



**Water Cycle Epidemiology WCE - WasteWater
based Epidemiology WBE - a vision for tomorrow
One piece of One Sustainable Health OSH**
June, the 16th, 2022



WEBINAR
COVID-19 and
the WATER SECTOR

📅 Thursday, 16 June 2022
🕒 17:00 – 18:30 hrs. (Bangkok time) GMT+7

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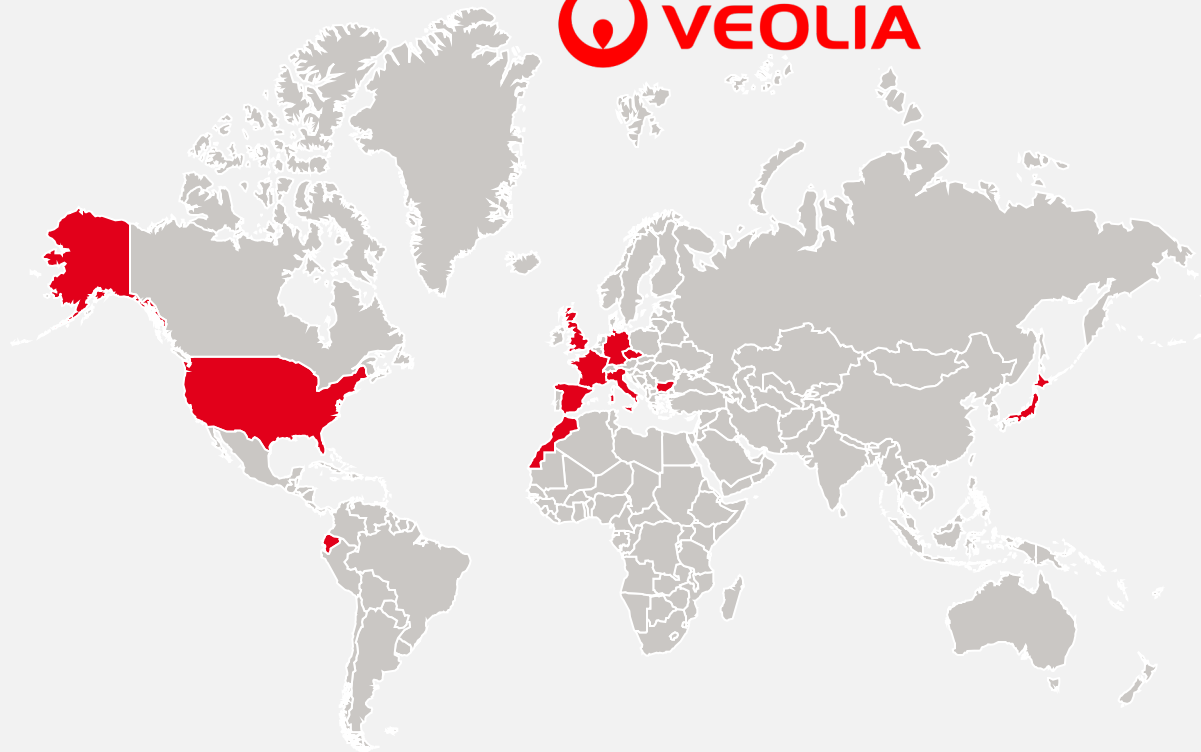
Q1. Veolia & Covid-19 pandemic

- * How Veolia as a water company facing COVID-19-related issues?*
- * What were the business impact of Covid 19 for the Water company like Veolia*



ACKNOWLEDGEMENT

Partners & Veolia BUs WW... and more coming soon





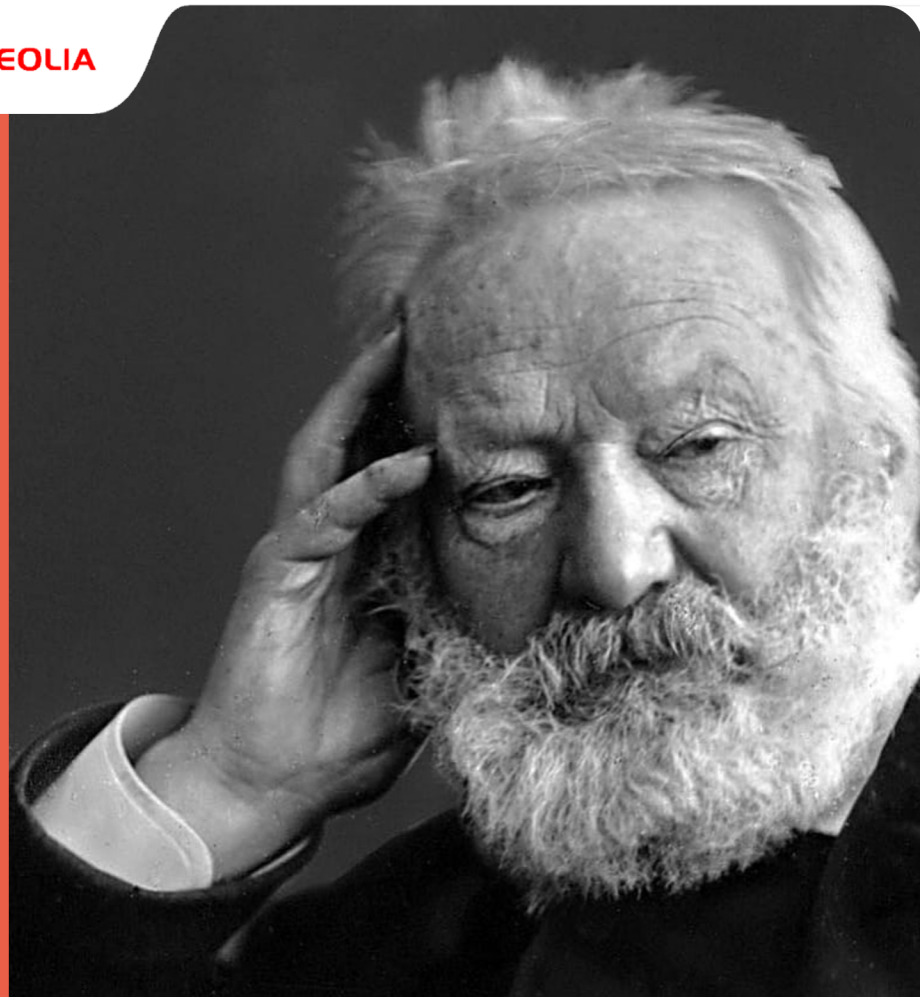
“No one can whistle a symphony. It takes a whole orchestra to play it.” H.E. Luccock

Back to the Sewer

*"The sewer is the conscience of the city.
Everything there converges and confronts
everything else. In that livid spot there are
shades, but there are no longer any secrets."*

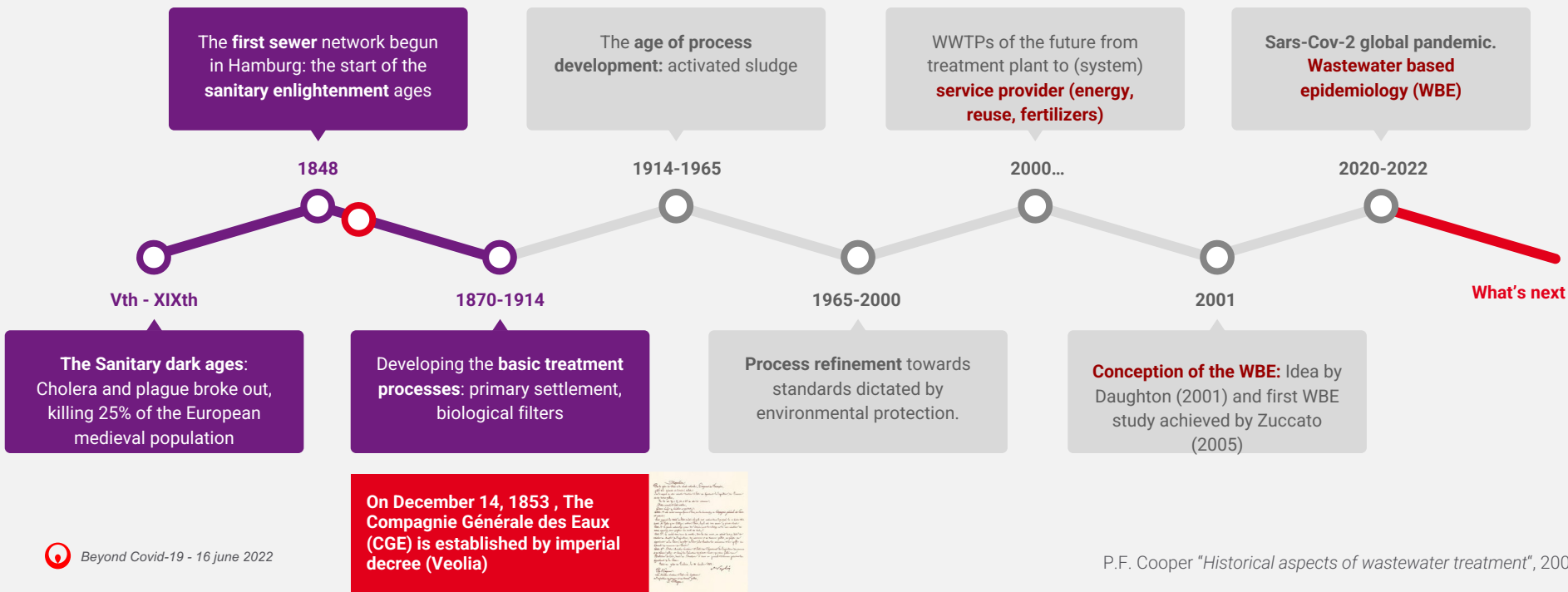
Victor Hugo

*The Intestine of Leviathan, Les Misérables
(1862)*



THE SANITATION TIMELINE

The history of wastewater treatment through the ages



THE COVID-19 and VEOLIA activities

Veolia Purpose, the essentials services and workers protection

What is Veolia's mission during the crisis?

Veolia's mission is to deliver essential water, waste and energy services on a daily basis. From the outset of the pandemic, we rolled out continuity plans for these services in our different zones and for our various businesses. Our employees are prepared and dedicated to maintaining these services for the public, healthcare establishments and vital businesses (food processing, supermarkets, energy suppliers, etc.), all of which rely on us to continue to provide their services on a daily basis.



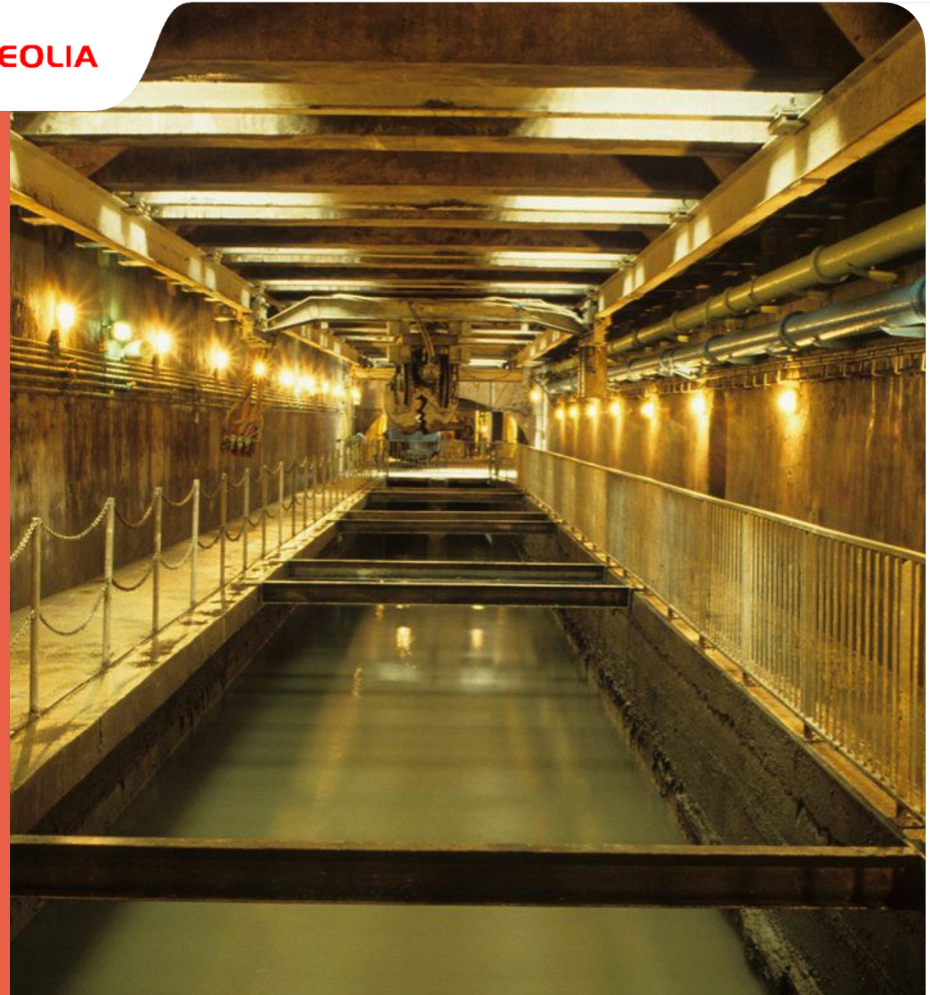
What are the priorities during the pandemic for WATER sector?

Our priorities are the essential operations: ensuring drinking water production and wastewater treatment. Some operations, such as non-emergency maintenance operations or meter readings, have been postponed.



Q2. Science, Technology, Innovation in the time of Covid-19

*What are the technological innovations you
have developed to handle this new
environmental issue?
Lessons learned?*



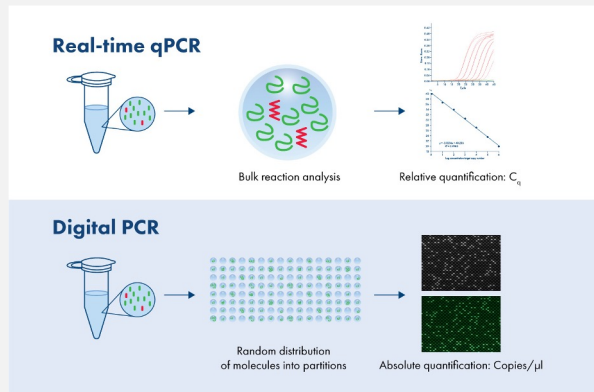
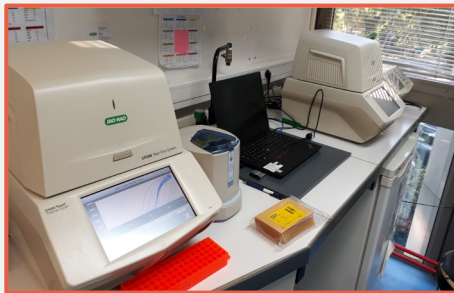


Science, Technology and Innovation in the time of Covid-19

Lab Automation & Digitalization



❖ From RTqPCR to dPCR



[Qiagen](#) website



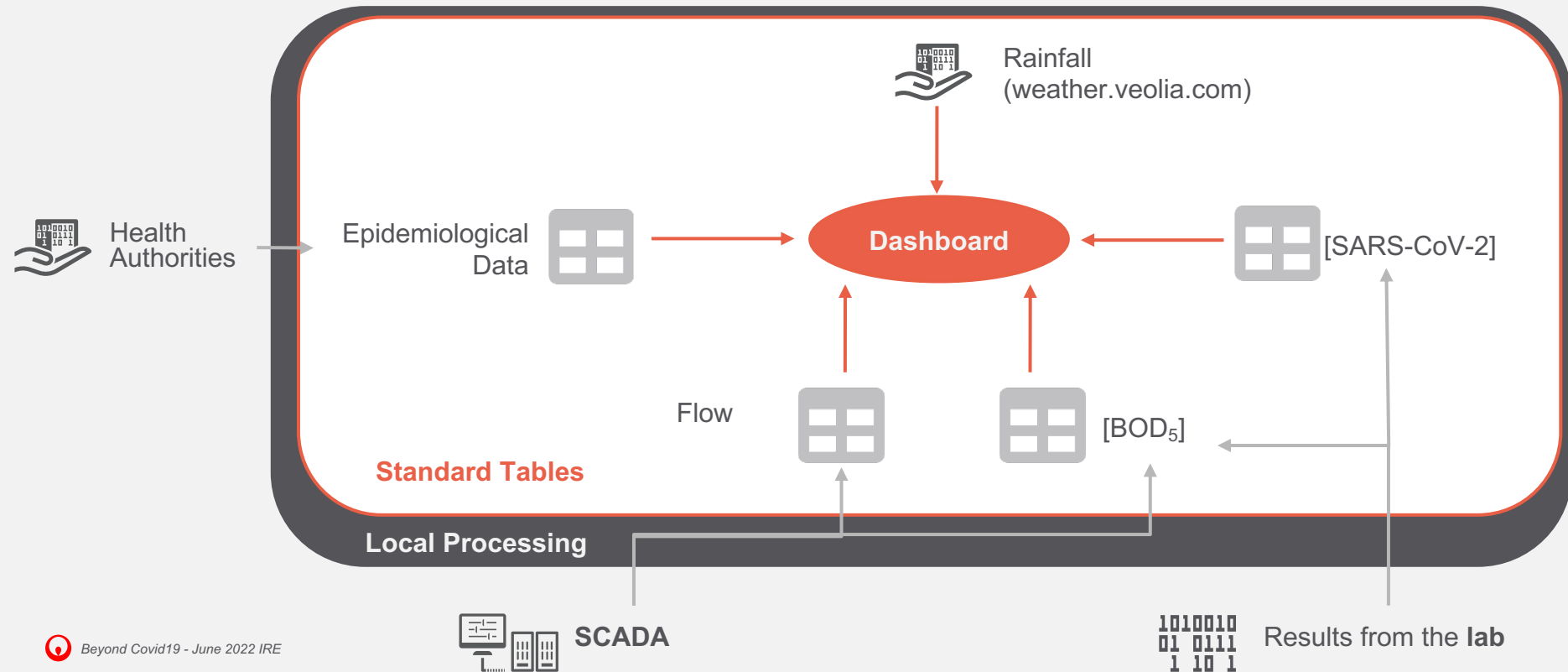
❖ Test of on-site equipments





Science, Technology and Innovation in the time of Covid-19

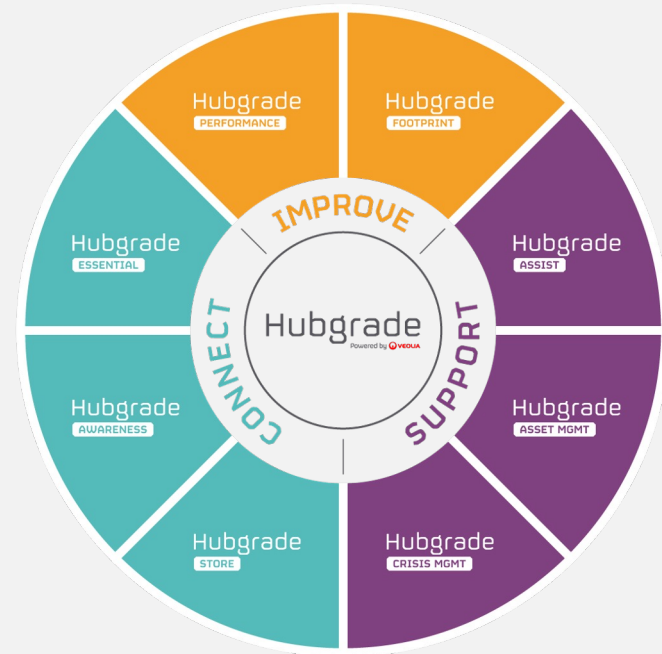
Data Transfer & Dashboarding Automation





Science, Technology and Innovation in the time of Covid-19

HUBGRADE, Veolia Digital Solutions





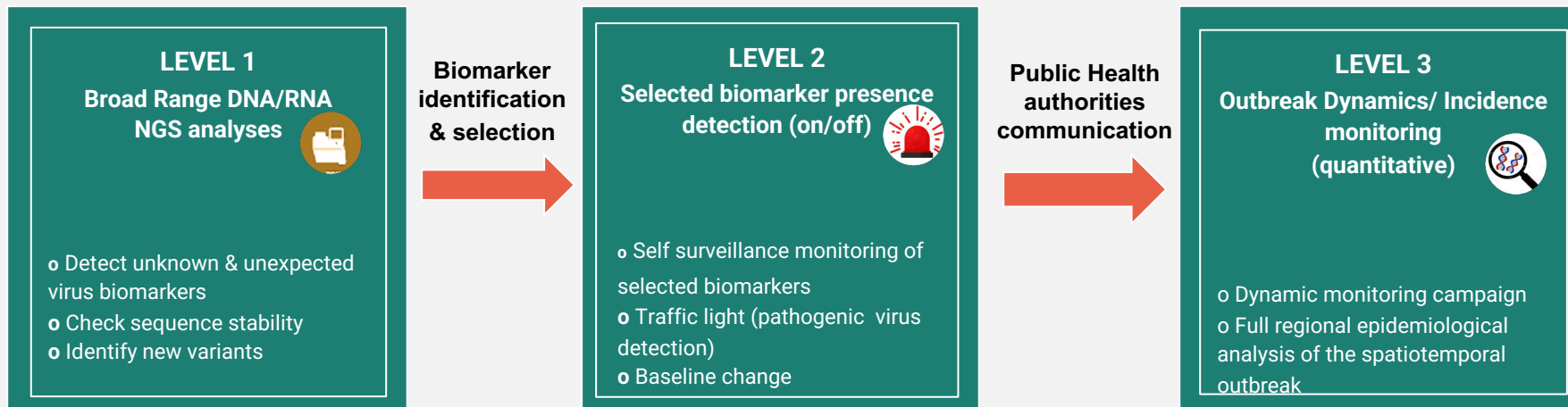
Science, Technology and Innovation in the time of Covid-19

Promising future...NGS, Data the new Oil, Sensors, Technos transfer, “Global Innovation Partnerships”... but also “operational” and cost-effective



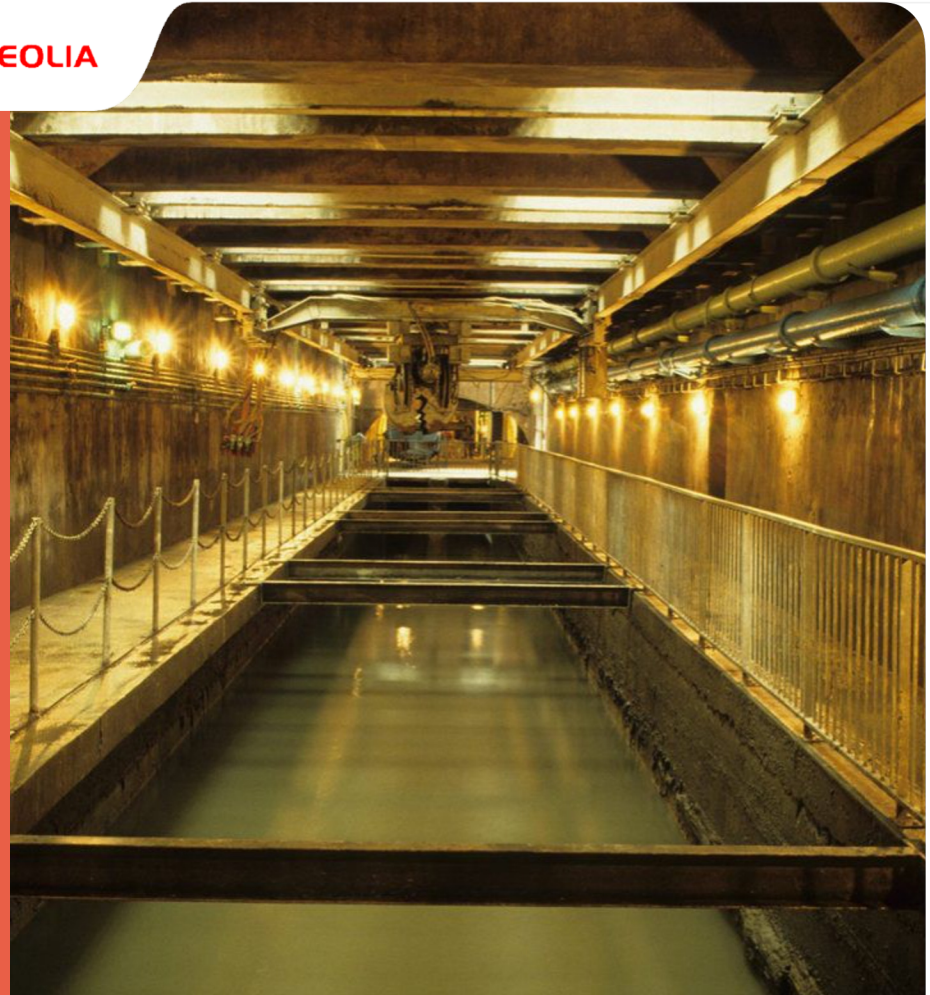
Next Sequencing Generation NGS Technology for a new vision of the WCE/WBE(sewer) as an “One Health” Observatory

- Detection of unknown & unexpected virus biomarkers, check for sequence stability, Identify new variants
- Selection of reliable biomarkers for routine monitoring (PCR detection)
- **But mainly available for R&D purposes, need highly skilled people & human health experts, too expensive for routine monitoring.**



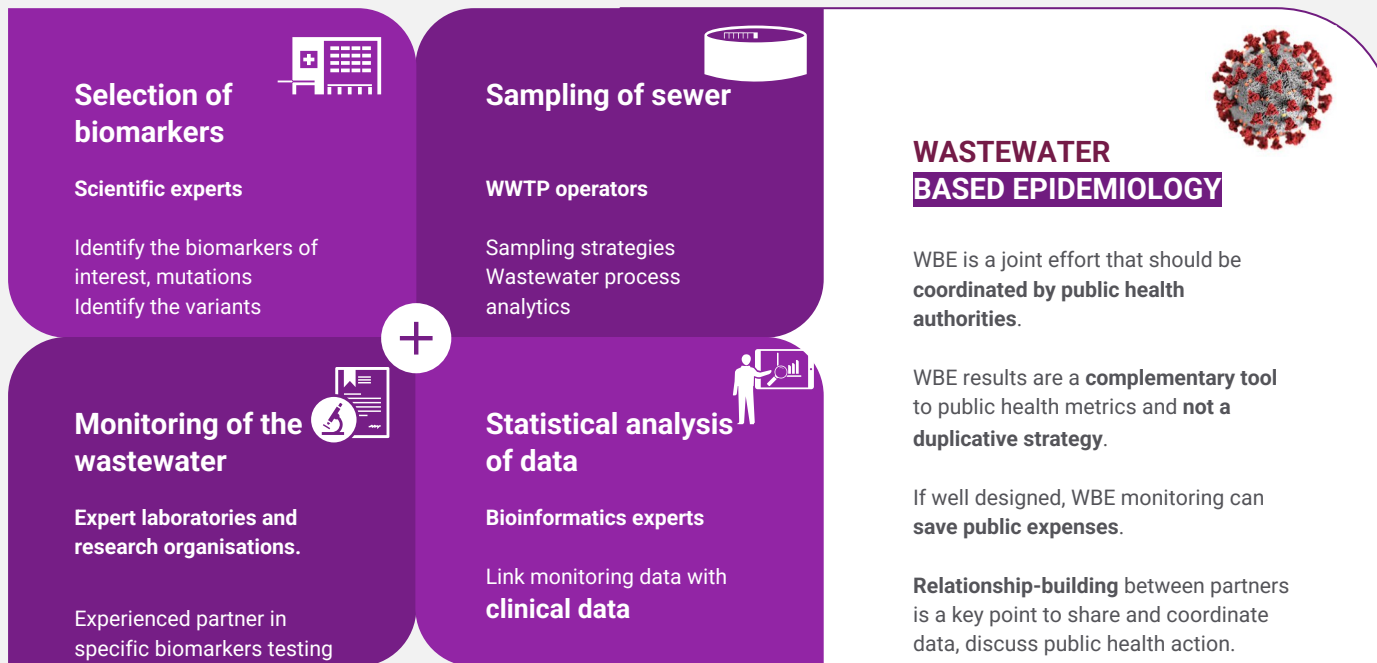
Q3. Broaden the scope

Broaden the scope of the methodology to other targets and to the water cycle => Water Cycle Epidemiology
How you are getting ready for the next epidemic?



BEYOND COVID-19

WasteWater Based Epidemiology (WBE) - Lessons from the Covid-19



BEYOND THE COVID-19

THE KEY QUESTIONS

What could **the next pandemic** be? What could be **the next pathogens**?



Dengue virus



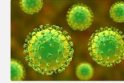
Zika Virus



Nile Virus



Chik Virus



Nipah Virus

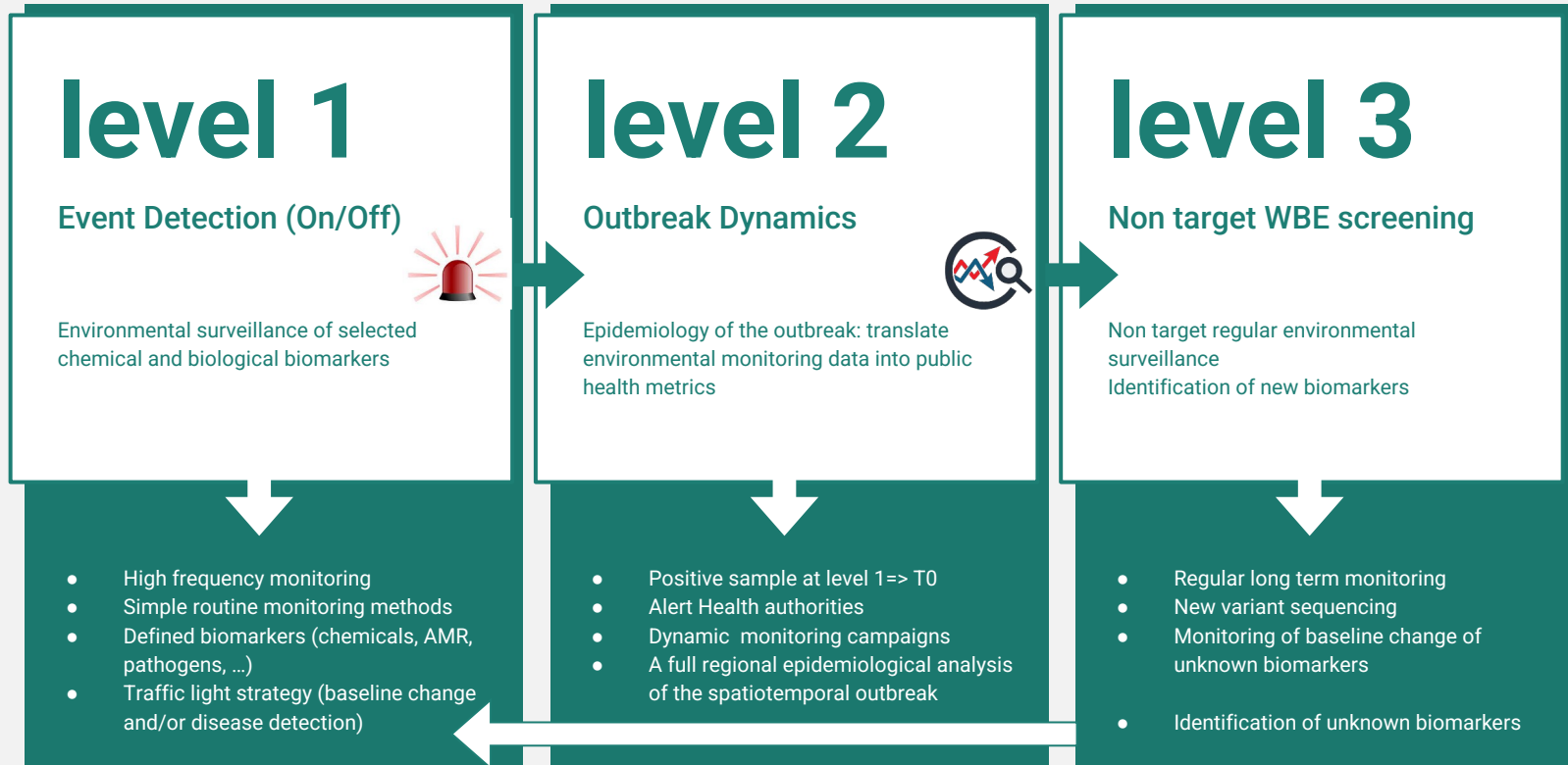


Which **detection and monitoring approaches** for Early Warning and monitoring infectious disease spread and chemicals?

- Next generation sequencing NGS approaches
- Electrochemical, antibody-based sensor, biosensors
- In silico Prediction Models

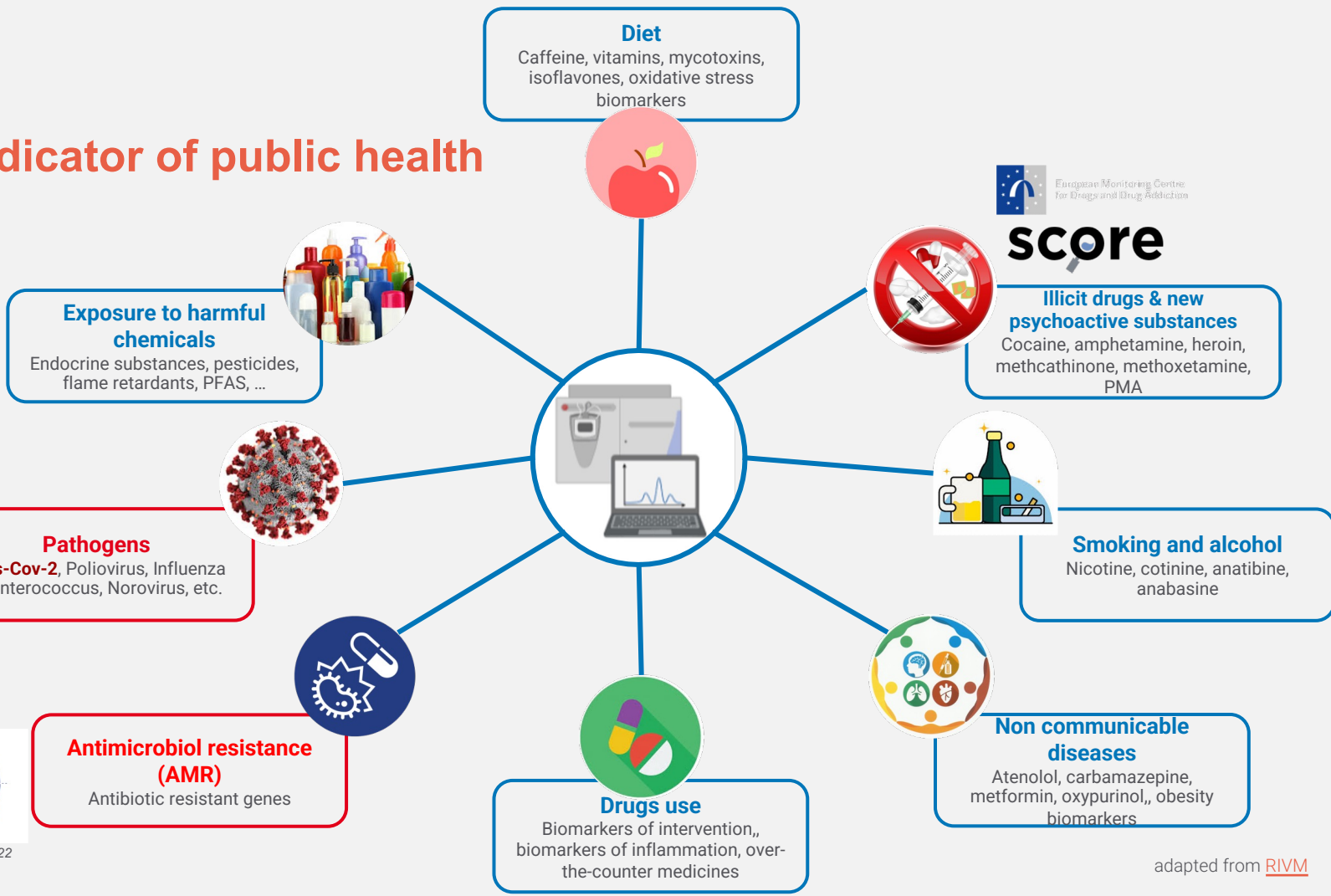
BEYOND COVID-19

THE FUTURE OF ENVIRONMENTAL MONITORING



WBE

An indicator of public health



POLIO GLOBAL ERADICATION INITIATIVE

Organisation mondiale de la Santé



Beyond Covid-19 - 16 june 2022

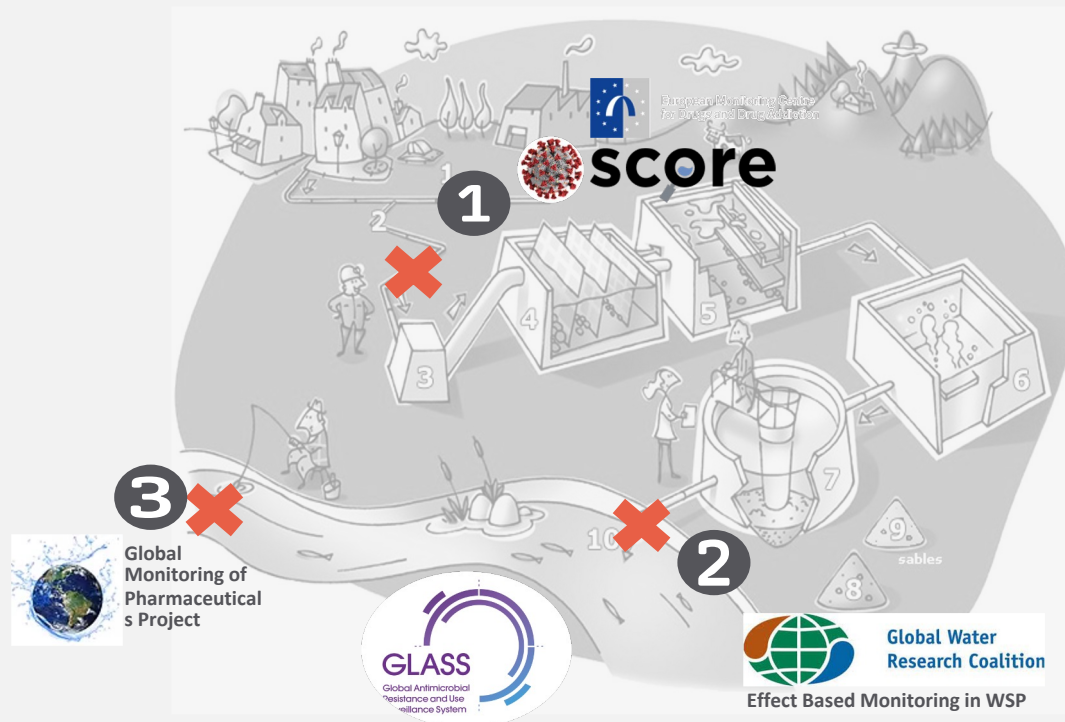
adapted from [RIVM](#)

WATER CYCLE EPIDEMIOLOGY, WCE

The indicator of “THE OSH”



- 1 Raw wastewater: WBE for human health and AMR
- 2 Treated wastewater: WCE for environmental health/resources protection
- 3 Surface water: WCE for human, animal & environmental health

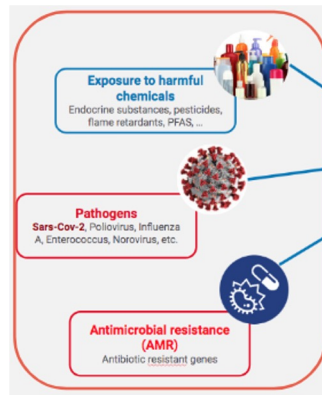


WATER SAFETY PLAN and SANITATION SAFETY PLAN

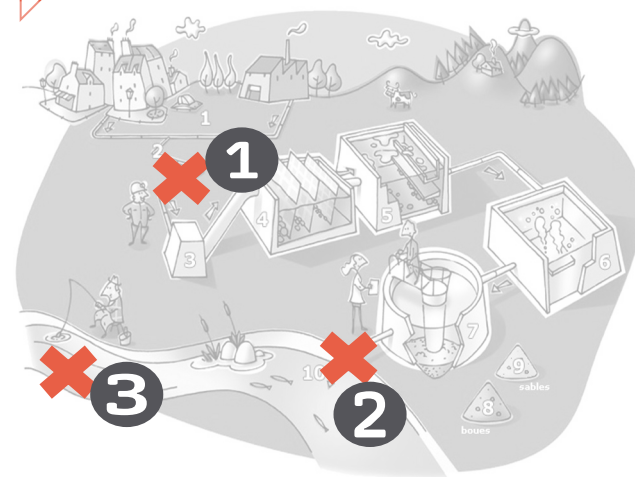
The tool to manage the next steps?



Health Protection: Risk management



Public Health indicators



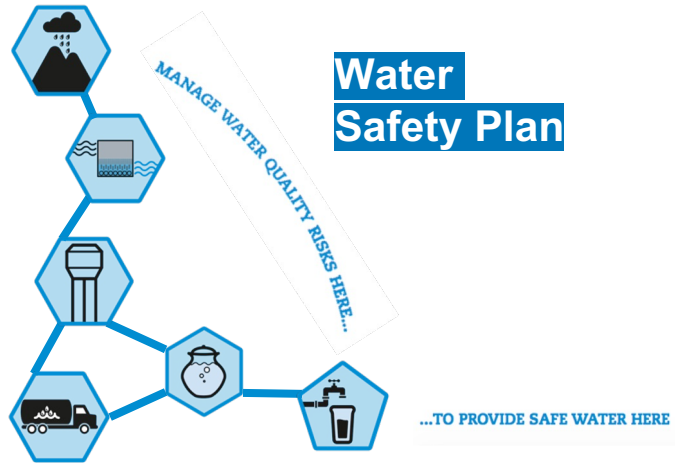
Risk Anticipation

WATER SAFETY PLAN and SANITATION SAFETY PLAN

The tool to manage the next steps?



Protection of Public Health through risk prevention



Source : WHO

Ensure safe drinking water



Source : WHO 2015

Ensure safe use of human waste



Assembling existing bricks, Bridging experts



CONCLUSIONS & Perspectives

- Sars-Cov 2 pandemic accelerated our preparedness to the use of WBE, the digitalisation and the cooperation between public and private
- Prioritisation of targeted markers/biomarkers is needed
- A successful coordination/communication between partners is a key point
- Municipalities/Cities should have a defined role
- There are existing bricks but research gaps remain
- This research cannot be done by one isolated entity

But how to duplicate this to low income countries with no sanitation systems ?

RESEARCH NEEDS

Multidisciplinary expertises

WBE and/or WCE need to **make bridges** between multidisciplinary experts

Some bricks already exist, other (marked with*) need to be developed for WBE/WCE purposes

Sampling strategies WWTP	Sampling strategies in the sewer *	Laboratory monitoring techniques	On-site sensing *
Biomarkers and trigger values *	Chemical targeted and non targeted monitoring	Scientific experts (AMR, Pathogens, Chemicals)	Mathematical modelling & Statistics *
Health Experts	Coordinated communication *	Ethical guidelines *	Biological targeted and non targeted monitoring



RESEARCH NEEDS

Multidisciplinary expertises

How to build an **International** co-operation **Public & Private** for piecing & tracking **together** the next pandemic and also ***the chemicals contamination*** through Covid-19 lessons learned ?



Chairman and Chief
Executive Officer

“In 20 years, we will probably use half of the solutions that do not yet exist today for the Ecological Transformation. Our project aims to create these solutions together” - Antoine Frerot

From R&I Approaches to **Policy** and the reality of **Operations** of the **Water Plant** for getting ready...
Next time!

REGULATIONS & STANDARDS NEEDS

Authorities Responsibilities - Public & Private resources!

From R&I Approaches to **Policy** and the reality of **Operations** of the **Water Plant** for getting ready... *Next time!*

**Policy
change?**

Who pays?
*Water model price for
health prevention?*

Impact?