

COST Action

Progress Report at 24 months

(29/10/2018 to 29/10/2020)

CA17110: Standardizing output-based surveillance to control non-regulated diseases of cattle in the EU

The Action was approved by the Committee of Senior Officials (CSO) on 13-4-2018 and has the MoU reference COST 021/18.

This report shows the data entered into e-COST to enable the Action Chair to verify the completeness and accuracy of the report with the MC prior to submitting the report via e-COST in fulfilment of the rules for COST Action Management, Monitoring and Final Assessment.

COST Association AISBL

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Action leadership and participants

Leadership positions

Position	Name	Contact details	Country*
Chair	Dr Inge Santman-Berends	i.santman@gdanimalhealth.com +33570660546	Netherlands

Position	Name	Contact details	Country*
Vice Chair	Prof Christine Fourichon	christine.fourichon@oniris-nantes.fr +33240687786	France

Working groups

#	WG Title	# of participants	WG Leader	Country*
1	WG1. Characteristics of existing CPs and requirements for an output-based framework	42	Prof George Gunn george.gunn@sruc.ac.uk	United Kingdom
2	WG2. Data requirements and availability	18	Prof Gerdien van Schaik g.v.schaik@gdanimalhealth.com	Netherlands
3	WG3. Evaluate existing methods with potential for output-based comparison of CPs	20	Dr Aurélien Madouasse Aurelien.Madouasse@oniris-nantes.fr	France
4	WG4. Stimulate initiatives aiming at development of methodologies that address knowledge gaps	20	Dr John Berezowski john.berezowski@vetsuisse.unibe.ch	Switzerland
5	WG5. Dissemination and adoption	18	Ms Tanja Knific tanja.knific@vf.uni-lj.si	Slovenia

Other key leadership positions

Position	Name	Contact details	Country*
STSM Coordinator	Dr Jacinto Gomes	jacinto.gomes@iniav.pt	Portugal
Science Communication Manager	Ms Tanja Knific	tanja.knific@vf.uni-lj.si	Slovenia
GH Scientific Representative	Prof Christine Fourichon	christine.fourichon@oniris-nantes.fr	France

* The country displayed is:

- for the Action Chair, the country that nominated that person to the Management Committee before they were elected Action Chair;
- for the Vice Chair the country that nominated the person as a Management Committee Member,
- for all other leadership positions, if the person is a MC Member the country displayed is the country of nomination, otherwise it is the country of the person's primary work affiliation.

Participants

COST members having accepted the MoU

AL	13/11/2018	AT	08/05/2018	BE	10/07/2018	BA	26/10/2018	HR	28/06/2018
DK	04/05/2018	EE	11/05/2018	FI	14/06/2018	FR	07/05/2018	DE	18/05/2018
EL	16/05/2018	HU	18/05/2018	IE	15/05/2018	IT	13/07/2018	LV	16/05/2018
LT	21/10/2019	NL	04/05/2018	MK	30/08/2018	NO	15/05/2018	PL	30/05/2018
PT	30/05/2018	RO	05/12/2018	RS	12/07/2018	SK	03/07/2018	SI	14/05/2018
ES	07/06/2018	SE	13/06/2018	CH	03/05/2018	TR	05/11/2018	UK	03/05/2018

Other participants

Institution Name	Country
National Academy of Agrarian Sciences of the Ukraine	Ukraine
University of Prishtina	Kosovo*

Summary

The main aim and objective of the Action is to

coordinate, stimulate and assist with initiatives to explore and implement a widely adaptable output-based framework applicable to substantiate the confidence of freedom and costs-effectiveness in current surveillance, control or eradication programmes for non-regulated cattle diseases in the EU.

During its first two years the Action progressed the achievement of this as described below

In the SOUND control COST Action, more than 100 multidisciplinary researchers originating from 32 different European countries work together to achieve the goals of by this Action. For this, the SOUND control COST Action was subdivided into five working groups that work closely together on the topic of output based surveillance. In WG1 (characteristics of existing control programmes (CPs) and requirements for an output based framework), definitions were set for important terms used in this action (e.g. disease status, non-regulated disease and control programme). Subsequently, a list of diseases that were within the scope of this action were defined and an overview was generated of each of these diseases in the participating countries (D1.1). Subsequently, WG1 was successful in submitting a proposal to Frontiers of Veterinary Science and a research topic was started that welcome scientific papers that describe control programmes for non-EU regulated diseases. These papers will be the basis of the handbook which is due in GP4 (D1.3). Among the members of the SOUND control COST Action, contact details were collected from relevant stakeholder organizations in each of the countries and the organizations on this list were added to the target list for dissemination (D1.2). Together with WG2 (data requirements and availability), WG1 developed a list with requirements for data needed for an output based framework. WG2, subsequently developed a data-matrix suited to evaluate i) data availability and ii) data quality and to collect data that could serve as input for an output based framework. The initial version of the matrix was pre-tested by two countries in the consortium and was subsequently discussed, evaluated and optimized during an interactive session in a workshop open to the whole consortium. Thereafter the matrix was digitalized and sent out to SOUND control members to obtain quantitative results from all countries. In the next period, the results of this evaluation will be analyzed. WG3 evaluated the available methods that are currently in place for output based surveillance and generated a table with recommendations which methods could be used in which situation. In WG4, information needs were identified using participatory methods in a workshop with WG4 members. Working Group 4 had planned stakeholder evaluation meetings but unfortunately these were canceled due to COVID-19. Currently online tools to replace face-to-face workshops with stakeholders are being explored. The dissemination of our work is covered by WG5. For visibility a website was developed, two newsletters were published, flyers were created and disseminated in each of the COST countries, a scientific paper describing our Action was written and published and each member provided updates on the Action to the national stakeholders. Given that there was a large variety of background knowledge on the topic of the Action, part of the members felt the need to be educated on several topics related to the Action such as epidemiology, surveillance, sample size estimation, risk analysis and statistical methods. From GP3 on (online) training schools will be organized for members of the Action.

The Action will implement the following measures in the coming two years to overcome any issues identified in this report as potentially endangering the achievement of the objectives of the Action

- Organization of regular online meetings for each of the WG in our Action
- Organization of online training schools when physical training schools are not allowed
- Stimulating people to develop scientific publications together presenting the work of our Action
- Organizing regular STSM calls given that a STSM may be possible even in the event where we can not organize bigger events yet
- Organizing online COST events where we invite all SOUND control members to all content related

meetings and presentations

- Stimulate WG members to participate in the development of promotional materials and the online newsletter
- Evaluate the possibility to use online interactive tools to use within the online meetings to stimulate participation
- During the life time of the Action we sometimes observed that some countries that were members of the Action were not participating. We addressed this by contacting other people in the country. We were partially successful with this approach. From some countries more active members joined and are now participating, but we still have a small number of countries that are members of the Action but that do not really have an active role. We keep pursuing this matter.

Action website

<http://www.sound-control.eu/>

Achievement of MoU objectives, deliverables and additional outputs/ achievements

MoU objectives

Please self-assess and describe the level of achievement of each MoU objective. For any MoU objective that is 25% or less achieved, please add an explanation.

MoU objective	Combine knowledge from numerous disciplines, including veterinarians, epidemiologists, economists, sociologists and stakeholders from governmental organisations and industry (All WG).
Type of objective	1.a Development of a common understanding/definition of the subject matter 2.a Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda 2.c Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach
Level of progress	51 - 75%
Description of progress with achieving the MoU objective	Throughout the Action we are discussing all matters that are relevant for the Action with our WG members who have a multidisciplinary background. All knowledge that is available within the Action is taken into account.

MoU objective	Identify and reach agreement on the requirements (both scientific and practical) that should be met by a framework that aims at an objective comparison of the output of CPs for non-regulated cattle diseases in the EU (WG1).
Type of objective	1.a Development of a common understanding/definition of the subject matter 2.c Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	The first two GP's WG meetings and a WG1 and WG2 workshop were dedicated to identifying the requirements that should be met by an output based framework. The requirements do not only depend on 'what is desired' but also on 'what is possible'. For this WG2 is evaluating both data availability and data quality. Based on these results a final discussion is foreseen to define the requirements that should and can be met by an output based framework.

MoU objective	Identify the non-regulated cattle diseases for which control, eradication and/or surveillance are currently being conducted in the EU (WG1). The framework should be applicable to a large number of diseases, but will initially be designed for a few 'example diseases' with considerable variation between MS.
Type of objective	1.a Development of a common understanding/definition of the subject matter 1.b Coordination of information seeking, identification, collection and/or data curation 1.f Achievement of a specific tangible output that cannot be achieved without international coordination (e.g. due to practical issues such as database availability, language barriers, availability of infrastructure or know-how, etc.)
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	The non-regulated cattle diseases that are included in this COST Action were defined based on a definition for which mutual agreement was reached. The diseases, the country status and control efforts of each of the countries that participate in this Action

	are described in deliverable 1.1: Overview of non-regulated cattle diseases in the European Union for which control programmes (CPs) are in place within Member States (MS).
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MoU objective	Evaluate the availability and quality of the heterogeneous data that is needed as an input for an output-based framework. This will be evaluated at each level of aggregation and for each of the countries involved in the SOUND-control Action (WG2).
Type of objective	1.b Coordination of information seeking, identification, collection and/or data curation
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	A data-collection tool was developed in several STSMs and a workshop with WG2 members. The tool was initially tested for two countries, subsequently reviewed and optimized. Eventually the data collection tool was digitalized with LimeSurvey software and sent to WG2 members to be tested. After a final evaluation round, in June 2020, the tool was sent to SOUND control members representing their country. The SOUND control members either filled the data collection tool or made sure somebody from their country provided the necessary data on cattle demographics, control programmes for IBR, BVD and Johne's disease and risk factors for disease transmission. In total 32 countries were asked to fill the questionnaire and up to now results were obtained from 23 countries.

MoU objective	Evaluate existing methods enabling output-based comparison of CPs and identify gaps (WG3).
Type of objective	1.a Development of a common understanding/definition of the subject matter 1.b Coordination of information seeking, identification, collection and/or data curation 1.d Comparison and/or performance assessment of a theory, model, methodology, technology or technique
Level of progress	26 - 50%
Description of progress with achieving the MoU objective	Within the Action, the methods known to members of the Action that might be applicable to the case of output-based surveillance were presented among the members of WG3. During a number of STSMs the different methods were evaluated and a table was created that described which method could best be applied in which situation. At this moment the WG3 members are working on a joint publication on the results of this work.

MoU objective	Encourage research initiatives that aim to take the next steps into development of innovative methodologies that tackle the gaps identified in WG3, including mathematic, epidemiologic, economic and social science methods, and facilitate the possibilities for short term scientific missions (STSMs) to combine expertise from different research areas (WG4).
Type of objective	1.a Development of a common understanding/definition of the subject matter 1.b Coordination of information seeking, identification, collection and/or data curation 2.a Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda
Level of progress	0 - 25%
Description of progress with achieving the MoU objective	An initial stakeholders meeting was held in Warsaw in January 2020. During this meeting subject matter experts (epidemiologists from the SOUND COST Action and some external experts) took initial steps towards the development of an internationally shared and agreed upon set of information needs for output based surveillance. Next steps will be to include additional stakeholders (industry groups and government disease control agencies) in order to establish a broader set of information needs will be supported by a broad group of international stakeholders. Given the COVID-19

	pandemic it is difficult to organize face-to-face stakeholder meetings. WG4 has explored online tools to organize an online stakeholder workshop and chose Miro to assist in the next step.
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MoU objective	Disseminate the knowledge that is achieved during the SOUND-control Action and encourage incorporation of an output-based framework both on national and European level (all WG, but specifically addressed by WG5).
Type of objective	1.g Input to stakeholders (e.g. standardization body, policy-makers, regulators, users), excluding commercial applications 1.i Dissemination of research results to the general public 1.j Dissemination of research results to stakeholders (excluding specific input in view of knowledge application)
Level of progress	51 - 75%
Description of progress with achieving the MoU objective	In the first half year of the project, a website was developed (www.sound-control.eu) that can act as platform to disseminate the results of the Action besides all other dissemination activities. A flyer was developed and spread in all countries that participate in the Action. To ensure maximal exposure in the scientific community SOUND-control groups were created on platforms such as research gate and linkedIN. Additionally, a paper was written and accepted for publication in Preventive Veterinary Medicine, in which the project and its aim was presented in more detail (https://www.sciencedirect.com/science/article/pii/S0167587720302993?via%3Dihub). Several SOUND control members presented the project to their national stakeholders and a short narrative was written in the native language of some of the COST members which was also shared with relevant stakeholders. To keep interested people updated on the progress of the Action, there is the possibility to subscribe to the annual newsletter and the project is continuously presented through poster and oral presentation at relevant conferences. Up to now two of newsletters are published.

MoU objective	Fostering knowledge exchange on the characteristics of CPs conducted for relevant non-regulated cattle diseases in the EU in cattle (WG1).
Type of objective	1.a Development of a common understanding/definition of the subject matter 2.a Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda 2.e Building capacity in the demographic inclusiveness of networks in science and technology, including representation of newly established research groups, Early-Career Investigators, the under-represented gender and teams from countries/regions with less capacity in the field of the Action
Level of progress	51 - 75%
Description of progress with achieving the MoU objective	In WG1 already a lot of knowledge was exchanged between the SOUND-control members given that the main tasks of this work group were planned in the first three GPs. Nevertheless, sharing knowledge between members and different research groups will continue throughout the duration of this Action.

MoU objective	Generating a handbook or wiki page that can be accessed to acquire information on country specific CPs that are applied for non-regulated cattle diseases in the EU (WG1).
Type of objective	1.b Coordination of information seeking, identification, collection and/or data curation 1.f Achievement of a specific tangible output that cannot be achieved without international coordination (e.g. due to practical issues such as database availability, language barriers, availability of infrastructure or know-how, etc.) 1.g Input to stakeholders (e.g. standardization body, policy-makers, regulators, users),

	excluding commercial applications
Level of progress	26 - 50%
Description of progress with achieving the MoU objective	This deliverable is planned (in agreement with the MC of this Action) for GP4. To ensure timely delivery of this work and achievement of a sufficient quality level, WG1 initiated actions to open a special topic on control of endemic diseases at the scientific journal: <i>Frontiers in Veterinary science</i> . The topic was approved in July 2020. From SOUND control, >32 members indicated that they wanted to contribute to this special issue. The dead-line for abstract submission, which was not mandatory was set at October 2020 and the deadline for paper submission is planned for February 2021.

Mou objective	Fostering experience on available methodologies that might be used (in an adapted form) for an objective comparison of output of different CPs and different initial situations with regard to the disease status (WG2, WG3).
Type of objective	<p>1.d Comparison and/or performance assessment of a theory, model, methodology, technology or technique</p> <p>2.e Building capacity in the demographic inclusiveness of networks in science and technology, including representation of newly established research groups, Early-Career Investigators, the under-represented gender and teams from countries/regions with less capacity in the field of the Action</p>
Level of progress	51 - 75%
Description of progress with achieving the MoU objective	In WG3, members that were experienced in the application of methodologies that could be used for output based surveillance presented their methods to the members of the Action. STSM possibilities were advertised to provide the opportunity to obtain more in-depth experience with several methods. Further, a questionnaire was distributed among all consortium members requesting feedback on knowledge needs aiming to make an inventory whether members would be interested in following a training school and the desired topic of such a training school. This inventory revealed major interest in training schools and resulted in multiple ideas for topics. The first training school was planned for June 2020, but was rescheduled to August and then to February 2021 because of the COVID-19 pandemic. In November we have decided to change the organization of a physical training school to an online training school. At this moment the topics and programme are ready, the trainers and trainees are known and most of the materials are available.

Mou objective	Developing a joint research agenda that offers the possibility to further develop an output-based framework to objectively compare outputs of CPs at different levels of aggregation that is applicable to a large range of diseases and meets the requirements of a large number of EU MS (WG4)
Type of objective	<p>1.f Achievement of a specific tangible output that cannot be achieved without international coordination (e.g. due to practical issues such as database availability, language barriers, availability of infrastructure or know-how, etc.)</p> <p>1.g Input to stakeholders (e.g. standardization body, policy-makers, regulators, users), excluding commercial applications</p> <p>2.a Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda</p>
Level of progress	26 - 50%
Description of progress with achieving the MoU objective	In January 2020 a workshop for WG4 members was initiated to obtain knowledge on information needs that should result from an output based framework. Following the workshop an STSM at the University of Utrecht was successfully completed; the main objective of this STSM was to summarize the results obtained during the Warsaw workshop. Subsequently, WG4 planned to evaluate the stakeholder needs. Unfortunately, due to COVID-19 it became impossible to organize stakeholder workshops. At this moment online possibilities to organize a workshop are explored and tested among the WG4 members. Eventually the tool Miro was chosen to assist in the

online stakeholder activities. This deliverable is planned for the final year of the project.

MoU objective	Develop training materials that can be disseminated through seminars, workshops and conference presentations (WG5).
Type of objective	<p>1.f Achievement of a specific tangible output that cannot be achieved without international coordination (e.g. due to practical issues such as database availability, language barriers, availability of infrastructure or know-how, etc.)</p> <p>1.j Dissemination of research results to stakeholders (excluding specific input in view of knowledge application)</p> <p>2.e Building capacity in the demographic inclusiveness of networks in science and technology, including representation of newly established research groups, Early-Career Investigators, the under-represented gender and teams from countries/regions with less capacity in the field of the Action</p>
Level of progress	26 - 50%
Description of progress with achieving the MoU objective	During this Action, detailed information on the disease control programmes that are in place for non-EU regulated diseases is generated and published. Additionally, the results are disseminated through flyers, posters and scientific publications. Materials will be developed for the training schools that will subsequently be published on the website. The information and knowledge that is obtained during the different STSMs will be presented to the members of the Action and the STSM reports are published on the website for all interested people.

MoU objective	Develop an open access platform to disseminate all knowledge and output that is obtained through SOUND-control to all interested stakeholders (WG5).
Type of objective	<p>1.j Dissemination of research results to stakeholders (excluding specific input in view of knowledge application)</p> <p>2.a Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda</p> <p>2.c Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach</p>
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	<p>Open access groups were created on LinkedIn and Research gate. Additionally, all the outputs of the Action are disseminated and freely available through the website.</p> <p>The groups can be accessed through:</p> <p>LinkedIn: https://www.linkedin.com/groups/8740517/</p> <p>Research gate: https://www.researchgate.net/project/COST-Action-CA17110-Standardizing-OOutput-based-surveillance-to-control-Non-regulated-Diseases-of-cattle-in-the-EU-SOUND-control.</p>

MoU objective	Involving specific target groups such as Early Career Investigators (ECI), under-represented gender, researchers from Inclusiveness Target Countries (ITC).
Type of objective	2.e Building capacity in the demographic inclusiveness of networks in science and technology, including representation of newly established research groups, Early-Career Investigators, the under-represented gender and teams from countries/regions with less capacity in the field of the Action
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	In our Action, gender representativeness is equally divided, both in the core group as in the management committee. It remains a challenge to involve ECI's, but we

continuously try to stimulate younger people to join, by conducting STSMs and stay on as Action member thereafter. In total 32 countries join our Action, of which 14 have an ITC status and 2 (Ukraine and Kosovo) are no COST member but are involved as NNC in our Action.

Deliverables

This section covers only deliverables that were foreseen for the Action, not additional outputs that were generated during the Action (these additional outputs will be added in the following section). Please select and comment on the progress with achieving each deliverable.

For deliverables that are:

- Delivered, please provide proof to enable the Action Rapporteur to confirm the delivery
- Not delivered but delivery is foreseen within 2 years please explain how the delivery will be achieved
- Not foreseen to be delivered please explain why not

Deliverable	D1.1: Overview of non-regulated cattle diseases in the EU for which CPs are in place within MS.		
Progress with achieving deliverable	Delivered	Month deliverable due	9
Proof of progress with achieving the deliverable	https://sound-control.eu/wp-content/uploads/2020/07/Deliverable-1.1-version-9.pdf		

Deliverable	D1.2: Contact list of all relevant stakeholders that are involved in the application (either practical or regulatory) of CPs of non-regulated cattle diseases in each of the MS.		
Progress with achieving deliverable	Delivered	Month deliverable due	24
Proof of progress with achieving the deliverable	https://sound-control.eu/wp-content/uploads/2020/03/Deliverable-1.2.-Contact-list-of-relevant-stakeholders.pdf		

Deliverable	D1.3: Handbook or wiki page describing the different CPs in place relative to the farming systems, including parameterisation, strengths and weaknesses in terms of ability to prevent new infections, ability for early detection of new cases, costs and acceptance by the stakeholders.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	24
Explanation	The delivery date was changed to GP4 (end of 2021) by MC vote. We are in the process to create a special issue in Frontiers of Veterinary Science. The dead-line for first submission is set at 28 February 2021. The papers will be combined into the handbook and be made available through the SOUND control website & research gate.		

Deliverable	D2.1: A data availability matrix for each of the countries that participate in the SOUND-control Action, the input parameters that are required are described and information on the availability of the data is provided, along with an assessment of its quality and regional coverage.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	30
Explanation	Is going as planned (almost finished). Is expected to be delivered on time.		

Deliverable	D2.2: A report, describing the methods, results and recommendations resulting from the STSM.		
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Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	30
Explanation	Multiple STSM reports are delivered, but we are still planning to conduct additional STSMs. Munoz et al., 2019: https://sound-control.eu/wp-content/uploads/2020/03/STSM-scientific-report-2019-03-Munoz-V-WG2.-Data-requirement-and-availability.pdf Koleci et al., 2019: https://sound-control.eu/wp-content/uploads/2020/03/STSM-scientific-report-2019-08-Koleci-X-WG2-STSM2-Review-data-collection-frameworks-.pdf Rapaliute et al., 2020: https://sound-control.eu/wp-content/uploads/2020/04/2020-03-Rapaliute-E-Design-a-data-collection-matrix.pdf		

Deliverable	D3.1: Report on comparison of different methodologies that can be applied to evaluate the quality of CPs, including an overview of the gaps for application of standardised comparison of outputs of both non-regulated and regulated diseases in the EU.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	36
Explanation	This deliverable is planned for the next grant period in 2021. The members of WG3 are currently working on writing a scientific paper that address the different 'problems' that can be encountered in output based surveillance and for each of these issues the best methods to apply.		

Deliverable	D3.2: Report with the results of the STSMs and subsequent material for conducting a webinar.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	30
Explanation	Status is ongoing. We have a number of STSMs that were conducted but also still some to come. Reports up to now: Meletis et al., 2019a: https://sound-control.eu/wp-content/uploads/2020/03/STSM-scientific-report-2019-10-Meletis-E-Evaluation-of-statistical-methods-for-the-estimation-of-a-probability-of-freedom-from-infection.pdf Ardelean et al., 2019: https://sound-control.eu/wp-content/uploads/2020/04/STSM-scientific-report-2019-11-Ardelean-A-WG3-STSM3-Review-and-ranking-of-methods-for-the-estimation-of-a-probability-of-freedom-from-infection.pdf Meletis et al., 2019b: https://sound-control.eu/wp-content/uploads/2020/03/STSM-scientific-report-2020-01-Meletis-E-WG3-STSM2-Evaluation-of-machine-learning-methods.pdf		

Deliverable	D3.3: Recommendations on the usefulness of current methodologies for providing standardised outputs of disease CPs, including a joint overview with recommendations on the knowledge gaps in the current methods that have to be fulfilled with a newly developed framework.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	39
Explanation	This deliverable is due in the next grant period (no delay expected).		

Deliverable	D4.1: Overview of the results of the brainstorm session on the needs and possibilities for developing methods for an output-based comparison of the confidence of freedom from infection that is applicable to numerous cattle diseases.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	39
Explanation	This deliverable is due in the next grant period. Hopefully, we will have no delay given the fact that it is very difficult to organise physical meetings at the moment.		

Deliverable	D4.2: Report with the methods, results and recommendations that result of the different STSMs.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	45
Explanation	<p>There are already a few STSMs finished (links to reports included below). For WG4 we have however also some STSMs that are postponed in light of the travel restrictions due to COVID-19. Hopefully we can continue with the STSMs in spring 2021. Reports up to now: Biesheuvel et al., 2019: https://sound-control.eu/wp-content/uploads/2020/06/STS_M-scientific-report-2019-10-Biesheuvel-M-Considering-the-application-of-a-systems-socio-ecological-approach.pdf Carmo et al., 2020: https://sound-control.eu/wp-content/uploads/2020/03/STSM-scientific-report-2020-01-Carmo-LP-Identify-information-and-other-needs-to-facilitate-trade.pdf</p>		

Deliverable	D4.3: A joint research agenda for development of a framework that enables objective comparison of outputs of CPs for non-regulated cattle diseases in the EU.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	45
Explanation	This deliverable is due in the last grant period, so planning is okay.		

Deliverable	D5.1. Dissemination plan, for disseminating knowledge obtained during the SOUND-control Action to all relevant stakeholders.		
Progress with achieving deliverable	Delivered	Month deliverable due	3
Proof of progress with achieving the deliverable	https://sound-control.eu/wp-content/uploads/2020/06/SOUND-control_Diss.-and-comm.-plan.pdf		

Deliverable	D5.2: The SOUND-control website is online and can be accessed. The members of the Action have internal page to share documents on a confidential basis..		
Progress with achieving deliverable	Delivered	Month deliverable due	6
Proof of progress with achieving the deliverable	https://sound-control.eu/		

Deliverable	D5.3: Annual online news letters, describing all the milestones and the progress of the action. This deliverable is due on month 12 of each of the four years.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	48
Explanation	Newsletters from year 1 and 2 are ready. We foresee extra newsletters for the coming years. The newsletters up to now can be found online: Year 1 https://sound-control.eu/wp-content/uploads/2020/01/SOUND_control_newsletter.pdf Year 2 https://sound-control.eu/wp-content/uploads/2020/10/SOUND_control_2nd_newsletter.pdf		

Deliverable	D5.4: Open access webinars are organised, and background information and hand-outs are developed. The webinars will be organised at midterm and at the end of the Action.		
Progress with achieving	Not delivered, but expected	Month deliverable due	48

deliverable	before end of Action		
Explanation	This deliverable is due in the last grant period. We don't see any problems in delivering this as planned.		

Deliverable	D5.5: Final conference is organised in which all knowledge obtained during the Action is disseminated to scientists, policymakers and other interested stakeholders. Additionally, the future prospects of the knowledge that was developed during the SOUND control Action will be discussed.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	48
Explanation	This deliverable is due in the last grant period. We don't see any issues. The only risk is COVID-19 but hopefully this will not prevent us from organising a final conference in 2022.		

Additional outputs / achievements

Co-authored Action publications

Please enter below ONLY publications (including publications that are submitted but not yet accepted):

- that are on the topic of the Action, and
- that are co-authored by at least two Action participants from two countries participating in the Action, and
- for which the Action networking was necessary.

Please pay special attention to representatives of Inclusiveness Target Countries (ITCs) in each publication. If there are more than 20 publications you *may* choose to enter only the most 20 significant (in terms of Inclusiveness, Excellence and the MoU Objectives).

	Bibliographic data	Countries participating in the Action among authors	Open Access	COST cited?	COST funds?	Relevance to H2020 Societal challenge	Peer Reviewed?
1	doi:10.1016/j.prevetmed.2020.105130 <p>Standardizing output-based surveillance to control non-regulated cattle diseases: aspiring for a single general regulatory framework in the European Union. Prev. Vet. Med.,</p>	AL, FR, NL, PT, SI, CH, UK	Y	Y	Y	Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy	Y
2	doi:10.3168/jds.2020-18193 <ul style="list-style-type: none"> Quantification of risk factors for BVDV in cattle herds: a systematic search and meta-analysis of observational studies, J. Dairy Sci. In press. 	FR, IE, NL	Y	N	N	Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy	Y
3	doi:10.3389/fvets.2019.00133 <p>A qualitative comparison of factors influencing confidence of freedom from bovine viral diarrhea virus infection in six European control programs. J. Dairy Sci.</p>	FR, DE, IE, NL, SE, UK	Y	N	N	Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy	Y

4	doi:10.3168/jds.2019-16915 A qualitative comparison of factors influencing confidence of freedom from bovine viral diarrhea virus infection in six European control programs. J. Dairy Sci. In press.	FR, DE, IE, NL, SE, UK	Y	N	N	Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy	Y
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Projects resulting from Action activities

Please enter below all the projects on the topic of the Action resulting from Action activities, involving at least one Action participant, and for which the Action networking was necessary.

The Action reported 1 project(s) and 2 proposal(s) resulting from the Action networking.

Key details of the projects are shown below.

#	Title	Countries participating in the Action among proposers	Main proposer name	Funder	Amount	Call identifier	Relevance to H2020 Societal Challenge
1	Global Control and Eradication Programmes For Cattle Diseases	AT, DE, IE, IT, NL, UK	Jörn Gethmann	Other EU	1 €	Frontiers Research topic	Not Applicable

Other outputs / achievements

Please enter below any additional outputs/ achievements on the topic of the Action that contribute to the COST mission: "COST enables break-through scientific developments leading to new concepts and products and thereby contributes to strengthen Europe's research and innovation capacities", and for which the Action networking was necessary (e.g. a patent, standards, white paper).

Output / achievement description	Dependence of achievement on the Action networking
Another output or achievement that is resulting from this Action is that a solid network is built between the members of SOUND control. As a result of a STSM, one STSM candidate (M. Biesheuvel) decided to pursue an international PhD position. Which led to a collaboration between the University of Calgary (Canada), the University of Nottingham (Great Britain) and Utrecht University (the Netherlands).	High

In the writing of the scientific papers the members within and between the member countries collaborate in the writing process.	High
Conference contributions:	High
<ul style="list-style-type: none"> • Knific, M. Ocepek, J. M. Gethmann, C. Fourichon, J. Gomes, B. Pinior , G. Gunn, C. Correia-Gomes, S. Strain, G. van Schaik, C. Faverjon, A. Madouasse, P. Kostoulas, J. Berezowski, M. Guelbenzu, L. Costa, J. Starič, J. Ježek, I. Toplak, J. J. Hodnik, SOUND control consortium, I. Santman-Berends. 2019. Standardizing output-based surveillance to control non-regulated diseases of cattle in the EU. SVEPM conference the Netherlands, 27-29 March 2019. • van Roon, C. Faverjon, Xh. Koleci, I. Santman-Berends, V. Muñoz-Gómes, H. Houe, E. Rapaliutė, T. Knific, SOUND control consortium, G. van Schaik. 2020. A data-collection matrix to capture heterogeneity in cattle industry & disease control measures between countries. Accepted for SVEPM conference the Ireland (Cancelled due to COVID-19). • Santman-Berends, J. J. Hodnik, X. Koleci, C. Correia-Gomes, S. Strain, J. M. Gethmann, G. Gunn, M. Henry, A. van Roon, G. van Schaik, C. Faverjon, A. Madouasse, P. Kostoulas, J. Berezowski, M. Guelbenzu, L. Costa, C. Fourichon, J. Gomes, B. Pinior, SOUND control consortium, T. Knific. 2020. Standardizing output-based surveillance to control cattle diseases. 12th Jornadas Hospital Veterinario Muralha de Evora. • Costa, T. Knific, J. Gomes, E. Leclerc Duarte, J. Niza Ribeiro, I. Santman-Berends. 2020. VIGILÂNCIA SANITÁRIA EM DOENÇAS DE BOVINOS NÃO-REGULAMENTADAS NA UE, uma abordagem harmonizada e baseada em resultados (SOUND-Control). 	

Impacts

Please describe the impacts (the short- to long-term scientific, technological, and / or socioeconomic changes produced by a COST Action, directly or indirectly, intended or unintended) that have resulted, or might result, from the Action in the following table (one impact per line).

Description of the impact, i.e. what will change, and for whom, as a result of what the Action achieved	Type of impact	Timing of impact
Job prospects and possibility to use the network to change jobs. During this Action members got the opportunity to get to know each other what resulted in job changes and start of a PhD career.	• Societal	Achieved
A common understanding and definitions of disease statuses in a country per disease. This enable that the presented disease statuses in D1.1 can be compared between countries.	• Scientific / Technological	Achieved
Members of different countries collaborate in writing research proposals and supervising younger researchers. This provides the opportunity for the younger scientists to grow and to work with more experienced researchers from different countries.	• Societal	Foreseen within two years of the end of the Action
In WG4 the needs from stakeholders are evaluated and the results create awareness that socio-economic aspects that are currently not taken into account in output-based surveillance, are extremely important.	• Scientific / Technological	Foreseen within two years of the end of the Action
Development and implementation of an innovative and easy to use output-based framework to compare the confidence of freedom and the costs i.e. the cost-effectiveness between different programmes.	• Scientific / Technological	Foreseen two-to-five years after the end of the Action
An output based methodology that is supported by researchers, industry partners and policy makers in a large number of EU COST countries who are involved in the SOUND control Action.	• Scientific / Technological • Economic • Societal	Foreseen two-to-five years after the end of the Action
In WG1 a lot of knowledge was exchanged about disease control programmes (CPs) that are in place in different countries and awareness was created on the very different context situations in different countries. This stressed the importance of output based surveillance and with the publications and handbook that result from these Action countries that want to set-up CPs can have insight in what other countries are doing, why different CPs are designed in a different way and how to come in contact with people involved in CPs of interest.	• Scientific / Technological	Foreseen by the end of the Action
Based on the results of WG2, the SOUND control members became more aware of the differences in data registration between different countries. The developed data-collection tool was set up in such a way that quantitative information could be collected in a similar way from all 32 countries in the consortium. This information enables objective and standardized comparison between countries and provides direction to which CP fits to which country.	• Scientific / Technological	Foreseen by the end of the Action
This COST Action created awareness that people involved in disease control in different countries can learn from each other. The project stressed the importance of having a network. Countries can definitely learn from others when setting up or improving disease control programmes.	• Societal	Foreseen by the end of the Action
In WG3, an evaluation was done which type of output based model is most relevant to apply in which situation. This information is written down in a mutual publication by WG3 members and can be used as guidelines when disease control efforts are evaluated.	• Scientific / Technological	Foreseen by the end of the Action
In GP2 an evaluation was done among the Action members about the	• Scientific /	Foreseen by the end

need of organizing training schools. Additionally, members were asked to submit topics they would like to have a training school on. Subsequently, a poll was organized on topic preferences for training schools. From GP3 on, every GP a training school is organized. The first one is on the topic of monitoring and surveillance and more than 20 members of SOUND control will participate as trainees. The trainers are mostly advanced researchers on this topic from within the Action. Given the COVID-19 situation, the dates were moved to 1-3 February in Slovenia. In November 2020 the CG has decided to move the TS online.

Technological of the Action

More in-depth view of the steps that have to be taken to improve safety of trade with regard to transmission of non-regulated cattle diseases in the EU.

- Scientific / Technological

Foreseen by the end of the Action

SOUND control will establish long-term collaborations and lay the scientific basis for policies aimed at improving the safety of intra-community trade in cattle.

- Societal

Foreseen by the end of the Action

Please describe how the Action is advancing the careers, skills and network of researchers, including ECIs (for example: joint supervision of graduate and PhD students, research exchanges not funded by the Action, collaborations, Training Schools with ECTS accreditation, joint projects and jobs prospects).

The collaborations in this Action and the STSMs provided the younger researchers the opportunity to be part of a network, to visit another institute and to do some work in the project. This resulted in a number of very enthusiastic young researchers that became very active participants in the project. One young researcher shift jobs between COST partners, another one was so enthusiastic that she quit her job and started a PhD position in another country. Multiple younger members are now entering the core group as WG co-leaders (MC approval was obtained during the annual meeting in November 2020). This will provide the next generation to experience the coordination of a WG and a COST Action and will prepare them to take on leadership roles later on in their career.

The career benefits are mainly to researchers with the following amount of experience after their PhD: ≤ 8 years.

Which of the stakeholders described in the “Plan for involving the most relevant stakeholders” in the Action’s MoU have been engaged and how? What additional stakeholders have been, or will be, engaged and how?

Dissemination of the knowledge generated by SOUND-control occurs at multiple levels. Key stakeholders were identified by the members and were actively approached to determine whether they are interested in participating as partners in the Action. When they replied positive they were added to the COST Action. Additionally, Stakeholders and national policy makers are actively informed on the progress of SOUND-control via periodic newsletters and through newsitems that are published on the website, LinkedIn and Research gate. A wide circle of stakeholders and people that might be interested in the Action, including possible end-users such as programme managers, regulators and representatives from other animal sectors are informed by the national representative in the Action. The progress of the Action is presented in oral presentations, poster presentations and through the open access SOUND-control website. In the second half of the project we are intending to develop webinars, provide presentations and organize workshops. At the end of the OSUND control Action we will organize a final conference in which all SOUNDcontrol achievements are presented. This conference will be targeted at involving all stakeholders.

Dissemination and exploitation of Action results (other than co-authored Action publications listed previously)

Please describe the Action's dissemination and exploitation approach as well as all activities undertaken to ensure dissemination and exploitation of the Action results and the effectiveness of these activities.

Dissemination and exploitation approach of the Action

At the start of this COST Action we developed an communication and dissemination plan in which multiple activities were described: https://sound-control.eu/wp-content/uploads/2020/06/SOUND-control_Diss.-and-comm.-plan.pdf In the first half of the project, the project was presented to national stakeholders, at conferences and to other interested people. A website was developed (www.sound-control.eu), a flyer to describe the project, a standardised presentation so that every participant could share some content on the project (https://sound-control.eu/wp-content/uploads/2019/11/SOUND_control_general_presentation.pdf) and a narrative summary in national languages. In the second half we are planning to create some video material on the project and the results, keep presenting at conferences and national symposia and use the developed training materials in the Action to educate young researchers.

Dissemination

Dissemination meetings funded by the Action

Title of Dissemination meeting	Meeting date	Meeting country	Action participant	Event name and hyperlink to the website	Title of presentation	Description of added value to the Action
N/A						

Other dissemination activities

E.g. participation to non-Action meetings, e.g. EU Parliament, meetings with policy makers, experts in the field, regional authorities.

Item/activity	Target audience	Outcome	Hyperlink
Presentation of the SOUND control Action and its result to the local stakeholders	Stakeholders and scientists at national level (and other interested people).	That national stakeholders are aware of this COST Action and its results. The results of this Action are freely available on the Actions web page and may be useful for countries that want to design disease control programmes, want to check disease status per country for non-regulated diseases or want to know about	https://sound-control.eu/wp-content/uploads/2020/11/SOUND-control_List-of-dissemination-and-communication-activities.xlsx

the availability of data or methods to compare outputs. The list with dissemination activities that are undertaken can be found below.

Exploitation activities

Please describe below any activities undertaken to ensure exploitation (use, in particular in a commercial context) of the Action's achievements.

Item/activity	Target audience	Outcome
Presentation of the Actions results at conferences (specifically results of the frst 3WG)	Mainly scientists from all over the world but also CVO representatives	Make sure that the scientific community is aware of the work that is being done in this COST Action and how it could be useful for them.

Other matters

This section is confidential to the Management Committee, the Action Rapporteur and the COST Association, and is not included in the version of the report that is published on the COST website.

Difficulties in implementing the Action

If any difficulties are experienced in the implementation of the Action (e.g. imbalances of participation across the Working Groups, inactive country representatives) please describe these below. Please also describe the efforts made by the MC to address these.

There is a large variety in commitment between members. We try to address this by organizing regular online meetings. Furthermore, we try to provide rewards for the work that is done. For example, we developed the rule that every representative that participate in providing information can co-author the scientific publication that results from this.

We do observe that the COVID-19 pandemic results in an inability to meet and complicates the situation. It is complicated to organize online meetings with more than 30 people and have a discussion. In face-to-face meetings it is possible to make sure everyone is involved by splitting up large scale meetings in small discussion groups. In online meetings the people are less committed and feel less motivated to participate in discussions.

The COVID-19 pandemic results in issues for the GH. The GH can claim 15 percent of the money that is spent in the Action for managing the finances. However, COST mainly covers expenditures for travel and accommodation and because we cannot meet, we are not spending much money. If we don't spend our budget, the GH can also not claim any financial compensation while they still need to do some work.

Endangerment Measures

Taking into account the issues identified throughout this report, please summarise the measures the Action will implement in the coming two years to overcome any issues identified as potentially endangering the achievement of the objectives of the Action.

•Organization of regular online meetings for each of the WG in our Action •Organization of online training schools when physical training schools are not allowed •Stimulating people to develop scientific publications together presenting the work of our Action •Organizing regular STSM calls given that a STSM may be possible even in the event where we can not organize bigger events yet •Organizing online COST events where we invite all SOUND control members to all content related meetings and presentations •Stimulate WG members to participate in the development of promotional materials and the online newsletter •Evaluate the possibility to use online interactive tools to use within the online meetings to stimulate participation •During the life time of the Action we sometimes observed that some countries that were members of the Action were not participating. We addressed this by contacting other people in the country. We were partially successful with this approach. From some countries more active members joined and are now participating, but we still have a small number of countries that are members of the Action but that do not really have an active role. We keep pursuing this matter.

Suggestions for improvements to COST framework/ procedures

The mandate of the Scientific Committee includes providing advice to the COST Committee of Senior Officials on possible improvements to the COST framework. Please describe below any improvements that you believe should be made to the COST framework.

The COVID-19 pandemic shows that (temporary) travel restrictions lead to major problems given that in some cases people can not retrieve the money they already paid for travel and accommodation. Additionally, this pandemic results

in issues for the GH given that they can not claim any financial compensation when no money is spent. It is expected that the Action continues online even when there are no possibilities to meet. I believe that the GH should still be able to claim some money in the WBP (small percentage). Another aspect is the number of contact moments between COST and the chairs. For me as an ECI it is the first time that I'm chairing a COST Action and it would be helpful to have a short regular Skype meeting with COST where the progress of the Action is discussed and any questions that either I or COST has can be resolved. In the first year of my Action there were some chair events where we could share our experiences. It would be very helpful if such events would be organized (online) once per year to discuss how to tackle the challenges that everyone is facing.

Sustaining the network beyond the Action

Are there any plans to sustain the network beyond the end of the Action?	YES
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Please describe how the network will be sustained beyond the end of the Action.

As part of WG4 we will develop a research agenda on the topic of output based surveillance. During the course of the Action we will evaluate possibilities to submit research proposals on the topic of the Action to further explore the field of output based surveillance. The largest gap that was identified up to now is the inclusion of social factors. Participation in CPs is not only driven by obligations, facts and economics but can also be influenced by values, believes and emotions. It would be worthwhile to focus on this aspect and we are exploring possibilities to study this aspect in more depth.

Emerging topics/ developments in the field of the Action

Please describe any emerging topics or potentially important future developments identified during the Action and that could potentially be addressed by future COST activities such as Actions S&T Conferences or Exploratory Workshops.

During the whole COVID-19 pandemic it becomes very clear that communication and social aspects are key in creating compliance and commitment when controlling and eradicating diseases. When we evaluate the topic of disease control the focus is on eradicating diseases, monitoring the free status and preventing new introductions by controlling risk factors. In reality not all farmers comply with the regulations which result in risk of reintroducing diseases, not only for themselves but also for other farmers. How to communicate in such a way that the message is clear for all groups and types of farmers warrants networking between scientists and communication experts. Additionally, even when farmers understand the importance of following the rules set out by the disease control programme, this will not in all cases lead to compliance. This will also depend on the mindset of the farmer: the believes, values, morals and emotions. As complicating factor, a large variety in mindset between inhabitants of different countries exists related to cultural differences. Much insight could be obtained by a COST Action given that would enable possibilities to bring social and communication experts from different countries together.

Annex 1: Types of objectives

1 - Coordination of scientific and technological activities at a European level

- 1.a - Development of a common understanding/definition of the subject matter
- 1.b - Coordination of information seeking, identification, collection and/or data curation
- 1.c - Coordination of experimentation or testing
- 1.d - Comparison and/or performance assessment of a theory, model, methodology, technology or technique
- 1.e - Development of knowledge needing international coordination, pertaining to a new or improved theory, model, methodology, technology or technique
- 1.f - Achievement of a specific tangible output that cannot be achieved without international coordination (e.g. due to practical issues such as database availability, language barriers, availability of infrastructure or know-how, etc.)
- 1.g - Input to stakeholders (e.g. standardization body, policy-makers, regulators, users), excluding commercial applications
- 1.h - Input for future market applications (including cooperation with private enterprises)
- 1.i - Dissemination of research results to the general public
- 1.j - Dissemination of research results to stakeholders (excluding specific input in view of knowledge application)

2 - Community building

- 2.a - Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda
- 2.b - Building a community around a new or emerging field of research
- 2.c - Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach
- 2.d - Acting as a stakeholder platform or trans-national practice community, pertaining to a certain area of socio-economical or societal application, or to a certain market sector
- 2.e - Building capacity in the demographic inclusiveness of networks in science and technology, including representation of newly established research groups, Early-Career Investigators, the under-represented gender and teams from countries/regions with less capacity in the field of the Action

Annex 2: Dimensions of successes

1 - Breakthroughs

- 1.a - Scientific breakthrough
- 1.b - Technological breakthrough
- 1.c - Breakthrough in socio-economic or societal applications

2 - Policy contribution

- 2.a - Contribution to regulatory policy
- 2.b - Contribution to environmental, infrastructural or agricultural policy
- 2.c - Contribution to economic or socio-economic policy
- 2.d - Contribution to social, cultural or legal policy

3 - Capacity building

- 3.a - Building capacity in an existing field of science and technology
- 3.b - Building capacity in bridging separate fields of science and technology
- 3.c - Building capacity in a new or emerging field of science and technology
- 3.d - Building capacity in valorising and implementing advances and applications in science and technology
- 3.e - Building capacity in the demographic inclusiveness of networks in science and technology, including representation of newly established research groups, Early-Career Investigators, the under-represented gender and teams from countries/regions with less capacity in the field of the Action