



**European Cooperation  
in the field of Scientific  
and Technical Research  
- COST -**

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**Brussels, 15 May 2014**

**COST 056/14**

**MEMORANDUM OF UNDERSTANDING**

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Subject : Memorandum of Understanding for the implementation of a European Concerted Research Action designated as COST Action TD1404: Network for Evaluation of One Health (NEOH)

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Delegations will find attached the Memorandum of Understanding for COST Action TD1404 as approved by the COST Committee of Senior Officials (CSO) at its 190th meeting on 14 May 2014.

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**MEMORANDUM OF UNDERSTANDING**  
**For the implementation of a European Concerted Research Action designated as**  
**COST Action TD1404**  
**NETWORK FOR EVALUATION OF ONE HEALTH (NEOH)**

The Parties to this Memorandum of Understanding, declaring their common intention to participate in the concerted Action referred to above and described in the technical Annex to the Memorandum, have reached the following understanding:

1. The Action will be carried out in accordance with the provisions of document COST 4114/13 “COST Action Management” and document COST 4112/13 “Rules for Participation in and Implementation of COST Activities” , or in any new document amending or replacing them, the contents of which the Parties are fully aware of.
2. The main objective of the Action is to enable future quantitative evaluations of One Health activities and to further the evidence base by developing and applying a science-based evaluation protocol in a community of experts.
3. The economic dimension of the activities carried out under the Action has been estimated, on the basis of information available during the planning of the Action, at EUR 28 million in 2014 prices.
4. The Memorandum of Understanding will take effect on being accepted by at least five Parties.
5. The Memorandum of Understanding will remain in force for a period of 4 years, calculated from the date of the first meeting of the Management Committee, unless the duration of the Action is modified according to the provisions of section 2. *Changes to a COST Action* in the document COST 4114/13.

## **GENERAL FEATURES**

### **Initial Idea:**

Human health and well-being are increasingly affected by global challenges such as malnutrition, emerging and endemic zoonotic diseases, antimicrobial resistance and climate change. A One Health approach has been proposed to tackle the challenges through accepting that their complexity requires interdisciplinarity, in particular applying natural and social sciences to human and animal health in the context of a sustainable environment. Several One Health initiatives have been implemented, such as the establishment of cross-sectoral coordination, communication and data sharing mechanisms as well as jointly executed risk assessments and disease control programmes.

However, no standardised methodology exists for quantitative evaluation of One Health activities; many One Health activities have not been evaluated or their assessments are qualitative. Therefore policy makers have insufficient evidence for making decisions on new policies and allocation of resources for a wider One Health approach.

The principal aim of the Network for Evaluation of One Health (NEOH) is to enable future quantitative evaluations and to further the evidence base of One Health activities by delivering:

- A science-based evaluation protocol for One Health activities
- Coordination of evaluations of existing One Health initiatives
- A networked community of experts collaborating to further the evidence base
- Researchers trained in performing evaluations of One Health activities.

**Keywords:** One Health, impact assessment, standardised methods, metrics, evaluation, index, public health, animal health, human health, environment, infectious disease, emerging zoonotic disease, zoonoses, disease mitigation, risk management, prevention, surveillance, intervention, food safety, food security, economic efficiency, cost-effectiveness, multidisciplinary, interdisciplinary

## A. CHALLENGE

Human health and well-being are increasingly affected by multidimensional global challenges which would indicate that they cannot be tackled by one discipline alone. The “One Health” concept acknowledges this complexity and proposes the need for interdisciplinarity, in particular between natural and social sciences working in human and animal health sectors and with people involved in sustainable environments to alleviate and mitigate the health risks to the global community.

Put into practice One Health initiatives include

- Joint cross-sectoral coordination (inter-ministerial committees, task forces, etc.)
- Routine communication (e.g. within and among individuals of agencies or sectors, outreach and education activities)
- Joint simulation exercises (e.g. emergency preparedness)
- Data and resource sharing (e.g. common data formats, means for routine data exchange)
- Joint risk assessment and risk management (e.g. formal analyses to inform programme development)
- Active cooperation on disease control programmes

While several such One Health activities have been launched worldwide, there is currently

- No systematic application of existing disciplinary methodology for the evaluation of One Health initiatives
- Sparse quantitative evaluation and assessment of One Health approaches,
- No systematic shifts in resource allocation towards One Health approaches.

This is a vicious circle that centres on the lack of an evaluation framework. Therefore the overall aim of NEOH is to enable appropriate evaluations of One Health activities and hence comparison of initiatives as well as informed decision-making and resource allocation. To this end, NEOH will deliver

- A science-based, standardised framework for the evaluation of One Health
- A suite of example evaluations of One Health initiatives
- A networked community of experts collaborating to assess the value of One Health
- A pool of early-stage researchers trained in performing evaluations of One Health activities.

## A 1. Challenges addressed by NEOH

### Background

The idea of interdependencies between human health, animal health and the environment at the core of the One Health concept is not a recent invention. Nevertheless, the different disciplines of human medicine, veterinary and environmental sciences have largely developed in isolation in the last fifty years linked tenuously through basic biology, but lacking holistic frameworks through which biological events are set in socio-economic context. Recent challenges associated with increasing globalisation and growing human and livestock populations have encouraged disciplines to work together more closely. The use of the new phrase “One Health” emerged in the early years of the 21<sup>st</sup> century; its widespread uptake has been spurred by the global avian influenza (AI) epidemic that followed the emergence of severe acute respiratory syndrome (SARS) in this time period.

With regards to this Action, One Health is defined as a concept that addresses complex challenges to promote the health and well-being of all species and the environment through the integration of relevant sciences at systems level. The methodologies established during NEOH will also be applicable to the closely related concepts of Ecohealth and Agrihealth, but for the sake of simplicity reference will only be made to One Health in this document.

### A 1.1 Need for interdisciplinary collaboration to tackle complex global challenges (*Objective Category B13: Bridging separate fields of science/discipline*)

The following challenges illustrate the complexity of factors that adversely affect health and well-being. They require combined expertise from veterinary and public health specialists, environmental specialists, economists, sociologists, epidemiologists, nutrition researchers, and political scientists.

**Global challenge 1: Malnutrition.** Food production, processing, retailing and consumption have become increasingly complex: economic growth, population growth, changing demand patterns particularly from coarse grains to livestock products (e.g. increased meat consumption in emerging nations), urbanisation, and energy production are all interlinked in a web of global trade. Despite unprecedented levels of global food production, 842 million people remain chronically undernourished and over a billion suffer from micronutrient deficiencies. At the same time, inexpensive refined cereals, sugars and fats contribute to an energy dense and nutrient poor diet, leading to a pandemic of obesity, diabetes and chronic diseases. Under and over nutrition lead to health problems and have been linked to susceptibility to pathogenic disease.

**Global challenge 2: Emerging zoonotic disease.** The boom in global demand for and production of livestock products has altered the ways in which animals are managed and produced leading to a higher proportion kept in industrial livestock systems with larger herds/flocks, higher population densities, new housing systems, use of high performance breeds, shifts in feeding patterns from grass to corn, exploration of new habitats with increased wildlife contact, and intense global movements. These changes give rise to concerns about disease emergence in evolving livestock systems and consequential pandemics. Over the last 30 years, new infectious agents affecting humans have emerged at a rate of more than one per year. Around 60% of all human infectious diseases and 75% of emerging infectious diseases are of zoonotic origin. Bovine spongiform encephalopathy, SARS, highly pathogenic AI and influenza A H1N1 caused costs of US \$ 220 billion in terms of control and health expenditures and losses from trade, tourism and tax revenues.

**Global challenge 3: Endemic diseases, zoonoses and antimicrobial resistance.** Despite the high profile and worldwide alarm about various emerging infectious diseases, endemic zoonoses (viral, bacterial, and parasitic diseases) impose the greatest human health burden. They cause sickness and death among (poor) livestock keepers, their communities and consumers of livestock products and cause major health service costs. Further, zoonotic and production diseases reduce livestock productivity and consequently the value of livestock output, which affects income. In addition, antimicrobial resistance is a major problem for human and animal health worldwide. The growing number of treatment failures associated with antimicrobial drugs of choice for hospitalised humans, combined with reports on increased prevalence of human carriers of multi-resistant bacteria, are raising concern globally.

**Global challenge 4: Food production and environmental change.** Livestock production is a major contributor to global climate change, through emissions of carbon dioxide, nitrogen, methane and other gases, and the conversion of habitats to pasture and croplands. Apart from emissions through land use, land use change, deforestation, and crop production for feed, methane emissions from ruminant livestock account for between 5 and 6% of global anthropogenic emissions. Further, livestock affects biodiversity levels through habitat fragmentation, introduction of foreign species, conversion of natural ecosystems by intensification and decreased genetic diversity of livestock species. The Living Planet Index has declined by more than 30% since 1970.

**Action progress:** NEOH will generate, exchange and disseminate new interdisciplinary knowledge (conceptual and technical) and promote interdisciplinary skills and collaboration. A conceptualisation stage across disciplines will be used to identify key elements and definitions that must be included in the evaluation of One Health activities. The network will define in a coherent and interdisciplinarily plausible and understandable manner the context in which the global

challenges can be described and analysed. This includes aspects ranging from theoretical basics to procedural recommendations, harmonising methods and data in order to make them accessible for meta-analysis.

To promote this process, the Management Committee (MC) as well as all 4 Working Groups (WG) will have an interdisciplinary composition with a mix of social and natural sciences across sectors. Participants will be able to exchange knowledge, build relationships and promote interdisciplinary skills at two full meetings per year and interdisciplinary collaboration will take place within the WGs throughout. Planned Training Schools, Short-Term Scientific Missions (STSM) as well as joint publication efforts will contribute to strengthen interdisciplinary ties.

### **A 1.2 Development of evaluation framework for One Health** (*Objective Category 5:*

*Development of knowledge needing international coordination*)

**State of the Art:** While many people agree that One Health adds value compared to traditional single disciplinary and sectoral approaches, there is limited evidence available that demonstrates or even quantifies this added value in comparison to costs that necessarily accrue when implementing holistic approaches like One Health and changing existing health systems. In particular there is a lack of comparison studies, for example, before/after One Health implementation, case-control, or randomised control trial study designs. There are plenty of studies that describe (rather than measure) multiple benefits of One Health such as increasing the benefit gained per resource unit used by sharing resources, larger societal benefits through integrated valuation of the impact of disease mitigation on human and animal health, reduction of the likelihood of zoonotic disease emergence and establishment, reduction of uncertainty in disease mitigation decisions and improved information, knowledge and collaboration. In contrast, only a dozen studies have actually measured the value of One Health.

Many methods and data protocols exist to investigate several of the relationships described. These cover some specific disciplinary aspects (e.g. Global Burden of Disease study based on disability-adjusted life years, DALY). In addition, some integrated assessments of zoonoses use composite indexes of cost-effectiveness in terms of cost per DALY averted with regards to public health, profitability for livestock, and assessment of cost sharing schemes.

**Relevance and Timeliness:** The existing disciplinary evaluation methods are recognised; yet it is argued that the underlying problem of partial evidence is the absence of standardised methods for the evaluation of One Health that fully capture the complexity. Multiple disciplines are needed to generate output in various populations, sectors and levels to truly characterise, quantify and assess One Health. However, metrics which combine and compare all the relevant social, cultural,

economic, health and other outputs have not been developed. The challenge lies in combining the right metrics and methods to allow a systematic assessment and comparison of One Health initiatives. An international workshop in September 2013 on metrics to measure One Health concluded that a standardised approach for One Health evaluation is needed and that such an approach needs to be tested by applying it to empirical case studies. So far, no organisation has taken the lead to establish such an evaluation method for One Health initiatives that brings together human, animal and environmental health and the factors that impact them. The Action will fill this gap.

**Action progress:** NEOH will develop a robust and standardised framework including metrics and associated methods for the evaluation of One Health initiatives. Work towards this objective will be performed within Working Group 1 (WG1). The main output of WG1 will contain three elements, namely (1) the overall framework, (2) a One Health index and (3) a protocol.

- **Framework:** During the Action, available evaluation frameworks, metrics and methods from various disciplines will be compiled and their suitability for the evaluation of One Health will be assessed. Where applicable, available methods and frameworks will be modified for interdisciplinary epidemiological and socio-economic analyses. A methodological approach for evaluation will be described and parameters with standardisation potential defined (e.g. access to health care, time to detection of new outbreaks, enhanced ecosystem service provision)
- **Index:** The index will comprise inputs (investments) into animal, human and environmental health and compare those to gross output measures from relevant disciplines (e.g. human health – DALYs, animal health – productivity).
- **Protocol:** It will detail the evaluation methodologies and data collection, storage, analysis and reporting processes (see Section C).

### **A 1.3 Evaluation of One Health initiatives** (*Objective Category 4: Performance assessment of theory/methodology*)

**State of the art:** Multiple One Health initiatives have been developed worldwide: there are new One Health training courses (e.g. MSc courses), One Health research consortia, human and animal health interventions with shared resources and/or budget allocation, One Health surveillance (e.g. the Human Animal Infections and Risk Surveillance group in the UK examines reports on infectious incidents in animal and human populations globally), collaboration of government departments (e.g. the Swiss government merged the food safety section of the public health department and the federal veterinary service) and One Health endorsement resolutions adopted by many organisations (e.g. American Medical Association, American Veterinary Medical Association). Around a dozen case reports and systematic assessments of One Health initiatives

exist.

**Relevance and timeliness:** The inherent complexity of interrelationships in the system emphasises the need to use estimates of the value of One Health to guide decision making in relation to resource allocation at regional, national and international level. Currently available evaluation results are not usually comparable and are often based on assumptions and expert opinion rather than empirical data. This not only constrains decision-making, but also the innovation of data collection protocols and the development of databases to capture and quantify the value of interdisciplinary approaches. To date, there are no integrated databases that address the full complexity of interdisciplinary challenges or meta-analyses of studies published that report the value of One Health as a concept.

**Action progress:** NEOH will coordinate the application of the framework, protocol and index developed to evaluate different One Health projects. The ongoing implementation of One Health initiatives creates a unique opportunity in terms of collecting appropriate data. Based on agreement of a methodological approach for evaluation of One Health initiatives (see previous objective), a first draft protocol will be developed and circulated within the network for application in empirical research. Many NEOH Participants are involved in One Health projects and have access to data that will allow testing of the developed framework, index and protocol. Participants will use datasets from One Health projects they are involved in to include evaluation of One Health in such work where appropriate. This will create additional evidence on the (cost)-effectiveness of One Health initiatives. Because of the application of a shared protocol, these studies will be available for international comparison and they will be suitable for meta-analysis. The findings from the case studies will be compared and communicated to relevant decision- and policy-makers. The final guidelines will be published in a peer-reviewed journal and disseminated by Participants through their networks within the scientific community, international organisations, non-governmental organisations (NGOs) and government departments (see Section C for details) to stimulate the uptake of the approach developed.

#### **A 1.4 Creating the necessary evidence-base to enable informed decision-making and resource allocation** (*Objective Category 7: Input to stakeholders*)

**State of the Art:** Every year millions of dollars are spent globally on managing, preventing and researching human and animal health problems. The current allocation of money is based on existing understanding of biological mechanisms underlying disease progression and transmission of pathogens and the application of biological knowledge to improve health management. When resources are allocated to One Health activities, decisions are rarely based on scientific evidence on (cost)-effectiveness, or on social acceptability. Further, they often focus on a narrow definition of

health, thus ignoring wider reaching processes that cause health problems (e.g. income from livestock production, environmental effects or malnutrition) and which should be fundamental aspects of prioritisation and efficient resource allocation for more effective health outcomes.

**Relevance and Timeliness:** Recognition of the complex problems facing humanity has led to an increased demand in the past decade for interdisciplinary approaches to mitigate disease risks. However, this is not supported by a systematic allocation of resources to integrated (multi)national programmes, and ministries of health and ministries of agriculture remain largely separated with individual budgets, agendas and responsibilities. There is a paucity of rigorous evidence demonstrating which One Health initiatives do or do not work, their cost-effectiveness and which factors influence the performance of these activities. This is complicated by sharing and reporting barriers both within and across institutions, lack of agreements on leadership, resource allocation and distribution of tasks among collaborators and inertia within existing sectoral systems. For policy makers, information on the extent of efficiency gains across health and environmental sectors is essential to inform decisions on resource allocation for strategies to promote health and well-being. Hence, the existing dearth of evidence needs to be addressed.

**Action progress:** By developing a framework for evaluation and applying it to case studies NEOH will generate the scientific evidence on the efficiency and cost-effectiveness of One Health activities required by decision-makers to develop policies and allocate resources. WG4 will be responsible for seeking a dialogue with national governments, NGOs, research organisations, and industry throughout the project to ensure that the evidence produced will address decision-makers' needs. They will be invited to be part of the problem formulation and accompany the Action throughout. Given the current momentum of One Health, the evidence generated will fall into policy windows of opportunity. This timely information will be accessible to a wide range of stakeholders and encourage uptake of cost-effective activities, and to strategically identify where resources for One Health would be more beneficial.

## A 2. Risks and Impact of NEOH

### A 2.1 Risks

An initial assessment of potential risks to the Action identified no high risks, but some low-medium risks that will be monitored by the Core Group (CG) and discussed in the MC to decide on contingency measures. The following table provides an overview of these risks.

<b>Risk</b>	<b>Probability</b>	<b>Severity</b>
Complexity of managing	Medium	Medium

multidisciplinary network is too high		
Biases due to incomplete or unavailable datasets	Low	Medium
Stakeholders do not implement the results of the Action	Low	Medium

### **A 2.2 Scientific Impact**

NEOH is expected to have significant scientific impact by developing the evaluation framework for One Health initiatives (including standardised methods and metrics) and by adding to the evidence base on the (cost-)effectiveness of the One Health concept. The urgent demand for such a science-based framework will warrant attention and rapid spread within the scientific communities, well beyond the network members. In addition, the broad base of input from many disciplines and the process of joint and transparent development will maximise the chances of widespread acceptance and uptake. A high level of scientific validity will be further supported by dissemination activities (see Section C) which will make Action activities transparent and communicate outputs to the scientific community for scrutiny.

Within the network, learning about other fields, methods, metrics, terminology and problem solving approaches will extend the boundaries of disciplinary knowledge and methodologies thereby promoting innovative approaches to reducing complex real-world problems that are often beyond a single discipline.

### **A 2.3 Societal Impact**

In the short-to-mid-term, the expected widespread adoption of the underlying methodologies by research groups will create further evidence as to whether One Health approaches add value and are more effective than existing health systems. This in turn will benefit European countries by allowing more systematic evaluation of investments into One Health and the identification of where such a holistic approach to health can be most beneficial. It is also likely to impact research funding schemes, when the benefits and impacts of One Health approaches become more widely acknowledged. This again is likely to influence positively the societal impact of research.

The long term benefit of improved decision-making and resource allocation and implementation of more successful disease mitigation programmes will be realisation of the benefits envisaged, in particular better animal, human and environmental health, reduction of poverty, economic growth, cost-savings, protection of ecosystem services, and improved nutrition.

## **B. ADDED VALUE OF NETWORKING**

Section A describes that One Health initiatives by definition are interdisciplinary in nature in order to tackle complex global challenges to health and well-being of all species. This implies that an evaluation framework for One Health should also be built on interdisciplinarity and be intersectoral. A formal and structured pan-European network will provide important benefits in comparison to what could be achieved without such a network. In particular, a coordinated network such as NEOH will:

1. Enhance the legitimacy of the developed evaluation methods and facilitate their widespread acceptance;
2. Form a clear pathway for communication towards policy-makers, a “single voice” that is more likely to be heard;
3. Be able to deliver more effective and in-depth solutions;
4. Allow the achievement of results in a more cost-effective manner;
5. Serve to reach international consensus more rapidly and in a timely manner;
6. Consolidate European competence in One Health and where appropriate raise the profile of One Health within Europe.

### **B 1. Enhanced legitimacy and facilitation of widespread uptake of One Health evaluation method**

The (informal) One Health community has organised meetings in recent years to discuss and promote One Health (e.g. Stone Mountain meeting, New Delhi ministerial conference, Winnipeg). These meetings have contributed to the evolution of a common definition of One Health and the establishment of a future research agenda. Further, these meetings have served to communicate new findings and ideas. However, each meeting has been organised by different research groups with their own strategic objectives. Such disparity and fragmentation has slowed down the advancement of common methodological approaches.

There is thus a need to make the network formal and to provide a structure for future events and to create strategic goals the Action can work towards. Regular meetings that the COST scheme will enable, will ensure that a strategic and coherent agenda can be followed and that goals and

objectives are met. By bringing together a critical mass of experts in the field, it will be possible to reach broad consensus and disseminate a widely accepted method as “one voice” (instead of fragmented messages) for uptake within the One Health community. This will trigger additional evaluations using the available methodology and further generation of evidence. Once robust evidence can be presented to organisations with an interest in One Health, it is expected that relevant decision-makers will release funding for implementation of cost-effective One Health initiatives.

## **B 2. A coordinated network is a more straightforward avenue of communication between researchers and policy-makers**

By creating a network comprised of experts in the field, working towards a common goal, the network will facilitate efficient knowledge exchange and systematic dissemination of outputs. The network has the potential to become the “go to” source for both the research community and policy makers working on One Health by providing access to evaluation tools and case studies. Existence of a single source is important as competing academic sources and outputs with different approaches can cause confusion among policy makers. Creating better accessible standardised national and international comparable evidence for policy makers is one part of the objective of this collaboration.

## **B 3. A coordinated interdisciplinary network will lead to more effective and in-depth solutions**

While knowledge can be exchanged in smaller meetings and irregularly at international conferences, such an approach only leads to fractional improvements that do not benefit from the full expertise available. Coordinated and structured network activities at international level, such as meetings and workshops aimed at developing an evaluation framework and methods for One Health could make greater use of synergies created from gathering the right people from multiple sectors and disciplines. Discussions in person will help stimulate creative thinking and aid progress. Working groups will be created to design evaluation tools and techniques to address different aspects of One Health evaluation by using the most suitable mix of people from different sectors and disciplines from the available network (e.g. statisticians, economists, epidemiologists, veterinary and environmental scientists) to provide in-depth and comprehensive solutions. This is rarely available within disciplinary departments and research groups in academic or policy institutions. Working in a disciplinary setting may lead to an unbalanced evaluation framework. For

example, animal health economists may provide an in-depth evaluation tool for the impact of One Health approaches on animal health, production and productivity but they may have insufficient knowledge to evaluate human health impacts.

Evaluations will not be complete without considering all aspects of One Health. Full evaluation will involve in-depth information provided by participants working within each discipline, coupled with experts on evaluation methods, who will set guidelines on the best evaluation approach. However, a further level of complexity will be required to merge disciplinary evaluations and to ensure that methods and tools are standardised. This is a key role of this Action.

#### **B 4. A formal network is more cost-effective in a growing field**

The topic of One Health and particularly its evaluation in the economic sense are recent and therefore the number of people working in this area is still relatively small. This demonstrates the need to coordinate efforts amongst research groups, to make best use of the available expertise and experience. A pan-European network will allow for coordinated efforts in gathering the expertise for meetings, workshops or other network activities. While individual research groups may pursue such activities, they are costly if organised in isolation, and are likely to lead to duplication of effort.

A separate fund for network activities by the COST scheme greatly complements other grant and project funding which is dedicated to research activities. This is specifically applicable to countries where available expertise and research funds are limited.

#### **B 5. A coordinated network will facilitate rapid and timely solutions**

A formal network with regular activities consisting of researchers working towards One Health evaluation will provide the most complete and timely solutions more rapidly. Communication between individual researchers and research groups can take place without such a network but it will not necessarily happen at regular intervals and following the same strategic objectives. This could lead to differences in approaches and competing practices, which fail to maximise the value of information for either the research community or policy makers. In addition, an informal network without dedicated resources for activities is less likely to have regular face-to-face meetings; discussions over e-mail or using the telephone are often not as efficient in advancing shared

research agendas and goals. Without a common strategic goal, groups may work in different directions and therefore take longer to reach an international consensus on unique and standardised evaluation methods, than would be reached using international coordination and regular meetings. Small work groups and plenary sessions will be included within meetings, facilitating the development of new ideas and approaches, but meaning that these can then be presented to and discussed by the wider group.

Timely solutions in this area of work are crucial because One Health approaches are increasingly on the agenda for policy makers. Without a significant body of evidence of their added value, however, they will not stay there for long.

#### **B 6. A formal network will consolidate European competence in One Health and raise the profile of One Health within Europe**

There are no formal One Health networks in existence within Europe. Through establishment of a pan-European network, this Action will contribute to solving health challenges within Europe and beyond. The Action will complement and, if appropriate, collaborate with similar organisations in operation in Asia, Africa and the United States, which link governmental departments, higher education institutions, non-government organisations, and/or private institutions. Thus NEOH will consolidate European competence in the One Health field and raise the profile of the One Health approach across Europe. This will attract further experts in different disciplines related to One Health to the network. Additionally, a formal pan-European network would be in a strong position to promote knowledge exchange and networking with international partners and will have global impact.

### **C. MILESTONES AND DELIVERABLES: CONTENTS AND TIME FRAMES**

#### **STRATEGY**

**Objective 1 (A.7) - Type: Input to stakeholders (e.g. standardization body, policy-makers, regulators, users) - excluding commercial applications**

1. Science and Technology Event or Meeting, Action Conference.
2. Science and Technology Event or Meeting, Action Workshop.

3. Stakeholders Outreach, including Unwritten Inputs and Dissemination, to the government sector.
4. Documents to be Used as Input to Stakeholders, to the government sector.
5. Book of Abstracts or Proceedings of COST Action Conference or Workshop, open access.

**Objective 2 (A.4) - Type: Comparison and/or performance assessment of theory/model/scenario/projection/simulation/narrative/methodology/technology/technique**

1. Science and Technology Event or Meeting, Action Workshop.
2. Science and Technology Coordination, Short-Term Scientific Missions (STSM).
3. Science and Technology Event or Meeting, Training School.
4. Action Science and Technology Meeting, Working Group.
5. Joint peer-reviewed publication, open access.
6. Database, Open access.

**Objective 3 (A.5) - Type: Development of knowledge needing international coordination: new or improved theory/model/scenario/projection/simulation/narrative/methodology/technology/technique**

1. Handbook, Guidelines, Best Practices, for S&T purposes.
2. Action Science and Technology Meeting, Working Group.
3. Science and Technology Event or Meeting, Training School.
4. Science and Technology Event or Meeting, Action Workshop.
5. Science and Technology Coordination, Short-Term Scientific Missions (STSM).

**Objective 4 (B.13) - Type: Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach**

1. Database, Open access.
2. Science and Technology Coordination, Short-Term Scientific Missions (STSM).
3. Internal and External Communication, Website.
4. Achievement of Specific Network Features in terms of WG Composition, expertise.

The work plan aims to achieve the Action Objectives as specified in previous sections.

The first activity after the official start of the Action (1<sup>st</sup> MC meeting) will be a Management Committee (MC) meeting co-located with the first Action S&T meeting (Deliverable D1), during which the Working Groups (WGs) will be established (Table C1).

**Table C1. Description of working groups**

WG1	Framework, protocol and index development	Conceptualisation, standardised framework, protocol and index for systematic evaluation of One Health
WG2	Framework application	Case studies based on application of framework, protocol and index to primary and secondary One Health datasets
WG3	Meta-analysis	Meta-analysis of case study results to facilitate international comparison and development of policy recommendations
WG4	Stakeholder engagement, dissemination and policy	Communication strategy, dissemination and best practice guidelines, Training School for key-stakeholders

Table C2 below provides a summary of the main milestones (Milestone 1-6) and deliverables (D1-D16) and timeline of the Action.

**Table C2: Milestones and Deliverables**

Year	Name	Description	WG involved	Objective category	Date of completion
		Official first MC Meeting organised by COST Office			Month 0
1		MC meeting 2: Kick-off			Month 2
	D1	Action S&T Meeting (WG meetings) including sub-sessions with stakeholder participation	WG1-4	A5, A7	Month 2
	D2	Action website	WG4	B13	Month 2
		MC Meeting 3			Month 7

	D3	Action S&T Meeting (WG meetings) alongside Training School 1 - Educating researchers about concepts and research in other disciplines (focus on early stage researchers)	WG1-4	A5, B13	Month 7
	D4	Short-Term Scientific Missions to discuss framework	WG1	A5, B13	Month 11
2		MC Meeting 4			Month 13
	D5	First Action Workshop	WG1	A5, B13	Month 13
	D6	Handbook summarising framework, protocol & index (Milestone 1)	WG1	A5	Month 15
		MC Meeting 5			Month 19
	D7	Action S&T Meeting (WG meetings) – Presentation of preliminary evaluation results from initial case studies. Alongside: Training School 2 - Instructing researchers about evaluation framework and best practices	WG2, WG4	A4, B13	Month 19
	D8	Short-term scientific mission to re-evaluate protocol	WG2	A4, A5, B13	Month 24
	D9	Data analysis and calculation of index for initial case studies (Milestone 2)	WG2	A4	Month 24

3		MC Meeting 6			Month 26
	D10	Second Action Workshop	WG1-4	A4, A5, A7, B13	Month 26
	D11	Meta-Analysis of all case studies completed (Milestone 3)	WG3	A4	Month 30
		MC Meeting 7			Month 33
	D12	Action S&T Meeting	WG3	A4, B13	Month 33
	D13 & D14	Final version of handbook (D13) summarising framework, protocol and index publicised and recommendations for policy makers (D14) communicated (Milestone 4)	WG1, WG3, WG4	A5, A7, B13	Month 36
4		MC Meeting 8			Month 40
	D15	Action Conference (Milestone 5) alongside Training School 3: Instructing researchers about evaluation framework and best practices	WG1-4	A7, B13	Month 40
		MC Meeting 9			Month 47
	D16	Final Action Publication (Milestone 6)	WG1-4	A7, B13	Month 48

Development of the Evaluation Framework, Index and Protocol (Objective Category A5:  
Development of knowledge needing international coordination)

To make best use of disciplinary and interdisciplinary expertise in the Action, WG1 will include Participants who are specialists in their respective fields. WG1 will work on a standardised and widely accepted framework, index and protocol for systematic evaluation of One Health, taking into

account various disciplinary perspectives and resulting complexity. This will include identification and description of the health, economic, environmental, social and cultural impacts of One Health, compilation and comparison of metrics and methods available to measure these impacts based on a literature review (including technical and data requirements, and presentation of examples), mapping of pathways to impact and categorisation and prioritisation of One Health challenges. Suggestions for a framework, protocol and index will be developed by WG1 and circulated to all Action participants. The protocol will include

- guidelines for the description of the evaluation context,
- selection of the evaluation objective and evaluation question,
- elaboration of hypotheses to be tested,
- mapping of impact pathways,
- selection of impacts to be measured,
- definition of data and technical requirements,
- description of methods for analysis,
- and reporting in scientific and lay terms to facilitate international comparison.

The index will include inputs (investments/resources) to human, animal, environmental and public health and combinations of key outputs from the relevant fields and focus on measurable and comparable metrics (e.g. life expectancy, disability-adjusted life years, productivity, animal welfare, anthropometric measures, income). A second Action S&T meeting (D3) and Short-Term Scientific Missions (D4) will be organised to discuss the progress of the framework, index and protocol in smaller groups. Comments from participants will be collated and integrated into documentation to be circulated before the first Action Workshop (D5), which will be open to all Action Participants and invited participants. During this workshop, Action Participants will discuss the framework, protocol and index elaborated in small groups and plenary sessions. The aim will be to reach consensus on the suggested framework, protocol and index. Finally, the draft framework, protocol and index will be summarised in an electronic handbook (D6) to be disseminated to all Action participants for testing in case studies (see next Objective). After testing and application of the framework, protocol and index, a final version of the handbook (D13) summarising the framework, protocol and index will be published.

## Case Studies - Evaluations of existing One Health activities (Objective Category A4: Performance assessment of theory/methodology)

The application of framework, protocol and index described in the handbook will be coordinated by WG2. Participants will use or facilitate access to available primary and secondary datasets stemming from ongoing One Health projects they are involved in (e.g. data on use of growth promoters in poultry production, mass drug administration for helminth control, land-use change and pathogen emergence etc.). They will seek to apply the protocol in One Health projects in their institutions and local networks, i.e. they will actively create opportunities for the testing of the framework, index and protocol. The data collected will be analysed and preliminary results of an initial set of case studies will be presented at the Action S&T Meeting in Month 19 (D7). At the same time a Training School (D7) will be organised to instruct researchers about best practices based on the lessons learned to date. Short-term scientific missions (D8) will be conducted for Action Participants to re-evaluate the framework, index and protocol before the conference and deal with issues that come up in the testing/implementation phase. This will be communicated within the whole network to refine and improve the framework, protocol and index. The aim is for data analysis and calculation of the One Health index for the initial case studies to be complete by the end of Month 24 (D9 = Milestone 2). The case studies will be presented at the second Action Workshop (D10), which will be open to all Action Participants and invited participants. Following this workshop, WG3 will conduct a meta-analysis of the available case study results (D11 = Milestone 3) to facilitate international comparison and the elaboration of policy recommendations. The case studies and meta-analysis will be published in joint publications. In addition, WG3 will develop recommendations for policy makers (D14) with regards to new policies and resource allocation (see next Objective).

## Involvement of decision-makers in NEOH activities (Objective Category A7: Input to stakeholders (e.g. standardisation body, policy-makers, regulators, users))

The Action aims to address the key questions of decision-makers “does One Health work?” and “is One Health worthwhile” and to generate rigorous evidence that would motivate enablers (policy makers, public sector, development programmes) and value chain actors to apply methods at the relevant scale. Uptake and use of the research will be facilitated by existing strong connections between the network and national governments, international organisations, and research organisations. Decision-maker input will be sought pro-actively at the beginning of the project by

inviting stakeholders to the kick-off meeting (D1) and throughout the project by seeking dialogue with stakeholders. WG4 will take responsibility for these activities and include Action Participants who already have good working relationships with key stakeholders in relevant organisations. WG4 will develop the Action website (D2), establish a communication and influence strategy covering the dissemination of contracted products (journal articles, popular articles, conference presentations, etc.) during the life of the project and invitation of key decision makers to relevant network meetings. It is foreseen that the handbook will be disseminated nationally and internationally and its use in the scientific community will be actively encouraged. This will facilitate implementation of further case studies and generation of evidence in different settings and contexts. In Month 40, a public Action Conference (D15 = Milestone 5) will be held to present the findings to date, exchange views and knowledge and disseminate the results. This Action Conference will include a Training School for key stakeholders where the recommendations for policy makers and handbook will be publicised and communicated. For those who cannot attend the Action Conference and Training School, further dissemination and events may be hosted in strategic locations (e.g. before or during international symposia) in the final year. To summarise the work of the Action, a Final Action Publication (D16 = Milestone 6) will be produced.

Creating the interdisciplinary network required to address evaluation of One Health approaches and to achieve sustainable policy impact (Objective Category B13: Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach)

This is a cross-cutting objective that will permeate through all NEOH activities. To be able to evaluate One Health, the Action will bring together the different necessary disciplines to discuss how the available tools and methods can be combined in a meaningful way. Therefore, the Action includes Participants from the disciplines of health, economics, nutrition, environmental science and policy making as well as statistics and epidemiology. To promote interdisciplinary exchange, WGs will include expert members from the social and natural sciences across the sectors involved. Regular meetings, workshops and conferences (D1, D3, D5, D7, D10, D12, D15) will be held and Short-Term Scientific Missions (D4, D8) will enable exchange of views, ideas and knowledge. Relevant materials from different fields will also be shared by email and using the Action's data sharing platform and website (D2) to promote interdisciplinary understanding and cross-fertilisation. The Action will aim to respect the views of others, communicate in a manner suitable for an interdisciplinary context, and will select pro-actively the most suitable metrics, methods and tools from relevant disciplines. People more experienced in interdisciplinary work will give advice

to less experienced Participants to help them acquire interdisciplinary skills and facilitate collaboration. In addition, to promote interdisciplinary exchange and education, Training Schools targeted at early stage researchers (D3) or more generally (D7, D15) will be established to provide formation in concepts and research in other disciplines or the evaluation framework and best practices.

## **D. ACTION STRUCTURE AND PARTICIPATION – WORKING GROUPS, MANAGEMENT, INTERNAL PROCEDURES**

### **D 1. Action Structure**

The structure of NEOH is designed to offer a framework for building and maintaining a pan-European network collaborating to achieve the common objectives. Action organisation and management will strictly follow the rules established by the COST scheme.

The main decision-making body will be the Management Committee (MC) which is composed of up to two representatives of each COST Country which has signed the Memorandum of Understanding (MoU) of the Action. MC Members are nominated by the COST National Coordinators of the COST Countries. The Action starts with the first MC Meeting, in which the MC Chair and MC Vice Chair are elected. The specific remit of the MC will be to take decisions on:

- The Action structure
- The Action strategy and the organisation of the Action S&T activities
- Budget relevant questions, including the reimbursement of Action participants
- Invitation of additional participants (e.g. Invited Experts, Occasional Participants)

The main Action activities are organised into four Working Groups (WG), each aiming at comprising of a mix of expert members from the social and natural sciences across the sectors involved. For each WG one WG Leader and one WG Co-Leader will be elected by the MC. Criteria for the selection of WG Leaders include: MC membership, scientific background, leadership and COST scheme experience. For WG Co-Leaders, early-stage researchers will be preferred. WG Leader and Co-Leader will jointly coordinate the activities within the WG, will chair the WG

Meetings and will prepare annual progress reports for submission to the MC. Expert members will be selected based on their scientific background (ensuring interdisciplinarity) and they should preferably originate from different COST countries.

For day-to-day management a Core Group (CG) will be formed, comprising the MC Chair, MC Vice Chair and WG Leaders.

In addition, the MC will elect the following bodies:

- Conference Organisation Committee (COC): Responsible for planning and organisation of MC/WG meetings, Training Schools, Action Workshops and the final Action Conference.
- Editorial Board (EB): In charge of preparing the Final Action Publication. The EB will include one experienced researcher from each WG and the MC Chair.
- STSM Committee (STSMC): Responsible for assessing and approving Short-Term Scientific Missions. The STSMC will include at least four members from different COST countries.
- Webmaster (WM): Organisation responsible for setting up and maintaining the Action website. At least one person of the WM must be a member of WG4.

## **D 2. Procedures**

Two MC Meetings will be held each year. WG and CG Meetings will be held alongside the MC Meetings to consolidate travel costs. In addition, the CG will hold regular tele-conferences at least once every three months. The Action will also organise several events open to the scientific community and stakeholders: Action Workshops will be targeted towards the development of scientific and technical outputs, for instance framework development in WG1 and case study meta-analysis in WG3. In the final year of NEOH an Action Conference will be organised in order to showcase the achievements of the Action and to disseminate the final output to stakeholders.

Finally, Training Schools will be organised with the aim of 1) educating researchers from each relevant scientific discipline about the concepts and research performed in the other disciplines and 2) instructing researchers about the evaluation framework and best practices elaborated in WG1.

Decision making: If required to fulfil its duties, the MC may be convened in addition to the regular MC Meetings according to the rules established by the COST scheme. MC Meetings shall be

officially held only if at least two-thirds of the participating COST Countries are represented. Each COST Country and Cooperating State participating in the Action has one vote in the MC. Decisions are taken by simple majority vote of MC Members present or represented. Votes can be held electronically via e-mail under the conditions laid down in the COST Implementation Rules.

Quality management: NEOH will apply a general “four-eye” principle for ensuring the quality of output produced: any Action output will be checked by at least one person with appropriate expertise who was not involved in the production of the output. The WG Leaders and Co- Leaders are responsible for overseeing the implementation of this principle within their WGs.

Publications: All publications and dissemination tools will comply with the COST Checklist for Publications (e.g. reference to COST funding, use of logos). Each publication and dissemination activity has to be approved by the MC.

Supporting early-stage researchers (ESR) is an important aspect of NEOH. In particular, ESRs will be

- given preference in the approval of STSM,
- selected preferentially as WG Co-Leader,
- encouraged to apply for COST Conference Grants,
- selected preferentially as Training School participants,
- nominated as national MC delegates whenever possible.

Equal rights: Throughout the Action NEOH participants will strongly emphasise principle equal rights irrespective of sex, race, gender, handicap or nationality.

### **D 3. Plan for network enlargement**

A declared objective of NEOH is to continuously grow the network during the course of the Action. Researchers from additional COST Countries and other eligible countries will be invited to join the Action by signing the MoU. WG4 will elaborate a dissemination plan comprising a set of coordinated measures directed towards achieving this objective.