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Roadmap of Actions 2025-2032

European Partnership on One Health Antimicrobial Resistance

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DESIGN OH AMR

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Background

Antimicrobial resistance (AMR), including antibiotic, antifungal, antiviral and antiparasitic resistance, is a global health challenge and affects human and animal health, food security and the environment. The World Health Organisation (WHO) has declared AMR as one of the top 10 global public health threats facing humanity, jeopardising the achievement of the Sustainable Development Goals. Likewise, the European Commission (EC) has identified AMR as one of the top three priority health threats. In 2017, the EC adopted the "EU One Health Action Plan against AMR"[1] to address AMR and its frightening consequences for public health. "Boosting research, development and innovation" is one of the three main objectives of this action plan. The importance of supporting research on AMR has also been acknowledged in a resolution adopted by the Council of the European Union (EU)[2], as well as by European Parliament[3] on 1 June 2023, which specifies "the establishment of and significant investment in a European partnership on One Health AMR to allow coordination, alignment and funding of cross-sectorial research and innovation". The European co-funded partnership on One Health Antimicrobial Resistance (OHAMR), under the Horizon Europe R&I framework programme[4], is thus one of the instruments deployed by the EC and the EU Members States to achieve the objectives of the EU Action plan against AMR. OHAMR is expected to start in 2025 and will deploy a joint research and innovation (R&I) programme, co-funded by the EU member states, countries associated to Horizon Europe and additional international partners, together with the EC. OHAMR builds on the Joint Programming Initiative on AMR (JPIAMR) but with a broader scope and stronger integration of social sciences and humanities, innovation and international aspects. It will include a more integrated One Health (OH) approach, recognising that human, animal and plant health are interdependent and interlinked with the environment. OHAMR will coordinate, align and boost One Health AMR R&I in the EU and beyond, aiming to improve the understanding of AMR, provide solutions to prevent the emergence and spread of AMR and to provide new and better treatment options for the drug-resistant infections. OHAMR will also contribute to the European Research Area (ERA) by supporting transnational research and innovation, capacity strengthening mobility, data sharing, knowledge valorisation and international cooperation. It will also contribute to and seek synergy with the Farm2Fork strategy[5], the Zero Pollution Action Plan[6], the EC widening programme[7] and the EU Digital strategy[8].

In addition, OHAMR will contribute to the implementation of the research agendas on AMR drafted by the WHO[9] and the quadripartite organisations[10,11], in alignment with the OHAMR SRIA, by increasing knowledge and evidence base and creating solutions for

[1] *A European One Health Action Plan against AMR (2017)*
[2] *Council Recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health approach (2023)*
[3] *EP resolution on Prudent use of antibiotics and more research needed to fight AMR (2023)*
[4] *Horizon Europe Work Programme 2023-2024, Health*
[5] *The Farm2Fork Strategy (2020)*
[6] *EU Action Plan: "Towards a Zero Pollution for Air, Water and Soil" (2021)*
[7] *Horizon Europe: Widening participation and spreading excellence*
[8] *Shaping Europe's digital future*
[9] *WHO Global research agenda for antimicrobial resistance in human health (2023)*
[10] *The Quadripartite organisations: The Food and Agriculture Organization of the United Nations (FAO), the United Nations Environment Programme (UNEP), the World Health Organization (WHO) and the World Organisation for Animal Health (WOAH)*
[11] *Quadripartite A one health priority research agenda for antimicrobial resistance (2023)*

prevention, treatment and diagnosis of AMR, including economic, political, implementation and behavioural aspects.

A first draft Scientific Research and Innovation Agenda (SRIA) for the OHAMR was published in May 2023[12], defining the overall goals, strategy and objectives of OHAMR. The Roadmap of Actions builds on the SRIA and delineates a range of joint activities to be implemented to achieve these goals. The SRIA is currently under revision and a new draft will be subjected to an open consultation during the spring of 2024.

[12] *Draft SRIA of the European Partnership on One Health AMR (May 2023)*

Overview of the roadmap of actions (2025-2032)

The mission of OHAMR is "To boost One Health AMR research and innovation leading to improved surveillance of resistant pathogens, better diagnostics and more effective treatment of infections and prevention measures reducing the use of antimicrobials and spread of AMR". This mission will be fulfilled through these specific objectives:[13]

- Enhance global and European synergy and multi-sectoral and multidisciplinary collaboration in AMR R&I and policies to break silos
- Boost AMR R&I to generate knowledge and develop solutions to prevent and tackle AMR
- Facilitate knowledge valorisation of R&I into products, policy and practice

The OHAMR Roadmap delineates the actions that will be undertaken to achieve these objectives, during the lifetime of the partnership (2025-2032). The Roadmap of Actions will be implemented through an Annual Work Programme for each year, providing a more detailed description of the planned actions.

The OHAMR Roadmap of Actions is structured around three main Focus Areas, which will be executed through four Programmes.

The following focus areas have been identified:

1. Prevent emergence and spread of AMR
2. Strengthen appropriate use of antimicrobials and infection prevention and control
3. Provide innovative and cost-effective treatment options

The OHAMR actions of these focus areas will be implemented through 4 programmes:

a) The Research and Innovation Funding programme
b) The Capacity Strengthening Programme
c) The Data Exploitation Programme
d) The Impact Programme for Knowledge Mobilisation

Each programme is expected to contribute to the achievement of several or all of the specific objectives of the SRIA. The activities of the programmes will be implemented through Annual Work Programmes, which will detail the joint transnational calls and additional activities that will be performed each year. For more details on the programmes, please see the OHAMR programmes section. Apart from the activities described in this document, OHAMR will also work actively to increase international alignment of AMR R&I and stakeholder engagement, as well as to facilitate dissemination and communication of the results.

All of the activities of the OHAMR partnership will have an integrated OH approach, encompassing human, animal, plants and the environment, but the focus will be on actions that have an impact on human health. Planetary health aspects, such as climate change, will also be investigated. OHAMR will seek synergies and collaboration with

[13] *The specific objectives of OHAMR have been slightly revised as part of the current update of the SRIA, which will be published during Q2 2024.*

other European partnerships, such as European Partnership on Animal Health and Welfare (EUP AH&W) to further ensure that AMR R&I of all OH sectors and other aspects affecting AMR are well covered.

OHAMR will boost R&I and research capacity in Europe and beyond, including Horizon Europe widening countries among EU member states and associated countries[14], as well as European and international low- and middle-income countries (LMICs). Precautions will also be taken to ensure that diversity, equity and ethical aspects are considered throughout all activities.

The focus areas and the programmes are delineated in figure 1 and are described in more detail in the subsequent sections.

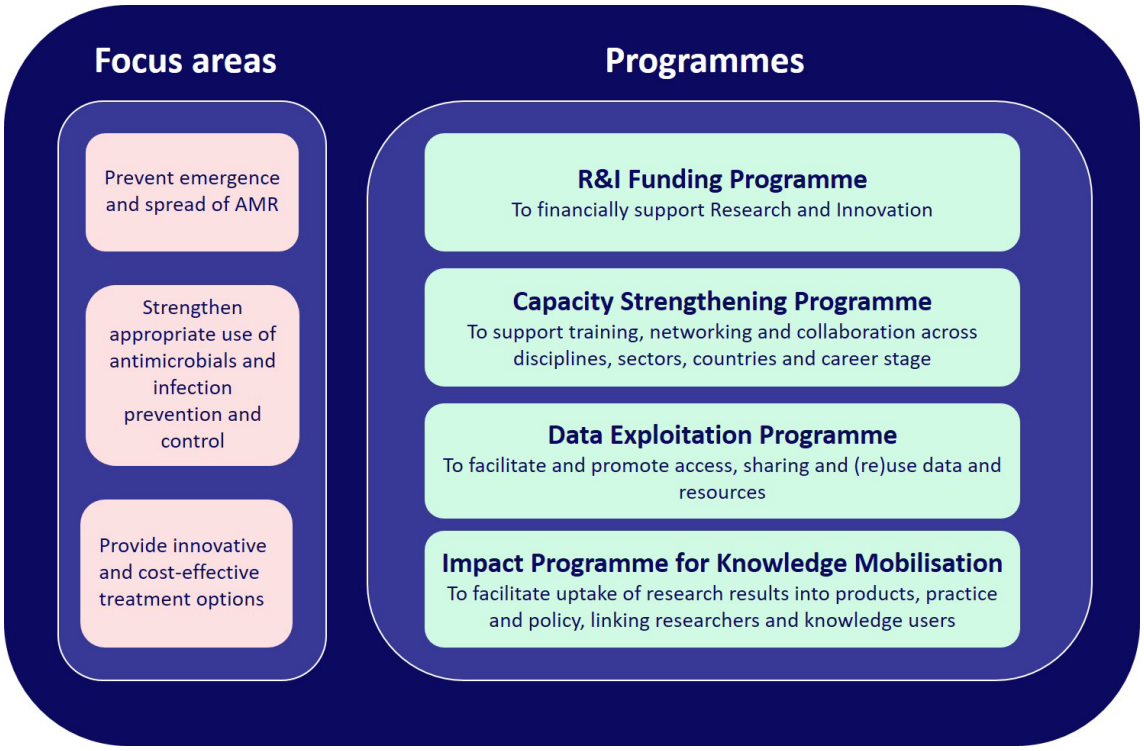

Figure 1. The three Focus areas and the four Programmes of the OHAMR Roadmap of Actions.

[14] *Horizon Europe Widening countries*

Focus areas

As part of the preparation of the OHAMR SRIA[15], extensive work and consultations have been carried out to identify, with a One Health perspective, how research and innovation could contribute to reduce AMR burden. The Research and Innovation prospects have been mapped and clustered in five thematic areas: Therapeutics, Diagnostics, Surveillance, Transmission and Evolution, and Interventions for prevention and mitigation[16].

A prioritisation exercise organised during the preparation of the partnership allowed the identification of three challenge-driven focus areas that should be addressed in priority by OHAMR actions (Table 1). Please see the section on Roadmap development process for more details on the process of identifying potential topics.

Table 1. The three identified focus areas and their objectives.

Focus Area	Objectives
Prevent the emergence and spread of AMR	1. To improve understanding of the mechanisms and drivers responsible for the emergence and spread of AMR 2. To design or identify cost-effective social and technical interventions aiming to prevent the emergence and spread of AMR
Strengthen appropriate use of antimicrobials and infection prevention and control	1. To understand the behavioural and social/societal factors driving overuse and misuse of antimicrobials in humans, animals, and plants 2. To develop or identify cost-effective technical innovations, including diagnostics, and social/ societal innovations aiming to a more prudent use of antimicrobials in humans, animals, and plants 3. To develop or identify cost-effective technical tools or social/societal interventions aiming to improved prevention of the infectious diseases in humans, animals, and plants
Provide innovative and cost-effective treatment options	1. To improve the current treatment strategies (increased efficiency, decreased risk to develop secondary resistance) and understand the barriers to access to therapeutic solutions 2. To develop new antimicrobials, novel treatment protocols or alternative treatment therapies along with their respective diagnostics

[15] *The draft OHAMR SRIA, 22 May 2023*
[16] *The OHAMR Research and Innovation Objectives, 22 May 2023*

Each of these three focus areas covers research topics and subtopics from more than one thematic area (Figure 2, please consult the description of the focus areas in the next sections for more details). These topics and subtopics should be seen as examples and are not exhaustive. Each focus area covers different disciplines (biological sciences, chemistry, social sciences, engineering…) and research from different maturity level (fundamental research, innovation, translational research and implementation). The focus areas will guide the development of the annual joint transnational calls for R&I projects.

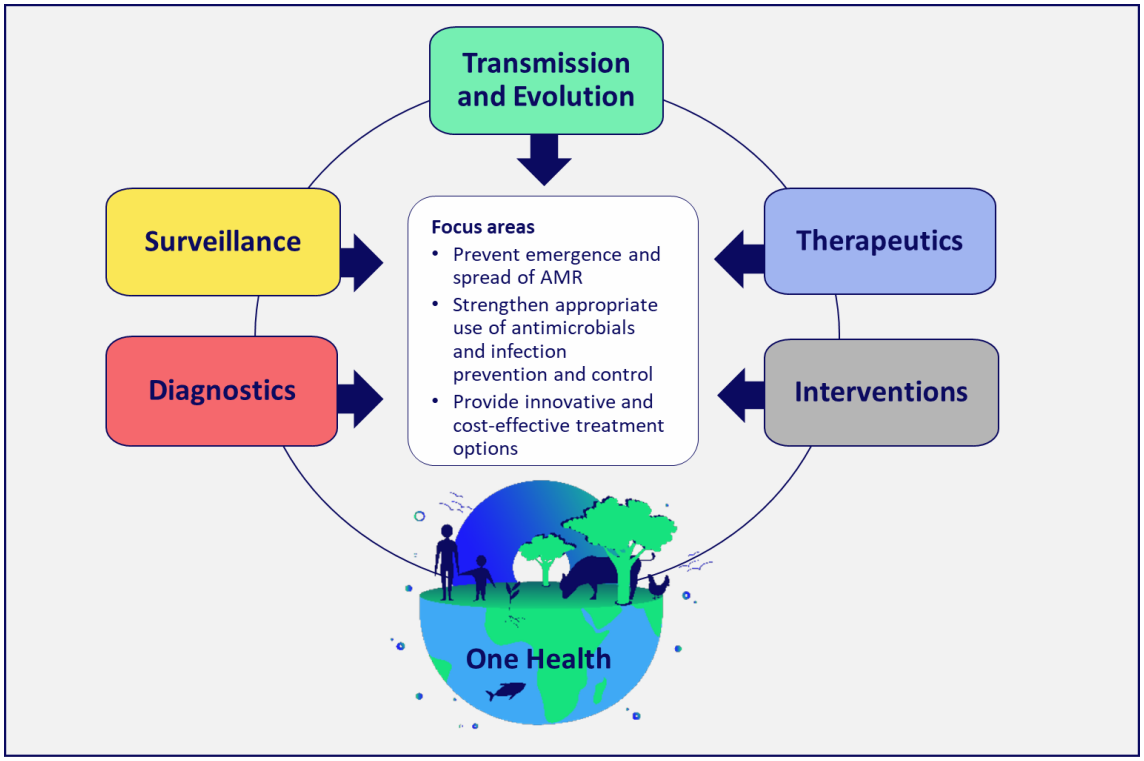

Figure 2. The relationship between the thematic areas of the OHAMR SRIA and the Focus Areas of the OHAMR Roadmap of Actions.

Each year, an annual work programme will be developed to select the topics and subtopics that will be addressed by annual joint transnational call(s) and additional activities (please see the OHAMR programmes section for more detailed description on these actions). This process will allow for flexibility to add additional topics, addressing future needs and unforeseen challenges. In addition, an update of the OHAMR SRIA and Roadmap is foreseen after the three first years of the partnership, leaving the possibility to add emerging focus area(s) or additional topics, if needed.

A description of the three focus areas is presented below.

Focus Area 1: Prevent emergence and spread of AMR

Challenge

Current measures taken in the human health sector, in agriculture and in the environment, to decrease and control the emergence and spread of AMR and recent technical advances are still insufficient to reduce the burden of AMR to the desired extent. In addition, it's still unclear how the recent measures taken in some sectors, such as the reduction of antimicrobial use in animal husbandry or the restriction of some critical antimicrobials for human cure only, will have an impact on human health. In the coming years, novel and/or improved measures need to be developed to control AMR, based on a better understanding of the mechanisms driving the emergence, evolution, selection, persistence, and transmission of AMR, in and between different OH sectors.

Objectives

1. To improve understanding of the mechanisms and drivers responsible for the emergence and spread of AMR[17].
2. To design or identify cost-effective social and technical interventions aiming to prevent the emergence and spread of AMR[18].

Potential topics targeting Focus Area 1

Potential, and not exhaustive, scientific topics that will be addressed by joint transnational calls or through other activities, in order to reach the objectives of Focus Area 1 are:

- Identification and characterisation of the factors (molecular, behavioural, ecological, social, societal, economic and environmental [19]) and mechanisms driving the emergence, evolution, selection and maintenance of the resistance genes and resistant microorganisms
  - *Including: Identification of new hot-spots and the factors determining an outbreak from AMR hotspots in different OH sectors; effect of different drugs and drug formulations, effect of disinfectants, effect of climate change, pollution, war, conflicts and migration on AMR emergence; utilisation of, and development of new, innovative tools to study AMR emergence, evolution, selection and maintenance (such as new generation sequencing, metagenomic data-sets machine learning, modelling); identification of new targets for drugs*

- Identification and characterisation of the risks, drivers, scale and direction of the AMR transmission routes within and between the different OH sectors
  - *Including: Development of new tools for the harmonisation and integration of surveillance data from different OH sectors and countries, models to simulate*

[17] *Factors responsible for an inappropriate Antimicrobial use (AMU) will be covered by the focus area 2: "Strengthen appropriate use of antimicrobials and infection prevention and control".*

[18] *Actions to prevent the transmission of infectious diseases and strategies to decrease AMU will be covered by the focus area 2: "Strengthen appropriate use of antimicrobials and infection prevention and control".*

[19] *A broad definition of environment is used throughout the document, including social and physical environment, in vivo environment (e.g. microbiota) and wildlife.*

AMR transmission, artificial intelligence (AI) tools, and risk assessment models; identification of AMR reservoirs and hotspots at different levels of granularity as well as of determinants of successful transmission; identification of knowledge gaps regarding AMR transmission, including antiparasitic and antiviral resistance

- Development of innovative solutions to limit the discharge, persistence, accumulation of antimicrobials and resistant genes/micro-organisms in the environment[20]
  - *Including: Development of novel solutions to limit AMR in AMR hotspots, novel decontamination strategies and strategies to limit discharge into the environment from all OH sectors; Design of degradable drug scaffolds and de-risking strategies for the recycling of organic waste in agricultural systems*

- Comparison of existing interventions aiming to limit AMR emergence and spread, and evaluation of their impact on AMR and their social, societal and economic benefit
  - *Including: Comparison of existing Interventions aiming to limit discharge of AMs and AMR determinants into the environment and to limit transmission between OH sectors; comparison of existing communication strategies directed to the general public, decision-makers and different stakeholders in all OH sectors to increase awareness and on AMR transmission risk.*

- Development of solutions to improve the access to social and technological innovations and interventions aiming to reduce AMR emergence and spread, and to facilitate their availability and their uptake by end-users.
  - *Including: Identification of barriers of access and uptake; Adaptation to different OH and socio-economic settings*

[20] *A broad definition of environment is used throughout the document, including social and physical environment, in vivo environment (e.g. microbiota) and wildlife.*

Focus area 2: Strengthen appropriate use of antimicrobials and infection prevention and control

Challenge

AMR is, to a large degree, driven by misuse and overuse of antimicrobials and poor infection prevention and control practices, in multiple sectors including human health, animal health (terrestrial and aquatic animals), and for plant cultivation.

Objectives

1. To understand the behavioural and social/societal factors driving overuse and misuse of antimicrobials
2. To develop or identify cost-effective technical innovations, including diagnostics, and social/ societal innovations aiming to a more prudent use of antimicrobials in.
3. To develop or identify cost-effective technical tools or social/societal interventions aiming to improved prevention of infectious diseases.

Potential topics targeting Focus Area 2

Potential, and not exhaustive, scientific topics that will be addressed by joint transnational calls or through other activities, in order to reach the objectives of Focus Area 2 are:

- Identification and characterisation of the factors leading to an appropriate or excessive use of antimicrobials
  - *Including: Social, societal, cultural, systemic, economic and behavioural factors that affects antimicrobial use (AMU) and infection prevention and control (IPC) strategies*

- Design of social and technical innovations, including diagnostics, aiming to facilitate the appropriate use of antimicrobials
  - *Including: Design of easy to use and rapid diagnostic tools to support decision on whether to use antimicrobial or not, and which antimicrobial to use; Improvement of AMR and AMU surveillance to guide antimicrobial empiric prescription; design of tools (e.g. AI tools) to guide antimicrobial prescription; optimisation of treatment protocols to improve antimicrobial use, such as treatment duration, personalised dosing, switch to narrow-spectrum antimicrobials [21] ; Development of communication strategies tailored to stakeholders, decision-makers and end-users to promote reduced antimicrobial use and prescription.*

[21] *Please note that other therapeutic strategies are included in the focus area 3 " Provide innovative and cost-effective treatment options ".*

- Design of social and technical innovations aiming to prevent or reduce the incidence of infections
  - *Including: development of solutions to decrease the risk of infection and thereby the need for antimicrobials, such as novel or improved IPC strategies, novel or improved water, sanitation and hygiene (WASH) strategies, anti-adherent surfaces, or probiotics; identification of vaccination targets; stewardship interventions in human health and agriculture and measures to improve food safety; Development of communication strategies tailored to stakeholders, decision-makers and end-users to promote infection prevention and control, and water, sanitation and hygiene.*

- Comparison of existing interventions aiming to reduce antimicrobial use or prevent infectious diseases in humans, animals, and plants and evaluation of their impact on human health, as well as their social, societal and economic benefit
  - *Including: Studies demonstrating the cost-effectiveness of the use of diagnostic tools, vaccination and sanitation campaigns and infection and control measures, new reimbursement models, new regulations for antimicrobial prescription, new societal organisation*

- Identification of barriers to uptake of and access to social, societal and technological innovations aiming to improve antimicrobial use and prevention of infection in humans, animals, and plants, and development of solutions to overcome these barriers
  - *Including: Uptake of diagnostics and surveillance, as well as interventions aiming to prevent infections (including vaccination); Implementation studies in different socio-economic settings; Proposals of new reimbursement models and new guidelines/regulations for antimicrobial prescription, new societal organisation*

Focus area 3: Provide innovative and cost-effective treatment options

Challenge

Drug resistant infections are responsible for an increasing number of treatment failures, increased mortality and decreased food productivity and new treatment options are needed.

Objectives

1. To improve the current treatment strategies (increased efficiency, decreased risk to develop secondary resistance) and understand the barriers to access to therapeutic solutions.
2. To develop new antimicrobials, novel treatment protocols or alternative treatment therapies along with their respective diagnostics.[22]

Potential topics targeting Focus Area 3

Potential, and not exhaustive, scientific topics that will be addressed by joint transnational calls or through other activities, in order to reach the objectives of Focus Area 3 are:

- Development of new antimicrobials, novel treatment protocols or alternative treatment therapies against Human Infectious diseases along with their respective diagnostics
  - *Including: development of new antimicrobials (new scaffolds, narrow spectrum antimicrobials, against new drug targets, repurposed molecules…) and alternative treatments, as well as their associated diagnostics for human infectious diseases; identification of current therapeutic gaps to treat infections resistant to antifungal, antiviral and antiparasitic treatments including needs in LMICs.*

- To improve, preserve and reinforce the clinical efficacy of the current treatment antimicrobials
  - *Including: Improved drug composition, formulation and drug delivery methods as well as treatment protocols (including personalised medicine, combination therapies) to increase antimicrobial efficacy and decrease the probability of resistance development; strategies to recycle antimicrobials that are not suitable for human use for animal/plant use; cost-effectiveness studies of existing and novel treatment protocols*

- Identification of barriers to access, availability, quality and uptake of therapeutic solutions and development of solutions to overcome those barriers
  - *Including: Barriers to uptake alternative treatments (including current regulations); access and availability in low-resource settings; adherence to*

[22] *Innovative solutions relating to diagnostics, surveillance and solutions to prevent infections will mainly be covered under focus area 2 "Strengthen appropriate use of antimicrobials and infection prevention and control" (with the exception of diagnostics accompanying therapeutics).*

therapeutic and diagnostic protocols; availability of suitable prescribers, supply chains; healthcare organisation, financing and insurance and agricultural system organisation

- Assessment and prediction of the impact of economic incentives and regulations on drug development, drug production, drug supply and treatment availability
  - *Including: economic analysis, strategic foresight and modelling/forecasting, side-effects of economic models; effect on AMR burden*

OHAMR Programmes

The actions in OHAMR will be executed by four different programmes; a) the R&I Funding Programme, b) the Capacity Strengthening Programme, c) the Data Exploitation Programme and d) the Impact Programme for Knowledge Mobilisation. These programmes will be coordinated by OHAMR partners.

For each year, an annual work programme will be developed to identify the activities that will be performed by each programme. This will include the topics and sub-topics for joint transnational calls, directed to one of the focus areas, as well as additional activities, such as activities to strengthen research capacity, facilitate data exploitation maximise impact, seeking intersectoral collaboration and breaking the silos. Some of these activities will be tailored to align with the needs of the call topics, supporting the researchers funded in the calls, whereas others will support AMR R&I in general.

The four programmes will cooperate to implement these activities and thereby address the focus areas and the objectives of the partnership. Precautions will be taken not to overlap with other partnerships or initiatives and to seek synergies with these.

The execution of the calls and all measures to be included in calls will be handled by the R&I Funding programme, whereas the other programmes will be responsible to coordinate and organise additional activities and events. The other programmes may also contribute to the drafting of the annual calls based on the needs identified in the mapping exercises conducted by the respective programme. Training activities will be performed by the Capacity strengthening programme in collaboration and cooperation of the Impact programme and the Data exploitation programme.

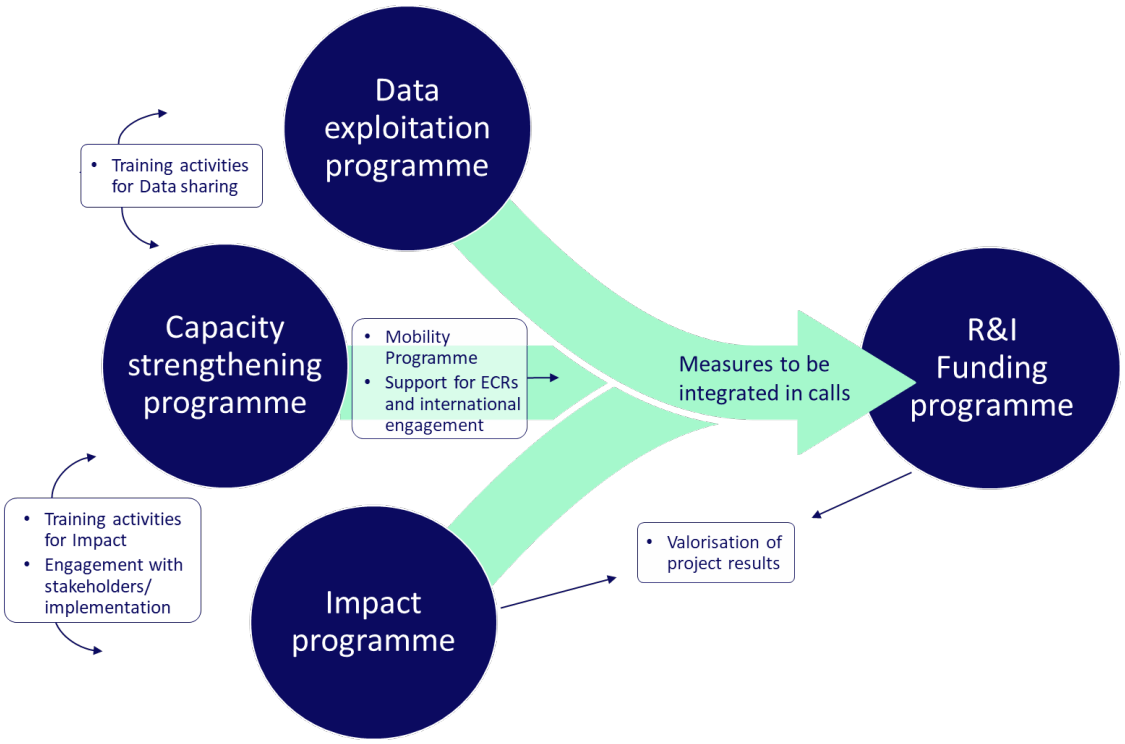

Figure 3. The connections and cooperation areas of the four OHAMR programmes**.**

Research and innovation funding programme

The objective of the R&I funding programme is to plan and implement the funding of OHAMR research and Innovation (R&I) activities by the organisation of:

- process for development and selection of funding instruments to address Focus area topic(s)
- call timeline, application and evaluation processes
- additional measures – support for capacity strengthening, mobility, data/resources sharing, knowledge transfer and valorisation – to be included in the proposals for research projects and networks.

Grant funding approaches

OHAMR joint transnational R&I calls will be competitive, open for proposals addressing the R&I priorities identified and outlined in the OHAMR SRIA[23] and in the Focus areas of the Roadmap. Calls will be open to researchers and innovators at universities, other research performing organisations and private actors, covering a wide range of scientific disciplines, according to each year call texts specificities. The eligibility criteria will depend on the Funding Partner Organisations (FPOs) that participate in the call. The calls will employ multiple grant funding approaches supporting transnational projects of different technology readiness levels adapted to the need and priority of each call topic.

The R&I programme will organise one joint transnational call process each year co-funded by OHAMR national/regional funding partner organisations (FPO) and the European Commission. The call process will be modular and is foreseen to cover one Focus Area through several modules supporting different types of research and innovation, from basic to more applied research (research projects) and knowledge synthesis (network projects), among others (Figure 1). It would be based upon to an annual prioritisation process and adapted to the present funding landscape/activities of other funding initiatives. Separate peer review panels and multiple ranking lists will be used if needed to ensure a fair distribution of grant funding between different call topics and activities.

[23] *The draft OHAMR SRIA, 22 May 2023*

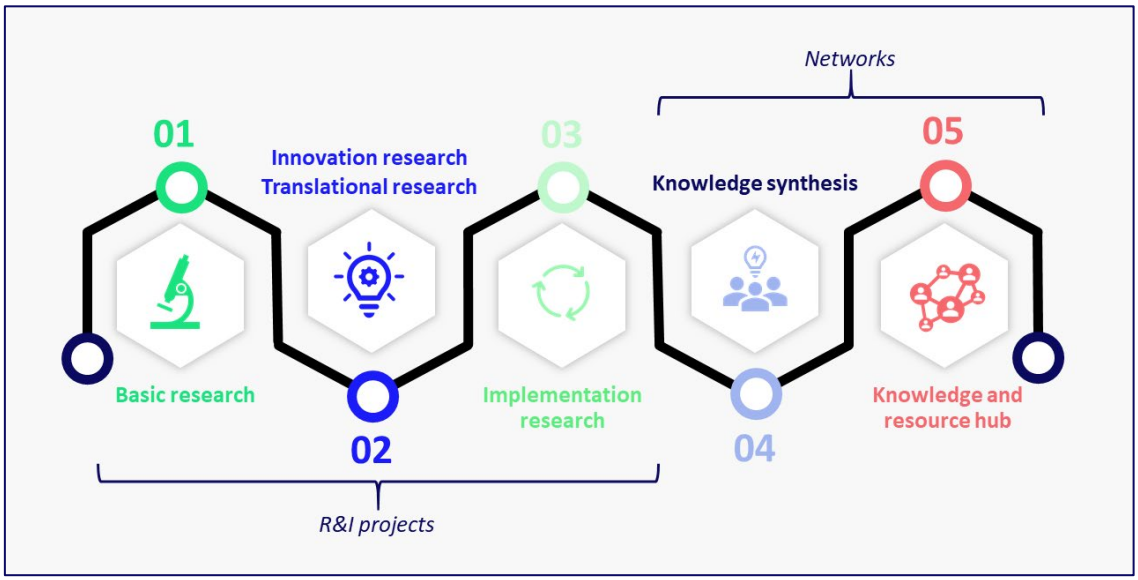

Figure 4. Grant funding approaches.

Type of funded projects include:

- **Basic research projects** - addressing fundamental research questions and bringing new knowledge
- **Innovation, translational research projects** - for research translation to technological development, proof of concept studies and innovations
- **Implementation research projects** – testing evidence-based solutions and interventions assessing effectiveness in real world contexts with the possibility to a sustainable scale-up.
- **Network projects** aimed to make a synthesis on the knowledge already available in the literature, and identify current knowledge gaps; identify new research questions or new way to explore identified research questions by looking at a specific problem from different angles and different perspectives; and, agree on common methods/ metrics/ guidelines to be implemented on future research projects. Networks of leading scientists, practitioners, stakeholders, and industry and experts could also support knowledge transfer, uptake of research results, practices and innovations and provide platforms for cross-sectoral and cross-disciplinary collaboration.

Additional measures to be integrated in calls

The following objectives will be addressed in configuring module(s) of joint annual transnational calls.

Capacity strengthening may be supported in calls by:

- Encouragement/incentives and/or requirement of inclusion, and/or exchange (twinning, secondments etc) of the following types of partners in and between project consortia:
  - Researchers of different scientific disciplines and One Health sectors
  - Early career researchers (ECRs) including encouragement/incentives of ECRs to coordinate projects/networks or for inclusions as principle investigators

- Researchers from Low and Middle- Income countries (LMICs) or widening countries.
- Private sector (small and medium-sized enterprises (SMEs), industry, farmers)
- Stakeholders and end-users (healthcare and veterinary staff, patient representatives, policy makers

Data (re)use, access and sharing facilitated by calls through:

- Mandatory analysis of whether there are existing datasets or other resources available that can be used for the project;
- Mandatory Data Management Plan, which is updated through the lifetime of the project, and project work plan and budget with defined responsibility and resources for FAIR data management activities (data stewardship);
- Mandatory reporting on the progress and outcome of data management, including project activities to make its' data Findable, Accessible, Interoperable and Reusable (FAIR)
- Mandatory publication of results in open access journals or deposition in open archives. The research and innovation outputs (publication, patent, dataset) must be labelled with persistent identifiers (e.g. DOI-code) for facilitated retrieval.

Generating increased impact through calls by:

- Mandatory project valorisation strategy/knowledge transfer plan detailing communication and dissemination strategies for how the project will reach impact and generate expected call-specific outputs.

Funding of the call

The financial contribution to the call is provided by the FPOs and the European Union according to Horizon Europe rules. The total budget is thus a Virtual Common Pot composed of individual committed funding from each FPO and the EU contribution. Each FPO will fund applicants from its own country/region/mandate eligible according to its own national/regional laws and regulations. The concept of variable geometry will be applied in that FPOs may provide funding for a selection of call modules/topics according to mandate and strategic priorities.

In order to maximise the number of funded projects a pre-condition for FPO participation will apply, in which each FPO must provide a sufficient budget for the call to fund a minimum number of applicants, based on the predicted national success rate.

Eligibility criteria

Projects are envisaged to be multi-annual and transnational involving at least two partners from two different EU Member States or countries associated[24] to Horizon Europe[25]. The call is opened to a wide range of scientific disciplines and interdisciplinary approach.

[24] *Association to Horizon Europe - European Commission (europa.eu)*
[25] *Potential applicants and targeted projects — ERA-LEARN*

Each FPO may select only one or several specific grant funding approaches in which applicants from its own country/region/mandate are eligible to apply.

Management and evaluation of the call

The call process is divided into two stages, pre-proposals and full proposals. The pre-proposal stage may be omitted or simplified for certain modules if compatible with Horizon Europe rules. The Peer Review Panels (PRP) may consist of scientists, experts, representatives from industry, patient organisations or other stakeholders with recognised expertise on the funding approach or the call topic.

The calls may cover several topics requiring different funding approaches, funding of different types of projects, thereby requiring several PRPs and generating multiple ranking lists.

Evaluation criteria for research projects

Only those proposals fully addressing the scope and objectives of the call will be evaluated. Research and network projects are evaluated with respect to the following evaluation criteria:

- Excellence
- Impact
- Quality and efficiency of the implementation

Based on the ranking lists from the PRPs, the FPOs will determine the total number of projects recommended to be invited to the full-proposal stage or for funding considering the national/regional/EC budgets available. In case of budgetary constraints, proposals scoring higher in the ranking lists may be prioritised considering the following core principles:

- Maximisation of the number of funded projects.
- Maximisation of the number of countries/regions involved in the funded projects
- Maximisation of underrepresented countries/regions in the funded projects, including widening countries.
- Aiming for a similar success rate between the topics
- Maximisation of the financial contribution by the EC obtained through the call.

Each proposal recommended for funding, will be assessed by ethics experts in the Ethic Review Board.

Timeline of OHAMR calls

The OHAMR is expected to be launched in the second quarter of 2025. The first call will open approximately in November 2025. The call process from launch to the decision on projects recommended for funding is approximately twelve months, resulting in a first grant period between 2026 and 2028 for the projects funded in the first call. Additional calls are expected to be launched annually.

Capacity strengthening programme

A dedicated Capacity Strengthening (CS) Programme will be implemented to strengthen the ERA and leverage the capacity of AMR researchers of different career stages and from diverse scientific backgrounds, OH sectors, professional sectors, gender and geographic origins (including widening countries and LMICs). The CS programme will develop training, networking and collaboration opportunities, to create optimal conditions to generate and disseminate high-quality research results with high probability to be taken up by end-users. The main target of the OHAMR CS programme will be researchers, but could be extended to also include other stakeholders, potentially in collaboration with other initiatives. Although most activities are foreseen to benefit all AMR researchers, a specific focus will be put on raising the next generation of AMR researchers, as well as on engaging with scientific disciplines, sectors and countries not yet involved, to be able to tackle the complex AMR challenge.

The CS programme will ensure sustainability by the creation of networks foreseen to persist beyond the duration of the OHAMR partnership and by strengthening research capacity in different national and regional settings, including widening countries and in LMICs.

The objectives of the CS programme will be:

1. To leverage technical and non-technical skills needed to meet the AMR challenges.
2. To strengthen the collaboration, knowledge exchange and mobility between researchers of different scientific disciplines, OH sectors, professional sectors and countries in EU and beyond.
3. To create a viable and sustainable AMR research community, including the support of ECRs as an important segment of this community.
4. To promote international engagement and research capacity strengthening in widening countries and in LMICs, in order to meet the global challenge of AMR.

The CS programme will be organised by a core team, who will analyse the needs and identify CS activities to be included in each annual work programme, coordinate the CS activities, and monitor the outcomes of the previous activities. The CS programme will liaise with other partnerships for strategic collaboration and maximised synergies. Some CS activities are also expected to be performed by the funded R&I projects. Careful consideration will be taken to ensure not to duplicate existing efforts and to learn from successful CS initiatives.

Potential activities

Mapping of needs, barriers, actors and target groups for capacity strengthening

In order to ensure that the CS activities are well suited and designed to maximise CS for researchers of different countries, socio-economic settings, disciplines, sectors and career stages, the first step will be to do a comprehensive mapping. The mapping will include needs and barriers (logistic, legal, financial) for CS, as well as actors and existing structures and platforms that can organise or collaborate on the CS activities. An overview of the already completed mapping exercises done by other initiatives will be

used as a starting point to optimise the use of resources. Precautions will be taken to promote equity and gender equity and diversity (including gender, geographical origin, socioeconomic setting etc.). The mapping will be performed at a general level at the start of the OHAMR partnership and followed up for the planning of each annual work programme, to meet the needs of the scientific questions addressed that year.

Below is a list of *potential* activities that could be executed by the CS programme, which will be subjected to prioritisation based on the mapping.

Training activities

OHAMR will set up a dedicated training programme for each annual work plan, to ensure that AMR researchers of different career stages are well trained to be able to deliver research results of highest quality that are designed to be readily taken up by industry, practice and policy. The training programme could include webinars, workshops, courses, Massive Open Online Courses and summer schools in different topics, aligned with the needs of the call topics, and can be organised by the OHAMR partners, ECRs or other researchers in a funded consortium or by collaboration with existing training platforms or other partnerships. Precautions will be taken to avoid overlap with other actors, including national initiatives. Training topics can include, but are not limited to:

- Training in advanced technologies that would enable cutting-edge research and innovation to advance the AMR field
- Training in interdisciplinary and intersectoral research methodology, project management, grant writing as well as equity and ethical perspectives
- Training in communication, dissemination, exploitation and entrepreneurship
- Training activities to increase the understanding of needs and requirements for uptake of research results, including engagement with end-users, policymakers and civil society, as well as exposure to real-world settings (in collaboration with the Impact programme, other partnerships and stakeholders).
- Training in data stewardship and FAIR data management (in collaboration with the Data exploitation programme)
- A train-the-trainers programme to extend education and awareness of AMR among for example public health, agriculture, environment professionals and students as well as the civil society and citizens (in collaboration with other initiatives)
- Communication and education activities to raise awareness of AMR

Activities to facilitate connections, collaborations, mobility and knowledge exchange across sectors, disciplines and countries

The CS programme will promote networking, collaboration, knowledge exchange and mobility to bring together all necessary expertise to approach the AMR challenge and raise awareness of how different scientific disciplines (including social sciences and implementation science), OH sectors, professional sectors (academic, private, end-users), national governmental agencies and EU agencies, and countries can address the complex nature of the AMR challenge. The following potential activities are envisaged:

- A dedicated mobility programme is foreseen in collaboration with the R&I Funding programme to promote knowledge exchange and enhance understanding of different OH sectors, different professional sectors (academia/public research centres/SMEs/ Industry), different disciplines and different countries, tailored to the needs identified for a given focus area and aligned with the call topic for each year (in collaboration with the R&I Funding programme).
- Activities to promote match-making of researchers of different disciplines, OH sectors and countries, as well as representatives from the private sectors and end-users. These activities can include, but are not limited to:
  - Events ahead of call launches to showcase how different disciplines and sectors can contribute
  - Directories of researchers (potentially in collaboration with other AMR partnerships or initiatives) and partner-search tools
  - Speed-dating sessions at conferences
- Joint start-up, mid-term and final workshops to promote collaboration with projects funded under the same call.
- Creation of an Investigator's Forum as a platform for dialogue and collaboration among researchers, providing a space for investigators to discuss emerging issues, share best practices, engage with policy makers.
- Organisation of a dedicated OHAMR conference or sessions at existing conferences with a large emphasis on networking and brokerage events, panel discussions and specific sessions for multidisciplinary research, for specific fields of research and for ECRs. A calendar of upcoming OH AMR-specific and -sensitive events and training opportunities can also be created.
- Active approach to reach researchers outside the traditional scope of the partnership, such as social scientists (including equity, bioethics and economy) and implementation scientists, and to engage end-users to participate in the OHAMR consortia.
- Organisation of workshops, working groups and networks to share good practice and alignment between national and international research programmes. Measures to promote intersectoral, interdisciplinary and international collaboration and mobility, will also be integrated in the joint transnational calls (Please see the R&I Funding programme).

Activities to facilitate career progression of early career scientists

OHAMR will support ECRs, engage them in OHAMR activities, introduce diverse career opportunities and create networks of the next generation of AMR researchers and innovators with an interdisciplinary, intersectoral and international mind-set, fit to meet future challenges of AMR. The following potential activities are suggested:

- A fellowship programme tailored for ECRs, encompassing comprehensive financial support, coupled with extensive training and networking opportunities, to empower ECRs in their research pursuits (in collaboration with the R&I Funding programme).
- Establishment of a network of ECRs participating in R&I projects funded under the same call, to connect the researchers of the future. The network will be encouraged to organise events, share best practises in e.g. methodology, suggest training activities and participate in working groups and PRPs.

- A mentorship programme to support career progression of ECRs about to become independent, by guidance, knowledge sharing and skill enhancement provided by more senior researchers.
- Contests (with prize awards), such as best video contests or hackathons to increase the exposure of the ECRs and to show-case successful research efforts.
- Measures to promote ECR engagement will also be integrated in the joint transnational calls (Please see the R&I Funding programme).

International engagement

Acknowledging the global challenge of AMR, the CS programme will work actively to promote international engagement and research capacity strengthening in widening countries and in LMICs. The activities will, to as large extent as possible, be bidirectional and build on mutual respect and trust. Many of the trainings, networking and ECR activities described above will be tailored to also promote international engagement, in particular by:

- Engagement with other EU programmes, international initiatives/funders, local/regional actors and development agencies to join efforts to promote support of local researchers and institutional capacity, including relevant infrastructures.
- Bidirectional knowledge exchange, sharing of best practices, and mobility programmes.
- Incentives and/or financial support for researchers from LMICs and widening countries to participate in project consortia, evaluation panels and training and networking activities. Training activities will be tailored to a reach a broad target audience, for example by offering online participation.

Expected outcomes

- AMR researchers equipped with a comprehensive set of technical and non-technical proficiencies necessary to address the multifaceted challenge of AMR.
- Stronger collaboration among AMR researchers and stakeholders, spanning diverse research disciplines, One Health sectors, SMEs, and industries, fostering a deeper comprehension of how each sector can contribute synergistically.
- Establishment of a robust network comprising the upcoming AMR researchers, ready to confront the evolving AMR challenges.
- Improved AMR research capacity within the EU and beyond, encompassing widening countries, extending support to Low- and Middle-Income Countries (LMICs), fortifying the collective global capacity to combat antimicrobial resistance.

Data exploitation programme

A data exploitation programme is envisaged to support the AMR community including, but not limited to, researchers, epidemiologists, clinicians, bioinformaticians, mathematical modellers, veterinarians, agricultural scientists, social scientists, environment experts and data stewards, to facilitate sharing and (re)using of data and research infrastructures to foster an effective and efficient control and prevention of AMR. There is also a need to share data and information about One Health AMR with other stakeholders outside the research domain to enable actions for policy and practice. To achieve this, data in the AMR research domain will be optimally produced, and made available for (re-)use. Data, in this context, includes all resources that are relevant for AMR-research, including quantitative and qualitative data sources from various research disciplines of relevance including, the software to use data, collections of physical resources like biological materials, audio and video recordings, etc, as well as existing resources such as datasets and databases covering the OH sectors, microbial resources and research infrastructures, such as biobanks.

The programme will therefore work towards implementing the FAIR principles, as these guide the steps towards data to become findable, accessible, interoperable and reusable for both people and machines (computers). It will be done through subsequent and feasible steps, considering the level of reusability of data resources in the funded projects as well other resources. The ultimate goal would be that funded research and innovation projects produce (or use) FAIR data that remain at their source, that can be visited by algorithms, and be used by computer technology (data science, artificial intelligence). This would facilitate advanced analyses on large amounts of data, from different domains, disciplines and geographical areas. The programme will also facilitate sharing (or ultimately data visiting by algorithms) of data generated from the funded research and innovation projects, as well promote use and re-use of existing resources and research infrastructure relevant in the field of AMR covering the OH sectors. The main objectives of the programme will be:

1. To identify the stakeholders and users of AMR data and their needs to maximise the potential of data (re)use from various sources within the OHAMR sectors to generate insights for research and policy.
2. To identify the needs, barriers and solutions for availability, interoperability and reusability of AMR data resources and existing research infrastructure across OH sectors.
3. To develop an operational structure and framework to support researchers and data stewards to produce FAIR data and facilitate different type of users' access to AMR data and information.
4. To demonstrate how the produced (meta)data can be (re)used to tackle AMR research, policy or public health issues with a OH approach.

To realise the goals of the programme the following actions will be undertaken:

Engage community to identify the needs, resources and use of data in OH AMR sectors

The programme will engage with the broad AMR community across disciplines and OH sectors, including, but not limited to) researchers, clinicians, epidemiologists, social scientists, public authorities, policy makers to identify the relevant databases, platforms and tools used by the AMR community. In this context, research infrastructures already available at the European or national level that enable sharing of samples, quality data and advanced analytical tools will be considered and assessed by the data experts for their level of FAIRness. Additionally, the needs of the involved stakeholders in terms of data sharing/visiting not covered by the existing infrastructures will be identified.

Potential activities

- Mapping of existing platforms on diagnostics, drug discovery, antimicrobial molecules, antimicrobial use (AMU), and antimicrobial consumption (AMC), their scope, limitations and relevant for OH sectors.
- Mapping of the OH surveillance data infrastructure landscape to identify the needs, main barriers and solutions for interlinked, integrated, multi-sectoral surveillance data on AMR and AMU/AMC across both human and animal health sectors, the food chain, and the environment.
- Identify users and users' needs on AMR data and information, and modern tools/methods (including the use of AI) to facilitate data interoperability and data visiting by algorithms, and transforming AMR (meta)data into knowledge.
- Facilitate networking and alignment with the reference centres for national and EU-wide coordination and interlinking of methods and systems for identifying and monitoring AMR and AMU/AMC.
- Engage and interact with existing research infrastructure and governing bodies for data-and metadata-standards to ensure that the needs of the AMR research community are covered.
- Engage the AMR community where domain experts together with data experts identify the requirements, choices for preferred data models and standards leading to harmonisation or convergence of data enabling data comparison from different OH sectors. Existing ontologies and standardised vocabularies will be used where available.
- Investigate data policy requirements, social, ethical and/ or legal barriers or restrictions imposed by the European Commission, and within the countries that might affect the opportunities to produce and reuse AMR data.
- Organise activities for mutual learning and good practice sharing across the OH sectors on harmonisation of definitions, protocols, data sharing between sources, criteria for analysis and reporting standards in countries with different socioeconomic settings.
- Engage the AMR community to identify the needs to use AI based approaches (including data mining and machine learning) for advanced data analytics. Explore the relevance of these methods and AI tools to gain insights on how to accelerate drug discovery, improving infection diagnosis and antibiotic prescription, and AMR surveillance predicting disease outbreaks.

- Organise events to plan coordination and seek complementarity with existing initiatives to facilitate interactive use of data sets and data banks by encouraging common data structures and close the gaps that are already identified.

Develop data FAIRIfication framework to foster AMR data (re)use for human and machine

The programme will facilitate the research community to use and produce reusable data. Data must be made FAIR, i.e. 'machine-readable' (and preferably 'machine-actionable') to enable efficient (re-)use of data. Making data FAIR (i.e. FAIRifying data) is a process that data producers and data stewards need to undertake during their research and data management actions. FAIR data rely heavily on FAIR metadata, which provide all the information that people and machines/computers need to use the data: e.g. a description of the dataset, the context within which it was produced, how the data were collected, where it can be found, the conditions to gain access to it, and the terminology standards that ensure their interoperability. The programme will therefore adopt metadata descriptions, schemes and templates developed by the community (AMR domain experts and data experts) and promote their use thereof on funded projects with support from the data stewards.

Potential activities

- FAIR research outputs will be realised by capturing FAIR metadata, and make them available on an existing portal or metadata catalogue:
  - For new resources, encourage the use of easy to implement, FAIR and extendable semantic metadata schemes.
  - For existing resources, if it is not already FAIR, adapt an existing or develop an ETL (extract, transform and load) pipeline that can be deployed and used anywhere.
- Establish standards (for instance, vocabularies, metadata schemes, templates, common data models, etc) for integration and interoperability of AMR datasets. Domain experts together with data experts identify the requirements and contribute to the improvement of the standardisation and harmonisation of data collection, analysis and interpretation protocols and workflows to enable data comparison from different OH sectors. Existing ontologies and standardised vocabularies will be used where available.
- Provide research groups with FAIR data-expertise through data stewardship training with data experts and interaction with other relevant existing initiatives on FAIR data.
- Provide support to the research community to implement FAIRification of their own data with help from the data experts (for instance, through "bring your own data" workshops) and raise awareness on available data platforms, resources and tools for reuse and data sharing.
- Facilitate online exposure of FAIR metadata, which expose and describe the data resources in a portal (i.e. metadata catalogue) to make AMR resources findable, and enable their reuse.

- Work towards developing (and deploying) a data access facility in the metadata catalogue to facilitate direct access to datasets for data reuse.
- Develop of a long-term policy for maintaining and capturing FAIR (meta)data addressing data models, data governance, interoperability requirements. Ensure that data is collected and used in accordance with relevant legal and ethical guidelines, and that appropriate safeguards are in place for data exploitation, such as privacy, content and confidentiality, where necessary.

Exploitation of the (meta)data to support AMR data use and reuse

One of the current major limitations in conducting effective and efficient research is the difficulty of finding, integrating and reusing data that are necessary to understand, monitor control and prevent AMR. Disparate practices in terms of data collection and management also hinders development of strategies and informed decision-making. Intention to share and reuse data have increased with time, however, available datasets remain underused. Following the work proposed in the first steps of the programme towards interoperability among data sources, the programme will demonstrate how the newly FAIR (meta)data can be (re)used to tackle AMR research, policy or public health questions/issues with a One Health approach.

Potential activities

- Conduct a "pilot test" utilising one or several datasets (from JPIAMR or OHAMR funded projects) that is unfair and would go through the entire "pipeline" and become "fully FAIR" to demonstrate the value of FAIRified data that can be effectively reused for further research.
- Explore the use of modern tools and methods to develop ready-to-use analysis services that could use the FAIR (meta)data previously developed to support decision-makers, professionals and practitioners.
- Explore big data analyses to identify potential high-value intervention points and evaluate the efficacy of various interventions, improved integrated OH surveillance, including early warning systems for AMR, as well as, advanced modelling on predictive factors and monitoring of AMR.
- Foster multidisciplinary efforts, including for e.g. medical, veterinary and agricultural scientists, microbiologists, ecologists, bioinformaticians, mathematical modellers and epidemiologists, to conduct meta-data analysis at national, regional and global levels to facilitate the integration of surveillance data.

Expected outcomes

- Better findability and access for the research community to AMR data and information on existing resources, and ability to use them in new and advanced research.
- Improved awareness and facilitating the research community to use and produce reusable (and as much as possible FAIR) AMR data with the help of standardised and machine-actionable descriptions of data and other resources.
- Improved opportunities for data science and artificial intelligence (AI) with FAIRified (meta)data, including advanced automated and integrated analyses on large AMR datasets from different domains, regions and sectors.

- Better interconnectivity of datasets from different OH sectors to extract more value from existing data and to enable researchers, professionals, policy-makers and other stakeholders for data-informed decision-making to prevent and control AMR.

Impact programme for knowledge mobilisation

An Impact Programme is envisaged to facilitate the transfer, uptake and valorisation of the knowledge generated from funded research and Innovation projects for maximum societal impact. It aims to facilitate the translation of knowledge into solutions and sustainable uptake of AMR interventions by providing a framework for collaboration between the knowledge generators[26] (funded researchers and innovators as well as other AMR programmes and initiatives) and the knowledge-users [27] , including policymakers, taking a OH lens to mitigate AMR in diverse socio-economic settings. The objectives of the programme are:

1. To support the identification of unmet needs, ensuring calls for research and innovation projects are informed by the relevant contexts, end-users and policymakers for generating evidence to create maximum impact.
2. To facilitate the translation and uptake of innovation and the implementation of evidence-based AMR interventions for sustainable impact.
3. To provide a framework to support and engage with knowledge generators, knowledge users and the relevant community for knowledge valorisation.

The knowledge translation measures to be implemented by the impact programme will be integrated throughout the overarching activities of the R&I grant-funding cycle. This will include support in the co-designing of the annual competitive transnational R&I calls, to inform and shape research and innovation questions for generating evidence. This will support the researchers/innovators to receive a clear understanding of the societal and public health impact as well as market opportunity, and route to translation of innovation and evidence. The approaches will be solution-oriented and transdisciplinary and involve implementation research, social and behavioural sciences covering the entire OH spectrum. The programme will connect and engage with the existing actors and networks in the AMR field, globally, partner with diverse stakeholders tapping their experience and expertise and avoid duplication of efforts to accomplish the set objectives.

The programme is proposed to be executed by the "knowledge facilitators"[28] who will act as intermediaries between the knowledge generators and relevant knowledge users to inform unmet needs and prioritisation of research and innovation questions, as well as accelerate the translation of outcomes from projects, including data, know-how and research results, into products, services, solutions and evidence-based policies for sustainable impact. The programme will develop a framework with clear criteria on how specific projects with potential of impact can be identified and ensure fire-walls are in place to avoid issues related to IP, confidentiality, conflict of interest when different

[26] ***Knowledge generators:*** *grantees of the JPIAMR and OHAMR R&I calls with the possibility to involve and engage with a broader scientific community funded in other relevant initiatives.*

[27] ***Knowledge users:*** *who are likely to be able to use research results to make informed decisions about policies, programs and/or practices. A knowledge user can be, but is not limited to, a social scientist, a practitioner, a policy maker, an educator, a decision maker, an investor, a health care administrator, a healthcare provider, a SME, a breeding company, food industry, biotech and pharma sector, a community leader or an individual in a charity, patient group, private sector organization, civil society organisations or media outlet representing the entire spectrum of the OH domains.*

[28] ***Knowledge facilitators:*** *The knowledge facilitators will be the key enablers to the pathway of impact and would comprise of representatives from multiple organisations - public institutions, public agencies, international initiatives, NGOs, research performing organisations (who are not beneficiaries/partners/members of the partnership and will not take part in the annual OHAMR R&I project calls).*

knowledge generators, users and facilitators will be involved in the activities of the programme as well as potential call for proposals. The knowledge facilitators would be leading the development and delivery of the objectives of the programme and are expected to:

- Scope and identify unmet needs and gaps to inform call topic prioritisation for maximum impact.
- Identify & map the added value and impact of R&I project findings.
- Facilitate the development of guidelines, recommendations and policy briefs where researchers and policymakers jointly contribute to use evidence to inform policy, programmes and practice.
- Facilitate testing and implementing AMR-sensitive and -specific interventions supported through the R&I funding programmes.
- Provide support to R&I products (new leads, candidates, diagnostics, tools, technologies) to progress for further development.

The knowledge facilitators will deliver on actions and activities directed to three strategic tracks for innovation translation, implementation of evidence for practice and policy-making under the programme engaging the knowledge users and the knowledge generators (Figure 5). The tracks are dynamic and interlinked and activities of the programme will cross-talk with the respective tracks to create coherent and cohesive lines of actions.

1. **Innovation translation:** The track will facilitate innovation and product development of leads/candidates (drugs, vaccines, alternatives), diagnostics and other tools and technologies generated from R&I projects and accelerate translation down the development path through collaboration between academia and industry. The track will scope ways to engage with industry and mobilise their commitment for public-private-partnerships.
2. **Implementation of evidence for practice:** The track will build on existing evidence to inform better interventions development and construct different strategies to implement evidence-based AMR interventions (with socio economic and behavioural science at its core).
3. **Policy Catalyst:** The track will strengthen the links between researchers and policymakers and facilitate integration of new scientific outcomes and tested interventions into strategies, narratives, policy programmes and practice informed by implementation research.

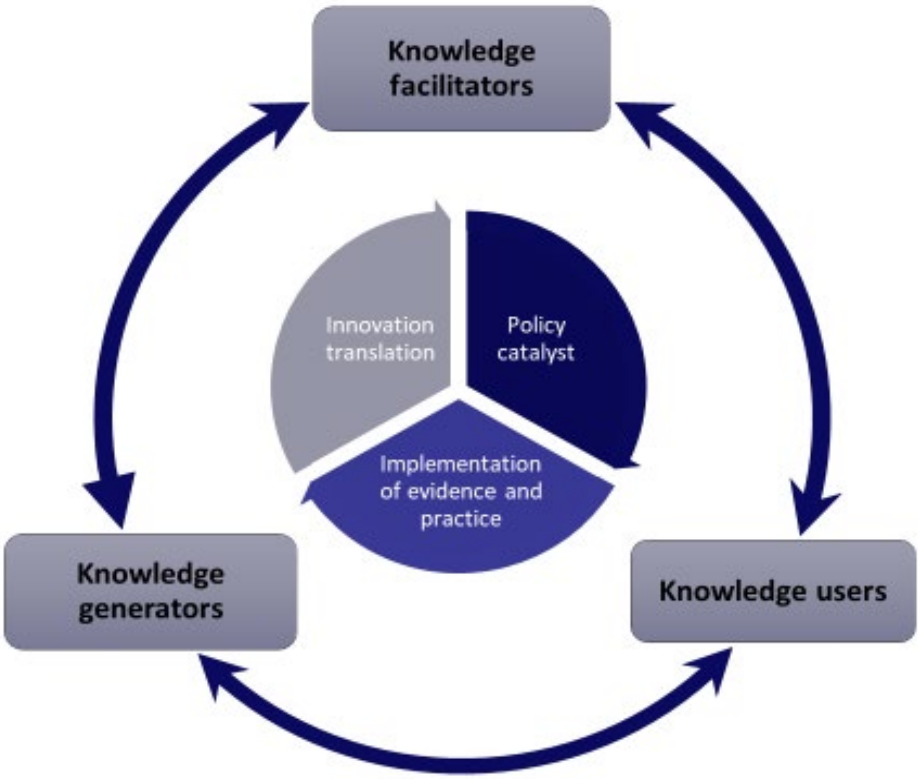

Figure 5. The Impact Programme comprising of knowledge generators, users and facilitators to execute knowledge transfer and uptake activities for the strategic clusters for innovation translation, implementation of evidence for practice and policy-making.

Potential activities

The following activities are proposed under the programme that will be conducted covering the three strategic tracks:

- Scoping activities:
  - Mapping of research and innovation outcomes with translational potential from JPIAMR and OHAMR projects in partnership with other programmes and initiatives to avoid overlap and encourage complementarity.
  - To identify barriers and opportunities for uptake of evidence and innovation including products in different socio-economic settings, with recommendations and opinions pieces as expected outcomes.
  - To support the joint development of case studies, recommendations, policy briefs and white papers and engage with national and international policymakers taking a One Health lens to accelerate the uptake of innovation.
  - To support the development of guidelines to inform researchers, innovators and other stakeholders on communicating and sharing evidence targeted for relevant end-users as well as general public for impact.

- Support for researchers:
  - Peer-peer learning activities on how best to engage with global and national funders, incubators, accelerators, other stakeholders to educate and inform researchers about innovation, policy and implementation needs.
  - The development of guidelines or knowledge transfer strategies for managing intellectual assets and clarifying IPR protection in a transnational research collaboration and international environment.
  - The development of guidelines reporting the good practices to perform informative interventions (in collaboration with regional and global partners) in a wider socio-economic setting, considering access and equity aspects.
- Support for innovators:
  - Brokerage events to promote match-making between researchers, industry, and business angels to support finding the right expertise to develop a project/start-up
  - Organise hackathons to identify specific needs and teams of innovators develop solutions for these needs
  - Provide academics and early entrepreneurs with tools and trainings through workshops, boot camps, etc. with existing accelerators, innovation programmes and other knowledge transfer and commercialisation offices to improve translational knowledge.
- Knowledge exchange activities:
  - Round tables to facilitate interactions between end users, policymakers and researchers to inform agenda setting and unmet needs
  - Design thinking with a range of stakeholders to facilitate translation and implementation of evidence to policy programmes and practice taking a OH approach
  - Events for interactions with other programmes, initiatives, HEU partnerships relevant for OHAMR research to share and showcase research outcomes.

The impact programme will connect with the capacity strengthening and the data exploitation programme within the partnership to collaborate and execute joint activities on overlapping themes.

Expected Outcomes

- Better informed R&I calls delivering on research for unmet needs to generate evidence for societal impact.
- Equip researchers with translational knowledge to learn about the entire R&I ecosystem, value proposition, end-users need and route to translation.
- Enhanced research impact through translation of research findings into sustainable solutions, products, services and knowledge-based policies made available for uptake and broad societal use.
- Deeper global cooperation and collaboration to maximise knowledge mobilisation and translation.

Synergies and complementarities with other partnerships, initiatives and stakeholders

The AMR challenge cannot be solved by a single partnership. Synergies, complementarities and collaboration among the existing and planned partnerships and initiatives are of utmost importance. OHAMR will therefore be in constant contact with these initiatives to identify synergies, plan potential joint activities and to avoid duplication of efforts. For some partnerships, a dialogue has already been initiated, for others meetings are foreseen to take place before the start of the OHAMR partnership. A stakeholder forum is also foreseen, potentially as a joint effort with other relevant partnerships.

Below is a list of identified partnerships with relevance for the OHAMR partnership and some synergies and collaboration opportunities that have already been identified. More details on planned joint activities are expected to be included in the next version of the Roadmap.

Table 2. Relevant European Partnerships within Horizon Europe Cluster 1 (Health).

Partnership	Objectives	Potential synergies and collaboration
Global Health European & Developing Countries Clinical Trials Joint Undertaking, (GH EDCTP 3-JU)	The Global Health EDCTP3 Joint Undertaking will support international research partnerships accelerating the clinical evaluation of drugs, vaccines and diagnostics for key infectious diseases affecting sub-Saharan Africa, as well as novel approaches for surveillance and control of emerging/re-emerging infections in the region and globally. It will also strengthen clinical research capacity in sub-Saharan Africa.	• Potential synergies on capacity strengthening. • Exchange of information and peer-learning. • Alignment of calls. • Potential joint workshops for dissemination and uptake of research results.
Pandemic Preparedness	This partnership aims to improve the EU's preparedness to emerging infectious health threats by better coordinating R&I at EU, national (and regional) level, to develop solutions and tools to prepare, predict, prevent and respond to emerging infectious diseases and pandemic outbreaks, and to assure that research infrastructures (including Clinical trial platforms) could be ready to operate in case of pandemic.	• Potential collaboration on antiviral and antiparasitic resistance, as well as on clinical trials.

Partnership	Objectives	Potential synergies and collaboration
Personalised Medicine, (EP PerMed)	The vision of the European Partnership for Personalised Medicine (EP PerMed) is to improve health outcomes within sustainable healthcare systems through research, development, innovation and implementation of personalised medicine approaches for the benefit of patients, citizens, and society.	• Potential synergies and collaboration opportunities on information exchange, dissemination, awareness-raising and other activities
ERA for Health Research, (ERA4Health)	ERA4Health focuses on tackling diseases and reducing disease burden by addressing the following challenges: • The increasing demand for a better quality of life and a better patient care. • The need to transform public health care systems into more effective, efficient, equitable, accessible, and resilient ones. • The need to strengthen disease prevention and health promotion.	• Exchange of information and peer-learning • Potential synergies and collaboration opportunities on stakeholder engagement, dissemination to policy and communication towards the public • Collaboration on European clinical trials networks mapping
Transforming Health and Care systems (THCS)	THCS aims to bring together stakeholders, create synergies, coordinate Research and Innovation actions, facilitate the digitization of health and care services and support the transformation of health and care systems with innovative solutions driven by knowledge and evidence.	• Exchange of information and peer-learning
Innovative Health Initiative Joint Undertaking (IHI JU)	This public private partnership aims to translate health research and innovation into benefits for patients and society. It covers prevention, diagnostics, treatment and disease management.	• Exchange of information and peer-learning

Table 3. Relevant European Partnerships within Horizon Europe Cluster 6 (Food, Bioeconomy, Natural Resources, Agriculture and Environment).

Partnership	Objectives	Potential synergies and collaboration
EUP on Animal Health and Welfare (EUP-AH&W)	The EUP-AH&W's general goals are to progress Europe towards healthy and sustainable livestock production systems (for both terrestrial and aquatic animals), including the reduction of anti-microbial usage, and to greatly improve production animal welfare, in line with the European Green Deal and farm-to-fork strategy.	• Alignment of joint translational calls and internal calls. • Potential joint training and data sharing activities. • Regular contact will be held to align the programmes.
Water4All – Water security for the planet	Water4All's Vision is to boost the systemic transformations and changes across the entire water research –innovation - implementation pipeline, fostering the matchmaking between problem owners and solution providers for ensuring water security for all in the long term	• Potential synergies on transmission routes in the environment • Exchange of information and peer-learning
Safe and Sustainable Food Systems for People (PSFS)	The overarching vision of the SFS Partnership is that its actors collectively will achieve environmentally-friendly, socially secure and fair, economically viable, healthy and safe food systems in Europe in order to help realise its goals of the Farm to Fork strategy, in line with the global ambitions of United Nations (UN) Sustainable Food Summit 2021.	• Potential Synergies on AMR in the food supply chain • Exchange of information and peer-learning
Accelerating farming systems transition: agroecology living labs and research infrastructures	The partnership aims to accelerate the transition towards sustainable, climate- and ecosystem-friendly farming practices. To do so, it will 1) enable a better comprehension of agroecological processes from farm to landscape levels, 2) boost place-based innovation in co-creative environments and 3) improve the flow and uptake of knowledge and innovations on agroecology.	• Exchange of information and peer-learning

Table 4. Relevant European Initiatives within other EU funding programmes/clusters.

Partnership	Objectives	Potential synergies and collaboration
Joint Action on Antimicrobial Resistance 2 (EU-JAMRAI 2)	EU-JAMRAI 2 will support MS/AC (Member States/Associated Countries) in their efforts to develop and update their National Action Plans on AMR, contributes to several EU4Health policy priorities by strengthening MS/AC coordination and responsiveness against AMR, ensuring the access to important medicinal products and medical devices and, protecting people from AMR.	• Synergies and potential collaboration on engagement with stakeholders and policy-makers, dissemination/uptake and training activities
EIT Health	The ambition of EIT Health is to enable people in Europe to live longer, healthier lives. The work goes beyond conventional approaches to disease management and disease prevention. We are building and growing businesses to create products and services that progress healthcare in Europe, while strengthening our economy.	• Exchange of information and peer-learning
European Open Science Cloud (EOSC)	The ambition of the European Open Science Cloud (EOSC) is to provide European researchers, innovators, companies and citizens with a federated and open multi-disciplinary environment where they can publish, find and re-use data, tools and services for research, innovation and educational purposes.	• Potential Synergies on access and sharing of data

OHAMR will also interact with other initiatives and stakeholders to ensure maximum synergies, share information and promote uptake of research results, as well as to avoid duplication of efforts. These stakeholders will serve an important role to advice on strategic planning and annual work programme development and to contribute with their expertise to the activities planned by the different programmes. Some examples of such stakeholders are mentioned below, but they should be seen as a preliminary and non-exhaustive list.

International organisations and funders will be of importance to align and seek synergies on research funding, capacity strengthening and implementation in countries outside the EU, in particular in LMICs. Such organisations include Action on Antibiotic Resistance (ReAct), International Centre for Antimicrobial Resistance Solutions (ICARS), the Fleming fund, Wellcome, Bill & Melinda Gates Foundation, Team Europe Initiative Africa, Global

AMR Innovation Fund (GAMRIF) as well as national initiatives, including those in LMICs and widening countries.

In order to facilitate translation and uptake of innovative solutions, for example into clinical trials, OHAMR will also cooperate with international funding initiatives, such as the Combating Antibiotic Resistant Bacteria Biopharmaceutical Accelerator (CARB-X), the Global Antibiotic Research & Development Partnership (GARDP), FIND, the AMR Action fund and the Pathways to Antimicrobial Clinical Efficacy (PACE) programme. Engagement with industrial associations like the Biotech companies from Europe innovating in Anti-Microbial resistance research (BEAM) Alliance or the European Federation of Pharmaceutical Industries and Associations (EPFIA) will also be sought.

Another important player will be the AMR Stakeholder Network, established at the European Public Health Alliance (EPHA), which brings together more than 60 leading organisations and individuals, including patient groups, health professional organisations, NGOs for public health, veterinarians etc. at national, regional and European level and thus is an excellent platform for stakeholder engagement, to advice on societal needs and facilitation of uptake of research results and solutions. Social science networks like the International Network for AMR Social Science (INAMRSS) will also be important.

OHAMR will also collaborate with training providers, such as the European Society of Clinical Microbiology and Infectious Diseases (ESCMID), EIT Health, the European Molecular Biology Organisation (EMBO) and the Federation of European Biochemical Societies (FEBS), as well as with existing research infrastructures and data sharing initiatives, such as the European life-sciences infrastructure for biological information (ELIXIR), The Microbial Resource Research Infrastructure (MIRRI), Biobanking and Biomolecular Resources Research Infrastructure (BBMRI), GO FAIR, the European Health Data Space (EHDS) as well as EARS-Net and EARS-VET for surveillance data in the clinical and animal sectors respectively.

OHAMR will also interact with other relevant stakeholders and policy makers, such as EC directorates (DGs) and EU agencies to align needs and provide scientific evidence-base for policy-making. These include DG for Research and Innovation (DG RTD), DG for Health and Food Safety (DG SANTE, including the EU AMR One Health Network), DG for Agriculture and Rural Development (DG AGRI), the Health Emergency Preparedness and Response department (HERA) the European Centre for Disease Prevention and Control (ECDC), the European Food Safety Authority (EFSA), the European Medicines Agency (EMA) and the European Environment Agency (EEA) (including the One Health cross agency task force[29]). In addition, OHAMR will be in close contact and align programmes of the WHO, the UN Quadripartite (including participation in the AMR Multi-Stakeholder Partnership Platform) and other international initiatives, such as the Global Leaders Group on Antimicrobial Resistance (AMR Leaders) Global AMR R&D Hub, the STAR-IDAZ International Research Consortium and the MedVetNet Association.

[29] *The EU agencies One Health cross-agency task force*

Roadmap development process

This Roadmap has been developed by partners in the CSA DESIGN OH AMR, with the contribution of JPIAMR members, additional funders who have expressed interest to join OHAMR, as well as other experts and relevant stakeholders. Below is a short description of the development process.

The Focus Areas of the Roadmap is based on the Research and Innovation Objectives of the OHAMR SRIA[30], which were developed by five thematic working groups covering Therapeutics, Diagnostics, Surveillance, Transmission and Evolution, and Interventions for prevention and mitigation. A series of consultations with various stakeholders were performed during the development of the Research and Innovation Objectives. The working groups consisted of the JPIAMR Scientific Advisory Board and additional scientific experts and the members of the working groups also played an important role in the refinement, combination and prioritisation of the objectives into focus areas and potential topics, during a workshop in Berlin 15-16 May 2023. The outcomes of the workshop are detailed in a report[31].

The R&I Funding programme is based on the work by a working group for a portfolio of potential funding instruments, including two workshops and a survey directed to funders and the research community. More details can be found in a published report[32].

Four working groups were formed in November-December 2023 to further develop the four programmes of the Roadmap. These working groups consisted of representatives from funding organisations that have expressed interest to join OHAMR, JPIAMR members and additional experts nominated by member countries.

In addition, the following consultations and meetings have taken place to obtain feedback on the content of the Roadmap:

Date	Participants	Format
30 Aug 2023	JPIAMR Steering Committee	Meeting
Sept 2023	DESIGN OHAMR consortium	Written feedback and consortium meeting 29 Sept
Sept 2023	JPIAMR Scientific Advisory Board (SAB)	Written feedback and SAB meeting 14 Sept
Sept-Oct 2023	EPHA AMR Stakeholder Network	Meeting 19 Sept and written survey
3 October 2023	EU agencies (EFSA, ECDC, EMA, EEA)	Meeting

[30] *Draft SRIA of the European Partnership on One Health AMR (May 2023)*
[31] *Prioritisation Workshop Report, Berlin 15-16 May 2023*
[32] *Report Portfolio of Funding Instruments for the OHAMR Partnership*

Date	Participants	Format
13 Oct 2023	JPIAMR Management Board and funders that have expressed interest to join OHAMR	Meeting and break-out room discussions
23 Nov 2023	Innovation agencies	Meeting
Nov-Dec 2023	Other European partnerships	Individual meetings
Nov-Dec 2023	AMR international resource mobilisation organisations in LMICS	Survey

The Roadmap will feed into the proposal of the OHAMR partnership, which will be submitted in September 2024 and the activities of the programmes will be further developed by the foreseen OHAMR partners. The call topics and activities will be described in more detail in each annual work programme. New topics and activities might be added reflecting scientific and other needs. This version of the Roadmap should be treated as a draft which could potentially be revised during the final preparations of the OHAMR partnership. The final version of the Roadmap will be adopted by the OHAMR partners at the start of the partnership and a revision of the Roadmap is also envisaged approximately three years after the start of the OHAMR partnership.

Abbreviations

AI	Artificial intelligence
AMR	Antimicrobial Resistance
AMU	Antimicrobial Use
CS	Capacity Strengthening
EC	European Commission
ECDC	European Centre for Disease Prevention and Control
ECR	Early Career Researcher
EEA	European Environment Agency
EFSA	European Food Safety Authority
EMA	European Medicines Agency
ERA	European Research Area
EU	European Union
FAIR	Findable, Accessible, Interoperable and Reusable
FPO	Funding partner organisations
IPC	Infection prevention and control
JPIAMR	Joint Programming Initiative on Antimicrobial Resistance
LMICs	Low- and middle-income countries
OH	One Health
OHAMR	European Partnership on One Health Antimicrobial Resistance
PRP	Peer Review Panel
R&I	Research and innovation
SME	Small and medium-sized enterprise
SRIA	Strategic Research and Innovation Agenda
WHO	World Health Organization