Pandemic and Disaster Preparedness Center

PDPC

Towards an interdisciplinary approach to disasters and pandemics

Contents

The PDPC

The Pandemic and Disaster Preparedness Center (PDPC) was established in May 2021 to gather the necessary knowledge to better prepare our society for major crises, such as pandemic or flood- and climate-related threats. The PDPC aims to achieve this by joining forces across scientific disciplines. More than 75 scientists from around 20 institutes in the Netherlands and beyond are already affiliated with the PDPC. Together, they conduct research, invest in education and develop new initiatives. They work interdisciplinary and from a systemic perspective to seek answers to the question: how can we prevent large-scale crises or limit their impact?

PDPC is the brainchild of Marion Koopmans: *"We've now all experienced what dealing with a real pandemic is like and how important preparedness is. What threats do we face, how do we detect them, and how do we prepare for the consequences?"*

Since the inaugural meeting in May 2021, a great deal has happened. The so-called Frontrunner projects were launched: inspiring new collaborations that aim to provide answers to future threats and complex challenges. Within the PDPC Academy, the PDPC anchors its expertise, methodology and vision and shares it with the world.

The PDPC is led by Marion Koopmans, Pearl Dykstra, Bas Jonkman and Anja Schreijer.

Marion Koopmans

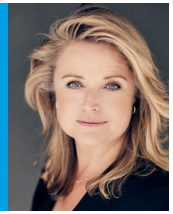
Scientific Director
Pandemic preparedness research

Pearl Dykstra

Societal preparedness research

Bas Jonkman

Disaster preparedness research



Anja Schreijer

Medical Director
Public Health research

Marion Koopmans is a professor of Virology at Erasmus MC and the PDPC's Scientific Director. Her research focuses on the animal-to-human transmission of viruses (zoonoses) and large-scale spread among humans (outbreaks and pandemics). She was a member WHO team of scientists who researched the origins of the SARS-CoV-2 virus and advised national and international governments on preparedness.

Pearl Dykstra is professor of Empirical Sociology at Erasmus University Rotterdam (EUR) and Scientific Director at ODISSEI (Open Data Infrastructure for Social Science and Economic Innovations). Under her leadership, advice was issued to the cabinet of European Commissioners on improving pandemic preparedness and management. She publishes on intergenerational solidarity, gender inequality, loneliness and families in the context of the welfare state.

Bas Jonkman is professor of Hydraulic Engineering at Delft University of Technology (TU Delft). In his teaching and research, he specializes in dealing with flood risks, climate adaptation and disasters. His research group develops risk models for this purpose and applies the building-with-nature risk concept in developing both "hard" (e.g. dykes and storm surge barriers) and "soft" solutions. Jonkman has taken part in post-disaster fact-finding studies in New Orleans, Thailand, Germany, and more recently in Limburg.

Anja Schreijer is a doctor of Public Health and the PDPC's Medical Director. After completing her PhD in clinical epidemiology, she held various positions specializing in the control of infectious diseases. This included chairing the national consultation body on infectious disease control (LOI), being a regular member of the Outbreak Management Team (OMT) and head of infectious diseases at GGD (Municipal Health Service) Amsterdam. Within the PDPC, her focus is on applied research – particularly within the realm of public health – and the development of the PDPC Academy.

The PDPC is powered by Convergence, the research collaboration between TU Delft, Erasmus MC and Erasmus University Rotterdam.

The PDPC story

The corona pandemic and the recent flooding of 2021 in the Southern Dutch provinces have revealed society's vulnerability. It showed that our lifestyle has consequences, both for ourselves and the planet. The sheer intensity with which the SARS-CoV-2 virus raged across the world surprised us, disrupting societies and claiming the lives of millions. The impact has been significant on healthcare, the economy, social cohesion and education.

The PDPC aims use the lessons learned to gather knowledge to better prepare our society for future pandemics as well as for floods and climate-related crises. The increasing frequency of floods and droughts across the world is a precursor for the climate and flood-related threats that are inexorably heading our way.

Resilient, flexible and responsive

We are facing numerous new scientific challenges and questions: what threats do we face in the future? Which factors increase risks? What are the potential consequences of the way we design urban deltas, the consequences of the way we treat animals and organise large-scale agriculture? And finally: How do we prepare ourselves for what is to come?

Ensuring a wider understanding across society of what is happening and why, is essential for solid preparedness. Which groups are vulnerable and will be particularly affected? Which solutions will certain groups understand and accept and which are likely to cause friction? How should we organise communication about risks and how do we ensure people are media literate and can easily discard disinformation and fake news? There is much to be gained from continued investment in proper preparation. A well-prepared society is resilient, flexible and responsive.

Need for interdisciplinary scientific institutes

In the years ahead it is expected that societies will increasingly face major disasters and crises. In addition to infectious diseases, the first signs of global warming are already visible in different parts of the world. Changes in the climate and our delta can also prove to be catalysts for infectious diseases.

The blueprint of pandemic consequences on society applies to flood- and climate-related crises as well, which can create a domino effect. For instance, the tiger mosquito reached Europe via freight transport from Asia, and can carry dengue fever. As a result of climate change and the associated warmer temperatures, the tiger mosquito is steadily moving further north. We can expect the same scenario when other invasive species come into contact with indigenous species, possibly transmitting diseases previously unknown to that area.

Linking together relevant scientific disciplines will be essential in ensuring effective preparation for and resilience to future threats. Society will need to be flexible by translating scenarios into sustainable interventions and solutions. This will require a robust crisis structure in which the different phases – acute, short to medium-term and long-term – have been clearly defined, with associated advisory bodies with members from across disciplines. The complexity of pandemics and disasters calls for convergence. What is needed is a systematic perspective and a shared, future-oriented knowledge agenda, with research projects that involve society, and collaborations with parties that are responsible for crisis management. The complexity of pandemics and flood and climate-related disasters calls for commitment, an interdisciplinary and long-term perspective, and continuous preparedness.

Knowledge platform for pandemics and flood and climate-related disasters

The PDPC provides a scientific knowledge and advisory platform for innovative research into (preparations for) pandemics and flood- and climate-related disasters and is the only center in the Netherlands that applies an interdisciplinary and systematic approach to threats related to infectious diseases, floods and climate. The Netherlands has first-class knowledge across all of these areas and a solid international reputation. Because of its high population density, large-scale rearing of livestock, wetland development, rapid climate change and densely built-up delta, the Netherlands is one of the key areas regarded for impact from future threats. The PDPC is based on the unique combination of world-renowned expertise on infectious diseases, climate research, research into floods and other water-related emergencies, empirical sociology and crisis management. Together, we develop knowledge to ensure a future society that is as healthy and safe as possible.

The Pandemic & Disaster Preparedness Center (PDPC) is the only center in the Netherlands that applies a systematic perspective in gathering the interdisciplinary knowledge needed for effective preparation for pandemics, floods and climate threats

Objective:	SOCIETY	
Resistant	Versatile	Resilient
	THREATS	
Pandemic	Climate	Water

- Long-term thinking, short-term action
- Interdisciplinary preparedness (vs. repair)
- Interdisciplinary science
- Connecting the Netherlands' scientific capital
- International collaboration
- Involving and preparing society (or why, what, how)
- From fundamental to translational research
- Investing in knowledge development

PDPC

The PDPC aims to:

1. Ensure that the Netherlands becomes more resilient, responsive and versatile in its ability to deal with future threats involving infection, floods and other climate-related issues;
2. Offer the answer to complex issues (interdisciplinary, leading expertise, international);
3. Focus on long-term effects and the potential for early identification and prevention;
4. Work to improve scientific knowledge development and synthesis before, during and after crises;
5. Translate insights into policy, with concrete recommendations for implementation aimed at politics and society.

PDPC objectives

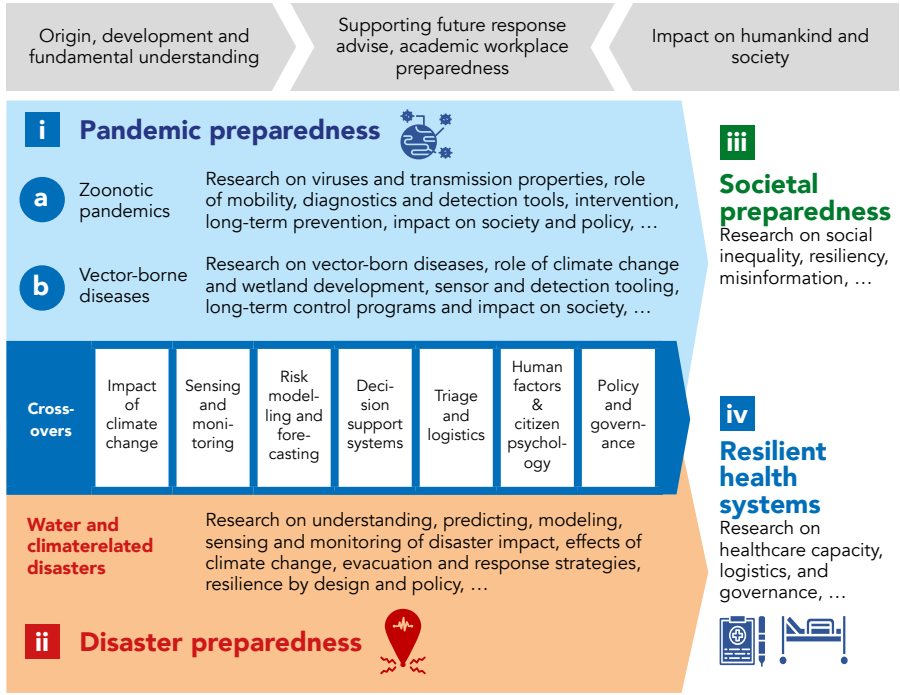
Frontrunners

Project duration: end of 2022 - end of 2027

In order to kick-start the long-term research agenda, several Frontrunner projects were launched in 2022. Leading experts from various disciplines collaborate with people from implementing organizations within these research projects to develop knowledge about pandemics and disasters and the social issues they can be expected to cause. These projects are organized in and around doctoral programmes and living labs.

The Frontrunner projects are:

1. Climate change and vector-borne virus outbreaks
2. Predicting, measuring and quantifying airborne virus transmission
3. Pandemic lessons for flood disaster preparedness
4. Towards social and urban resilience
5. Integrated early-warning surveillance methods and tools



The PDPC knowledge agenda

Frontrunner project 1: Climate change and vector-borne virus outbreaks

Background

Because of climate change we face higher temperatures, different precipitation patterns and more extreme weather conditions. The landscape is changing: The delta is facing salinization and we are creating additional water buffers to cope with floods. Mosquitoes, which can carry viruses, thrive in this warmer and wetter landscape.

There has currently not been sufficient research into the links between environmental changes, landscape management, the ecology of arthropods, animals and human health.

Objective

The aim is to study how salinization and the changing landscape affect the ecology of mosquitoes, birds and the transmission of viruses.

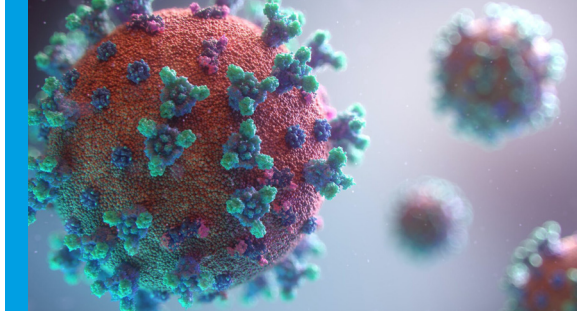
Approach

We will develop scenarios where groundwater salinization, salt intrusion in surface water and the delta, land-use modifications, and surface-water temperatures relate to ideal mosquito habitat. We study the impact of salinization and the climate on four globally important mosquito species. These mosquitoes carry viruses and are also present in the Netherlands. We research how water landscape management influences the distribution of different types of birds and explore whether these developments will contribute to the transmission of viruses to urban areas. Lastly, experts in virus ecology and animal ecology will explore innovative methods of 'bird distraction'.

We will conduct a joint risk analysis for public health in the Rotterdam urban delta with our partners and stakeholders.

Team

Name	Institute	Expertise	Position
Pier Siebesma, Principal investigator	TU Delft, Geoscience & Remote Sensing, KNMI (Royal Netherlands Meteorological Institute)	Clouds, convection, precipitation, high-resolution modelling	Professor
Marion Koopmans, PDPC Scientific Director, PDPC Principal Investigator	Erasmus MC, Viroscience	Public health virology	Professor, Head of Viroscience
Koos Biesmeije	Leiden University, Environmental Biology, Naturalis	Biodiversity, global change	Professor
Thom Bogaard	TU Delft, Hydrology	Interaction between water and the environment	Associate Professor
Ewout Fanoy	Municipal health service (GGD), Rotterdam	Public health, One Health	Medical doctor
Gertjan Geerling	Radboud University Nijmegen, Deltares	Disease ecology of wetlands in the national and international context	Senior Researcher
Henk van der Jeugd	NIOO-KNAW (Netherlands Institute of Ecology)	Avian ecology	Head of the Dutch Centre for Avian Migration and Demography
Neeltje Kielen	Directorate-General of Public Works and Water Management (RWS), Ministry of Infrastructure and Water Management	Fresh/saline water issues	
Sander Koenraadt	Wageningen University & Research (WUR), Laboratory of Entomology	Medical entomology in the context of One Health	Associate Professor
Wouter Kranenburg	TU Delft, Environmental Fluid Mechanics, Deltares	Salt intrusion processes, prediction and prevention	Associate Professor
Julie Pietrzak	TU Delft, Environmental Fluid Mechanics	Salt intrusion in deltas, coastal and ocean modelling	Professor
Eldar Rakhimberdiev	University of Amsterdam (UvA), Theoretical and Computational Ecology	Animal movement ecolog	Assistant Professor
Stephan de Roode	TU Delft, Geoscience & Remote Sensing	Atmospheric boundary layer processes	Assistant Professor
Maarten Schrama	Leiden University, Institute of Environmental Sciences (CML), Environmental Biology	Ecosystem ecology, mosquito ecology	Assistant Professor
Gerard van der Schrier	KNMI	Meteorology, climatology, climate change	
Anja Schreijer, PDPC Director of Medical Affairs, PDPC Principal Investigator	Erasmus MC – Viroscience	Public Health	
Judy Shamoun-Baranes	UvA, Institute for Biodiversity and Ecosystem Dynamics	Theoretical and computational ecology	Head of the department of Theoretical and Computational Ecology
Henk Sierdsema	SOVON	Bird migration, large bird distribution databases	
Reina S Sikkema	Erasmus MC – Viroscience	Arboviruses in the context of One Health	Researcher
Natalie Theeuwes	KNMI	Urban climate	



Frontrunner project 2: Predicting, measuring and quantifying airborne virus transmission

Background

The next pandemic will likely emerge from one of the large and well-known families of respiratory viruses. Measuring the extent to which these viruses can spread via small droplets, large droplets, or direct contact is crucial. However, measuring and quantifying airborne viruses is notoriously difficult. Numerous external factors are of influence, including temperature and humidity levels. If we gain a greater understanding of the route of transmission of respiratory viruses, we can work on strategies to reduce that spread.

Objective

In this Frontrunner project, we will develop methods for predicting, measuring and quantifying the spread of airborne viruses. These methods could ultimately result in new and improved mitigation strategies.

Approach

In four related subprojects, we improve methods for measuring air quality and disinfecting the air. These methods will be adapted for indoor environments and tested in hospitals and nursing homes. We explore four significant families of respiratory viruses and link the data to ventilation and air conditioning effectiveness.

Team

Name	Institute	Expertise	Position
Ron Fouchier, Principal Investigator	Erasmus MC, Viroscience	Virology	Professor
Marion Koopmans, PDPC Scientific Director, PDPC Principal investigator	Erasmus MC, Viroscience	Public health virology	Professor, Head of Viroscience
Philomena Bluyssen	TU Delft, Architectural Engineering and Technology	Air quality in indoor environments	Professor
Pieter Fraaij	Erasmus MC Sophia	Medicine, paediatric infectious diseases	
Clara Garcia Sanchez	TU Delft, Architecture and the Built Environment	3D modelling, pollutant simulations	Assistant Professor
Hanneke Gelderblom	TU Eindhoven, Applied Physic	Capillary phenomena in (bio) fluids, Physics	Assistant Professor
Dick Heederik	Utrecht University (UU), Institute for Risk Assessment Sciences	Human exposure assessment, aerosols	Professor
Sander Herfst	Erasmus MC, Viroscience	Virology	Assistant Professor
Tess Homan	TU Eindhoven, Mechanical Engineering	Multiphase flows, spray characterization techniques, data analysis, machine learning	Assistant Professor
Bas Kolen	TU Delft, Values, Technology and Innovation, HKV	Risk modelling, field labs	Guest researcher, Scientific Director, HKV
Marco Ortiz	TU Delft, Architecture and the Built Environment	SenseLab, Field lab testing and monitoring	Researcher
Anja Schreijer, PDPC Director of Medical AffairsPDPC Principal Investigator	Erasmus MC – Viroscience	Public Health	
Jérôme Wishaupt	Reinier de Graaf Hospital Delft	Medicines	Paediatrician
Inge Wouters	UU, Institute for Risk Assessment Sciences	Environmental epidemiology, exposure	Assistant Professor
GuoQi Zhang	TU Delft, Electronic Components, Technology and Materials	Electronics (e.g. UV inactivation, sensing)	Professor

Frontrunner project 3: Pandemic lessons for flood disaster preparedness

Background

Ever since the Netherlands began building mounds, much has been invested in flood prevention. However, there has been little focus on preparations during a flood. The floods in the Netherlands, Germany and Belgium in the summer of 2021 revealed what the consequences could be, even during a short-lived flood. Historically, floods have often disrupted the regular functioning of healthcare, showing us that we need to better prepare healthcare institutions.

Objective

We will identify what is needed to safeguard access to quality healthcare during floods. In this process, we consider the lessons learned during the recent floods and the lessons learned from the COVID-19 pandemic.

Approach

In three subprojects, we explore the impact of large-scale floods on our healthcare system. This includes the challenges that can emerge during crises due to a rapid increase in patient numbers as well as the long-term health impacts. We base our work on information and evaluations from floods (e.g. Limburg, New Orleans) and simulations of potential floods in Zuid-Holland. We take the first step toward a real-time system that charts patient flows, available staff and infrastructure. We also explore which measures and interventions impact most during specific scenarios. Lastly, we focus on a decision-making structure that supports collaboration between actors.

We will work with our stakeholders to incorporate the results of the subprojects into a serious game. This serious game should prepare administrators and people in the field to make effective decisions during flood-related crises.

Team

Name	Institute	Expertise	Position
Roland Bal, Principal Investigator	EUR, Erasmus School of Health Policy and Management	Policy and organizational science	Professor
Bas Jonkman, PDPC Principal Investigator	TU Delft, Hydraulic Structures and Flood Risk	Climate adaptation, flood-risk reduction strategies	Professor
Maarten van Aalst	University of Twente (UT), Geo-Information Science and Earth Observation, International Red Cross Red Crescent Climate Centre.	Natural disasters, climate change	Prinses Margriet Professor, Director, International Red Cross Red Crescent Climate Centre
Saskia Baas	Stichting Philadelphia Zorg	Innovations in healthcare	CEO
Tina Comes	TU Delft, Engineering Systems and Services	Information systems and support in crisis and risk management decision-making	Professor
Menno van Duin	Netherlands Institute for Public Safety (NIPV)	Crisis management	Lector
Bert de Graaff	EUR, Healthcare governance	Healthcare governance	Associate Professor
Tjebbe Hagenaars	Erasmus MC, Emergency Department and Trauma Surgeon	Medical specialist	Head of Emergency Department
Dennis den Hartog	Erasmus MC, Trauma Surgery, Trauma Center Zuid West Nederland	Medical specialist	Head of Trauma Center Zuid West Nederland
Saba Hinrichs-Krapels	TU Delft, Multi Actor Systems	Systems and design strategies in complex decision-making environments	Technology fellow
Bas Kolen	HKV, Research and development	Water and crisis management	Research coordinator
Anja Schreijer, PDPC Director of Medical Affairs, PDPC Principal Investigator	Erasmus MC, Viroscience	Medical issues & public health	Doctor of Social Medicine and Health

Frontrunner project 4: Towards social and urban resilience

Background

Resilience is the ability of a person, household or community to offer resistance to, adapt to or recover from a crisis. Disasters, health crises and crisis measures hit people with a low socio-economic status the hardest, worsening inequality. Through spatial organization and social systems with characteristics like diversity, self-organization, openness, trust, leadership and social networks, we can improve the resilience of communities and society as a whole.
Generally, the consequences of crises, such as drought, floods, extreme temperatures and pandemics, are studied in isolation from each other, despite the significant likelihood of a domino effect happening. A better approach calls for interdisciplinary preparation, especially for vulnerable groups.

Objective

The aim of this Frontrunner project is to develop new knowledge to improve the resilience of citizens and communities in times of crisis.

Approach

Within four subprojects, we explore how we can improve society's resilience.
We investigate the impact of hot summers on unequal groups within an urban and regional context. Furthermore, we research how to combat disinformation.
We explore how to effectively reach vulnerable groups during crises and how to offer them an appropriate action strategy. We investigate how to better support effective citizen initiatives aimed at reducing this vulnerability. Lastly, we research how social networks impacted the spread of the coronavirus and how to present the results to policymakers in an understandable manner.

The knowledge gained will be used in subproject 5: Social and Urban Resilience for Pandemics and Disasters (SURE) Living Lab (see under Living Labs).

Team

Name	Institute	Expertise	Position
Maarten van Ham, Principal Investigator	TU Delft, Urbanism	Urban inequality, spatial context effects	Professor, Departmental Director, Urbanism
Pearl Dykstra PDPC Principal Investigator	EUR, Public Administration and Sociology	Family, life-courses, data infrastructure	Professor
Lex Burdorf	Erasmus MC Public Healthcare	Occupational health	Professor, Head of Department, Public Healthcare
Jet Bussemaker	LUMC, Leiden University, Governance and Global Affairs	Science for policy, healthcare	Professor
Luc E. Coffeng	Erasmus MC, Epidemiology	Infectious disease epidemiology	Assistant Professor, mathematical modeller
Ruben Dood	CBS (Statistics Netherlands)	Data and statistics	Director of Services and Information
Machiel van Dorst	TU Delft, Urbanism	Social psychology and urban design	Professor
Tom Emery	EUR, Public Administration and Sociology	Family dynamics, data and methods	Associate Professor
Godfried Engbersen	EUR, Public Administration and Sociology	Diversity, citizenship, migration	Professor, Scientific Director, Public Administration and Sociology
Arnoud Molenaar	City of Rotterdam		Chief Resilience Officer
Marjolein Pijpers-van Esch	TU Delft, Architecture and the Built Environment	Urban heat islands	Assistant Professor
Wim Timmermans	UT, Geo-Information Science and Earth Observation	Remote sensing, heat	Researcher
Sake J. de Vlas	Erasmus MC, Public Health	Individual-based modelling	Professor
Rens Vliegenthart	WUR, dept. Strategic Communication	Media and society	Professor
Hélène Voeten	GGD Rotterdam-Rijnmond	Public Health	Researcher

Frontrunner project 5: Integrated early-warning surveillance methods and tools

Background

To be effectively prepared for any subsequent pandemic, the early detection of new virus outbreaks is essential. That is why we need to be able to identify critical focal points that could play a role in the spread of viruses. Surveillance needs to be rapidly deployable and widely integrated. Think of bioinformatics, innovative sampling methods, detection, metagenomics, and social media data mining. Although various methods are already being used to gain a better understanding of people, animals and goods, virus outbreaks and transport routes, these data are not being combined or used for pandemic intelligence.

Objective

This Frontrunner project aims to contribute to the early and risk-based detection and characterization of new viruses. We will monitor these viruses within the context of the Netherlands given its role as a hub in the complex global transport and trading network.

Approach

One of our most significant challenges is to ensure that data is consistent, valid, and representative. We also must consider the organization of access to data, privacy, and ethical considerations. We sample drinking water, animal manure, dust on surfaces and wastewater. We investigate methods for representative sampling and obtaining sufficient virus material in an effective and reproducible way.

We will work with several stakeholders, including local and national healthcare organizations, port authorities and Customs in the Living Lab. This collaboration allows us to validate and translate our results into necessary actions. Read more under Living Labs.

Team

Name	Institute	Expertise	Position
Gertjan Medema, Principal Investigator	TU Delft, Sanitary Engineering KWR	Transmission of pathogens via the environment (water, air), environmental surveillance	Professor, KWR, Principal Microbiologist
Marion Koopmans, PDPC Scientific Director, PDPC Principal Investigator	Erasmus MC, Viroscience	Global impact of rapidly spreading zoonotic virus infections, preparedness, viral infections at the human/animal interface, molecular epidemiology	Professor, Head of Viroscience
Marc Bonten	UMC Utrecht, Epidemiology, ECRAID	Epidemiology of infectious diseases	Professor
Pearl Dykstra, PDPC Principal Investigator	EUR, Public Administration and Sociology, ODISSEI	Data infrastructure, social implications of crises	Professor, Scientific Director, ODISSEI
Ewout Fanoy	Public Health Service (GGD) Rotterdam-Rijnmond	Outbreak control, disease surveillance, public health	Medical doctor
José Gonzales Rojas	Wageningen Bioveterinary Research	Transmission of infectious diseases, risk assessment and risk-based surveillance	Researcher
Miranda de Graaf	Erasmus MC – Viroscience	Origins and development of viruses, surveillance of virus development in the environment	Assistant Professor
Ludo Hellebrekers	Wageningen Bioveterinary Research, ERRAZE	Early Recognition and Rapid Action in Zoonotic Emergencies (ERRAZE)	Professor, Programme lead ERRAZE@WUR
Bas Jonkman, PDPC Principal Investigator	TU Delft, Hydraulic Structures and Flood Risk	Fluvial flooding, flood risk and prevention	Professor
Jeroen Langeveld	TU Delft, Sanitary Engineering	Urban drainage, fluvial flooding	Associate Professor
Petra van der List	Public Health Service (GGD) Rotterdam-Rijnmond	Data analysis	Data scientist
Sabine Roeser	TU Delft, Values, Technology and Innovation	Ethics of risks, research ethics, moral emotions, public deliberation	Professor, Head of Department of Values, Technology and Innovation
Rob Slegtenhorst	Port of Rotterdam Authority	Data, information, GIS	
Alexander Verbraeck	TU Delft, Technology, Policy and Management	Transport modelling and simulation, transport network analysis, airport and port processes, risk analyses and mitigation	Professor
Saskia Wiegmans	Port Health Authority	Data and digitalization	

Living labs

We conduct some of our research in Living Labs, in which innovative solutions are developed and tested in an existing environment. Stakeholders are actively involved in the research and, ideally, have a role in formulating the research questions.

SURE Living Lab
Vulnerable groups in society are more seriously affected by disasters and take longer to recover. The Social and Urban Resilience for Pandemics and Disasters (SURE) Living Lab aims to better understand which conditions temper these effects. The activities of this Living Lab are based in Rotterdam-Zuid.

To improve resilience, it is not only necessary to identify risks, but also to investigate what works. Subsequently, we focus on how groups form and citizen initiatives take root. We also explore how to guide and encourage this process. In addition, using an app, we train citizens to distinguish between facts and disinformation.

Air samples and ventilation systems
To understand how viruses spread via the air, we are working on improved equipment for taking air samples and detecting viruses. The equipment is tested in the SenseLab (TU Delft), various nursing homes and the Reinier de Graaf Hospital. Tests will follow in cafés and restaurants to determine how ventilation systems affect the spread of viruses.

Intelligent pandemic monitoring
We will establish an intelligent monitoring system based on Frontrunner project 5: 'Integrated early-warning surveillance methods and tools'. Using new methods developed in this project, we will take samples at (and in collaboration with) the port of Rotterdam and Schiphol airport.

In addition, we will work with stakeholders, such as local and national healthcare organizations, port authorities and Customs, to test the system's validity and quality of the results. Stakeholders and experts will then be able to determine which results should prompt action and what these actions should look like. This way, we can discover what is needed regarding informed consent, voluntary participation and ethics.

The PDPC Academy

The PDPC Academy aims to catalyse, connect and share the PDPC expertise and philosophy through knowledge transfer and education, and an academic workplace.

Knowledge transfer and education: teaching the PDPC philosophy!
The PDPC Academy aims to facilitate postgraduate students working on theses on one of the key PDPC topics. Students will receive education and supervision in addition to their study programmes. We are exploring several education methods, such as interdisciplinary case-based learning and possibilities for post-academic knowledge transfer. You can find the first results on the PDPC website: the PDPC webinars.

Academic workplace: policy, practice and research
With its academic workplace, the PDPC fulfills a deficiency by providing short-term knowledge on pandemics and disasters. External parties as well as PDPC researchers can suggest research questions to the PDPC workplace. The short-term research projects will result in a knowledge agenda that leads to in-depth scientific research. Within the PDPC Academy framework, we work closely with stakeholders, such as the Municipal Public Health Services (GGDs), the Port of Rotterdam and ministries. The Academic workplace unites questions and answers and strives to share them widely in an open-source format.

The academic workplace is intended for applied research that combines three key pillars: policy, practice and research. Examples of short-term research projects are listed below.

Targeted interventions
Information about disasters and epidemics can sometimes fail to effectively reach specific groups in society, or these groups cannot respond adequately due to circumstances. For instance, some people did not get the corona vaccine due to misinformation or because they found it difficult to reach a vaccination location, making these groups extra vulnerable. This project will apply a three-step approach to explore which targeted interventions can be developed to reach these groups.

The first step involves identifying the groups. Secondly, we will conduct qualitative research to identify the barriers and drivers that play a role in, for example, COVID-19 vaccination.

In the final step, we will translate our research into targeted interventions. We use the Tailoring Immunization Programmes (TIP) approach developed by the WHO to develop customized vaccination programmes to achieve high and equitable vaccination uptake. However, this approach suits other prevention measures implemented during the COVID-19 pandemic and also other health challenges.

Investigating knowledge gaps in the pandemic
Lessons learned for an integrated assessment framework: a joint project involving the PDPC, UMC Utrecht, the Council of Public Health & Society (RVS) and the Netherlands Institute for Social Research.

The Dutch approach adopted during the COVID-19 pandemic was based on advice regarding infectious diseases, epidemiology and behaviour/society. In this project, we seek to identify knowledge gaps within these areas. We are working with different scientific experts to simulate several key decision-making moments in the coronavirus crisis. What knowledge did they have at that time? How was this knowledge taken into account in decision-making? The intended outcome is an interdisciplinary research agenda describing the knowledge needed to improve advice in the future.

Infectious disease factor model
Commissioning authority: City of Rotterdam

The City of Rotterdam is working on deploying interventions to prevent infectious diseases. The city identifies different factors that positively or negatively affect infection rates. Potential interventions are assessed in terms of prevalence, relevance and proven impact. The result will be a factor model for infectious diseases. The PDPC provides expertise and advice regarding infectious diseases.

Resilient healthcare systems
Tjebbe Hagenaars, Head of Emergency Department and Trauma Surgeon at Erasmus MC: *"Healthcare should never be allowed to reach a crisis situation and should continue functioning effectively under all circumstances. For healthcare, that's the overriding objective."*

Institutional healthcare systems are organized in such a way that they only effectively function under normal circumstances. At times of crisis, this can prevent an adequate response. With this project, the PDPC aims to identify the questions we need to answer to improve the resilience of the healthcare sector, enabling it to continue to operate effectively even during a pandemic or a flood. The early detection of - and response to - risks plays a central role in this process.

This project is led by Roland Bal, Professor of Policy and Governance of Healthcare at Erasmus University Rotterdam (EUR).

Measures and passenger behaviour during Omicron flights
How we travel played an essential role in the spread of the virus during the COVID-19 pandemic. We want to understand the impact of passenger behaviour on the spread of epidemics and to explore whether the measures taken had the desired effect. In collaboration with Schiphol and the GGD Kennemerland, the PDPC will study the proportionality of measures relating to the so-called Omicron flights at the end of 2021.

Long-term COVID-19 strategy
Doctor of Social Medicine and Health Anja Schreijer from the PDPC: *"Structural changes with more trust and responsibility for citizens are needed to make our society more robust."*

If we want to avoid far-reaching measures in the battle against COVID-19, a long-term strategy is required. In January 2022, the PDPC facilitated a meeting with experts from (bio)medical and social sciences and social partners to draw up this strategy. After outlining four scenarios (from cold virus to worst-case), a document (in Dutch) was drafted, exploring how to gain wide societal support and improve society's resilience.

PDPC

Scientists and experts from numerous organizations and institutes work together within the PDPC.

UMC Utrecht

Reinier de Graaf

IMISCOE

University of Twente.

Gemeente Delft

Leiden University Medical Center

Erasmus MC
Universitair Medisch Centrum Rotterdam

NIOO

Deltares
Enabling Delta Life

Koninklijk Nederlands Meteorologisch Instituut
Ministerie van Infrastructuur en Waterstaat

HKV
LIJN IN WATER

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Centraal Bureau voor de Statistiek

Erasmus University Rotterdam

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Naturalis Biodiversity Center

GLOBAL CENTER ON ADAPTATION

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Research Development Office
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veo

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