DNAsequence

THE MICROBIOME AS A BIOSAFETY TOOL

DNAsequence

QUANTIFYING LIFE WITH DIGITAL BIOLOGY

- Biotechnology company with the mission to embed DNA technologies in business operations.
- We provide end-to-end, personalised solutions to our customers using cutting-edge technologies.
- We use innovative technologies to sequence genetic material and we analyse complex data using Bioinformatics and Artificial Intelligence methods.
- We employ and collaborate with scientists world-renowned in their field. Thus, we have the possibility to provide consulting services, add to the theoretical background of the problem and co-shape with our clients their personalised solution.

dna-sequence.eu | info@dna-sequence.eu | a.chasapi@dna-sequence.eu

Areas of Expertise

Metagenomics of Built Environments

- Detection and monitoring of all microorganisms found in a built environment.
- The sampling method is non-invasive and can be applied to air, liquids and surfaces.
- Huge range of applications such as hospitals, public buildings, means of transport, livestock units, water supply systems, sewage, archaeological excavation sites and works of art.

Agrigenomics

- Genetic identification of ingredients in organic samples such as food and soil samples, using state-of-the-art technologies (Next Generation Sequencing, microarrays).
- Applications in agriculture, animal husbandry and across the wide range of food industry.

dna-sequence.eu | info@dna-sequence.eu | a.chasapi@dna-sequence.eu

The scientific team - MBE

CSO (Chief Scientific Officer)

Prof. Christos Ouzounis is the CSO and cofounder of the company, and a Prof. in Bioinformatics at AUTH. He holds a B.Sc. in Biological Sciences (AUTH), an M.Sc. in Biological Computation and a DPhil in Computational Chemistry and Structural Biology, both from the University of York. He has lead core bioinformatic facilities at EMBL-EBI, King's College London and CERTH in Thessaloniki.

CTO (Chief Technology Officer)

Christos Karapiperis is the CTO and co-founder of the company. He has a Bachelor's degree in Computer Science, an MBA degree from the University of Sheffield and is a PhD Candidate in Bioinformatics at AUTH. He has over 20 years of experience in IT and Bioinformatics projects.

Bioinformatics Expert

Dr. Anastasia Chasapi holds a Bachelor's degree in Biological Sciences (AUTH), an M.Sc. in Proteomics and Bioinformatics from the University of Geneva and a PhD in Computational Biology from the University of Lausanne. She has worked for years at the Swiss Institute of Bioinformatics as a collaborating scientist. Currently she holds a Research position at CERTH.

The scientific team - Agrigenomics

Agrigenomics Team Leader

Dr. Zoe Chilioti is an agronomist, she holds an M.Sc. in Greenhouses / Protected Crops and a PhD in Molecular Plant Biology. She has many years of experience as a collaborating scientist at Johns Hopkins University and the NIH in USA. Currently she is leading a research group at CERTH in Thessaloniki.

Agrigenomics Expert

Dimitrios Valasiadis is an agronomist, he holds an M.Sc. in Genetics & Plant Breeding and is a PhD candidate in Systems Biology & Post-Harvest Physiology. Currently, he is an active researcher in the field of Applied Life Sciences.

Biologist

Athanasia Alexandridou recently obtained a Bachelor's degree in Biological Sciences from the University of Oklahoma, USA. She is currently conducting her first research steps in Applied Life Sciences.

Metagenomics in Biosafety

- Detection and monitoring of infectious agents in key areas of human activity (eg hospitals, schools, water supply system) is essential for effective prevention and control of health risks.

- MBE technology allows the exhaustive identification of all microbes in a sample and constitutes a universal solution for the identification of pathogenic microbial communities in an environment, without the need for special tests for expected or well-characterised pathogens.

- Our advanced bioinformatics platform permits the identification of biological risk factors and helps us set priorities and provide guidelines for the prevention of public health issues.

The problem

- The recent SARS-CoV2 pandemic has demonstrated the urgent need to develop effective microbial detection and monitoring strategies in high-mobility public places such as schools, universities, services and transport hotspots.

- The problem is exacerbated in transfer stations, as microbial diversity varies around the world, with the risk of exposing the public to unknown pathogens with increased infectious capacity.

- A special case is hospital environments, which are, by definition, important nodes of infectious agents, dangerous to public health, while they also face more permanent problems such as the development of Hospital Acquired infections.

- The water supply system is another critical sector, as water quality can deteriorate at any stage of its course, from springs and water horizons to inadequate treatment and end user piping system.

- Finally, inadequate urban wastewater treatment can exacerbate the problem by adding harmful microorganisms to aquifers.

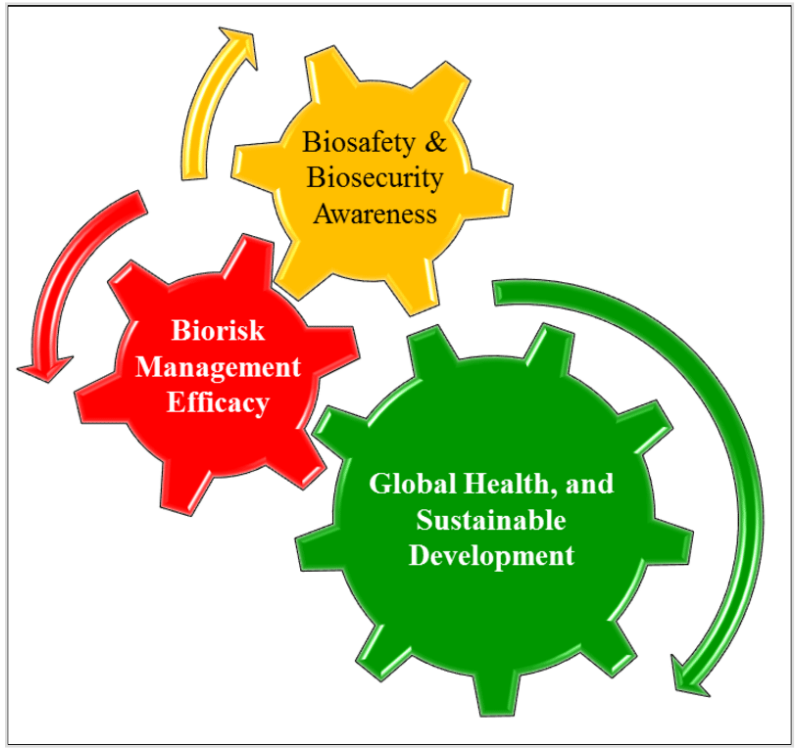
Proposed solution

- Our main goal is to detect and systematically monitor microbial communities found in public places and to pinpoint infection hotspot areas and transmission patterns.

- By constructing almost complete genomes from metagenomic samples, we are able to exhaustively identify all potential biological hazards and monitor their spread in areas of intense mobility (eg SARS-CoV2).

- Monitoring pathogens in the environment in almost real time enables targeted and effective infection control measures.

- Monitoring the microbial load on surfaces, air samples, closed water systems and wastewater will provide a comprehensive epidemiological profile of the system and will lead to better strategies for pathogen spread mitigation.



Air – Surface – Water Monitoring

Public
indoor spaces

Public
outdoor spaces

Water supply network

Urban sewage

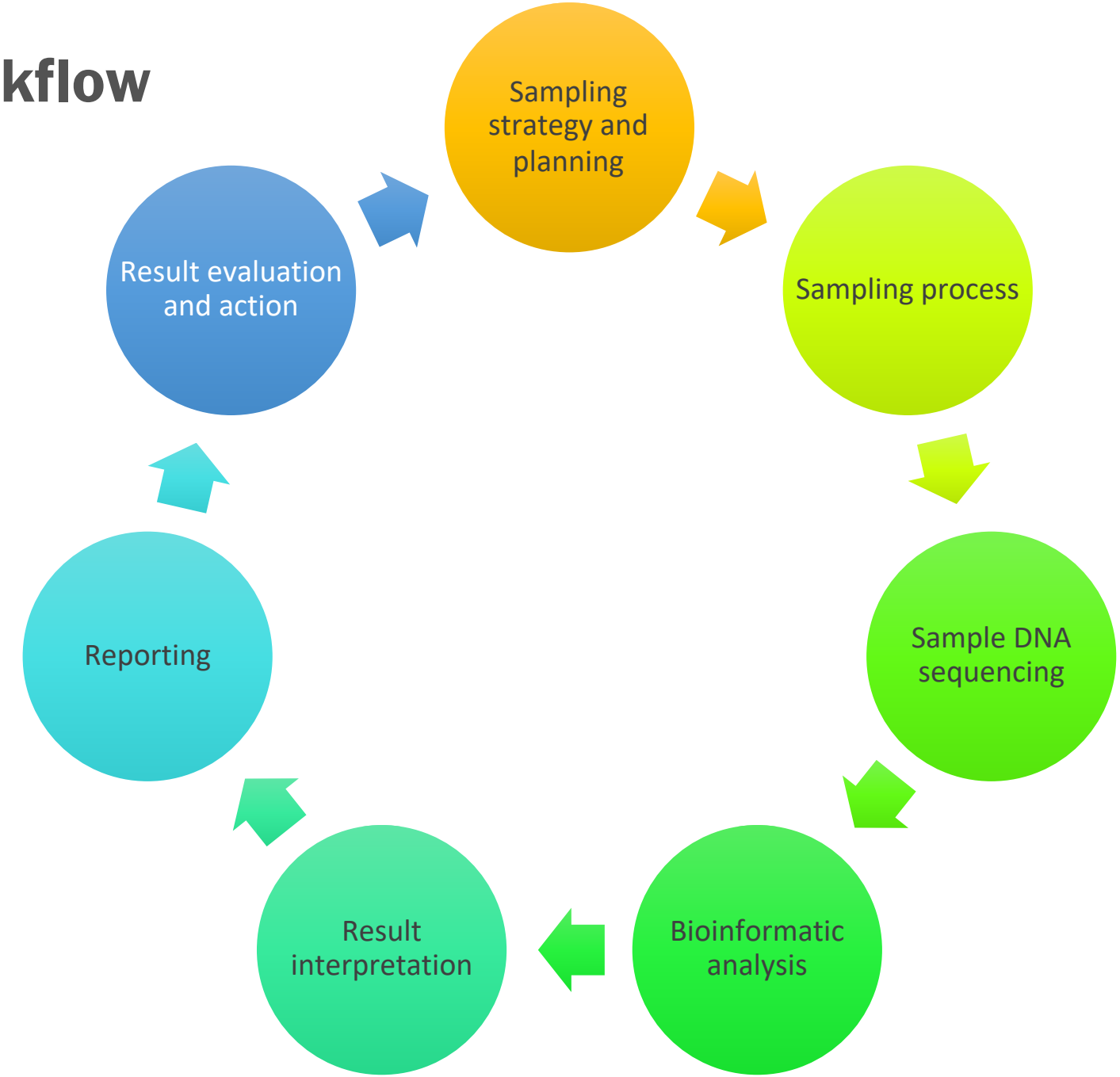
Benefits of the application

- The MBE solution for the microbial imprint detection and monitoring in air and public building surfaces will ensure immediate information to the competent bodies about possible health threats and will enable prompt and effective prevention actions.

- The microbial footprint of urban sewage and wastewater is an indicator of epidemiological burden and can be used by the competent authorities both for the protection of public health (as in the case of SARS-CoV2) and for waste sanitary management.

- The interactive result reports generated by the DNA sequence Biosafety Platform can be used to inform authorities and stakeholders.

Our circular workflow



Comparison of Existing Approaches

Criteria	Classic Microbiology	Molecular Analysis (PCR)	Metagenomic Analysis
Sample preparation difficulty	**	*	
Possibility for automated sample collection			***
Technical skill required for analysis	*	**	*
Time required for analysis	***	**	*
Result precision and accuracy		*	***
Amount of microbes that can be identified	*	*	***
Equipment & Hardware Cost	*	**	***

Dedicated Biosafety Platform

- Our Biosafety platform includes three main axes of analysis:

    1. *Sample sequencing*
    2. *Bioinformatic analysis and result interpretation*
    3. *Statistical analysis and presentation of the results*

- For the Biosafety platform hosting, we encourage the development of local infrastructures, which will give full control and immediate access of all produced data to the interested parties.

- The dedicated Biosafety Platform will consist of:

    1. **A Data Center**, equipped with sufficient computing power and storage space, holding all produced data
    2. **Network and Data Security** structures, such as back up devices
    3. **A Crisis Management Room**, with teleconferencing capabilities.

- The above can be achieved through the collaboration with a contractor with expertise in the field.

THANK YOU FOR YOUR ATTENTION

Vasilisis Sofias 57 Ave. - Athens Greece
Anatolikis Romilias 11 Str. Neapoli - Thessaloniki Greece
Pictor Ion Negulici no 13C Str. - Bucharest Romania
https://www.dna-sequence.eu
info@dna-sequence.eu | a.chasapi@dna-sequence.eu

DNAsequence