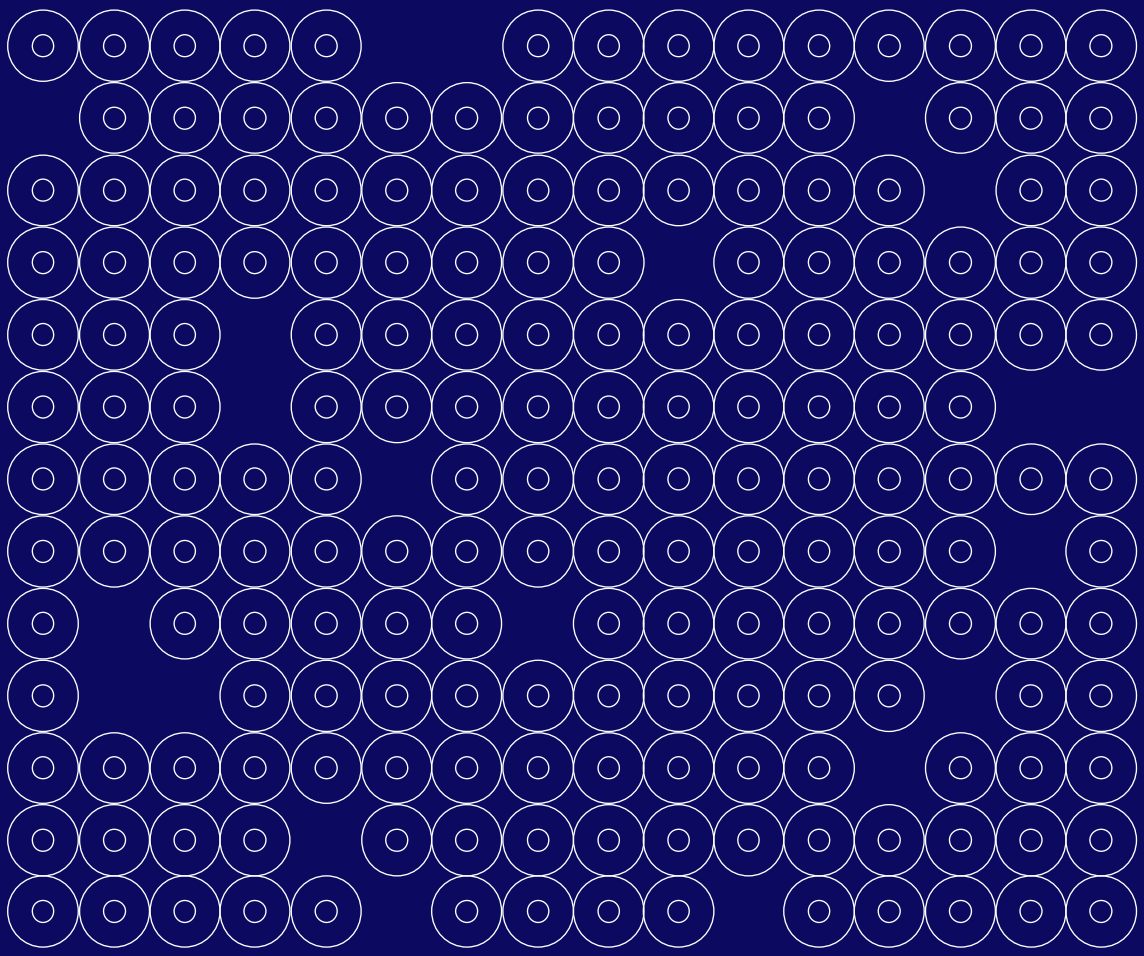
Workshop report 2018 JPIAMR Transnational Networks

Start-up meeting 19-20 February 2019, The Netherlands



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jpiamr
Joint Programming Initiative on Antimicrobial Resistance

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Introduction

Background and workshop objectives

The JPIAMR launched two network calls in 2018, (1) Surveillance, and (2) Building the Foundation of the JPIAMR-Virtual Research Institute. Within the surveillance call ten networks were funded. Within the JPIAMR-VRI call, eight networks were funded.

On February 19-20, 2019, the funded Networks within both calls met for the start-up workshop. The meeting was held at the Hilton Hotel, Schiphol Airport, the Netherlands. The Networks discussed alignment and enhanced interactions. The JPIAMR-VRI Networks also worked on future incorporation into the JPIAMR-VRI, and the surveillance networks were introduced to the JPIAMR-VRI and considered whether further interaction within the JPIAMR-VRI could promote and enhance surveillance actions.

Workshop outcome

This workshop aimed to explore opportunities for future research collaborations, synergies and partnerships both between applicants and with external partners, between networks within each call, and between calls if appropriate. In addition to this, the workshop aimed to create an overview of network activities within the funding period to enhance alignment and coordination, and support communication of network outputs by the JPIAMR.

Meeting Organisation

The Start-Up workshop for networks was organised by the WAWES network coordinated by Stefan Börjesson (National Veterinary Institute, Sweden) with funding from the Swedish Research Council, and the CONNECT network coordinated by Nicola Petrosillo (National Institute for Infectious Diseases, Italy) with organisation by John Rossen (University of Groningen, the Netherlands), and Liset van Dijk (Nivet, the Netherlands) with funding from ZonMw.

Joint Sessions

JPIAMR Introduction and Roadmap of Actions

Laura Marin, JPIAMR Secretariat

JPIAMR was formed as a European Initiative in 2011 as a result of the political urgency of the topic of AMR. The JPIAMR currently has a membership of 27 countries and has expanded beyond the European boundaries, with members including Japan, South Korea, Canada, South Africa, India and Argentina. JPIAMR focuses on research on AMR with a One Health approach, and the members of JPIAMR are research ministries, health ministries and research funding agencies.

JPIAMR identifies research priorities and gaps, and supports research by holding strategic workshops, joint calls for networks and joint calls for research. The JPIAMR is also involved in international policy actions. The JPIAMR Strategic Research Agenda (SRA) was developed in 2013 and has been updated in 2018 to include innovation (SRIA). One of the major recent activities of JPIAMR has been the launch of a mapping of research funding in the area of AMR, for projects active during 2017. The mapping has been presented in an interactive online dashboard. The main focus of the JPIAMR in the coming years is the development of the JPIAMR-Virtual Research Institute (JPIAMR-VRI).

Building the foundation of the JPIAMR-Virtual Research Institute

Edith Brochu, JPIAMR Secretariat and Canadian Institutes of Health Research – Institute of Infection and Immunity

The JPIAMR-VRI is a global virtual platform to connect research networks, and research performing institutes, centres and facilities beyond scientific disciplines and geographic boundaries in larger AMR One Health Global Networks. The JPIAMR-VRI is envisioned as a dynamic global network that will change the way resources are shared and used.

Figure 1. The six modules of the JPIAMR-VRI.

The JPIAMR-VRI is an entity under JPIAMR. The governance of the JPIAMR-VRI lies with the JPIAMR Management Board.

The first funded Networks within the call 'Building the Foundations of the JPIAMR-VRI' will provide the building blocks to support the creation of the JPIAMR-VRI. JPIAMR will ensure that the JPIAMR-VRI will be successful by maintaining a momentum in terms of activity and coordination.

Using data to drive policy action – the perspective of ReAct

Maria Pränting, ReAct

ReAct is an independent network that was founded in 2005 as a result of the lack of global action on AMR at the time. ReAct now has five nodes (in Sweden, India, Kenya, Ecuador and the USA) with primary activities to act at the interface between science and policy, as well as working with activities on the ground. The core funding of ReAct comes from the Swedish International Development Cooperation Agency (Sida), with additional funding from some other sources, such as Uppsala University, which hosts the European division of ReAct. No funding is accepted from the pharmaceutical industry.

The major actions undertaken by ReAct include to: (1) Influence policies and practices – evidence-based advocacy; (2) Connect stakeholders to facilitate action; (3) Encourage action: Engage-Train-Support-Advise; and (4) Share information.

ReAct was one of the first organisations to articulate the role of effective antibiotics in development and reaching the Sustainable Development Goals (SDGs). In order to manage the issue of AMR there is a need for collaborative efforts. In Africa, ReAct has established a large network of AMR champions that help set priorities in Africa and drive action on the continent.

ReAct is helping on the ground to support the development and implementation of National Action Plans on AMR. ReAct also works on social innovation: for example, teaching school children about health, bacteria and resistance.

To support action especially in low-resource settings, ReAct has developed the Toolbox; a repository on antibiotic resistance that provides open access resources and guidance. It focuses on understanding, raising awareness, measuring, rational use, preventing infection and policy (www.reactgroup.org/toolbox/).

Overall, there is a lot of scientific research that is relevant that is not reaching the policymakers, and there is a need to better connect social movement, political involvement and the research - Scientists also need to be champions and communicate the urgency of the issue and enter the political debate.

GLASS update and partners

Barbara Tornimbene, WHO GLASS

The Global Antimicrobial Resistance Surveillance System (www.who.int/glass/en/) was the first global system to collect official national data on AMR for selected bacterial pathogens that cause common infections in humans. GLASS has a standardised approach to collection, analysis and sharing of epidemiological, clinical and microbiological data. GLASS has objectives to: (1) Foster national surveillance systems and harmonise global standards (coordinating, capacity building and advocacy role); (2) Estimate the extent of AMR globally by monitoring selected indicators (global output of AMR estimates); (3) Collect data need to inform and estimate AMR burden; (4) Analyse and report global data; and (5) Detect emerging resistance

Glass collects the status of national AMR surveillance system and AMR data for eight priority human bacterial pathogens from clinical specimens (*Acitinobacter* spp., *E. coli*, *Klebsiella pneumoniae*, *Streptococcus pneumoniae*, *Shigella*, *Salmonella*, *Neisseria gonorrhoea* and *Staphylococcus aureus*) and population data. In 2018 GLASS launched the second data call to collect information that is used to generate the GLASS report. There has been an increase in the enrolment of countries and more than twice the number of countries submitted AMR data, compared to the first data call. GLASS collects data from both HIC and LMIC countries (11 LMIC reported data in the last year).

Ongoing activities of GLASS:

- GLASS Emerging AMR reporting (GLASS-EAR)
- Surveillance of antimicrobial consumption and use
- Enhanced surveillance of multi-resistance gonorrhoea (e-GASP)
- AMR surveillance in invasive *Candida* infection
- One Health: working with OIE and FAO to develop One Health projects e.g. Tricycle-1 (monitoring ESBL *E. coli* in the environment, animals and humans) and TISSA (Tripartite Integrated Surveillance System on AMR and AMU)
- Web tools for data analysis and visualisation (GLASS IT platform)
- Studies to evaluate the burden of AMR

GLASS partners include GLASS AMR Collaborating Centres Network of partner technical institutions and WHO AMR Surveillance and Quality Assessment Collaborating Centres Network. These partnerships provide key support for capacity building and GLASS development and dissemination. GLASS has connections with Northern GLASS, EARS-Net, CESAR and EVIPNet (evidence-informed policy network).

GLASS has an already collected and unprecedented level of information relating to AMR at a global level and continues to foster further development of national AMR surveillance systems. GLASS also showed interest to collaborate further with the JPIAMR-VRI in alignment with their work plan, actions and objectives, if appropriate.

Regulatory Bioinformatics activities at the European Commission's Joint Research Centre

Alexander Angers, European Commission

The Joint Research Centre is part of the European Commission. It supports the EU policies with independent evidence. Their activities can be divided into knowledge production and knowledge management. They are located in 5 member states: Belgium, Germany, Italy, Netherlands and Spain and the 75% of the staff are scientists.

One of the projects deals with “Omics in Society”, that aims to understand the role of Omics in society and focuses on communicating on and preparing for the impact of new Omics technologies. It is within this project that the JRC started activities related to AMR, in particular exploring the role of NGS for the prediction of AMR.

The activities related to “Regulatory Bioinformatics” strives to develop and implement standardized bioinformatics workflows intended for regulatory decision-making. It started with the NGS for AMR. Two workshops have been organised with different experts in the AMR field, in 2017.

These workshops focused of understanding the state of art and existing gaps for the implementation of NGS in this context. Two activities are currently ongoing as a result of these discussions: on common AMR databases for NGS, as EUCAST published a paper on the problem with current databases, and on designing bioinformatics benchmark resources.

Responsible people for the currently available databases were approached and asked fill in a survey form; early analysis of the results suggests that several are worried concerning the sustainability of their databases due to financial problems and/or Human Resources.

In May two workshops will be organised in Italy. One is focusing on AMR databases whereas the other focuses on the benchmarking of NGS bioinformatics pipelines for AMR.

So far, previous workshops resulted in the following publication:

Angers-Loustau A, Petrillo M, Bengtsson-Palme J, Berendonk T, Blais B, Chan KG, Coque TM, Hammer P, Heß S, Kagkli DM, Krumbiegel C, Lanza VF, Madec JY, Naas T, O'Grady J, Paracchini V, Rossen JWA, Ruppé E, Vamathevan J, Venturi V, Van den Eede G. The challenges of designing a benchmark strategy for bioinformatics pipelines in the identification of antimicrobial resistance determinants using next generation sequencing technologies. Version 2. F1000Res. 2018 Apr 13 [revised 2018 Jan 1]; 7. pii: ISCB Comm J-459. doi:10.12688/f1000research.14509.2. eCollection 2018. PubMed PMID: 30026930; PubMed Central PMCID: PMC6039958.2.

Building on the EURL-AR experience for global harmonised AMR surveillance

Valeria Bortolaia, Technical University of Denmark

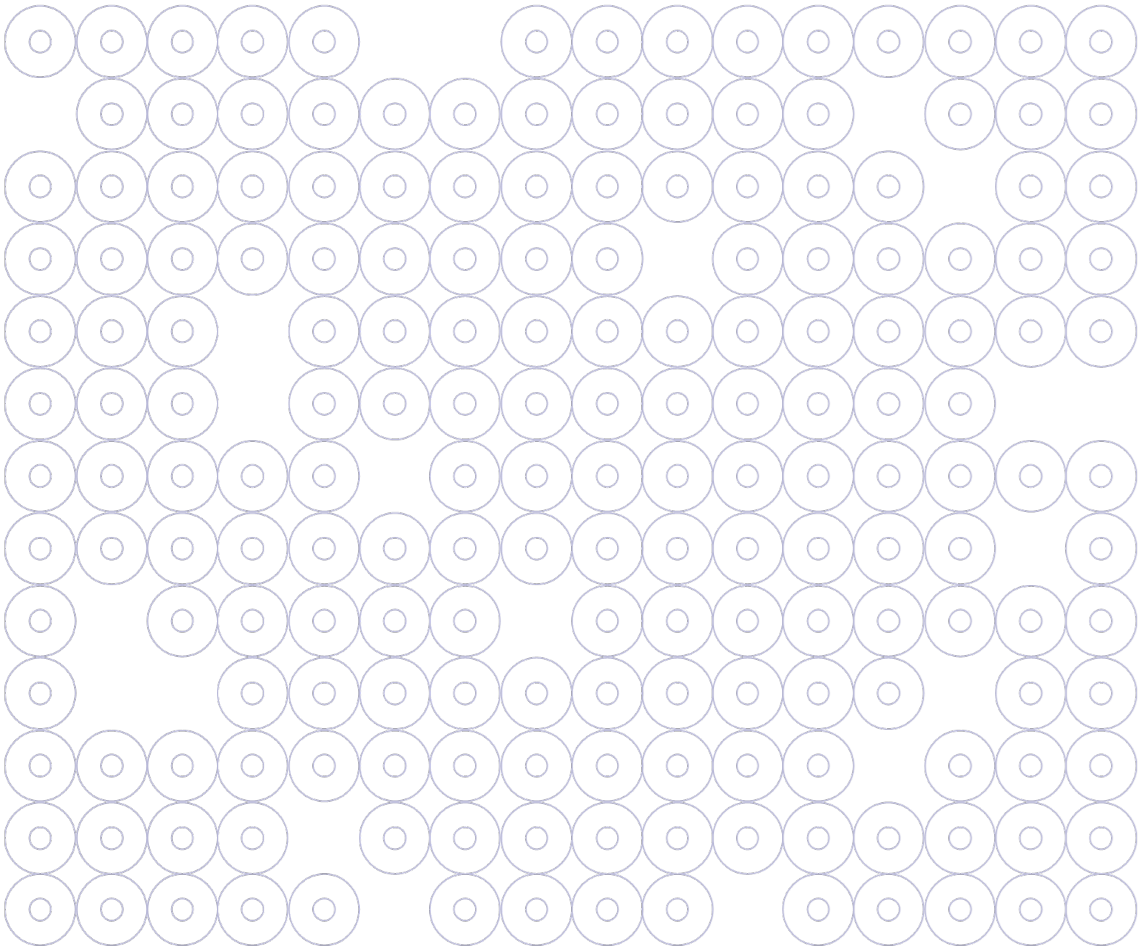
In line with the mandate from the EC, the EURL-AR has built a network of national reference laboratories (NRLs) dedicated to AMR, which is currently composed by 28 official NRLs in each Member State and 6 affiliated laboratories. Ongoing activities to maintain the EURL-AR network include annual workshops, site visits and training courses. Based on the EURL-AR experience, it is very important to pay attention to soft management skills to ensure cohesion within the network. Thus, cultural differences and language barriers should be taken into account and, in the EURL-AR experience, it has been relevant to avoid different speeds even when some laboratories were more advanced than others due to a better infrastructure.

Another task of the EURL-AR within the EC mandate is to set-up harmonized protocols. Some of these protocols have been embedded in the EU legislation thus ensuring harmonized AMR surveillance in bacteria from food and food animals across EU. Importantly, harmonized protocols should not be seen as static documents but should be revised based on the users' experience. To ensure that the harmonized protocols are correctly applied and laboratories provide reliable results, the EURL-AR also organizes Proficiency Testing programs and ad hoc surveys. Recently, the EURL-AR performed a survey to test to what extent MIC reading varies across laboratory personnel, which revealed that the differences are greater than expected. Overall, this stresses the importance of regularly checking the quality of the data provided by laboratories in the network.

Surveillance programs based on current protocols are mainly suited to detect the tip of the iceberg, i.e. the most prevalent AMR issues in selected populations. In 2016, DTU started the Global Sewage Surveillance Project to monitor AMR in large healthy populations through metagenomics of waste water samples (thus circumventing any privacy issue). The results showed that the type, abundance and diversity of AMR genes differed according to continent. In European and North American samples, macrolide resistance genes were predominant. In African and Asian samples, tetracycline, macrolide and fluoroquinolone resistance genes were predominant and equally abundant. Higher diversity of AMR genes was detected in samples from Africa and Asia compared to the other world regions.

Such metagenomic approach proved to be very powerful but may not be optimal in selected circumstances at least using the current protocols. For example, in a recent study in Czech Republic, metagenomics was not as sensitive as selective culture for detection of ESBL and carbapenem-resistant E. coli in hospital waste water samples, likely due to overall low prevalence of these bacteria within the total bacterial population. In conclusion, as different methods convey different information, it is very important to clearly establish the objectives of a surveillance program to decide upon the best suited methodological approach.

Network Call on Surveillance



NETESE

Full title
Network for Enhancing Tricycle ESBL Surveillance Efficiency

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JPIAMR priority area
Surveillance

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Summary of the Network

The extended-spectrum beta-lactamase (ESBL)-Escherichia coli Tricycle surveillance program has been developed by WHO to obtain a global picture of antimicrobial resistance (AMR) in humans, animals and the environment in all countries, especially in those with limited surveillance capacities. Basically, Tricycle proposes countries to implement a similar technical protocol to generate yearly rates of ESBL-E. coli in the three sectors of interest. Repetition of harmonised protocols every year should allow

the determination of trends, as well as inter- and intra-regional comparisons, and provide a dynamic dashboard of antibacterial resistance for decision makers.

Tricycle currently begins its implementation phase in a small number of pilot countries, sponsored by the Fleming Fund. Other countries are preparing to initiate the process in the coming years with other sources of funding. However, at this stage, no formal system has been developed to help all countries that will ultimately participate to Tricycle to be linked together for exchange, mutual support and experience sharing. The lack of such system could weaken the efficiency and sustainability of the whole project. Therefore, the Network "Network for Enhancing Tricycle ESBL Surveillance Efficiency" (NETESE) will work to achieve this goal.

NETESE gathers 15 institutions from nine low- and middle -income countries (LMIC) at different stages of implementation of Tricycle and three EU countries that have been strongly instrumental in the development of the project. Effective networking will be obtained through the organisation of two face-to-face meetings that will gather all participants (at the beginning and at the end of the project). In between, Network members will exchange information through trimonthly web-conferences on dedicated topics of interest. The outputs of NETESE will be to synergise the experience of the countries that are implementing Tricycle. NETESE will also establish contacts to ensure its own sustainability in order to become the nest where additional countries want to enter Tricycle in the coming years will find support and experience, before helping themselves others with similar difficulties to enter the surveillance program. Altogether NETESE will be a key element to draw a global dynamic picture of AMR.

Expected outputs of the Network

- White paper
- Start-up meeting (face-to-face)
- Guidelines report
- Final meeting (face-to-face)
- International and regional meetings
- Final grant report

ARCH

Full title
Bridging the gap between humAn and animal suRveillance data, antibiotic poliCy, and stewardship

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JPIAMR priority areas
Surveillance, Interventions

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Summary of the Network

Surveillance is essential to all aspects of the clinical management of antimicrobial resistance. It provides necessary information to develop empiric therapy guidelines, antibiotic formularies, and stewardship programmes. However, the value of surveillance as a critical component of antimicrobial stewardship is not fully established and the majority of the guidance documents focus either on laboratory surveillance or antibiotic guidelines.

The ARCH Network brings together multi-sectoral specialists and Networks in the field of animal and human surveillance to bridge the gap between surveillance data and antibiotic stewardship. The group will finalise four white papers ("Bridge the Gap: Survey to Treat") tailored to: hospitals (medical and surgical wards, paediatric clinic, intensive care units), long term care facilities, out-patients ambulatory, and veterinary care. The white papers will be developed in the form of checklists (app and paper forms) summarising the microbiological and antimicrobial data that are essential for antibiotic prescribing, and how these data relate to antibiotic guidance and stewardship interventions. The multidisciplinary group will integrate recommendations for the checklist implementation in heterogeneous economic settings and where expertise in surveillance is limited.

The ARCH Network will organise two one-day workshops and will be operating through WebEx meetings and conference calls. During the first workshop, the group will discuss opportunities for data sharing, involvement of other Networks, website features, and define the milestones and task timeline. The drafts of the white paper will be available for open consultation to ARCH members and through the associated networks (EUCIC, EPI-Net, ResistanceMap, LOTTA, EUCAST, LAB-Net, KISS, HANNET, Global PPS, AMCLI-COSA, SWISS-NOSO, CLEO) and international stakeholders (ECDC, WHO, Wellcome, EMA). The ARCH experts will also develop a strategic research agenda to identify critical areas and gaps in clinical surveillance. In the second workshop the white paper and the strategic research agenda will be reviewed and approved. The dissemination will be pursued in the dedicated website, quarterly Newsletter, national and international conferences, publications in open scientific peer reviewed journals and through relevant national societies in the field. The ARCH Network will develop a plan for the sustainability of the Network after the funding period.

Expected outputs of the Network

- White papers (4)
- One-day face-to-face meetings (2)
- Strategic research agenda
- Dedicated website
- Quarterly newsletter
- Scientific publications in peer-reviewed journals
- Sustainability plan
- Short report
- Final grant report

Solidness

Network Coordinator
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Website and social media
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JPIAMR priority areas
Surveillance, Transmission

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Summary of the Network

Mobile genetic elements (MGEs) are DNA molecules that often carry important genes for microorganism fitness, such as resistance and virulence genes, which may confer an adaptive advantage to recipient bacteria. Hence, MGEs play a pivotal role in horizontal gene transfer. MGEs are one of the main players in antibiotic resistance dissemination and can be shared by different bacterial strains, species or even genera, which makes them one of the biggest concerns to healthcare stakeholders. MGEs are challenging to characterise through sequencing, due to their chimeric, modular and repetitive nature. Our main objective is to establish a Network of excellence for surveillance of MGE-mediated antibiotic resistance spread.

This Network will improve the access to high-quality and curated MGE sequencing data that will be shared at the international level. It will result in the production of documents (standard operating procedures, SOPs) by the Network detailing 1) harmonisation of high-quality sequencing standards and protocols for MGEs detection; 2) definition of bioinformatics workflow for MGEs sequence analysis from next-generation sequencing data; and 3) definition of new sequence-based typing methods of plasmids for both Gram-positive and Gram-negative bacteria. Since the Network includes a wide range of stakeholders with numerous expertise, including classical typing methods, "-omics", bioinformatics and plasmid-detection, which will contribute to the creation of the high-quality and curated MGEs database from different sources, this Network aims to track the evolution and spread of antimicrobial resistance and virulence in bacteria, mediated by MGEs, and in the future, find ways to prevent it.

Expected outputs of the Network

- Dedicated website
- Scientific publications in peer-reviewed journals
- Conference papers
- SOPs
- Open workshop
- Free web-based database
- Final grant report

KlebNet

Full title
A One Health Network bridging science and surveillance on antimicrobial resistant *Klebsiella pneumoniae (Kp)*

Network Coordinator
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Website
research.pasteur.fr/en/project/klebnet-a-one-health-network-bridging-science-and-surveillance-on-antimicrobial-resistant-klebsiella/

JPIAMR priority areas
Surveillance, Transmission, Interventions

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Summary of the Network

Klebsiella, particularly *Klebsiella pneumoniae (Kp)*, is an opportunistic pathogen of humans and animals that now tops the 'urgent threat' lists of CDC, ECDC and WHO due to high rates of multidrug resistance. *Kp* can also play a pioneer role in the amplification of novel AMR mechanisms acquired from environmental microbes, which can then spread to other important bacterial pathogens, as exemplified with KPC-2 or NDM-1 carbapenemases. Despite this, *Kp* does not currently feature as a target of surveillance efforts. Although *Kp* is generally viewed as 'ubiquitous', data on its distribution in healthy people, the environment, animals and the food chain are scarce, and the transmission of *Kp* and its AMR gene cargo between these potential sectors and hospitalised individuals is poorly understood. We therefore propose a Network dedicated to identifying key knowledge gaps relating to *Kp* ecology and transmission, and to developing a One Health strategy for *Kp* surveillance.

Strategy

Research on the ecological distribution of *Kp* and transmission routes should be guided by expected impact on implementation into surveillance and control programs. An optimal *Kp* surveillance strategy must be defined based on: (1) the most advanced knowledge on the ecology, population biology and epidemiology of *Kp*, combined with (2) action and practical aspects of implementation of surveillance, in high income countries (HIC) and LMIC, and across appropriate sectors (clinical, animal, food).

Objectives

(1) To review current knowledge on *Kp* reservoirs, population biology and transmission dynamics, and to identify and prioritise gaps where further research is required; (2) To issue recommendations on how *Kp* surveillance should be implemented and harmonised across the environment, animals, food and hospitals, including both technical and strategic considerations.

Expected outputs of the Network

- Knowledge gap document
- Strategy paper and recommendations
- Final grant report

NeWIS

Full title
National health care infrastructures, health care utilisation and patient movements between hospitals: Networks working to improve surveillance

Network Coordinator
Hajo Grundmann, University of Freiburg, Germany

JPIAMR priority areas
Surveillance, Transmission, Interventions

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Summary of the Network

There is a worldwide concern about the emergence, and widespread dissemination, of AMR “high-risk” clones that carry the genomic determinants for enhanced virulence and resistance. Regional, national and international surveillance is considered an important component in a strategy to control these strains. However, current surveillance systems are not fit for this purpose and there is still no good evidence base for deciding which and how many sentinel hospitals should be included in surveillance programs. Previous work coordinated by the lead applicant has shown that AMR “high-risk” clones spread between health care institutions as a result of patient movement. Hospitals thus become connected by patients. Taken together, all connections create a nexus of institutions that can be described as national health care referral networks. Despite their apparent complexity, these networks reveal a simple scaffolding and remarkably consistent properties that lie at the core of national health care infrastructures. These show many of the typical hallmarks of hierarchically distributed networks, with regionality, centrality, scale-freeness and small world properties. Hence a quantitative understanding of the network dynamics offers the means for purpose-designed surveillance and better targeted interventions.

The current proposal will bring together a critical mass of public health microbiologists, health systems researchers, and social network analysts from Europe and beyond. These experts shall define the data needs, data sources, algorithms and analysis tools with the aim to identify a heuristic optimisation approach to sentinel site selection. In this way, the suggested project will provide recommendations for the development of surveillance structures that are more parsimonious, cost- and time effective and provide—through the selection of sampling sites for genomic surveillance by whole genome sequencing (WGS)—the genetic signatures for early, next generation diagnostics of recently emerging clones. The focus on site selection means that WGS will not be part of this initiative.

Expected outputs of the Network

- Analysis tools
- Definition of data needs, sources, algorithms
- Recommendations for the development of surveillance structure
- Final grant report

PRAISE

Full title
Providing a Roadmap for Automated Infection Surveillance in Europe

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JPIAMR priority areas
Surveillance

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Summary of the Network

Healthcare-associated infections (HAI) affect one in 25 patients admitted to a European hospital, and contribute to morbidity and medical cost. Surveillance of healthcare-associated infections, including surgical site infections (SSI) and central line associated bloodstream infections (CLABSI), is a key component of prevention efforts and national surveillance programs. Identifying infections allows for the quantification of the burden of infections, including those caused by antimicrobial resistant (AMR) pathogens, and evaluation of the effectiveness of interventions.

Traditionally surveillance is performed by manually reviewing patient charts, a process that is time-consuming and prone to error. These limitations make large-scale standardised surveillance unachievable in many European countries. In recent years, automated HAI surveillance systems using data routinely stored in hospital electronic health records, have been developed for among others SSI and CLABSI. These systems use information routinely documented in medical charts to identify patients that may have developed an infection for manual chart review. Advantages of semi-automated surveillance include higher quality of surveillance through better standardisation and a 75-95% reduction of manual chart review workload. In some instances, surveillance has been fully automated, thereby obviating the need for manual review.

Automated surveillance is promising, but most of the currently available systems have been developed in individual hospitals, and are hence heterogeneous in design, aims, methods and definitions used. In addition, within each hospital, many similar challenges and barriers are encountered, but knowledge on how to address them is not widely disseminated, thus contributing to inefficient use of resources and repeated considerable investments.

Within the PRAISE Network, we aim to design a shared roadmap to move automated surveillance from the research setting to large-scale implementation. PRAISE will deliver: 1) A roadmap to automated HAI surveillance, describing requirements of automated surveillance systems and one or more possible trajectories towards their design; 2) A research agenda to support future development efforts; and 3) Guidance documents regarding regulatory and governance barriers, IT and data management solutions and training needs.

The PRAISE Network uniquely brings together experts working in the field of surveillance, with representatives from hospitals as well as public health institutes. The output of the Network will improve AMR surveillance by providing the guidance necessary to develop high-quality automated surveillance tools for HAI, caused by AMR and susceptible pathogens.

Expected outputs of the Network

- Shared roadmap
- Research agenda
- Guidance documents
- Final grant report

CoEvalAMR

Full title
Convergence in evaluation frameworks for integrated surveillance of AMR

Network Coordinator
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JPIAMR priority areas
Surveillance

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Summary of the Network

The mitigation of antimicrobial resistance (AMR) is informed by fit-for-purpose, integrated surveillance systems that allow identifying emerging resistance, understanding the AMR epidemiology, and planning and evaluating policies for AMR reduction. International organisations have called for collaboration across animal, human and environmental sectors and adoption of a “One Health” approach. Several integrated surveillance strategies exist, but their performance and economic value remain to be evaluated.

Multiple research groups worldwide are currently working on the evaluation of integrated AMR surveillance looking at different perspectives of the evaluation challenge, such as the Theory of Change, systems-based approaches, business cases, governance structures, suitable metrics and measurement approaches, and definition of integration levels, among others. The disconnected nature of the work of different research and implementation groups results in multiple frameworks and disjointed recommendations for evaluation and measurement.

The Co-Eval-AMR Network brings people together with the aim of harmonising and refining existing frameworks and approaches for the evaluation of AMR surveillance. By reviewing existing frameworks and approaches and assessing their usefulness and validity, the Network will produce an overview of existing protocols and develop supporting guidance to evaluate the performance and value of integrated surveillance systems for AMR. This topic is of growing importance globally, and our results will contribute to this new and dynamic field of research on One Health evaluation and metrics. The results will allow end users to evaluate their integrated surveillance systems for AMR and thereby identify areas for improvement to increase the effectiveness and efficiency of such surveillance.

Expected outputs of the Network

- Frameworks
- Harmonised protocols and guidance (public access, per-review publications, policy briefs)
- Face-to-face workshops (2)
- Workshop report
- Final grant report

WAWES

Full title
Wildlife, Agricultural soils, Water environments and antimicrobial resistance - what is known, needed and feasible for global Environmental Surveillance

Network Coordinator
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JPIAMR priority areas
Environment, Surveillance, Transmission

Network Partners

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Summary of the Network

The World Health Organisation (WHO), Food and Agriculture Organisation (FAO), and World Organisation for Animal Health (Ireland), agree that surveillance of antibiotic/antimicrobial resistant bacteria (AMR) should be performed using a One Health multi-sectoral approach. Despite this, there is an overall lack of surveillance focusing on the environment and wildlife. Furthermore, there is unquestionably a lack of standardisation and synergy between projects and research efforts focusing on AMR in the environment and wildlife. The JPIAMR Strategic Research Agenda published in 2013 also highlighted the deficiency of data, comparable information and cross-sectoral studies on AMR in the environment. To amend this, we have initiated the WAWES Network – *Wildlife, Agricultural soils, Water environments and antimicrobial resistance - what is known, needed and feasible for global Environmental Surveillance*, which consists of 27 partners from 16 countries from all over the globe representing low to high income settings. The WAWES participants have a shared objective of finding a way to perform global comparative surveillance of AMR in the environment and wildlife, which is furthermore applicable in the majority of countries irrespective of economic resources.

Due to the complexity of the environment and the size of the Network WAWES has been divided into four different work-packages each with a designated workgroup leader.

1. Wildlife, led by Jean-Yves Madec, National Agency for Food, Environmental and Occupational Health & Safety, France
2. Agricultural soils, led by Fiona Walsh, Maynooth University, Ireland
3. Water environments, including wastewater, led by Thomas Berendonk, Technische Universität Dresden, Germany
4. Technologies & Methodology, led by Muna Anjum, Animal and Plant Health Agency, United Kingdom

Expected outputs of the Network

- Start-up web meeting
- Face-to-face meetings (3)
- Teleconferences
- Workshop
- Review papers
- White paper: Guidelines and Method Protocols
- Final grant report

Towards Developing an International Environmental AMR Surveillance Strategy

Network Coordinator
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JPIAMR priority areas
Surveillance

Network Partners

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Summary of the Network

There is an urgent and increasing need to fully understand the development and transmission of AMR both into, and within, the wider environment. However, at present, research into environmental aspects of AMR has been largely confined to individual institutions or academic laboratories. National governments and international bodies (EU, UN, WHO) have recognised that we must establish effective environmental surveillance systems to identify and monitor AMR in our waters, soils, air and wildlife in order to increase understanding of the natural environment's role in emergence and spread of AMR and how the introduction of antimicrobials/resistant microorganisms from human/animal sources into the environment contribute to AMR. A One Health approach promotes harmonised surveillance across human, veterinary and food sectors and the use of common outcome indicators to monitor AMR and antimicrobial use: several joint national reports publish AMR trends for key indicator bacteria and key antibiotics (for example United Kingdom One Health report, DANMAP and Scottish One Health Antimicrobial Usage and Antimicrobial Resistance Report (SONAAR). However, there is no clear consensus so far regarding which indicators to measure for the environmental sector. Therefore, this Network aims to identify robust, measurable surveillance indicators and methodologies for environmental AMR by:

- Building on and transferring existing knowledge from clinical and animal AMR indicators and methodologies in the context of a multi-sectorial, One Health approach.
- Bringing together key researchers with policy makers and regulators across the environmental, human health and veterinary sector and from countries with a wide range of economic settings.
- Arrive at a standardised set of targets and reproducible, accessible methodologies allowing comparative data to be generated in a coordinated manner.
- Setting out our findings in advice and briefings to governments and international bodies.

Expected outputs of the Network

- Methodologies
- Briefings
- Final grant report

ICALM Network

Full title
Intensive Care Airway and Lung Microbiome Network

Network Coordinator
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JPIAMR priority areas
Diagnostics, Surveillance

Network Partners

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Summary of the Network

The overarching goal of ICALM is to create a global, ICU-based AMR Network with a focus on both clinical and translational research. This Network will develop a shared lung microbiome database of mechanically ventilated patients, with and without respiratory infections, supported by clinical data, and allow the sharing of epidemiological and outcome data and resources. This platform will enable the establishment and use of biobanks and the identification of patient populations for mechanistic work, in the Lung Microbiome & Respiratory Infections (LM-RI). ICALM will:

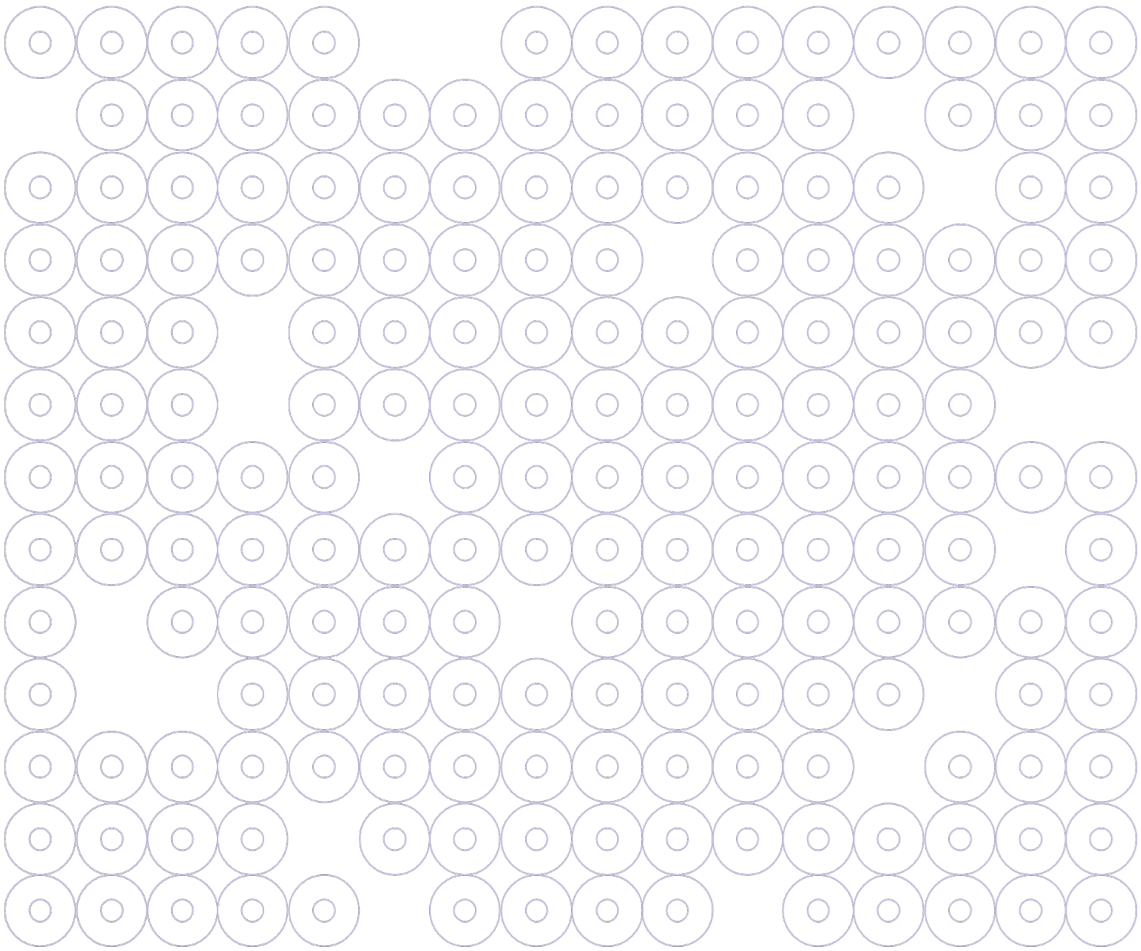
1. Build a Network of experts in LM-RI and research that will determine the research priorities for ICU-related respiratory infections depending on lung microbiome and local ICU ecology by a prospective observational study on lung colonisation, infection and antibiotic resistance in mechanically ventilated patients.
2. Assess the need for a JPIAMR research into a surveillance task force and the need for a LM-RI research agenda.
3. Attract new researchers into the field of LM-RI through presentations at international congresses and dissemination of research priorities and knowledge.
4. Support and encourage early career researchers, many of whom are applicants in this proposal, through multidisciplinary training opportunities and participation at senior levels in Network activities.
5. Facilitate applications to industry and different surveillance and preventive sources to build LM-RI research capacity as joint venture partnership for a deep understanding in LM-RI.

This Network will enhance research capacity in LM-RI in different social and economic settings. The Network aims to develop a global Network that will leverage different antimicrobial resistance ecology patterns among the participating ICUs to identify modifiable causal factors. We aim to further evaluate these aspects in a larger cohort of critically ill patients, observing the relationship between the heterogeneity of pulmonary microbiota and clinical variables and outcome.

Expected outputs of the Network

- White paper
- Face-to-face meetings
- Draft case report forms
- Data platform
- Dedicated website
- Final grant report

Network Call on JPIAMR-VRI



GAP-ONE

Full title
Global Antimicrobial resistance Platform for ONE Burden Estimates

Network Coordinator
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JPIAMR priority areas
Environment, Surveillance

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Summary of the Network

Relevance of antimicrobial resistance (AMR) costs is amply acknowledged by many global and international institutions and organisations. Even so, current figures fail to capture the full health and economic burden caused by AMR. Most current estimates are based only on the human health perspective, with data from high-income countries, and a fully One Health integrated approach to cost estimates is lacking: What are the entire shadow costs attributable to AMR, worldwide and across the diverse, interconnected domains of human health, animal health and the environment, of the One Health areas? If available, these estimates would constitute a powerful

benchmark for advocating in favour of global action against AMR, for evaluating cost-effectiveness of interventions aiming at tackling AMR, and even for identifying opportunities for reallocating resources to research and development of new antimicrobial therapies.

The GAP-ONE Network aims to create a virtual research environment able to:

1. Involve all stakeholders into a Network that will provide an opportunity for participants from different disciplines to interconnect more fully and effectively.
2. Identify all the data elements required to build a reliable tool for estimating resource waste due to AMR worldwide, not only in human health but also integrating veterinary and environmental data, within a One Health approach.
3. Provide a framework to assess data quality.
4. Devise a strategy for sharing currently available information.

The GAP-ONE Network includes human and veterinary clinicians, human and veterinary microbiologists, experts in antimicrobial resistance burden, food safety, health-economics, and international law, as well as infection control experts, clinical epidemiologists, statisticians, and health information librarians. The Network will also involve additional stakeholders, such as patient organisations, drug and diagnostics manufacturers, social science experts, behavioural change experts, health authorities, and governmental agencies. We will aim at including all stakeholders included in the "AMR stakeholder mapping" ReAct Europe – Action on Antibiotic Resistance - A global mapping of stakeholders working with antimicrobial resistance. We will meet at least three times during the project: one face-to-face workshop and at least two teleconference meetings.

Expected outputs of the Network

- Mapping of stakeholders
- Online global platform (including taxonomy and quality control) to collect, share, connect and disseminate data and info on AMR costs
- Common framework to assess data quality
- Open access scientific publications (1-2) in peer-reviewed journals
- Communication activities (dedicated website, social media, quarterly newsletter, national meetings, international conferences
- Physical meeting (month 8)
- Final scientific report
- Final grant report

AMRIC

Full title
Antimicrobial Resistance in Intensive Care

Network Coordinator
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JPIAMR priority areas
Surveillance, Diagnostics

Network Partners

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Summary of the Network

The primary objective of the proposed Network is to establish a platform for global data sharing for acute and critical care environments to determine the impact of antimicrobial resistance. The planned operations will be to initially coordinate the Network contributors to develop and pilot the relevant research tools to develop:

1. Case report forms and a corresponding data dictionary;
2. An electronic database embedded within ACCESS-MAPS;
3. A global catalogue of potential sites for ongoing data collection;
4. A data sharing framework and agreements with individual sites.

The Network will subsequently function electronically, with communication via email and routine tele-conferencing. Data on microbiology lab capabilities will be collected simultaneously through ACCESS-MAPS, which will serve a dual purpose of establishing a cadre of motivated investigators who would be willing to collect further data for these purposes. This novel approach, using the JPIAMR-VRI Network to facilitate engagement, the ACCESS-MAPS initiative to spearhead data collection, and the InFACT collaboration to engage the larger community, allows for a multi-faceted approach to a complex problem.

Expected outputs of the Network

- Case report forms
- Data dictionaries and protocols for standardised data collection
- Electronic database (ACCESS-MAPS)
- Global catalogue of potential sites for ongoing data collection
- Pilot platform (microbiologic, clinical, and ICU, patient and hospital-specific data)
- Final grant report

AMR Dx Global

Network Coordinator
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JPIAMR priority areas
Surveillance, Diagnostics, Therapeutics

Network Partners

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Summary of the Network

AMR Dx Global is a transnational, multi-sectorial, multi-stakeholder and interdisciplinary Network focused on rapid diagnostics training and capacity building to tackle the global threat of antimicrobial resistance with a One Health approach. The Network is coordinated by the University of Edinburgh and brings together partners from 18 countries including international organisations like WHO, FIND, AMREF and ICAN. AMR Dx Global will develop a Strategic Action Plan on training to support the formation of the JPIAMR-VRI and focus on Diagnostics as one of the six priority topics of the JPIAMR Strategic Research Agenda. AMR Dx Global evolved from the successful JPIAMR Working Group AMR-RDT, which identified barriers to development, implementation and use of rapid diagnostics to tackle AMR. AMR Dx Global will run a twelve-month programme including two major face to face meetings and structured data collection on existing strategies, needs and gaps in AMR diagnostics training and capacity building.

Expected outputs of the Network

- Strategic Action Plan on training for diagnostics
- Face-to-face meetings (2) 1st meeting in Brussels in March 2019; Final meeting
- Structure data collection
- Blueprint for the JPIAMR-VRI Virtual School of Diagnostics
- Final grant report

CONNECT

Full title
inCreasing cOmmunicatioN, awareNEss and data sharing in a global approaCh against resisTance

Network Coordinator
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JPIAMR priority areas
Surveillance, Diagnostics, Transmission

Network Partners

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Summary of the Network

The CONNECT Network output will contribute to the development of the JPIAMR VRI by sharing values on solving problems through core business activities of research on JPIAMR in a One Health approach, and by providing also an opportunity for stakeholders to come together around a common set of goals, share their lesson learned and identify synergic work and each single effectively contribute to the research (collective impact).

Recognising the complexity and scale of AMR must be emphasised by the amount of resources needed to address them and the limits of available resources and organisational capacity of governments, civil society, and philanthropy/charities. Through partnerships, resources across sectors have the potential to complement one another and create more effective and sustained change. To have meaningful and sustainable impact, community engagement is needed. To develop trust, institutions and communities in the Network should be involved in design and implementation of research.

Developing Member interoperability is expected to contribute to a strong and coherent globally connected effort based on exchange data, information, services, and/or outputs, align their activities, policies and procedures and effectively operate together. As an ultimate goal, the platform will encourage the development of priorities on strategic focuses, the engagement of brains thinking of out of the box innovative solutions, and will represent the virtual and unique point for governing the research in Europe on the fight against AMR on a One Health approach.

The main objective of CONNECT, in collaboration with the entire JPIAMR-VRI project, will be to identify priorities on the research in the field of AMR, in a One Health approach, in Europe through the creation of a platform that will allow knowledge, resource, findings, database exchange, and connection between researches.

Expected outputs of the Network

- Mapping current research programs, studies, databases via questionnaires to assess heterogeneity and identify gaps in order to establish governance proposal through different work packages
- Virtual platform to share a variety of information on AMR research and exchange programmes
- Blueprints on the structure of connecting within the JPIAMR-VRI
- Final grant report

IRAADD

Full title
International Research Alliance for Antibiotic Discovery and Development

Network Coordinator
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JPIAMR priority areas
Therapeutics, Interventions

Network Partners

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Marco Pieroni	University of Parma, Italy
Violetta Cecchetti	University of Perugia, Italy
Atanas G. Atanasov	Polish Academy of Sciences, Poland
Rui Moreira	University of Lisbon, Portugal

Name	Affiliation
Hrvoje Petković	University of Ljubljana, Slovenia
Olga Genilloud	Fundación MEDINA, Spain
Anders Karlén	Uppsala University, Sweden
Jean-Louis Reymond	University of Bern, Switzerland
Jörn Piel	ETH, Switzerland
Gilles P. van Wezel	Leiden University, The Netherlands
Marnix Medema	Wageningen University, The Netherlands
Maarten B. M. van Dongen	InnoTact Consulting/ AMR Insights, The Netherlands
Barrie Wilkinson	John Innes Centre, United Kingdom
Ian Gilbert	University of Dundee, United Kingdom
Eriko Takano	University of Manchester, United Kingdom
Youming Zhang	Shandong University, China
Valerie Mizrahi	University of Cape Town, South Africa

Summary of the Network

The IRAADD Network aims to promote and expedite translational science in the early stages of novel antibiotic discovery and lead candidate development. The areas of research we would like to leverage towards application will include hit identification and hit-to-lead programmes, aiming at novel preclinical candidate nominations. These initial stages of drug development are essential to find and validate novel drug candidates, which are effective to fight AMR. However, such early-stage projects are mainly embedded within the academic sector and are greatly underfunded. Partnering with external funders, e.g. from pharmaceutical industry, is in most scenarios only realistic after nomination of preclinical lead candidates, which most often cannot be achieved by academic funding and infrastructures alone.

IRAADD will also work on developing strategies for an increased awareness of the need for novel antimicrobial therapeutics mainly within the public sector in order to enhance chances of sustainable funding for the initial phases of anti-infective drug development. Several global health organisations and public-private partnerships (PPPs) do currently address this gap, but still fail to help academic researchers to efficiently translate their findings into novel and useful therapeutic products. Thus, IRAADD will devise blueprints together with stakeholders in industry and politics that shall serve as a guidance how to overcome this severe funding problem, which would be a big step forward to boost the production of new antibiotics and to improve the global situation of spreading AMR. These aims are also in line with the current “One Health Action Plan against Antimicrobial Resistance”, introduced by the European Commission, which explicitly demands for the implementation and support of “research into the development of new antimicrobials” and the establishment of sustainable research networks in this area.

Expected outputs of the Network

- Blueprints on research Hub for antibiotic discovery and development
- Cooperative research platform (open access data + confidential data)
- Partnerships
- Final grant report

NEAR AMR

Full title
Network of European and African Researchers on Antimicrobial Resistance

Network Coordinator
Adam Roberts, Liverpool School of Tropical Medicine, United Kingdom

JPIAMR priority areas
Surveillance

Network Partners

Name	Affiliation
Michael Brouwer	Wageningen Bioveterinary Research, The Netherlands
Teresa Coque	Ramón y Cajal Health Research Institute, Spain
Sabiha Essack	University of KwaZulu-Natal, South Africa
Nicholas Feasey	The University of Malawi the College of Medicine, Malawi
Bruno Gonzalez-Zorn	Complutense University, Spain
Matthew Holden	University of St Andrews, United Kingdom
Shevin Jacob	Infectious Diseases Institute, Uganda
Nina Langeland	University of Bergen, Norway
Joel Manyahi	Muhimbili University of Health and Allied Sciences, Tanzania
Dik Mevius	Utrecht University, The Netherlands
Lawrence Mugisha	Makerere University, Uganda
Emmanuel Nsutebu	Royal Liverpool Hospital and the African Sepsis Alliance, United Kingdom
Remy Pacifique Ntirenganya	Partners In Health, Liberia
Luísa Peixe	University of Porto, Portugal
Maja Rupnik	National laboratory for health, environment and food, Slovenia
Courage Saba	University for Development Studies, Ghana
Wangari Waweru-Siika	Aga Khan University, Kenya
Andrew Singer	NERC Centre for Ecology & Hydrology, United Kingdom
Patrizia Spigaglia	Istituto Superiore di Sanità, Italy
Arnfinn Sundsfjord	Arctic University, Norway
Maha Talaat	World Health Organisation, Egypt
Thomas Van Boeckel	ETH Zurich, Switzerland
Nicola Williams	University of Liverpool, United Kingdom

Summary of the Network

The Network of European and African Researchers on Antimicrobial Resistance (NEAR-AMR) represents a group of experts from leading institutions throughout Europe and Africa, within multiple disciplines (clinical, pharmacy, veterinary, environmental microbiology, epidemiology, molecular biology and evolution) encompassing a One Health approach to AMR. The comprehensive geographical spread allows different, country-specific insights into the two focal areas of this Network:

1. Determining which common capacity and capability training needs exist for young investigators hoping to establish themselves within any area of AMR research from Europe and Africa.
2. Informing on the preferred profile, and realistic limitations, of global surveillance data sharing platforms, informing expectations on what is possible within a range of existing healthcare infrastructures from multiple geographical settings.

Network outputs will be included within a dedicated NEAR-AMR website, and will inform on the strategic direction of the JPIAMR-VRI as it develops. The overall aim of this Network is to focus international efforts for maximal benefit and to ensure that results are translatable on intercontinental scales.

Expected outputs of the Network

- White paper on training junior researchers
- Open access position paper on preferred platform profile for data sharing tool taking in account resource limitations, capabilities (current and future) of different health systems and geography
- e-Platform (slack.com)
- Meeting month 4 in Africa. Meeting month 9 in Liverpool (to coincide with the 11th European Congress on Tropical Medicine and International Health (ECTMIH)
- Webpage for NEAR-AR for communication in the network and dissemination of results to stakeholders
- Final grant report

VeRI BEAM

Network Coordinator
Florence Sejourne, represented by Frédéric Peyrane, BEAM Alliance, France

JPIAMR priority areas
Therapeutics

Network Partners

Name	Affiliation
Remko van Leeuwen	Madam Therapeutics, The Netherlands
Eran Eden	MeMed Diagnostics, Israel
Bo Öberg	Ultupharma, Sweden
Heather Fairhead	Phico Therapeutics, United Kingdom
David Mantus	Arsanis Biosciences, Australia
Deborah O'Neil	Novabiotics, United Kingdom
Bertrand Ducrey	Debiopharm, Switzerland
Stéphane Huguet	Mutabilis, France
Rasmus Toft-Kehler	Union Therapeutics, Denmark
Mike Westby	Centauri Therapeutics, United Kingdom
Guy-Charles Fanneau de La Horie	Pherecydes Pharma, France
Martti Vaara	Northern Antibiotics, Finland
Marc Gitzinger	BioVersys, Switzerland
Marc Lemonnier	Antabio, France
Holger Zimmermann	AiCuris, Germany
Emmanuel Petiot	Deinove, France
Helmut Kessmann	Polyphor, Switzerland
Annette Säfholm	Gedea Biotech, Sweden
Juan José Infante Viñol	Vaxdyn, Spain
Egill Masson	Akthelia, Iceland
Alessandro Pini	Setlance, Italy
Fredrik Almqvist	QureTech Bio, Sweden
Mark E Jones	Basilea Pharmaceutica, Switzerland
Bruno Santos	ImmuneThep, Portugal
Nicolas Tesse	Septeos Group, France

Summary of the Network

All recent reports establishing a roadmap to tackle the global, worldwide antimicrobial resistance (AMR) problem highlight the need to enlarge the current armamentarium beyond the sole "full antibiotic" model. Many efforts are being devoted to fulfil these needs both by academia and industry, as exemplified by the BEAM Alliance members' portfolio (https://beam-alliance.eu/ba_pipeline). These new options include improved time-to-cure, anti-virulence, involvement of immune system, impact on flora, prevention, etc. both for animal and human medicine. But whereas there is a clear path to Health Technology Assessment on antibiotic candidates (thanks to the EUCAST clinical breakpoint guidelines), no such established methodology is available for alternative antimicrobial treatments. Thus, any new treatment option faces the problem of lacking differentiation criteria to allow assessments of their products that cannot be assessed by the classical MIC – PK/PD method. The clear definition of such criteria could benefit to the whole AMR research community. This uncertainty turns any such drug development into an undefined and risky market access conditions. As a consequence, private investors are reluctant to engage and to play their supporting role to pull-out promising candidates and bring them to the market. Most of the time, private companies learn or even co-build these requirements with (inter)national stakeholders, but this knowledge is rarely shared with e.g. academic labs or funding agencies, although it is of tremendous importance to anticipate pitfalls and avoid misuse of public funding.

The purpose of the VeRI BEAM Network is thus to implement a pilot action working on:

1. How the above-mentioned differentiation criteria could be defined and
2. The proper way to share the gained knowledge among AMR community.

Such pilot action will be used to validate a more general and long-term communication flow within the future VRI between academic labs, industrial and institutional actors in a non-competitive manner with a focus on innovative product development. Such workflow will be helpful in anticipating R&D pitfalls and avoiding misuse of public funding.

The proposed communication workflow model will ensure building capacity and strengthening capability of VRI members through knowledge exchange mainly on the non-scientific side, but including business skills such as regulatory frameworks, manufacturing policies, marketing, and technology or policy development. This can be part of a more general Training Plan to be implemented at the whole VRI level.

Expected outputs of the Network

- Mapping information – Catalogue of surveys
- Report on the expected new differentiation criteria for alternatives to antibiotics
- Communication workflow model
- Final grant report

TT

Full title
TRANSLOCATION-Transfer

Network Coordinator
Mathias Winterhalter, Jacobs University Bremen, Germany

JPIAMR priority areas
Surveillance, Therapeutics, Diagnostics

Network Partners

Name	Affiliation
Phil Gribbon	Fraunhofer Institute for Molecular Biology and Applied Ecology, Germany
Wes Kim	The Pew Charitable Trusts, United States of America
Paolo Ruggerone	Cagliari University, Italy
Miquel Vinas	University of Barcelona, Spain
Isabelle Schalk,	University of Strasbourg, France
Francoise Van Bambeke	Louvain Drug Research Institute, Belgium
Helen I. Zgurskaya	University of Oklahoma, United States of America
Emad Tajkhorshid	National Institute of Health Centre for macromolecular Modelling and Bioinformatics, United States of America
Derek S. Tan	Memorial Sloan Kettering Cancer, United States of America
Olga Genilloud	Fundación MEDINA, Spain
Nevine S. Fam	Theodore Bilharz Research Institute, Egypt
Heim Barr	Weizmann Institute of Science, Israel
Wolfgang Fecke,	European infrastructure EU-OpenScreen, Germany
Jacek Kolanowski	Institute of Bioorganic Chemistry Polish Academy of Sciences, Poland
Jean-Marie Pagès	Université Marseille, France
Ruth Brenk	University of Bergen, Norway
Thilo Köhler	University Hospitals of Geneva, Switzerland
Aigars Jirgensons	Latvian Institute Organic Synthesis, Latvia
Esin Aki-Yalcin	Ankara University, Turkey
Petr Džubák	Institute of Molecular and Translational Medicine, Czech Republic
Päivi Tammela	University of Helsinki, Finland

Summary of the Network

In response to the pharmaceutical industry stepping back from antibiotic discovery, multiple public efforts, including the JPIAMR and IMI ND4BB, as well as the efforts of Biomedical Science (BMS) European Research Infrastructures community have stepped in to fill the gap. In this project, we will set up a knowledge sharing Network, Translocation-transfer (TT) bringing together experts from two major publicly funded programs, with the goal to improve the process of academically driven antibiotic drug discovery by capitalising on recently gained insights into a key bottleneck in anti-bacterial research, namely how compound penetration properties determine efficacy and resistance properties.

Three existing communities who will form the TT Network are: i) the partners associated with the multinational program *Translocation* (www.translocation.eu), part of IMI ND4BB; ii) partner sites from EU-OPENSCREEN, the European Research Infrastructure for chemical biology and screening (www.eu-openscreen.eu) and iii) partners from the wider global community working on AMR issues and research.

Translocation (1/2013-6/2018) was one of the largest antibiotic research programs in the world specifically devoted to understanding and to devising ways of increasing antibiotic penetration into bacteria. EU-OPENSCREEN began operation in April 2018 and from 2019 onwards will run some 50 chemical biology and academic drug discovery projects per year, across a Network of 25 screening sites, based in eight European countries on behalf of users from across Europe. It is anticipated that at least 20% of EU-OPENSCREEN projects will involve antibiotic drug discovery element.

The initial goal of the TT Network will be to transfer knowledge between *Translocation* and EU-OPENSCREEN to fully incorporate compound permeation and efflux considerations into academic antibiotic drug discovery. We have the active participation of the Pew Charitable Trust, which will contribute to the long-term systematic dissemination of findings from the co-funded funded *Translocation* project.

Expected outputs of the Network

- Kick off meeting
- Map drug discovery efforts on poor permeability characteristics
- Linkage with existing datasets and develop new dataset
- Training resources
- Shared working environment
- Knowledge sharing plan
- Final grant report

Summary and Overview

Ten Networks were funded by JPIAMR within the Surveillance Network Call. The funding for these Networks was provided by France (2), Germany (2), Netherlands (2), UK (2), Sweden (1) and Ireland (1). Additional funding for organisation of the Start-up Workshop was provided by the Swedish Research Council (VR) and the Final Workshop will be funded by the French National Funding Agency (ANR). The coordinators within these networks are 70% male, 30% female. The Networks all focus on Surveillance, however all JPIAMR priority areas, with the exclusion of therapeutics, will also be addressed by the Networks (Figure 2).

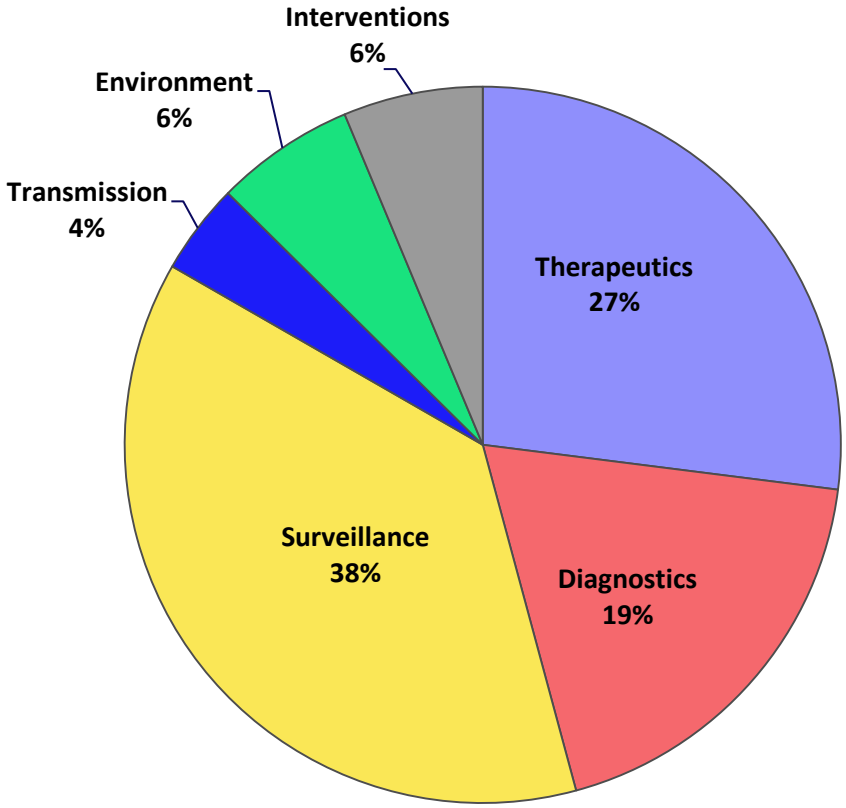

Figure 2. Priority areas addressed by Networks within the JPIAMR Network call on Surveillance.

Eight Networks were funded by JPIAMR within the Network Call: Building the Foundation of the JPIAMR-VRI. The funding for these Networks was provided by Italy (2), Germany (2), France (1), Canada (1) and UK (2). Additional funding for organisation of the Start-up Workshop was provided by the Netherlands (ZonMw) and the Final Workshop will be funded by the Swedish Research Council (VR). The coordinators within these networks are 75% male, 25% female. All JPIAMR priority areas are addressed by the Networks, with a major focus on Therapeutics, Diagnostics and Surveillance (Figure 3).

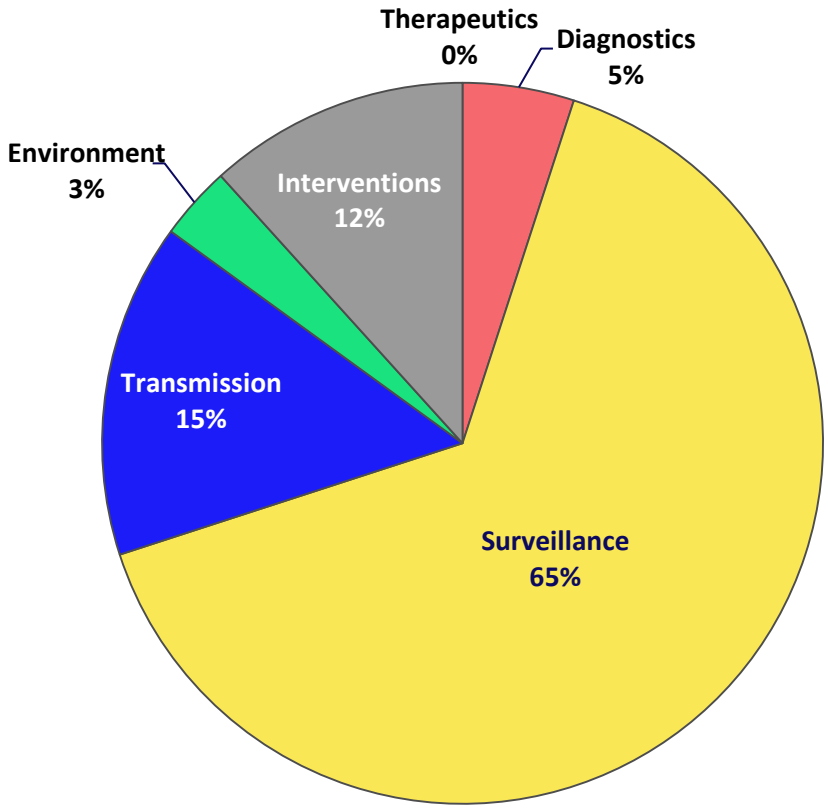

Figure 3. Priority areas of JPIAMR Networks in the JPIAMR-VRI Network call.

Within the Start-up workshop there were discussion on how to synergise the Networks both within and between the two Network calls. New connections were formed and this led to future interactions such as:

- Aligning Network activities by increased communication between coordinators
- Inclusion of coordinators into other Networks
- Inclusion of coordinators from other Networks to workshops and meetings of interest from the other Networks

Communications were also discussed. JPIAMR highlighted a wish to communicate the outputs and activities of the Networks, and coordinators expressed a wish to further connect with JPIAMR via the construction of JPIAMR-hosted webpages, dissemination of their outputs and support for communication activities. Coordinators were requested to provide the JPIAMR secretariat with a pre-warning for the news so the funders can prepare to support communications.

The final meeting was discussed. Coordinators wish to hear about the other projects and highlight interactions that were made across networks. In the future, the coordinators would appreciate information on the process of running a Network, which could be a guidance produced by JPIAMR or a capacity building programme.

Annex I. JPIAMR Networks start-up workshop agenda

NETWORKS

- Working to improve Surveillance
- Building the Foundation of the JPIAMR Virtual Research Institute

Time 09:00 February 19, 2019 to 12:00 February 20, 2019

Venue Hilton Hotel Schiphol, Amsterdam, the Netherlands

PROGRAMME

Day 1, February 19, 2019

Time	Session	
09:00 – 09:05	**Welcome** John Rossen and Liset van Dijk	
09:05 – 09:15	**Aims of the Meeting** Stefan Börjesson and Nicola Petrosillo	
09:15 – 09:45	**JPIAMR: Introduction and Roadmap of Actions** Laura Marin, JPIAMR Secretariat	
09:45 – 10:00	**JPIAMR-VRI** Edith Brochu, JPIAMR Secretariat/VRI Lead/CIHR	
10:00 – 10:30	**Using data to drive policy action – the perspective of ReAct** Maria Pränting, ReAct	
10:30 – 11:00	*Coffee break*	
11:00 – 11:30	**GLASS overview and update** Barbara Tornimbene, GLASS	
11:30 – 16:30	***Parallel sessions: Surveillance and JPIAMR-VRI***	
11:35 – 11:40	***Introduction to Surveillance session*** *Session Chairs: Stefan Börjesson and John Rossen*	***Introduction to JPIAMR-VRI session*** *Session Chairs: Nicola Petrosillo and Liset van Dijk*
11:40 – 12:05	**Regulatory Bioinformatics activities at the European Commission's Joint Research Centre** Alexander Angers, European Commission	**The JPIAMR-VRI:** • Similar platforms • Current development phase • Expectations • Timelines • Discussion Edith Brochu, JPIAMR-VRI
12:05 – 12:30	**Building on the EURL-AR experience for global harmonised AMR surveillance** Valeria Bortolaia, Technical University of Denmark	
12:30 – 13:30	*Lunch*	

13:30 – 16:30	**Presentation of JPIAMR Networks (8 min) + Questions (7 min)**	
13:30 – 13:45	**Network for Enhancing Tricycle ESBL Surveillance Efficiency (NETESE)** Etienne Ruppe, France	**Global Antimicrobial resistance platform for ONE Burden Estimates (GAP-ONE)** Luigia Scudeller, Italy
13:45 – 14:00	**Bridging the gap between humAn and animal suRveillance data, antibiotic poliCy, and stewardsHip (ARCH)** Evelina Tacconelli, Germany	**Antimicrobial Resistance in Intensive Care (AMRIC)** Srinivas Murthy, Canada
14:00 – 14:15	**Surveillance Of mobiLome meDiated aNtibiotic rEsiStance Spread (SOLIDNESS)** John Rossen, the Netherlands	**AMR Dx Global** Till Bachmann, UK
14:15 – 14:30	**KlebNet: a One Health network bridging science and surveillance on antimicrobial resistant Klebsiella** Sylvain Brisse, France	**Increasing cOmmunicatioN awareNEss and data sharing in a global approach against resistance (CONNECT)** Nicola Petrosillo, Italy
14:30 – 14:45	**National health care infrastructures, health care utilisation and patient movements between hospitals: Networks working to improve surveillance (NeWIS)** Hajo Grundmann, Germany	**International Research Alliance for Antibiotic Discovery and Development (IRAADD)** Rolf Müller, Germany
14:45 – 15:15	*Coffee break*	
15.15 – 15:30	**Providing a Roadmap for Automated Infection Surveillance in Europe (PRAISE)** Maaike van Mourik, the Netherlands	**Network of European and African Researchers on Antimicrobial Resistance (NEAR-AMR)** Adam Roberts, UK
15:30– 15:45	**Convergence in evaluation frameworks for integrated surveillance of AMR (CoEval-AMR)** Barbara Haesler, UK	**VeRI BEAM** Frédéric Peyrane, France
15:45– 16:00	**Wildlife, Agricultural soils, Water environments and antimicrobial resistance - what is known, needed and feasible for global Environmental Surveillance (WAWES)** Stefan Börjesson, Sweden	**TRANSLOCATION-transfer (TT)** Mathias Winterhalter, Germany
16:00– 16:15	**Towards Developing an International Environmental AMR Surveillance Strategy** William Gaze, UK	**JPIAMR-VRI Network synergies** Chair: Edith Brochu, JPIAMR-VRI
16:15 – 16:30	**Intensive Care Airway and Lung Microbiome Network (ICALM)** Ignacio Martin-Loeches, Ireland	

16:30– 17:15	Panel discussion: JPIAMR network calls - Overview, lessons learnt from 4th call, expectations from JPIAMR and from the networks & specific challenges Panel: Till Bachmann (AMR-RDT) and Srinivas Murthy (AMRIC) Moderators: Laura Plant (JPIAMR)
17:15– 17:30	**Summary of the day** Stefan Börjesson and Nicola Petrosillo
18:00 – 19:00	**Reception**
19:00	*Dinner*

Day 2, February 20, 2019

Time	**Session**
09:15 – 09:30	**Welcome and introduction to Day 2** Elevator pitch of their network activities. Chairs: Stefan Börjesson and Nicola Petrosillo
09:30 – 10:30	**Networking and Matchmaking** Break-out meetings for Network coordinators to explore synergies
10:30 – 11:00	*Coffee break*
11:00 – 11:15	**Communication of network activities for 2019** Anders Bjers
11:15 – 11:45	**Feedback and meeting planning: How was this meeting? What would the networks like at the final meeting?** John Rossen and Etienne Ruppé
11:45 – 12:00	**General discussion and overview of meeting** Stefan Börjesson and Nicola Petrosillo
12:00	*Lunch and departure*

Annex II. List of participants

Name	Affiliation	Country
Akin Akkoyun	Das Deutsche Zentrum für Luft- und Raumfahrt	Germany
Alexandre Angers	Joint Research Centre, European Commission	Italy
Till Bachmann	Edinburgh University	United Kingdom
Thomas Berendonk	TU Dresden	Germany
Anders Bjers	JPIAMR Secretariat	Sweden
Geneviève Boily-Larouche	Canadian Institutes of Health Research – Institute of Infection and Immunity	Canada
Jessica Boname	Medical Research Council	United Kingdom
Valeria Bortolaia	Technical University of Denmark	Denmark
Sylvain Brisse	Institut Pasteur	France
Édith Brochu	JPIAMR Secretariat - Canadian Institutes of Health Research – Institute of Infection and Immunity	Canada
Stefan Börjesson	National Veterinary Institute	Sweden
Natacha Couto	University Medical Center Groningen	Netherlands
William Gaze	University of Exeter	United Kingdom
Hajo Grundmann	Institute for Infection Prevention and Hospital Epidemiology	Germany
Barbara Haesler	Royal Veterinary College	United Kingdom
Giuseppe Ippolito	National Institute Infectious Diseases	Italy
Barbara Junker	Das Deutsche Zentrum für Luft- und Raumfahrt	Germany
Marc Lemonnier	ANTABIO SAS	France
Ignacio Martin Loeches	St James's Hospital	Ireland
Laura Marin	JPIAMR Secretariat	Sweden
Marcus Miethke	Helmholtz-Institute for Pharmaceutical Research Saarland	Germany
Virginie Mouchel	Agence Nationale de Recherche	France
Srinivas Murthy	University of British Columbia	Canada
Rolf Müller	Helmholtz-Institute for Pharmaceutical Research Saarland	Germany
Nicola Petrosillo	Istituto di Ricovero e Cura a Carattere Scientifico	Italy
Frederic Peyrane	BEAM Alliance	France
Laura Plant	JPIAMR Secretariat	Sweden
Maria Pränting	ReAct	Sweden

Name	Affiliation	Country
Adam Roberts	Liverpool School of Tropical Medicine	United Kingdom
John Rossen	University Medical Center Groningen	Netherlands
Etienne Ruppe	Université Paris Diderot	France
Maria Josefina Ruiz Alvarez	Italian Ministry of Health	Italy
Constance Schultz	University of Amsterdam	Netherlands
Luigia Scudeller	IRCCS Policlinic San Matteo Foundation	Italy
Maria Starborg	Swedish Research Institute	Sweden
Evelina Tacconelli	University of Tübingen	Germany
Barbara Tornimbene	World Health Organisation/GLASS	
Liset van Dijk	Nivel	Netherland
Linda van Gaalen	ZonMw	Netherlands
Arjon van Hengel	European Commission	Belgium
Maaike van Mourik	Universitair Medisch Centrum, Utrecht	Netherlands
Mathias Winterhalter	Jacobs University Bremen	Germany