



Virtual Event - Regional Workshop on the Current Developments of the Whole Genome Sequencing Platforms and the Bioinformatic Data Processing.

Hosted by

The International Atomic Energy Agency
IAEA Headquarters

13 to 17 December 2021

Ref. No.: ME-RER5025-2105676

Information Sheet

Purpose

The purpose of the virtual regional workshop is to present the development of workflows for access of counterpart laboratories to New Generation Sequencing (NGS) / Whole Genome Sequencing (WGS) technologies and give an outline to the practical applications of NGS / WGS platforms, the bioinformatic data processing in detection and characterization of animal and zoonotic pathogens.

Working Language

The working language of the event will be **English**.

Deadline for Nominations

Nominations received after **6 December 2021** will not be considered.

Project Background

Animal diseases can cause massive losses in livestock and seriously decrease their productivity, creating considerable socio-economic consequences. Moreover, zoonotic diseases can be easily transmitted from animals to humans and therefore pose significant public health threat. Both, worldwide and in Europe, the number of outbreaks of transboundary animal diseases and zoonotic diseases is growing. Due to these reasons capacities for detection and characterization of animal and zoonotic pathogens at the animal to human interface play an important role in the early detection and rapid response.

Scope and Nature

The IAEA is looking for possibilities for wider dissemination / application of the NGS / WGS technologies in counterparts laboratories. Currently two approaches are considered: **i**) establishment of functional ZODIAC National Laboratories under Pillar 1 of ZODIAC project (INT5157) in each of the IAEA regions (Africa, Asia & the Pacific, Europe, and Latin America & Caribbean) and **ii**) establishment of continuous workflow for service based NGS / WGS with an external service provider for possible wider coverage to as many laboratories as possible. The laboratories covered under point i) will be limited in number (2-4 in each of the IAEA regions) and are expected to upgrade to regional centres of training and research for other regional counterparts. The laboratories covered under point ii) will be all other laboratories from the IAEA TC counterparts' community, which will be ready to adopt NGS / WGS technologies - primarily laboratories with established Sanger sequencing workflow, independently as "in-house" or service based

The number of laboratories in the service-based cluster is expected to be much higher. Therefore, this workshop will be organized in two parts: **i**) an expert meeting (duration 3 days) to discuss the critical steps of the service based NGS and **ii**) a technical workshop (duration 2 days) to review the current applications of the NGS technologies in animal health. During the first part – the expert meeting component (day 1-3), the invited experts will present and discuss with the APH team on the most suitable recommendations for following topics of the NGS workflow:

- i) Sample preparation:** *a) host nucleic acids (NA) removal; b) extraction of NAs; c) biological safety of extracted NAs for international transport (RTL, RTL+ buffer or other buffers); d) library preparation (should it be performed in the local laboratories or by the service provider); e) use / benefit of specific procedures (RNA based capture, SISPA... or others); f) PCR amplification-based procedures for specific pathogen (primers used for Influenza A, SARS-CoV-2, RVF etc...).*
- ii) Library preparation:** *a) Host laboratories or the service provider (advantages / disadvantages); b) cost considerations and group submission; c) cost and R&D perspective.*
- iii) Suggestions on bioinformatics workflow for service based NGS:** *a) Sequence quality control and quality trimming; b) host reads removal; c) de novo assembly; d) Reference guided assembly; e) Variant calling; f) post assembly sequence analysis (annotation, comparative analysis, and phylogeny); g) Sequence sharing (Genbank submission and raw data submission).*
- iv) Quick metagenomic analysis:** Clinical samples and co-infections?

- v) **Interest for participation as technical partners in the upcoming CRP (2022-2027)?** Tentative activities: a) Verification of procedures in local laboratories; b) Verification of bioinformatic workflows in local laboratories; c) Guidance and materials for training under TC to ensure harmonization.

During this component, the invited participants will have status of guests / observers. The purpose of their presence at the meeting will be to familiarize with the practical solutions for the above-mentioned phases of the NGS / WGS workflows. In the context of the virtual meeting, the guests will have no access to cameras and microphone, however, they will have access to the chat and will be able to write comments and / or questions.

During the second phase of the workshop (the technical workshop), the experts will present their activities, research and application of the NGS / WGS technologies in animal health, followed by questions and answers session by the counterparts.

The invited participants will be nominated by the participating Member States of the ongoing TC Projects INT/5/157: Supporting National and Regional Capacity in Integrated Action for Control of Zoonotic Diseases; RAS/5/085: Using Nuclear Derived Techniques in the Early and Rapid Detection of Priority Animal and Zoonotic Diseases with Focus on Avian Influenza and RER/5/025: Improving Early Detection and Rapid Response to Potential Outbreaks of Priority Animal and Zoonotic Diseases.

Expected Outputs:

The expected outputs of the meeting are:

- I. Practical recommendations for the individual phases of the NGS / WGS workflow mentioned above.
- II. General introduction on the existing WGS platforms and bioinformatic data processing presented and discussed.
- III. Options for service based WGS workflows presented and discussed.
- IV. Different New Generation Sequencing (NGS) approaches (*Targeted NGS; Family based NGS; WGS; Metagenomics*) presented and discussed.
- V. Possible workflows for service based NGS / WGS applications [Simple / mobile workflows (technical and bioinformatic requirements); Intermediate workflows (technical and bioinformatic requirements); Advanced workflows (technical and bioinformatic requirements)] presented and discussed.

Participation

The regional workshop is open to candidates from the Member States participating in the TC project RER5025.

Each country is invited to nominate one participant who must match the profile described in the corresponding paragraph.

Participants' Qualifications and Experience

The Member States should nominate staff members of the officially designated veterinary laboratories responsible for detection and characterization of animal and zoonotic diseases.

The nominated candidates should also be directly responsible for performing above mentioned techniques in the host laboratory or at least involved in training technical staff working with the subject. The participants should be familiar with the common molecular technologies such as the conventional, real time PCR and Sanger Sequencing.

Application Procedure

Candidates wishing to apply for this event should follow the steps below:

1. Access the InTouch+ home page (<https://intouchplus.iaea.org>) using the candidate's existing Nucleus username and password. If the candidate is not a registered Nucleus user, she/he must create a Nucleus account (<https://websso.iaea.org/IM/UserRegistrationPage.aspx>) before proceeding with the event application process below.
2. On the InTouch + platform, the candidate must:
 - a. Finalize or update her/his personal details, provide sufficient information to establish the required qualifications regarding education, language skills and work experience ('Profile' tab) and upload relevant supporting documents;
 - b. Search for the relevant technical cooperation event (EVT2105676) under the 'My Eligible Events' tab, answer the mandatory questions and lastly submit the application to the required authority.

NOTE: Completed applications need to be approved by the relevant national authority, i.e. the National Liaison Office, and submitted to the IAEA through the established official channels by the provided designation deadline.

For additional support on how to apply for an event, please refer to the [InTouch+ Help page](#). Any issues or queries related to InTouch+ can be addressed to InTouchPlus.Contact-Point@iaea.org.

Should online application submission not be possible, candidates may download the nomination form for the meeting from the [IAEA website](#).

Administrative and Financial Arrangements

Nominating authorities will be informed in due course of the names of the candidates who have been selected, and will at that time be informed of the procedure to be followed with regard to administrative and financial matters.

Selected participants who indicate their need, will receive financial support to contribute to the expenses of their costs for internet connection for the duration of the event in line with IAEA rules and procedures.

Disclaimer of Liability

The organizers of the event do not accept liability for the payment of any cost or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the course, and it is clearly understood that each Government, in approving his/her participation, undertakes responsibility for such coverage. Governments would be well advised to take out insurance against these risks.

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