Drawing on academic expertise for scientific advice in crisis

OECD Public Governance Directorate,
Infrastructure and Public Procurement Division
High Level Risk Forum Secretariat

High Level Risk Forum, 2 February 2024

Royal Academy of Engineering

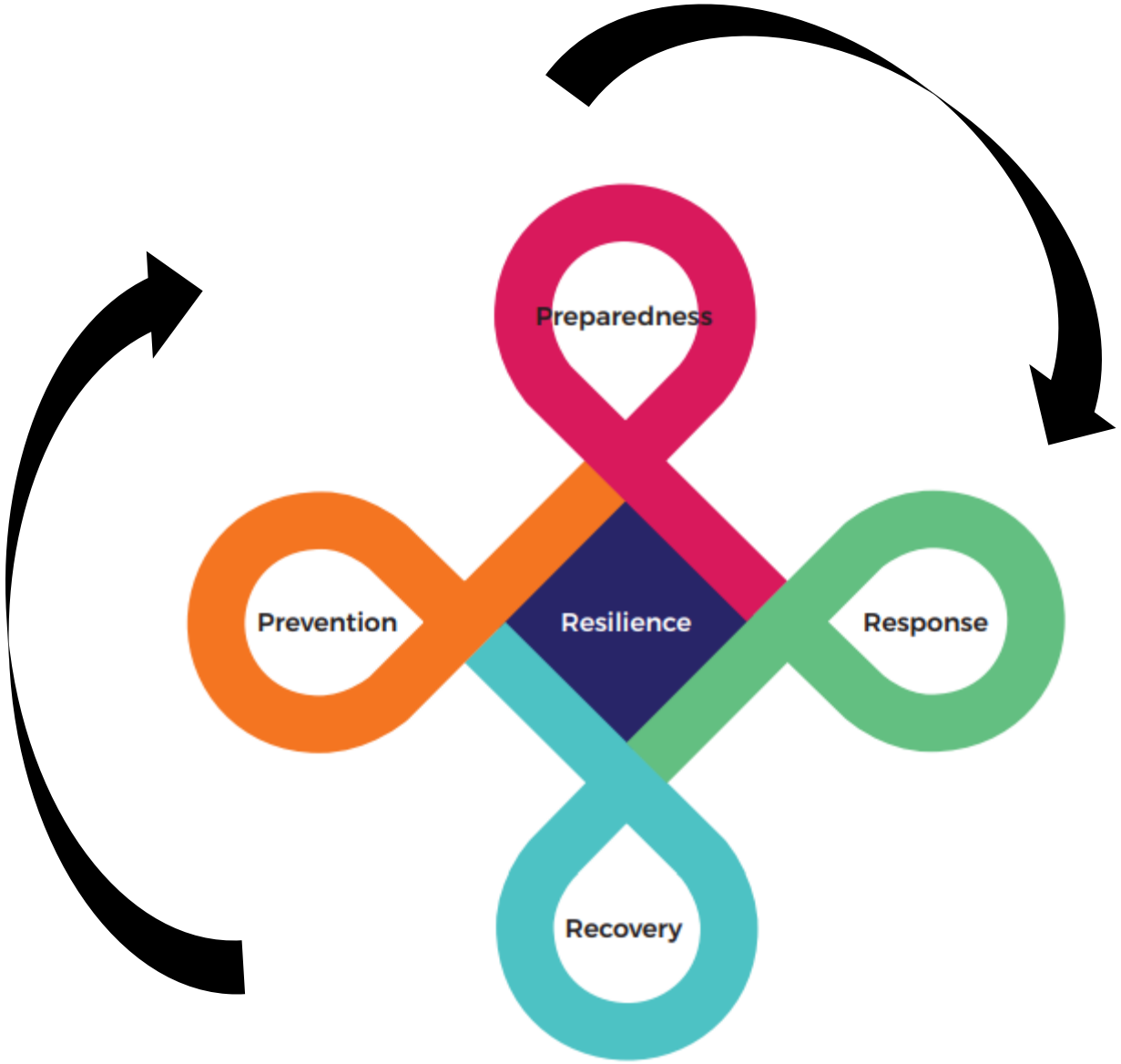
Drawing on the right expertise in a crisis

Dr Alexandra Smyth

Royal Academy of Engineering

Expert involvement

Learning from history

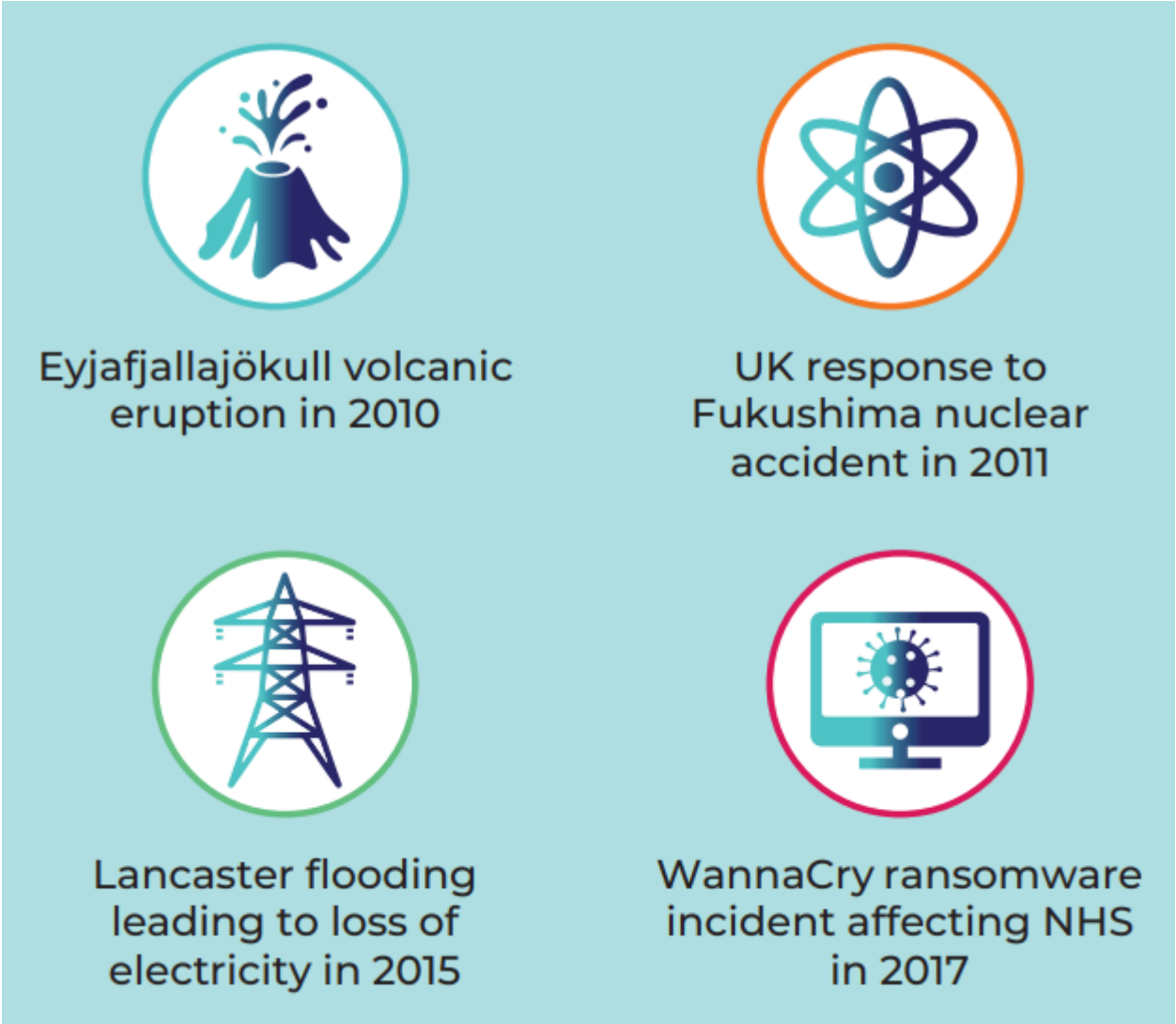


Royal Academy of Engineering

Learning from history

With each emergency we face, there is an imperative to collectively reflect and learn lessons.

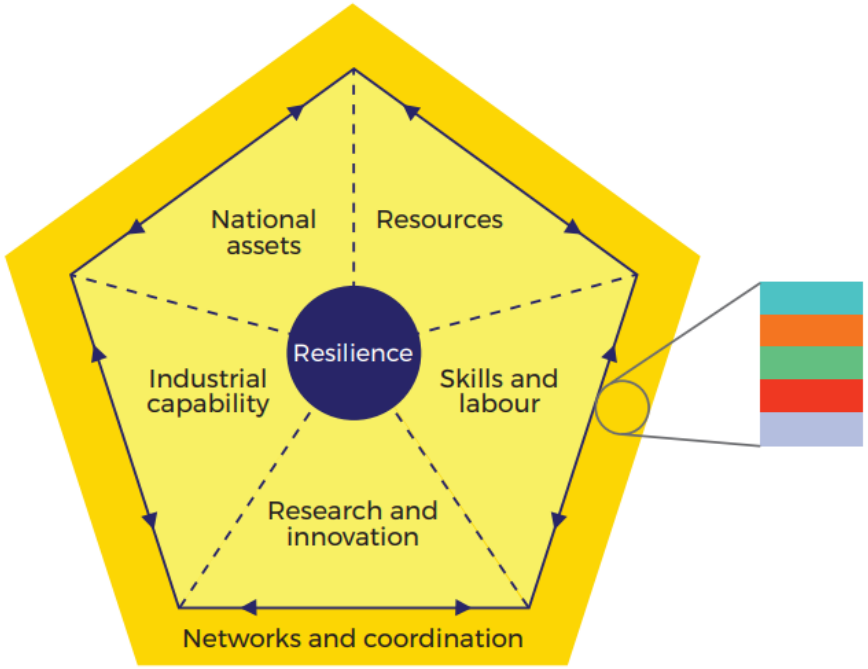
Combining lessons from past events, near misses and strategic foresight can better inform investment in wider resilience and implement improvements to our preparedness for future challenges.



Royal Academy of Engineering

Critical Capabilities

An effective response to an emergency is one that can rapidly call on the right system of capabilities to deliver the most effective response at the right time.



Cross cutting components of networks and coordination

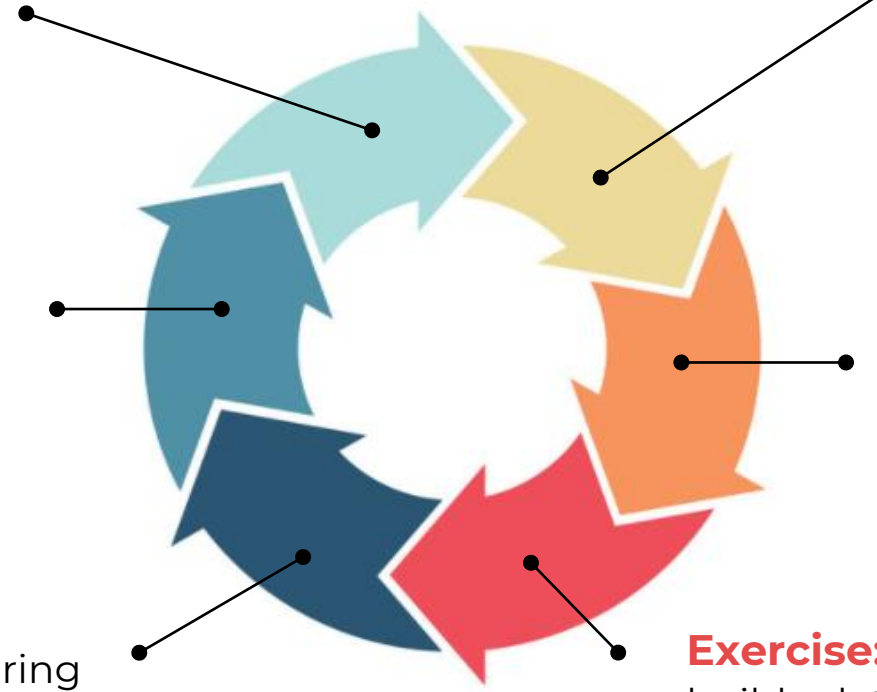
- Agile networks for rapid mobilisation
- Permeating the intersection between the public and private sector
- Expertise and advice into governments
- Local, national or international coordination
- Facilitating communication and engagement

Royal Academy of Engineering

Practices for Preparedness

Agility: keeping pace with increasing digital interconnectedness and evolving threats and hazards

Understanding: mapping of national, local, organisational capabilities, what they can provide and identification of gaps



Resilience by design: improving preparedness and response of organisations, processes, infrastructure and facilities

Relationships: building and maintaining a network of networks across local, national and international boundaries

Responsibility: ensuring clear ownership of resilience at every level

Exercise: practicing responses to build relationships, increase awareness of existing capabilities and better prepare for a range of emergency situations

Royal Academy of Engineering

Role of government

Recovery

- Facilitating the lessons to be learned with expert groups at different time points after the event, not just immediately.

Prevention

- Asking what would be different if it happened again and highlighting prevention opportunities.

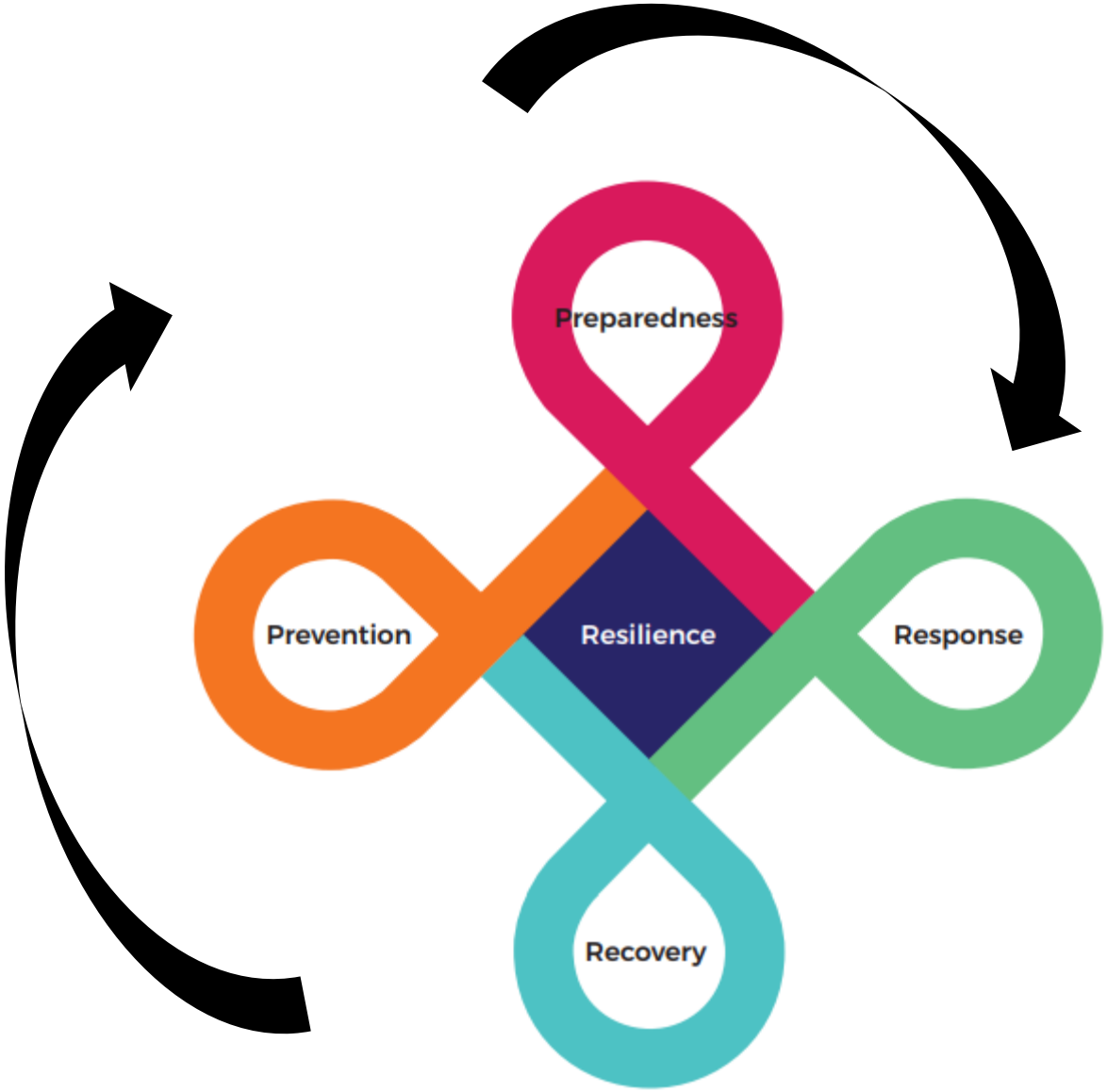
Preparedness

- Building trusted relationships with expert groups and intermediaries. This could be supported by:
  - an audit of existing public, private and third sector relationships and convening bodies. to ensure the right diversity of strategic relationships are in place.
  - Establishing resilience focused multidisciplinary research networks to build capability, multi-outcome models and establish trusted relationships.
  - Facilitating exercises to practice the mechanisms for engagement.

Royal Academy of Engineering

Expert involvement

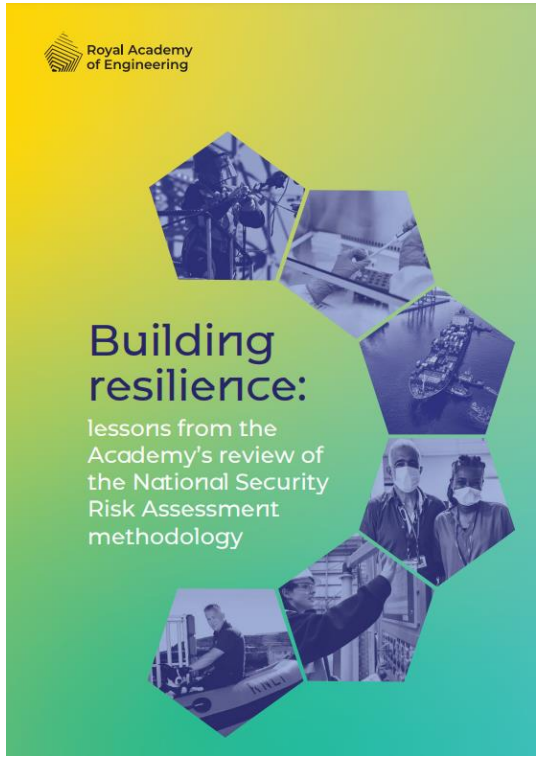
Learning from history



Royal Academy of Engineering

Expert involvement

1. Ensure a joined-up approach
2. Encourage participation and communicate clearly
3. Focus on impact
4. Explore the interdependencies
5. Consider a range of scenarios
6. Embed new data and metrics
7. Review based on need



Royal Academy of Engineering

Expert involvement

Principle	Role of experts
Ensure a joined-up approach	Building strong relationships and a shared understanding of capability across organisations.
Encourage participation	Differing expertise and experience can offer meaningful and constructive challenge.
Explore the interdependencies	Coming together is critical to uncover cascading risks and interdependencies.
Embed new data and metrics	Using experts help fill gaps in data availability and research.

Royal Academy of Engineering

Role of government

Preparedness

Actively seeking diverse expert scrutiny of risk assessments and interdependencies.

Increased transparency about risks to inform public and private research programmes and networks.

Response

Using existing networks but questioning who else should be part of the advice mechanism.

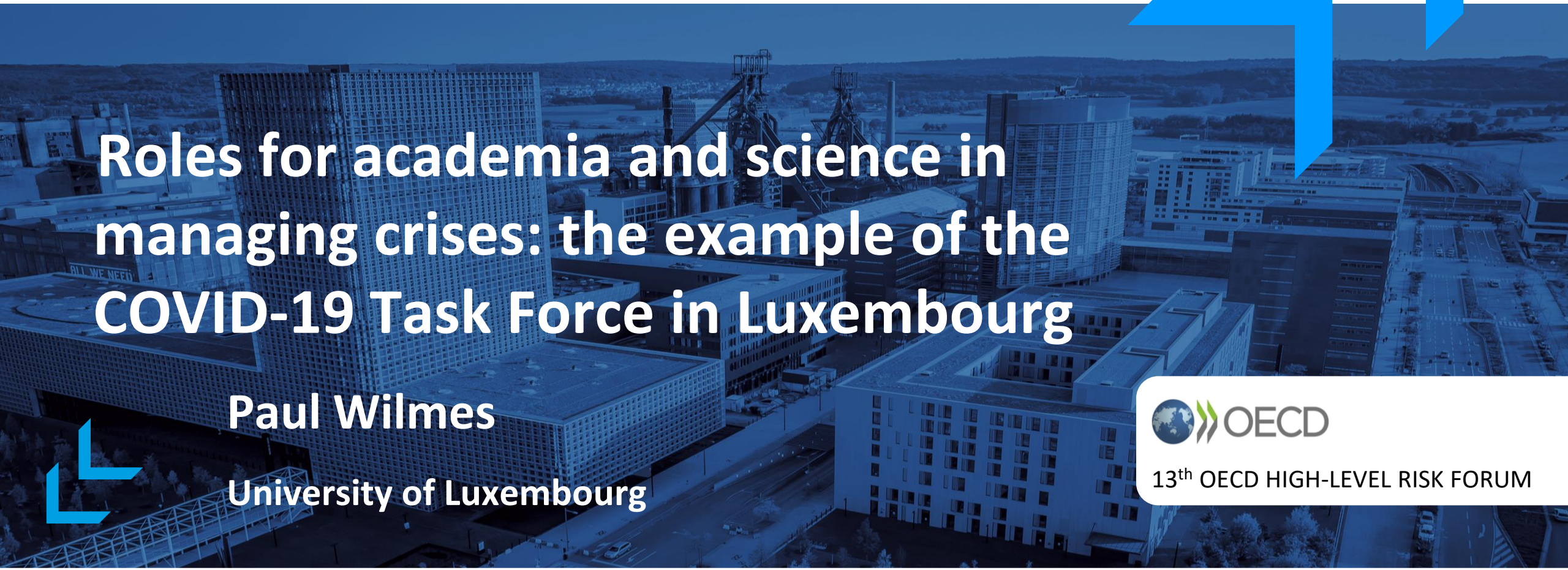
Giving due consideration to expert advice and taking action.

Royal Academy of Engineering

Get in touch

Resiliencepolicy@raeng.org.uk

RESEARCH LUXEMBOURG



Roles for academia and science in managing crises: the example of the COVID-19 Task Force in Luxembourg

Paul Wilmes

University of Luxembourg

OECD

13th OECD HIGH-LEVEL RISK FORUM

LE GOUVERNEMENT DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Enseignement supérieur et de la Recherche

LE GOUVERNEMENT DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de la Santé
Direction de la santé

LUXEMBOURG INSTITUTE OF HEALTH

UNIVERSITY OF LUXEMBOURG

LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY | LIST

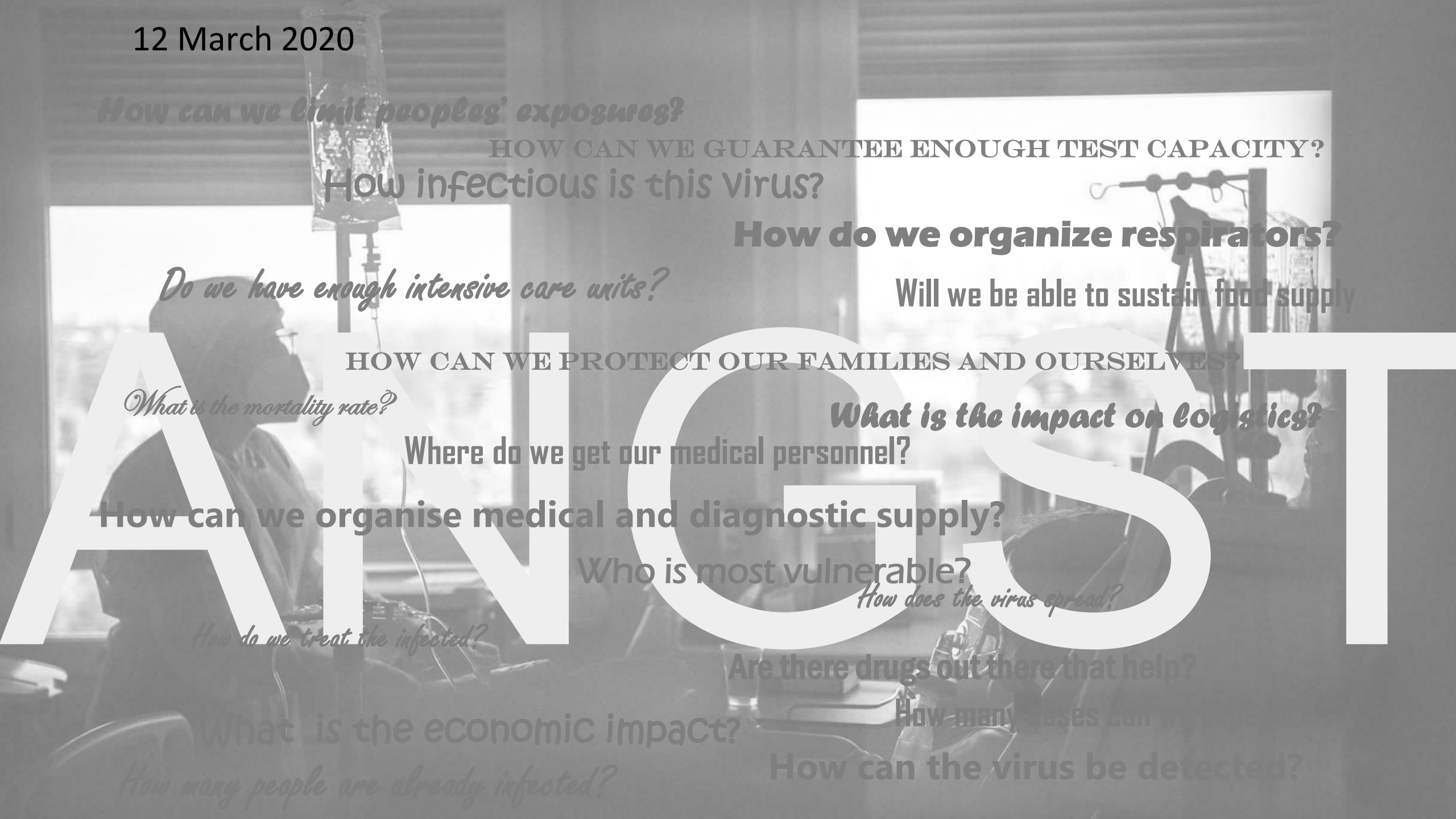
LISER LUXEMBOURG INSTITUTE OF SOCIO-ECONOMIC RESEARCH

LNS LUXEMBOURG

Luxembourg National Research Fund

LUXINNOVATION

12 March 2020



ANGST

RESEARCH LUXEMBOURG

COVID-19 Task Force

Luxembourg National Research Fund

LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY | LIST

uni.lu UNIVERSITY OF LUXEMBOURG

LNS LUXEMBOURG

LUXINNOVATION TRUSTED PARTNER FOR BUSINESS

LISER LUXEMBOURG INSTITUTE OF SOCIO-ECONOMIC RESEARCH

LUXEMBOURG INSTITUTE OF HEALTH RESEARCH DEDICATED TO LIFE

LE GOUVERNEMENT DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Enseignement supérieur et de la Recherche

RESEARCH LUXEMBOURG

Spokesperson
Prof. Ulf Nehrbass
CEO, Luxembourg Institute of Health

Spokesperson
Prof. Paul Wilmes
Professor of Systems Ecology, uni.lu

Coordination: Romain Martin (Ministry of Higher Education and Research)

Operational lead: Frank Glod (LIH)

Members:Henry-Michel Cauchie (LIST)

Frank Glod (LIH; coordination: workpackages 1, 2, 3 & 4)

Lars Geffers (LIH; coordination: workpackages 8 & 9)

Jasmin Schulz (LIH; coordination: workpackages 5, 10 & 11)

Paul Wilmes (UL; coordination: workpackages 6, 7, 12 & 13)

Image source: www.gouvernement.lu

Work packages

Based on a list of priority requests from the ministries

Questions

↓

Evidence

↓

Answers

↓

Solutions

Organising the knowledge pool

QUESTIONS

Do we have enough intensive care units?

Where do we get our medical personnel?

How do we deal with the respirators?

How infectious is this virus?

What is the mortality?

How do we treat the infected?

Are there drugs out there that help?

How does the virus spread?

How can the virus be detected?

Who is most vulnerable?

What is the impact on logistics?

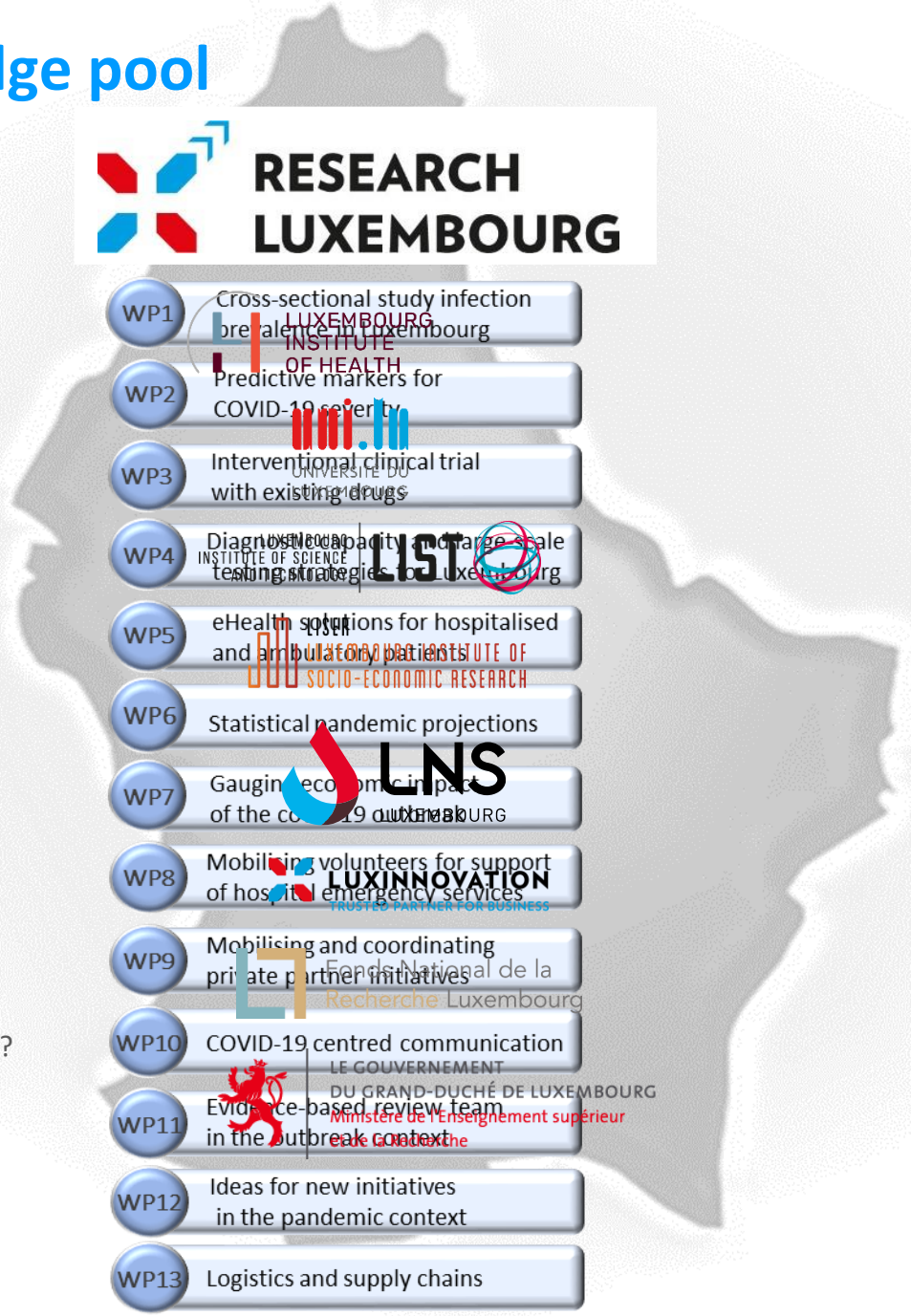
Will we be able to sustain food supply?

How can we organise medical and diagnostic supply?

How can we protect our families and ourselves?

What is the economic impact?

.....



SOLUTIONS

Markers for COVID-19 severity

Clinical trial for COVID-19 treatment

Prevalence of infection in Luxembourg

Pandemic projections and modelling

Capacity for diagnostic testing

Evidence-based reviews

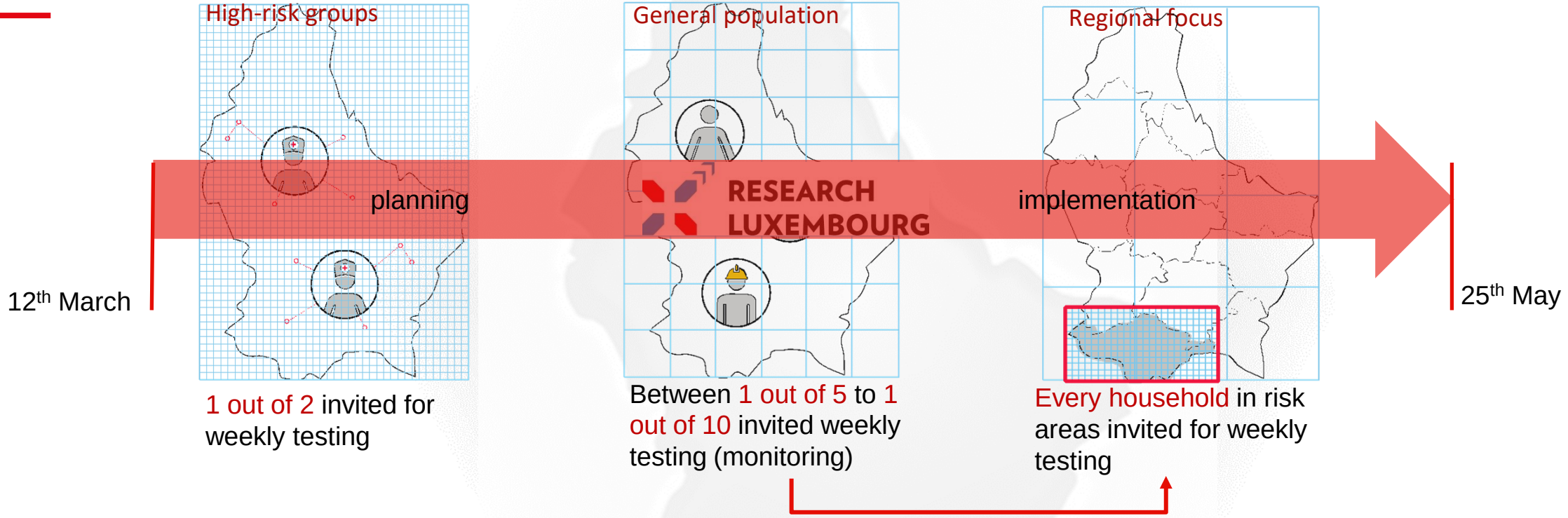
Gauging economic impact of the COVID-19 outbreak

Mobilising volunteers for support of hospital services

Logistics and supply chain analysis

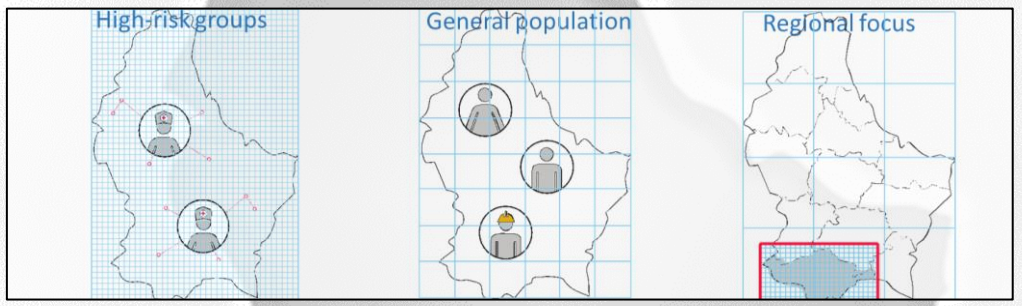
RESEARCH LUXEMBOURG

SARS-CoV-2 mitigation strategy



Large-Scale Testing of up to 10% of the population/week

Mass screening, Large-Scale Testing (LST)



- LST turned out to be the **only feasible strategy** as non-symptomatic carriers are infectious
- Over 18 months: **Luxembourg kept schools & shops open**, **while in France, Germany & Belgium under lock-down**

RESEARCH LUXEMBOURG

RESEARCH LUXEMBOURG

Best practice – Independent advice

Andreas Keller, Chair for Clinical Bioinformatics, Saarland University, Saarbrücken, Germany

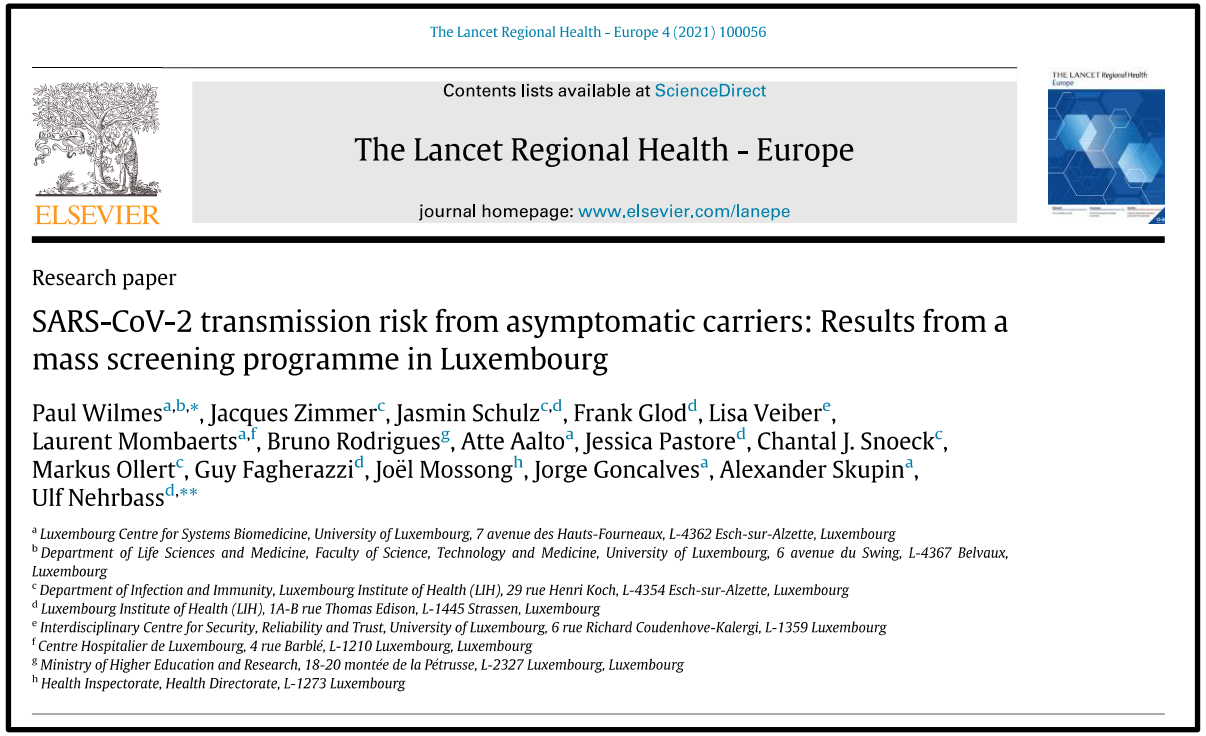
Bartha Knoppers, Professor of Law and Ethics, McGill University, Canada

Marc Lipsitch, Professor of Epidemiology, Harvard T.H. Chan School of Public Health, Cambridge, MA, USA

Jean-Louis Schiltz, Chairman Hôpitaux Robert Schuman, Vice-Chairman FEDIL, Professor (Hon.) at the University of Luxembourg

Eran Segal, Professor of Computational Biology, Weizmann Institute of Science, Rehovot, Israel

Best practice – Independent peer-review



The Lancet Regional Health - Europe 4 (2021) 100056

Contents lists available at ScienceDirect

The Lancet Regional Health - Europe

journal homepage: www.elsevier.com/lanepe

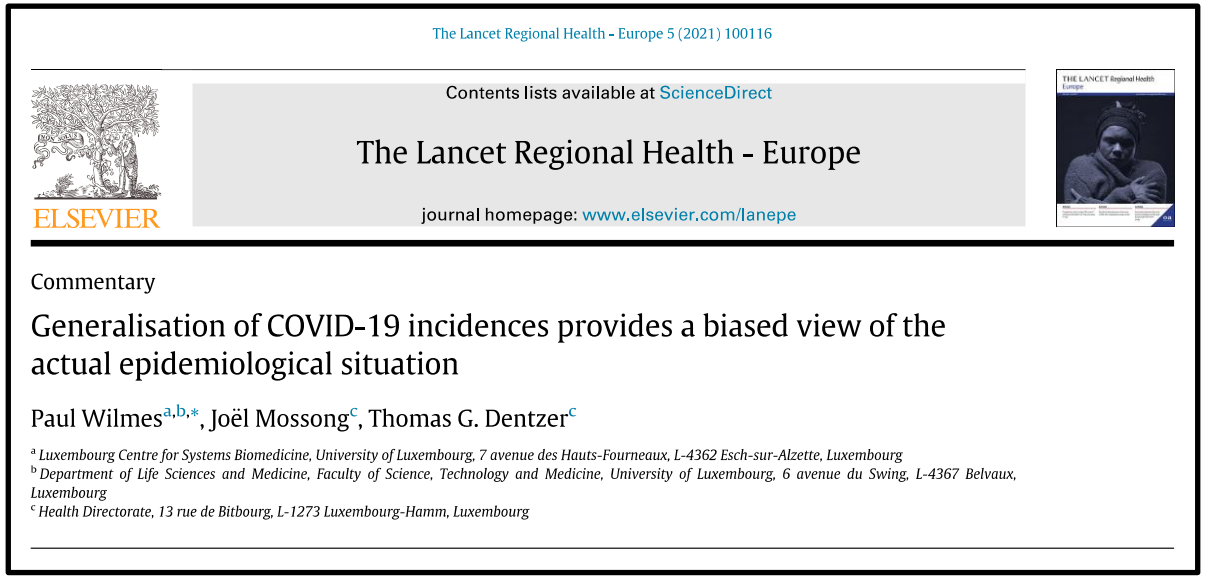
Research paper

SARS-CoV-2 transmission risk from asymptomatic carriers: Results from a mass screening programme in Luxembourg

Paul Wilmes[a,b,*], Jacques Zimmer[c], Jasmin Schulz[c,d], Frank Glod[d], Lisa Veiber[e], Laurent Mombaerts[a,f], Bruno Rodrigues[g], Atte Aalto[a], Jessica Pastore[d], Chantal J. Snoeck[c], Markus Ollert[c], Guy Fagherazzi[d], Joël Mossong[h], Jorge Goncalves[a], Alexander Skupin[a], Ulf Nehrbass[d,**]

[a] *Luxembourg Centre for Systems Biomedicine, University of Luxembourg, 7 avenue des Hauts-Fourneaux, L-4362 Esch-sur-Alzette, Luxembourg*
[b] *Department of Life Sciences and Medicine, Faculty of Science, Technology and Medicine, University of Luxembourg, 6 avenue du Swing, L-4367 Belvaux, Luxembourg*
[c] *Department of Infection and Immunity, Luxembourg Institute of Health (LIH), 29 rue Henri Koch, L-4354 Esch-sur-Alzette, Luxembourg*
[d] *Luxembourg Institute of Health (LIH), 1A-B rue Thomas Edison, L-1445 Strassen, Luxembourg*
[e] *Interdisciplinary Centre for Security, Reliability and Trust, University of Luxembourg, 6 rue Richard Coudenhove-Kalergi, L-1359 Luxembourg*
[f] *Centre Hospitalier de Luxembourg, 4 rue Barblé, L-1210 Luxembourg, Luxembourg*
[g] *Ministry of Higher Education and Research, 18-20 montée de la Pétrusse, L-2327 Luxembourg, Luxembourg*
[h] *Health Inspectorate, Health Directorate, L-1273 Luxembourg*

Wilmes *et al.* (2021) *The Lancet Regional Health – Europe* **4**:100056. doi:10.1016/j.lanepe.2021.100056.



The Lancet Regional Health - Europe 5 (2021) 100116

Contents lists available at ScienceDirect

The Lancet Regional Health - Europe

journal homepage: www.elsevier.com/lanepe

Commentary

Generalisation of COVID-19 incidences provides a biased view of the actual epidemiological situation

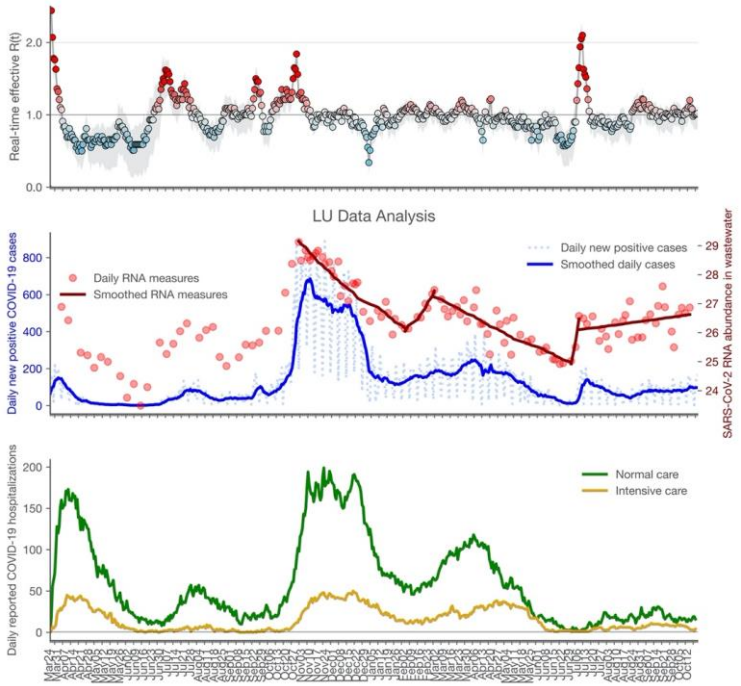
Paul Wilmes[a,b,*], Joël Mossong[c], Thomas G. Dentzer[c]

[a] *Luxembourg Centre for Systems Biomedicine, University of Luxembourg, 7 avenue des Hauts-Fourneaux, L-4362 Esch-sur-Alzette, Luxembourg*
[b] *Department of Life Sciences and Medicine, Faculty of Science, Technology and Medicine, University of Luxembourg, 6 avenue du Swing, L-4367 Belvaux, Luxembourg*
[c] *Health Directorate, 13 rue de Bitbourg, L-1273 Luxembourg-Hamm, Luxembourg*

Wilmes, Mossong & Dentzer (2021) *The Lancet Regional Health – Europe* **5**:100116. doi: 10.1016/j.lanepe.2021.100116.

RESEARCH LUXEMBOURG

Providing data & evidence



- R_{eff}
- Projections for social interactions, variants and vaccination
- Hospital projections
- General situation assessment

RESEARCH LUXEMBOURG
COVID-19 Task Force

Update on the current situation in Luxembourg

Stefano Magni, Atte Aalto, Silvia Martina, Laurent Mombaerts, Daniele Proverbio, Françoise Kemp, Lisa Veiber, Paul Wilmes, Jorge Goncalves, Alexander Skupin

16 October 2020

This document provides an update of the report provided of October 9 on the second wave in COVID-19 infections in Luxembourg. To ease comparison, the recent developments are also commented on within the corresponding figure captions.

Analysis of the current situation
This document gives a short update on the analysis of the current epidemic status based on the data available up to October 16. Note that this analysis is mainly based on data of all cases and not of inhabitants only.

Overall, **the concerning tendency of last week has further manifested during the current week and the situation exhibits now some indication of an exponential dynamics** as shown by

(i) an increase of R_{eff} to 1.31 (Figure 1) (compared to 1.14 last week) and a corresponding decrease in the doubling time to 5.5 days compared to 7 days last week (note that this is a continuous decrease in the doubling time over the last weeks),

(ii) the analysis of daily new cases and corresponding projections by curve fitting that exhibits indications for an exponential behavior or at least a strong increase of a non-linear regime with 157 cases/day (compared to 91 cases/day last week) and with the highest values since the beginning of the epidemics (Figures 2 and 3),

RESEARCH LUXEMBOURG

Interactions with Government and Parliaments - Examples

LST launch, 22th May 2020

LST hand-over, 15th September 2020

LANDTAG DES SAARLANDES

Landtag des Saarlandes • Franz-Josef-Röder-Straße 7 • 66119 Saarbrücken

Professor Dr. Paul Wilmes,
Luxembourg Centre for Systems Biomedicine
Department Systems Ecology
Campus Belval, Université du Luxembourg
7, Avenue des Hauts Fourneaux
L-4362 Esch-sur-Alzette

AUSCHUSS FÜR SOZIALES GESUNDHEIT FRAUEN UND FAMILIE

Unser Zeichen: Tgb.-Nr. 2471/21
Datum: 24.02.2021

Christian Gintzel
Telefon: 0681 / 5002-514
E-Mail: c.gintzel@landtag-saar.de

Anhörung: „Zwischenbilanz- Ein Jahr Corona-Pandemie im Saarland“

Landtag des Saarlandes, 10th March 2021

Mossong *et al. BMC Infectious Diseases* (2021) 21:417
https://doi.org/10.1186/s12879-021-06089-5

BMC Infectious Diseases

RESEARCH ARTICLE Open Access

SARS-CoV-2 transmission in educational settings during an early summer epidemic wave in Luxembourg, 2020

Joël Mossong[1*], Laurent Mombaerts[2], Lisa Veiber[3], Jessica Pastore[1,4], Gwenaëlle Le Coroller[1,4], Michael Schnell[4], Silvana Masi[1], Laetitia Huiart[1,4] and Paul Wilmes[2,5]

Report on situation in schools, 14th August 2020

Press conferences

COVID-19 Task Force
Press conference, 9th July 2020

Expert Group on Vaccination
Press conference, 5th July 2022

Image sources: 100,7 and RTL

RESEARCH LUXEMBOURG

Press coverage

The New York Times

CNN

Luxemburger Wort

RTL

La Libre BELGIQUE

Tageblatt LETZEBUERG

Semper
Publication date : 06/04/2022 Page : 62, 63
Tirage : 2600 Audience :

«Cela a été rendu possible par l'environnement de collaboration étroite favorisé par Research Luxembourg depuis le début de la pandémie, qui a abouti à un protocole d'étude intégré, holistique et complet» *Pr Paul Wilmes*

RESEARCH LUXEMBOURG

L'Essentiel
Publication date : 12/11/2021 Page : 2
Tirage : 93847 Audience : 207100

«Protéger les non-vaccinés»

LUXEMBOURG Porte-parole de la Task Force Covid-19, Paul Wilmes cite les leviers possibles si la situation sanitaire s'aggrave.

Avec près d'un quart de sa population adulte non vaccinée, le Luxembourg aborde la quatrième vague avec inquiétude. «Pour le moment, le système hospitalier n'est pas débordé, mais il y a un risque», assure Paul Wilmes, porte-parole de la Task Force Covid-19.

«La plupart des vaccinés infectés n'ont pas de symptômes graves. Si l'on doit réintroduire des mesures, ce serait avant tout pour la protection des non-vaccinés qui seront admis à l'hôpital. Le risque est plus lié à eux», poursuit le professeur à l'Université du Luxembourg. Si des mesures s'avéraient nécessaires, quels seraient les leviers possibles?

■ **Masques** Le retour des masques en classe est pressenti. On y observe «pas mal d'infections. Les moins de 12 ans n'étant pas vaccinés, c'est à prévoir», note Paul Wilmes. Ailleurs, associer masque et CovidCheck dans certaines activités pourrait être une option.

■ **Retour du Large Scale Testing** «Un dépistage efficace et le suivi des contacts ont un effet. C'est un choix politique, note l'expert. Des sérologies pour tous n'auraient pas d'impact sur les transmissions, car il n'y a pas de correspondance directe entre taux d'anticorps et protection contre l'infection».

■ **Interactions** «Les échanges et interactions sont à un niveau élevé, presque normal. Il faut se demander s'il est vraiment important de faire maintenant des fêtes ou activités avec beaucoup de gens», confie-t-il.

■ **Rappel de vaccin** La dose de rappel est un levier. «Mais on a vu chez les vaccinés avec Janssen que la participation n'est pas assez significative. Cela suppose des efforts».

■ **Vacciné ou guéri** Le Land allemand de Saxe et l'Autriche ont validé un passe sanitaire qui est plus strict, où le test ne permet plus d'accéder au restaurant. «Cela enlève le risque pour les non-vaccinés de s'infecter lors d'activités avec des vaccinés», dit Paul Wilmes.

NICOLAS MARTIN

Online presence

[Article series] The experts behind Luxembourg's COVID-19 fight

Partager cet article :

Publié le vendredi 10 avril 2020

Prof. Paul Wilmes (PW) is Principal Investigator at the Luxembourg Centre for Systems Biomedicine (LCSB) of the University of Luxembourg, where people with broad and diverse backgrounds focus on understanding the mechanisms of disease. Prof. Wilmes is specialised in microbiology and his research group at the LCSB studies how microbial communities impact our health. In the context of the COVID-19 pandemic, he is deputy spokesperson for the COVID-19 Task Force of Research Luxembourg. As the representative of the University of Luxembourg in the Task Force, he is in charge of coordination between researchers working in the different focus areas, directing certain projects reflecting an immediate need as well as the liaison with the Ministries, hospitals and research institutions in Luxembourg. In this short interview, he also discusses his expertise and involvement in ongoing COVID-19 projects.

Interview with Paul Wilmes - "Cross-vaccination yields higher protection against COVID-19"

Cross-vaccination started to be recommended by several countries. What is cross-vaccination and is there a benefit? We asked Prof. Paul Wilmes, spokesperson of the Research Luxembourg COVID-19 Task Force, to share the latest insights on this topic with us.

+read more *(published on 1 September 2021)*

Interview with Paul Wilmes on superimmunity

Two years after the pandemic outbreak, researchers and scientists continue to look at the immune system's defence mechanisms against the coronavirus and its variants. Why do some people seem to have greater immunity to COVID-19 than others? How is it that some individuals have been infected several times and others have managed to avoid the virus in the last two years?

+read the article on covid19.public.lu in French or in Geman *(published on 5 May 2022)*

Research Luxembourg hat ein Konzept entwickelt, mit dem der Lockdown schneller und sicherer durchgeführt werden kann. Weshalb sicherer? Weshalb schneller? Hintergründe zum Konzept.

RESEARCH LUXEMBOURG

Impact

- **Lowest excess mortality in EU plus UK**

Analysis

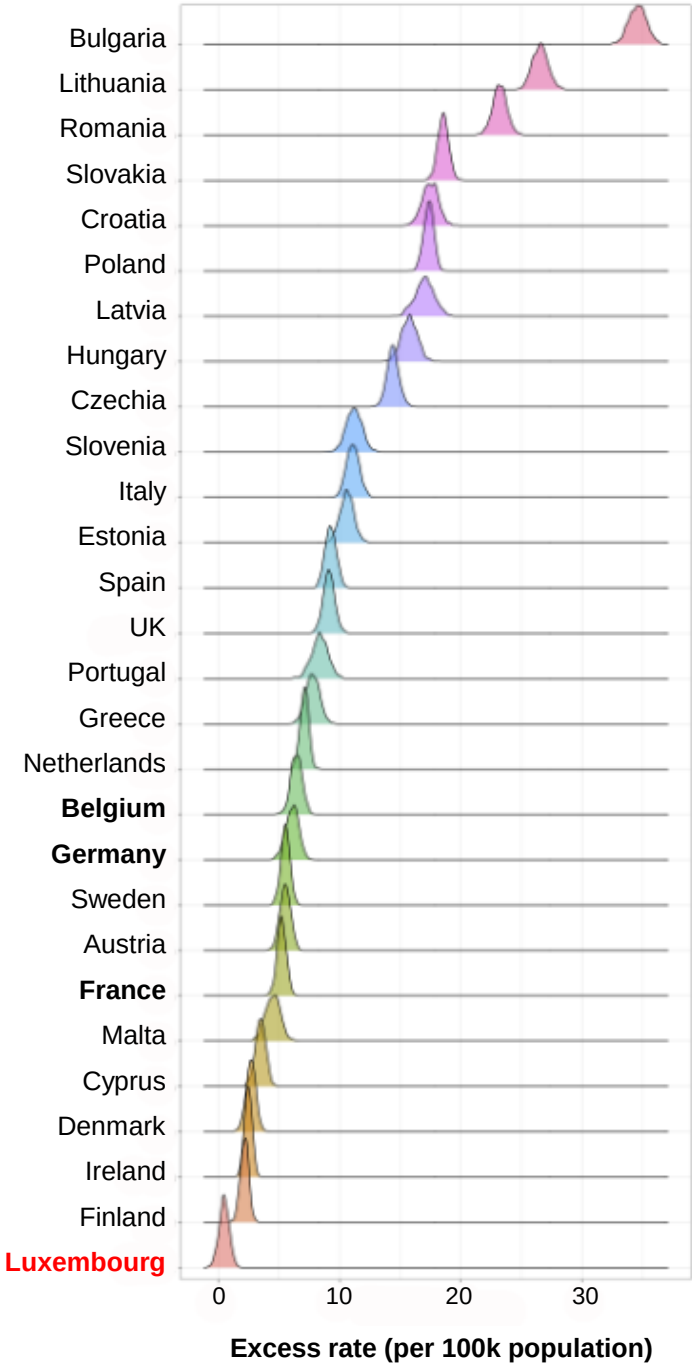
The WHO estimates of excess mortality associated with the COVID-19 pandemic

https://doi.org/10.1038/s41586-022-05522-2
Received: 19 May 2022
Accepted: 3 November 2022
Published online: 14 December 2022
Open access
Check for updates

William Msemburi[1], Ariel Karlinsky[2], Victoria Knutson[3], Serge Aleshin-Guendel[3], Somnath Chatterji[1] & Jon Wakefield[3,4]

The World Health Organization has a mandate to compile and disseminate statistics on mortality, and we have been tracking the progression of the COVID-19 pandemic since the beginning of 2020[1]. Reported statistics on COVID-19 mortality are problematic for many countries owing to variations in testing access, differential diagnostic capacity and inconsistent certification of COVID-19 as cause of death. Beyond what is directly attributable to it, the pandemic has caused extensive collateral damage that has led to losses of lives and livelihoods. Here we report a comprehensive and consistent measurement of the impact of the COVID-19 pandemic by estimating excess deaths, by month, for 2020 and 2021. We predict the pandemic period all-cause deaths in locations lacking complete reported data using an overdispersed Poisson count framework that applies Bayesian inference techniques to quantify uncertainty. We estimate 14.83 million excess deaths globally, 2.74 times more deaths than the 5.42 million reported as due to COVID-19 for the period. There are wide variations in the excess death estimates across the six World Health Organization regions. We describe the data and methods used to generate these estimates and highlight the need for better reporting where gaps persist. We discuss various summary measures, and the hazards of ranking countries' epidemic responses.

Msemburi W, *et al*. (2023) *Nature* **613(7942)**:130-137.
doi: 10.1038/s41586-022-05522-2

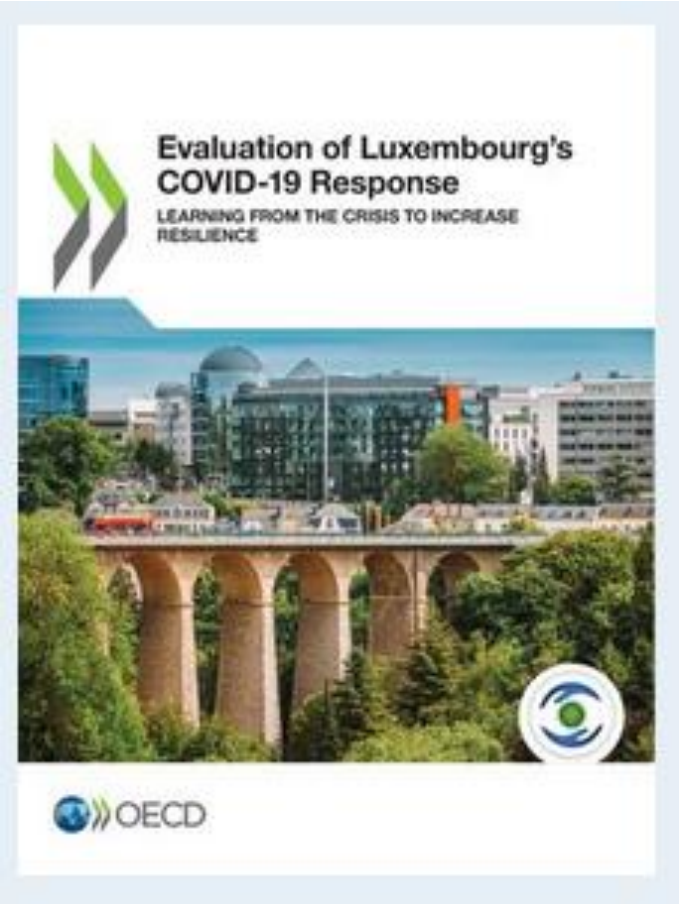


RESEARCH LUXEMBOURG

Outlook

"Luxembourg could strengthen its system for providing scientific advice to the government and more systematically assess the impact of the measures adopted during the crisis to learn the relevant lessons."

Lessons learnt are being integrated into national crisis preparedness plan



OECD (2022) Evaluation of Luxembourg's COVID-19 Response: Learning from the Crisis to Increase Resilience, OECD Publishing, Paris, doi.org/10.1787/2c78c89f-en

RESEARCH LUXEMBOURG

Conclusion

- **Recommendations**
  - Clearly articulate needs & questions
  - Define mechanisms & remit for delivering scientific evidence & advice
  - Ensure consistent & concerted input from diverse scientific fields
  - Openly communicate information & uncertainties
  - Establish trusted relationships early on
  - Ensure quality assurance (peer-review)
  - Provide institutional, logistical & personnel support
  - Facilitate international sharing of data & expertise (open science)

- **Evidence-based policy- & decision-making saves lives**

RESEARCH LUXEMBOURG

Acknowledgments

UNIVERSITÉ DU LUXEMBOURG

LCSB

FACULTY OF HUMANITIES, EDUCATION AND SOCIAL SCIENCES

Atte Aalto, Rudi Balling, Léa Delacour, Milena Despotovic, Aymeric Fouquier D'Herouël, Salah Ghamizi, Katarzyna Golkowska, Jorge Goncalves, Laurent Heirendt, Sascha Herzinger, Françoise Kemp, Julia Kessler, Jens Kreisel, Rejko Krüger, Cédric Laczny, Anjy Leist, Yves Le Traon, Stefano Magni, Benny Mantin, Silvia Martina, Camille Martin-Gallausiaux, Teresa Martins, Patrick May, Laurent Mombaerts, Carlos Vega Moreno, Daniele Proverbio, Venkata Satagopam, Sabine Schmitz, Reinhard Schneider, Alex Skupin, Safia Thaminy, Christophe Trefois, Lisa Veiber

Funding

Luxembourg National Research Fund

andré losch FONDATION

THE GOVERNMENT OF THE GRAND DUCHY OF LUXEMBOURG

FONDATION DE LUXEMBOURG
Philanthropy in action

LUXEMBOURG INSTITUTE OF HEALTH
RESEARCH DEDICATED TO LIFE

Arnaud D'Agostini
Guy Fagherazzi
Frank Glod
Ulf Nehrbass
Markus Ollert
Jasmin Schulz
Chantal Snoeck
Jacques Zimmer

LIST

Henry-Michel Cauchie
Francesco Ferrero
Leslie Ogorzaly

LNS LUXEMBOURG

Tamir Abdelrahman
Guillaume Fournier
Friedrich Mühlschlegel
Anke Wienecke-Baldacchino

LE GOUVERNEMENT DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de la Santé

Direction de la santé

Tom Dentzer
Joël Mossong
Jean-Claude Schmit

LE GOUVERNEMENT DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Enseignement supérieur et de la Recherche

Romain Martin
Bruno Rodrigues

Luxembourg National Research Fund

Jean-Paul Betertemes
Didier Goossens
Hélène Jacuszin
Marc Schiltz

LISER
LUXEMBOURG INSTITUTE OF SOCIO-ECONOMIC RESEARCH

Aline Muller

RESEARCH LUXEMBOURG

RESEARCH LUXEMBOURG

Thank you very much!

LE GOUVERNEMENT DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Enseignement supérieur et de la Recherche

LE GOUVERNEMENT DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de la Santé
Direction de la santé

LUXEMBOURG INSTITUTE OF HEALTH

UNIVERSITY OF LUXEMBOURG

LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY | LIST

LISER LUXEMBOURG INSTITUTE OF SOCIO-ECONOMIC RESEARCH

LNS LUXEMBOURG

Luxembourg National Research Fund

LUXINNOVATION