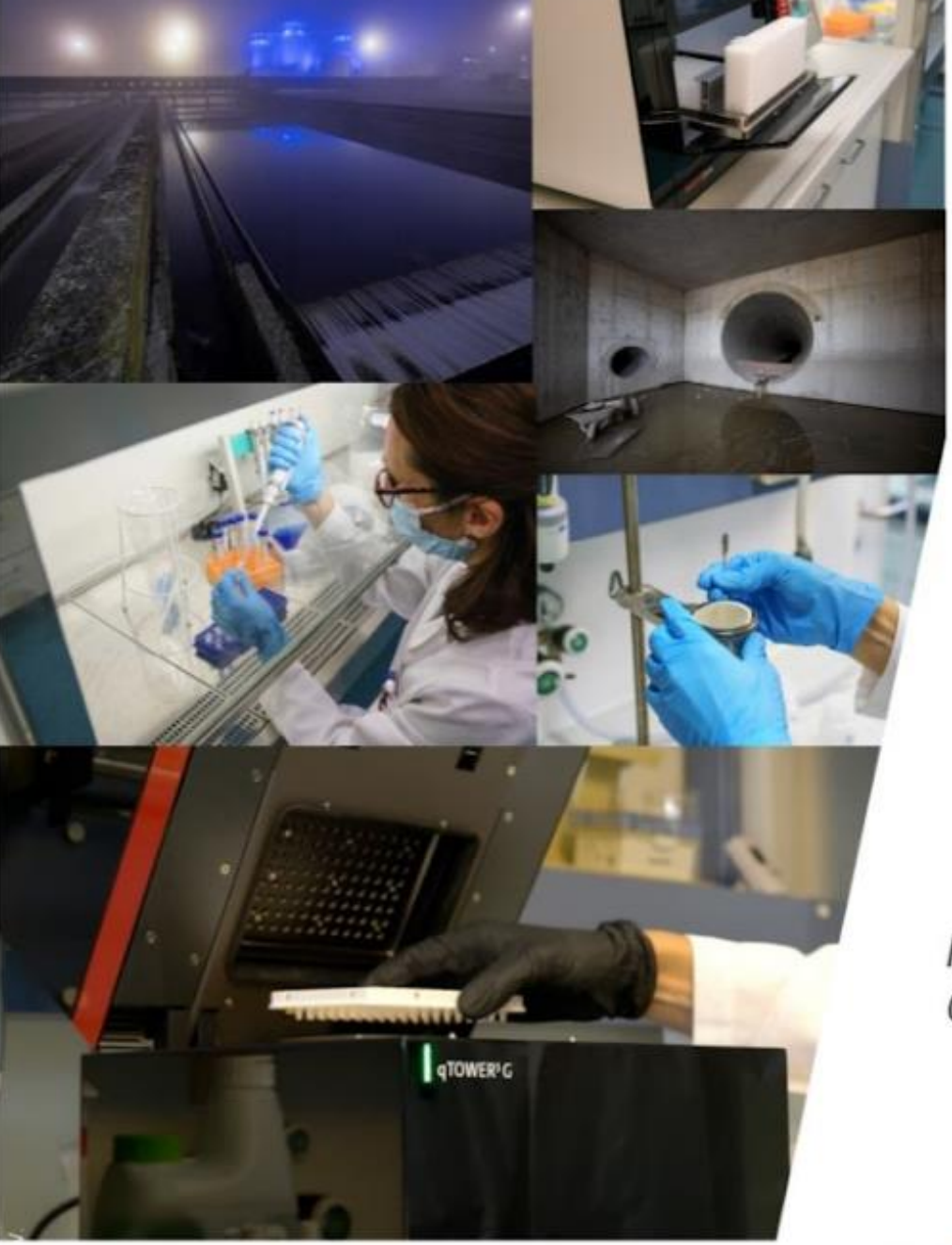

WBEready

WBEready - Wastewater-based epidemiology and preparedness

Research needs for a roadmap to build adaptive monitoring capacity in the public health service

PD Dr. Marek Widera (Goethe-University Frankfurt, University Hospital)
On behalf of the WBEready consortium

Gefördert durch:

Bundesministerium für Gesundheit
Federal Ministry of Health

GOETHE UNIVERSITÄT FRANKFURT AM MAIN

Virologie Universitätsklinikum Frankfurt

Emschergenossenschaft Lippeverband

FiW

RWTH AACHEN UNIVERSITY

GOETHE UNIVERSITÄT

University Medicine Essen
Institute for Artificial Intelligence in Medicine

Universitätsmedizin Essen
Universitätsklinikum
Institut für Urban Public Health (InUPH)

Our world is getting closer…

https://www.istockphoto.com/de/fotos/globalisierung

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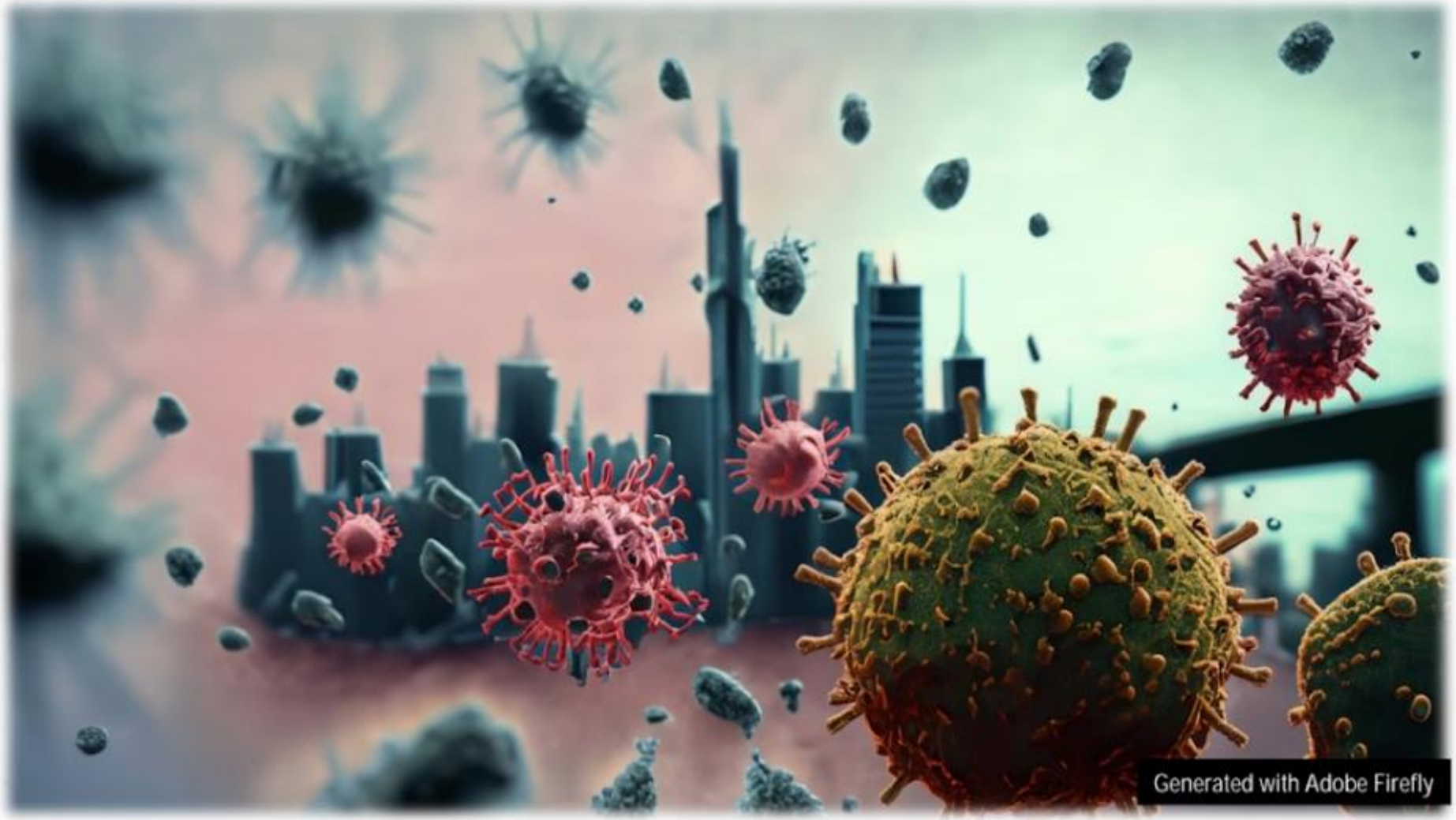
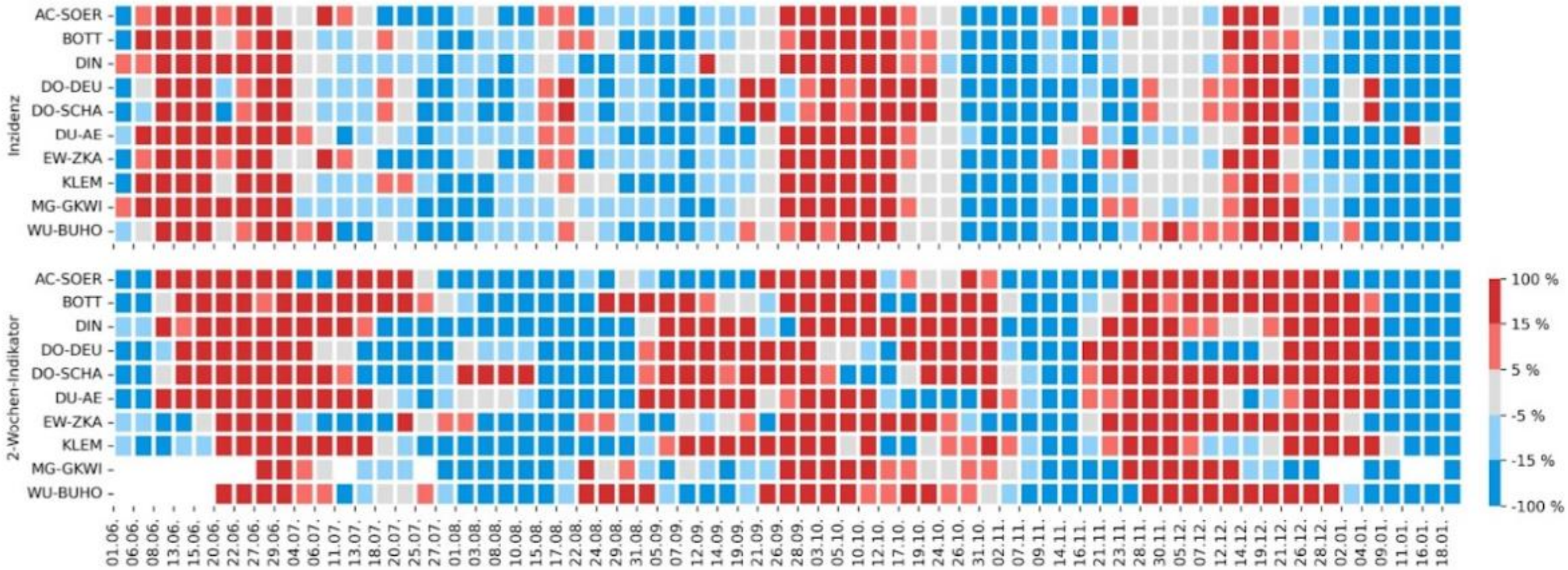
WBEready: From routine to pandemic preparedness…



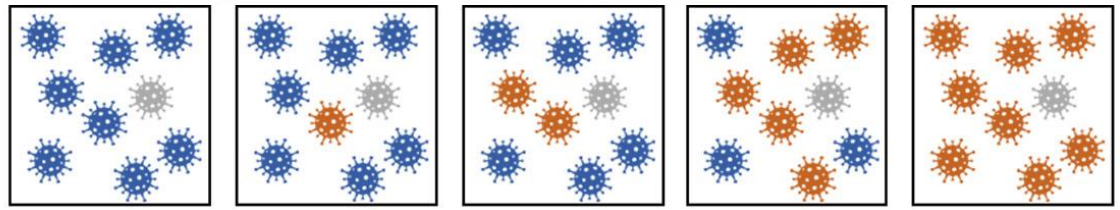
Trend analysis of SARS-CoV-2 RNA measured in wastewater

COVIDready



Decentral, succesive workflow for wastewater laboratories

Prevalence SARS-CoV-2 variants in population



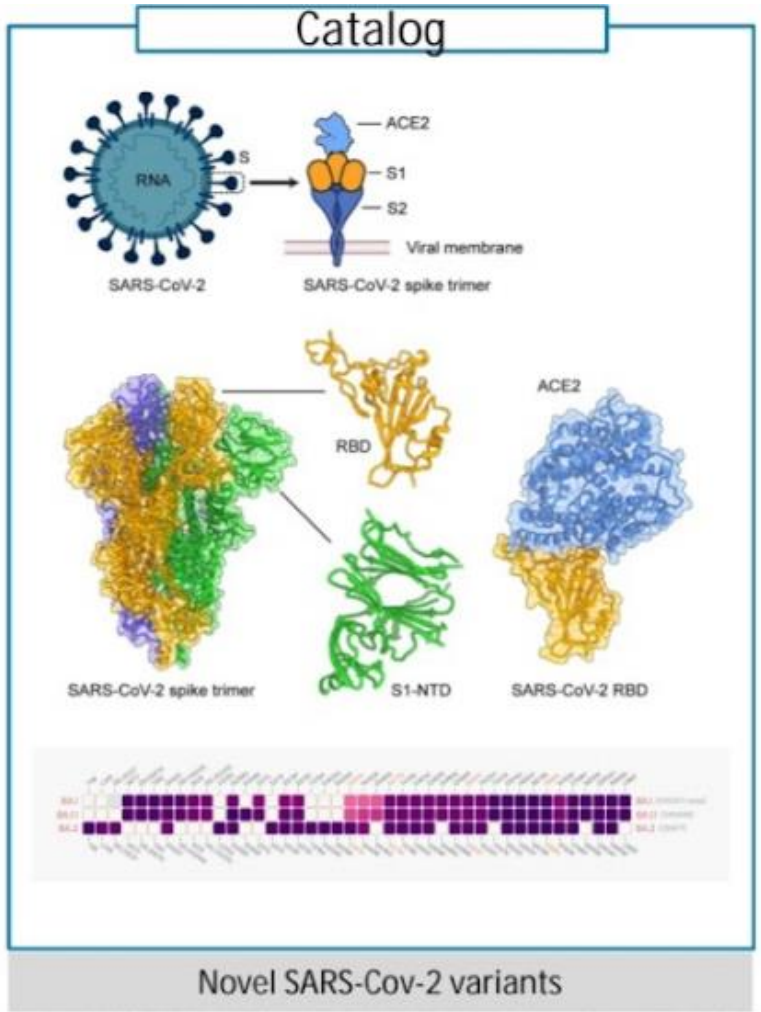
COVIDready

WWTP

sampling (twice a week)

Wilhelm et al. 2022, Sci Total Environ

Clinical relevance of SARS-CoV-2 VoC screening



Wilhelm, A., 2022. STOTEN, Vol 846, 10 Nov 2022, 157375; Wilhelm, Widera et al. 2022. eBioMed 2022 Aug;82:104158., Du et al. 2021, Cellular & Molecular Immunologie, Grohmann et al. 2021, JRC technical report - European Network of GMO Laboratories

WBEready: From routine to pandemic preparedness...

Gefördert durch:

Bundesministerium für Gesundheit | Federal Ministry of Health

COVIDready → WBEready

WBEready: From routine to pandemic preparedness...

Gefördert durch:
Bundesministerium für Gesundheit
Federal Ministry of Health

COVIDready → WBEready

Goethe Universität Frankfurt am Main – Virologie Universitätsklinikum Frankfurt

ISA | RWTH Aachen University

Analytical methods

University Medicine Essen
Institute for Artificial Intelligence in Medicine

Health-related and clinically relevant questions

FiW

Environmental and Wastewater-Related Assessment

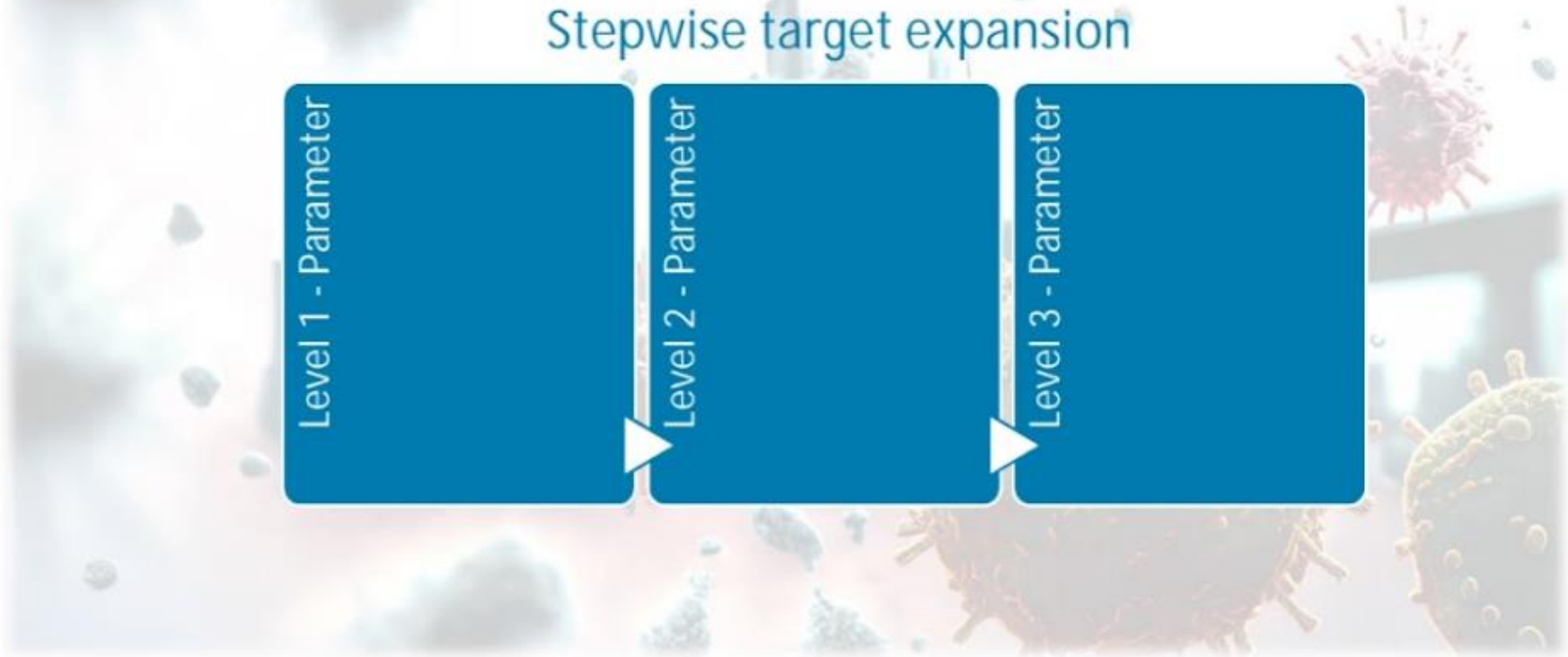
Data management and analysis

Universitätsmedizin Essen
Universitätsklinikum
Institut für Urban Public Health (InUPH)

Emschergenossenschaft
Lippeverband

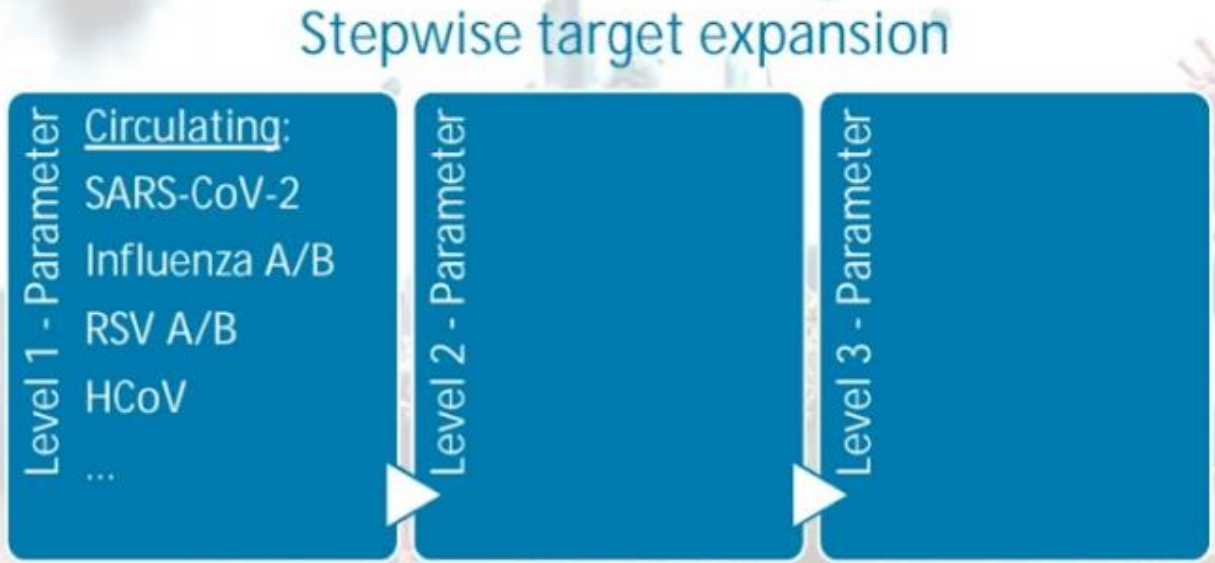
WBEready: From routine to pandemic preparedness...

COVIDready → WBEready



WBEready: From routine to pandemic preparedness…

COVIDready → WBEready



Level 1: Provides regular, consistent, fast and cost-effective monitoring of endemic or frequent diseases

WBEready: From routine to pandemic preparedness...

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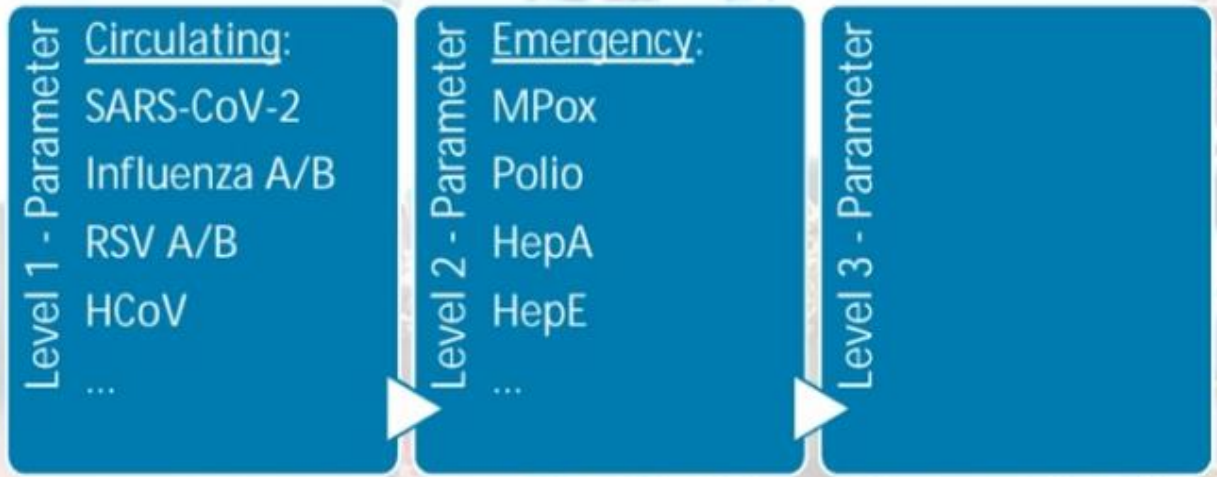
Stepwise target expansion



Level 2: Enables a rapid response to local outbreaks and emergencies

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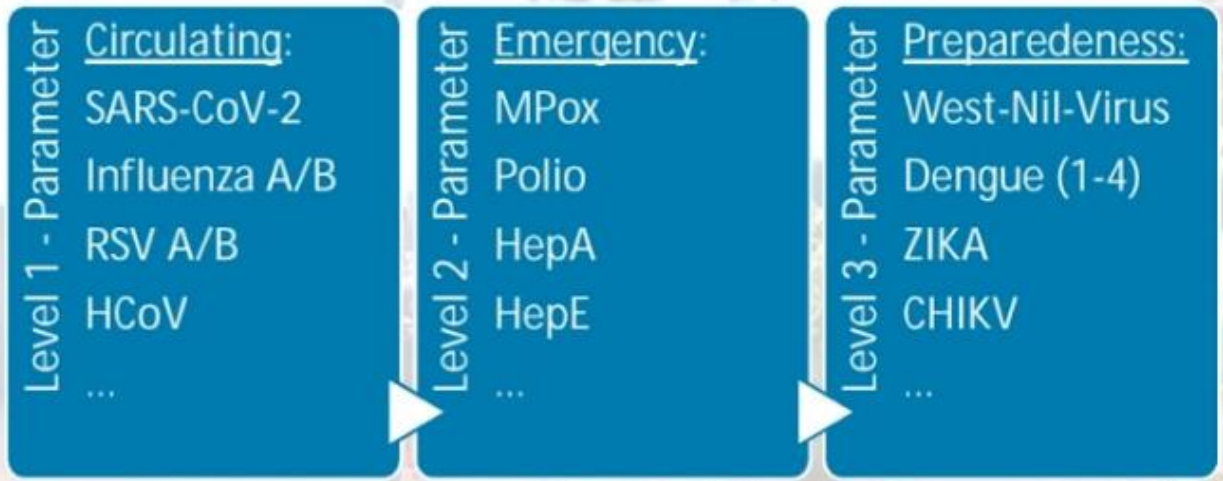
Stepwise target expansion

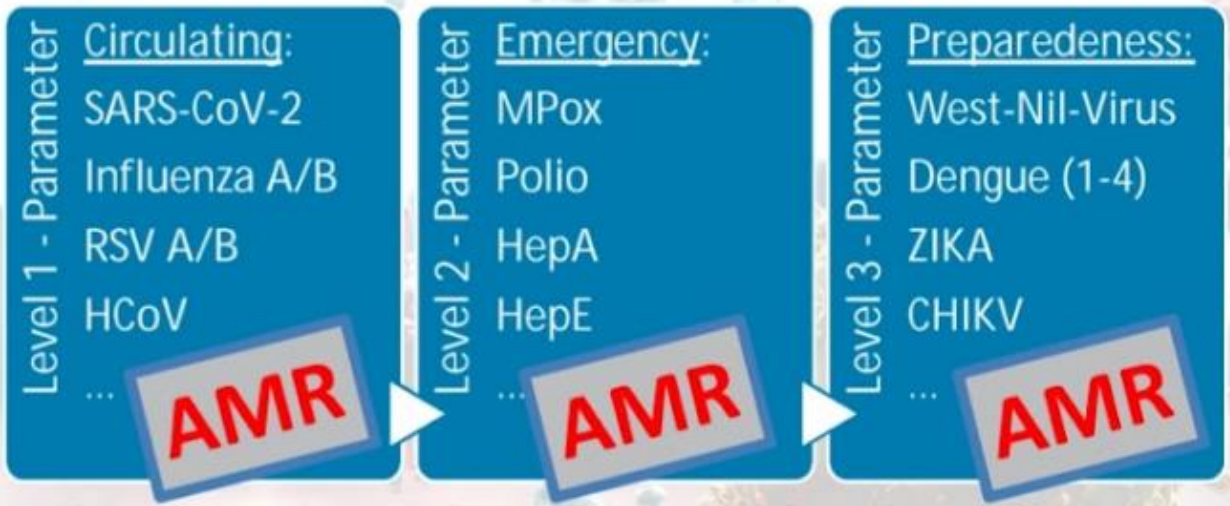


Level 3: Scanning for potential threats enables the assessment of possible rare or unexpected diseases at the population level...

WBEready: From routine to pandemic preparedness...

COVIDready → WBEready

Stepwise target expansion



AMR: Scanning for antibiotic resistant bacteria enables the detection of possible and unexpected resistance issues at the population level...

WBEready: Core objectives of virus monitoring in wastewater

- Level 1: Circulating & common resp. humanpathogenic viruses

  SARS-CoV-2, Influenza (A/B), RSV (A/B),
  HCoV (NL63, 229E, OC43, HKu1)...

- Level 2: Emergency

  HepA, HepE, Mpox, (non-Variola Orthopox)...

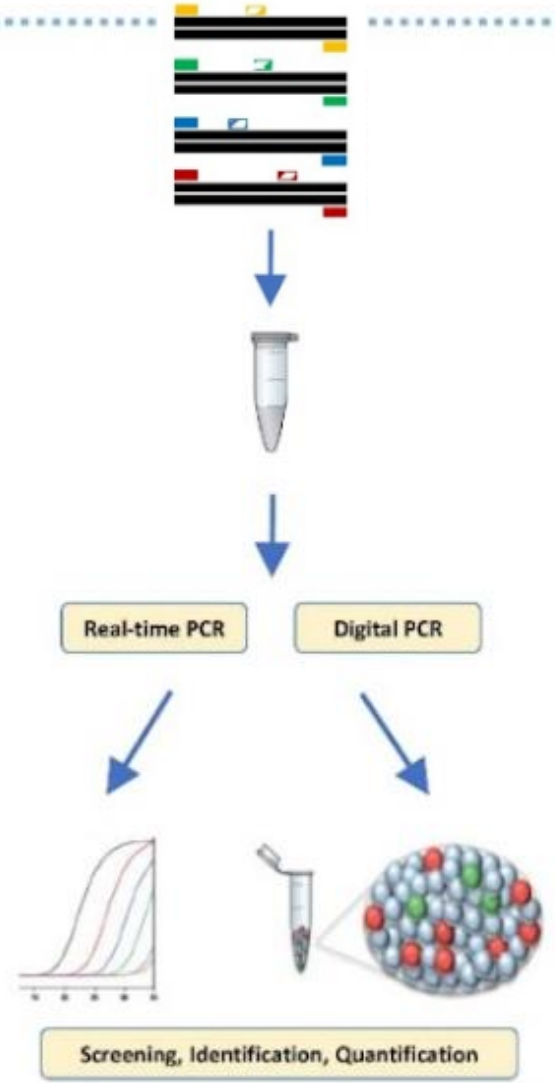
- Level 3: Preparedeness

  Arboviruses: West-Nil-Virus, Dengue (1-4), ZIKA, CHIKV...

- Parameters for normalization

  PMMoV, CrAssphage, BCoV...

WBEready



Grohmann et al. 2021, JRC technical report - Guidance document on multiplex real-time PCR methods, European Network of GMO Laboratories

WBEready: Core objectives of AMR monitoring in wastewater

- Quantitative PCR

  cost-efficient, sensitive, semi-quantitative (PCR)
- ampliSeq

  more expensive, sensitive, genotyping, 16s rDNA might be included, mix of approx. 100-300 primer pairs
- Shotgun sequencing

  expensive, probably less sensitive, no PCR bias, contigs / MAGs, identification of new targets > development of new PCR assays

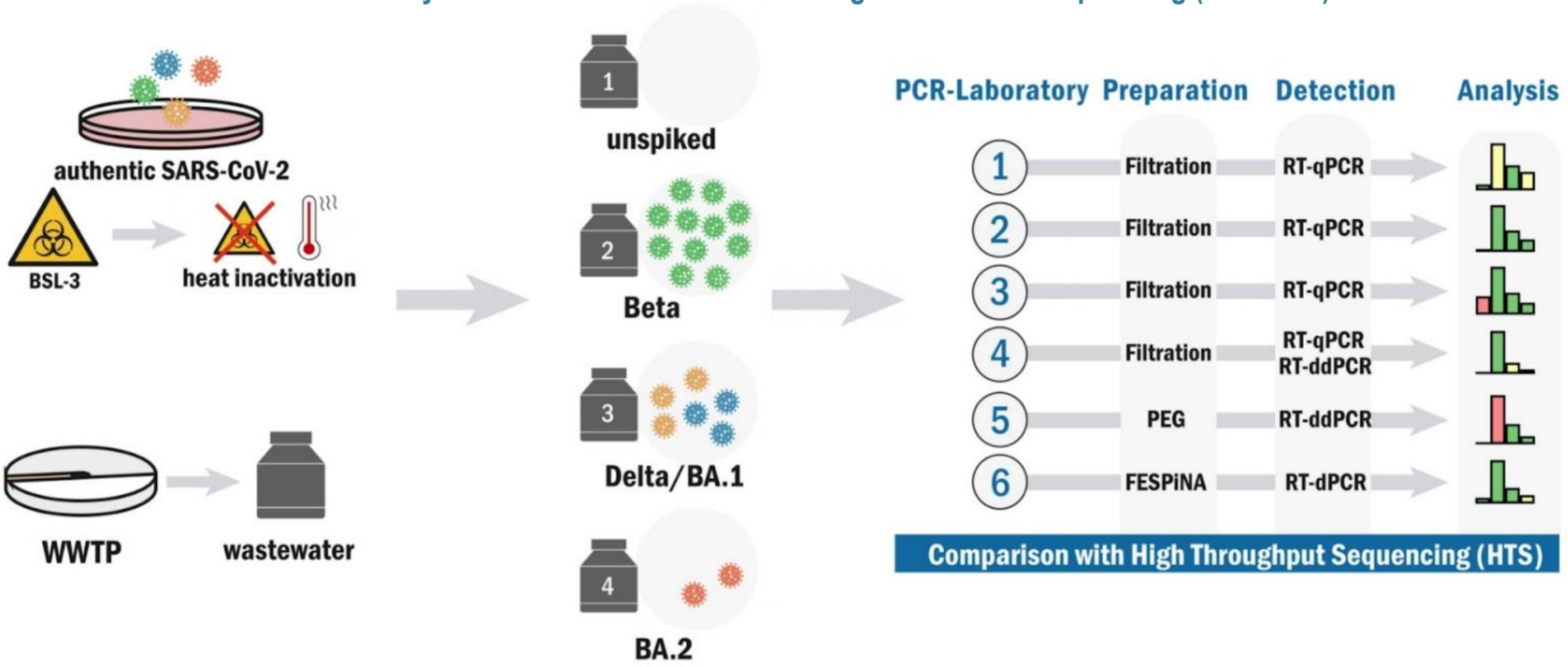
***bla*OXA-48**
*bla*OXA-23
*bla*OXA-24
*bla*OXA-58
*bla*OXA-51
*bla*OXA-72
***bla*KPC-2**
*bla*KPC-3
*bla*IMP
mcr-1
mcr-2
ermB
***bla*Vim1**
*bla*Vim2
***bla*NDM-1**
*bla*NDM-5
mecA
mecC
*bla*TEM
*bla*CTXM-15
*bla*CTXM-32
*bla*CTXM
*bla*CMY2
*bla*SHV
sul1
tetM (tetO?, tetA?, tetB?)
vanA
vanB

PD Dr. Annette Jurke (LZG.NRW)

Interlaboratory comparison using inactivated SARS-CoV-2 variants as a feasible tool for quality control in COVID-19 wastewater monitoring

Sci Total Environ. 2023 Dec 10:903:166540. doi: 10.1016/j.scitotenv.2023.166540.

Quality control in wastewater monitoring for PCR and Sequencing (HTS/NGS)



Wilhelm et al. 2023, Sci Total Environ

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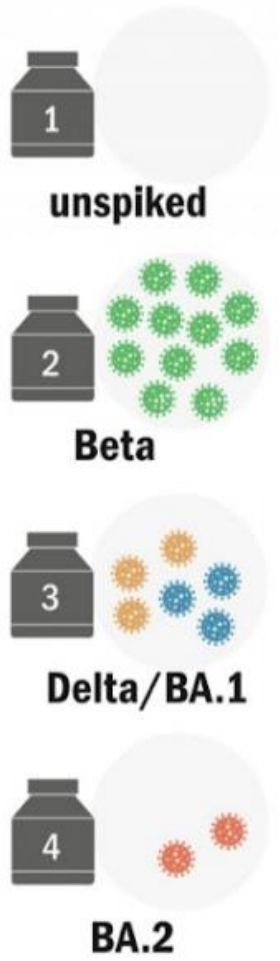
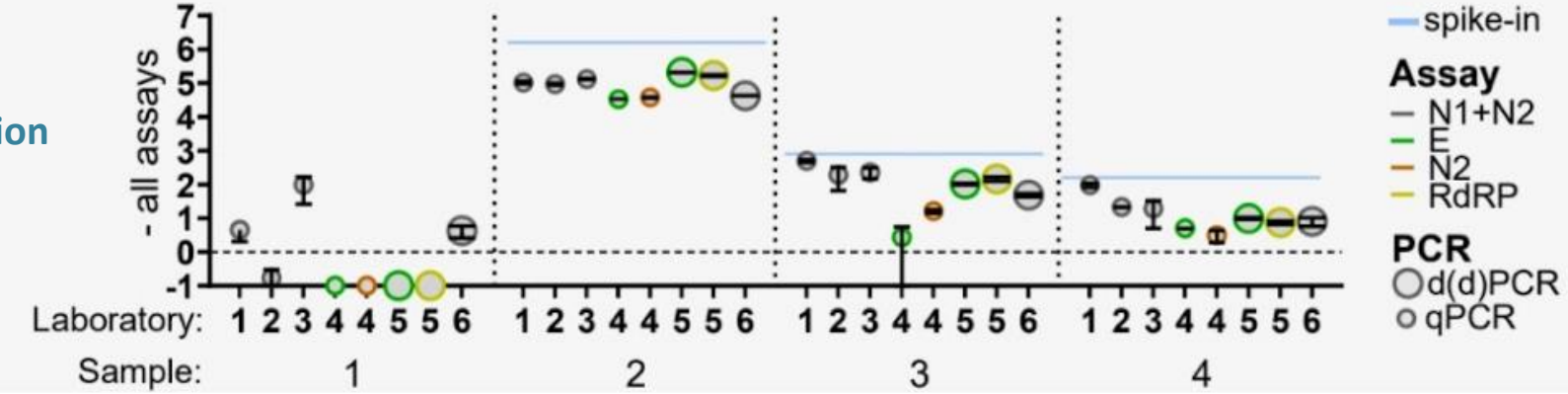


Quantitative detection of SARS-CoV-2 RNA



Wilhelm et al. 2023, Sci Total Environ

WBEready: From routine to pandemic preparedness…

Emschergenossenschaft
Lippeverband

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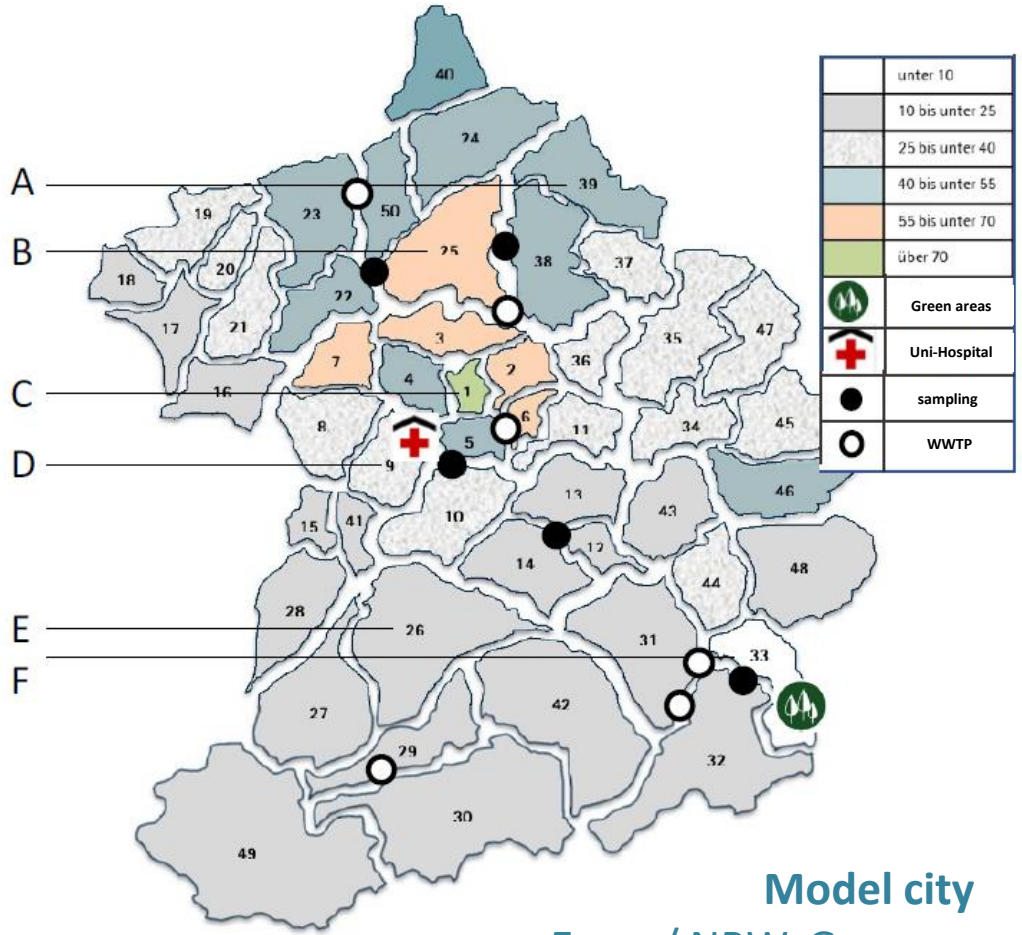
Model region EGLV
the largest water association in Germany (NRW)

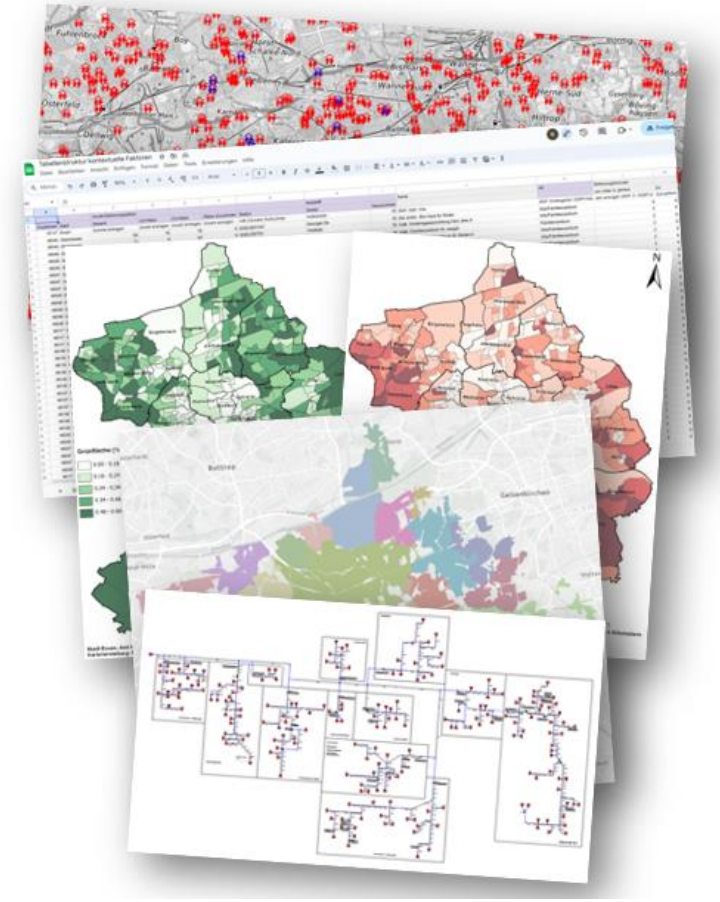
Model sewer system for the
investigation of wastewater network processes
(µ3 – Forschungszentrum Soers, ISA-RWTH Aachen)

WBEready: From routine to pandemic preparedness…

Selected **sampling** locations according to public health aspects



Model city
Essen/ NRW, Germany



Communication and exchange with public health authorities

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www.WBEready.de