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# D4.11 Cogwheel Workshop 3

## WP4 Joint integrative projects

Responsible Partner: SVA

Contributing partners: NVI

## GENERAL INFORMATION

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| **European Joint Programme full title** | Promoting One Health in Europe through joint actions on foodborne zoonoses, antimicrobial resistance and emerging microbiological hazards |
| **European Joint Programme acronym** | One Health EJP |
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## DOCUMENT MANAGEMENT

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| **Deliverable** | D4.11: 3rd cogwheel workshop report with INNUENDO, IRIDA and COMPARE |
| **WP and Task** | WP4; Task 4.3 – Subtask 4.3.1 |
| **Leader** | Ann Lindberg (SVA)/Karin Artursson (SVA) |
| **Other contributors** | Merete Hofshagen (NVI) and Solveig Sølverød Mo (NVI) |
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| **Type**<br>*R: Document, report*<br>*DEC: Websites, patent fillings, videos, etc.*<br>*OTHER* | R |
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# Report from Cogwheel Workshop 3
# One Health EJP / INNUENDO, IRIDA and COMPARE

## Introduction

In Work Package 4 (WP4) of the One Health European Joint Programme (OHEJP), EU initiatives that require strategic interaction with OHEJP are identified in collaboration with WP2 and WP5, to avoid redundancy and to further leverage the alignment at EU level. One of the instruments, so called cogwheel workshops (CW), are being organised by WP4 to allow key actors and relevant partners within the OHEJP, typically Project leaders or WP leaders within Joint Research Projects (JRP:s) or Joint Integrative Projects (JIP:s), to identify synergies, joint priorities and opportunities for collaboration within the OHEJP or with other EU initiatives. Before contacting the relevant EU initiative/project, it is important to identify and collect (common) JRP and JIP needs and to define if the initiative complies with these needs. Furthermore, it is important to see if the initiative can complement or assist the OHEJP, for instance with database/repositories, protocols, advice, practical collaboration (sequencing, bioinformatics) and so on.

Eight CWs will be organised during the OHEJP. The reports from cogwheel workshops will be part of the input to updates of the Strategic Research Agenda (SRA) of WP2, as well as the Strategic Research and Innovation Agenda (SRIA) of WP7.

The targets for the third CW activity were three projects external to the OHEJP; INNUENDO, IRIDA and COMPARE.
INNUENDO (https://sites.google.com/site/theinnuendoproject/) is an EFSA-funded project aiming to design an analytical platform and standard procedures for the use of whole-genome sequencing in surveillance and outbreak investigation of food-borne pathogens. The project was coordinated by University of Helsinki, and ended in July 2018. However, the platform will continue to exist and be updated with new bacterial species and tools.
The IRIDA (The Integrated Rapid Infectious Disease Analysis) project (https://www.irida.ca/) is a Canadian-led initiative to provide an open source, end-to-end platform for public health genomics. IRIDA is currently used for a large-scale research project studying emergence and transmission of antimicrobial resistance genes from farm-to-fork.
COMPARE (https://www.compare-europe.eu/) is a 60-month EU funded project aimed to develop an analytical framework and information sharing platform that enables identification, containment and mitigation of emerging infectious diseases and foodborne outbreaks. The project is coordinated by DTU, an OHEJP beneficiary, and ends in 2019.
The CW will ensure that OHEJP development is complementary and that potential synergies are identified.

## Practicalities

- Information about the upcoming cogwheel workshop was sent to all OHEJP Project leaders and deputies on 14 May 2019. Information about INNUENDO, IRIDA and COMAPRE was included.
- Three ongoing OHEJP projects (ARDIG, ORION and COHESIVE) and one new OHEJP project (BeONE) identified the three external initiatives as relevant projects to learn more about, to avoid duplication and/or to have potential for synergies with the OHEJP.
- The cogwheel workshop was held as a physical meeting at Hotel Kompas Dubrovnik 16th and 17th September 2019, in conjunction with the 12th IMMEM conference (International Meeting on Epidemiological Markers). The agenda is included in the annex.

**Attendance list**

| Project | Representatives (institution) |
|---|---|
| ARDIG | Arnoud van Vliet (UoS)<br>Jose Francisco Delgado Blas (UCM)<br>Carlos Serna Bernaldo (UCM)<br>Manal Abu Oun (APHA)<br>Muna Anjum (APHA) |
| COHESIVE | Adriano Di Pasquale (IZS)<br>Erika Scaltriti (IZS-LER) |
| ORION | Fernanda Dórea (SVA)<br>Wonhee Cha (SVA)<br>Jeevan Karloss (NVI/NIPH)<br>Karin Lagesen (NVI)<br>Mohammed Umaer Naseer (NIPH)<br>Charlotte Cook (also COHESIVE)<br>Joanna Lawes (also COHESIVE) |
| BeONE | Eva Litrup (SSI)<br>Kristoffer Kiil (SSI) |
| EFSA | Mirko Rossi (EFSA) |
| ECDC | Erik Alm (ECDC)<br>Karin Johansson (ECDC) |
| CDC | Heather Carleton (CDC) |
| INNUENDO | João André Nogueira Custódio Carriço (University of Lisabon)<br>Mario Ramirez (University of Lisabon) |
| IRIDA | Damion Dooley (BCCDC)<br>Emma Griffiths (SFU)<br>Gary Van Domselaar (NML-PHAC)<br>Thomas Matthews (NML-PHAC)<br>William Hsiao (BCCDC) |
| COMPARE | Guy Cochrane (EMBL, day 2)<br>Marion Koopmans (Erasmus Medical Centre, day 2 online) |
| EJP WP4 | Robert Söderlund (SVA)<br>Solveig Sølverød Mo (NVI) |

## Output

All OHEJP projects interested in participating in the cogwheel workshop had the opportunity to do so. The relevant key elements in INNUENDO, IRIDA and COMPARE, as identified by each OHEJP project, are listed below. The proposed action points from each project are listed in a separate summary table below.

**Meeting summary, per project**

Key elements in IRIDA, INNUENDO and COMPARE relevant for each EJP project:

| EJP Project | ARDIG |
|---|---|
| INNUENDO:<br>• Its modular design which allows the generation of specific pipelines and the transparency of the analysis throughout the process. | |
| COMPARE:<br>• The flexibility of the platform to integrate different kind of data that are generated from different tools and platforms.<br>• The benefit of access to EBI/ENA repository. | |
| IRIDA:<br>• The standardization of the metadata and the high capacity to control and share all genomic data linked to the metadata between different collaborative centres.<br>• The need to have within institute IT support. This system seemed slightly more complicated compared to the others. | |
| • A key element for the APHA SeqFinder AMR tool for WGS analysis that was presented at this workshop is that it is a tool built by APHA and hence the availability of different platforms, which may potentially host this tool may help APHA SeqFinder to be used by others in the community. | |
| • The pipelines built in INNUENDO, IRIDA and COMPARE are of relevance to ARDIG, as analysis of the data generated in ARDIG will add value to those data. | |
| • It was helpful to meet the partners as this will assist in future discussions. | |

| EJP Project | ORION |
|---|---|
| Concerning INNUENDO and IRIDA:<br>• Potential platforms for supporting WGS data sharing across PHE (Public Health England) and APHA | |
| • IRIDIA is produced using technology that is already in use at PHE | |
| • INNUENDO providing a very flexible approach with less technical overhead | |
| • Epidemiological data integration for outbreak management have been a consideration during development of both platforms. They are both very suitable for outbreak management. The workshop approach was beneficial in stressing the personnel requirements needed for running both platforms | |

| EJP Project | COHESIVE |
|---|---|
| Concerning INNUENDO and IRIDA:<br>• Standard pipelines for food-borne pathogens | |
| • CIS system might be integrated with those | |
| • IRIDA ontology initiative has interesting implication for the coding management in feasibility study of COHESIVE Task 4.1 | |
| • Cluster detection / definition methods (lightly covered) | |

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| • Visualisation tools for strain relations as evidence of signals |

| EJP Project | BeONE |
|---|---|
| • Very relevant to be updated on the status of INNUENDO. | |
| • Also very important to get a deeper insight into IRIDA, since there are many commonalities. | |
| • Ontology session was also very relevant in terms of sparking discussion of how/to what extent ontologies should be implemented in BeONE. | |

**Summary table Action points**

| Project | Action points | Who, when |
|---|---|---|
| ARDIG | • The integration of metadata of the isolates sequenced by different ARDIG collaborators in this kind of platforms to track them all over the project and share the information among collaborators.<br>• The use of tools for AMR prediction implemented in these platforms with isolates sequenced by ARDIG collaborators, to compare the different results obtained with these tools and the APHA pipeline.<br>• APHA will be hosting a WGS AMR workshop in October where the 10 different project partners will trial APHA SeqFinder tool so AMR gene analysis performed by this pipeline can be compared with those from other pipelines that ARDIG partners currently use. The results from this workshop may be helpful for all EJP partners who are interested in this area of work.<br>• Comparison with other data platforms needs to be agreed and planned, sooner rather than later.<br>• Agreement on which platforms and databases should be used in all studies could be of benefit for cross-validation purposes. | • All partners, December 2019<br>• MA and MAO, October 2019<br>• All partners, December 2019 |
| ORION | • Share the main findings with PHE and investigate if they are aware of the platforms<br>• Investigate the possibility of introducing a platform approach at APHA especially the hardware requirements and skills required | • CC and JL, November 2019<br>• CC and JL, complete, long-term goal |
| COHESIVE | • Try to implement ideas from IRIDA ontology to the COHESIVE information system, with the help of IRIDA team | • ADP and FD, December 2019 |
| BeONE | • Establish contact to IRIDA team<br>• Test IRIDA platform<br>• Revise project roadmap based on new insights | • See BeONE workplan T1.1 |

## Other:

- ORION and COHESIVE: Possible Thematic Workshop topic: Integration of WGS and epidemiological definition / detection parameters would be a potential topic for a thematic workshop. Within the cogwheel workshop, it was evident that the bioinformaticians from the other projects and within ORION would like epidemiological input on requirements for tools. One tool that was mentioned was the ability to detect related clusters within WGS data. Relatedness on a genomic level is useful. However, in practice other epidemiological

considerations are important when managing outbreaks, such as the time between sampling, geographical location, epidemiological connections, age of subjects, etc. A workshop encouraging bioinformaticians and epidemiologists from veterinary, public health and food sectors to work together to produce workable, programmable definitions of clustering would be an important first step to turning WGS data into actionable information and encourage harmonisation across European partners. It would also be beneficial to include experienced participants from complimentary projects such as INNUENDO and IRIDA to share their experience in the area. As many of the public health epidemiologists may be attending ESCAIDE 2019 it may be beneficial to hold it prior to, or after the conference in Stockholm 27 – 29 Nov 2019.

- ARDIG: There is still debate and lack of clarity/agreement about data formats, data sharing/confidentiality and access, including training where required. It also needs validation across partners/users to ensure appropriate QC.
- ARDIG: All platforms had elements of data security.
- BeONE: Good number of breaks, to keep session lengths manageable. Very tight programme with many talks. Could maybe have used a bit more time for networking.

## Concluding remarks

In general, INNUENDO, IRIDA and COMPARE have several activities that are relevant for the OHEJP projects. It is necessary to clarify how synergies between the projects can be best exploited, and how methods, data etc. can be shared between the projects.
ORION and COHESIVE suggested that a workshop encouraging bioinformaticians and epidemiologists from veterinary, public health and food sectors to work together to produce workable, programmable definitions of clustering would be an important first step to turning WGS data into actionable information and encourage harmonisation across European partners.

Feedback from the workshop participants indicated that they prefer physical- to online meetings. They value the possibility to interact in person on physical meetings. Also, some participants have experienced difficulties when trying to present i.e. online applications or tools during Adobe Connect meetings, as the applications or tools in question might not be available for all operating systems. However, all participants consider online meetings a good “plan B”.
An online document including recorded presentations and slides was made available for the workshop participants;
https://docs.google.com/document/d/1EO7_2z9xSJp2IjH1EihVVdHmWAo2fj_pp5P6-biw7pI/edit?usp=sharing

## Presentations given at the meeting

See Annex and https://docs.google.com/document/d/1EO7_2z9xSJp2IjH1EihVVdHmWAo2fj_pp5P6-biw7pI/edit?usp=sharing