- Disruptions, preparedness and response
- Last mile delivery for securing medical supplies
- Impact of COVID-19 on the medical supply chain

3.4.4 Activities and steps

Week 3 contains the following activities and steps.

Activity 1: Introduction to Week 3

In this activity, the learner will be introduced to what will be learned this week and the week's educators.
- Step 3.1 Introduction: medical supply chains
- Step 3.2 Introducing this week's educators

Activity 2: Understanding medical supply chains
In this activity, the learner will be introduced to the content of week 3, medical supply chain, the characteristics of medical supply chains, the need for temperature control, and COVID-19 responses from an NGO.
- Step 3.3 What is a medical supply chain?
- Step 3.4 Describe a medical supply chain
- Step 3.5 Special characteristics of medical supply chains
- Step 3.6 Temperature control in the medical supply chain
- Step 3.7 COVID-19 responses from an NGO: Project Hope in India
- Step 3.8 COVID-19 responses from an NGO: Project Hope in Nepal

Activity 3: Disruptions, preparedness, and response
In this activity, the learner will be guided to learn about disruptions, preparedness, and response in the medical supply chain.
- Step 3.9: Disruptions in the medical supply chain
- Step 3.10: How to secure the medical supply chain
- Step 3.11: How to secure the medical supply chain (part-2)
- Step 3.12: Pandemic preparedness and response
- Step 3.13: Responding to the COVID-19 pandemic from first responders
- Step 3.14: Responding to the COVID-19 pandemic from first responders
- Step 3.15: A case of supply chain disruptions during the pandemic

Activity 4: The last-mile delivery for securing medical supplies
In this activity, the learner will Learn about the challenges and solutions for last-mile delivery in the medical supply chain.
- Step 3.16: The last-mile delivery challenges and benefits of using drones
- Step 3.17: Potentials of drone deliveries
- Step 3.18: A medical cargo delivery system
- Step 3.19: Preparing for emergency medical deliveries using drones

Activity 5: Impact of COVID-19 on the medical supply chain
In this activity, the learner will Learn about the impact of COVID-19 on the medical supply chain and the lessons learned.
- Step 3.20: The economic impact of COVID-19
- Step 3:21: Challenges during COVID-19 and lessons learned
- Step 3.22: Impact of COVID-19

Activity 5: Wrap-up of week 3
This activity will provide a short recap and a quiz on what the learner has learned during the week.
- Step 3.23: What did you learn this?
- Step 3.24: Summary of the week

3.4.5 Summary of the week

Week 3 focuses on different aspects of medical supply chains. This week, learners have analysed the flows and stakeholders and other special characteristics of medical supply chains, thereby also being able to spot and understand the impact of disruptions on such supply chains. They have been exposed to different case studies, a framework to categorise supply chain disruptions, and various mitigation strategies to them. Finally, learners have put the impacts of such disruptions into a larger economic context.

3.5   Week 4: Social media analytics of misinformation spread in pandemics

Week 4 of the MOOC is developed based on WP 4. The objectives of this WP were to track COVID-19 misinformation content and spread it on social media using legitimate assessments from fact-checkers. The WP developed methods for automatically categorizing social media posts as relevant or irrelevant to the given crisis. The content of week 4 in the MOOC has been represented in five main components as follows.

3.5.1 Introduction to the week

This week, we will show how the online information environment can also cause disruption with the spread of false claims and fake content. During COVID-19, we have experienced challenges like panic buying, unavailability of PPE or vaccine hesitancy, all of which may be influenced by what we see online. Whether you're a private citizen, an organisation delivering services during the pandemic, or a policy maker, understanding misinformation is an important part of decision-making while living with COVID-19.

This week, the discussion will be on several approaches and tools that can be used to explore social media misinformation topics and help in understanding the information environment during pandemics.

3.5.2 Learning outcomes

After successful completion of this week, the learner will able to:
- Understand the role of misinformation and fact-checks in pandemics,
- Grasp different approaches for handling misinformation online,
- Measure credibility and trust in information online,
- Understand trends and patterns in misinformation online, and
- Understand how conspiracies and persistent misinformation spread online.

3.5.3 Topics covered

Week 4 covers the following topics:
- Understanding misinformation
- Social media analysis in misinformation research
- Source credibility and trust

- Trends and patterns of misinformation and fact-checking

3.5.4 Activities and steps

Week 4 contains the following activities and steps.

Activity 1: Introduction to Week 4
In this activity, the learner will be introduced to what will be learned this week and the week's educators.
- Step 4.1: Introduction: misinformation in pandemics
- Step 4.2: Introducing this week's educators

Activity 2: Understanding misinformation
In this activity, the learner will get an introduction to week 4 of the course. This week, the focus will be on social media analysis of misinformation, particularly as it relates to COVID-19.
- Step 4.3: Recognising health-related misinformation
- Step 4.4: Misinformation on social media
- Step 4.5: Misinformation types

Activity 3: Social media analysis in misinformation research
This activity introduces how misinformation is researched and some of the different approaches used to mitigate it. In particular, the information that people see on social media.
- Step 4.6: Fact-checking on social media
- Step 4.7: Other approaches to managing misinformation
- Step 4.8: Dealing with misinformation online
- Step 4.9: Challenges of dealing with misinformation

Activity 4: Source credibility and trust
In this activity, the learner will be introduced to one of our own tools that we created to help people assess the credibility of their sources.
- Step 4.10: Assessing source credibility: MisInfoMe
- Step 4.11: Using MisInfoMe to assess source credibility

Activity 5: Trends and patterns of misinformation and fact-checking
In this activity, the learner will be exploring ways to amplify fact-checkers' work in understanding the flow of information and the potential impact of fact-checking on misinformation spread.
- Step 4.12: The Fact-Checking observatory
- Step 4.13: Understanding and affecting the co-spread of misinformation and fact-checks on social media
- Step 4.14: Using the Fact-Checking Observatory

Activity 6: Wrap-up of week 4
This activity will provide a short recap and a quiz on what the learner has learned during the week.
- Step 4.15: What did you learn this week?
- Step 4.16: Summary of the week
- Step 4.17: Week's evaluation

Activity 5: Course Wrap-up

This activity will provide a summary of what the learner has learned during the course and a final test of the course material.

- Step 4.18: Summary of the course
- Step 4.19: A look back on what you learned
- Step 4.20: Final test

3.5.5 Summary of the week

The last week focuses on the spread of misinformation and disinformation on social media. In the first activity, the topic of misinformation was introduced, and some difficulties in spotting misinformation online were discussed. Next, learners review different types of misinformation, which may be helpful to discern different types of misinformation, such as completely fabricated content, conspiracies, disinformation and misleading content. In the second activity, mitigation strategies are addressed such as fact-checking or "de-bunking". In a later step, two approaches to fighting misinformation are introduced: pre-bunking (or inoculation), and information literacy. This includes the introduction of MisInfoMe, which is a tool developed by researchers at the Open University to support further information literacy and awareness of misinformation on social media. Learners use this tool to explore misinformation that may have been shared over the Twitter platform and to perform a credibility check on different websites. Next, learners are introduced to the fact-checking observatory (FCO), where they can follow how the FCO draws on fact-checkers' work to understand trends and patterns in misinformation and fact-checking efforts on social media.

Finally, the week closes the entire course with some joint reflection and a final test.

3.6 Feedback from the first facilitated run of the MOOC

The massive open online course (MOOC) "Health Emergency Response to a Pandemic" was launched on February 6, 2023, and delivered to the first batch of learners between March 16 and April 20, 2023. In this first facilitated run, the HERoS MOOC has been taken by a variety of learners across the globe and facilitated by MOOC developers from five universities supported by other HERoS partners.

The MOOC consists of four different topics that distil the learning from HERoS WPs 1-4 (making sense of COVID-19 data, governance in pandemics, securing medical supply chains, and social media analytics of misinformation spread in pandemics) into articles, videos, podcasts, discussions, and quizzes. In the MOOC, four weeks of content is delivered with the following learning objectives:

- To assess different pandemic scenarios and make decisions under uncertainty (Week 1)
- To discuss crisis governance strategies and various elements that contribute to an effective pandemic response (Week 2)
- To discuss issues and potential solutions in medical supply chains during a pandemic (Week 3)
- To identify the negative effects of misinformation during emergency response situations (Week 4)

The MOOC of Health Emergency Response to a Pandemic has been delivered on FutureLearn as an online platform which provides access to MOOC content for learners with the opportunity to receive a certificate of completion from the MOOC according to the platform system.

3.6.1 Learner profile

In the first run of Health Emergency Response to a Pandemic MOOC, a diverse group of learners has characterised the first batch. The learners varied in age, and country and other characteristics. Data on learner profiles have been extracted from the FutureLearn platform. Figure 15 and Figure 16 show different demographics, vs. Figure 17 the learner engagement of participants during weeks 1 – 4 of the MOOC.

The MOOC has attracted the attention of 158 learners who have signed up from 51 countries on all continents Asia, Europe, North and South America, Africa and Australia.
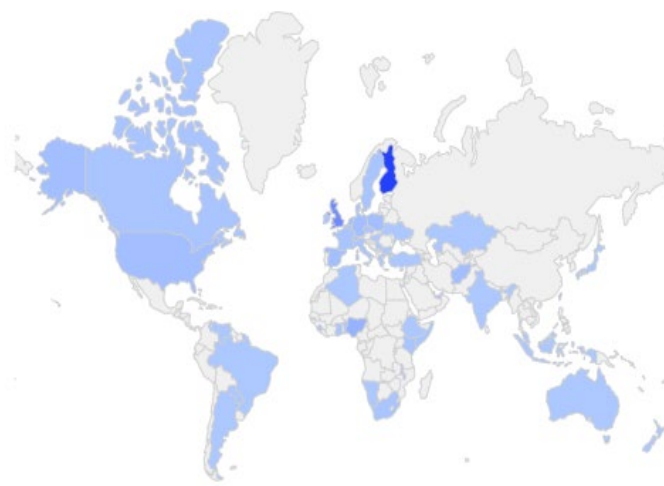
Figure 15 Geographical distribution of learners

The following figure shows the age distribution of the MOOC joiners. The distribution reveals that most of the age categories took the course from categories 18 to above 65 years; however, a considerable number of learners did not respond to this, but the distribution of age shows fair participation from different age categories.

Enrolments by age range

Age range	Percentage
<18	0%
18-25	1%
26-35	2%
36-45	7%
46-55	2%
56-65	6%
>65	5%
Unknown	77%
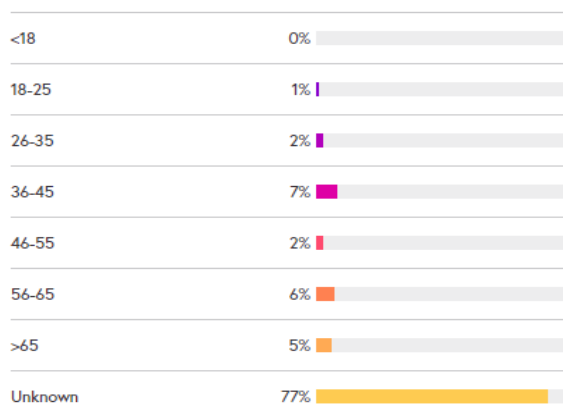
Figure 16 Demographic distribution of learners

Through the facilitation period, the learners of Health Emergency Response to a Pandemic MOOC have been engaged in the course by performing the designed activities, such as going through the steps, completing the tasks, commenting, and asking questions. The platform measures the steps visited by learners, and categorises them into active vs social learners depending on how they interact with one another.

Week	1	2	3	4
Learners visiting steps	146	76	67	64
Active learners	85	63	53	50
Social learners	44	25	16	23
Visited Steps	1,759	1,070	1,370	1,017
Average visited steps per user	12.05	14.08	20.45	15.89
Completed steps	1,379	891	1,129	836
Average completed steps per user	16.22	14.14	21.3	16.72
Comments	142	83	90	93
Average comments per user	3	3	5	4

Figure 17 Learner engagement

3.6.2 End of MOOC survey results

The platform runs a standard survey for all its MOOCs as a final step with learners. The statistics in the figures extracted from Futurelearn post-course survey. While overall response rates are rather low in these surveys Figure **18** shows the response to the question whether the course had met the expectations of the learner, Figure **19** to the question of having acquired new knowledge or skills, and Figure **20**, whether the learner has applied any of their learning since starting the course.

Did this course meet your expectations?   Responses (23)

Yes, the course was better than I expected	26%
Yes, the course met my expectations	61%
No, the course was worse than I expected	4%
Not sure	9%

Figure 18 Meeting expectations

Did you gain new knowledge or skills by taking the course?   Responses (22)

Yes	100%
No	0%
Not sure	0%

Figure 19 New knowledge or skills

Results are overwhelmingly positive, with 26% of learners saying that the course was better than they had expected, and 61% confirming that it met their expectations; and all respondents attesting to

having learned something new. Even more intestingly, 45% of respondents had already had a chance to apply their new learning during the events of the course.

Figure 20 Application of learning

3.7 Integration of the MOOC in the curriculum

The MOOC has also been integrated into the curriculum of the HERoS co-ordinator at the Hanken School of Economics as course code 38026, Health Emergency Response and Medical Logistics, on t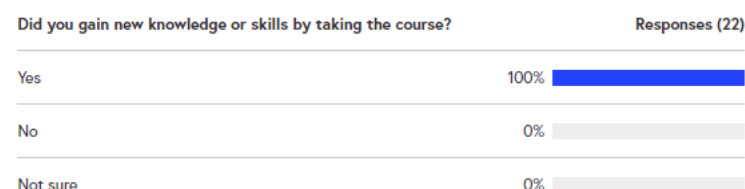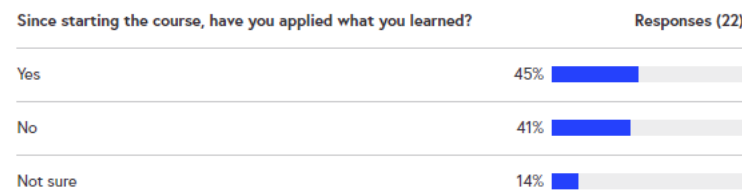he MSc level. To pass this course, participants had to first pass the MOOC and then apply their learning further in a separate final assignment.

Instructions for the final assignment were as follows:

> You have been hired as a consultant for a city of your choice. While there have necessarily been any specific threats identified so far, there is a general consensus that it is only a question of time until the city is affected by another pandemic. After reviewing the city's response to the COVID-19 pandemic, it was found that there is room for improvement for any future pandemics. To help them be better prepared, the city council has tasked you, as a pandemic preparedness consultant, with writing a short report on what the city should do to prepare in two areas of concern:
> 1. A plan for securing medical supplies and how to integrate innovative solutions to combat negative effects of the pandemic on these supply chains.
> 2. A plan for what data should be collected on the pandemic and which models need to be developed to enable informed decision making by the city council.
> OR
> A framework for the city council's crisis governance, sense-making and decision-making processes during the pandemic.
> OR
> A plan for finding and combatting online misinformation during the pandemic.

While most participants focused on Finnish cities (e.g. Helsinki, Espoo, Vantaa, Vaasa, Hanko), assignments also included a focus on cities around the world, including e.g. Hradec Králové, Manila, Montreal, Mumbai, Nairobi, Stockholm, and Tianjin.

Altogether, 55 participants took part in the MOOC and an additional final assignment on the basis of the MOOC at Hanken. A separate course evaluation was run for these participants (focusing on the MOOC plus the final assignment). Results from this evaluation are as follows (all on 1-5 scales, with 5 as highest):
- Overall grade for the course: average: 4.0, standard deviation: 0.8
- I would recommend the course to other students: avg. 4.0, standard deviation: 1.1
- I have achieved the learning objectives and have acquired the expected skills and knowledge from the course: avg. 3.8, standard deviation: 0.9

4. Conclusions

Over the last three years (2020 - 2022), HERoS' project partners completed most of the deliverables of HERoS content work packages (WPs 1-4). Throughout the project, results from these WPs were presented at periodic joint webinars, as well as informed different types of trainings.

The HERoS webinars were paced out across the years of the project. They distill the results of the project at their given times, and reflect also the new elements that HERoS' research engaged with over the years. They need to be read as a product of their time; with the first webinar focusing on the results of the first six months or the "rapid response phase" of the project; the second incorporating first lessons learned but also new aspects regarding e.g. COVID-19 vaccines and variants; and the third bringing more insights from further case studies and lessons learned. Each of them also provided a sneak peak to ongoing work in the project, some of which was published only somewhat later in various deliverables. The webinars also introduced many tools and factsheets developed in the HERoS project. All the webinars are recorded and published on YouTube and HERoS website.

The last two months of the project (extension based on amendment requests) complemented these with two further joint dissemination events: A HERoS seminar at HNPW 2023, and the HERoS final conference.

Apart from these, D5.6 also reports on the development of the second main training activity in the HERoS project, a massive open online course (MOOC). As in the previous training that was geared towards HERoS end users (and reported in D5.5), also this training is based on the needs of end users, however, now geared towards a wider audience, such as first responders, decision-makers, policymakers, and students aspiring to work in a health emergency context. The MOOC itself consists of many different activities that distill the learning from HERoS WPs 1-4 into articles, videos, podcasts, discussions and quizzes. The MOOC allows more end users and decision-makers to learn from the project's results, thereby widening the impact of HERoS to a global audience. Apart from the response during its first facilitated run in the spring of 2023, it needs to be noted that the MOOC remains open and will be integrated in at least two further years (spring 2024 and 2025) in the curriculum of the HERoS co-ordinator, the Hanken School of Economis.

Appendix 1

Appendix 1.1 MOOC week 1 planning

Week 1 focus: Making sense of COVID-19 data, models and their visualisation. Approximate learning time for this week: 5 hours

Activities	Steps	Step type	Contributors
Activity 1 name: Introduction to the course Learning outcome addressed:	Step 1.1 Introduction to Health Emergency Response to a Pandemic	Article	Technische Universiteit Delft (TU Delft), Nordic Healthcare Group (NHG), Space Research Centre (CBK), and Hanken School of Economics
	Step 1.2 Meet the lead educators	Article	
	Step 1.3 Introduce yourself	Discussion	
Activity 2: Making sense of COVID data, models and their visualisation	Step 1.4 Introduction to COVID data, models and their visualisation	Video	
	Step 1.5 Introduction to this week's educators	Article	
Activity 3 Healthcare data	Step 1.6 What is healthcare data?	Article	
	Step 1.7 Considerations with COVID-19 health data and utilisation	Article	
	Step 1.8 Healthcare data use cases	Discussion	
Activity 4 Computational models and how to use them	Step 1.9 What is a model?	Video	
	Step 1.10 Complex models of complex systems	Article	
	Step 1.11 All models are wrong or the role of assumptions in modelling	Article	
	Step 1.12 Uncertainty and its role in computational models	Video	
	Step 1.13 To model or not to model?	Quiz	
Activity 5 Visualisations of COVID-19 data and models	Step 1.14 Data and models visualisation techniques: chart types	Article	
	Step 1.15 Data and models visualisation techniques: thematic maps	Article	
	Step 1.16 Visualisation dashboards to enhance situation awareness of COVID-19 pandemic	Article	
	Step 1.17 Design a visualisation	Discussion	
	Step 1.18 What makes a visualisation good?	Article	
	Step 1.19 COVID-19 data visualisation- dos and don'ts	Article	
Activity 6: Wrap-up of Week 1	Step 1.20 What did you learn this week?	Quiz	
	Step 1.21 Summary of the week	Article	

Appendix 1.2 MOOC week 2 planning
Week 2 focus: Governance in pandemics. Approximate learning time for this week: 5 hours

Activities	Steps	Step type	Contributors
Activity 1: Introduction to Week 2	Step 2.1 Introduction to week 2	Article	VU Amsterdam
	Step 2.2. Introduction to the lecturers	Video	
Activity 2: Crisis Governance	Step 2.3 Theoretical framework on crisis governance - Part 1	Video	
	Step 2.4 Theoretical framework on crisis governance - Part 2	Video	
	Step 2.5 Sensemaking and decision-making during a pandemic	Article	
	Step 2.6 Sensemaking and decision-making during crises	Discussion	
Activity 3: Societal resilience in times of crisis	Step 2.7 Societal resilience and community engagement	Video	
	Step 2.8 How to strengthen your crisis response through societal resilience	Discussion	
	Step 2.9 Resilience in an acute crisis	Article	
	Step 2.10 Resilience in a slow-burning crisis	Article	
Activity 4: Using visual methods	Step 2.11 Community engagement and visual methods	Article	
	Step 2.12 Ethnographic film: 'We thought it would be fun'	Video	
	Step 2.13 Ethnographic film: reflection	Discussion	
Activity 5: What can we learn from Covid-19 crisis governance?	Step 2.14 Policy recommendations: responding to diverging vulnerabilities in crisis governance	Article	
	Step 2.15 Policy recommendations for your own field	Discussion	
Activity 6: Wrap-up of Week 2	Step 2.16 What did you this week?	Quiz	
	Step 2.17 Summary of the week	Discussion	

Appendix 1.3 MOOC week 3 planning

Week 3 focus: Securing medical supply chains. Approximate learning time for this week: 5 hours

Activities	Steps	Step type	Contributors
Activity1: Introduction to Week 3	3.1: Introduction of the week	Video	Hanken School of Economics (HANKEN) Squadron Sp. z o.o.(SQU), Croce Rossa Italiana, Project HOPE, Polish Center for International Aid (PCPM)
	3.2 Introducing this week's educators	Article	
Activity 2: Understanding medical supply chains	3.3: What is a medical supply chain?	Video	
	3.4: Describe a medical supply chain that you have come across	Discussion	
	3.5: Special characteristics of medical supply chains	Video	
	3.6: The need for temperature control in the medical supply chain	Article	
	3.7: COVID-19 responses from an NGO: Project Hope in India	Video	
	3.8: Covid-19 responses from an NGO: Project Hope in Nepal	Video	
Activity 3: Disruptions, preparedness and response	3.9: Disruptions in the medical supply chain	Article	
	3.10: How to secure medical supply chain - Part-1	Video	
	3.11: How to secure medical supply chain - Part-2	Video	
	3.12: Pandemic preparedness versus response	Article	
	3.13: Responding to the COVID-19 pandemic from first responders	Video	
	3.14: Responding to the COVID-19 pandemic from first responders	Video	
	3:15: A case of supply chain disruptions during the pandemic	Discussion	
Activity 4: Last mile delivery for securing medical supplies	3:16: Challenges of and solutions for the last-mile delivery in the medical supply chain	Article	
	3.17: Potentials of drone deliveries	Video	
	3:18: A medical cargo delivery system	Article	
	3:19 Preparing for emergency medical deliveries using drones	Video	
Activity 5: Impact of COVID-19 on the medical supply chain	3:20: The economic Impact of COVID-19	Video	
	3:21: Challenges during COVID-19 and lessons learned	Podcast	
	3:22: Impact of the COVID-19 pandemic	Podcast	
Activity 6: Wrap-up of week 3	Step 3.23 (quiz): What did you learn this week?	Quiz	
	Step 3:24 Summary of the week	Discussion	

Appendix 1.4 MOOC week 4 planning
Week 3 focus: Social media analytics of misinformation spread I pandemics. Approximate learning time for this week: 5 hours

Activities	Steps	Step type	Contributors
Activity 1: Introduction to social media analytics of misinformation spread in pandemics	Step 4.1 Introduction to Week 4	Video	The Open University (OU).
	Step 4.2 Introduction to Week's Educators	Discussion	
Activity 2: Introduction to social media analytics of misinformation spread in pandemics	Step 4.3: Recognising health-related misinformation	Discussion	
	Step 4.4: Misinformation on social media	Article	
	Step 4.5: Misinformation types	Discussion	
Activity 3: Social media analysis in misinformation research	Step 4.6: Fact-checking misinformation on social media	Article	
	Step 4.7: Other approaches to managing misinformation	Article	
	Step 4.8: Dealing with misinformation online	Poll	
	Step 4.9: Challenges of dealing with misinformation	Discussion	
Activity 3: Source credibility and trust	Step 4.10: Assessing source credibility: MisInfoMe	Video	
	Step 4.11: Using MisInfoMe to assess source credibility	Exercise	
Activity 4: Trends and patterns of misinformation and fact-checking	Step 4.12: The Fact-Checking Observatory	Video	
	Step 4.13: Understanding and affecting the co-spread of misinformation and fact-checks on social media	Article	
	Step 4.14: Using the Fact-Checking Observatory	Video	
Activity 5: Wrap -up of Week 4	Step 4.15: What did you learn this week?	Quiz	
	Step 4.16: Summary of the week	Article	
	Step 4.17: Week's evaluation	Discussion	
Activty 6: Course Wrap-up	Step 4.18 Summary of the course	Article	
	Step 4.19: A look back on what you have learned	Poll	
	Step 4.20: Final test	Test	

Appendix 2

Appendix 2 MOOC development meetings

Sl.	Meeting date	Participants	Agenda	Duration (minutes)
1	2.02.2022	HERoS project members at Hanken	How to go about MOOC development	60 minutes
2	3.02.2022	Teaching lab and HERoS project members	Introduction to FutureLearn and MOOC process	30 minutes
3	4.02.2022	Arttic and Hanken project member	Folder for MOOC on HERoS SharePoint	30 minutes
4	8.02.2022	Arttic and Hanken project member	Dissemination of HERoS project	30 minutes
5	8.02.2022	HERoS Executive Board	Introduction of MOOC and course template, structure	60 minutes
6	11.02.2022	Hanken and VU	Introduction to MOOC	30 minutes
7	15.02.2022	Hanken and TU Delft	Introduction to MOOC	60 minutes
8	16.02.2022	Hanken and Project HOPE	HERoS MOOC: how to get involved	Half hour
9	18.02.2022	Hanken HERoS project members and other MOOC leader at Hanken	Timeline for MOOC development	30 minutes
10	21.02.2022	Hanken and CRI	HERoS MOOC: how to get involved	30 minutes
11	22.02.2022	Hanken project members and Hanken	Update on MOOC	45 minutes
12	22.02.2022	Hanken and OU	Introduction to MOOC	45 minutes
13	24.02.2022	Hanken and PCPM	HERoS MOOC: how to get involved	30 minutes
14	08.03.2022	HERoS Executive Board	Update on MOOC and critical decisions	60 minutes
15	11.03.2022	Hanken project members and Hanken	HERoS MOOC course proposal template	30 minutes
16	15.03.2022	Teaching lab and HERoS project members	MOOC questions	20 minutes
17	22.03.2022	Hanken and FutureLearn	MOOC discussion and FutureLearn requirements	50 minutes
18	23.03.2022	Teaching lab and HERoS project members	MOOC planning	30 minutes
19	24.03.2022	Teaching lab and HERoS project members	Course template upload at FutureLearn	30 minutes
20	24.03.2022	Hanken and OU	MOOC and FutureLearn all we need to know	60 minutes
21	07.042022	Hanken project members	MOOC planning	30 minutes
22	12.04.2022	HERoS Executive Board	MOOC update and critical decisions	60 minutes
23	19.04.2022	Teaching lab, Hanken IT and Hanken project members	MOOC planning	60 minutes
24	22.04.2022	Hanken and Squadron	Drone simulation for MOOC	30 minutes
25	26.04.2022	Hanken, OU, Tu Delft and VU	MOOC planning	90 minutes
26	29.04.2022	Hanken project members	MOOC WP3 content	60 minutes
27	05.05.2022	Hanken project members	MOOC update	60 minutes
28	05.05.2022	Project HOPE and Hanken	HERoS MOOC: how to get involved	30 minutes
29	08.05.2022	PCPM and Hanken	HERoS MOOC: how to get involved	30 minutes
30	17.05.2022	Hanken project members	Content alignment	30 minutes
31	17.05.2022	Hanken, OU, Tu Delft and VU	HERoS MOOC alignment	45 minutes
32	19.05.2022	Hanken and VU technical team	Video recording	30 minutes
33	02.06.2022	Hanken and Project HOPE	Podcast preparation	30 minutes
34	08.06.2022	Hanken and Project HOPE	Podcast	30 minutes
35	15.06.2022	Hanken and VU technical team	Video recording	30 minutes
36	17.06.2022	Hanken project members	MOOC task alignment	45 minutes
37	21.06.2022	Hanken and Project HOPE	Video recording	30 minutes
38	21.06.2022	Hanken project members	Video recording	30 minutes
39	21.06.2022	Hanken and CRI	Video recording	30 minutes
40	21.06.2022	Hanken and Squadron	Video recording	30 minutes
41	22.06.2022	Hanken and CRI	Video recording	30 minutes
42	22.06.2022	Hanken and PCPM	Video recording	30 minutes
43	29.06.2022	Hanken project members	MOOC alignment	45 minutes

Sl.	Meeting date	Participants	Agenda	Duration (minutes)
44	22.08.2022	Teaching lab, Hanken IT and Hanken project members	MOOC requirements	60 minutes
45	13.09.2022	HERoS executive	MOOC requirements	60 minutes
46	21.09.2022	Hanken project members	MOOC load distribution	60 minutes
47	23.09.2022	Hanken project members	MOOC update	25 minutes
48	12.10.2022	Hanken project members	MOOC report structure	30 minutes
49	12:10.2022	Hanken project members	MOOC way ahead	60 minutes
50	17.10.2022	Hanken, OU, and VU	MOOC alignment	60 minutes
51	17.10.2022	Hanken Tu Delft, CBK and NHG	MOOC alignment	60 minutes
52	25.10.2022	Hanken project members	MOOC video recording	30 minutes
53	03.11.2022	Hanken, OU, Tu Delft and VU	MOOC alignment	60 minutes
54	24.11.2022	Hanken, OU, Tu Delft and VU	MOOC alignment	60 minutes
55	29.11.2022	All partners	MOOC	45 minutes
56	05.12.2022	Hanken project members	MOOC report and requirements	60 minutes
57	08.12.2022	Teaching lab and Hanken project members	Teaching lab and Hanken project members	90 minutes
58	14.12.2022	IT and Hanken project members	MOOC video editing	30 minutes
59	14.12.2022	Teaching lab and Hanken project members	Teaching lab and Hanken project members	60 minutes
60	16.12.2022	Hanken project members	MOOC	30 minutes
61	09.01.2022	Hanken project members	MOOC	45 minutes
62	09.01.2022	Teaching lab and Hanken project members	MOOC	45 minutes

Appendix 3

Appendix 3: MOOC enrolment by country

Enrolments by country

Country	Percentage
Finland	22%
United Kingdom	10%
Nigeria	4%
Netherlands	2%
Poland	2%
Afghanistan	2%
Germany	2%
United States of America	2%
Spain	2%
Sudan	1%