Information meeting for the training programme in genomic epidemiology and public health bioinformatics – "GenEpi-BioTrain"

18 October 2024

Information meeting wave 5 & 6

Anders Rhod Larsen (ARL@ssi.dk)

National Reference Laboratory for Antimicrobial Resistance

Statens Serum Institut

Denmark

Information meeting for ECDC contact points

ECDC Microbiology team

Contractors:

- Danish Technical University (DTU) and the consortium DTU & SSI (Statens Serum Institut, DK), Institut Pasteur (FR), Research Centre Borstel (DE), Finnish Institute for Health and Welfare (FI) and Karolinska University Hospital (SE)

Relevant stakeholders:

- *National Focal Points for Microbiology & Surveillance, Tuberculosis, AMR, HAIs, Training*
- *Operational Contact Points for*
  - *Bioinformatics, Tuberculosis, Antimicrobial-resistant isolates, Diseases Caused by Antimicrobial-Resistant Microorganisms, Healthcare-Associated Infections: Clostridium difficile Infections, Healthcare-Associated Infections*
- *Observer National Focal Points for*
  - *Microbiology & AMR*
- *Contact Points for Operations for EURGen-Net, ERLTB-Net members*

CC:

- *ECDC National Correspondents, National Coordinators of ECDC Coordinating Competent Bodies*

Housekeeping rules

- Mute your microphone

- Disable camera

- Post questions in the chat

- Recording

Information meeting for ECDC contact points

Programme	
13:00-13:05	**Welcome** (Anders Rhod Larsen, SSI) ○ Adoption of the meeting agenda & Housekeeping
13:05-13:15	**Presentation: Background of the training programme** (Theresa Enkirch, ECDC)
13:15-13:25	**Presentation: Training programme in genomic epidemiology and public health bioinformatics – "GenEpi-BioTrain"** (Valeria Bortolaia, SSI) ○ Overview of the training programme and training activities
13:25-13:35	**Presentation: "Bridging the gaps in bioinformatics"** (Kirsten Ellegaard, SSI) ○ Outline and learning outcomes of the course edition 2025
13:35-13:45	**Presentation: Pathogen Wave 5 activities at Research Center Borstel** (Christian Utpatel, RCB) ○ Overview of activities at RCB in 2025
13:45-13:50	*Short break*
13:50-14:10	**Presentation: GenEpi-BioTrain consortium partners** ○ Danish Technical University (DTU), Denmark ○ Institut Pasteur (IP), France ○ Research Centre Borstel (RCB), Germany ○ Statens Serum Institut (SSI), Denmark ○ Finnish Institute for Health and Welfare (THL), Finland ○ Karolinska University Hospital (KUH), Sweden
14:10-14:20	**Presentation: Nomination and selection process** (Theresa Enkirch, ECDC) ○ Who did we invite and why ○ Who will be involved and how ○ Nomination and selection of training participants ○ Upcoming dates
14:20-14:30	**Feedback and Q & A session; AOB** (Anders Rhod Larsen, SSI)

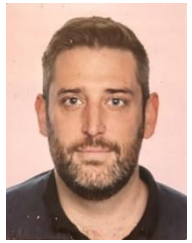
ECDC team

Microbiology and Molecular Surveillance Group

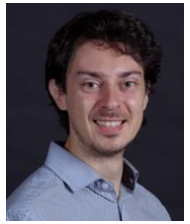
Daniel Palm, Group leader

Theresa Enkirch,
Microbiologist,
project manager

Priyanka
Nannapaneni,
Bioinformatician



Andreas Hoefer,
Microbiologist



Luca Freschi,
Bioinformatician

Jessica Beser,
Microbiologist

Training section

Rodrigo Filipe,
Principal Expert Instructional
Design/ E-Learning

The consortium

Contractor

National Food Institute, Technical University of Denmark **(“DTU”)**

Lead **Rene Hendriksen**

Host institutions

- Statens Serum Institut **(“SSI**”)- co-lead **Anders Rhod Larsen**
- Institut Pasteur **(“IP”)-**PI **Sylvain Brisse**
- Research Center Borstel, **(“RCB”)-**PI **Stefan Nieman**

Training institutions

- Karolinska University Hospital **(“KUH”):** PI **Christian Giske**
- Finnish Institute for Health and Welfare **(“THL”):**

PIs **Carita Savolainen-Kopra, Saara Salmenlinna**

Training programme in genomic epidemiology and public health bioinformatics – "GenEpi-BioTrain"

Background of the training programme

Theresa Enkirch, ECDC (Microbiology and Molecular Surveillance Group)
18 October 2024

EU investments triggered by the pandemic

- 'HERA Incubator' (February 2021), a new EU bio-defence preparedness plan against SARS-CoV-2 variants
  - Rapid detection of SARS-CoV-2 variants

- On 25 February 2021, President Ursula von der Leyen announced that the EU would provide EUR 200 M to strengthen detection and monitoring of SARS-CoV-2 variants:
  - Whole genome sequencing (WGS)
    - short-term support for access to high-capacity WGS services
    - longer-term support for national investments into WGS infrastructure for the public health laboratories
    - cross-border networking activities such as bioinformatics, standardisations, and training

Overview of European Commission/ECDC* activities to boost genomic epidemiology

Access to high-capacity, rapid turn-around time WGS services

National WGS and RT-PCR infrastructure projects

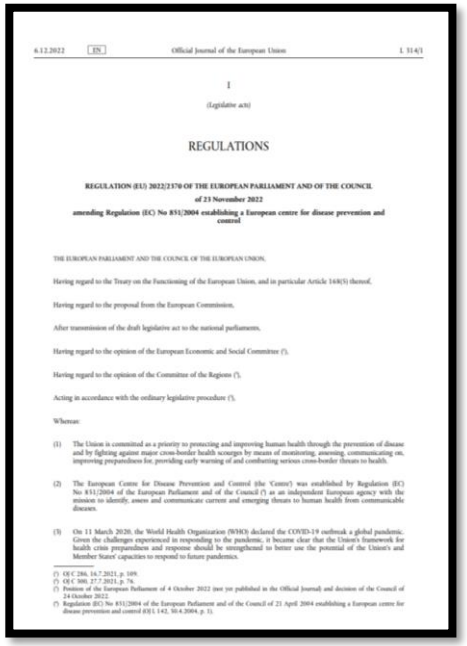
National WGS and RT-PCR infrastructure projects (EU4Health)
Consolidation of national infrastructure (EU4Health)

Cross-border capacity-building support programme

2021 2022 2023 2024

*: Either implemented directly by ECDC, or implemented by HERA/HaDEA with ECDC technical input and support

Updated EU regulations, November 2022



6.12.2022 EN Official Journal of the European Union L 314/1

I

(Legislative acts)

REGULATIONS

REGULATION (EU) 2022/2370 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 23 November 2022
amending Regulation (EC) No 851/2004 establishing a European centre for disease prevention and control

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 168(5) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee (1),

Having regard to the opinion of the Committee of the Regions (2),

Acting in accordance with the ordinary legislative procedure (3),

Whereas:

(1) The Union is committed as a priority to protecting and improving human health through the prevention of disease and by fighting against major cross-border health scourges by means of monitoring, assessing, communicating on, improving preparedness for, providing early warning of and combatting serious cross-border threats to health.

(2) The European Centre for Disease Prevention and Control (the 'Centre') was established by Regulation (EC) No 851/2004 of the European Parliament and of the Council (4) as an independent European agency with the mission to identify, assess and communicate current and emerging threats to human health from communicable diseases.

(3) On 11 March 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a global pandemic. Given the challenges experienced in responding to the pandemic, it became clear that the Union's framework for health crisis preparedness and response should be strengthened to better use the potential of the Union's and Member States' capacities to respond to future pandemics.

(1) OJ C 286, 16.7.2021, p. 109.
(2) OJ C 300, 27.7.2021, p. 76.
(3) Position of the European Parliament of 4 October 2022 (not yet published in the Official Journal) and decision of the Council of 24 October 2022.
(4) Regulation (EC) No 851/2004 of the European Parliament and of the Council of 21 April 2004 establishing a European centre for disease prevention and control (OJ L 142, 30.4.2004, p. 1).

Updated ECDC mandate

The Centre should <u>broaden its collection and analysis of data</u> in terms of epidemiological surveillance and related special health issues, progression of epidemic situations, unusual epidemic phenomena or new diseases of unknown origin, including in third countries, **<u>molecular pathogen data</u>** and health systems data.

L 314/26 EN Official Journal of the European Union 6.12.2022

REGULATION (EU) 2022/2371 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 23 November 2022
on serious cross-border threats to health and repealing Decision No 1082/2013/EU

(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 168(5) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee (1),

Having regard to the opinion of the Committee of the Regions (2),

Acting in accordance with the ordinary legislative procedure (3),

Whereas:

(1) A network for the epidemiological surveillance and control of communicable diseases was set up by Decision No 2119/98/EC of the European Parliament and of the Council (4). Its scope was extended by Decision No 1082/2013/EU of the European Parliament and of the Council (5) to strengthen and provide for a more coordinated and wider approach to health security at Union level. The implementation of that legislation confirmed that coordinated Union action on monitoring, early warning of and combatting those threats adds value to the protection and improvement of human health.

(2) In light of the lessons learnt during the ongoing COVID-19 pandemic and in order to facilitate adequate Union-wide preparedness for and response to all cross-border threats to health, the legal framework for epidemiological surveillance, monitoring, early warning of, and combatting serious cross-border threats to health, including zoonotic-related threats, as provided for in Decision No 1082/2013/EU, needs to be broadened with regard to additional reporting requirements and analysis regarding health systems indicators, and with regard to cooperation between Member States and Union agencies and bodies, particularly the European Centre for Disease Prevention and Control (ECDC), the European Medicines Agency (EMA), and international organisations, in particular the World Health Organization (WHO), while taking into account the burden faced by national competent authorities depending on the actual public health situation. Moreover, in order to ensure the Union's effective response to novel cross-border threats to health, the legal framework to combat serious cross-border threats to health should make it possible to immediately adopt case definitions for the surveillance of novel threats and should provide for the establishment of a network of EU reference laboratories and a network to support monitoring of disease outbreaks that are relevant to substances of human origin. The capacity for contact tracing should be strengthened via the creation of an automated system, using modern technologies, while respecting Union legislation on data protection such as Regulation (EU) 2016/679 of the European Parliament and of the Council (6).

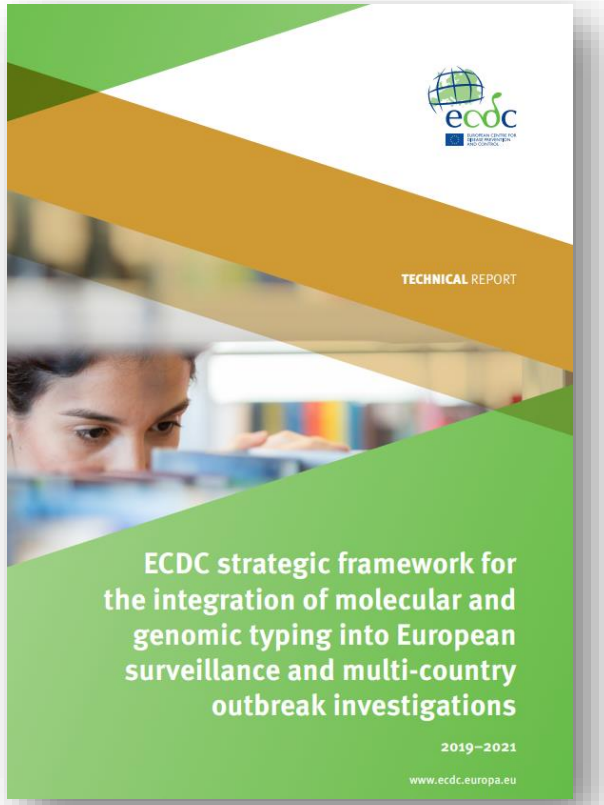
(1) OJ C 286, 16.7.2021, p. 109.
(2) OJ C 300, 27.7.2021, p. 76.
(3) Position of the European Parliament of 4 October 2022 (not yet published in the Official Journal) and decision of the Council of 24 October 2022.
(4) Decision No 2119/98/EC of the European Parliament and of the Council of 24 September 1998 setting up a network for the epidemiological surveillance and control of communicable diseases in the Community (OJ L 268, 3.10.1998, p. 1).
(5) Decision No 1082/2013/EU of the European Parliament and of the Council of 22 October 2013 on serious cross-border threats to

Regulation on serious cross-border threats to health and repealing Decision No 1082/2013/EU

The national competent authorities ….shall communicate the following information…to the participating authorities of the network for epidemiological surveillance:

…<u>molecular pathogen data, if required for detecting or investigating serious cross-border threats to health</u>

ECDC strategy for integrated genomic typing



Support to multi-country outbreak investigations through sequence-based typing:

Campylobacter spp., *Clostridium difficile*, hepatitis A virus, *Legionella* spp., *Listeria monocytogenes*, multidrug-resistant *Mycobacterium tuberculosis* (MDR TB), *Neisseria meningitidis*, *Salmonella enterica*, Shiga-toxin producing *E. coli*, West Nile virus and emerging multi- or extensively drug-resistant (MDR or XDR) bacteria, Methicillin-resistant Staphylococcus aureus (MRSA), new pathogens or new modes of transmission of healthcare-associated or community pathogens.

EU-wide sequence-based continuous surveillance:

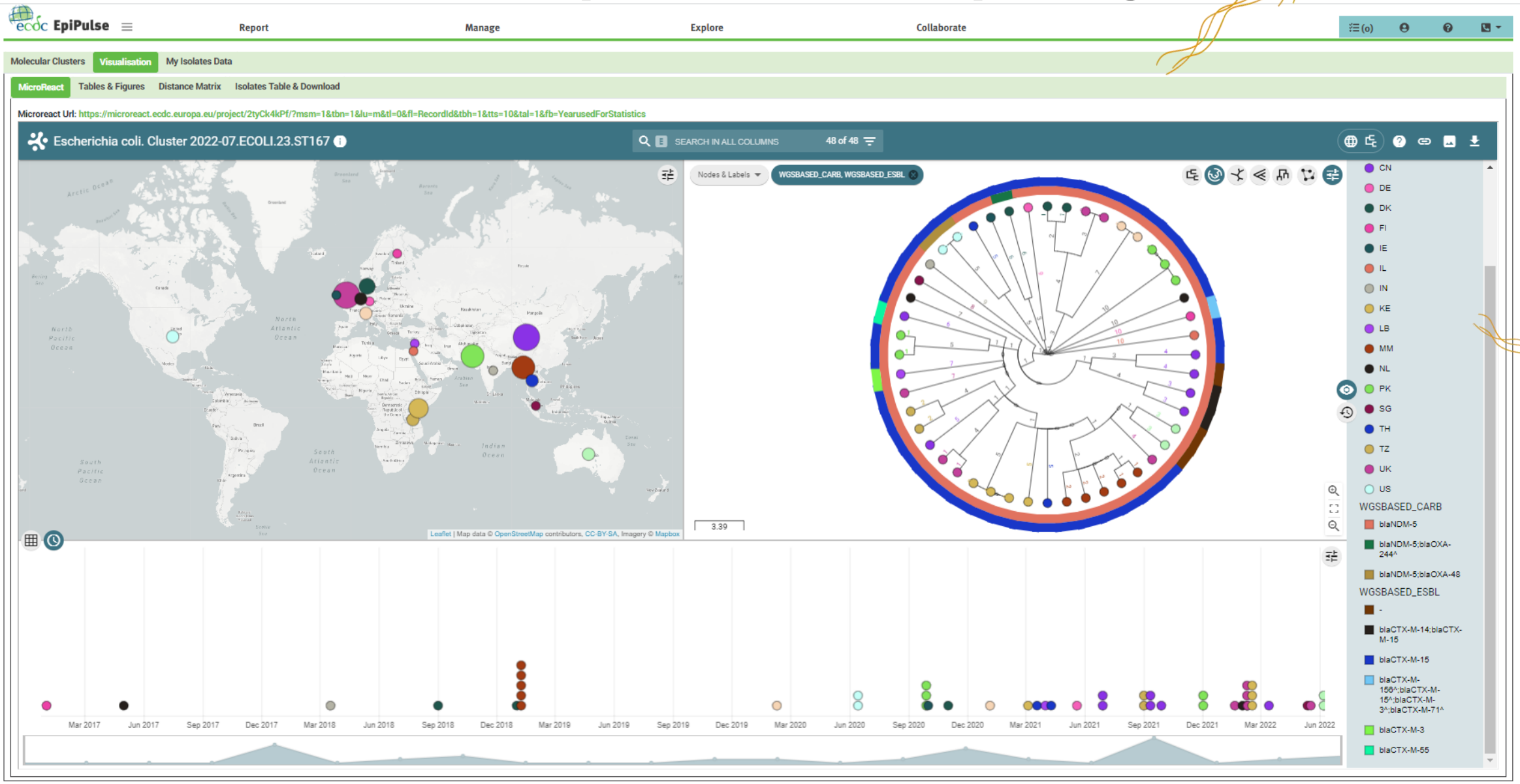
Influenza virus, *Listeria monocytogenes*, MDR TB, *Neisseria meningitidis*, *Salmonella enterica* and Shiga-toxin producing *E. coli*.

Sentinel surveillance or surveys:

Antibiotic-resistant *Neisseria gonorrhoeae, Bordetella pertussis*, carbapenem- or colistin-resistant Enterobacteriaceae, carbapenem-resistant *Acinetobacter baumannii*, HIV-transmitted drug resistance, and *Streptococcus pneumoniae*.

ECDC strategic framework for the integration of molecular and genomic typing into European surveillance and multi-country outbreak investigations – 2019–2021 (europa.eu)

Whole Genome Sequencing in EpiPulse
WGS surveillance expanded to new pathogens



ECDC Bioinformatic training needs assessment, November 2021

- Survey was sent to the NMFPs of all EU/EEA and Western Balkan countries (November 2021, January 2022)
- NMFPs were asked to identify 3 persons who can reply to the questions from the institute's bioinformatics, microbiology, and epidemiology perspective

Objectives of the survey:

- Identify training needs for bioinformatics, microbiology and epidemiology in order to build and deliver a genomic epidemiology training programme
- Assess how to promote the integration of experts with different backgrounds in multi-disciplinary teams

Results training needs assessment (ECDC)

- **Two main groups: 40% low or no knowledge in bioinformatics, 40% need advanced training**
- The great majority of the countries are interested in learning more about evolutionary biology (89%) and metagenomics as a tool for surveillance (93%)
- Majority (>60%) of microbiologists would like to get more familiar with phylogenetic analysis
- All countries indicated that it would be important to know more about standards in data collections/sharing (e.g. standardization of dates, ids, categories, etc.)
- The great majority of microbiologists (93%) and epidemiologists (89%) find it useful to perform exercises in multi-disciplinary teams to improve the use of sequence information for public health

Cross-border capacity-building support programme in genomic epidemiology

Framework contract:

"Training programme in genomic epidemiology and public health bioinformatics"

- GenEpi-BioTrain

Aim:

Increase capacity to respond to Covid-19 pandemic
Increase capacity for genomic epidemiology for other diseases

- Value of the contract: ~5.2 Mio EUR for up to 48 months
- The kick off meeting was held in January 2023

Training programme in genomic epidemiology and public health bioinformatics "GenEpi-BioTrain"

Information meeting – 18 October 2024

Valeria Bortolaia, DVM, PhD
Overall Training Coordinator
Statens Serum Institut (SSI), Denmark

What's in the next 10 minutes

1. Overview of the training programme
2. Pathogen waves
3. Training activities and timeline

GenEpi-BioTrain at a glance

WHY?

Support countries in building capacity for the routine use of genomic information for surveillance, preparedness and outbreak response

WHO?

Public health professionals:

- w. background in computational biology/bioinformatics
- w/o. specific background in bioinformatics (e.g. microbiologists and epidemiologists)

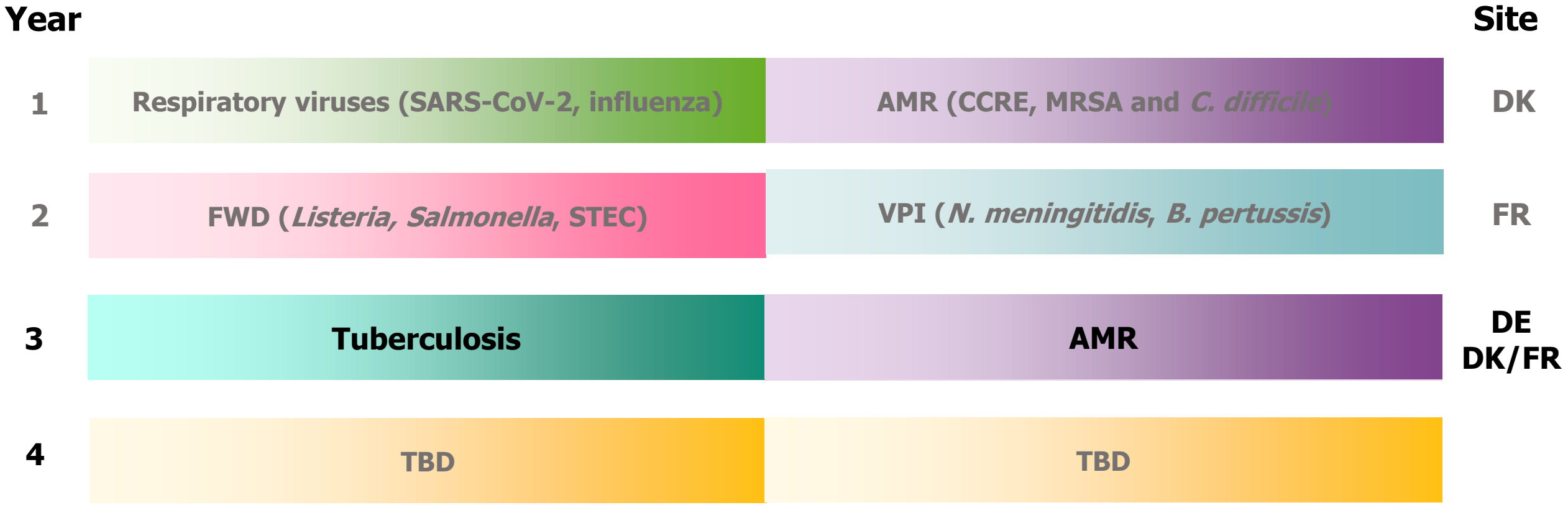
WHERE? HOW? WHEN?

- SSI & DTU, Denmark; IP, France; RCB, Germany; THL, Finland; KUH, Sweden;
- In person & Online
- 2023 - 2026

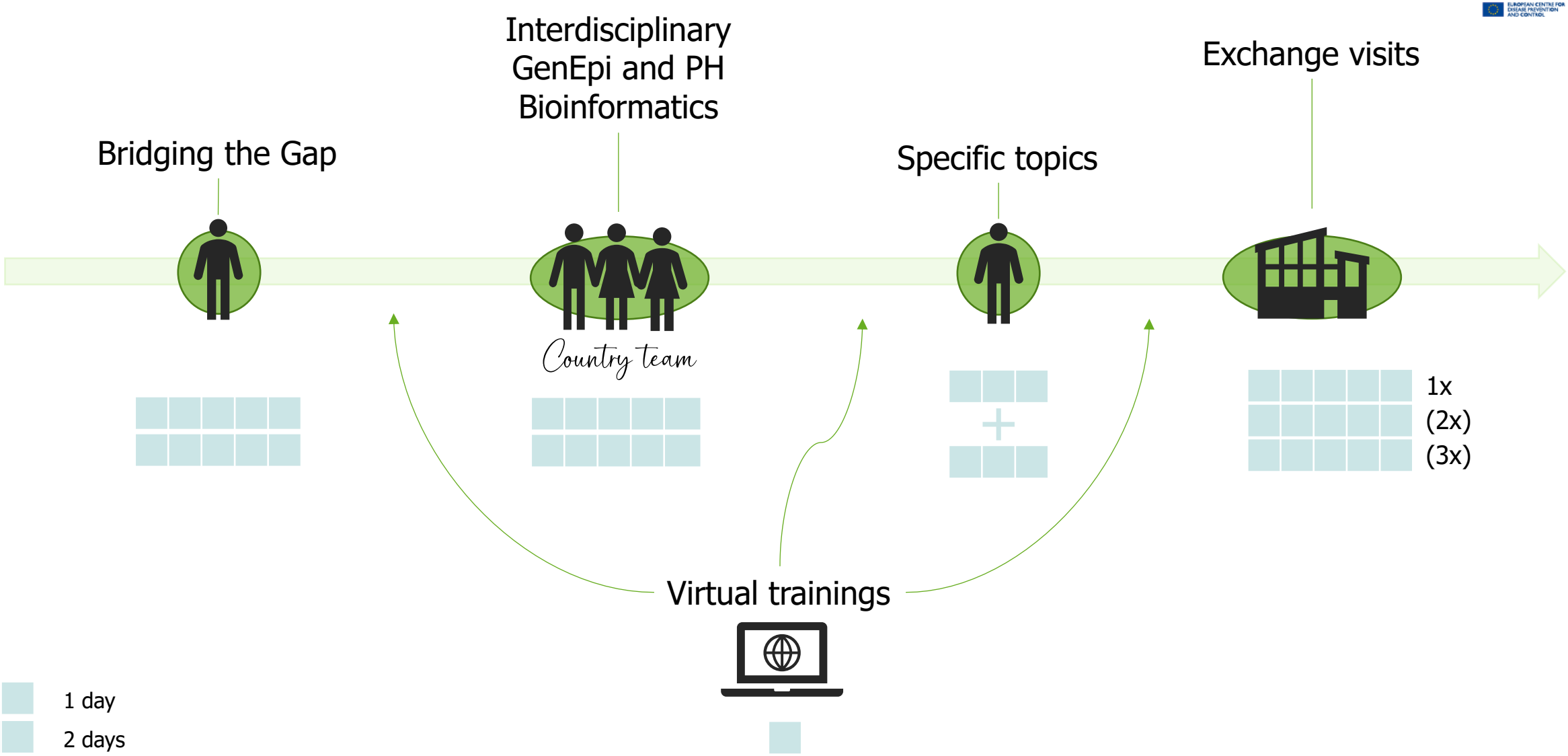
WHAT?

Pathogen waves

Pathogen waves



Training activities per wave



Bridging the gaps in bioinformatics (BTG)

In-person

2 weeks

10 trainees/course

- The aims are to **strengthen programming knowledge and skills** for use and development of bioinformatics tools in the public health context
- Trainees have basic bioinformatics skills (beginners)
- It follows the pathogen waves (24 February - 7 March 2025)

Interdisciplinary genomic epidemiology and public health bioinformatics (InterD)

In-person

2 weeks

30 trainees/course
(10 country teams)

- The aim is to **improve the knowledge of and capacity for <u>applied</u> genomic epidemiology** and bioinformatics for public health action
- Trainees will be **"country teams"**, whereby each team is composed by a bioinformatician, a microbiologist and an epidemiologist from a country
- It follows the pathogen waves
  - Pathogen wave 5: 31 March – 11 April 2025
  - Pathogen wave 6: 27 October – 7 November 2025

Exchange visits for bioinformaticians

In-person

40 trainees x 1 week
15 trainees x 2 weeks
5 trainees x 3 weeks

3-5 trainees/visit

- The aims are to **learn best practices** for public health bioinformatics and to **build a network** for support
- Host institutions: IP, KUH, RCB, SSI, THL
- Trainee should express their training needs
- 1-week visits follow the pathogen waves:
  - 1-week visit (Pathogen wave 5): 15 – 19 September 2025 (RCB)
  - 1-week visit (Pathogen wave 6): 16 – 20 June 2025 (IP)
- 2- and 3-week visits will be announced separately

Specific topics in genomic epidemiology and/or public health bioinformatics

In-person

3 days

10 trainees/course

- Topics to be defined based on trainees' skills. Different trainings can cover different proficiency levels
- Dates for 2025:
  - SQL course (SSI): 20-22 May 2025
  - Pathogen wave 5 (RCB): 2-4 June 2025
  - Pathogen wave 6 (SSI): 9-11 December 2025

Virtual trainings on genomic epidemiology and public health bioinformatics

Virtual

1 day

Open to many trainees

- Wide range of topics
  - Countries are welcome to express needs for specific topics
- It does not need to follow the pathogen waves strictly
- Approximately once per month

Information sharing activities

- Yearly virtual meeting with ECDC national contact points (18 October 2024)
- Yearly virtual information sessions with the appointed trainees (January 2025)
- Quarterly newsletter
- ECDC Virtual Academy (EVA) – open to everyone!
  https://eva.ecdc.europa.eu/

Thank you!

We are looking forward to receiving applications from interested trainees!

STATENS SERUM INSTITUT

Bridging the gaps in Bioinformatics

Getting started on genome sequencing and analysis

Kirsten Ellegaard, PhD

Department of Bioinformatics
Statens Serum Institut
Denmark

STATENS SERUM INSTITUT

It’s the third edition of the course

- We (the trainers) are also learning
- Course continues to evolve, overall schedule is settled

This course is:

- Popular
- Much appreciated
- **Intense!**

Intended learning outcomes

STATENS SERUM INSTITUT

- Process sequencing data (from raw data to genomes)
- Perform basic analysis supporting epidemiological investigations, including interaction with public databases
- Critically evaluate data quality at all steps of the process
- Write basic python/bash scripts, to extract relevant information from processed data
- Write a basic processing pipeline

Intended learning outcomes

STATENS SERUM INSTITUT

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Intended learning outcomes

STATENS SERUM INSTITUT

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The programme at a glance

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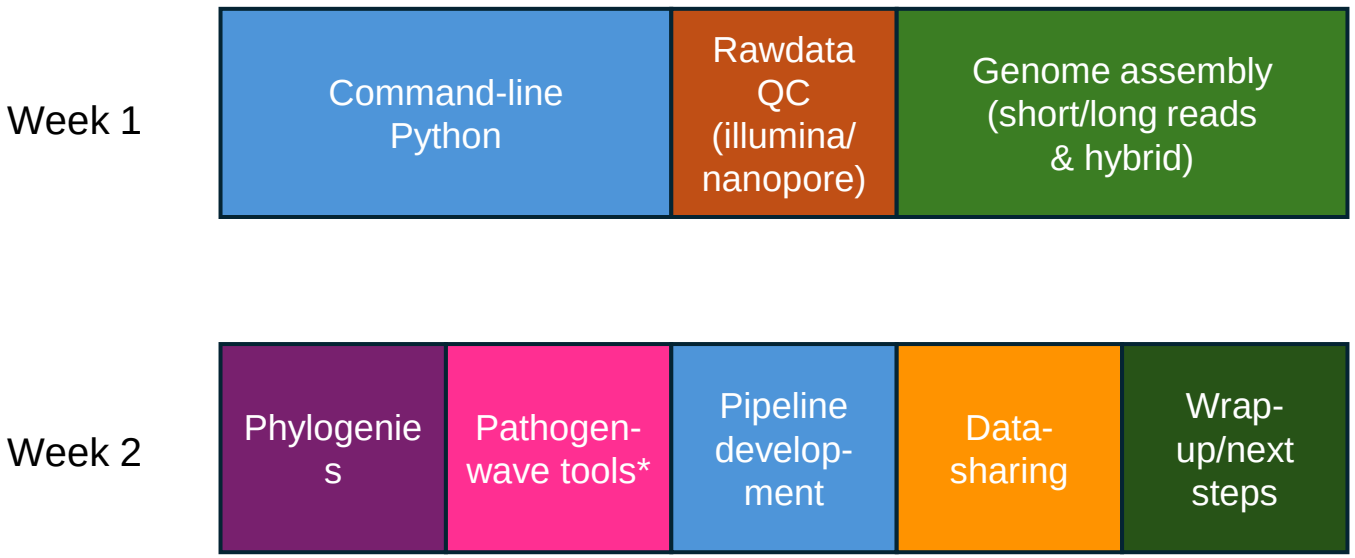

* Brief! (Two pathogen-waves covered in one day)

It’s a “hands-on” course

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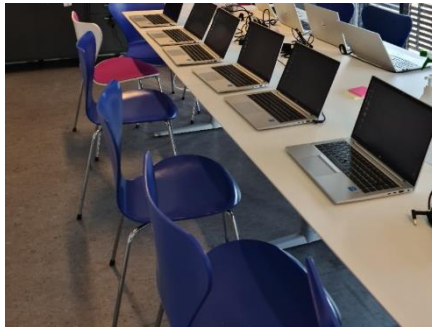


- Laptops with data and software installed (Linux)
- Working on real data
- 90% practicals, 10% lectures

Who should apply

- It’s a two-week course, aimed at beginners
- Motivation is key

- It takes years to become proficient
- We aim to get the participants started on the journey

GenEpi-BioTrain Pathogen WAVE 5 Tuberculosis

2025 Trainings at the Research Center Borstel

18.10.2024

Tuberculosis

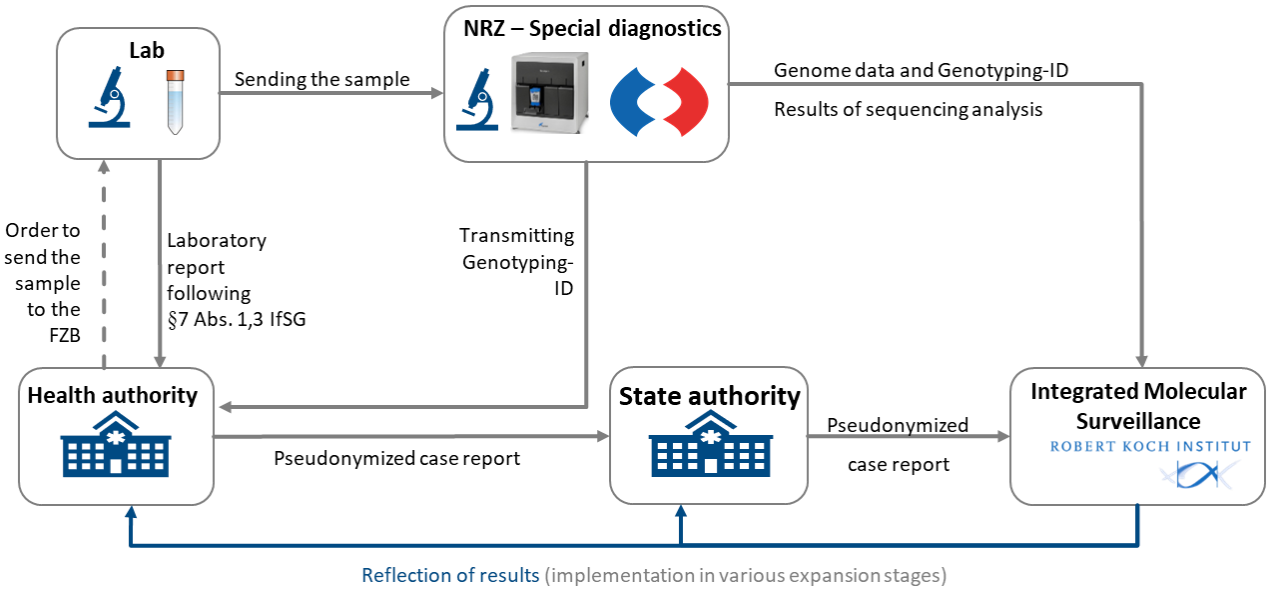
The causative agent:

- Member of the *Mycobacterium tuberculosis* complex (MTBC)
- 99,5 % sequence identity
- Genome: 4.4 million base pairs
- 4000 genes; 40 with known resistance mediating function
- More than 400 known resistance conferring mutations

Interdisciplinary genomic epidemiology and public health bioinformatics – Two Week course

Date: **31.3.25-11.4.25**

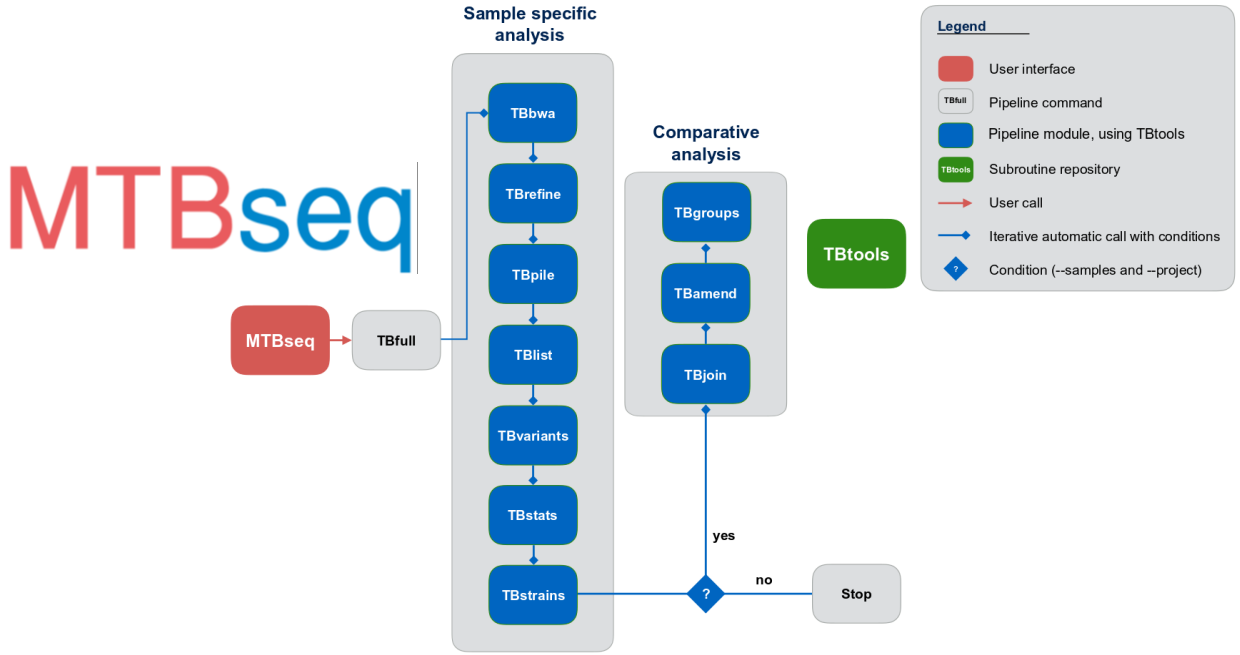
- Enhance participants' knowledge and skills in genomic epidemiology and bioinformatics
- Further participants' knowledge and use of open source tools for integrated analysis and visualisation of WGS and resistance and epidemiological data
- Support participants' deeper understanding of how the interdisciplinary interpretation of such integrated results can inform infectious disease prevention and control

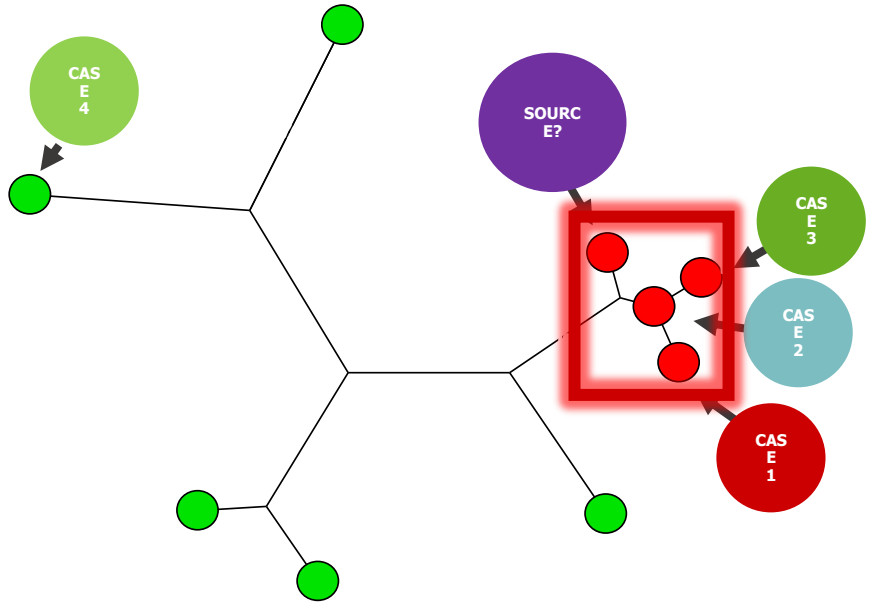


One-week exchange visit for bioinformaticians

Date: **15.9.25-19.9.25**

The content is tailored to individual learning needs and wishes.



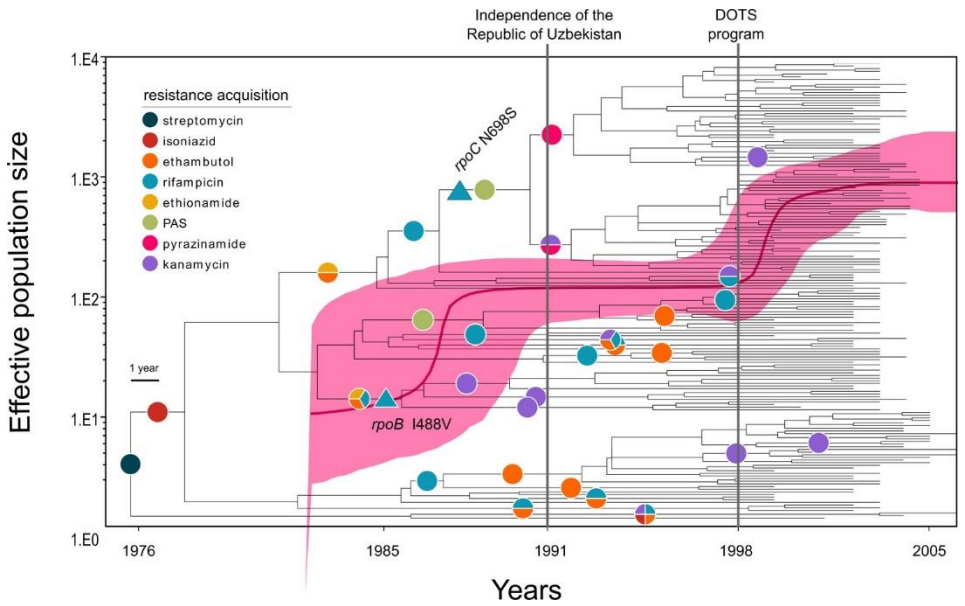


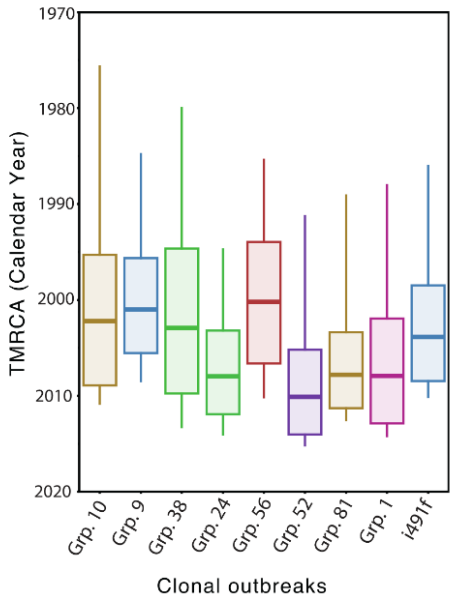
Three-day course on specific topics

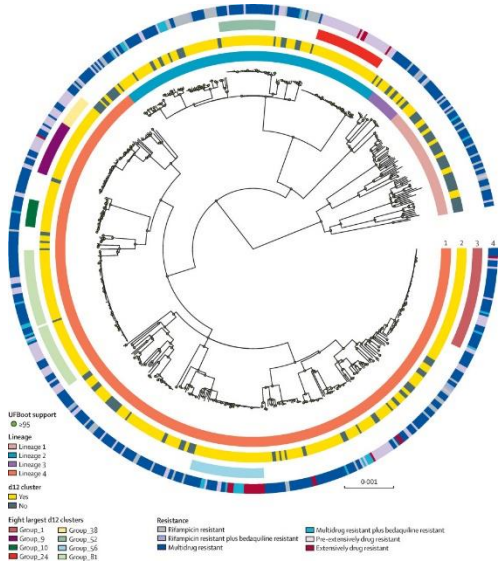
Date: **2.6.25-4.6.25**

The content can vary to cover different proficiency levels of the trainees.

- Advanced phylogenies including bayesian modeling*
- Detailed outbreak inspections for public health decision making*







*Examples only and content is to be decided

TRAINING PROGRAMME IN GENOMIC EPIDEMIOLOGY AND PUBLIC HEALTH BIOINFORMATICS

"GENEPI-BIOTRAIN"

Consortium partners

Research Group for Global Capacity Building

National Food Institute

Technical University of Denmark

Prof. René S. Hendriksen
National Food Institute,
Technical University of Denmark (DTU FOOD)

Information meeting for the training programme in genomic epidemiology and public health bioinformatics – “GenEpi-BioTrain”. 20 October 2023

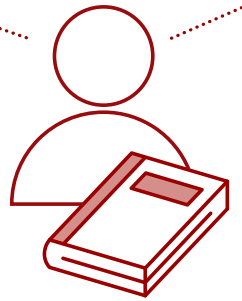
Staff - students, Technical University of Denmark - DTU

Human resources – FTEs (incl. faculty)

5,824

18%
PhD students

39%
researchers and educators (VIP)



43%
in support functions

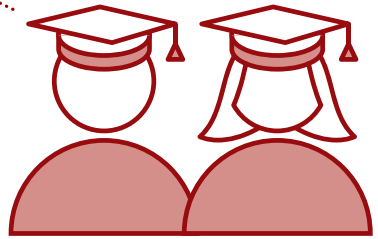
Approx. 300 full-time staff under DTU Food

Full-time students

13,414

30%
BSc Eng

30%
BEng



40%
MSc Eng

At the forefront of healthy, safe and sustainable solutions

DTU National Food Institute conducts research into and disseminates sustainable and value-creating solutions in the area of food and health for the benefit of society.

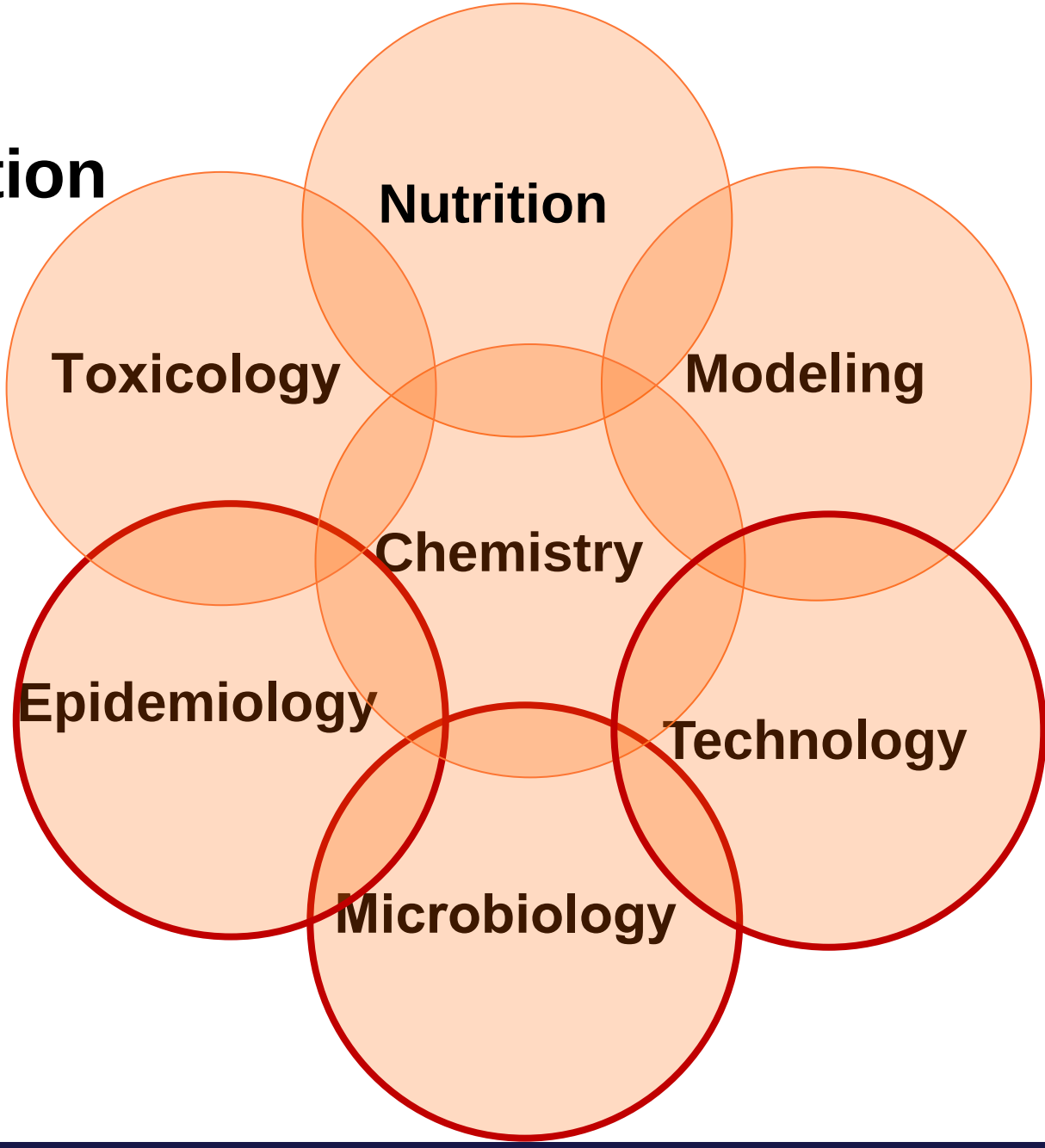
DTU National Food Institute's vision is to make a difference by generating future prosperity through research into food and health.

DTU National Food Institute:

- Prevents disease and promotes health
- Creates sustainable technological solutions
- Develops new and better food products for a growing population.

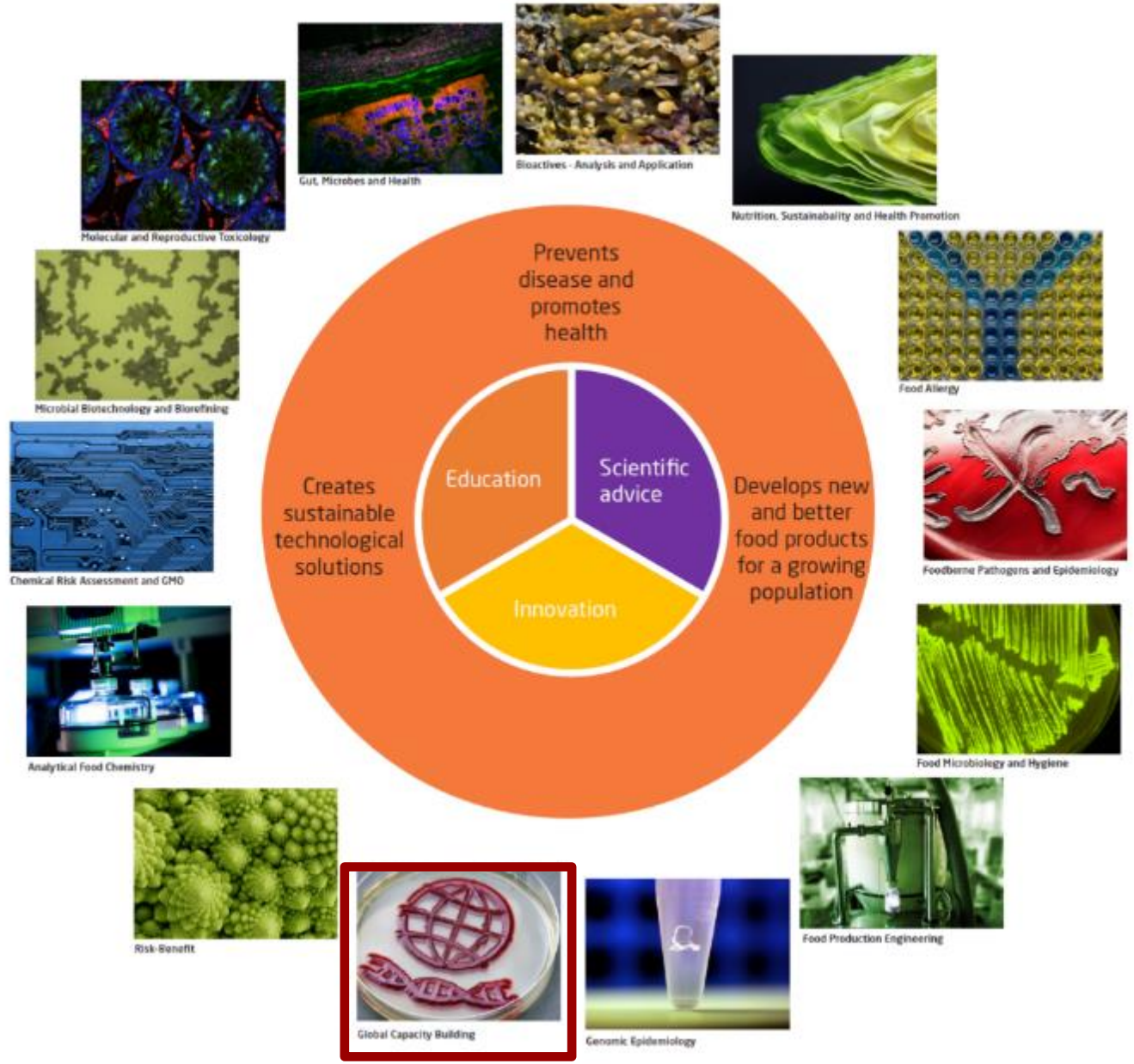
Interdisciplinary cooperation

The National Food Institute's tasks are carried out in a unique interdisciplinary cooperation between the disciplines of:



Research at DTU Food

The Research Group for Global Capacity Building is one of 14 units within the Institute



We work on a global scale building capacity for AMR

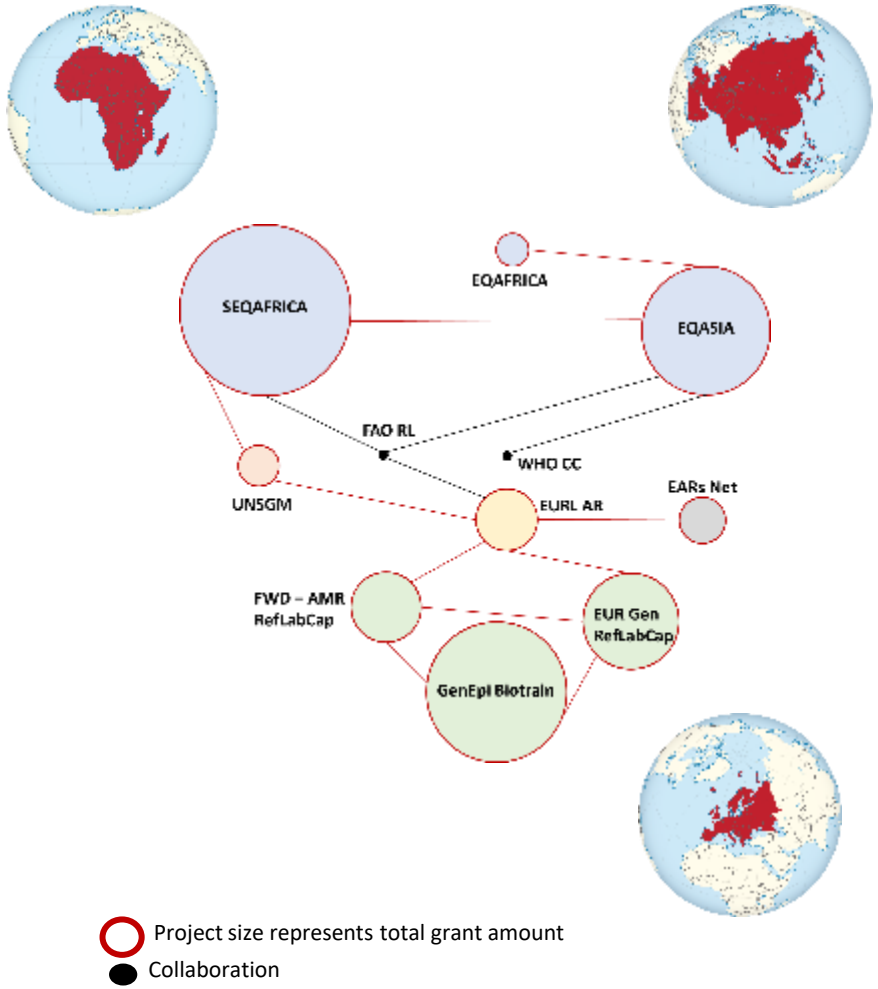
We are:

- FAO reference laboratory for Antimicrobial Resistance
- European Union Reference Laboratory for Antimicrobial Resistance (EURL-AR)
- WHO Collaborating Centre for Antimicrobial Resistance and Foodborne Pathogens and Genomics
- Program contractors for EC (HaDEA)/ European CDC
  - EARS-net EQA provider
  - EURGEN-RefLabCap
  - FWD-AMR-RefLabCap
  - GenEpi-BioTrain
- UK Aid Fleming Fund regional project grantee
  - SeqAfrica
  - EQAsia and SeqAsia (WGSAsia)
- UNSGM grantee

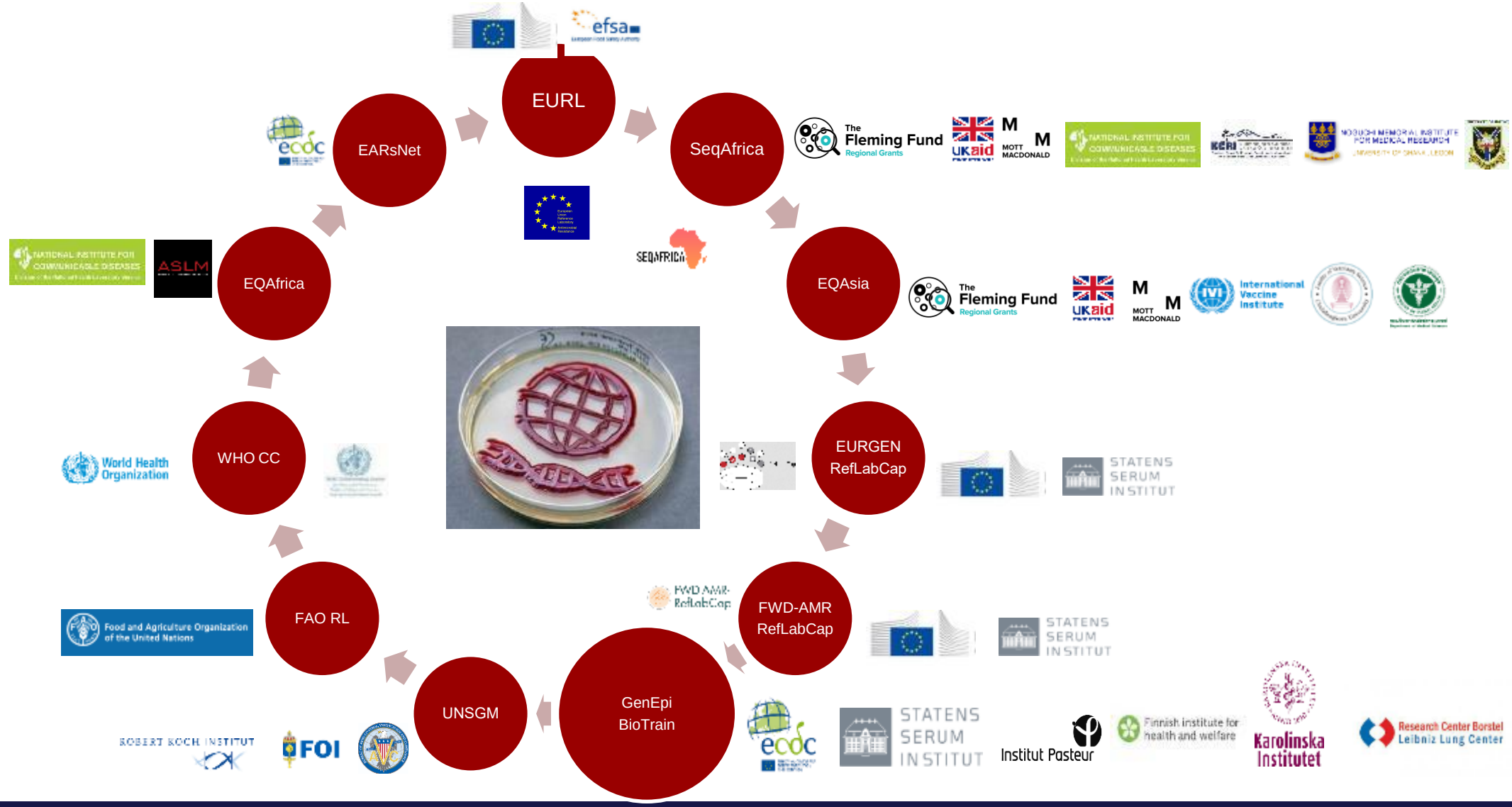
What we do in the Global Capacity Building

We work to:

- Strengthen the ability for and increase the quality of the global monitoring of antimicrobial resistance (AMR) by implementing research
- Develop and implement methods and guidelines to support building the capacity of AMR and WGS surveillance
  - in collaboration with the EU, FAO, WHO, UK AID/ Fleming Fund, UNEP, ECDC, EFSA, US CDC, US FDA among others
- Give scientific and technical assistance to supranational organizations, national reference laboratories, health organizations and foundations, globally
- Perform external quality assessment (EQA's) trials and training activities in detection of infectious diseases and AMR by phenotypic and genomic methodologies



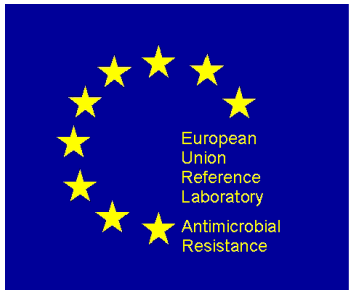
Whom we primarily work with and stakeholders



Thank you for your attention

Prof. Rene S. Hendriksen, PhD

Head of Research Group Global Capacity Building
WHO Collaborating Centre for Antimicrobial Resistance in Food borne Pathogens and Genomics
European Union Reference Laboratory for Antimicrobial Resistance
FAO Reference Laboratory for Antimicrobial Resistance
National Food Institute, Technical University of Denmark
rshe@food.dtu.dk



FAO Reference Center
for Antimicrobial Resistance

INSTITUT PASTEUR

LOUIS PASTEUR
1822 – 1895
200 ANS

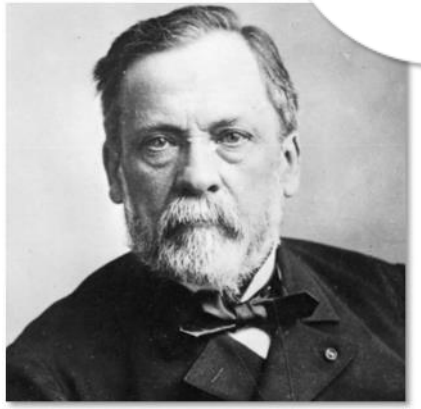
The Institut Pasteur

Thierry LANG
International Relationships
Education Department

INSTITUT PASTEUR

Who We Are

- **A non-profit foundation with recognized charitable status**, founded by Louis Pasteur, 130 years ago/
- Staff 2500

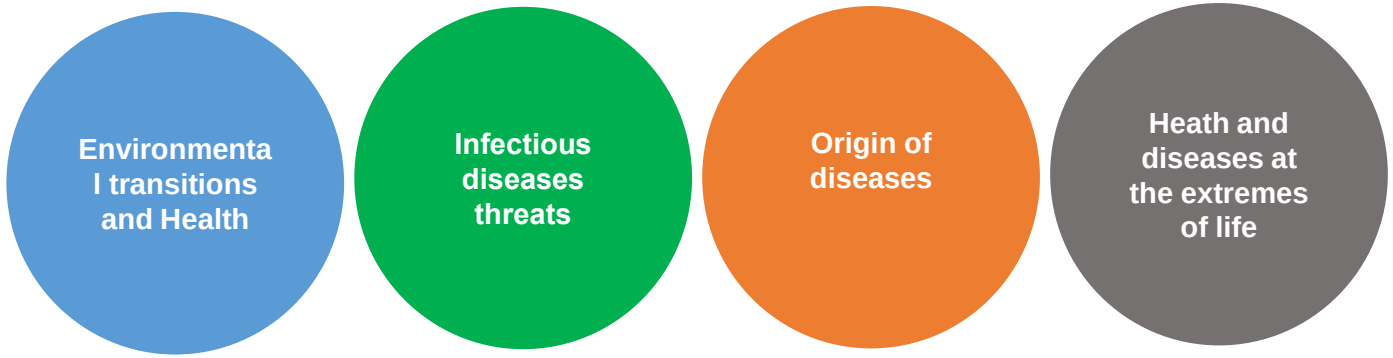


- **Our ambition** is to advance research at the service of human health and medical progress for everyone.

- We have **4 missions**:
  1. Research
  2. Public Health
  3. Training
  4. Research applications

Strategic Priorities

4 Priority Scientific Areas



Global ambition : to give new impetus to basic research and increase the impact of research on health challenges

Basic research
Information
Knowledge

→

Translation/CR
Technology

→

Health
Wealth

- **146 research units**
- **13 Departments**
- **The Education Center**

- **Hub for bioinformatics and BioStatistics**
- **35 Core technologies center (Omics, microscopy, …)**

- **16 Natl Reference Centers**
- **7 WHO collaborative centers**
- **Biological Resources Center**

Education center at Institut Pasteur

www.pasteur.fr/education

- **Major focus** on Public Health topics initial and continuing education
- **Out of the 40 courses**
  - **20 courses** on Public Health topics (Medical Mycology, Tuberculosis, Vaccinology, Insect Vectors and Pathogens, etc)
  - **14 courses** are part of the Pasteur-Cnam-EHSP Specialized Master in Public Health
  - **9 courses** will be part of the NEW One Health – Emerging Infectious Diseases (1H-EID) Graduate School

- **Theoretical**
- **Practical**

face-to-face Pasteur COURSE

Pasteur MOOCs

→MOOCs

- **Broadcasted** on Fun platform
- **Around** 4 - 6 chapters
- **25-30** videos (with MCQs)
- **Online forum** for scientific debates
- **Live** sessions

Pasteur participants involved in GenEpi-BioTrain

Biodiversity and Epidemiology of Bacterial Pathogens Unit

National Reference Center for diphtheria
National Reference Center for Whooping cough and other Bordetella infections
Genomic taxonomies of bacterial strains (BIGSdb-Pasteur)
Klebsiella genomics

Sylvain BRISSE, Head of Unit

Solène Cottis, Project Manager

Education Department

Monica SALA, Director of Education Department
Thierry LANG, International teaching, Education Department
Hervé Waxin, Education Center
Murielle Almoussa, Education Center

Enteric Bacterial Pathogens Unit

Natl Ref Centers for E. coli-Shigella-Salmonella,
WHO Collaborative Center for the typing and antibiotic resistance of Salmonella

François-Xavier WEILL, Head of Unit

Invasive Bacterial Infections Unit

Hosts the National Reference Center for meningococci and Haemophilus influenza
WHO Collaborative Center for meningitis

Muhammed-Kheir TAHA, Head of Unit

Hub of Bioinformatics and Biostatistics

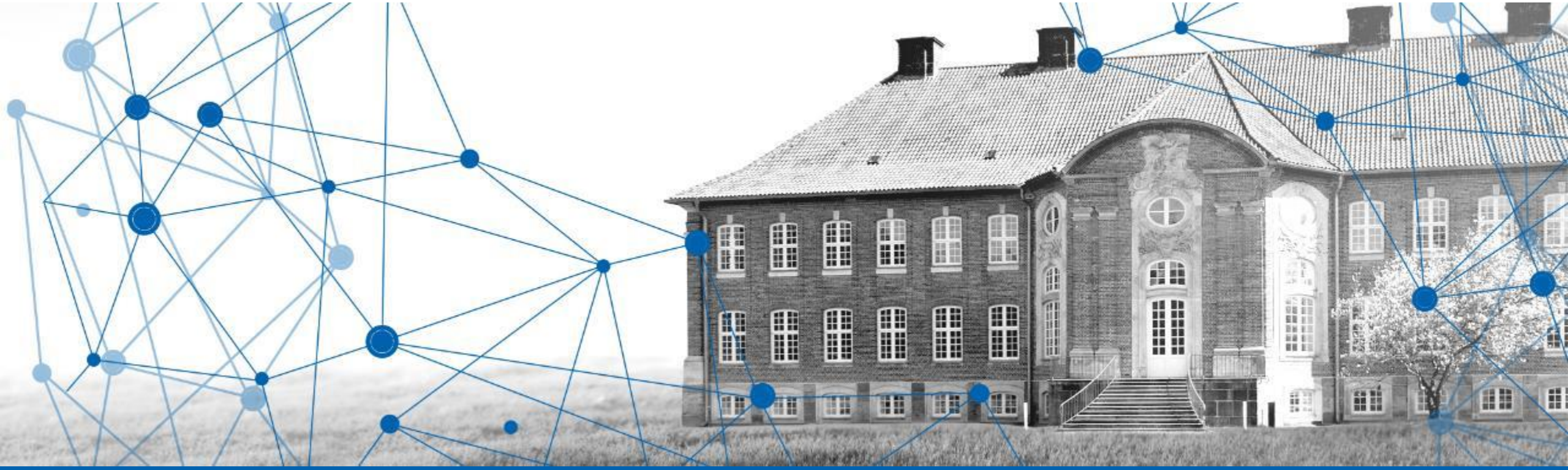
Department of Computational Biology
Center for Computing Resources and Research

Marie-Agnès Dillies, Head of Platform
Hervé Menager, Head of Platform

Research Center Borstel
Leibniz Lung Center

1947 - 2022

Forschungszentrum Borstel
Leibniz Lungenzentrum



GenEpi-BioTrain Tuberculosis: Introduction of the Host Institute

by Christiane Gerlach

Forschungszentrum Borstel, Leibniz Lungenzentrum (1947)

Forschungszentrum Borstel
Leibniz Lungenzentrum

Leibniz Association

379

Research Funding:
28 Mill Base Budget
8 Mill Third-Party

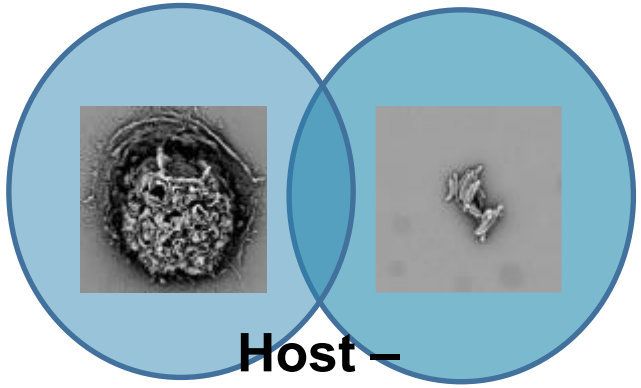
RCB focuses on chronic inflammatory lung diseases such as asthma, chronic obstructive pulmonary disease (COPD) and allergies, as well as tuberculosis and other infection-related inflammations of the lung. The overriding goal of the basically interdisciplinary and translational research activities is to elucidate the causes and mechanisms of infectious and non-infectious chronic inflammatory diseases of the lung in order to derive new innovative concepts for their prevention, diagnosis and therapy.

Nationally/Internationally involved in:

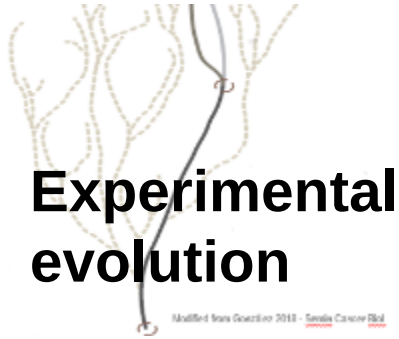
- **The German Health Centers:**
  - German Center of Infectious Diseases
  - German Center of Lung Disease
- **Large international Alliances:**
  - ERA4TB and UNITE4TB for the development and clinical testing of new TB drugs

Genomics/Bioinformatics

Experimental Mycobacteriology



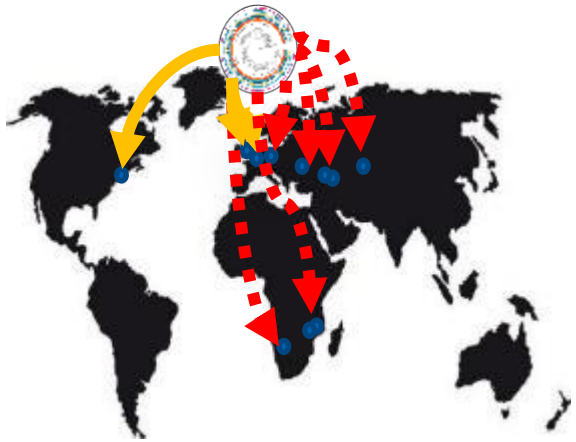
Host – Pathogen Interaction



Experimental evolution

REM-Pictures: S. Homolka, T. Gutsmann

Implementation team



field studies

EXCHANGE

Training in laboratories

Interdisciplinary work

Workshops

Continuing education

CAPACITY BUILDUNG

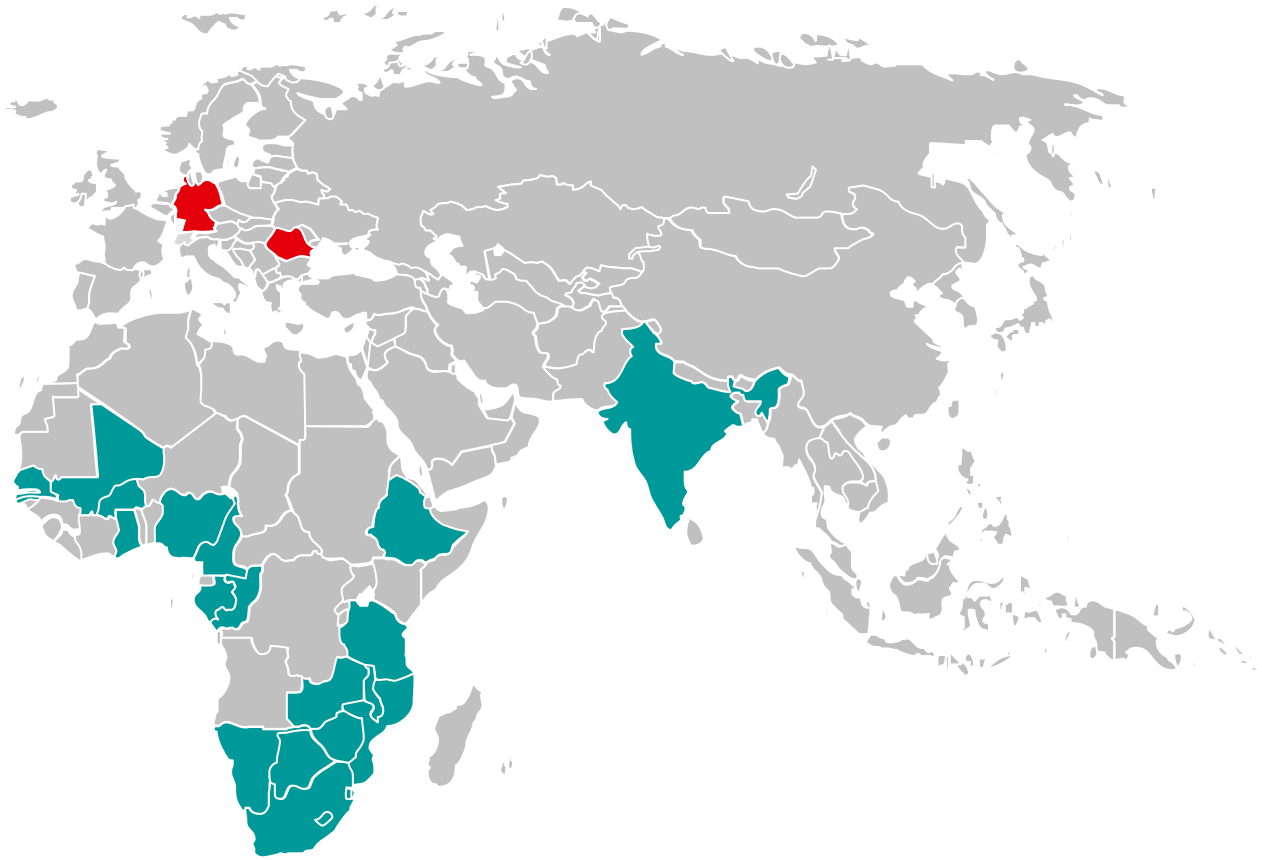
Wet lab and bioinformatic training courses

Maintaining and expanding competence

- in diagnosis and therapy
- in sequencing technology
- In bioinformatic data analyses

Documentation

Transfer



Stefan Niemann:
Head of Molecular and Experimental Mycobacteriology Group
Director of the Program Area Infections
Head of the National and Supranational Reference Laboratory for Mycobacteria Borstel
Expertise: Molecular Biology, Molecular/Genome characterization of
M. tuberculosis complex strains and other pathogens

Christian Utpatel:
Research associate in Molecular and Experimental Mycobacteriology Group
Co-lead of NGS platform (1x Illumina NextSeq2000, 1x NextSeq100, 1x MiSeq,
1x MiniSeq, 1x iSeq100, 2x Oxford Nanopore MinION, 1x PacBio Sequel II)
with an annual sample throughput of ~10,000.
Expertise: Molecular Microbiology, Next Generation Sequencing (NGS) technology and bioinformatics analysis to elucidate antibiotic resistance, transmission and population structure of Mycobacterium tuberculosis complex isolates,
atypical mycobacteria and other selected pathogens
Virtual training: "*Introduction to bioinformatic analysis of SARS-CoV-2 amplicon sequencing data*"

Ivan Barilar:
Research associate in Molecular and Experimental Mycobacteriology Group
Expertise: Molecular Biology, Bioinformatics, NGS data analysis, Population Genetics
Virtual training: "*Introduction to bioinformatic analysis of SARS-CoV-2 amplicon sequencing data*"

Viola Dreyer:
Research associate in Molecular and Experimental Mycobacteriology Group
Expertise: Bioinformatics, implementation and developing of pipelines for the analysis of NGS data for in-house analysis and development of browser based pipelines for the automated analysis and resistance prediction of MTBC strains (e.g. PhyResSE)

Matthias Merker:
Head of Evolution of the Resistome Group
Expertise: Exploration of drug interaction and bacterial genome evolution, evolution of drug resistance, analysis of worldwide expansion of multidrug resistant TB strains,TB strain identification, sequencing, genotyping

Christiane Gerlach
Scientific Project Manager in Molecular and Experimental Mycobacteriology Group
Expertise: Coordination of research and implementation projects (application, contracting, reports, financing), worldwide management of the implementation of modern genome-based diagnostics for the detection of multidrug-resistant tuberculosis, establishing and expanding national and international partnerships and networks

Niemann and Merker groups

Thank you for your attention

120 years of Statens Serum Institut

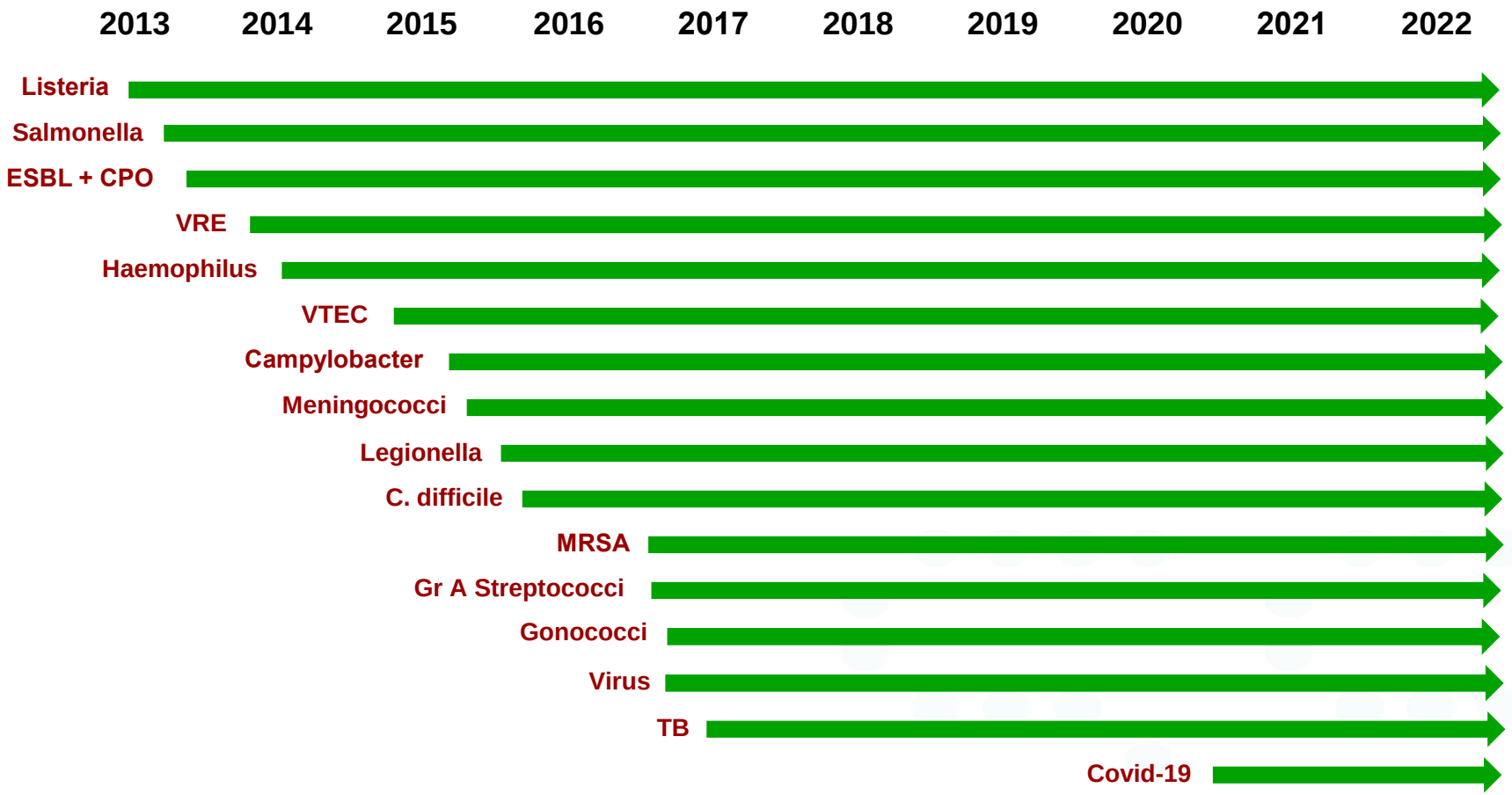
Statens Serum Institut (SSI) was established in 1902

- Governmental Public Health Institut under the Danish Ministry of Health
- The national center for infectious disease control and national laboratory for both human and animal health

- **Preparedness organisation - Infectious diseases**
  - Covid-19
  - Foodborne disease outbreaks
  - Antimicrobial resistance
  - Vaccine program

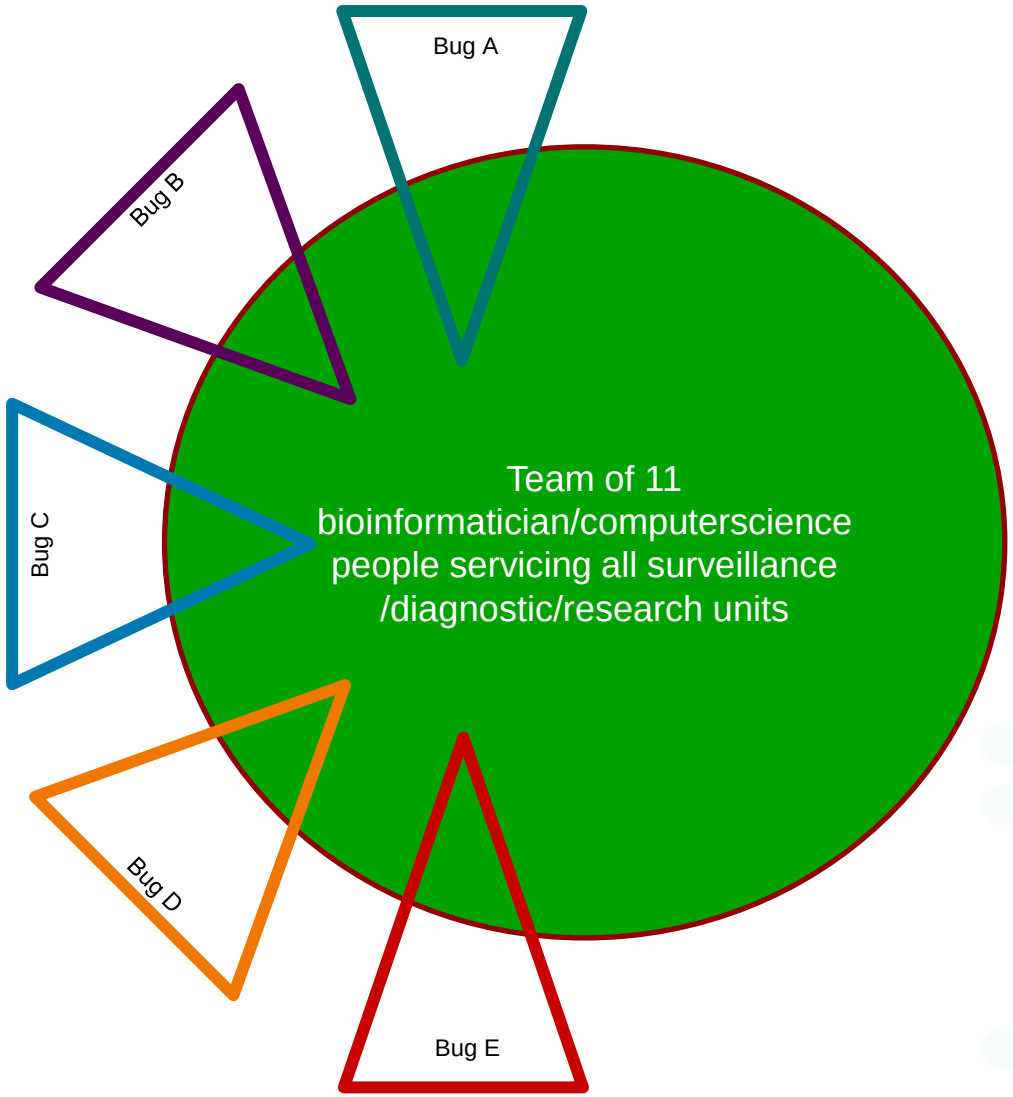
- Danish National Biobank & Biomarkers
  - Total 22 million biological samples
    - screening of all newborns since 1982 (3 millions blood samples)

Implementation of WGS at Statens Serum Institut



- Approx. 11,000 bacterial genomes in 2022
- Up to 15,000 SARS-CoV-2 genomes per week- > 800,000 in total

Optimized bioinformatic work flow



Combining WGS with clinical and epidemiological data for surveillance and outbreak investigations

STATENS SERUM INSTITUT

Civil Registration System
Key in all public health registers

National Microbiology Database
- Results of all microbiological test performed in hospitals

Whole Genome Sequencing
- Typing
- Resistance genes
- Clonal assembly

National Patient Register
- Primary care
- Hospital care

Surveillance and outbreak

Capacity building programs

- HERA Incubator: Direct grants for National WGS and RT-PCR infrastructure projects: “SSI-SEQ”

- EURGen-RefLabCap and FWD AMR-RefLabCap: Increasing capacity in NRL functions, focus on implementing WGS for specific organisms colistin and carbapenem resistant Enterobacterales, *P. aeruginosa, A. baumanii* and Salmonella and Campylobacter

- GenEpi-BioTrain: Improving bioinformatic capacity and make WGS data useful in public health

- Fleming Fund
  - Fellows program in Bangladesh
  - SEQ-Africa

Staff presentation at SSI and DTU

Rene

Management team

Contract project manager: Rene Hendriksen (DTU)

Deputy project manager: Anders Rhod Larsen (SSI)

Overall training coordinator and deputy

Administrative and logistic coordinator and deputy

Task 1a-c, 1e, 2

Anders

Language quality proof-reader (DTU &SSI)

Travel- and logistic assistant (CWT)

Valeria

Jette

Training team

Overall training coordinator: Valeria Botulaia (SSI)

Deputy: Jette Sejer Keldgaard (DTU)

Three lead experts

Host Institution/Training site representatives

Task 1d, 3, 4, 6, 7

Coordination Team

Lead, project assistant: Susanne Karlsmose (DTU) - Administrative and logistics coordinator

Deputy: Marianne Noer Hjorth (SSI) - Deputy administrative and logistics coordinator

Project assistant: Camilla Wiuff Coia (SSI)

Financial assistant: Christina Odgaard (DTU)

Overall training coordinator and deputy

Task 5

Susanne

Deepak

Marianne

Camilla

Laila

Henrik

Marc

Kirsten

Bioinformatic team

Lead: Henrik Hasman (SSI) - Lead expert for genomic epidemiology and public health bioinformatics

Deputy: Marc Stegger (SSI) - Deputy expert for genomic epidemiology and public health bioinformatics

Host institution/Training site representatives

Trainers and mentors

Genomic Epidemiology team

Lead: Camilla Wiuff Coia (SSI) - Deputy expert in infectious disease epidemi

Deputy: Jette Sejer Keldgaard (DTU)

Lina M. Cavaco (SSI) - Lead expert in instructional design

Birgitte Helwigh (DTU) - Deputy expert in instructional design

Lone Jannok (SSI) - Lead expert in infectious disease epidemiology

Host Institutions/Training sites representatives

Trainers and mentors

Camilla

Jette

Lina

Birgitte

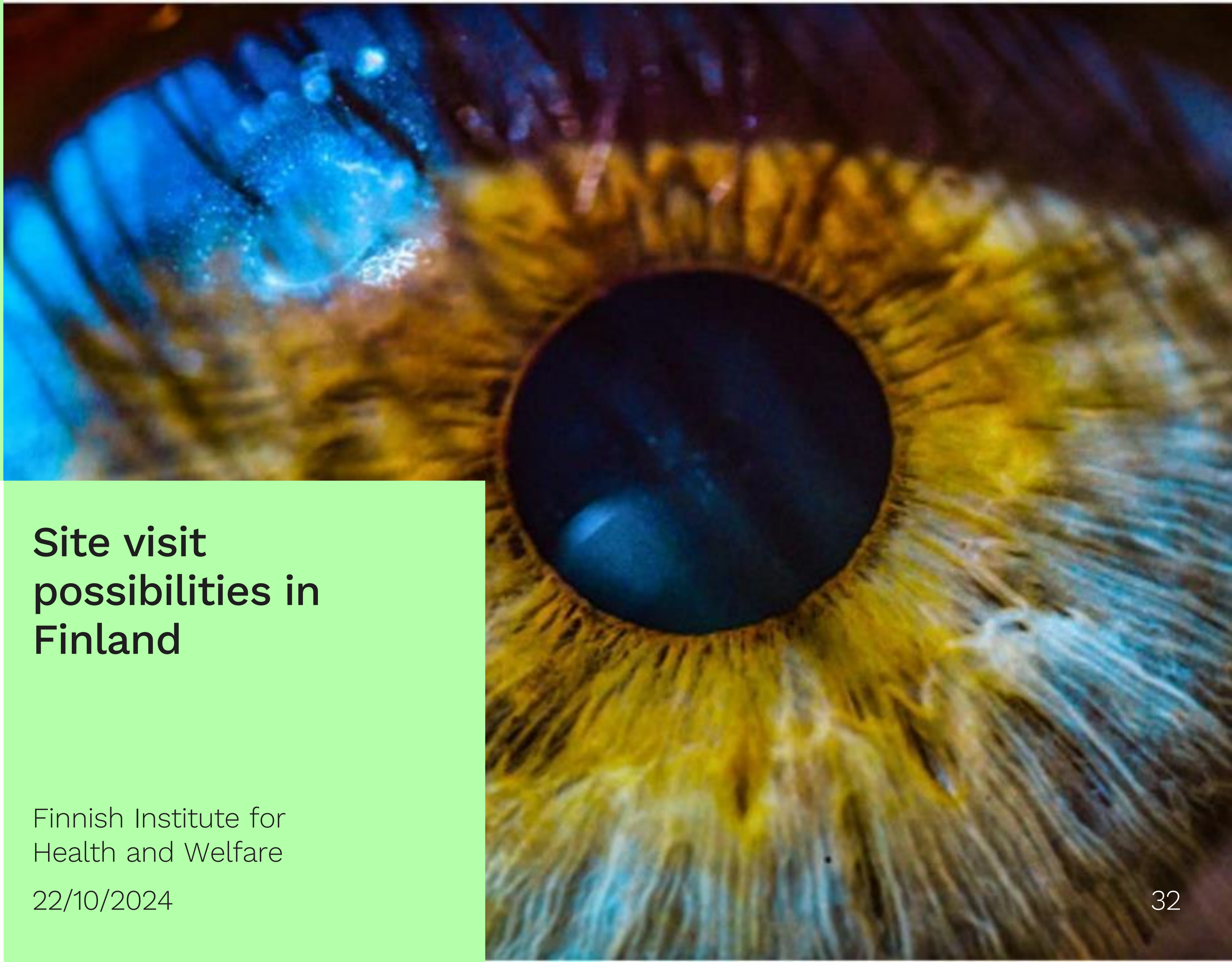
Lone

GenEpi-BioTrain

Site visit possibilities in Finland

Finnish Institute for Health and Welfare

22/10/2024



Duties and roles

- THL
  - State-owned expert and research institute
  - Promotes welfare, health, and safety of the population
  - Operates and serves at national level
- Department of Public Health
  - Monitoring health and wellbeing
  - Preparedness for national and cross border health threats
  - Expertise in planetary health
- Microbiology Unit
  - Expertise on bacterial, viral, and parasite infections, AMR, and microbiological water analysis
  - Coordination of laboratory-based surveillance of infectious diseases
  - Offers microbiological analysis
  - Participates in outbreak investigations
  - Reference laboratory for polio, influenza, measles, and rubella
  - Accreditation for several methods

TIETOA TESTAUSLABORATORIOSTA
FINAS
Finnish Accreditation Service
T077 (EN ISO/IEC 17025)
ilac-MRA

thl

MANAGEMENT

Mika Salminen
Director General

RDI MANAGEMENT

COMMUNICATIONS AND INFLUENCING

Marjo Loisa
Communications Director

DATA PERMIT AUTHORITY

Johanna Seppänen
Director

HEALTHCARE AND SOCIAL WELFARE	PUBLIC HEALTH	SAFETY
Piia Aarnisalo Director of Department	*Otto Helve* Director of Department	*Anneli Pouta* Director of Department
Promotional and Preventive Work	Lifestyles and Living Environments	Forensic Chemistry
Welfare State Research	Microbiology	Forensic Medicine
Service System	Welfare Epidemiology and Monitoring	Safety and Protection
Services	Prevention of Health Threats	Performance guidance of state mental hospitals, child welfare units and prisoners' health care

DATA AND ANALYTICS

Sirpa Saini
Director of Department

Data Management of Healthcare and Social Welfare | Datasets and Dataproducts | Data Production and Methods | Interoperability and Quality

ENABLERS

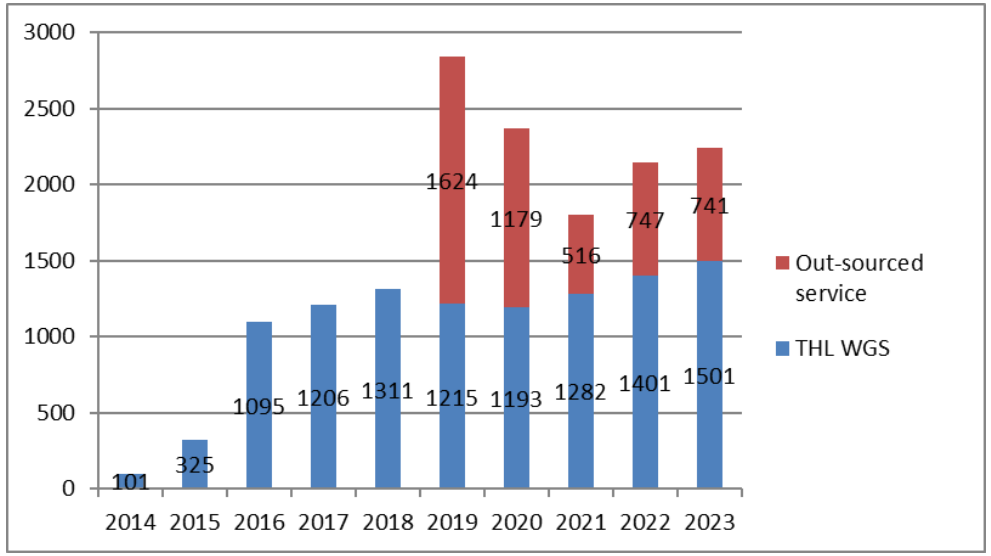
Mia Nykopp
Director of Administration and Finance

Digital Services | HR and Finance | Development and Guidance | Legal and Permit Services | Pharmaceutical Wholesale | Working Environments, Safety and Security

WGS-based surveillance

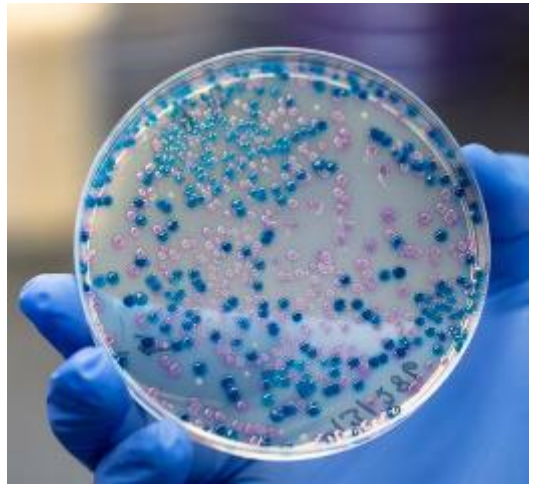
- WGS started in 2014 for bacteria
  - ~2200 sequenced strains/year
  - Sequencing in-house and outsourced
- WGS started in 2021-22 for viruses
  - Influenza A and B, since 2022, ~ 60-240 genomes /year
  - SARS-Cov2
    - 2022, previously outsourced, ~ 12 000 genomes
    - week 40/2023-20/2024, >3000 genomes
  - Enterovirus, incl. polio, ~ 20, since 2023
  - Adeno outbreak investigation, ~ 30, 2024
- MiSeq, NextSeq, MinIon

WGS, Bacteria



WGS based surveillance (or outbreak investigation)

- Listeria, STEC, Salmonella, Vibrio, (Yersinia, Campylobacter, C. perfringens, Shigella)
- MRSA, VRE, CPE, (ESBL)
- N. meningitidis, H. influenzae, S. pneumoniae
- (S. pyogenes)
- Legionella
- C. difficile
- M. tuberculosis



Viral WGS-based surveillance and outbreak investigation

- Influenza A and B amplicon sequencing
- SARS-CoV-2 amplicon sequencing
- Polio- and other enterovirus sequencing
- Target enrichment sequencing for respiratory and emerging viruses
- Metagenomics
- Waste water surveillance for SARS-CoV-2, influenza A and B, RSV

Site-visits at THL

- August 2023
  - Bioinformaticians, 5 persons, one week
  - Focus on influenza, SARS-CoV2, waste water
  - Also covered: WGS-surveillance for bacteriology and virology, reporting, standardization, laboratory infrastructure
- Possibilities
  - FWD, VPD, AMR, respiratory viruses, waste-water
  - Program to be adjusted according to needs

Experts

Virology
Niina Ikonen
Erika Lindh
Niko Tervo

Bacteriology
Anni Vainio
Ulla-Maija Nakari
Saara Salmenlinna

Bioinformatics
Pilvi Hepo-oja
Jani Halkilahti

Karolinska University Hospital

Christian G. Giske, Professor Clinical Bacteriology
Jan Albert, Professor Clinical Virology
Annika Tiveljung Lindell, Head of Department
24 February 2023

Karolinska University Hospital

- One of the largest university hospitals in Europe with 1.35 million patient visits annually
- The population of the Stockholm region is 2.4 million, almost a quarter of the population of Sweden, and the laboratory catchment area includes six of the seven emergency hospitals in the region and approximately half of the general practitioners
- Clinical microbiology is one of the departments belonging to Medical Diagnostics Karolinska (MDK)
- Clinical microbiology has 320 employees and offers a very broad range of diagnostic areas
- Clinical microbiology also has national reference function for a number of areas such as retroviruses, enteroviruses, TBE, respiratory viruses (except influenza), *M. tuberculosis* (primary diagnostics), atypical bacterial pneumonia, susceptibility testing of anaerobes, and mycology

Bioinformatics capacity

- Among trainers available in this project are
  - Sofia Stamouli, bioinformatician with expertise on viruses and metagenomics
  - Lili Li, bioinformatician with expertise on viruses
  - Mohammad Razavi, bioinformatician with expertise on bacteria and metagenomics
  - Patrik Jonsson, biomedical analyst with extensive experience on analysis of data from epidemiological typing of bacteria
  - Martin Vondracek, molecular biologist with long experience regarding metagenomic diagnostics

Which areas of interest do we offer?

- Whole genome sequencing of *S. aureus*, *Enterococcus* spp., *E. coli*, *K. pneumoniae*, *P. aeruginosa*, *A. baumannii*, *N. gonorrhoeae* and *M. tuberculosis*
  - For *M. tuberculosis* we also offer genomic AST, for others mostly epidemiological characterisation
  - For *Candida* spp. work is ongoing to establish assays
- Molecular susceptibility testing of HIV
- Subtyping of SARS CoV-2
- Metagenomics (16S, ITS, shotgun metagenomics)

Karolinska University Hospital Solna and Huddinge

Training programme in genomic epidemiology and public health bioinformatics – "GenEpi-BioTrain"

Nomination and selection of training participants

Theresa Enkirch, ECDC (Microbiology and Molecular Surveillance Group)
18 October 2024

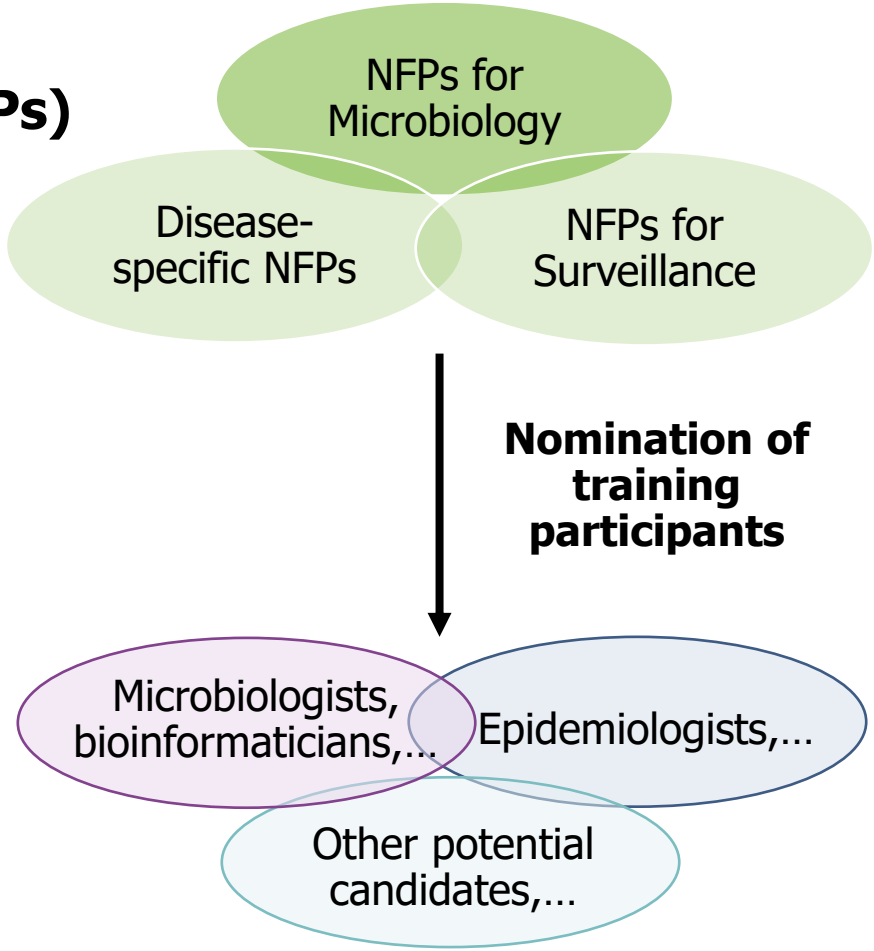
Who did we invite for this meeting and why

- National Focal Points for
  - Microbiology
  - Surveillance
  - Tuberculosis
  - AMR
  - HAIs
  - Training
- Observer National Focal Points for
  - Microbiology
  - AMR
- Contact Points for Operations for EURGen-Net
- ERLTB-Net members
- ECDC National Correspondents
- National Coordinators
- Operational Contact Points for Bioinformatics
- Operational Contact Points (Microbiology & Epidemiology) for
  - Tuberculosis
  - Antimicrobial-resistant isolates
  - Diseases Caused by Antimicrobial-Resistant Microorganisms
  - Healthcare-Associated Infections: Clostridium difficile Infections
  - Healthcare-Associated Infections: All

→ To ensure the information reaches ALL relevant stakeholders

How can I apply for the training programme?

- Training participants should be nominated
- Nomination of participants should be done by the (Observer) **National Focal Points for Microbiology (NMFPs)**
  - GenEpi-BioTrain is a microbiology capacity building activity
  - NMFPs have contacts to the National and sub-national laboratories
  - NMFPs know where training and capacity building is needed most
- Disease-specific NFPs and NFPs for Surveillance can contact the NFPs for Microbiology to coordinate the nominations
- NFPs for Microbiology lead the coordination of the nomination process in their country



How does the nomination process work?

- Each country will receive a separate email containing an invitation letter to nominate potential candidates for the GenEpi-BioTrain
- A survey link will be provided in the email which can be distributed to potential candidates
- Interested candidates should contact their National Focal Point for Microbiology to receive the survey link
- The email will be sent:

  To: (Observer) National Focal Points for Microbiology & Alternates

  CC: National Focal Points for Surveillance, Disease-specific NFPs, Disease-specific OCPs, NFPs for Training, National Coordinators

How does the nomination process work?

- Potential candidates are asked to fill the survey
  - Choose the pathogen wave and training block of interest
  - Contact details
  - Short CV
  - Short statement why they chose the training and how they can benefit from it
  - Short questionnaire about bioinformatics skills

- **NMFP should write a short paragraph** (word document/pdf; signed) to be attached to the survey before submission
  - To justify why this individual should be chosen for the training
  - How the host institute can benefit from their participation

Example: Survey for nomination

EUSurvey

Nomination for the training programme in genomic epidemiology and public health bioinformatics – “GenEpi-BioTrain” focused on tuberculosis and AMR.

Nomination for GenEpi-BioTrain

Instructions

- Select the pathogen wave (Tuberculosis and/or antimicrobial resistance (AMR) pathogens) and the training block(s) you wish to attend
- Select your current level of bioinformatic skills
- Provide a short CV (max. one page) and a justification for training (max. 200 words each)
- Provide your contact information
- For further details on the training programme, please check the invitation letter and presentations
- **To be filled by the NFP for Microbiology:** Provide a short paragraph to justify why this person should be chosen for the training and how the host institute can benefit from their participation (max. 200 words), and send the signed letter to the candidates
- **Deadline for nomination: 29 November 2024**

Example: Survey for nomination

* **Pathogen Wave**

- [x] Tuberculosis (Wave 5)
- [ ] Antimicrobial resistance (AMR) pathogens (Wave 6)

Choose the pathogen wave(s) and training block of interest

* **Tuberculosis Training Block**

- [ ] Block 1
- [x] Block 2
- [ ] Block 3

Bioinformatics skills

* Do you have experience working from the command-line UNIX?

- ○ A lot
- ○ Some
- ○ Not at all

(10 questions in total)

* Do you have experience with coding in python?

- ○ A lot
- ○ Some
- ○ Not at all

Example: Survey for nomination

CV, Motivation letter and Justification for nomination

* CV (required, to be filled by candidates). Indicate your Education, Working experience. Max. 1 page.

Select file(s) to upload ← Click here to upload your short CV (word, pdf)

* Why do you think you are the appropriate applicant to this training? Maximum 200 words ← Free text fields to be filled

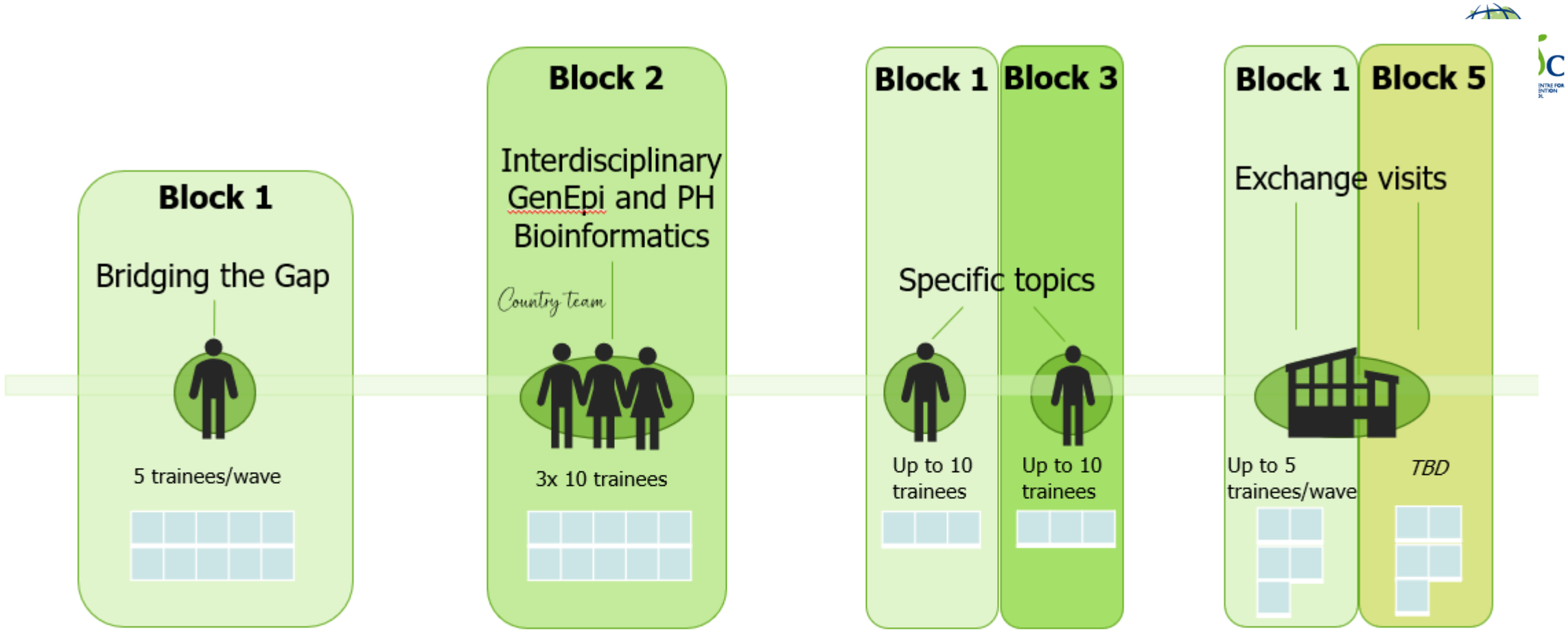
* Elaborate on how do you see the application the newly acquired skills and knowledge in your everyday work? Maximum 200 words

* Justification for nomination (required, and should be filled by NFPs). Please upload the signed pdf document from NFPs. Instructions for NFPs: Short paragraph (Maximum 200 words) to justify why this person should be chosen for the training and how the host institute can benefit from their participation. Please note, only signed documents from NFPs are accepted.

Select file(s) to upload ← Click here to upload the justification letter from your NFP

Training "blocks" per pathogen wave

	Block 1: • "Bridging the gaps" • Exchange visits • Specific topics	**Block 2:** • Interdisciplinary training ("Country teams")	**Block 3:** • Specific topics	**Block 4:** • Virtual training sessions	**Block 5:** • Exchange visits
Level:	BEGINNER LEVEL	BEGINNER/ ADVANCED LEVEL	BEGINNER/ ADVANCED LEVEL	BEGINNER/ ADVANCED LEVEL	BEGINNER/ ADVANCED LEVEL
Target group:	Bioinformaticians or "bioinformaticians-to-be"	Per country: 1 Bioinformatician 1 Microbiologist 1 Epidemiologist	Bioinformaticians, others (Microbiologists, epidemiologists,…)	Anyone who is interested	*TBD*
Further info:	Candidates should work/plan to work directly with public health sequencing-related activities	Bioinformaticians should have some experience; No bioinformatic experience needed for microbiologists or epidemiologists	Candidates should already have some experience in bioinformatics	*These activities will be announced separately*	*These activities will be announced separately*



24 Feb - 7 Mar 2025
(TB & AMR) (at DTU/SSI)

31 Mar - 11 Apr 2025 (RCB)
27 Oct - 7 Nov 2025 (SSI)

B1: 20-22 May 2025 (SQL, SSI)
B3: 2-4 June 2025 (TB, RCB)
B3: 9-11 Dec 2025 (AMR, SSI)

Hosts:
IP (16-20 June 2025)
RCB (15-19 Sep 2025)

1 day
2 days
3 days
⋮

Nominations per country

- For each pathogen wave, each country can nominate up to two potential participants per training block
  - One person as backup in case someone drops out

- F2F workshop "Interdisciplinary genomic epidemiology and public health bioinformatics" (Block 2)
  - For each pathogen waves, two country teams can be nominated
  - Each country team should consist of one bioinformatician, one microbiologist, one epidemiologist
  - Only complete country teams will be considered!
  - Epidemiologists should be nominated in coordination with the NFPs for Surveillance/Disease-specific NFPs

Nominations per country

- Nominees should be selected by the NFPs in an effort to ensure maximum impact of the training on the public health sector they serve, taking into consideration:
  - their projected period of implementation of skills at the institute
  - possibilities of cascading training nationally
  - direct use of the acquired skills

Eligibility and selection criteria

- Nominees must currently be employed **in the public health sector** in one of the EU/EEA countries
- ECDC will review applications and select candidates based on
  - professional background
  - training needs
  - maximum impact
  - course availability

Further information on the nomination and selection process

- ECDC will send out invitations to the NFPs to select nominees on **21/22 October 2023**
- Deadline for nominations/submitting the survey is **29 November 2024**
- ECDC will send an email to NMFPs, acknowledging the receipt of the nominations
- NMFPs then have the possibility to rank potential candidates
- Review of applications: 2 December – 13 December 2024
- Notification letter to successful candidates latest 20 December 2024 (Please send your acknowledgement and confirmation of attendance by 15 January 2024)
- ECDC will select one participant/country/training block/pathogen wave
- For the Interdisciplinary genomic epidemiology and public health bioinformatics workshop, ECDC will select one country team/country per pathogen wave
- If a selected participant is not able to join an activity, another person (backup) from the respective country can attend

Additional information

- There is a dedicated space on EVA (ECDC Virtual Academy) for the GenEpi-BioTrain: GenEpi-BioTrain Common (europa.eu)
  - Information about the training programme
  - Minutes and recording of this meeting
  - Virtual trainings
  - Training material from the different courses

If you have any further questions, please contact us!

ECDC.Microbiology@ecdc.europa.eu