VETAGRO SUP
CAMPUS VETERINAIRE DE LYON

Année 2018 - Thèse n°086

EVALUATION DES COLLABORATIONS DANS LES SYSTEMES DE SURVEILLANCE « ONE HEALTH ». CAS D'ETUDE DE LA SURVEILLANCE DE L'ANTIBIORESISTANCE AU VIETNAM.

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Présentée à l'UNIVERSITE CLAUDE-BERNARD - LYON I
(Médecine - Pharmacie)
et soutenue publiquement le 22 novembre 2018
pour obtenir le grade de Docteur Vétérinaire

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Liste des abréviations

SIGLE	Signification en anglais	Signification en français
ABR	Antibiotic resistance	Résistance aux antibiotiques (antibiorésistance)
ABU	Antibiotic usage	Usage des antibiotiques
AMR	Antimicrobial resistance	Resistance aux antimicrobiens
CDC	American Centre for Disease Control and Prevention	Centre américain de Contrôle et de Prévention des Maladies
CIRAD	Agricultural Research Centre for Development	Centre de coopération internationale en recherche agronomique pour le développement
DAH	Department of Animal Health	Département de la Santé Animale
DANMAP	Danish Programme for surveillance of antimicrobial consumption and resistance in bacteria from animals, food and humans.	Programme danois pour la surveillance de la consommation et la résistance aux antibiotiques des bactéries issue des animaux, de la nourriture et des humains
FAO	Food and Agricultural Organisation of the United Nations	Organisation des Nations Unies pour l'Alimentation et l'Agriculture
FVI		France Vétérinaire International
GAP	National action plan on combatting drug resistance	Plan d'action national de lutte contre la résistance aux antimicrobien
GDPM	General Department for Preventive Medicine	Département Général de Médecine Préventive
JICA	Japanese International Cooperation Agency	Agence de Coopération Internationale du Japon
JEE tool	Joint external evaluation tool	Outil d'évaluation externe conjointe
MARD	Ministry of Agriculture and Rural Development	Ministère de l'Agriculture et du Développement Rural
MOH	Ministry of Health	Ministère de la Santé
MOIT	Ministry of Industry and Trade	Ministère de l'Industrie et du Commerce
MONRE	Ministry of Natural Resources and the Environment	Ministère des Ressources Naturelles et de l'Environnement
NAP	National Action Plan for management of antibiotic use and control of antibiotic resistance in livestock production and aquaculture	Plan d'action national pour la gestion de l'utilisation des antibiotiques et le contrôle de l'antibiorésistance dans les élevages d'animaux de production et en aquaculture.
NCVHI	National Centre for Veterinary Hygiene and Inspection	Centre National pour l'Inspection et l'Hygiène Vétérinaire
NEOH	Network for Evaluation of One Health	Réseau pour l'évaluation du concept One Health
NHTD	National Hospital for Tropical Medicine	Hôpital National des Maladies Tropicales
NIHE	National Institute for Hygiene and Epidemiology	Institut National d'Hygiène et d'Épidémiologie
NIN	National Institute for Nutrition	Institut National pour la Nutrition
NIVR	National Institute for Veterinary Research	Institut National pour la Recherche Vétérinaire
OASIS tool	Analysis tool for surveillance systems	Outil d'Analyse des Systèmes d'Information en Santé animale

OHP	One Health Partnership	Partenariat pour « Une seule santé »
OH P4P	One Health Planning for performance Tool	Outil conception One Health pour la performance
OIE	World Organisation for Animal Health	Organisation Mondiale de la Santé Animale
OMS / WHO	World Health Organisation	Organisation Mondiale de la Santé
OUCRU	Oxford University Clinical Research Unit	Unité de Recherche Clinique de l'Université d'Oxford
SNAT Tool	Surveillance Network Assessment Tool	Outil d'évaluation des réseaux de surveillance
USAID	United States Agency for International Development	Agence américaine pour le Développement International
VFA	Vietnam Food Administration	Administration de l'alimentation du Vietnam
VOHUN	Vietnam One Health University Network	Réseau d'Universités pour "Une seule santé" du Vietnam

Introduction

A travers le concept One Health, ou « une seule santé », et face aux enjeux de la globalisation, un courant scientifique fort souligne l'importance d'aborder les problématiques sanitaires complexes à l'aide d'une approche systémique (*Zinsstag et al.*, 2011). Un exemple emblématique de ces problématiques complexes est la résistance aux antibiotiques qui concerne l'homme, les animaux et leur environnement. Si l'impact sanitaire de ce danger est encore mal connu, il pourrait devenir la première cause de mortalité humaine en 2050. Il a un effet tout aussi néfaste sur la santé animale, en particulier dans les élevages, ce qui pourrait également compromettre la sécurité alimentaire mondiale (*O'Neill*, 2014).

Aujourd'hui, les instances internationales, et en particulier à travers l'accord tripartite entre l'OIE, la FAO et l'OMS (*FAO et al.*, 2010), promeuvent l'application du concept One Health pour la gestion des dangers sanitaires complexes. Cependant, l'opérationnalisation de ce concept est difficile. En particulier parce qu'il repose sur la mise en place de collaborations qui mobilisent des acteurs variés avec des cultures et objectifs différents, qui sont demandeuses en temps et ressources (*Bordier, Uea-Anuwong, et al.*, 2018). Démontrer leurs pertinences et bénéfices est donc essentiel pour favoriser leur financement et leur opérationnalisation par les acteurs (*Häsler et al.*, 2014). La surveillance, qui appuie la prise de décision pour la gestion des risques sanitaires, peut faire appel également au concept One Health lorsqu'il s'agit de dangers à l'interface homme-animal-environnement (*Stärk et al.*, 2015). Son opérationnalisation, cependant, reste tout aussi problématique.

S'il existe des preuves de l'intérêt des collaborations dans les systèmes de surveillance (*Häsler et al.*, 2014), il n'existe à ce jour aucun outil d'évaluation de ces collaborations. Il existe par contre des outils pour évaluer l'approche One Health (*Rüegg et al.*, 2017) ou des outils d'évaluation des systèmes de surveillance (*Hendrikx et al.*, 2011), (*Calba et al.*, 2015). Dans ce contexte, notre étude cherche donc à développer une méthode pour évaluer la pertinence et le fonctionnement des collaborations au sein des systèmes de surveillance One Health en fonction du contexte et de l'objectif poursuivi. Cette méthode sera testée sur le cas d'étude de la surveillance de l'antibiorésistance au Vietnam.

PARTIE I : La surveillance One Health, son évaluation et le cas de surveillance de l'antibiorésistance au Vietnam

I. Les systèmes de surveillance One Health :

A. Des éléments introductifs sur les systèmes de surveillance

La surveillance a pour but de produire de l'information sur un danger sanitaire afin d'appuyer la prise de décision pour sa gestion. La définition suivante la décrit plus précisément comme « une méthode d'observation fondée sur des enregistrements en continu permettant de suivre l'état de santé ou les facteurs de risque d'une population définie, en particulier de déceler l'apparition de processus pathologique et d'en étudier le développement dans le temps et dans l'espace, en vue de l'adoption de mesures appropriées de lutte. » (*Toma et al.*, 1991).

Cette définition souligne que le but principal de la surveillance est d'orienter la prise de décision. Cependant ces objectifs vont varier en fonction de l'épidémiologie du danger sanitaire, et du contexte socio-politique et économique. Ceux-ci peuvent être classés en 4 catégories: (i) détecter l'apparition d'un danger sanitaire (ex maladies exotiques, nouvelle maladie, prouver l'absence d'une maladie éradiquée) afin d'entreprendre une gestion précoce, (ii) établir une hiérarchie des dangers sanitaires en fonction de leur importance en termes économique, social et sanitaire, (iii) évaluer les résultats des mesures de gestion mises en œuvre suivant l'évolution et la propagation du danger sanitaire, (iv) mieux connaître le danger et susciter des hypothèses de recherche qui permettront dans un second temps de mettre en place une gestion appropriée (*Dufour, Hendrickx*, 2011).

D'après sa définition, la surveillance peut être décomposée en trois étapes principales : (i) le recueil des données de façon continue sur un danger sanitaire, (ii) l'analyse et l'interprétation des données et (iii) la dissémination des résultats afin d'appuyer la prise de décision pour la maîtrise du risque correspondant. Ces étapes, représentées dans la figure 1, peuvent elles-mêmes être décomposées. Elles sont capitales puisqu'elles permettent de différencier la surveillance du monitoring ou d'une enquête épidémiologique et permettent de définir le cas d'étude.

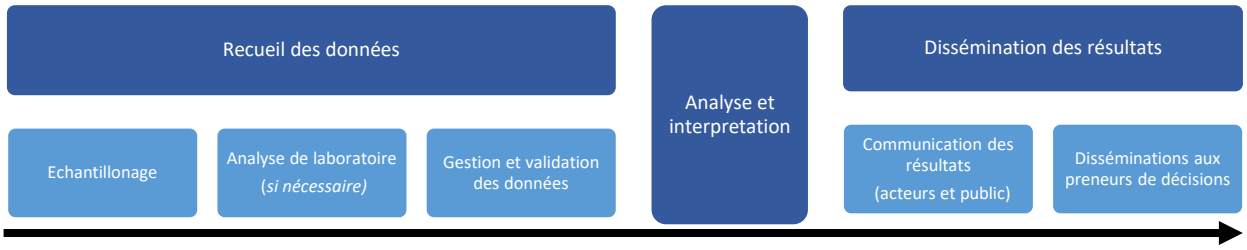


Figure 1: Etapes de la surveillance, © Camille Delavenne

La différenciation sémantique des termes « monitoring », « recherche épidémiologique » et « prophylaxie » permettent de souligner respectivement trois éléments importants de la surveillance : (i) l'importance de la dissémination des résultats auprès des preneurs de décisions, (ii) le caractère continu de la surveillance, (iii) l'importance de la phase d'analyse et d'interprétation des résultats pour avoir une photo d'ensemble et dépasser la gestion des cas individuels. (*Dufour, Hendrickx*, 2011).

B. Les systèmes de surveillance One Health

a. Une introduction au concept One Health

Il existe de nombreuses définitions du concept One Health, mais toutes reconnaissent que la santé humaine, animale et environnementale sont interconnectées et que des approches collaboratives entre secteurs et disciplines sont requises (*Rabinowitz et al.*, 2013). One Health est donc un concept holistique qui promeut les efforts collaboratifs entre les secteurs et disciplines dans le but d'atteindre une santé optimale chez l'homme, les animaux et l'environnement (*Zinsstag et al.*, 2011).

Cette approche holistique de la santé humaine et animale n'est pas un nouveau concept, les premiers guérisseurs étaient souvent compétents dans les deux domaines et on retrouve des documents égyptiens, chinois ou encore arabes qui font référence à ce concept (*Zinsstag et al.*, 2011). Le concept actuel est issu de l'avènement de la médecine comparative en Amérique, où l'on voit apparaître le terme :« One Medecine ». Les principes de Manhattan signés en 2004 cristallisent l'importance de l'environnement dans le concept (*Zinsstag et al.*, 2011). Ce concept holistique a évolué parallèlement au concept « Eco Health » et ne peut être dissocié aujourd'hui de celui-ci (*Destoumieux-Garzón et al.*, 2018).

Le champ d'application du concept s'étend à tous les dangers sanitaires, c'est-à-dire qu'il concerne aussi bien les maladies zoonotiques que des problématiques plus complexes de santé, comme les contaminants environnementaux (pesticides, métaux lourds, etc.). Cependant, la plupart des initiatives One Health se concentrent sur le paradigme homme-animal, et en particulier la problématique des maladies infectieuses. Aujourd'hui, le concept est principalement appliqué à l'étude des zoonoses. Le défi est donc de sortir de cette dichotomie, et d'aborder aussi la composante écosystémique des dangers sanitaires (*Destoumieux-Garzón et al.*, 2018).

b. Des généralités sur les systèmes de surveillance One Health

La surveillance One Health fait référence à une méthodologie de surveillance respectant l'approche holistique du concept One Health. Toutefois, il n'y a aujourd'hui pas de consensus pour définir ce type de surveillance.

Une des premières définitions dans la littérature présente la surveillance One Health comme « l'effort collaboratif entre les secteurs de santé humaine et animale afin de conduire un recueil systématique de données sur des événements de santé, l'analyse de ses données et la dissémination dans un délai opportun afin d'appuyer les interventions pour prévenir ou contrôler les maladies dans les populations humaines et animales » (*Karimuribo et al.*, 2012). Cette définition met en avant la nécessité de collaborer entre les secteurs de santé comme le recommande le concept One Health ; cependant, ce dernier ne prend pas en compte, ou que partiellement, en évoquant les animaux sauvages, la composante environnementale.

Une première définition trouvée dans la littérature pour décrire la surveillance One Health est : « La collection, la validation, l'analyse, l'interprétation des données et la dissémination des informations collectées sur les humains, les animaux et l'environnement, pour appuyer la prise de décision pour des interventions sanitaires plus efficaces, factuelle et holistique » (*Stärk et al.*, 2015). Dans cette définition, l'emphase est mise sur le recueil de données dans les 3 secteurs. Contrairement à la première définition, on ne parle plus d'un processus collaboratif entre les secteurs pour justifier d'une approche holistique.

Berezowski et *al.* (2015) propose une autre définition similaire, celle-ci définit la surveillance One Health comme « la collection et analyse continue, collaborative et systématique de données provenant de plusieurs secteurs afin de détecter des évènements en relation avec la santé et de produire des informations qui pourront induire des actions ayant pour objectif d'atteindre une santé optimale pour les hommes, les animaux et l'environnement ». Si on retrouve bien la notion de données collectées dans différents domaines, il n'existe ici plus une limitation de nombre, et on voit apparaître le mot « collaborative » pour définir deux étapes de la surveillance : le recueil des donnés et l'analyse. Cette définition souligne aussi le but holistique de toute initiative One Health : une santé optimale dans tous les secteurs

A la suite d'une revue de littérature, Bordier, Uea-Anuwong, et *al.* (2018) proposent une autre définition : « Un système dans lequel existent des efforts collaboratifs entre *a minima* deux secteurs (comme la santé humaine, animale, et environnementale) dans la réalisation du processus de surveillance, afin de produire et disséminer des informations permettant de prendre des mesures pour améliorer la santé humaine, et/ou animale et/ou des écosystèmes. » Cette définition met en avant l'effort collaboratif entre secteurs et disciplines comme socle de la définition de la surveillance One Health. Elle fait ainsi écho aux définitions précédentes, mais elle ne rajoute pas la contrainte de surveiller ou de collecter des données dans les 3 domaines.

Cette définition peut se décliner à travers 3 modèles possibles d'organisation intersectorielle (fig. 2).

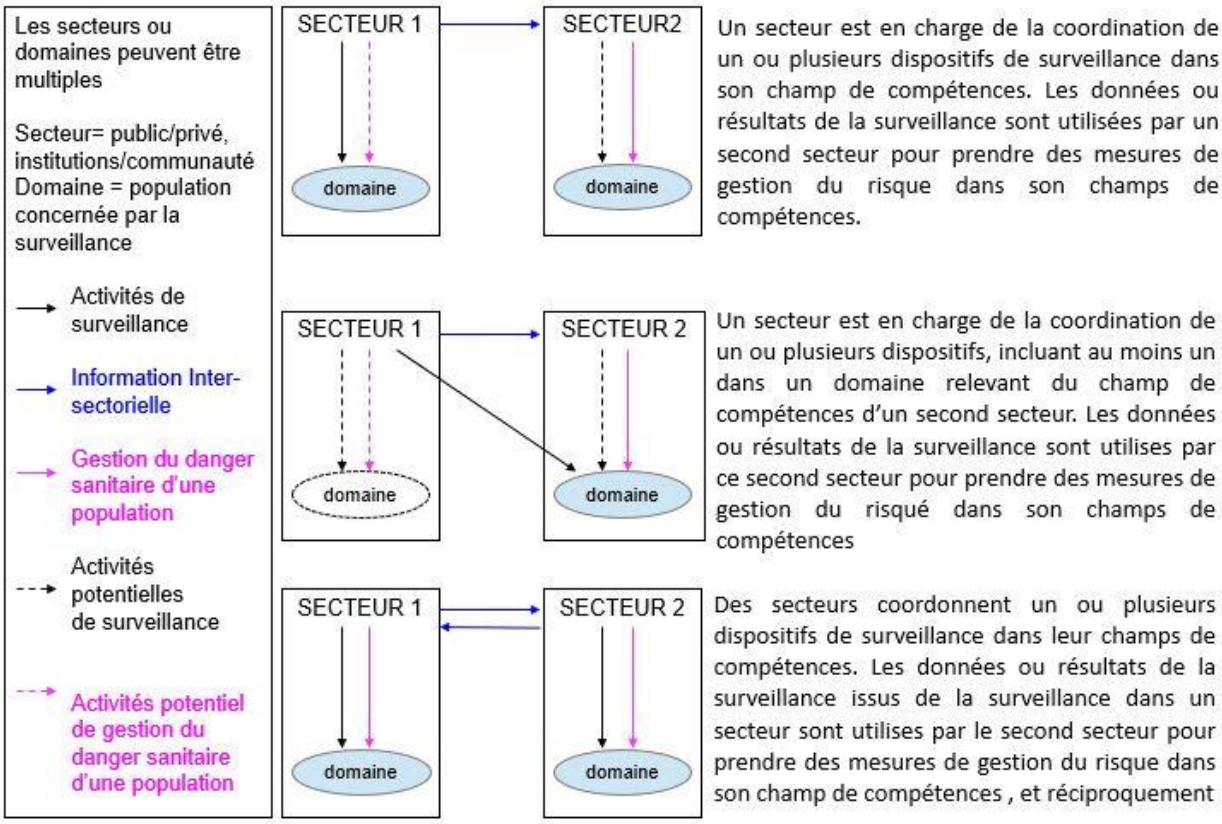


Figure 2: Schématisation des trois modèles d'organisation de surveillance intersectorielle définis par Bordier, Uea-Anuwong, et al., (2018), © Marion Bordier.

c. *La description des collaborations dans les systèmes de surveillance One Health*

Les collaborations dans un système de surveillance One Health sont donc essentielles, et il est donc important de pouvoir les caractériser pour mieux comprendre l'organisation et le fonctionnement de ces systèmes. Bordier, Uea-Anuwong, et *al.* (2018), dans une revue de littérature, ont identifié cinq dimensions possibles de collaboration : entre secteurs, entre acteurs public-privé, entre des institutions avec des mandats différents, entre des disciplines différentes ou entre des niveaux hiérarchiques différents. Ces cinq dimensions possibles de collaboration sont représentées schématiquement dans la figure 3.

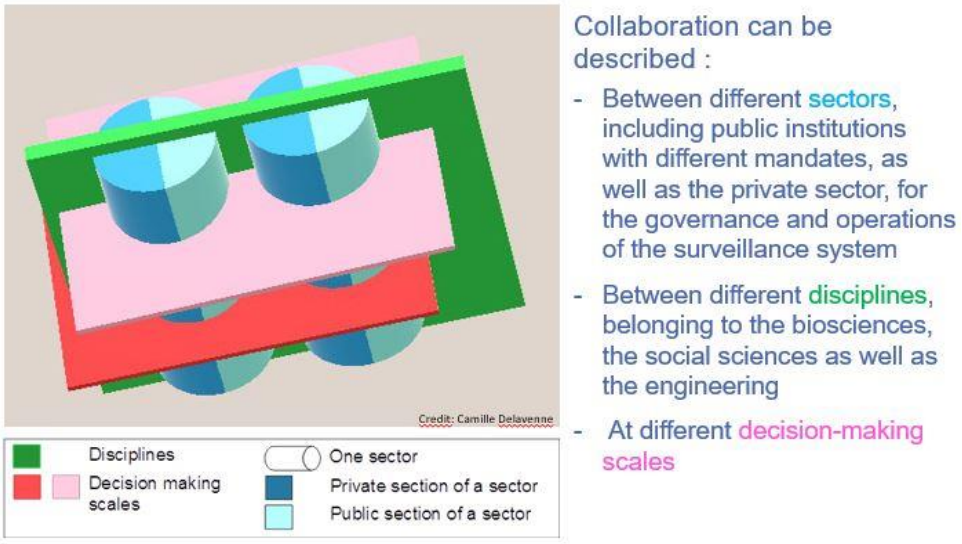


Figure 3: Schématisation des dimensions de collaboration définie par Bordier, Uea-Anuwong, et al., (2018). © Camille Delavenne

Les collaborations sont aussi caractérisées par leurs modalités, c'est-à-dire à quel moment du processus de surveillance et à quels degrés elles interviennent. Ainsi, par exemple, au niveau du processus de surveillance pour la collecte de données, leur échange en fonction des collaborations peut être plus ou moins intégré comme les trois possibilités suivantes : aucun échange, un échange discontinu des cas positifs après leur analyses ou un échange continu en temps réel de données plus ou moins brutes. Dans le deuxième cas, le degré de collaboration entre les deux institutions nécessitera d'être plus important. Le tableau I représente une partie des modalités identifiées par Bordier, Uea-Anuwong, et *al.* (2018) dans tous les systèmes de surveillance One Health que leur revue de littérature a identifiés.

Tableau I: Modalités de collaboration dans les systèmes de surveillance One Health, (Bordier, Uea-Anuwong, et al., 2018) .

Step of the surveillance process	Possible degrees of collaboration				
Planning	Carried out separately in each sector	Carried out by a single sector for all the surveillance components	Cross-sectoral consultation but carried out separately in each sector	Carried out by a multi-sectorial unit	
Data collection	Carried out separately in each sector	Carried out by a single sector for all the surveillance components	Carried out separately in a harmonized way	Carried out in joint sectoral activities	Carried out by a multi-sectorial unit
	No data sharing	Notification of positive cases only	Ongoing data exchange		
Analysis/ Interpretation	Carried out separately in each sector	Carried out separately in each sector then compared by a single sector	Carried out by a single sector for all the surveillance components	Carried out separately in each sector then compared by a multi-sectorial unit	Carried out by a multi-sectorial unit
Dissemination	Carried out separately in each sector	Dissemination of joint information separately in each sector	Dissemination of joint information carried out by a single sector	Dissemination of joint information by a multi-sectorial unit	

C. Des exemples de systèmes de surveillance One Health dans le monde

Dans leur revue systématique de littérature, Bordier, Uea-Anuwong, et *al.* (2018) ont identifié 33 systèmes de surveillance collaborative One Health. Ces systèmes surveillent principalement des maladies zoonotiques (29, dont onze maladies vectorielles), et seulement quatre maladies ou dangers environnementaux. Neuf des systèmes surveillent la résistance aux antibiotiques, ils peuvent avoir plusieurs modalités de collaboration : l'analyse intersectorielle (5/9), l'échange intersectoriel de données (4/9), la notification des cas exceptionnels (1/9), la mise en place d'une surveillance multisectorielle par une unique institution (1/9), ou seulement des activités de collaboration pour mettre en œuvre une dissémination conjointe (1/9). Dans tous les cas, l'objectif de tous les systèmes collaboratifs identifiés est de monitorer l'antibiorésistance avec comme but d'améliorer la connaissance et/ou de supporter les interventions.

Les deux systèmes suivants sont des exemples de systèmes multi-sectoriels One Health, sur deux problématiques différentes : l'antibiorésistance et la fièvre du Nil occidental. Le premier a une couverture nationale alors que le second est régional. C'est l'une des nombreuses différences entre ces deux systèmes, qui peuvent être définis par leur dispositif de surveillance, leurs dimensions de collaboration et les modalités de surveillance mises en place.

a. *Un exemple de système de surveillance One Health : DANMAP*

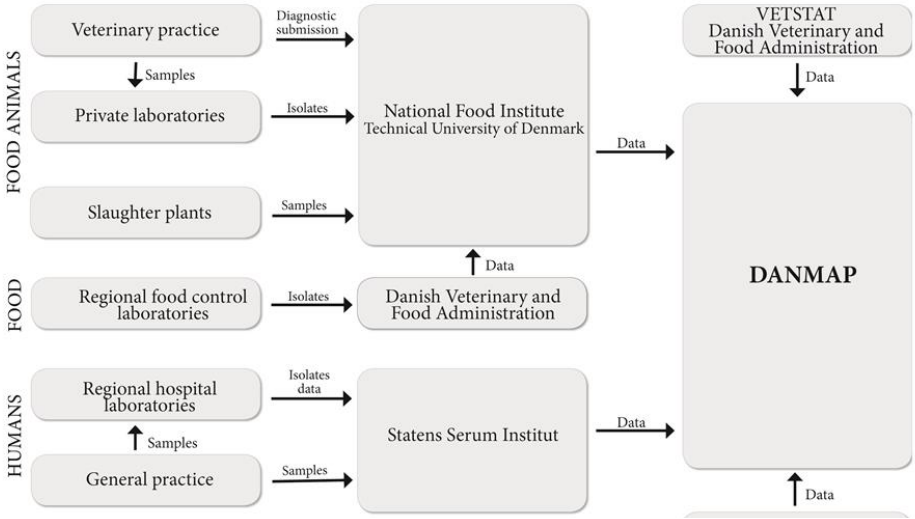


*Figure 4: Schéma d'organisation du DANMAP. © (*DANMAP, *2018)*

DANMAP ou « programme danois pour la surveillance de la consommation et la résistance aux antibiotiques des bactéries issues des animaux, de la nourriture et des humains » est un système de surveillance multi-sectoriel (*DANMAP*, 2018). L'objectif de ce système One Health est de monitorer les tendances afin d'améliorer la connaissance sur la résistance aux antibiotiques. (*Bordier, Uea-Anuwong, et al.*, 2018) Le programme est établi grâce à la collaboration entre trois instituts nationaux danois appartenant à trois secteurs différents : l'Institut national de l'alimentation en charge de la surveillance de l'antibiorésistance chez les animaux et dans l'alimentation, l'Institut national vétérinaire en charge du dispositif de surveillance de la consommation d'antibiotique chez les animaux et l'Institut Statens Serum en charge de la surveillance de la consommation et de l'antibiorésistance en médecine humaine (fig. 4). L'Intitut national vétérinaire n'est en charge que de la collection de données de la consommation d'antibiotiques par les animaux, alors que les autres sont en charge des sections du rapport en fonction de leurs compétences respectives.

Les dimensions de collaboration ont principalement lieu entre les trois secteurs, puisque le DANMAP est placé sous la juridiction du ministère de l'Agriculture, de la Pêche et de l'Alimentation, en collaboration avec le ministère de la Santé. Cette collaboration intersectorielle s'étend également au niveau institutionnel et entre les autorités en charge de ces domaines respectifs et les instituts fondés pour la recherche. La collaboration a également lieu entre les microbiologistes, les docteurs, les vétérinaires, et les épidémiologistes. Enfin, les acteurs privés le long de la chaîne alimentaire collaborent avec le système de surveillance (*Wielinga et al.*, 2014). L'organisation du système multi-sectoriel correspond au modèle 3 décrit par Bordier, Uea-Anuwong et *al.* (2018). Les modalités de collaboration sont l'échange continu des données intersectorielles et l'analyse intersectorielle de ces données.

a. *Un exemple de système de surveillance One Health : la fièvre du Nil occidental dans la région de l'Émilie Romagne en Italie*

La surveillance de la fièvre du Nil occidentale est un autre exemple de système de surveillance multi-sectorielle. Le but du système est de détecter le plus précocement possible l'apparition sur le territoire surveillé du virus du Nil occidental. Eu égard à la complexité du cycle de transmission du virus, l'approche holistique du concept One Health est importante. La surveillance de la fièvre du Nil occidental en Italie est une surveillance composée de plusieurs dispositifs :

- Surveillance passive des chevaux associée à une surveillance active de 28 chevaux sentinelles dans la région (permettant de détecter une prévalence du virus supérieur à 10 %)
- Surveillance passive des oiseaux sauvages retrouvés morts et surveillance active de six espèces d'oiseaux sauvages non migrateurs sélectionnées dans le cadre de programme de protection des populations
- Surveillance active entomologique par collection hebdomadaire ou mensuelle de moustiques grâce à des stations placées dans des zones fixes définies en amont ou dans des zones où il existe une preuve de la circulation du virus
- Surveillance syndromique des maladies neuro-invasives chez l'homme et d'une surveillance active sérologique de toutes les personnes travaillant, vivant dans ou visitant les zones où le virus circule (*Bellini et al.*, 2014).

Le système de surveillance est une collaboration entre trois secteurs : la santé humaine, la santé animale et l'environnement. Les disciplines représentées au sein des collaborations comprennent l'ensemble des disciplines majeures en lien avec la maladie : virologie, entomologie, médecines vétérinaire et humaine. La collaboration a aussi lieu entre les instituts de recherche et les autorités en charge de la surveillance. Les modalités de collaboration permettent un échange d'information continu sur les différentes populations dans le but de soutenir les interventions pour protéger la santé humaine (*Rizzo et al.*, 2016).

II. L'évaluation des systèmes de surveillance One Health :

A. L'évaluation des systèmes de surveillance sectoriels

Les systèmes de surveillance sont dynamiques, leur existence dépend fortement de la durabilité de leur financement. Ils doivent premièrement démontrer leur efficacité et leur utilité aux gestionnaires et bénéficiaires du système, et deuxièmement prouver leur pertinence par rapport à un contexte en évolution permanente. L'utilité de tout système de surveillance dépend majoritairement de la qualité des données et informations qu'il produit pour appuyer la prise de décision dans la gestion du danger. Cette qualité est directement corrélée au bon fonctionnement du système. Ainsi, il est important de conduire des évaluations de ces systèmes pour justifier leur existence et améliorer leur fonctionnement afin qu'ils répondent à leurs objectifs (*Dufour, Hendrickx*, 2011).

Une évaluation d'un système de surveillance ou d'un de ses composants est « la définition de son mérite en comparant le système à un standard, un objectif, un critère ou un autre système réel ou modélisé » (*RISKSUR*, 2015). Ainsi, toute évaluation peut être décomposée en trois étapes : (i) la collecte de données, (ii) la mesure, (iii) le jugement. Pour effectuer une collecte de données appropriée, une préparation en amont de l'évaluation est nécessaire. Elle consiste en une description et une compréhension du contexte de la surveillance, et en la formulation d'une question d'évaluation cohérente avec ce contexte et les attentes des gestionnaires et bénéficiaires. Cette question d'évaluation permet alors de choisir les méthodes, les attributs ou les critères appropriés pour répondre à la question. L'évaluation en tant que telle peut alors commencer (*Calba et al.*, 2015).

La collecte de données et sa mesure dépendent de la méthode choisie. La majorité des méthodes reposent sur des critères ou attributs d'évaluation, c'est-à-dire des éléments caractéristiques mesurables du système de surveillance de façon qualitative, semi-quantitative ou quantitative. Cette mesure peut alors être effectuée selon une échelle, un standard ou en comparaison avec un autre système. Enfin, une fois que la mesure est effectuée, il est nécessaire de poser un jugement, c'est-à-dire de donner une valeur au système pour compléter l'évaluation (*Calba et al.*, 2013).

B. Une présentation des outils d'aide à l'évaluation : d'OASIS à EVA TOOL

Il existe de nombreuses méthodes d'évaluation des systèmes de surveillance en santé publique, en santé animale ou en santé publique environnementale. Dans une revue systématique de littérature, Calba et *al.* (2015) ont identifié 15 approches différentes. Parmi ces approches en santé animale, seul l'OASIS a été identifié comme fournissant des outils concrets (guide de notation, questionnaire et matrice de notation) permettant d'encadrer la mise en application de la méthode d'évaluation. On notera que deux autres outils en santé humaine ont aussi été identifiés par Calba et *al.* (2015), mais ils n'ont pas été étudiés ici.

L'outil OASIS – « outil d'analyse de système d'information en santé » – a été élaboré en 2011 par Hendricks et *al.* (2011) à partir de l'outil « Surveillance Network Assessment Tool » (SNAT) (*Lefrançois et al.*, 2007), de la méthode d'audit basée sur des critères développés par l'OMS et le « Center for diseases control and prevention » (CDC) (*German et al.* 2001), et de la méthode des critères critiques (*Dufour*, 1999). Cette méthode semi-quantitative permet de mesurer une série de 78 critères grâce à une notation allant de 0-3 et présentant les résultats sous la forme de trois représentations graphiques inspirées des méthodes d'audits existants. La collecte des données est encadrée par un questionnaire extensif rempli grâce à des interviews avec des membres clés du système de surveillance. Cet outil permet d'obtenir une réponse standardisée et de comparer des systèmes entre eux, mais il ne permet d'analyser ni les coûts, ni les bénéfices du système. Il ne répond donc pas à toutes les questions d'évaluation, et l'outil manque de flexibilité (*Calba et al.*, 2015).

A la suite de ces observations, le projet Risk Sur a développé l'outil EVA Tool. Celui-ci n'est pas un outil d'évaluation à proprement parler. En effet, il accompagne le processus d'évaluation en identifiant la bonne question d'évaluation, hiérarchisant les attributs d'évaluation en fonction de celle-ci et du contexte, et proposant une méthode pour évaluer ces attributs, comme l'utilisation de l'outil OASIS (*RISKSUR*, 2015).

C. L'évaluation des systèmes de surveillance One Health

Aujourd'hui, il n'existe aucune approche ou méthode dédiée à l'évaluation des systèmes de surveillance One Health. Cependant, de nombreux cadres conceptuels pour l'évaluation de ces systèmes ont été développés avec souvent une approche économique, par exemple ceux de Narrod (*Narrod et al.*, 2012), Dente (*Dente et al.*, 2018) ou Martins (*Martins et al.*, 2016). Cependant, plusieurs approches proposent aujourd'hui des méthodes pour évaluer les initiatives One Health ou les stratégies politiques One Health.

Le premier outil est le « NEOH evaluation framework », développé par le consortium NEOH (Network for the evaluation of One Health). L'évaluation nécessite (i) la description de l'initiative et du contexte, (ii) la description des sorties et des conséquences du système en définissant son chemin d'impact, (iii) une liste d'attributs permettant d'apprécier l'organisation du système et le degré de « One Healthness » et enfin (iv) une appréciation de l'association entre l'évaluation de l'organisation du système et ses conséquences identifiées ultérieurement. Le degré de « One Healthness » permet de comparer le système étudié par rapport à un système conceptuel entièrement intégré, holistique, éthique et équitable défini par le consortium NEOH (*Rüegg et al.*, 2018).

De même, l'OMS, financée par l'Agence d'aide au développement américain (USAID), a créé un outil, « The One Health Planning for performance » (OH P4P), permettant d'évaluer les stratégies One Health en complément des outils de l'OMS comme le « Joint External Evaluation » (JEE). Cet outil, OH P4P, apprécie les capacités et les performances d'organisation des plateformes nationales One Health afin de hiérarchiser et de planifier des améliorations (*P&R*, 2018).

Ces deux outils d'évaluation, « NEOH evaluation framework » et OH P4P, n'ont pas été créés spécifiquement pour l'évaluation des systèmes de surveillance Cependant, l'outil de NEOH considère les systèmes de surveillance One Health comme une initiative. Dans ce cadre, l'outil de NEOH a été utilisé pour évaluer deux systèmes de surveillance : le système de surveillance de la cysticercose au Portugal (*Fonseca et al.*, 2018) et le système de surveillance du virus fièvre du Nil occidental Italie (*Paternoster et al.*, 2017). Dans les deux cas d'étude, l'évaluation aboutit à la définition d'un niveau de « One Healthness » du système de surveillance. Cependant, ce chiffre, aujourd'hui, ne permet pas de conclure que le degré de « One Healthness » atteint améliore l'efficacité et le coût-bénéfice du système. De plus, la méthode actuelle est lourde et difficile à appliquer, car elle est très généraliste et demande des informations difficiles à se procurer, même dans le cadre d'une auto-évaluation (*Fonseca et al.*, 2018).

Ainsi, il existe de nombreuses preuves qu'une approche holistique One Health avec des collaborations a des bénéfices, comme favoriser la production de connaissance, ou encore avoir un meilleur rapport coût-efficacité/coût-bénéfice par le partage des ressources (*Häsler et al.*, 2014). Cependant, les collaborations sont très demandeuses en ressources, et rien ne prouve qu'un système de surveillance One Health complètement intégré soit la solution la plus performante et efficiente en fonction du danger surveillé et du contexte de la surveillance (*Martins et al.*, 2016).

III. La surveillance de l'antibiorésistance et le cas d'étude du Vietnam

A. Des éléments introductifs sur l'antibiorésistance dans le monde

L'antibiorésistance est la cause de la diminution de l'efficacité des traitements antibiotiques, rendant le traitement des patients difficile, coûteux et quelquefois impossible. C'est un phénomène biologique naturel qui correspond à l'ensemble des mécanismes de survie des bactéries sélectionnées au cours du temps. L'utilisation excessive et inappropriée des antibiotiques est le premier facteur de l'apparition des résistances (*WHO*, 2014). D'après O'Neill, l'antibiorésistance pourrait être la première cause de mortalité mondiale en 2050 avec 10 millions de morts par an (*O'Neill*, 2014). Bien que ce chiffre soit aujourd'hui contesté, la problématique de l'antibiorésistance est devenue une priorité internationale, et l'OMS a appelé à une réponse systémique à un problème global (*WHO*, 2001).

Toutefois, il existe un amalgame récurrent entre la notion de résistance aux antibiotiques (ABR) et celle aux antimicrobiens (AMR). Ce second terme inclusif concerne non seulement les résistances aux antibiotiques chez les bactéries, mais aussi les résistances à d'autres molécules présentes chez les parasites, les champignons et autres microbes. Ces termes ne sont pas à confondre, car l'épidémiologie et les mécanismes de résistance sont différents pour chaque catégorie de microbes, et une telle généralisation peut avoir des effets néfastes sur leur gestion (*Swensen*, 2017).

L'antibiorésistance est un phénomène qu'on retrouve dans les bactéries des trois compartiments : humain, animal et environnement. Cependant, l'épidémiologie du phénomène est complexe et présente de nombreuses inconnues. Ainsi, par exemple, les preuves d'un transfert de gène de résistance de bactéries provenant d'animaux de production à des bactéries du système digestif humain sont faibles, et, dans le cas d'individu sain, si transfert il y a, ces gènes ne persistent pas dans la flore intestinale (*Phillips et al.*, 2004). Par contre, on a retrouvé par exemple des résistances chez les personnes en contact avec des animaux traités aux antibiotiques, dans l'environnement autour des élevages et dans les cours d'eau où les entreprises productrices d'antibiotiques rejettent leurs déchets (*Baquero et al.*, 2008), (*Davies, Davies*, 2010),(*Phillips et al.*, 2004). La figure 5 de Philips et al., (2004) reprend un ensemble de pistes possibles de transmission.

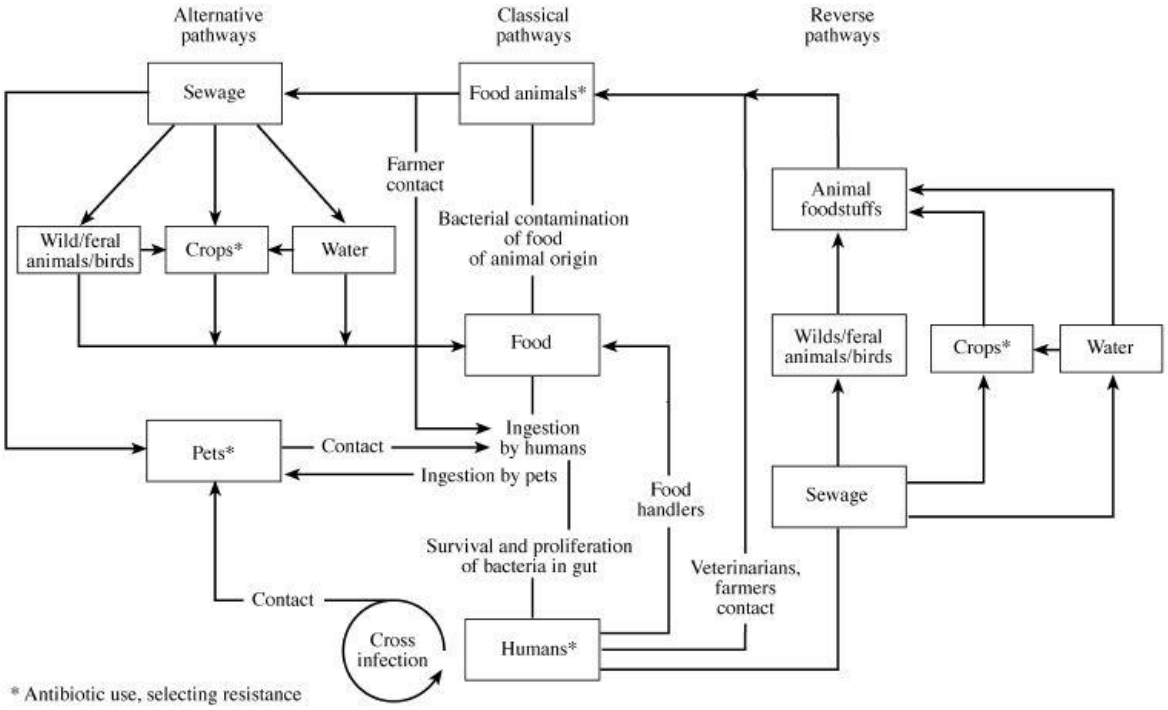


*Figure 5: Route de transmission possible des résistances aux antibiotiques. © (*Phillips et al., *2004)*

B. La surveillance de l'antibiorésistance : objectifs et nécessité d'une approche One Health

La surveillance de l'antibiorésistance peut permettre d'apporter des informations sur la prévalence et l'émergence de résistances, ou d'appuyer la mise en œuvre et l'évaluation des interventions mises en place par une politique publique (*Queenan et al.*, 2016). L'OMS souligne la nécessité d'une surveillance multisectorielle de la résistance aux antibiotiques incluant la consommation d'antibiotiques (*WHO*, 2013). En effet, si le phénomène est à l'interface entre l'homme, l'animal et l'environnement, l'OMS, avec son objectif de santé publique, souligne la nécessité de surveiller les résistances aux antibiotiques chez l'homme, les animaux de production et les aliments issus des productions animales (en particulier la viande) (*WHO*, 2013). De plus, l'utilisation des antibiotiques est considérée comme un facteur majeur de l'apparition et de l'entretien du maintien des résistances (*Queenan et al.*, 2016).

La création d'un système de surveillance plurisectoriel présente potentiellement de nombreux bénéfices, tels que la compréhension des voies de transmission entre les domaines, l'identification de leur rôle dans l'émergence et le maintien des résistances chez l'homme, ainsi que l'observation des liens entre usage et résistance (*Queenan et al.*, 2016). D'autres bénéfices plus ou moins mesurables sont associés généralement à la mise en place de système de surveillance One Health : la création de savoir, de capital social et intellectuel, d'amélioration des capacités techniques et de diminution de l'anxiété par le partage des responsabilités et d'une réassurance mutuelle (*Babo Martins et al.*, 2016). En raision de son épidémiologie complexe à l'interface entre les trois domaines, il est important d'aborder la surveillance de l'antibiorésistance avec une approche holistique et multidisciplinaire, et cela malgré les nombreux obstacles ne facilitatnt pas l'opérationnalisation d'un tel système de surveillance(*Bordier, Binot, et al.*, 2018).

C. La surveillance de l'antibiorésistance au Vietnam

a. La situation de l'antibiorésistance au Vietnam

Depuis plus de quinze ans, des études soulignent le taux élevé d'antibiorésistance présent au Vietnam. On retrouve aussi bien des prévalences élevées de résistance chez des bactéries pathogènes humaines que chez les animaux de production ou encore dans les denrées alimentaires d'origine animale telles que la viande, le poisson, les œufs et le lait. En 2000, un rapport du réseau de surveillance asiatique des pathogènes résistants a souligné qu'au Vietnam la prévalence des *Streptococcus pneumoniae* résistant à la pénicilline (71.4 %) et aux érythromycine (92.1 %) était la plus élevée des 11 pays du réseaux (*Nguyen et al.*, 2013). Certains taux de prévalence augmentent au cours du temps, par exemple la résistance des *Salmonella entericae* serovar Typhi à l'acide nalidixique, qui a évolué de 3.5 % à 97 % entre 1993 et 2004 (*Chau et al.*, 2007). Ces taux importants de résistance ont aussi été retrouvés dans toutes les productions animales utilisant des antibiotiques, et en particulier dans les filières avicoles, porcines, mais aussi en aquaculture. Ainsi, dans une étude sur 202 isolats de *Campylobacter* issus d'élevage porcin et aviaire du delta du Mékong, tous présentaient des résistances à l'érythromycine, 99 % au sulfaméthoxazole-triméthoprime, et 92 % à l'acide nalidixique et à l'ofloxacine. De même, 18 % des *E. coli* isolées d'échantillon de crevettes issues d'un marché de Nha Trang étaient producteurs de Beta-lactamases et 55 % d'entre eux présentaient des résistances multiples (*Le et al.*, 2015).

Le contexte vietnamien présente un certain nombre de facteurs qui favorisent l'émergence et le maintien des résistances. Dans le secteur humain, la vente des antibiotiques sans prescription et l'automédication sont communes. Ce dernier point est favorisé par l'augmentation des dépenses personnelles non prises en compte par l'assurance maladie. Dans les hôpitaux, la surpopulation et les infections nosocomiales favorisent aussi la dissémination des résistances. A cela s'ajoutent le manque de connaissance de nombreux professionnels, et l'absence de guide national à jour pour une bonne gestion et prescription des antibiotiques en milieu hospitalier (*Nguyen et al.*, 2013).

En santé animale, les éleveurs souvent traitent de leur propre initiative ou en suivant les conseils du voisin ou du vendeur de médicaments (diplômé ou non), ceux-ci n'ayant même pas observé les animaux. Une étude a ainsi mis en avant un certain nombre de mauvaises pratiques dans ce système, comme l'augmentation des doses d'une fois et demie par les éleveurs, qui pensent que cela augmente les résultats sans faire du mal aux animaux (*Luu et al.*, 2015).

b. *Un court historique du système de surveillance One Health de l'antibiorésistance au Vietnam*

Les prémices d'un système de surveillance multisectoriel sont apparues en 2013 avec le lancement du Plan national contre la résistance aux antimicrobiens (GAP) par le ministère de la Santé. Ce document officiel prévoit la création d'un système de surveillance de l'antibiorésistance (ABR) et de l'usage des antibiotiques (ABU) chez l'homme et chez l'animal. Il faut souligner deux particularités de ce document. Tout d'abord, si son nom fait référence aux antimicrobiens, le programme est focalisé sur la lutte contre l'antibiorésistance. Deuxièmement, si le ministère de l'Agriculture et du Développement (MARD) est cité dans le document, il n'a pas participé à sa rédaction, et ne l'a pas officiellement approuvé.

En 2015, suite à la publication du rapport mondial sur l'antibiorésistance et du plan global d'action appelant à la collaboration entre secteurs (*WHO*, 2013), une profession de foi est signée pour formaliser la volonté des 4 ministères en charge de la santé humaine (ministère de la Santé – MOH), de l'agriculture (ministère de l'Agriculture et du Développement rural – MARD), de l'environnement (ministère de l'Environnement et des Ressources naturelles – MONRE) et du commerce (ministère du Commerce et des Industries – MOIT) de collaborer sur la problématique de l'antibiorésistance. Ce document, appelé Aide-mémoire, prévoit une collaboration entre les secteurs pour mettre en place une surveillance multisectorielle.

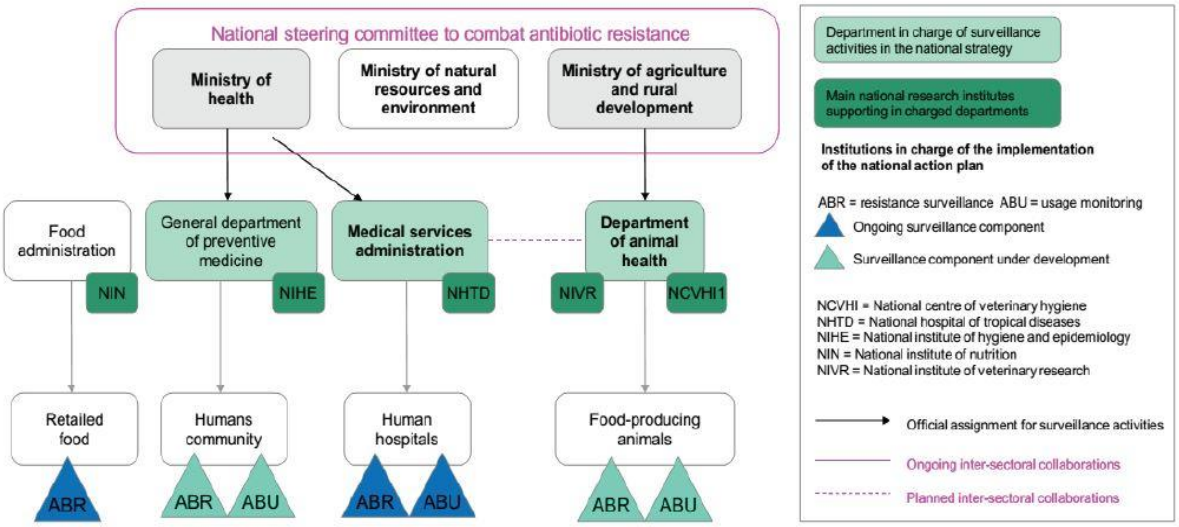


*Figure 6 :Organisation du système de surveillance One Health de l'antibiorésistance au Vietnam © (*Bordier, Dien, *2017)*

En 2017, le MARD publie son propre plan d'action (NAP), dans lequel est décrite la création d'un système de surveillance de l'antibiorésistance et de l'usage des antibiotiques chez les animaux de production, notamment en filières porcine et volaille. Le document prévoit la mise en place de collaborations avec le MOH via l'échange d'informations, la création d'une base de données partagée et des activités de communication et de dissémination communes.

Le système de surveillance One Health au Vietnam est donc encadré par de nombreux documents. L'ensemble des dispositifs est résumé par la figure 6 de Bordier et Dien (2017), ainsi que leur mise en place. On remarque, dans la figure, que le dispositif de surveillance des résistances dans les denrées alimentaires d'origine animale mis en place par l'autorité en charge de la sécurité sanitaire des aliments sous MOH n'est pas intégré dans les plans d'action. Cependant, on notera que le dispositif de surveillance de l'antibiorésistance est en phase pilote depuis le second semestre 2017 (*Fleming Fund*, 2018), la situation du système de surveillance a donc évolué depuis la création de la figure 6.

c. *Les acteurs de la surveillance de l'antibiorésistance au Vietnam*

En se basant sur la littérature officielle, et les entretiens semi-structurés d'acteurs clés, Bordier, Binot et *al.* (2018) ont identifié l'ensemble des acteurs du système de surveillance de l'antibiorésistance au Vietnam. Les résultats de l'étude sont schématisés dans la figure 7.

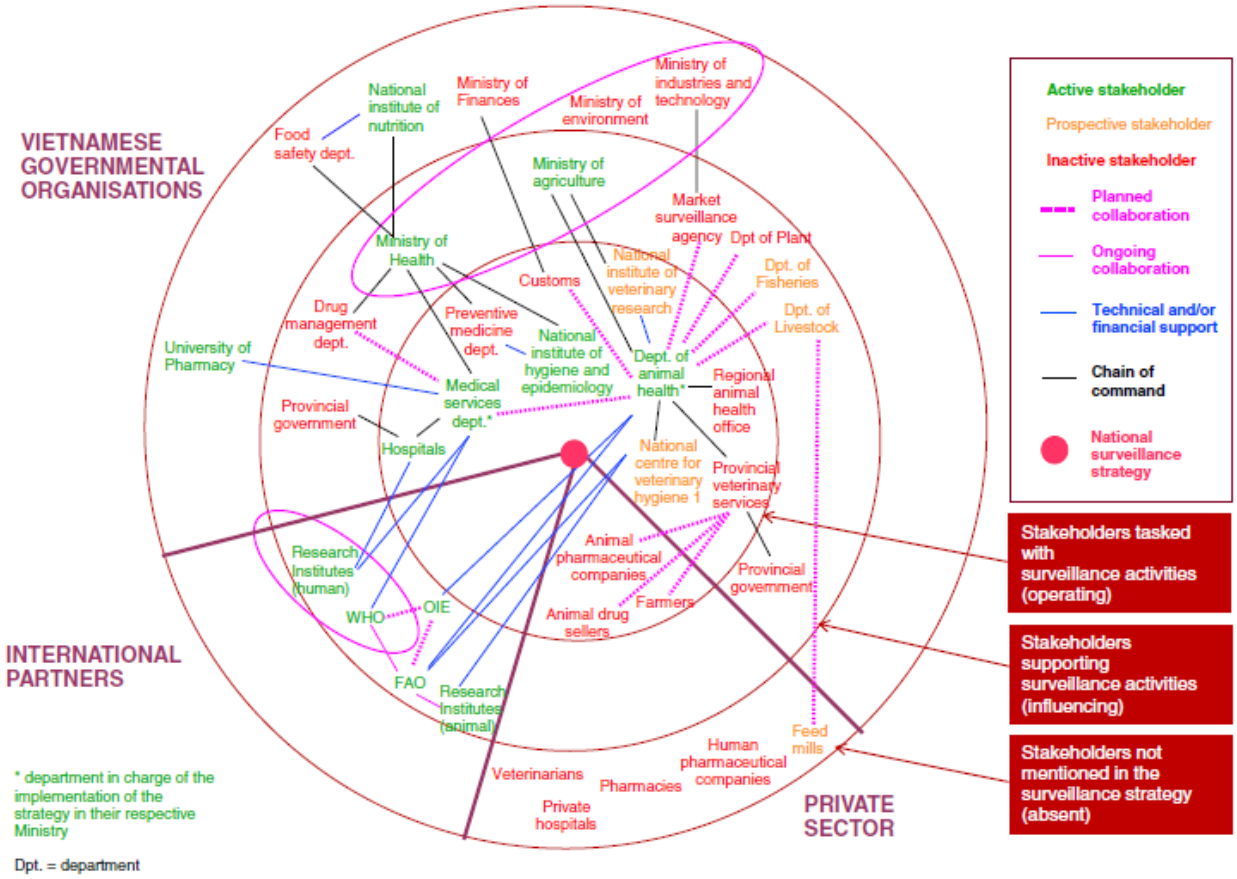


Figure 8 : Cartographie organisationnelle et fonctionnelle des acteurs de la stratégie de surveillance One Health de l'antibiorésistance au Vietnam ©(Bordier, Binot et al., 2018).

Cette figure 7 montre bien la complexité et la diversité des acteurs présents. Il existe un décalage entre la simplicité de la figure 5 et la diversité des acteurs de la figure 7. Elle identifie trois catégories d'acteurs : les acteurs privés (associations, particuliers, industriels, distributeurs) qui ne participent pas pour le moment au système de surveillance, les partenaires internationaux (instituts de recherche ou organisations intergouvernementales) et les organisations gouvernementales (autorité le long de l'échelle hiérarchique, instituts de recherche ou universités). Les collaborations ont lieu principalement à un niveaux politique à travers un engagement formel de lutter conjointment contre l'antibiorésitance entre les partenaires internationaux d'une part et entre les 4 ministères de l'autre (*Bordier, Binot, et al.*, 2018).

PARTIE II : Matériel et méthode

En se basant sur l'hypothèse que les systèmes de surveillance One Health nécessitent des collaborations de qualité et adaptées à l'objet surveillé et au contexte de la surveillance, cette étude tend à produire un outil spécifique pour évaluer les caractéristiques des collaborations au sein de ces systèmes. Cet outil vient en complément des outils d'évaluation existants, et est appliqué aux cas d'étude de la surveillance de l'antibiorésistance au Vietnam. L'étude est divisée en trois étapes : (i) la définition des attributs permettant d'évaluer les collaborations dans un système de surveillance, (ii) le développement d'un outil d'évaluation des collaborations dans les systèmes de surveillance One Health et (iii) l'application de l'outil à l'évaluation des collaborations dans le système de surveillance de l'antibiorésistance au Vietnam. Le cadre de l'étude est défini par l'ensemble des définitions présentées précédemment, en particulier celle des systèmes de surveillance One Health et de l'évaluation. Cette étude a été conduite entièrement en anglais afin de pouvoir atteindre le maximum d'experts, de créer un outil partageable avec toute la communauté scientifique internationale, et de communiquer avec les acteurs du système de surveillance vietnamien.

Finalement, le déroulement de cette thèse s'est fait en deux temps. Dans un premier temps, cette thèse a eu lieu dans le cadre d'un stage de master encadré par Mme Marion Bordier, à Hanoï au Vietnam, pendant 5 mois. Dans le cadre de ce stage, j'ai élaboré le questionnaire pour l'élicitation d'opinion d'experts, j'ai encadré une étudiante de master 1 pour l'analyse des réponses au questionnaire, puis effectué les changements correspondants sur la liste des attributs. Une fois la liste établie, j'ai créé la matrice de notation et récolté les données nécessaires pour l'évaluation des collaborations au Vietnam. Après le stage, j'ai continué de travailler en collaboration avec Mme Bordier. Nous avons alors créé des tableaux et un formulaire pour la récolte de données, ainsi que le guide d'utilisation de l'outil d'évaluation des collaborations. Nous avons aussi organisé un second tour d'élicitation d'opinion d'experts pour valider la liste des attributs modifiés pendant le stage, et enfin j'ai utilisé l'outil pour évaluer les collaborations au sein du système de surveillance de l'antibiorésistance au Vietnam.

I. La définition des attributs d'évaluation des collaborations, et l'élicitation d'opinion d'experts

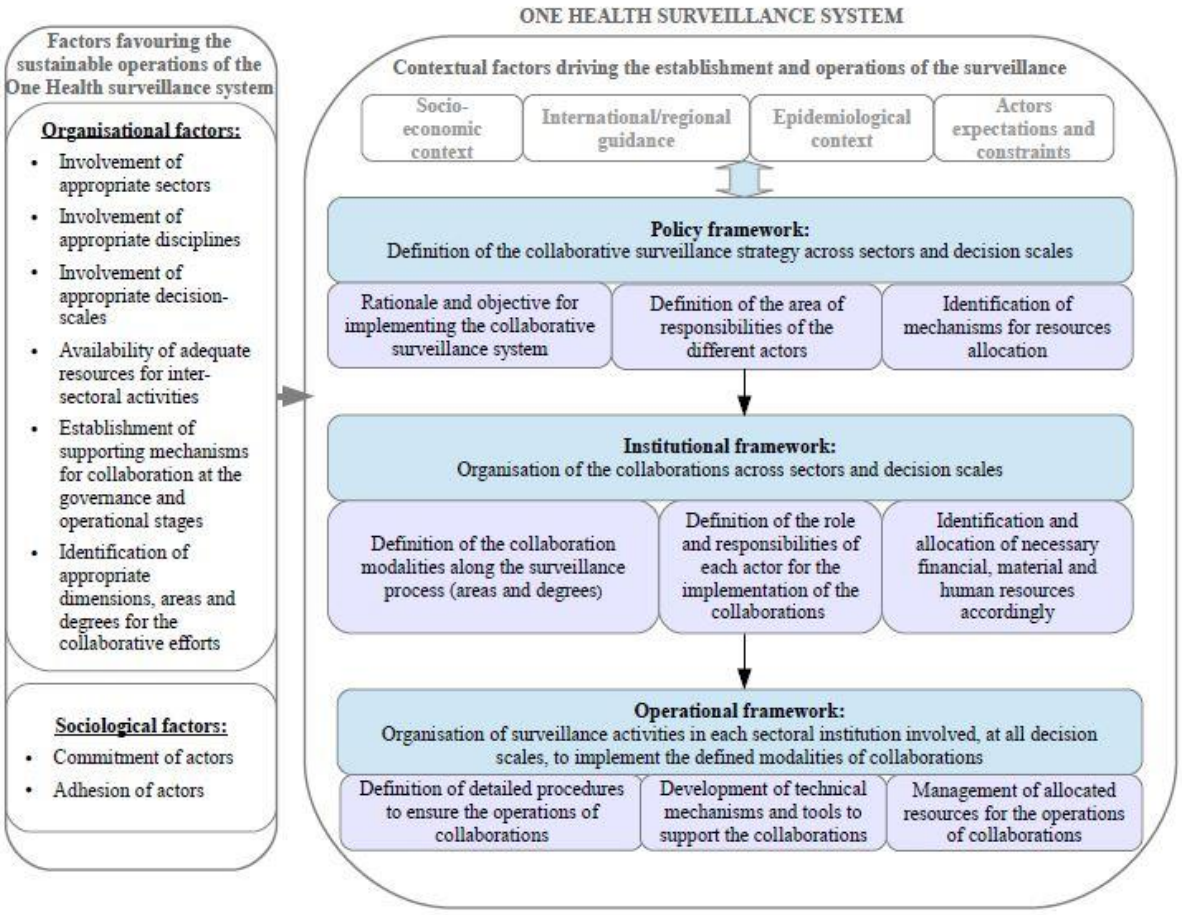


Figure 10: Cadre conceptuel de l'organisation des collaborations dans les systèmes de surveillance One Health. ©(Bordier, Uea-Anuwong, et al., 2018).

La première version des attributs de collaboration a été créée en confrontant les attributs de surveillance définis dans l'outil OASIS (*Hendrikx et al.*, 2011) et ceux définis dans l'outil EVA Tool (*Calba et al.*, 2013) au cadre conceptuel développé par Bordier, Uea-Anuwong, et al., (2018) à la suite de la revue systématique de littérature. Ce cadre conceptuel, présenté dans la figure 8, montre trois niveaux d'organisation et de fonctionnement des collaborations. Les collaborations sont tout d'abord définies à un niveau politique en termes de stratégie de collaboration (formalisation de l'objectif motivant la collaboration entre secteurs). Cette volonté politique est alors traduite en modalité de collaboration institutionnelles. Ces dernières sont ensuite opérationnalisées par les acteurs de la surveillance. La mise en place de ces collaborations, aux différents niveaux, est influencée par des facteurs contextuels et organisationnels.

Ces attributs ont été ensuite soumis à une élicitation d'opinion d'experts. La méthodologie est basée sur un questionnaire, un retour aux experts puis un second tour pour confirmer la position des experts dans le but de valider les attributs. Les experts ont été sélectionnés suivant deux méthodes : les premiers et derniers auteurs de l'ensemble des publications retenues dans la revue de littérature conduite par Bordier, Uea-Anuwong, et *al.* (2018), les experts impliqués sur des projets en lien avec la surveillance One Health tels que le consortium RISKSUR et NEOH. Finalement, 256 experts ont été identifiés. Ces experts furent encouragés à partager le questionnaire avec des experts de leur réseau qui leur semblaient pertinents.

Les acteurs ont été contactés électroniquement, pour remplir un questionnaire en ligne élaboré avec l'outil SurveyMonkey©. Le questionnaire était séparé en deux parties : une première partie relative aux informations générales concernant les participants, et une seconde relative à leur opinion sur les attributs de collaboration . La première partie du questionnaire était composée de 5 questions permettant de récolter les informations suivantes : nom, secteur professionnel, formation académique, discipline d'expertise, expertise spécifique dans la surveillance et l'application du concept One Health. La deuxième partie du questionnaire récoltait l'opinion des experts sur la pertinence des attributs présentés ainsi que sur le potentiel manque d'autres attributs. Les attributs ont été séparés en cinq catégories : gouvernance, opération, fonction, efficacité et valeur (*Calba et al.*, 2013).

Le questionnaire fut envoyé conjointement avec un texte présentant l'étude ainsi qu'un glossaire élaboré à l'aide des définitions présentées auparavant. Celui-ci contenait trois autres parties sur les modèles de surveillance One Health, les dimensions de collaboration et les modalités de collaboration qui ne sont pas abordées dans cette étude. Le questionnaire est resté ouvert du 9 au 30 mars 2018. Les résultats ont alors été téléchargés à partir du site Internet dans un tableur Excel©, où chaque ligne correspond à la réponse d'un expert (adresse IP unique) et les colonnes aux questions. Le tableau ainsi obtenu a été nettoyé et encodé afin d'obtenir une base de données sur laquelle a été réalisée l'analyse. Une analyse statistique descriptive a été effectuée sur les informations générales des experts et sur leur opinion sur la liste des attributs (attribut pertinent ou manquant). Les commentaires ont été analysés qualitativement afin de pouvoir identifier de grandes thématiques et de redéfinir les attributs. Les attributs redéfinis ont alors été présentés de nouveau à une table ronde d'experts pour un second tour d'élicitation. Les experts contactés pour participer à cette table ronde sont ceux qui ont répondu au premier tour. Les conclusions à l'issue de ce second tour ont alors servi à valider et/ou modifier de nouveau la liste d'attributs.

II. La méthode pour mesurer les attributs d'évaluation des collaborations

Les attributs revus à la suite de l'élicitation d'opinion d'experts ont été divisés en deux groupes : (i) les attributs décrivant l'organisation de la gouvernance et l'opérationnalisation des collaborations dans le système de surveillance One Health et (ii) les attributs de fonctions des collaborations. Afin de pouvoir mesurer les attributs d'organisation et d'opérationnalisation des collaborations, ils ont été traduits en un ou plusieurs critères pour lesquels une grille de notation allant de 0 à 3 a été développée. La note 3 signifie que tous les éléments définis dans le critère sont mis en œuvre, la note 0 signifie au contraire qu'aucun élément n'est en place. Les notes 1 et 2 assurent un gradient entre les deux notes extrêmes. Pour certains critères, la valeur « Sans Objet » est également possible, et n'impacte pas la note finale d'évaluation.

Les critères associés aux attributs décrivant l'organisation et l'opérationnalisation des collaborations ont alors été regroupés de manière différente : (i) par indicateurs macros afin d'obtenir une vision d'ensemble de l'organisation et du fonctionnement des collaborations et (ii) par attribut de fonctions des collaborations afin d'évaluer la qualité des collaborations. Les indicateurs macros ont été développés en appliquant la démarche « qualité par processus » (*Pillou*, 2006). Il existe trois processus : le « management » des collaborations (relatif à tous les éléments en place pour diriger les collaborations), les éléments « support » (relatifs à tous les éléments permettant la mise en place d'opérations de collaboration) ainsi que leur « réalisation » (relatifs à toutes les activités de collaboration et leurs produits). Ces indicateurs ou attributs sont mesurés en pondérant les notes obtenues par les différents critères qui leur ont été attribués. Afin d'illustrer les notes obtenues pour chaque attribut et indicateur, des représentations graphiques ont été développées.

III. La création de l'outil d'évaluation.

A ce stade, une matrice d'évaluation des collaborations a été développée. Pour une bonne utilisation de la matrice, il est nécessaire de créer un guide d'utilisation de la matrice ainsi qu'un protocole de récolte de données. Ce qui a nécessité trois étapes. Tous d'abord, les critères ont permis d'identifier les informations nécessaires pour leur notation et qui devront être collectés dans le système de surveillance multisectoriel. Puis, l'identification de ces informations a permis de créer un protocole de récolte des données. Enfin, un guide d'utilisation de l'outil (matrice et protocole de récolte de données) a été développé dans le but de standardiser au maximum la procédure.

IV. L'application de la méthode au cas d'étude du Vietnam

Afin de tester l'outil développé, celui-ci a été appliqué au cas de l'antibiorésistance au Vietnam. L'objectif étant de tester la matrice d'évaluation et les documents pour la récolte de données, aucune question d'évaluation précise n'a été fixée et tous les attributs ont été évalués. Afin de pouvoir évaluer les collaborations entre secteurs, il était d'abord nécessaire de recueillir des données sur les dispositifs existant dans les différents domaines : hôpitaux, animaux producteurs de denrées alimentaires, aliments à la distribution. Puisque le protocole de récolte de données n'avait pas encore été établi, une évaluation OASIS (version Flash) préalable a été effectuée pour chacun des dispositifs (*Dufour, Hendrickx,* 2011), et les informations nécessaires pour répondre aux critères ont été identifiées. Le recueil des informations nécessaires a été réalisé sur la base des données collectées dans le cadre d'une analyse des acteurs du système de surveillance (*Bordier, Binot et al.*, 2018) et lors d'entretiens semi-structurés avec les coordinateurs ou des acteurs clefs du dispositif (laboratoires, unités intermédiaires, structures d'appui technique et scientifique, bailleurs).

PARTIE III : Résultats

I. Les résultats de l'élicitation d'opinion d'experts et la révision des attributs

Sur la base de l'existant et du cadre conceptuel présenté précédemment, une première liste de 38 attributs de collaboration des systèmes de surveillance One Health a été développée (Annexe 1). Ces attributs sont catégorisés en 5 groupes : gouvernance (9), opération (8), fonction (7), efficacité (10) et valeur (4). Sur les 256 experts sollicités, 84 ont accédé au questionnaire et 39 ont répondu à la partie relative aux attributs d'évaluation.

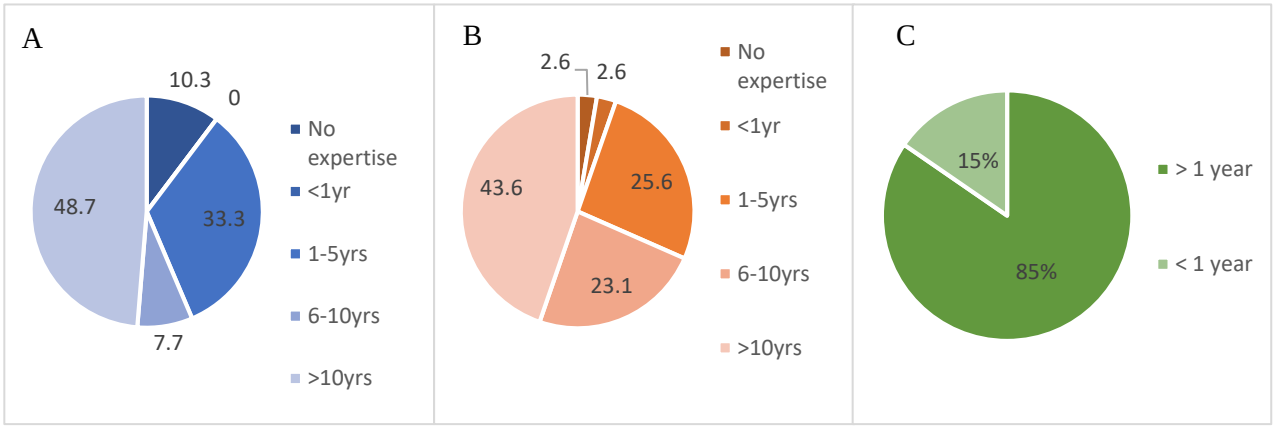


Figure 11 : Expertise spécifique des experts ayant répondu au questionnaire en surveillance et sur le concept One Health. © Nguyen Thi Thuy Dung

(A) Proportion d'experts ayant répondu au questionnaire et ayant déjà travaillé dans la surveillance des dangers ; (B) Proportion d'experts ayant répondu au questionnaire et ayant déjà travaillé dans le cadre du concept One Health ; (C) Proportion d'experts ayant répondu au questionnaire ayant travaillé plus ou moins d'un an dans le domaine de la surveillance et le concept One Health

La majorité des répondants au questionnaire élaboré (Annexe 1) se déclarent épidémiologistes (74 %) et/ou vétérinaires (72 %) travaillant dans la recherche (54 %) ou des organisations gouvernementales nationales ou internationales (39 %). Ils ont généralement répondu qu'ils avaient de l'expérience dans les disciplines suivantes : épidémiologie (95 %), santé animale (85 %), santé publique vétérinaire (77 %), santé publique humaine (67 %) ou sécurité sanitaire des aliments (62 %). Spécifiquement dans le domaine de la surveillance, plus de la majorité d'entre eux ont plus de 6 ans d'expérience (56 %) (fig. 9A). De même, la majorité d'entre eux ont déjà travaillé plus de 6 ans dans le cadre du concept One Health (66 %) (fig. 9B). En somme, 85 % des experts ont au moins un an d'expérience dans le domaine de la surveillance et le concept One Health (fig. 9C).

La majorité des experts n'ont pas identifié d'attributs manquants ou non pertinents dans les différentes catégories, telles que celles présentés dans la figure 10A. Cependant, quand on considère la liste entière d'attributs toutes catégories confondues (fig. B), plus de la moitié des experts (57 %) ont identifié au moins un attribut manquant. Un quart des experts (24 %) n'ont identifié aucun attribut manquant ou non pertinent

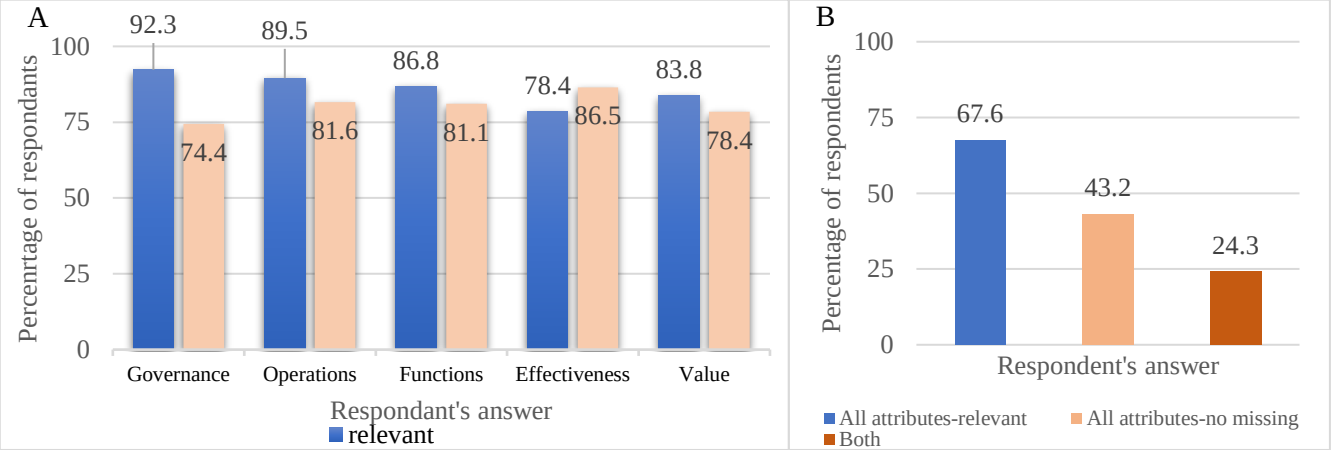


Figure 12 : Proportions d'experts considérant la liste d'attributs pertinente ou complète. © Nguyen Thi Thuy Dung

(A). Proportions d'experts considérant que la liste des attributs est pertinente ou complète par catégories d'attributs. (B) Proportions d'experts considérant que la liste des attributs est pertinente et/ou complète.

Après nettoyage, le questionnaire a permis de recueillir 61 commentaires qui ont été regroupés selon 5 grandes thématiques : « attributs manquants » (50 % des commentaires), « hiérarchisation et sélection des attributs » (16 %), « nécessité de clarifier la définition des attributs » (13 %), « attributs non pertinents » (13 %), « clarification nécessaire entre les attributs permettant l'évaluation des collaborations et ceux permettant l'évaluation d'un système One Health » (8 %).

L'analyse de 28 commentaires a permis d'identifier une série de 27 attributs manquants tels que représenté dans le tableau II.

Tableau II : Attributs manquants identifiés par les experts par catégorie.

CATEGORIE D'ATTRIBUTS	ATTRIBUTS MANQUANTS IDENTIFIES PAR LES EXPERTS
GOUVERNANCE	Existence de formation tel que des exercices de simulation Existence d'un leader Volonté politique Plan d'action commun pour la surveillance et l'intervention Temps de réponse et capacité du système Mécanisme de décision pour un système juste Mécanisme de décision et responsabilité des acteurs par rapport à leur institution Conception, réflexion et opération multisectorielles et multidisciplinaires
OPERATION	Définition d'un protocole commun pour les investigations Utilisation de l'information pour la gestion du danger par niveaux hiérarchiques Guide d'action des interventions Stock de fournitures pour les interventions Mémoire institutionnelle, apprentissages et réseau de connaissances Qualité et régularité des données
FONCTION	Capacité financière pertinente Utilité de la surveillance pour les acteurs concernés par la surveillance
EFFICACITE	Sensibilité Spécificité Capacité d'établir des équipes intersectorielles pour aborder la question des risques de santé nationaux
VALEUR	Coût efficacité Perception sociale positive du danger sous surveillance Fatigue participative Indicateur d'économie de la santé (ex : DALYs et QUALYs) Coût-bénéfice Valeur perçue par les acteurs des collaborations à la surveillance (par rapport à un système non collaboratif)

De même, dix attributs nécessitant une clarification ont été identifiés. Parmi les attributs d'opérations, un répondant a exprimé la nécessité de distinguer les niveaux d'échange d'information entre secteurs, entre échange de résultats et échange de données de surveillance brutes. Concernant les attributs d'efficacité, 6 commentaires soulignaient la nécessité de préciser la définition de : « sensibilité » (2 commentaires), « précision » (1), « répétabilité » (1), « exhaustivité » (2), « couverture » (2), « représentativité » (2). Enfin, trois commentaires sur les attributs de valeur considéraient que la définition du coût n'était pas complète, que celle des impacts techniques devait être affinée et que les notions de « coût-bénéfice » et « coût-efficacité » devaient être différenciées.

Les commentaires relatifs à la pertinence des attributs faisaient principalement référence aux attributs d'efficacité (88 % sur 8 commentaires). Six attributs ont été explicitement mentionnés par les répondants : « portabilité », « simplicité », « valeur prédictive positive », « valeur prédictive négative », « sensibilité », et « répétabilité ». Un commentaire cependant considérait que les attributs « information », « formation », « ressources » et « formalisation » faisaient référence à la durabilité du système de surveillance (institutionnelle et politique), et n'étaient donc pas à leur place parmi les attributs évaluant la gouvernance des collaborations.

L'analyse des commentaires présentés précédemment a donc permis de redéfinir la liste des attributs. Tout d'abord, deux idées ont été rajoutées à la liste. Premièrement, les termes faisant référence aux flux d'informations et de connaissances au sein des collaborations dans les systèmes de surveillance One Health ont été redéfinis. Cela a permis d'expliciter différentes caractéristiques des attributs relatives à l'information (échange et mémoire institutionnelle) et les activités de communication et de dissémination. La deuxième idée, relative aux mécanismes décisionnels au sein des collaborations, a permis de rajouter les notions de boucle de rétroaction dans les mécanismes décisionnels ainsi que la notion de voie balancée pour représenter l'équilibre des pouvoirs au sein des collaborations.

Les attributs ont été aussi revus pour éviter les amalgames entre l'évaluation du système de surveillance One Health et celle des collaborations. Dans cette démarche, l'ensemble des attributs d'efficacité a été jugé comme non pertinent, car ils n'évaluaient pas l'efficacité des collaborations mais leur impact sur celles des dispositifs du système de surveillance. Au contraire, les attributs de fonctions ont été complètement revisités afin qu'ils puissent permettre l'évaluation de la qualité des caractéristiques des collaborations.

Un ensemble de commentaires n'a pas été retenu pour redéfinir la liste des attributs car ils sortaient des définitions encadrant cette étude. C'est le cas de tous les attributs sur les interventions mises en œuvre sur la base des résultats de la surveillance. De même, le commentaire listant des attributs de gouvernance comme non pertinents parce qu'ils sont en lien avec la durabilité des collaborations et non du degré d'intégration de celles-ci n'a pas été conservé. En effet, cette étude évalue justement les collaborations indépendamment du degré d'intégration de celle-ci, les attributs en lien avec la durabilité de ces collaborations sont donc pertinents. Enfin, les commentaires relatifs à la sélection des attributs ne nous ont pas paru pertinents car l'objectif était de présenter tous les attributs possibles quelle que soit la question d'évaluation (qui va, elle, effectivement influer les attributs qui seront sélectionnés pour l'évaluation). Enfin, malgré leur pertinence, les commentaires relatifs aux attributs de valeur n'ont pas été conservés, car il a été décidé que les attributs de valeurs ne seraient pas définis dans cette première matrice d'évaluation.

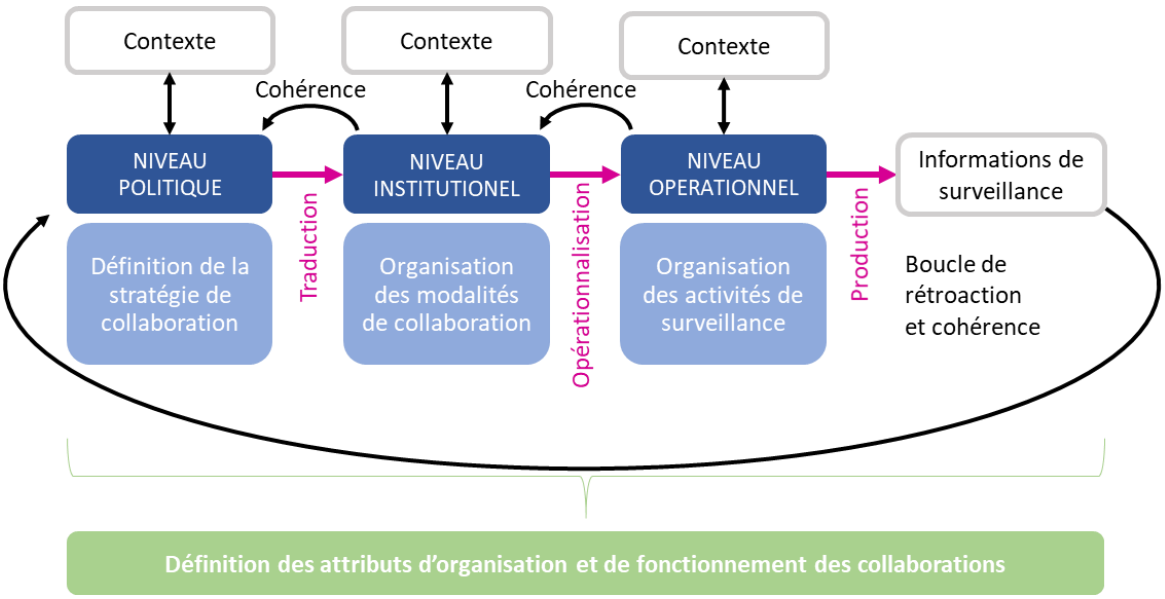


Figure 13 : Schéma explicitant la définition des attributs de collaboration au sein des systèmes de surveillance © Marion Bordier.

Après prise en compte des différents commentaires, une nouvelle liste de 22 attributs d'organisation (13) et d'opérationnalisation (9 d'opérations) a été élaborée. Cette nouvelle liste d'attributs permet d'évaluer les collaborations à trois niveaux d'organisation en suivant la logique dans la figure 11. Quatre attributs de gouvernance évaluent les collaborations dans leur ensemble : la formation des acteurs aux collaborations, l'évaluations des collaborations, l'engagement des acteurs dans le système de surveillance, et l'information au sein du système de surveillance. La liste finalisée des attributs de gouvernance et des attributs d'opérations est représentée respectivement dans les tableaux III et IV. Les attributs de fonctions ont également été redéfinis pour évaluer la qualité des caractéristiques de fonctionnement des collaborations implantées.

Tableau III : Liste finalisée des attributs de gouvernance et des critères correspondants.

Attribute name	Attribute description	Measurable criteria
G.1 Formalisation of the collaborative surveillance strategy	Formalisation of the rationale, objective(s) and purpose of collaboration in the surveillance system as well as the area of actions of the surveillance actors and endorsement by all actors from all sectors, disciplines and decision scales involved.	1. Formalisation of rationale behind the willingness to collaborate for surveillance.
		2. Formalisation of the objective(s) and purpose of collaboration for surveillance.
		3. Formalisation of the areas of action of main stakeholders in the multi-sectoral surveillance system, i.e. the tasks they are assigned with in term of collaboration and of coordination of sectoral surveillance
		4. Endorsement of the documents where all the previous statements are formalised by all actors from different sectors, disciplines and decision scales involved.
G.2 Relevance of the collaborative purpose and objective	Relevance of the collaborative objective(s) and purpose regarding the stakeholders' expectations, the epidemiological and socio-economic context, the international/regional guidance (regulations, recommendations, standards).	1. Relevance of the collaborative objective(s) and purpose regarding actors and end-users' expectations (including meeting the sectoral objectives).
		2. Relevance of the collaborative objective(s) and purpose regarding the epidemiological, socio-political and economic context.
		3. Relevance of the collaborative objective(s) and purpose regarding the international/regional guidance (regulations, recommendations, standards).
G.3 Formalisation of collaboration modalities	Description of collaboration in terms of modalities, and role of surveillance actors.	1. Formalisation of the collaborative modalities.
		2. Formalisation of roles and responsibilities of actors involved in collaboration.
		3. Endorsement of the documents where all the previous statements are formalised by all actors from different sectors, disciplines and decision scales involved or consistent across the institutions.
G.4 Relevance of collaborative modalities	Relevance of the collaborative modalities across the different dimensions regarding the collaborative objective(s) and surveillance context	1. Relevance of the collaborative modalities regarding the collaborative objective(s) and surveillance context
G.5 Coverage	Relevance of the dimensions and data sources covered by the multi-sectoral surveillance system regarding the collaborative objective(s) and surveillance context.	1. Relevance of the dimensions (sectors, disciplines, decision making scales, mandates and public private partnership) regarding the collaborative objective(s) and surveillance context
		2. Relevance of the data sources regarding the collaborative objective(s) and surveillance context.

G.6 Governance of resources for collaboration	Definition of resource allocation mechanisms in the collaborative strategy and allocation of relevant resources for collaborative modalities.	1. Definition of financial, material and human resources allocation mechanisms in the collaborative strategy.
		2. Allocation of relevant financial, material and human resources for collaborative modalities.
		3. Relevance between areas of action, roles and responsibilities assigned in the multi-sectoral surveillance system (collaborative and sectoral activities) and professional competencies.
G.7 Mechanisms to steer collaboration	Existence of appropriate mechanisms to steer collaboration in the surveillance system.	1. Existence and formalisation of the mechanism for steering collaboration in the surveillance system.
		2. Representativeness of all appropriate actors and end-users from relevant sectors, decisions scales and disciplines in the steering mechanism (inclusion, participation and appropriate voice).
		3. Functioning of the mechanism for steering collaboration including the capacity to advocate for change.
		4. Existence of appropriate feedback loop for steering collaboration.
		5. Availability of all appropriate resources to support the mechanism for steering collaboration.
G.8 Mechanisms to coordinate collaboration	Existence of appropriate mechanisms to coordinate collaboration in the surveillance system.	1. Existence and formalisation of the mechanism for coordinating collaboration in the surveillance system.
		2. Representativeness of all appropriate actors from relevant sectors, decisions scales and disciplines in the coordinating mechanism (inclusion, participation and appropriate voice).
		3. Functioning of the mechanism for coordinating collaboration including the capacity to advocate for change.
		4. Existence of appropriate feedback loop for coordinating collaboration.
		5. Availability of all appropriate resources to support the mechanism for coordinating collaboration.

G.9 Mechanisms to technically and scientifically support collaboration	Existence of appropriate mechanisms to technically and scientifically support collaboration.	1. Existence and formalisation of the mechanism for supporting scientifically and technically collaboration in the surveillance system.
		2. Representativeness of all appropriate actors from relevant sectors, decisions scales and disciplines for supporting scientifically and technically collaboration (inclusion, participation and appropriate voice).
		3. Functioning of the mechanism for supporting scientifically and technically collaboration including the capacity to advocate for change.
		4. Existence of appropriate feedback loop for supporting scientifically and technically collaboration.
G.10 Training for collaboration	Provision of relevant initial and ongoing training for operating actors involved in collaborative activities.	1. Existence of designed and planned initial training for operating actors involved in collaborative activities.
		2. Accessibility of initial training in relevant timeframe for operating actors involved in collaborative activities.
		3. Relevance of initial training for operating actors involved in collaborative activities with the collaborative modalities and surveillance context.
		4. Existence of designed and planned ongoing training for operating actors involved in collaborative activities.
		5. Accessibility of ongoing training in relevant timeframe for operating actors involved in collaborative activities.
		6. Relevance of ongoing training for operating actors involved in collaborative activities with the collaborative modalities and surveillance context.
G.11 Information and communication	Appropriate information management and communication.	1. Existence of an institutional memory including all information related to the rationale of collaboration, to the organisation and functioning of the multi-sectoral surveillance system and to the outputs of the multi-sectoral surveillance system.
		2. Accessibility of the institutional memory to surveillance actors and end-users.
		3. Relevance of the information produced by multi-sectoral surveillance system regarding the collaborative objective(s).
		4. Appropriateness of the communication (both in terms of content and means) of the information produced by the multi-sectoral surveillance system to surveillance actors and end users.

G.12 Performance and evaluation	Existence of specific performance indicators of collaboration routinely used and of periodic external evaluations of the collaborative effort.	1. Existence and relevance of specific performance indicators of collaboration routinely used.
		2. Existence of periodic external evaluation of the surveillance system that considers an evaluation of collaboration.
		3. Existence of periodic internal evaluation of the surveillance system that considers an evaluation of collaboration.
		4. Implementation of corrective measures if relevant.
G.13 Engagement	Engagement of actors in their assigned areas of responsibility and role in the multi-sectoral surveillance system.	1. Engagement of actors in their assigned areas of responsibility and roles in the multi-sectoral surveillance system.

Tableau IV : Liste finalisée des attributs d'opérations et des critères correspondants.

Attribute name	**Attribute description**	**Measurable criteria**
O.1 Surveillance design	Implementation of appropriate collaborative activities for each step of the surveillance process.	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.
O.2 Data collection- sampling		
O.3 Data Collection - Laboratory testing		
O.4 Data sharing		2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).
O.5 Information sharing		
O.6 Data management and storage		
O.7 Data analysis and interpretation		3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.
O.8 Communication to surveillance actors		
O.9 External communication		
O.10 Dissemination to decision-makers		

Les conclusions du questionnaire et les attributs modifiés ont alors été présentés lors d'un second tour d'élicitation d'experts comprenant six participants du premier tour. La synthèse de cette table ronde et les modifications proposées ont alors été communiquées ultérieurement aux experts (Annexe 2). Ainsi, l'ensemble des attributs a été validé, ainsi que la démarche. Cependant, à la suite de cette table ronde, un attribut de fonctions a été créé « leadership », et la définition de l'attribut de fonctions « efficacité » a été révisée. La liste finalisée de ces attributs de fonctions et leur définition sont représentées dans le tableau V. Ce second tour a aussi permis de souligner l'importance de bien définir un certain nombre de termes dans le guide d'utilisation de l'outil d'évaluation des collaborations.

Tableau V : Liste finale des attributs de fonction.

Function indicators	Definition
Stability	Collaboration is stable in time, it is formalised and endorsed by all relevant stakeholders (surveillance actors and end-users).
Usefulness	Collaboration is appropriate regarding the surveillance objective and context.
Effectiveness	The governance of collaboration is operational, and collaboration is effectively implemented to meet the surveillance objective.
Acceptability	Surveillance actors demonstrate trust into the system, mutual understanding and willingness to collaborate. The objective(s) of collaboration and outputs of the multi-sectoral surveillance system meet stakeholders (surveillance actors and end-users) expectations.
Resources	The mechanisms for resources allocation are defined. The resources are appropriate and available for the effectiveness of activities of collaboration.
Adaptability and flexibility	Collaboration can adapt and evolve upon changes in collaborative governance, knowledge and surveillance context.
Inclusiveness	Collaboration is well balanced: sectors, disciplines and decision-making scales have appropriate voices. Roles are adequately allocated to actors with regard their mandates and competencies. At the relevant dimensions, corresponding actors, data sources are considered to meet the collaborative objective(s).
Shared leadership	Governance mechanisms are appropriate to guide the operation of collaboration in the multi-sectoral surveillance system. They provide a trustworthy environment where stakeholders can freely express their views and be heard, creating mutual understanding. They adapt upon changes, internal or external to the system.
System knowledge	The multi-sectoral surveillance system has an effective communication system and an institutional memory. Stakeholders (surveillance actors and end-users) have access to relevant information about the surveillance organisation and outputs.

II. La matrice d'évaluation des collaborations

Les attributs de premier niveau ont été divisés en 78 critères (tab. III et IV). Pour chacun d'entre eux, une échelle de notation semi-qualitative a été définie, comme présenté dans l'annexe 3. Trois représentations graphiques ont été créées pour qualifier les collaborations. Chaque représentation graphique est associée à une catégorie d'attributs ou d'indicateurs d'évaluation : les attributs d'organisation, les indicateurs macros ou les attributs de fonction. La note donnée à un attribut ou à un indicateur correspond à la somme des notes obtenues pour chaque critère lié à cet attribut ou indicateur divisé par le nombre de critères liés à cet attribut ou indicateur fois la note maximale qui est 3.

La première représentation permet de visualiser la note globale d'évaluation pour chacun des attributs. La note de chaque attribut est représentée par un graphique circulaire, comme celui de la figure 15. Les attributs de gouvernance et d'opérations sont séparés en deux colonnes afin de ne pas les confondre. Dans le cas des attributs d'opérations, si une étape de surveillance n'est pas une modalité dans le système de surveillance One Health évalué, le graphique ne s'affiche pas.

La deuxième représentation graphique reflète la valeur obtenue pour les trois indicateurs macros permettant d'évaluer les collaborations en termes de processus de « management », de « support » et de « réalisation ». Chaque critère a été affecté à l'évaluation d'un de ces indicateurs macros (Annexe 4). Ainsi, la note calculée pour chaque indicateur permet de visualiser rapidement la qualité du fonctionnement des collaborations. Les notes des trois indicateurs sont représentées sur un seul histogramme, comme dans la figure 16.

La dernière représentation graphique est un diagramme radar permettant de visualiser la note obtenue par chaque attribut de fonctions des collaborations. Pour obtenir ces notes, les critères ont été affectés à chaque attribut en fonction de leur impact sur la qualité de celui-ci. Par exemple, tous les critères relatifs à la formalisation des collaborations sont considérés comme un gage de stabilité et sont affectés à l'attribut de second niveau « Stabilité ». Ainsi, chaque critère a été attribué à un ou plusieurs attributs de fonctions (Annexe 4). Le calcul de la note de chaque attribut de fonctions est le même que celui des attributs ou des indicateurs macros. Sur cette dernière représentation (fig. 17), une échelle qualitative a été instaurée afin de souligner la subjectivité de l'outil et de mettre l'accent sur les faiblesses et les atouts du système, et non des notes, dont les chiffres n'ont pas de vraie signification.

III. Les documents accompagnant la matrice d'évaluation des collaborations

Afin d'accompagner l'utilisation de la matrice d'évaluation, une série de documents annexes a été créée : (i) un tableau pour visualiser les informations essentielles sur les acteurs, (ii) un tableau synthétisant les informations principales sur les dispositifs de surveillance et (iii) un formulaire permettant de synthétiser les informations nécessaires pour délivrer une note aux différents critères (Annexe 5). Afin de faciliter la correspondance entre les documents permettant la récolte de données et les critères notés, une colonne a été rajoutée à la matrice d'évaluation expliquant où l'information est synthétisée dans les tableaux ou le formulaire de recueil de données (Annexe 3). De plus, pour accompagner l'utilisation de l'outil, expliquer la procédure de collecte de données, de la matrice d'évaluation, et standardiser la procédure d'évaluation, un guide d'utilisation a été élaboré sur le principe de celui d'OASIS (Annexe 6) (*Hendrickx*, 2012).

IV. L'évaluation des dispositifs sectoriels actifs du système de surveillance de l'antibiorésistance au Vietnam.

L'évaluation du système de surveillance de l'antibiorésistance au Vietnam a été faite en deux temps : une évaluation des dispositifs sectoriels a d'abord été effectuée, suivie de celle des collaborations. Lors de l'évaluation, trois dispositifs actifs de surveillance de l'antibiorésistance au Vietnam ont été identifiés : surveillance dans un réseau de 16 hôpitaux, surveillance chez les animaux de production à l'abattoir (porc et poulet), surveillance des denrées alimentaires d'origine animale dans trois grandes villes. D'après les informations collectées (documents et transcrits d'acteurs), une surveillance de l'usage des antibiotiques chez l'homme et les animaux ainsi qu'une surveillance de l'antibiorésistance et de la consommation dans la communauté sont en cours de développement. Ces dispositifs n'ont donc pas été intégrées à l'étude.

Finalement, 12 acteurs ont été contactés électroniquement par email, et 10 entretiens ont eu lieu entre le 7 mai et le 6 juin 2018. L'ensemble des interviews a été conduit par une ou deux personnes en anglais, et a été retranscrit *a posteriori*. L'ensemble des données collectées lors des interviews et l'étude des documents ont permis de remplir les grilles de note d'OASIS et de la matrice d'évaluation des collaborations. Avant de présenter les résultats, il est nécessaire de souligner que ces évaluations ont eu lieu pour obtenir un jeu de données afin d'élaborer l'outil, ils ne sont pas le fruit d'une démarche consensuelle d'évaluation à la demande des acteurs de surveillance. Ainsi, si dans le reste du document nous évaluons ces données, les conclusions ne peuvent en aucun cas être interprétées comme une évaluation réelle du système de surveillance de l'antibiorésistance au Vietnam.

Le premier dispositif évalué est le système de surveillance de l'antibiorésistance dans 16 hôpitaux, qui trouve son origine dans un projet de recherche avec des capitaux étrangers. Depuis la parution de la décision numéro 6211-QD/BYT qui décrit l'organisation de la surveillance de l'antibiorésistance sur les isolats cliniques, le département du ministère de la Santé en charge de l'administration des hôpitaux (VAMS) s'est réapproprié la coordination du réseau. Ce dispositif de surveillance est orienté par le sous-comité 2 du Comité d'Orientation National (NSC). Le NSC a une responsabilité plus large et est en charge de la mise en œuvre du plan national de lutte contre l'antibiorésistance (GAP). L'objectif du système de surveillance à ce stade est d'estimer la prévalence des résistances, ainsi que de détecter rapidement les nouvelles résistances dans un but de protection de la santé publique. Cette surveillance passive repose sur les demandes d'analyse des docteurs dans le cadre de leur exercice quotidien de la médecine. Les 16 laboratoires des hôpitaux en charge de l'analyse récoltent les données et les envoient à VAMS à la demande de ce dernier. Le dispositif bénéficie d'un appui scientifique et technique de la part de quatre partenaires étrangers, avec des capacités techniques en microbiologie, en épidémiologie et en base de données.

La représentation graphique 1 de l'OASIS (fig. 12 A) souligne l'absence d'évaluation interne et externe du système ainsi qu'une communication externe insuffisante. Les modalités de surveillance de l'organisation institutionnelle centrale et de terrain ainsi que la gestion des données sont aussi des points faibles du dispositif de surveillance. En effet, la surveillance passive actuelle est incomplète et peu représentative et ne permet pas de répondre aux objectifs du dispositif. De plus, il n'existe pas de procédure générale encadrant cette surveillance, et, en particulier, la gestion des données et la standardisation des procédures entre les unités intermédiaires. La représentation graphique 2 (fig. 12 B) soulève un manque de contrôle des points critiques suivants : l'échantillonnage (5.3/20) et la diffusion de l'information (1.7/10). Le recueil et la circulation des données seraient aussi à améliorer (5/10). Le manque de standardisation à l'étape d'échantillonnage est dû au format passif de la surveillance et à l'absence d'orientation nationale pour les médecins. La représentation graphique 3 (fig. 12 C) montre que la qualité générale du système est correcte, en revanche, l'utilité du système est faible car à ce jour l'information produite n'est pas utilisable. Il manque, en effet, des informations épidémiologiques importantes pour une analyse et une interprétation fiable des résultats. La fiabilité, la sensibilité et la stabilité du système sont tout juste moyennes, car, en dehors du défaut d'homogénéisation, les capacités techniques des laboratoires sont très variables d'un hôpital à l'autre. De plus, les ressources financières et le support technique sont essentiellement assurés par des partenaires étrangers ou des organisations internationales.

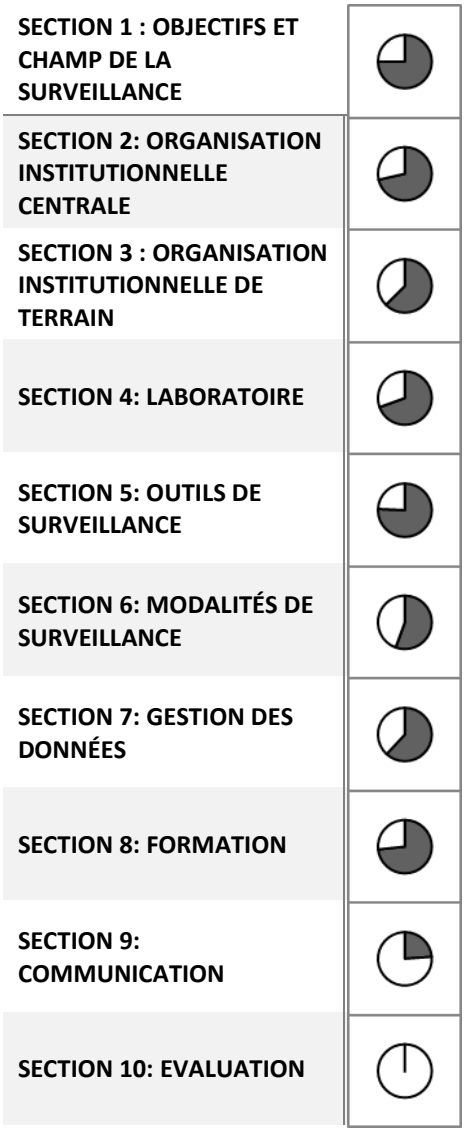


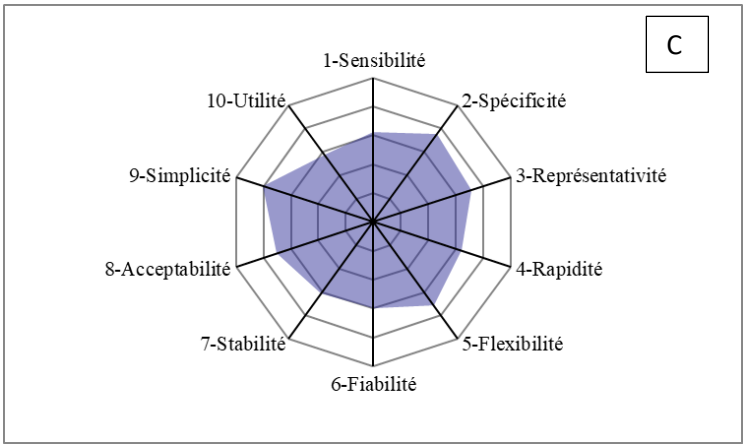
Figure 14: Résultat de l'évaluation OASIS du dispositif de surveillance de l'antibiorésistance dans les hôpitaux au Vietnam.

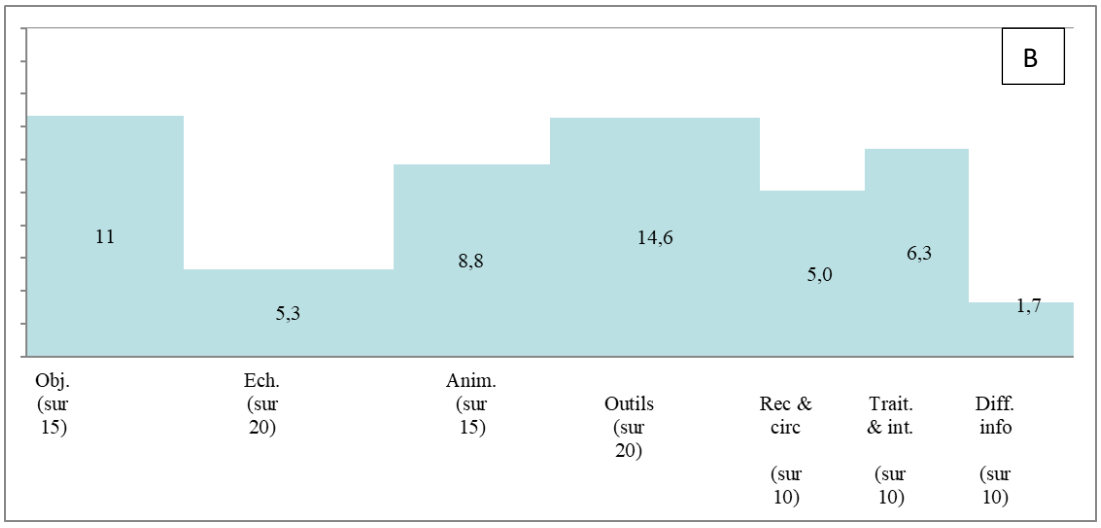
A. Liste des attributs permettant une analyse du fonctionnement général du dispositif à l'aide de 10 graphiques en secteur.

B. Analyse des points critiques du processus de surveillance à l'aide d'un histogramme

(Ob. = Objectifs de surveillance/ Ech= Échantillonnage/ Anim=Animation/ Outils= Outils de surveillance/ Rec. & Circ.= Recueil et circulation des données/ Trait. & Int= Traitement et interprétation des données/ Diff info= Diffusion des informations de surveillance).

C. Analyse des attributs de qualité à l'aide d'un graphique radar comportant une branche par attribut.





Le deuxième dispositif évalué est la surveillance de l'antibiorésistance chez les animaux de production – porc et poulet – à l'abattoir. L'objectif du dispositif de surveillance à ce stade est d'estimer la prévalence des résistances dans ces populations, avec la finalité de protéger la santé publique. Le dispositif était en phase pilote lors de l'étude, il est coordonné par le Centre national pour l'inspection et l'hygiène vétérinaire 1 (NCVH 1), avec le support technique de la FAO et OUCRU (Groupe Zoonoses) et sous l'orientation du département de la santé animale du ministère de l'Agriculture (DAH). Dans le cadre de cette phase pilote, une première campagne de prélèvements a été organisée dans 6 provinces à la mi-2017. La surveillance était encadrée par des procédures de l'étape du prélèvement jusqu'aux analyses de laboratoire. Les prélèvements ont été effectués en collaboration avec les départements provinciaux du DAH (Sub DAH), mais toujours sous la supervision directe et en personne d'un membre de NCVHI 1.

La représentation graphique 1 (fig. 13 A) du dispositif souligne principalement un déficit en communication et évaluation. En effet, il n'y a pas encore de données validées à communiquer, et la seule évaluation du système de surveillance était principalement orientée sur les capacités de laboratoire (*évaluation Lab Mapping Tool et ATLASS de la FAO*). L'organisation institutionnelle centrale et de terrain, les modalités de surveillance, la gestion des données et la formation sont aussi des éléments à améliorer. De plus, la cellule de coordination manque de ressources humaines, et les financements proviennent essentiellement d'organisations internationales dans le cadre de projet apportant un support technique. La représentation graphique 2 (fig. 13 B) soulève un manque de contrôle des points critiques suivants : la diffusion de l'information (0,8/10), l'animation (7,4/15) et traitement et l'interprétation des données (5,0/10). En effet, l'animation est effectuée par une seule personne, le directeur du NCVHI 1, qui a seulement une expertise de microbiologiste et pas d'expérience en surveillance, ni en épidémiologie. La représentation graphique 3 (fig. 13 C) montre que la qualité générale du système est moyenne, et en particulier, elle souligne un déficit en termes d'utilité, de sensibilité et de représentativité. En effet, le système a été créé pour répondre à un objectif de santé publique, alors que le danger concerne aussi la santé animale, qui est le mandat premier des acteurs de la surveillance. Il y a donc un conflit entre l'objectif de la surveillance et les attentes des acteurs du secteur. De plus, la surveillance se limite à des prélèvements en abattoir, ce qui exclut les animaux abattus hors de la structure (marché, fermes industrielles, etc.).

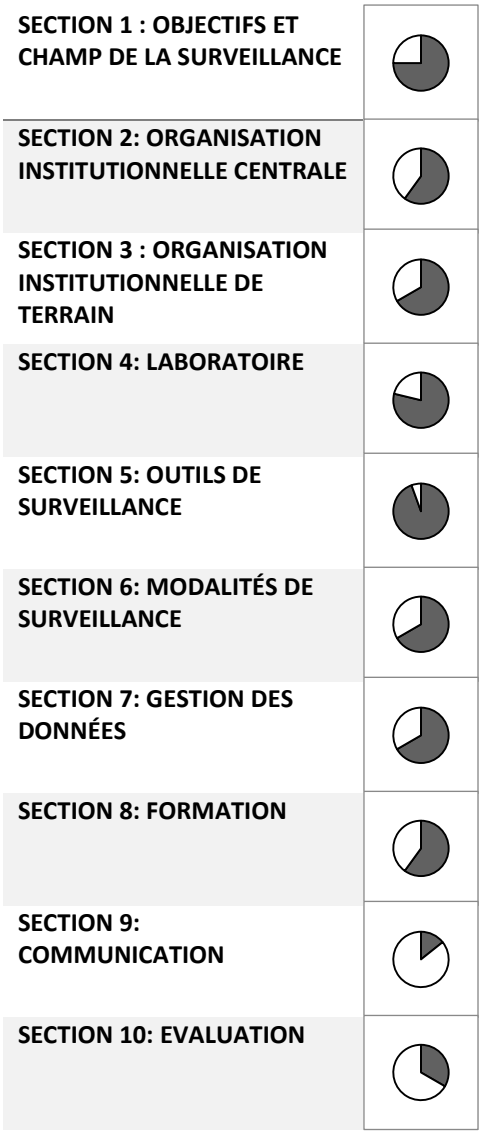


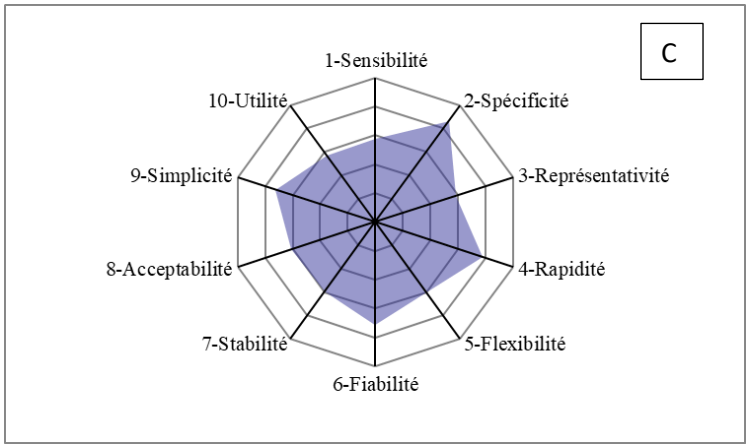
Figure 15: Résultat de l'évaluation OASIS du dispositif de surveillance de l'antibiorésistance chez les animaux de production au Vietnam.

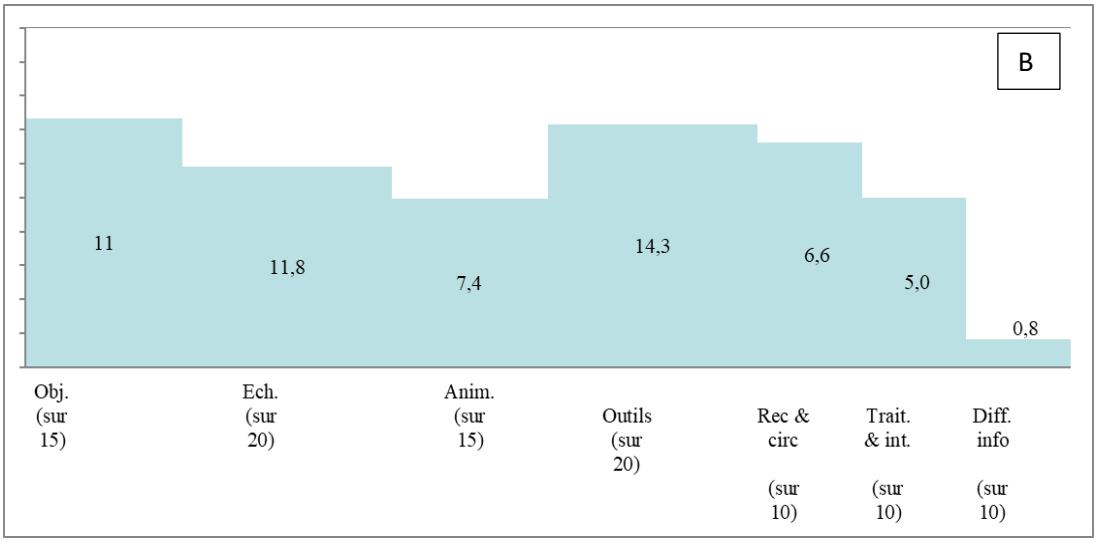
A. Liste des attributs permettant une analyse du fonctionnement général du dispositif à l'aide de 10 graphiques en secteur.

B. Analyse des points critiques du processus de surveillance à l'aide d'un histogramme

(Ob. = Objectifs de surveillance/ Ech= Échantillonnage/ Anim=Animation/ Outils= Outils de surveillance/ Rec. & Circ.= Recueil et circulation des données/ Trait. & Int= Traitement et interprétation des données/ Diff info= Diffusion des informations de surveillance).

C. Analyse des attributs de qualité à l'aide d'un graphique radar comportant une branche par attribut.





Le troisième dispositif évalué est la surveillance de l'antibiorésistance dans les denrées alimentaires d'origine animale (viandes) sous la supervision du ministère de la Santé et la coordination par l'Agence vietnamienne des aliments (VFA). Il est coordonné par l'Institut national de la nutrition (NIN) en accord avec la direction des deux autres instituts (Institut Pasteur de Nhan Trang et Institut Pasteur d'Ho Chi Minh) participant au réseau sous l'orientation de VFA. Le dispositif a été initié dans le cadre d'un projet de recherche, mais fait maintenant partie intégrante du dispositif national de surveillance des denrées alimentaires. Les campagnes de collecte des prélèvements ont lieu tous les trois mois, et sont organisées par chaque institut, également chargé de leur analyse. Toutes les informations collectées sont envoyées à VFA et à NIN. NIN est en charge de l'analyse des données avec le support technique d'un expert de l'Agence de coopération internationale du japon (JICA).

La représentation graphique 1 (fig. 14 A) du dispositif souligne principalement un déficit en communication et évaluation, car, pour le moment, aucune évaluation du système n'a été mise en œuvre et les premières données n'ont pas été considérées assez pertinentes pour être communiquées. Les objectifs de surveillance ainsi que la formation nécessitent aussi une amélioration. En effet, les attentes des acteurs de la filière ainsi que celles des consommateurs n'ont pas été identifiées. De plus, aucun mécanisme interne de formation n'est identifié, et pour le moment le système dépend de la formation procurée par le projet de recherche initial. La représentation graphique 2 (fig. 14 B) soulève un manque de contrôle du point critique, « la diffusion de l'information » (4,2/10), puisque pour le moment il n'y a pas de ressource pour la diffusion de l'information, et peu de retour aux preneurs de décision et aucun aux acteurs de terrain. L'autre point critique qui a tout juste la moyenne est l'objectif (9/15), ce qui souligne encore l'absence de prise en compte des acteurs du terrain et le manque de clarté des objectifs. La représentation graphique 3 (fig. 14 C) montre que la qualité générale du dispositif est correcte, mais souligne un déficit en termes d'utilité faisant référence de nouveau à l'absence de prise en compte des acteurs du secteur.

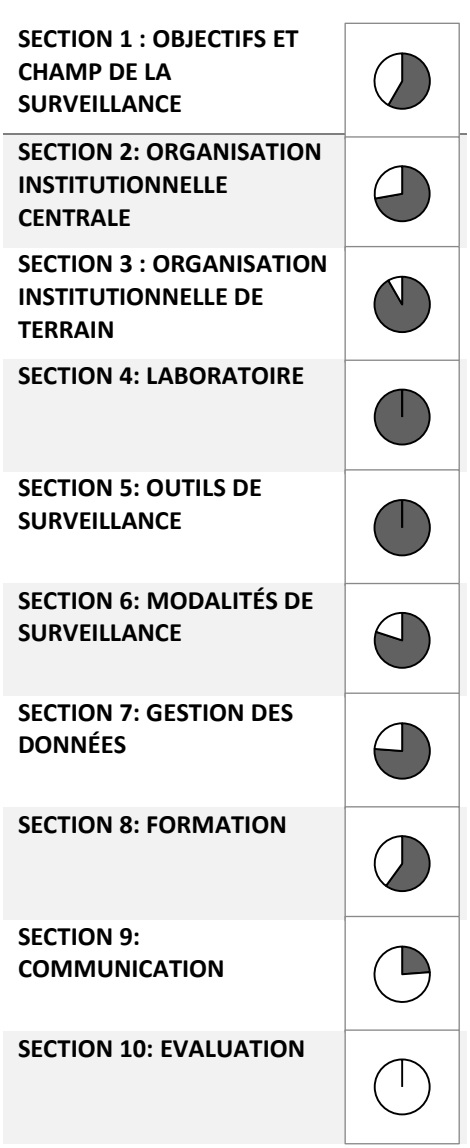


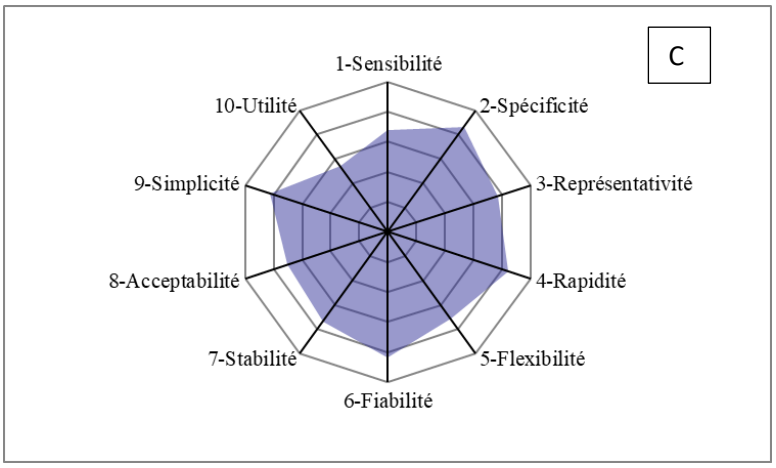
Figure 16: Résultat de l'évaluation OASIS du dispositif de surveillance de l'antibiorésistance dans les denrées alimentaires d'origine animale au Vietnam.

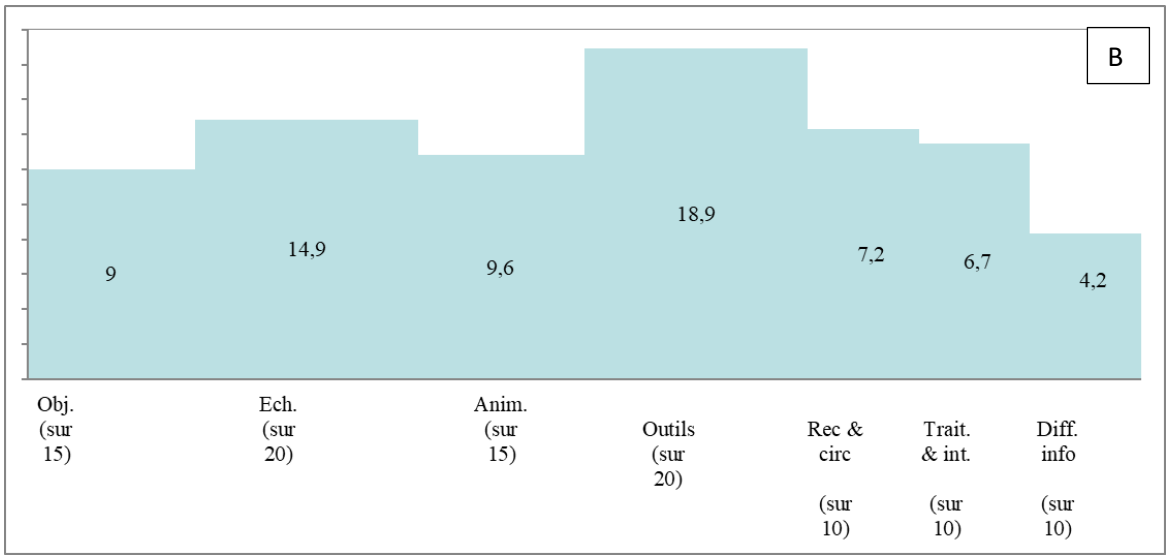
A. Liste des attributs permettant une analyse du fonctionnement général du dispositif à l'aide de 10 graphiques en secteur.

B. Analyse des points critiques du processus de surveillance à l'aide d'un histogramme

(Ob. = Objectifs de surveillance/ Ech= Échantillonnage/ Anim=Animation/ Outils= Outils de surveillance/ Rec. & Circ.= Recueil et circulation des données/ Trait. & Int= Traitement et interprétation des données/ Diff info= Diffusion des informations de surveillance).

C. Analyse des attributs de qualité à l'aide d'un graphique radar comportant une branche par attribut.





V. L'évaluation des collaborations du système de surveillance de l'antibiorésistance au Vietnam

L'outil d'évaluation a été appliqué à ce système de surveillance. Avant de présenter ces résultats et les conclusions de l'évaluation, il est nécessaire de souligner à nouveau que la procédure d'évaluation n'a pas entièrement été suivie. En effet, cette évaluation n'a pas eu lieu de façon consensuelle comme la guidance le préconise, puisque, entre autres, les acteurs de la surveillance n'ont pas participé à la notation des critères. Malgré cela, afin de présenter la démarche d'évaluation, nous présenterons les résultats comme si une évaluation avait eu lieu. Pour cela, le tableau recensant les acteurs de la collaboration et celui décrivant chacun des dispositifs participant aux systèmes de surveillance ont été remplis. Parallèlement, le formulaire de recueil de données a été complété (Annexe 6). Une fois l'ensemble des informations recueillies dans les documents, les 78 critères ont été notés un par un dans la matrice d'évaluation (tab. VI). Ces notations ont permis à la matrice de produire automatiquement trois représentations graphiques (fig. 15, fig. 16, fig. 17).

Tableau VI : Notation des critères décrivant l'organisation et le fonctionnement des collaborations dans le système de surveillance de l'antibiorésistance au Vietnam

Attribute's name	**Measurable criteria**	**Score**	**Justification**
G.1 Formalisation of the collaborative surveillance strategy	1. Formalisation of rationale behind the willingness to collaborate for surveillance.	**1**	The Aide Memoire recognizes AMR as a global issue; it mentions the importance of collaboration and information exchange across sectors to combat AMR, but it does not clearly refer to collaboration between surveillance components.
	2. Formalisation of the objective(s) and purpose of collaboration for surveillance.	**1**	There is no clearly formalised objective for inter-sectoral collaboration in terms of surveillance except that sectors need to collaborate and exchange information to improve the situation and protect public health, trade, economy and sustainable development of the country (Aide Memoire and GAP). It is important to underline that the main purpose remains protecting public health, which is formalised but lacks in detail.
	3. Formalisation of the areas of action of main stakeholders in the multi-sectoral surveillance system, i.e. the tasks they are assigned with in term of collaboration and of coordination of sectoral surveillance	**3**	The areas of actions are well established across the Aide Memoire, the GAP and NAP MARD. Especially, MOH oversees collaboration according to the NAP GAP. The documents were issued one after the other, hence, the areas of responsibility are not completely consistent across the documents, however they are better described over time, making them well formalised in the latest document (for example, in the first document, the GAP, no one is responsible of surveillance of AMR in livestock, which is the case in the NAP MARD).
	4. Endorsement of the documents where all the previous statements are formalised by all actors from different sectors, disciplines and decision scales involved.	**1**	The endorsement of the documents is done at the ministry level between different sectors for the Aide Memoire (MOH, MARD, MONRE, MOIT). The GAP and NAP MARD are only endorsed by one sector after consultation of most of the decision-making scales but with very few inter-sectoral consultations occurred.

G.2 Relevance of the collaborative purpose and objective	1. Relevance of the collaborative objective(s) and purpose regarding actors and end-users' expectations (including meeting the sectoral objectives).	**2**	The objectives and purpose of collaboration follow actor's expectation across sectors. However, there are incoherence across the decision scale in the animal sector (the purpose of public health isn't relevant regarding the expectation of the sub DAH and other actors of the animal health sector, who want the important pathogen in animal health, to be addressed as well).
	2. Relevance of the collaborative objective(s) and purpose regarding the epidemiological, socio-political and economic context.	**2**	Updated information exchange across sectors to protect public health is relevant with the epidemiological, socio political (low maturity of sectoral component, low technical competencies) and economic context. However, the animal health sector is also affected by AMR, but this element is not identified in the purpose.
	3. Relevance of the collaborative objective(s) and purpose regarding the international/regional guidance (regulations, recommendations, standards).	**2**	The Vietnamese strategy is in line with most international guidance. However, the OIE always stresses out the importance to preserve ATB for animal welfare and food security, hence when dealing with AMR issues, the animal health purpose should not be forgotten to be in line with all the guidance.
G.3 Formalisation of collaboration modalities	1. Formalisation of the collaborative modalities.	**2**	The collaborative modalities are described respectively in the NAP MARD for the animal sector (which is a mix document gathering the policy strategy as well as the institutional implementation) and in decision 6211 of MoH for the human sector. The modalities are the following: share information, share results, joint communication, joint dissemination.
	2. Formalisation of roles and responsibilities of actors involved in collaboration.	**1**	All leading agencies (VAMS, DAH, GDPM) are responsible for collaboration across sectors but it is clearly formalised only for DAH in the NAP MARD (only for a third of the actors).
	3. Endorsement of the documents where all the previous statements are formalised by all actors from different sectors, disciplines and decision scales involved or consistent across the institutions.	**1**	The institutional documents describing the modalities are sectoral. Hence by definition they have not been endorsed by actors from a different sector, but they were formalised with consultation of a few actors from the human sector in the case of the NAP MARD.

G.4 Relevance of collaborative modalities	1. Relevance of the collaborative modalities regarding the collaborative objective(s) and surveillance context	**1**	All the collaborative modalities (sharing information, sharing results, joint data analysis and interpretation, joint communication, joint dissemination) are relevant with the collaborative objectives to produce information. However, there isn't a full consensus on the modalities described in the different sectoral documents, and the actors involved in the different modalities. Hence the lack of clarity impedes the system capacity to attain its objectives. Also, joint surveillance design has not been identified as a modality. However, it is important when joint analysis and interpretation as there is a lack of agreement on what are the bacteria/ antibiotic under surveillance (hence collaboration at the surveillance design step). This is also not in coherence with this public health purpose creating a major discrepancy between the collaborative objective and the collaborative modalities.
G.5 Coverage	1. Relevance of the dimensions (sectors, disciplines, decision making scales, mandates and public private partnership) regarding the collaborative objective(s) and surveillance context	**1**	Some major discrepancies between the identified dimension and the collaborative objectives and purpose were identified as there are many relevant dimensions who were not referred in the documents (food sector, PPP for ABU surveillance in human health, and the disciplines linked to risk assessment (epidemiology, surveillance...).
	2. Relevance of the data sources regarding the collaborative objective(s) and surveillance context.	**1**	The data sources for ABR are appropriate regarding the collaborative surveillance objectives and context (in hospitals, in livestock, in retailed food). However, in the current surveillance strategy, there are no data collection, in the community and the aquaculture even though the surveillance of this sources were identified in the documents. ABU data that have been collected recently are not part of an organised surveillance and can't also be considered as a missing data source of the multi-sectoral surveillance system.

G.6 Governance of resources for collaboration	1. Definition of financial, material and human resources allocation mechanisms in the collaborative strategy.	**2**	All the documents (NAP MARD, GAP and Aide Memoire) state that each sector should put its own mechanisms to allocate resources with the help of funds from international partners to attain the surveillance objectives. However, those mechanisms are not specific of collaboration in surveillance.
	2. Allocation of relevant financial, material and human resources for collaborative modalities.	**1**	There are no material and financial resources allocated to collaboration however it isn't irrelevant regarding the collaborative modalities at this stage. However, Decision 5888 states that MOH will allocate resources from MSA dept for the NSC. Except from this, no proof of other human resources allocated to collaboration has been found, which is needed to put the collaborative modalities in place.
	3. Relevance between areas of action, roles and responsibilities assigned in the multi-sectoral surveillance system (collaborative and sectoral activities) and professional competencies.	**3**	The assigned responsibility is coherent with the professional competencies of the different actors.
G.7 Mechanisms to steer collaboration	1. Existence and formalisation of the mechanism for steering collaboration in the surveillance system.	**3**	The NSC is the entity in charge of steering the collaborative strategy to fight against AMR, with its subcommittee 9 dedicated to surveillance. It is clearly formalised in decision 5888.
	2. Representativeness of all appropriate actors and end-users from relevant sectors, decisions scales and disciplines in the steering mechanism (inclusion, participation and appropriate voice).	**1**	The NSC contains representatives of all the main actors, with decision scales going down to institution (hospitals, research institute…) and some regional power (person in charge of Hanoi health), with most actors from MOH. MOH is also leading the NSC with MARD, MONRE and MOIT as assistant lead, creating an imbalance between the different actors.
	3. Functioning of the mechanism for steering collaboration including the capacity to advocate for change.	**1**	The NSC frequency meeting is low (less than once a year), making it barely functional.
	4. Existence of appropriate feedback loop for steering collaboration.	**1**	During meetings, results and other information are apparently brought up. However, due to the low meeting frequency, the feedback loop can't be efficient.
	5. Availability of all appropriate resources to support the mechanism for steering collaboration.	**1**	Each institution provides staff to participate in the NSC. However, MOH, who oversees the secretariat, doesn't have any available resources, impeding its capacity to organise the meetings.

G.8 Mechanisms to coordinate collaboration	1. Existence and formalisation of the mechanism for coordinating collaboration in the surveillance system.	**1**	There are sectoral coordination units (in NIN, DAH, VAMS) but no mechanism to support the cross-sectoral collaboration of these units. The sub-committee 9 could play this role as it is the only one which is inter-sectoral (dedicated to agriculture but with MoH sitting in), but, so far, it is not functional.
	2. Representativeness of all appropriate actors from relevant sectors, decisions scales and disciplines in the coordinating mechanism (inclusion, participation and appropriate voice).	**1**	If we consider that the sub-committee 9 is playing the role of the inter-sectoral coordination committee, then VAMS is not part of it (only VFA, DAH and medical environment management), hence the sub-committee is missing a key actor.
	3. Functioning of the mechanism for coordinating collaboration including the capacity to advocate for change.	**0**	Sub-committee 9 has never met so far, it isn't functional for the moment.
	4. Existence of appropriate feedback loop for coordinating collaboration.	**0**	The coordination is not functioning, hence there can't be a feedback loop.
	5. Availability of all appropriate resources to support the mechanism for coordinating collaboration.	**0**	Departments are overwhelmed and seating in the sub-committee is not a priority; hence there are no resource allocation to coordination and it impedes strongly the working of the sub-committee 9.
G.9 Mechanisms to technically and scientifically support collaboration	1. Existence and formalisation of the mechanism for supporting scientifically and technically collaboration in the surveillance system.	**1**	OHP is an intergovernmental platform to share information between sectors (under MONRE, MARD and MOH), to support collaboration and to disseminate information to policy makers. It is clearly formalised however the platform isn't specific to AMR. Recently NTD and NIHE met to start creating a new platform to support collaboration in AMR resistance surveillance, but the project is only at its infancy. PATH also organises meeting, in the human sector between the community and hospital components. Overall, the mechanisms to support scientifically and technically collaboration are numerous, making the whole support system complicated and sometimes unclear.

	2. Representativeness of all appropriate actors from relevant sectors, decisions scales and disciplines for supporting scientifically and technically collaboration (inclusion, participation and appropriate voice).	**1**	OHP isn't dedicated to AMR surveillance, hence even if all supporting actors are represented, many of those actors are not attending (not an AMR actor is representative of the institute, the institute never attends to the meetings, etc…), creating major imbalance between the different disciplines.
	3. Functioning of the mechanism for supporting scientifically and technically collaboration including the capacity to advocate for change.	**2**	The scientific and technical support is functional between OHP and all the international partners. So even if the international partners mainly support the surveillance system with a sectoral approach (and bilateral agreements between actors and international partner), they advocate strongly for collaboration and most of them are collaborating at a higher level (tripartite agreement between FAO-OIE-WHO).
	4. Existence of appropriate feedback loop for supporting scientifically and technically collaboration.	**1**	A lot of information on surveillance and surveillance output are presented during OHP meetings/workshop, however the attendance of the relevant actors is too low for the feedback loop to be properly functional. This is especially the case since OHP isn't dedicated to AMR, hence the institution representative isn't always an AMR actor.
G.10 Training for collaboration	1. Existence of designed and planned initial training for operating actors involved in collaborative activities.	**NR**	Currently the modalities of collaboration imply mainly the need of meetings, discussion and information sharing, hence currently no training is currently needed.
	2. Accessibility of initial training in relevant timeframe for operating actors involved in collaborative activities.	**NR**	
	3. Relevance of initial training for operating actors involved in collaborative activities with the collaborative modalities and surveillance context.	**NR**	
	4. Existence of designed and planned ongoing training for operating actors involved in collaborative activities.	**NR**	Currently the modalities of collaboration imply mainly the need of meetings, discussion and information sharing, hence currently no training is currently needed.

	5. Accessibility of ongoing training in relevant timeframe for operating actors involved in collaborative activities.	**NR**	
	6. Relevance of ongoing training for operating actors involved in collaborative activities with the collaborative modalities and surveillance context.	**NR**	
G.11 Information and communication	1. Existence of an institutional memory including all information related to the rationale of collaboration, to the organisation and functioning of the multi-sectoral surveillance system and to the outputs of the multi-sectoral surveillance system.	**2**	OHP database can be considered as an institutional memory. They follow up on all activities related to ABR and maintain an extended data base on research undertaken in Vietnam. They are closely connected to the government (MARD and MoH) as well as to research institutes. They have access to surveillance results but not to the raw data. However, they are missing documents such as bilateral agreements between institutions. Overall, the institutional memory is almost complete but lacks organisation or people to help decipher the documents.
	2. Accessibility of the institutional memory to surveillance actors and end-users.	**2**	Most stakeholders have access to the institutional memory; however, some stakeholders do not consider OHP database as an institutional memory and hence don't use it.
	3. Relevance of the information produced by multi-sectoral surveillance system regarding the collaborative objective(s).	**1**	Currently data has been produced by the surveillance of AMR in hospitals, but they are not reliable and representative and therefore haven't been shared. The first data produced by the AMR surveillance in food-producing animals also lack representativity compared to the objectives (pilot phase, so surveillance during only 6 months in 3 provinces). Additionally, AMU surveillance result haven't been produced or communicated. Hence, major discrepancies can be found between the information produced by collaboration and the collaborative objective of exchanging information to improve public health on the issue of antibiotics resistance.

	4. Appropriateness of the communication (both in terms of content and means) of the information produced by the multi-sectoral surveillance system to surveillance actors and end users.	**1**	The sectoral information produced is currently shared during workshops where different categories of stakeholders and end-users are gathered. No attempt to tailor the information to the different categories of actors and end-users has been observed and the information shared across sectors seems to be mainly appropriate for researchers. Also, the multi-sectoral surveillance system is designed to protect public health and it does not meet expectation of some actors in the animal sector (Vets, sub-DAH) who would be more interested in also having AST results in pathogenic bacteria for animal communicated to them.
G.12 Performance and evaluation	1. Existence and relevance of specific performance indicators of collaboration routinely used.	**0**	No developed performance indicator of collaboration has been observed during this evaluation.
	2. Existence of periodic external evaluation of the surveillance system that considers an evaluation of collaboration.	**0**	An ATLASS evaluation of the NCVHI 1 was done with collaboration of FAO and it did evaluate a bit collaboration in the surveillance system, however the evaluation was sectoral and was mainly concentrating on the laboratory capacity of NCVHI 1. Hence it can't really be considered as an external evaluation of collaboration as the approach was to sectoral and the method incomplete.
	3. Existence of periodic internal evaluation of the surveillance system that considers an evaluation of collaboration.	**0**	No internal evaluation of collaboration has occurred according to our current knowledge of the multi-sectoral surveillance system.
	4. Implementation of corrective measures if relevant.	**NR**	
G.13 Engagement	1. Engagement of actors in their assigned areas of responsibility and roles in the multi-sectoral surveillance system.	**1**	Some actors who have endorsed documents and/ or have been appointed to take part in the multi-sectoral surveillance system are engaged. However, MOH doesn't properly take part into its collaborative role of NSC secretariat. Also, GDPM who was appointed by MOH to oversee the implementation of an ABR surveillance component in the community has not been engaged in his task. Its disengagement created an unusual situation, as NIHE decided to take charge of the surveillance system and started to work on the issue of developing an ABR surveillance component in the community.

O.1 Surveillance design	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	**NR**	No collaboration modalities have been identified at this step of the surveillance process.
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	**NR**	No collaboration activities have been identified at this step of the surveillance process.
	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	**NR**	
O.2 Data collection-sampling	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	**NR**	No collaboration modalities have been identified at this step of the surveillance process.
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	**NR**	No collaboration activities have been identified at this step of the surveillance process.
	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	**NR**	

O.3 Data Collection - Laboratory testing	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	**NR**	No collaboration modalities have been identified at this step of the surveillance process.
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	**NR**	No collaboration activities have been identified at this step of the surveillance process.
	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	**NR**	
O.4 Data sharing	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	**0**	No collaboration activities have been identified at this step of the surveillance process despite being defined as a modality.
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	**0**	No collaboration activities have been identified at this step of the surveillance process.
	3. Availability of appropriate resources at this step of the surveillance process to implement the collaborative activities in the local context.	**0**	

O.5 Information sharing	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	**1**	Many workshops or meetings are organised; however, they are often not dedicated to AMR and their frequency is too low, creating a discrepancy between the implemented activities and information sharing as a modality.
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	**1**	The organised workshops or meeting often allow only to share information passively. However, those presentations are very rare and often the right actor to receive the information isn't present. Also, no proper working groups allowing an active information transfer were observed. Hence, for example, during the follow up meeting of the GAP, there was a will to create working groups to exchange information, not only the planned working groups were sectoral but, they didn't occur, as actors were not available.
	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	**1**	Currently, to do information sharing, actors find their own sectoral resources that isn't dedicated to collaboration (sending human resources to meetings and workshop, allocating additional resources when organising meetings and/or workshops). However even these available resources are lacking, as most of the actors of the multi-sectoral surveillance system are often understaffed, creating obstacles to engage into regular information sharing meetings or workshop.
O.6 Data management and storage	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	**NR**	No collaboration modalities have been identified at this step of the surveillance process.
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	**NR**	No collaboration activities have been identified at this step of the surveillance process.
	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	**NR**	

O.7 Data analysis and interpretation	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	**0**	No collaboration activities have been identified at this step of the surveillance process.
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	**0**	No collaboration activities have been identified at this step of the surveillance process.
	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	**0**	
O.8 Communication to surveillance actors	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	**NR**	No collaboration activities have been identified at this step of the surveillance process.
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	**NR**	No collaboration activities have been identified at this step of the surveillance process.
	3. Availability of appropriate resources at this step of the surveillance process to implement the collaborative activities in the local context.	**NR**	

O.9 External communication	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	**1**	The only collaborative activity identified for communication, is the "AMR awareness week". However, this activity only happens once a year, which doesn't allow a proper communication of the surveillance results, hence more communication activities is needed for collaboration to be relevant with the collaborative modalities defined. The communication of the results to international partners such as FAO/ OIE/ WHO, is also planned as a modality in every sector, has not occurred which doesn't allow those international organisations to do a joint communication on AMR results in Vietnam.
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	**1**	The implemented activity ("AMR awareness week") doesn't allow a proper communication of the surveillance results as they are lost in general message on AMR. Additionally, the information isn't appropriately tailored to stakeholders, making it hard for them to assimilate the message.
	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	**1**	The current collaboration is missing technical competencies to be able to properly communicate surveillance results in a tailored fashion to targeted stakeholder groups. They also miss a lot of human resources and financial resources to implement other communication activities to have a proper joint communication outside of the organised "AMR awareness week".
O.10 Dissemination to decision-makers	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	**0**	There are currently no activities implemented for joint dissemination which isn't appropriate regarding the collaborative modalities defined.
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	**0**	There are currently no activities implemented for joint dissemination, hence no output, which isn't appropriate regarding the objectives of collaboration.
	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	**1**	The OHP platform is a perfect tool to do joint dissemination of AMR results and it is available to all actors of the multi-sectoral surveillance system. However, they are no other human, financial and material resources to support joint dissemination activities. The surveillance results are also not being disseminated due to the bad quality of the results and/ or lack of representativity and/or quality.

Avant de présenter les résultats graphiques de la surveillance, il est nécessaire de se rappeler le contexte du système. Ici, le système de surveillance One Health étudié est issu d'une volonté politique nationale voulant instaurer une stratégie multisectorielle pour gérer la problématique de l'antibiorésistance au Vietnam. Cette stratégie est encadrée par trois documents officiels inter-ministériels ou ministériels (NAP MARD, GAP et Aide-mémoire). Le but principal de ces collaborations est d'améliorer la santé publique.

La représentation 1 (fig. 15), permet de visualiser la note des attributs relatifs à la gouvernance et l'opération. Aucun des attributs n'atteint la note maximale. Les meilleurs résultats sont obtenus pour les attributs de gouvernance (entre 70 % et 50 %) : « G.3 Formalisation des modalités de collaboration », « G.5 Couverture » et « G.6 Gouvernance des ressources pour la collaboration ». Plusieurs attributs obtiennent une note entre 50 et 30 « G.1 Formalisation de la stratégie des collaborations pour la surveillance », « G.2 Pertinence des buts et objectifs de collaboration », « G.7 Mécanismes pour orienter la collaboration », « G.9 Mécanismes pour apporter un support technique et scientifique à la collaboration » et « G.11 Information et communication ». Les attributs « G.4 Pertinence des modalités de collaboration » et « G.13 Engagement » ne dépassent pas les 30 % de la note maximale, et « G.8 Mécanisme pour coordonner la collaboration » est à 10 %. L'attribut « G.12 Évaluation » est à zéro puisque aucune évaluation des collaborations dans le système n'a été mise en place. Enfin, l'attribut « G.10 Formation » n'est pas noté parce que les modalités de surveillance actuelle mises en place ne nécessitent pas de formation.

La représentation 1 souligne ici le manque important de mécanismes permettant d'opérationnaliser les collaborations. En effet, les collaborations ne sont pas prises en charge par une entité coordinatrice, et les modalités de collaboration sont peu pertinentes. Ainsi sur dix attributs d'opérations, la moitié d'entre eux ne sont pas pertinents, puisqu'ils n'ont pas été identifiées comme des modalités de collaboration. Les attributs d'opérations « O.4 Échange de données », « O.7 Analyse et interprétation des données » et « O.10 Dissémination », n'ont aucune activité développée. L'opération « O.10 Dissémination » a cependant une note autour de 10 % puisque, si les activités se développent, il existe déjà un outil à leur disposition pour faciliter leur mise en place (tab. VI). Les attributs d'opérations : « O.5 Échange d'information » et « O.9 Communication externe » ont des notes autour de 30 %, puisque certaines activités de collaboration ont déjà été mises en place. En effet, la majorité de ces activités sont assez passives et consistent à inviter des acteurs ou à participer une fois par an à un évènement. De plus, les acteurs sont aujourd'hui peu volontaires pour échanger et communiquer leurs informations puisqu'ils n'ont pas confiance dans la qualité de leur résultats sectoriels (tab. VI).

Figure 17 : Représentation graphique 1 de l'outil d'évaluation des collaborations dans les systèmes de surveillance One Health représentant les attributs de gouvernance et d'opérations des collaborations du système de surveillance One Health de l'antibiorésistance au Vietnam.

OUTPUT 1

Attributes for the organisation and operationalisation of collaboration

Attribute Name	Result	Attribute Name	Result
G.1 Formalisation of the collaborative surveillance		O.1 Surveillance design	NR
G.2 Relevance of the collaborative purpose and objective		O.2 Data collection-sampling	NR
G.3 Formalisation of collaboration modalities		O.3 Data Collection - Laboratory testing	NR
G.4 Relevance of collaborative modalities		O.4 Data sharing	
G.5 Coverage		O.5 Information sharing	
G.6 Governance of resources for collaboration		O.6 Data management and storage	NR
G.7 Mechanisms to steer collaboration		O.7 Data analysis and interpretation	
G.8 Mechanisms to coordinate collaboration		O.8 Communication to surveillance actors	NR
G.9 Mechanisms to technically and scientifically support		O.9 External communication	
G.10 Training for collaboration	Training isn't necessary	O.10 Dissemination to decision-makers	
G.11 Information and communication			
G.12 Performance and evaluation		=All the criteria are fulfilled for the attribute.	
G.13 Engagement		All the criteria have not been filled for this attribute	

1

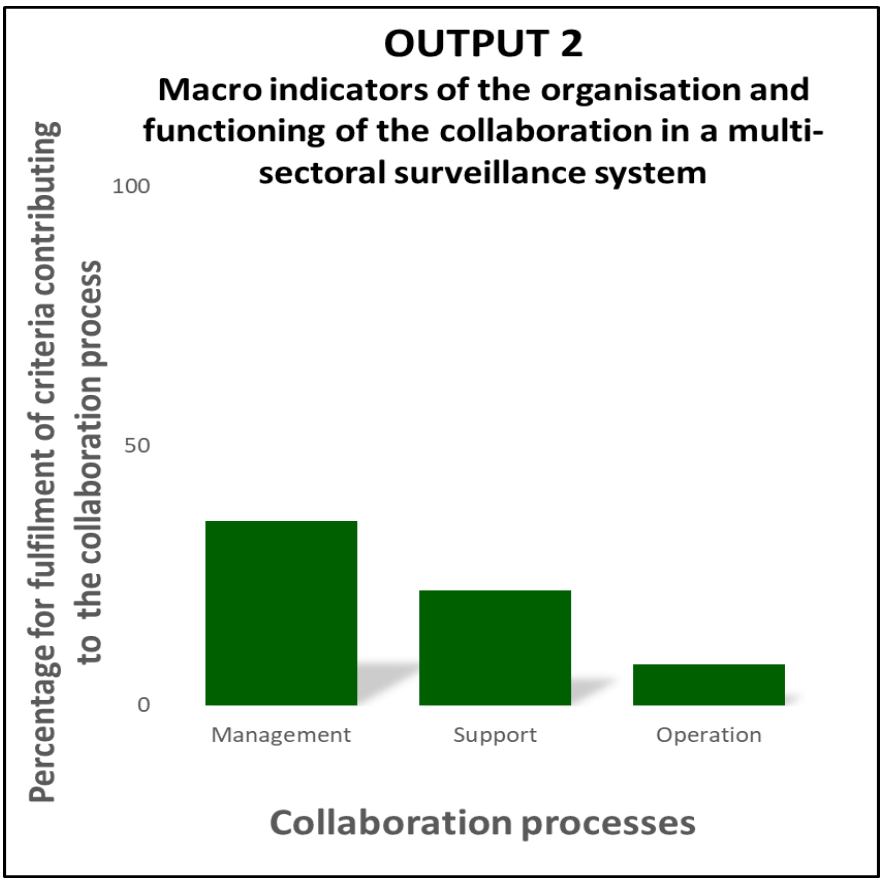


Figure 18 : Représentation graphique 2 de l'outil d'évaluation des collaborations dans les systèmes de surveillance One Health représentant les macro- indicateurs du système de surveillance One Health de l'antibiorésistance au Vietnam.

La représentation 2 (fig. 16) schématise les indicateurs macros de l'organisation et du fonctionnement des collaborations selon 3 processus : le management des collaborations, le support aux collaborations et la réalisation des activités de collaboration. La figure 16 montre que le processus le plus implanté est le « Management des collaborations » (35 %), les processus « Support aux collaborations » (22 %) et « Réalisation » (8 %), eux, sont encore moins développés. On peut ainsi se demander si l'absence d'un management fort impacte non seulement l'implantation des activités de collaboration mais aussi l'accès aux ressources essentielles.

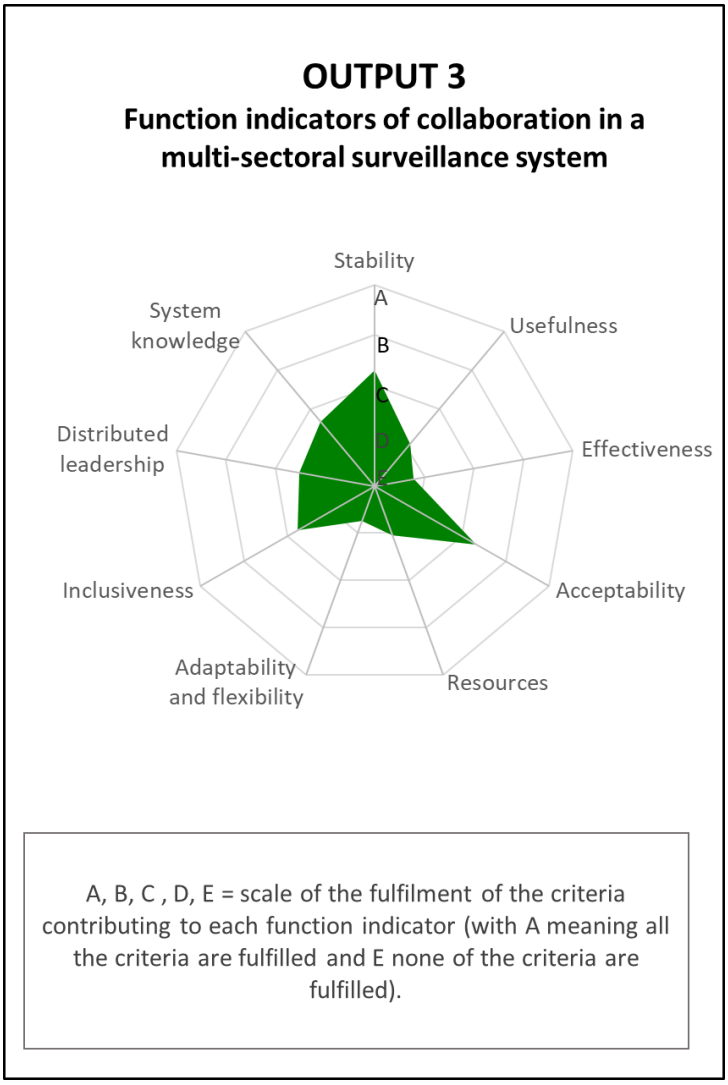


Figure 19: Représentation graphique 3 de l'outil d'évaluation des collaborations dans les systèmes de surveillance One Health représentant les attributs de fonctions des collaborations du système de surveillance One Health de l'antibiorésistance au Vietnam.

La représentation 3 (fig. 17) permet de visualiser les attributs de fonctions. A ce stade, les collaborations dans le système de surveillance One Health au Vietnam sont de mauvaise qualité. Les attributs de fonctions avec les meilleures notes, c'est-à-dire B, sont « Acceptabilité » et « Stabilité ». Les attributs de fonctions suivants obtiennent la note de C : « Inclusion », « Connaissance systémique », « Leadership partagé » et « Utilités ». Les attributs de fonctions « Ressources », « Adaptabilité et flexibilité », et « Efficacité » obtiennent tous l'avant-dernière note. Ces derniers attributs soulignent que les collaborations actuelles au Vietnam ne sont pas efficaces, qu'elles manquent de ressources et que tout le système n'est pas capable de s'adapter à la situation présente. Au contraire, le fait que ces collaborations soient assez stables et acceptées montre que, malgré leur inefficacité, il y a une réelle volonté politique et publique pour leur mise en place.

On peut ainsi faire la synthèse des conclusions des représentations graphiques afin d'établir les résultats de l'évaluation des collaborations au Vietnam. Au premier coup d'œil, sur l'ensemble des représentations graphiques, les collaborations sont finalement assez faibles par rapport aux exigences de l'outil d'évaluation. Ensuite, les indicateurs macros permettent d'observer que si le management a la meilleure note des trois indicateurs, celle-ci reste faible. Cela illustre bien l'impact d'un management faible pour trouver les bons mécanismes de support des collaborations et réaliser les activités espérées pour atteindre les objectifs

Si l'on confronte cette lecture des indicateurs macros aux attributs de gouvernance, on observe que le problème ne vient pas du manque de volonté politique, mais d'une absence de leadership. En effet, non seulement il n'y a pas d'unité de coordination des collaborations fonctionnelles, mais il n'existe pas non plus de vrai consensus sur les modalités de collaboration. Les critères en lien avec la pertinence des modalités (tab. VI) ont permis de souligner que les documents officiels successifs qui établissent ces modalités ont souvent été élaborés à un niveau ministériel, preuve d'un engagement politique. Cependant, la concertation était toute relative au niveau des échelons décisionnels inférieurs, des acteurs de terrain, mais aussi des autres secteurs. De plus, le but affiché des collaborations est la santé publique, ce qui peut jouer un rôle sur le manque de consensus dans les modalités, puisque ce but ne prend pas en compte les attentes du secteur animal créant un déséquilibre entre les différents secteurs.

L'absence de mécanisme de gouvernance approprié impacte tout d'abord la mise en œuvre des collaborations par les institutions en charge, puisqu'ils n'ont pas de ligne directrice. Cette absence de ligne directrice est accentuée par l'absence de consensus sur ces modalités de collaboration. Cela pourrait également favoriser le manque d'engagement des acteurs, qui ne savent pas forcément quoi faire. L'absence de mécanisme de gouvernance approprié a également un impact sur les ressources techniques et financières, qui, malgré la présence de mécanismes de financement, sont inacessibles et limitent la mise en place de collaborations. L'absence de coordination impacte aussi l'ensemble des activités que doit animer cette entité de gouvernance comme la formation aux activités de collaboration, l'évaluation des collaborations, mais aussi l'engagement des acteurs dans le système de surveillance One Health.

Ces éléments sont soulignés différemment dans la représentation graphique 3 ; en effet, on note que les meilleures qualités du système sont sa stabilité et son acceptabilité. Ce premier attribut « Stabilité » permet d'évaluer si la formalisation des collaborations est bonne ou non.Cela est souvent synonyme d'une forte volonté politique et d'une organisation sérieuse. De même, l'acceptabilité du système repose principalement sur l'approbation de la stratégie et des modalités par tous ; ce qui est le cas ici par les principaux acteurs. L'absence de management joue sur l'adaptabilité et la flexibilité des collaborations, puisqu'il n'y a personne pour prendre des décisions, pour adapter ces collaborations au changement de contexte. Le management est, en revanche, assez inclusif, ce qui est une caractéristique recherchée pour mettre en place une bonne collaboration. L'attribut sur le leadership partagé a une note moyenne, ce qui n'est pas cohérent au premier abord avec l'absence d'unité de coordination. Cependant, cet attribut est aussi affecté par la présence ou non d'une unité d'orientation et d'une unité apportant un support scientifique et technique. Ainsi dans notre cas, c'est l'unité d'orientation qui est très developpées, comme l'indique la représentation graphique 1 (fig. 15). C'est un bon exemple pour illustrer la discordance entre la volonté politique présente et l'absence d'unité de coordination nécessaire pour l'opérationnalisation des collaborations.

En conclusion, ces trois graphiques présentent donc des informations similaires, mais l'approche différente permet d'apporter de nouveaux niveaux d'interprétation et de compréhension des collaborations dans ce système de surveillance. Dans le jeu de données utilisé sur le système de surveillance de l'antibiorésistance au Vietnam, les collaborations ont un niveau faible par rapport aux exigences de l'outil, l'avantage principale du système est d'être assez stable du fait d'une volonté politique forte pour la mise en place des collaborations. Le principal point faible du système est l'absence d'unité de coordinatio,n ce qui est un obstacle majeur à la bonne opérationnalisation des collaborations.

PARTIE 5 : Discussion

Cette étude a permis la création d'une matrice d'évaluation des collaborations dans les systèmes de surveillance One Health. Elle a nécessité la définition d'attributs et d'indicateurs des collaborations leur redéfinition par élicitation d'opinion d'experts, la création de critères mesurables et la grille de notation correspondante, puis enfin la création de représentations graphiques pour accompagner les évaluateurs dans l'analyse des résultats. Une fois la matrice établie, un protocole de récolte de données, basé sur des tableaux et un recueil d'information, a été élaboré en plus d'un guide d'utilisation général de l'outil d'évaluation des collaborations dans les systèmes de surveillance One Health ou multisectoriels. Cet outil a alors été appliquée à l'évaluation du système de surveillance de l'antibiorésistance au Vietnam.

I. La validité des résultats de l'élicitation d'opinion d'experts

La validité des résultats d'une élicitation d'opinion d'experts repose sur (i) le suivi d'une méthode reconnue, (ii) le taux de participation, (iii) la preuve de l'expertise des participants et (iv) la représentativité des experts. Dans le cadre de cette étude, ces éléments peuvent être critiqués.

Dans un premier temps, l'élicitation d'opinion d'experts s'est faite en deux tours, avec un retour aux experts à la fin de chaque étape. Ce processus est une forme très simplifiée de la méthode de Delphi modifiée, et il ne permet donc pas de limiter les biais liés aux experts (*Gosling*, 2014). Cependant, dans cette étude, puisque le but de l'élicitation est la validation et la redéfinition des attributs proposés, les informations les plus importes récoltées par l'élicitation sont les critiques des experts et la variété de leur opinion. Ceci est contraire à la plupart des élicitations d'opinion d'experts qui cherchent à obtenir un consensus entre les experts.

Dans un second temps, le taux de réponses à l'élicitation d'opinion d'experts est bas. En effet, sur au moins 256 experts contactés directement, seuls 84 ont répondu partiellement au questionnaire, et 39 personnes ont répondu à la partie sur les attributs. Cela correspond seulement à 15 % de la population des experts sélectionnés. Les questions sur les attributs étant en fin de questionnaire, ce qui a peut-être découragé les experts, puisque le taux de répondants a diminué de moitié entre le début du questionnaire et la fin. La création d'un questionnaire indépendant aurait peut-être augmenté le taux de réponses. Il était cependant plus simple de ne faire qu'un questionnaire, parce que celui-ci regroupait tous les sujets abordés par le projet plus global dans lequel s'inscrit cette étude. Certains experts ont aussi considéré qu'ils n'avaient pas l'expertise suffisante pour répondre à cette partie.

Dans un troisième temps, les experts sélectionnés et contactés avaient la possibilité de disséminer le questionnaire dans leur réseau. Cette possibilité engendre un effet boule de neige et permet d'atteindre un champ plus large d'experts. En revanche, une partie de l'information sur l'expertise réelle des répondants est perdue. On peut tout de même supposer que ce taux d'expertise est bon, puisque 85 % des répondants ont déclaré avoir au moins un an d'expertise dans le domaine de la surveillance et du concept One Health.

Enfin, dans un quatrième temps, on peut se poser la question de la représentativité des répondants par rapport à la population des experts concernés. Ceux-ci ont majoritairement déclaré être des vétérinaires avec une formation en épidémiologie. Cette information pose donc les questions suivantes : existe-t-il un biais de sélection des experts en faveur des vétérinaires, et est-ce que les autres secteurs et disciplines sont sous-représentés dans le domaine de la surveillance One Health. Les membres encadrant l'étude sont des vétérinaires, donc le biais de sélection en leur faveur est probable. Cependant, les experts de la première sélection ont été identifiés à partir de publications lors de la revue systématique Bordier, Uea-Anuwong et *al.* (2018) et de leur implication dans le consortium NEOH ou le projet RISK SUR. L'hypothèse d'une sous-représentativité des autres disciplines et secteurs au sein du domaine de la surveillance One Health n'est donc pas négligeable. On peut noter que les chefs de projet du consortium NEOH sont majoritairement vétérinaires, sauf un économiste spécialisé en agriculture et un biostatisticien travaillant sur des problématiques en lien avec la santé animale (*NEOH Members*, 2015).

Cette tendance a également été observée par Manlove et *al.* (2016) qui ont étudié le profil des scientifiques publiant des articles One Health dans le domaine des modèles de transmission dynamique des maladies zoonotiques. Ces recherches ont montré une ségrégation entre les publications des vétérinaires, celles des écologistes et celles d'un troisième groupe plus hétéroclite en termes de secteurs et disciplines. Il a particulièrement souligné le manque d'intérêt des médecins malgré un fort taux de publication dans le domaine. En effet, seuls deux des vingt-cinq journaux médicaux à plus fort impact ont publié des articles One Health. Même si on ne peut pas extrapoler ces remarques pour la surveillance One Health, on peut se poser les questions suivantes : Pourquoi les vétérinaires sont sur-représentés ? Comment expliquer le désintérêt des médecins ? Pourquoi les professionnels de l'environnement sont sous-représentés ? Dans le cadre précis de notre étude, il aurait fallu trouver des collaborateurs provenant du secteur médical ou environnemental pour qu'ils mettent à contribution directement leur propre réseau. Cependant, cette amélioration repose sur l'existence d'une ségrégation dans le domaine d'une surveillance One Health.

En conclusion, les résultats de cette élicitation d'opinion d'experts sont valides malgré les biais suivants : une méthode simplifiée, un taux de réponses faible, mais un taux d'expertise fort, et une représentativité des répondants par rapport à la population des experts de la surveillance One Health difficilement mesurable.

II. La subjectivité dans l'utilisation des dires des experts

L'analyse des dires des experts pour redéfinir et modifier la liste des attributs peut être controversée, car il existe une certaine subjectivité dans l'utilisation de leurs commentaires. En effet, de nombreux commentaires ont été définis comme non pertinents à l'étude, permettant d'identifier trois points de controverse : (i) la différence entre les collaborations et les systèmes de surveillance collaboratifs, (ii) la hiérarchisation des attributs, (iii) la définition de la surveillance.

Le premier point de controverse avec certains experts est la différence entre les collaborations et le système de surveillance collaboratif. Cette différence est assez floue. En effet, un système de surveillance collaboratif, qu'il soit multisectoriel ou One Health, repose sur la collaboration entre différents dispositifs de surveillance. Les systèmes de surveillance collaboratifs et les collaborations ne peuvent donc pas avoir des objectifs et des buts différents. La bonne communication au sein du système ou la présence d'une mémoire institutionnelle sont également des caractéristiques de bon fonctionnement systémique. En effet, on ne peut pas concevoir une évaluation des collaborations sans prendre en compte la qualité des communications entre les acteurs. Cependant, un système de surveillance collaboratif doit prendre en compte les particularités des dispositifs sectoriels. Donc ces dispositifs peuvent avoir des objectifs ou buts en plus de ceux définis par les collaborations.

Le second point de controverse avec certains experts est la nécessité de hiérarchiser les attributs en fonction de la question d'évaluation. Dans un premier temps, ce point n'a pas été pris en compte dans l'analyse des dires des experts, car le but était d'obtenir une liste exhaustive de tous les attributs caractérisant les collaborations dans un système de surveillance One Health. Dans un deuxième temps, cette liste a permis de créer une matrice qui ne hiérarchise pas ces attributs, puisqu'elle répond à des questions d'évaluation sur l'organisation, le fonctionnement et la qualité des collaborations dans les systèmes de surveillance, comme le fait l'outil OASIS à un niveau sectoriel. La matrice permet aux évaluateurs de classifier quelques attributs d'organisation comme non pertinents en fonction des particularités des collaborations. Dans d'autres méthodes, les attributs sont hiérarchisés pour répondre à des questions d'évaluation précises sur l'efficacité, la valeur et l'impact des systèmes de surveillance (*Drewe et al.*, 2012), (*Calba et al.*, 2015). De plus, certains experts considèrent qu'utiliser tous les attributs rallonge et complexifie l'évaluation. Dans notre cas, cela permet d'avoir des résultats standardisés quels que soient l'organisation et le degré d'intégration du système de surveillance évalué.

Le dernier point de controverse concerne la définition de la surveillance. En effet, la surveillance s'arrête à la production d'informations de surveillance et à leur dissémination. Les interventions qui en découlent et leurs impacts sont les conséquences des résultats de la surveillance. On ne considère donc pas l'intervention comme une étape du processus de surveillance. Certains experts pensent qu'on ne peut pas différencier les deux notions, en particulier quand on évalue l'impact d'un système de surveillance. Dans notre étude, il a été décidé de ne pas évaluer les impacts des collaborations.

III. La difficile opérationnalisation de la stratégie intersectorielle de surveillance de l'antibiorésistance au Vietnam

L'évaluation du système de surveillance au Vietnam a été effectuée en deux temps : tout d'abord, une analyse des dispositifs sectoriels en utilisant l'outil OASIS Flash, puis une évaluation des collaborations au sein de ce système. Même si l'évaluation n'a pas été effectuée à la demande des acteurs, les résultats, théoriquement non exploitables, qui en sont issus, reflètent tout de même une certaine réalité.

Premièrement, l'outil OASIS Flash a permis d'évaluer trois jeunes dispositifs de surveillance (toutes les organisations ont moins d'un an) qui ont tous été initiés sous l'impulsion de partenaires internationaux. Ces partenaires ont principalement des missions d'appui technique, notamment dans le domaine des analyses de laboratoire, et apportent très peu d'expertise sur l'établissement et la gestion d'un réseau de surveillance. Cela explique le déséquilibre entre les capacités techniques de laboratoire bien développées et des résultats de surveillance de faible qualité. Cette impulsion externe explique aussi le manque de cohérence de certains objectifs, en particulier dans le secteur animal, mais également les défaillances en termes d'organisation et d'animation des dispositifs sectoriels. Ces jeunes dispositifs de surveillance sont donc fragiles et d'une faible utilité malgré un fort support technique, scientifique et financier.

Deuxièmement, l'évaluation des collaborations a conclu qu'il existe une volonté de collaboration à un niveau politique, mais que le manque de mécanisme de gouvernance approprié ne permet pas de mettre en œuvre leur opérationnalisation effective. Ainsi, malgré de nombreux documents officiels formalisés au niveau ministériel, qui démontrent la présence d'une volonté politique forte, l'absence d'une cellule de coordination souligne, quant-à elle, le défaut de management des collaborations. Ce défaut est accentué par l'absence de modalités de collaboration clairement définies auxquelles les acteurs se réfèrent. La complexité de l'épidémiologie de l'antibiorésistance explique en partie les difficultés à trouver un consensus. Cette difficulté ne touche pas seulement les autorités compétentes au Vietnam, mais aussi les partenaires internationaux. En effet, si ces partenaires poussent les acteurs de la surveillance à collaborer, leurs actions individuelles sont essentiellement sectorielles, et il n'existe pas entre eux de consensus sur les modalités de collaboration nécessaires au système de surveillance de l'antibiorésistance au Vietnam.

Ainsi, malgré la volonté politique de faire tomber les barrières sectorielles dans la lutte contre l'antibiorésistance au Vietnam, les dispositifs de surveillance tendent à fonctionner en silos, puisqu'ils ne savent pas comment faire autrement. Cependant, si les dispositifs continuent d'évoluer indépendamment, la mise en place des collaborations risque de devenir encore plus compliquée, car chaque secteur va tendre à la création de son propre objet de surveillance qui ne sera pas forcément compatible avec une vision commune (*Fortané*, 2015). L'opérationnalisation de la stratégie de surveillance intersectorielle de l'antibiorésistance au Vietnam risque donc de devenir plus compliquée au fur à mesure que le temps passe.

IV. Les enseignements de l'application de l'outil d'évaluation des collaborations à la surveillance de l'antibiorésistance au Vietnam

Pour développer l'outil, il a fallu collecter un jeu de données sur un système de surveillance One Health, et c'est le système de surveillance de l'antibiorésistance au Vietnam qui a été choisi. Ce système de surveillance a été évalué par l'outil développé et en soumettant chaque dispositif de surveillance actif à une évaluation avec l'outil OASIS Flash. L'application de ces deux outils de surveillance a permis (i) d'identifier les informations sectorielles non collectées par l'outil d'évaluation et (ii) d'obtenir des indices encourageants pour une future validation de l'outil d'évaluation des collaborations.

L'outil OASIS Flash a permis de récolter un certain nombre d'informations sur les acteurs des différents dispositifs et leurs engagements dans leurs missions sectorielles. Les résultats des évaluations des dispositifs permettent également d'obtenir une bonne compréhension du fonctionnement et de la qualité des informations produites par les différents dispositifs. Ces éléments sont nécessaires pour une bonne évaluation des collaborations des systèmes de surveillance multisectoriels. Les informations importantes que l'outil d'évaluation des collaborations ne capture pas sont les faiblesses des dispositifs sectoriels qui expliquent la mauvaise qualité des informations de surveillance produites. Ces informations sur les dispositifs sectoriels permettent une meilleure compréhension du système de surveillance évalué, mais ne sont pas indispensables dans une évaluation indépendante des collaborations.

Dans leur étude, Bordier, Binot et *al.* (2018) ont identifié un certain nombre d'obstacles à la mise en place des collaborations au Vietnam : un modèle de gouvernance non fonctionnel, des divergences culturelles fortes entre les institutions, l'absence de perception de l'apport potentiel des collaborations à la surveillance, l'absence de ressources dédiées aux collaborations, l'absence de confiance dans les capacités techniques des dispositifs sectoriels, les intérêt commerciaux conflictuels et l'influence des partenaires internationaux. Les deux premiers obstacles peuvent être surmontés si un leadership pertinent passant par une unité de coordination se met en place. Les résultats de l'évaluation des collaborations soulignent également que l'engagement des acteurs dans le système de surveillance est faible, et l'absence de perception de l'apport potentiel des collaborations au système de surveillance peut en être la cause. De plus, l'absence de confiance dans les capacités techniques des dispositifs sectoriels touche la mise en place d'activités de collaboration, ce qui a été mis en évidence par l'outil. Ainsi, si l'outil d'évaluation des collaborations n'a pas vocation à identifier les obstacles à leur opérationnalisation, il permet de mettre en avant les faiblesses du système et de mettre les acteurs sur la piste des obstacles.

Cette évaluation des collaborations dans le système de surveillance de l'antibiorésistance au Vietnam a été conduite en même temps que le développement de l'outil d'évaluation des collaborations. On ne peut donc pas utiliser cette évaluation comme une validation de l'outil. Cette évaluation reste cependant un exemple d'utilisation de l'outil. Dans ce sens, la cohérence des résultats avec l'étude antérieur de Bordier, Binot et *al.* (2018) reste encourageante. Une seconde évaluation, cette fois effectuée consensuellement avec les acteurs de la surveillance, est tout de même prévue prochainement.

V. Un outil innovant pour évaluer les collaborations dans un système de surveillance

A notre connaissance, cet outil d'évaluation, est le premier à proposer une méthode pour apporter un jugement des collaborations dans un système de surveillance One Health. Cet outil contient certaines notions communes avec l'outil développé par le consortium NEOH puisque le sujet d'étude est très proche. Les notions sont la représentativité, l'exhaustivité, l'équilibre des collaborations, le leadership partagé ou encore la connaissance créée par les collaborations. Toutes ces notions sont des caractéristiques essentielles des collaborations, mais sont également inhérentes à l'approche One Health, qu'elles soient appliquées à un système de surveillance ou à une autre initiative nécessitant une approche holistique (*Rüegg et al.*, 2017).

Cependant, l'hypothèse qui est le point de départ du développement de cet outil suggère que chaque contexte de surveillance nécessite des modalités de collaboration qui lui sont propres, et que le niveau d'intégration n'est pas forcément proportionnel à la performance et au coût-bénéfice du système de surveillance One Health. L'outil basé sur cette hypothèse a été créé dans le but d'accompagner l'opérationnalisation des collaborations au sein des systèmes de surveillance, et, afin de ne pas faire l'amalgame, celui-ci ne sera plus défini comme un « outil d'évaluation des collaborations au sein des systèmes de surveillance One Health », mais comme un « outil d'évaluation des collaborations au sein des systèmes de surveillance multisectoriels ».

Au contraire, l'outil développé par le consortium NEOH a pour objectif d'apporter la preuve que le plus haut degré de « One Healthness » (leur initiative One Health idéale) permet d'obtenir le plus de bénéfice en comparant les résultats de différentes initiatives entre elles. Donc, non seulement les hypothèses de départ diffèrent, mais aussi, les objectifs finaux de l'outil NEOH et de l'outil développé sont différents. De plus, le terme « intégration » est souvent utilisé comme synonyme d'un haut degré de « One Healthness ». Cependant, l'intégration a pour définition la création d'un tout unique à partir d'entités différentes. Cependant, le but du concept One Health est d'avoir une approche holistique, sa force est justement de concilier des cultures institutionnelles et professionnelles et des savoirs différents pour créer des stratégies collectives innovantes. On peut donc se demander si trop intégrer ne pourrait pas nuire à l'émergence de nouveaux savoirs collectifs en les lissant et en entraînant une perte de la diversité des connaissances.

VI. Les limites de l'outil et perspectives futures

Il est important de souligner que cet outil d'évaluation des collaborations a pour but d'accompagner un évaluateur pour l'aider à formuler ses recommandations. Les représentations graphiques seules ne peuvent donc pas être considérées comme le résultat d'une évaluation. La présentation de ces graphiques doit s'accompagner d'une communication appropriée comme pour l'outil OASIS.

L'outil en l'état présente trois principales limites. Tout d'abord, la matrice est basée sur une notation semi-quantitative des critères. Ainsi, même en accompagnant l'évaluateur avec un guide d'utilisation et en appliquant une méthode d'analyse de la disparité des notes de plusieurs évaluateurs comme dans l'outil OASIS, il restera toujours une part de subjectivité (*Hendrikx et al.*, 2011). De plus, cette matrice ne permet pas d'évaluer l'efficacité des collaborations leur valeur en termes de bénéfices ou de coûts, paramètres qui intéressent le plus les gestionnaires ou les bailleurs de fonds (*Häsler et al.*, 2014). De même, il conviendrait de valider l'approche permettant la notation des attributs de fonctions et des indicateurs macros. On peut ainsi se demander si les critères sont correctement associés aux attributs de fonctions et aux indicateurs macros, et si une hiérarchisation des critères associés, par pondération de leur note, est nécessaire pour mieux représenter chaque attribut et indicateur.

De plus, deux pistes peuvent déjà être identifiées pour améliorer cet outil. Tout d'abord, l'outil créé semble regrouper tous les éléments nécessaires pour une évaluation basique des collaborations indépendamment de la question d'évaluation. Cependant, en fonction de cette question, des élements complémentaires seront potentiellement nécessaires comme pour la méthode OASIS dans le cadre d'une evaluation d'un système de surveillance (*Calba et al.*, 2015). Si c'est bien le cas, il est important d'identifier les éléments manquants pour mieux identifier les limites de l'outil. Il conviendrait également de repenser les représentations graphiques afin de les faire paraître moins alarmistes. C'est potentiellement le cas pour des systèmes collaboratifs en cours de développement présentant peu de critères positifs, comme dans le cas de la surveillance de l'antibiorésistance au Vietnam. Cependant, cette présentation dépend fortement de l'évaluateur et de son rapport, et il est important dans une situation comme celle développée au Vietnam de proposer de vraies solutions et d'accentuer les capacités du système à s'améliorer. Ainsi, la modification des graphiques pour accentuer l'évaluation de la qualité des collaborations dans le temps est une première piste.

En général, afin de valider l'outil, la question de son ergonomie, sa facilité d'utilisation est primordiale. Dans le cas de l'évaluation du Vietnam, les données ont été récoltées préalablement à la définition du protocole de données. Ainsi, cette évaluation n'apporte aucune information sur la « praticité de l'outil », son protocole, et le temps nécessaire pour effectuer toute la procédure ; il est donc nécessaire de tester l'outil dans de vraies conditions. Cependant, en termes d'ergonomie, une première piste d'amélioration reste la création d'un site Internet pour rendre l'ensemble plus interactif et facile d'utilisation. En plus de l'ergonomie, cette démarche est essentielle pour valider le guide d'utilisation de l'outil et le protocole de récolte de données. Pour ce dernier, il est important de valider que l'utilisation des tableaux permet de se dédouaner des évaluations sectorielles comme celles effectuées avec l'outil OASIS Flash. En effet, lors de la conception du protocole, l'OASIS Flash n'a pas semblé s'adapter au regard du peu de ressources habituellement dédiées aux évaluations.

Enfin, cet outil a été développé sur un système et dans un contexte bien particuliers qu'est la surveillance de l'antibiorésistance au Vietnam. Afin de s'assurer de son caractère générique, il est important de pouvoir le tester sur des systèmes destinés à surveiller des dangers sanitaires avec une dynamique épidémiologique différente et mis en œuvre dans des contextes socio-économiques variés. Dans cette perspective, il est planifié que la matrice soit appliquée à l'évaluation des collaborations dans le système de surveillance multisectoriel des salmonelles en France.

Conclusion

Cette étude a permis de développer un outil innovant pour évaluer les collaborations au sein des systèmes de surveillance One Health. C'est une première étape avant la validation de l'outil et son intégration potentielle aux outils existants d'évaluation des systèmes de surveillance. Il permet d'accompagner les acteurs dans la compréhension de l'organisation des collaborations et l'identification de leurs forces et faiblesses. En effet, ces collaborations sont aujourd'hui un des obstacles majeurs dans la mise en œuvre des systèmes de surveillance One Health ou multisectoriels. L'application de cet outil au cas d'étude de l'évaluation des collaborations dans le système de surveillance multisectoriel de l'antibiorésistance au Vietnam a démontré que celle-ci peut être opérationnelle. L'évaluation a souligné que la stratégie collaborative au Vietnam relève d'une volonté politique forte. Cependant, l'absence de mécanismes pour la coordination de ses collaborations et de consensus sur les modalités entre les secteurs sont un frein à l'opérationnalisation des activités de collaboration par les autorités compétentes et les institutions mandatées. Cette évaluation est un exemple de l'utilité de l'outil pour identifier les obstacles à la collaboration, et proposer des pistes d'amélioration pour définir des collaborations plus pertinentes au regard du contexte et de l'objectif de surveillance.

Bibliographie

BABO MARTINS S., RUSHTON J. et STÄRK K.D.C. 2016. Economic Assessment of Zoonoses Surveillance in a 'One Health' Context: A Conceptual Framework. *Zoonoses and Public Health* [en ligne]. Vol. 63, n° 5, pp. 386-395. Disponible à l'adresse : http://onlinelibrary.wiley.com/doi/10.1111/zph.12239/abstract [Consulté le 12 mars 2018].

BAQUERO F., MARTÍNEZ J.-L. et CANTÓN R. 2008. Antibiotics and antibiotic resistance in water environments. *Current Opinion in Biotechnology* [en ligne]. Vol. 19, n° 3, pp. 260-265. Disponible à l'adresse : http://www.sciencedirect.com/science/article/pii/S0958166908000591 [Consulté le 11 juin 2018].

BELLINI R., CALZOLARI M., MATTIVI A., TAMBA M., ANGELINI P., BONILAURI P. et al. 2014. The experience of West Nile virus integrated surveillance system in the Emilia-Romagna region: five years of implementation, Italy, 2009 to 2013. *Eurosurveillance* [en ligne]. Vol. 19, n° 44, pp. 20953. Disponible à l'adresse : https://www.eurosurveillance.org/content/10.2807/1560-7917.ES2014.19.44.20953 [Consulté le 27 septembre 2018].

BEREZOWSKI J., AKKINA J., DEL RIO V., DEVORE K., DOREA F., DUPUY C. et al. 2015. Do we need One Health Surveillance. *One Health Newsletter* [en ligne]. Vol. 8, n° 1, pp. 5. Disponible à l'adresse : http://media.news.health.ufl.edu/misc/egh/One%20Health%20Newsletter/OHNL_Volume8_Issue1.pdf [Consulté le 12 octobre 2018].

BORDIER M., BINOT A., PAUCHARD Q., NGUYEN D.T., TRUNG T.N., FORTANÉ N. et al. 2018. Antibiotic resistance in Vietnam: moving towards a One Health surveillance system. *BMC Public Health* [en ligne]. Vol. 18, n° 1, pp. 1136. Disponible à l'adresse : https://doi.org/10.1186/s12889-018-6022-4 [Consulté le 11 octobre 2018].

BORDIER M. et DIEN N.T. 2017. Moving towards a One Health surveillance system for antibiotic resistance in Vietnam. *Policy Brief by GREASE* [en ligne]. pp. 4. Disponible à l'adresse : https://asie-sud-est.cirad.fr/content/download/6027/52357/version/1/file/POLICY_BRIEF_+One+Health+surveillance+system+_+final.pdf [Consulté le 11 octobre 2018].

BORDIER M., UEA-ANUWONG T., BINOT A., HENDRIKX P. et GOUTARD F.L. 2018. Characteristics of One Health surveillance systems: a systematic literature review. *Preventive Veterinary Medicine* [en ligne]. Disponible à l'adresse : http://www.sciencedirect.com/science/article/pii/S0167587718303659 [Consulté le 22 octobre 2018].

CALBA C., GOUTARD F.L., HOINVILLE L., HENDRIKX P., LINDBERG A., SAEGERMAN C. et al. 2015. Surveillance systems evaluation: a systematic review of the existing approaches. *BMC Public Health* [en ligne]. Vol. 15, n° 1. Disponible à l'adresse : http://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-015-1791-5 [Consulté le 6 avril 2018].

CALBA C., RVC J.D., GOUTARD F., GROSBOIS V., RVC B.H., HOINVILLE L. et al. 2013. The evaluation attributes used for evaluating animal health surveillance systems. [en ligne]. Disponible à l'adresse : https://www.fp7-risksur.eu/sites/default/files/documents/Deliverables/RISKSUR%20(310806)_D1.3.pdf [Consulté le 11 octobre 2018].

CHAU T.T., CAMPBELL J.I., GALINDO C.M., HOANG N.V.M., DIEP T.S., NGA T.T.T. et al. 2007. Antimicrobial drug resistance of Salmonella enterica serovar Typhi in Asia and molecular mechanism of reduced susceptibility to the fluoroquinolones. *Antimicrobial agents and chemotherapy*. Vol. 51, n° 12, pp. 4315-4323.

DANMAP. 2018*Organization and workflow of the DANMAP* [en ligne]. 2018. [Consulté le 12 octobre 2018]. [Consulté le 12 octobre 2018]. . Disponible à l'adresse : https://www.danmap.org/About%20Danmap/Organization%20chart.aspx [Consulté le 12 octobre 2018].

DAVIES J. et DAVIES D. 2010. Origins and Evolution of Antibiotic Resistance. *Microbiology and Molecular Biology Reviews* [en ligne]. Vol. 74, n° 3, pp. 417-433. Disponible à l'adresse : http://mmbr.asm.org/content/74/3/417 [Consulté le 11 juin 2018].

DENTE M.G., RICCARDO F., NACCA G., RANGHIASCI A., ESCADAFAL C., GAAYEB L. et al. 2018. Strengthening Preparedness for Arbovirus Infections in Mediterranean and Black Sea Countries: A Conceptual Framework to Assess Integrated Surveillance in the Context of the One Health Strategy. *International Journal of Environmental Research and Public Health* [en ligne]. Vol. 15, n° 3, pp. 489. Disponible à l'adresse : http://www.mdpi.com/1660-4601/15/3/489 [Consulté le 6 avril 2018].

DESTOUMIEUX-GARZÓN D., MAVINGUI P., BOETSCH G., BOISSIER J., DARRIET F., DUBOZ P. et al. 2018. The One Health Concept: 10 Years Old and a Long Road Ahead. *Frontiers in Veterinary Science* [en ligne]. Vol. 5. Disponible à l'adresse : http://journal.frontiersin.org/article/10.3389/fvets.2018.00014/full [Consulté le 22 avril 2018].

DREWE J.A., HOINVILLE L.J., COOK A.J.C., FLOYD T. et STÄRK K.D.C. 2012. Evaluation of animal and public health surveillance systems: a systematic review. *Epidemiology and Infection* [en ligne]. Vol. 140, n° 04, pp. 575-590. Disponible à l'adresse : http://www.journals.cambridge.org/abstract_S0950268811002160 [Consulté le 6 avril 2018].

DUFOUR B. 1999. Technical and economic evaluation method for use in improving infectious animal disease surveillance networks. *Veterinary research* [en ligne]. Vol. 30, n° 1, pp. 27-37. Disponible à l'adresse : https://hal.archives-ouvertes.fr/hal-00902554/document [Consulté le 12 octobre 2018].

DUFOUR, B et HENDRICKX, P. 2011. *Surveillance épidémiologique en santé animale: 3e édition*. Editions Quae.

FAO, OIE et WHO. 2010*A Tripartite Concept Note: Sharing responsabilities and coordinating global ativities to adress health risks at the animal-human-ecosystem interfaces.* [en ligne]. 2010. [Consulté le 15 juin 2018]. [Consulté le 15 juin 2018]. . Disponible à l'adresse : http://www.who.int/foodsafety/zoonoses/final_concept_note_Hanoi.pdf [Consulté le 15 juin 2018].

FLEMING FUND. *Terms of Reference for Request for Proposals- First Fleming Fund Grant to Vietnam* [en ligne]. The Fleming Fund. [Consulté le 11 octobre 2018]. [Consulté le 11 octobre 2018]. . Disponible à l'adresse : https://www.flemingfund.org/wp-content/uploads/a88f5280cacd11a455f03e5e6a439906.pdf [Consulté le 11 octobre 2018].

FONSECA A.G., TORGAL J., DE MENEGHI D., GABRIËL S., COELHO A.C. et VILHENA M. 2018. One Health-ness Evaluation of Cysticercosis Surveillance Design in Portugal. *Frontiers in Public Health* [en ligne]. Vol. 6. Disponible à l'adresse : https://www.frontiersin.org/articles/10.3389/fpubh.2018.00074/full
[Consulté le 30 mars 2018].

FORTANÉ N. 2015. La surveillance comme dispositif-frontière: La triple ontologie des bactéries résistantes d'origine animale. *Revue d'anthropologie des connaissances* [en ligne]. Vol. 9,2, n° 2, pp. 265. Disponible à l'adresse : http://www.cairn.info/revue-anthropologie-des-connaissances-2015-2-page-265.htm [Consulté le 22 avril 2018].

GERMAN R.R., LEE L.M., HORAN J., MILSTEIN R., PERTOWSKI C. et WALLER M. 2001. Updated guidelines for evaluating public health surveillance systems. *MMWR Recomm Rep* [en ligne]. Vol. 50, n° 1-35. Disponible à l'adresse : http://www.columbia.edu/itc/hs/pubhealth/p8475/readings/cdc-updated-guidelines.pdf
[Consulté le 12 octobre 2018].

GOSLING J.P. 2014. Methods for eliciting expert opinion to inform health technology assessment. *Vignette Commissioned by the MRC Methodology Advisory Group. Medical Research Council (MRC) and National Institure for Health Research (NIHR)* [en ligne]. Disponible à l'adresse : https://pdfs.semanticscholar.org/38eb/a762cdaf5d6dae2fee2063bf776d5facec5b.pdf

HÄSLER B., CORNELSEN L., BENNANI H. et RUSHTON J. 2014. A review of the metrics for One Health benefits. *Rev Sci Tech* [en ligne]. Vol. 33, n° 2, pp. 453–64. Disponible à l'adresse :
https://pdfs.semanticscholar.org/f74f/0bd0c2172041fc9dbbb1123f7b68d953df23.pdf
[Consulté le 12 octobre 2018].

HENDRICKX P. Outil OASIS. *Centre de ressources épidémiosurveillance | French National Epidemiological Surveillance Platform for Animal Health* [en ligne]. 2012. [Consulté le 11 octobre 2018]. Disponible à l'adresse : https://www.plateforme-esa.fr/outils-et-methodes-methodes-oasis [Consulté le 11 octobre 2018].

HENDRIKX P., GAY E., CHAZEL M., MOUTOU F., DANAN C., RICHOMME C. et al. 2011. OASIS: an assessment tool of epidemiological surveillance systems in animal health and food safety. *Epidemiology and Infection* [en ligne]. Vol. 139, n° 10, pp. 1486-1496. Disponible à l'adresse : http://www.journals.cambridge.org/abstract_S0950268811000161 [Consulté le 6 avril 2018].

KARIMURIBO E.D., SAYALEL K., BEDA E., SHORT N., WAMBURA P., MBOERA L.G. et al. 2012. Towards One Health disease surveillance: The Southern African Centre for Infectious Disease Surveillance approach. *Onderstepoort Journal of Veterinary Research* [en ligne]. Vol. 79, n° 2, pp. 7. Disponible à l'adresse : https://ojvr.org/index.php/ojvr/article/view/454 [Consulté le 22 avril 2018].

LE Q.P., UEDA S., NGUYEN T.N.H., DAO T.V.K., VAN HOANG T.A., TRAN T.T.N. et al. 2015. Characteristics of Extended-Spectrum β-Lactamase–Producing Escherichia coli in Retail Meats and Shrimp at a Local Market in Vietnam. *Foodborne pathogens and disease* [en ligne]. Vol. 12, n° 8, pp. 719-725. Disponible à l'adresse : https://www.liebertpub.com/doi/abs/10.1089/fpd.2015.1954 [Consulté le 12 octobre 2018].

LEFRANÇOIS T., HENDRIKX P., GONGORA V., TROTMAN M., ZAMORA A., MILLIEN M. et al. 2007. The Caribbean animal health network (CaribVET) harmonisation and reinforcement of animal disease surveillance focused on emerging diseases. *12th International Con-ference of the Association of Institutions for Tropical Veterinary Medicine. Does Control of Animal Infectious Risks Offer a New International Perspective* [en ligne]. pp. 421-425. Disponible à l'adresse : https://www.researchgate.net/profile/DrJalil_Zorriehzahra/publication/245535842_Isolation_and_Identification_of_the_Infectious_Haematopoietic_Necrosis_Virus_IHNV-like_Agent_from_Farmed_Rainbow_Trout_Oncorhynchus_mykiss_from_Iran/links/00b7d51d7331bc51d8000000.pdf#page=440 [Consulté le 12 octobre 2018].

LUU Q.H., NGUYEN T.L.A., PHAN T.H.P. et CHU V.T. *Investigating the use of antibiotics in livestock production within Viet Nam: case study on pig production in Ha Nam province*. Hanoi : Secretariat of the Viet Nam One Health Partnership for Zoonoses.

MARTINS S.B., RUSHTON J. et STÄRK K.D.C. 2016. Economic Assessment of Zoonoses Surveillance in a 'One Health' Context: A Conceptual Framework. *Zoonoses and Public Health* [en ligne]. Vol. 63, n° 5, pp. 386-395. Disponible à l'adresse : https://onlinelibrary.wiley.com/doi/abs/10.1111/zph.12239 [Consulté le 17 mai 2018].

NARROD C., ZINSSTAG J. et TIONGCO M. 2012. A One Health Framework for Estimating the Economic Costs of Zoonotic Diseases on Society. *EcoHealth* [en ligne]. Vol. 9, n° 2, pp. 150-162. Disponible à l'adresse : http://link.springer.com/10.1007/s10393-012-0747-9 [Consulté le 5 février 2018].

NEOH Members, 2015. *Network for Evaluation of One Health* [en ligne]. [Consulté le 11 octobre 2018]. Disponible à l'adresse : http://neoh.onehealthglobal.net/members/ [Consulté le 11 octobre 2018].

NGUYEN K.V., THI DO N.T., CHANDNA A., NGUYEN T.V., PHAM C.V., DOAN P.M. et al. 2013. Antibiotic use and resistance in emerging economies: a situation analysis for Viet Nam. *BMC Public Health* [en ligne]. Vol. 13, n° 1, pp. 1158. Disponible à l'adresse : https://doi.org/10.1186/1471-2458-13-1158 [Consulté le 12 octobre 2018].

O'NEILL J. 2014. Antimicrobial resistance: tackling a crisis for the health and wealth of nations. *The Review on Antimicrobial Resistance* [en ligne]. Vol. 20. Disponible à l'adresse : https://amr-review.org/sites/default/files/AMR%20Review%20Paper%20-%20Tackling%20a%20crisis%20for%20the%20health%20and%20wealth%20of%20nations_1.pdf [Consulté le 12 octobre 2018].

PATERNOSTER G., TOMASSONE L., TAMBA M., CHIARI M., LAVAZZA A., PIAZZI M. et al. 2017. The Degree of One Health Implementation in the West Nile Virus Integrated Surveillance in Northern Italy, 2016. *Frontiers in Public Health* [en ligne]. Vol. 5. Disponible à l'adresse : http://journal.frontiersin.org/article/10.3389/fpubh.2017.00236/full [Consulté le 15 janvier 2018].

PHILLIPS I., CASEWELL M., COX T., DE GROOT B., FRIIS C., JONES R. et al. 2004. Does the use of antibiotics in food animals pose a risk to human health? A critical review of published data. *Journal of Antimicrobial Chemotherapy* [en ligne]. Vol. 53, n° 1, pp. 28-52. Disponible à l'adresse : https://academic.oup.com/jac/article/53/1/28/680882 [Consulté le 6 avril 2018].

PILLOU J.-F. Quality - Process Management. *CCM* [en ligne]. 2006. [Consulté le 11 octobre 2018]. Disponible à l'adresse : https://ccm.net/contents/618-quality-process-management [Consulté le 11 octobre 2018].

P&R. *One Health Planning for Performance Process : Facilitator Guide* [en ligne]. USAID. [Consulté le 12 octobre 2018]. [Consulté le 12 octobre 2018]. . Disponible à l'adresse : http://preparednessandresponse.org/ [Consulté le 12 octobre 2018].

QUEENAN K., HÄSLER B. et RUSHTON J. 2016. A One Health approach to antimicrobial resistance surveillance: is there a business case for it? *International Journal of Antimicrobial Agents* [en ligne]. Vol. 48, n° 4, pp. 422-427. Disponible à l'adresse : http://linkinghub.elsevier.com/retrieve/pii/S0924857916301832 [Consulté le 15 janvier 2018].

RABINOWITZ P.M., KOCK R., KACHANI M., KUNKEL R., THOMAS J., GILBERT J. et al. 2013. Toward Proof of Concept of a One Health Approach to Disease Prediction and Control. *Emerging Infectious Diseases* [en ligne]. Vol. 19, n° 12. Disponible à l'adresse : https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3840882/ [Consulté le 11 juin 2018].

RISKSUR. *Best Practices for risk-based and cost effective animal health surveillance* [en ligne]. [Consulté le 12 juin 2018]. [Consulté le 12 juin 2018]. . Disponible à l'adresse : https://www.fp7-risksur.eu/sites/default/files/documents/publications/riskbasedsurv_BPdoc_FINAL_formatted_03.pdf [Consulté le 12 juin 2018].

RIZZO C., NAPOLI C., VENTURI G., PUPELLA S., LOMBARDINI L., CALISTRI P. et al. 2016. West Nile virus transmission: results from the integrated surveillance system in Italy, 2008 to 2015. *Eurosurveillance* [en ligne]. Vol. 21, n° 37. Disponible à l'adresse : https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5032855/ [Consulté le 27 septembre 2018].

RÜEGG S.R., MCMAHON B.J., HÄSLER B., ESPOSITO R., NIELSEN L.R., IFEJIKA SPERANZA C. et al. 2017. A Blueprint to Evaluate One Health. *Frontiers in Public Health* [en ligne]. Vol. 5. Disponible à l'adresse : http://journal.frontiersin.org/article/10.3389/fpubh.2017.00020/full [Consulté le 15 janvier 2018].

RÜEGG S.R., NIELSEN L.R., BUTTIGIEG S.C., SANTA M., ARAGRANDE M., CANALI M. et al. 2018. A Systems Approach to Evaluate One Health Initiatives. *Frontiers in Veterinary Science* [en ligne]. Vol. 5. Disponible à l'adresse : https://www.frontiersin.org/articles/10.3389/fvets.2018.00023/full [Consulté le 3 juin 2018].

STÄRK K.D.C., ARROYO KURIBREÑA M., DAUPHIN G., VOKATY S., WARD M.P., WIELAND B. et al. 2015. One Health surveillance – More than a buzz word? *Preventive Veterinary Medicine* [en ligne]. Vol. 120, n° 1, pp. 124-130. Disponible à l'adresse : http://www.sciencedirect.com/science/article/pii/S0167587715000355 [Consulté le 16 février 2018].

SWENSEN J. 2017. Antibiotic resistance has a language problem : Nature News & Comment. [en ligne]. pp. 7. Disponible à l'adresse : http://go.galegroup.com/ps/anonymous?id=GALE%7CA491085603&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=00280836&p=AONE&sw=w
[Consulté le 12 octobre 2018].

TOMA B., BÉNET J.J., DUFOUR B., ELOIT M., MOUTOU F. et SANAA M. 1991. Glossary of animal epidemiology. *Glossary of animal epidemiology*. [en ligne]. Disponible à l'adresse : https://www.cabdirect.org/cabdirect/abstract/19922229288
[Consulté le 19 février 2018].

WHO. *Antimicrobial resistance: global report on surveillance* [en ligne]. Geneva, Switzerland : World Health Organization. [Consulté le 12 octobre 2018]. [Consulté le 12 octobre 2018]. . Disponible à l'adresse : www.who.int/drugresistance/documents/surveillancereport [Consulté le 12 octobre 2018].

WHO. *WHO global strategy for containment of antimicrobial resistance* [en ligne]. WHO. [Consulté le 12 octobre 2018]. [Consulté le 12 octobre 2018]. . Disponible à l'adresse : www.who.int/drugresistance/WHO_Global_Strategy_English.pdf
[Consulté le 12 octobre 2018].

WHO. *Integrated surveillance of antimicrobial resistance: Guidance from a WHO Advisory Group* [en ligne]. WHO. [Consulté le 12 octobre 2018]. [Consulté le 12 octobre 2018]. . Disponible à l'adresse : www.who.int/foodsafety/publications/agisar_guidance/en
[Consulté le 12 octobre 2018].

WIELINGA P.R., JENSEN V.F., AARESTRUP F.M. et SCHLUNDT J. 2014. Evidence-based policy for controlling antimicrobial resistance in the food chain in Denmark. *Food Control* [en ligne]. Vol. 40, pp. 185-192. Disponible à l'adresse : http://www.sciencedirect.com/science/article/pii/S0956713513006294
[Consulté le 3 octobre 2018].

ZINSSTAG J., SCHELLING E., WALTNER-TOEWS D. et TANNER M. 2011. From "one medicine" to "one health" and systemic approaches to health and well-being. *Preventive Veterinary Medicine* [en ligne]. Vol. 101, n° 3, pp. 148-156. Disponible à l'adresse : http://www.sciencedirect.com/science/article/pii/S0167587710002023
[Consulté le 17 février 2018].

One Health Surveillance System : Expert Opinion Elicitation

1. **Welcome to this online survey!**

Thank you for your willingness to participate in our study!

The purpose of this questionnaire is to elicit your expertise to refine our findings about the characterization and evaluation of collaboration within a One Health surveillance system.

A One Health surveillance system is defined in this study as "a system in which collaborative efforts exist across at least two sectors (*among human health, animal health and environment health*) during the surveillance process to produce and disseminate information which leads to actions aimed at attaining optimal health of humans and/or animals and/or ecosystems.**" The analysis of our systematic literature review of existing One Health surveillance systems allowed us to identify that collaboration could be described at different dimensions and under different modalities.**

One Health Surveillance System : Expert Opinion Elicitation

2. GENERAL INSTRUCTIONS AND POINTS TO REMEMBER BEFORE FILLING OUT THE SURVEY:

***You can scroll through the questionnaire pages by pressing the "Next" and "Back" buttons. Pressing "Ok" allows you to pass to the next question or you can just scroll down the page. To ensure you do not lose your answers on a page: press 'Next' before going back or leaving the questionnaire. At any time you can stop and come back to the questionnaire later on using the same device.**

***Most questions are compulsory, you will need to answer then before moving on to another page of the questionnaire.**

***By pressing "Finish" on the last page you will finalize the questionnaire, which will be then sent to us automatically.**

***Through the questionnaire, you will have diverse opportunities to refer to the**

glossary by clicking on the various hypertext. The glossary is also attached to your invitation email.

The questionnaire consists of 36 questions divided in 5 sections:
- Background information
(questions 1 to 5)
- Dimensions of collaboration in a One Health surveillance system
(questions 6 to 10)
- Modalities of collaboration in a One Health surveillance system
(questions 11 to 13)
- Collaboration modalities depending on the surveillance context and objective
(question 14 to 24)
- Evaluation attributes of collaboration in a One Health surveillance system
(questions 25 to 35 - optional)

As mentioned in the invitation email, we estimate that it will take you approximately 30 minutes to complete. Please note that all your answers and comments will be anonymised in the analysis of the questionnaire.

If you have any difficulties or questions, please contact Marion Bordier at marion.bordier@cirad.fr.

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One Health Surveillance System : Expert Opinion Elicitation

3. BACKGROUND INFORMATION

* 1. Please enter you name and surname:
(This information is necessary for feedbacks and your answer will be anonymised for the data analysis)

* 2. Please check the box(es) that best describe(s) the institution your are currently working for:

(More than one answer is possible)

- [ ] Inter-governmental organization
- [ ] Governmental authority
- [ ] Academia (university, research institute, etc.)
- [ ] Private sector
- [ ] Other (please specify)

* 3. Please check the box(es) that best describe(s) your academic background:

(More than one answer is possible)

- [ ] Veterinarian
- [ ] Medical doctor
- [ ] Biologist
- [ ] Epidemiologist
- [ ] Economist
- [ ] Sociologist
- [ ] Engineer
- [ ] Other (please specify)

* 4. Please check the box in each boxed that best describe(s) your discipline and state your years of experience in each area of specialization and/or work:

	No expertise	< 1 year of experience	1-5 years of experience	5-10 years of experience	> 10 years of experience
Epidemiology	○	○	○	○	○
Public Health	○	○	○	○	○
Veterinary Public Health	○	○	○	○	○
Food Safety	○	○	○	○	○
Animal Health	○	○	○	○	○
Plant Health	○	○	○	○	○
Ecology	○	○	○	○	○
Laboratory diagnostic	○	○	○	○	○
Economy	○	○	○	○	○
Health geography	○	○	○	○	○

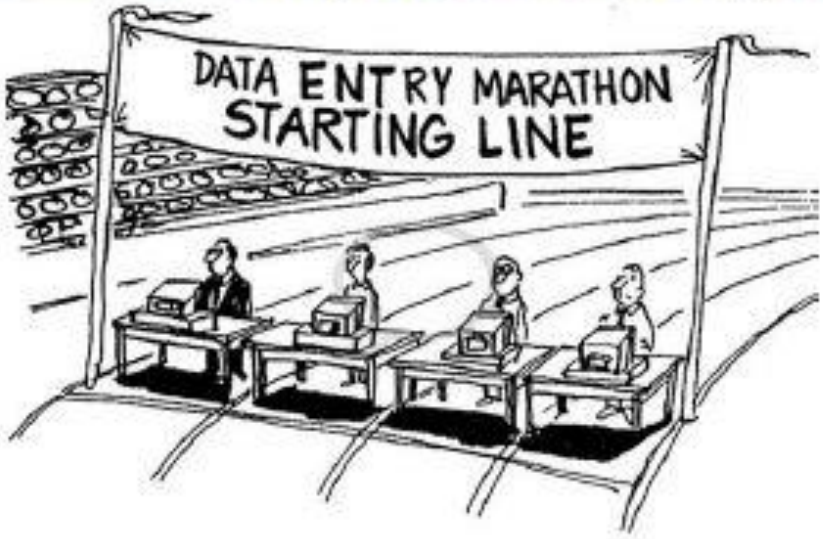
Other (please specify the Discipline/Field) and the years of experience

* 5. Please specify if you have a specific experience in the following subjects:

(Select your answer from the provided list)

	Experience	Number of years
Surveillance of health hazard		
Working with One Health paradigm		

Thank you for answering all the questions on your background.



One Health Surveillance System : Expert Opinion Elicitation

7. ATTRIBUTES FOR EVALUATING THE COLLABORATION IN A ONE HEALTH SURVEILLANCE SYSTEM

Welcome to the 5th and last section of this questionnaire about the evaluation attributes of a One Health surveillance system.
(11 questions)

When conducting the evaluation of a surveillance system requiring collaboration, it is important to assess the appropriateness and the efficacy of these collaboration, as well as the added value they generate.

Based on existing evaluation attributes of OASIS and EVA TOOL, we have identified other characteristics or new attributes to specifically assess collaboration in the organization and operations of a One Health surveillance system.

* 25. This part of the questionnaire is optional. Please check the following boxes to tell us what you want to do.

- ◯ Yes I would like to continue the questionnaire.
- ◯ No, I would like to stop here.

One Health Surveillance System : Expert Opinion Elicitation

8. ATTRIBUTES FOR EVALUATING THE COLLABORATION IN A ONE HEALTH SURVEILLANCE SYSTEM

For a better understanding, we have split the attributes into 5 parts: governance, operations, function, effectiveness and value.

WARNING: **The following attributes only allow an assessment of the collaboration in a surveillance system. Therefore they come in addition to the ones in existing evaluation tools for sectoral surveillance system (ie. OASIS, EVA TOOL etc.).**

One Health Surveillance System : Expert Opinion Elicitation

9. CRITERIA FOR EVALUATING THE COLLABORATION IN A ONE HEALTH SURVEILLANCE SYSTEM
PART I: GOVERNANCE

PART I: Governance

Attributes' name	Definition
Formalization at the policy level	Formulation of the rationale and objectives of the collaborative surveillance effort as well as the area of responsibilities of the surveillance actors and the dimensions of the collaboration in document(s), and endorsed by all the actors from different sectors and decision scales involved.
Formalization at the institutional level	Description of the collaboration in terms ofmodalities (area and degree), role and responsibilities of actors in document(s), and endorsed by all the actors from the different sectors and decision scales involved.
Relevance of the collaborative objective	Relevance of the collaborative objective(s) regarding the actors' expectations, the epidemiological and social-economic context, the international/regional guidance (regulation, recommendations, standards).
Relevance of the collaborative modalities	Relevance of the collaboration modalities (areas, degrees) across the different dimensions, in relation to the surveillance objective and context.
Mechanisms	Existence of appropriate mechanisms of collaboration for the management (steering body), for the coordination (central body) of the surveillance system as well as for the scientific and technical support (technical body) , involving representatives from relevant sectors, decision scales, disciplines.
Resources	(i) Definition of resources allocation mechanisms to support collaboration at the policy level and allocation of appropriate resources for collaboration at the institutional level. (ii) Specifically, while defining the human resources, an assessment of the adequacy between responsibilities assigned by the collaborative surveillance system and professional skills should be done.
Performance and evaluation	Existence of specific performance indicators of collaboration routinely used and of periodic external evaluations of the collaborative effort to meet the collaborative surveillance objective – Implementation of corrective measures if deemed necessary.
Training	Provision of adequate initial and ongoing training for operating actors involved in collaborative activities.
Information	Provision of adequate initial and ongoing information about (i) the rationale behind the collaborative effort (ii) the overall organization of the surveillance system, as well as of all the different sectoral components.

* 26. Are all those attributes **relevant** when it comes to the evaluation of collaboration within a surveillance system?

- YES
- NO

If NO, please specify and be as detailed as you can. Thank you!

* 27. Do you identify some **missing evaluation attributes** to assess the collaboration in a One Health surveillance system?

- YES
- NO

If YES, please specify and be as detailed as you can. Thank you!

One Health Surveillance System : Expert Opinion Elicitation

10. CRITERIA FOR EVALUATING THE COLLABORATION IN A ONE HEALTH SURVEILLANCE SYSTEM
PART II: OPERATIONS

PART II: Operations

Name	Definition
Planning	Implementation of appropriate collaborative activities for the design/organization of the surveillance campaign(ex:meeting to select hazards) and availability of related resources, to meet the collaborative surveillance objective and to comply with the collaborative modalities defined at the institutional level
Data collection	Implementation of appropriate collaborative activities for the data collection(ex:data standardization) and availability of related resources, to meet the collaborative surveillance objective and to comply with the collaborative modalities defined at the institutional level

Laboratory testing	Implementation of appropriate collaborative activities for laboratory testing(ex:harmonization of methods) and availability of related resources, to meet the collaborative surveillance objective and to comply with the collaborative modalities defined at the institutional level
Data management and storage	Implementation of appropriate collaborative activities for data management/storage(ex:data ownership) and availability of related resources, to meet the collaborative surveillance objective and to comply with the collaborative modalities defined at the institutional level
Data exchange	Implementation of appropriate collaborative activities for data exchange(ex:compatibility of information systems) and availability of related resources, to meet the collaborative surveillance objective and to comply with the collaborative modalities defined at the institutional level
Data analysis and interpretation	Implementation of appropriate collaborative activities for data analysis/interpretation(ex:inter-sectoral technical working group) and availability of related resources, to meet the collaborative surveillance objective and to comply with the collaborative modalities defined at the institutional level
Communication	Implementation of appropriate collaborative activities for data communication(ex:inter-sectoral meeting) and availability of related resources, to meet the collaborative surveillance objective and to comply with the collaborative modalities defined at the institutional level
Dissemination	Implementation of appropriate collaborative activities for data dissemination (ex:joint reports) and availability of related resources, to meet the collaborative surveillance objective and to comply with the collaborative modalities defined earlier

* 28. Are all those attributes **relevant** when it comes to the evaluation of collaboration within a surveillance system?

- ◯ YES
- ◯ NO

If NO, please specify and be as detailed as you can. Thank you!

* 29. Do you identify some **missing evaluation attributes** to assess the collaboration in a One Health surveillance system?

- ◯ YES
- ◯ NO

If YES, please specify and be as detailed as you can. Thank you!

One Health Surveillance System : Expert Opinion Elicitation

11. CRITERIA FOR EVALUATING THE COLLABORATION IN A ONE HEALTH SURVEILLANCE SYSTEM
PART III: FUNCTIONS

Part III: Functions

Attribute's name	Definition
Stability and sustainability	The ability of collaboration to function without failure (reliability), to be operational when needed (availability) and the robustness and ability of the collaboration to be ongoing in the long term (sustainability).
Acceptability and engagement	Willingness of persons and organizations to collaborate, the degree to which each of these users is involved in the collaboration, including assessment of: actor knowledge of the collaborative system (rationale, organization), their understanding of it, their trust into the system and among them, their feeling to be valued and to take part to a "community" towards a common objective, their beliefs about the benefits or adverse consequences of inter-sectoral collaboration, their satisfaction in the collaboration (especially in the ability of the system to meet their expectations).
Simplicity	Assessment of the simplicity of the collaboration modalities and the ease of their operation (activities), especially in terms of exchanges of data/results/information across sectors, disciplines and decision scales.
Adaptability and flexibility	Assessment of the ability of the collaborative framework to keep operating despite changes and assessment of the ability of the collaborative framework to adapt to changing information needs or operating conditions with little additional time, personnel or allocated funds.
Portability	Evaluating the possible use of the collaborative framework for other circumstances or at a different location.

Interoperability	**Assessment of the extent to which the system can integrate new sectoral components.**
Data completeness and Correctness	**Assessment whether the data exchanges across sectors (if relevant) are adequate regarding data exchange protocol.**

* 30. Are all those attributes **relevant** when it comes to the evaluation of a collaboration within a One Health surveillance system?

- YES
- NO

If NO, please specify and be as detailed as you can. Thank you!

* 31. Do you identify some **missing evaluation attribute** to assess the collaboration in a One Health surveillance system?

- YES
- NO

If YES, please specify and be as detailed as you can. Thank you!

12. CRITERIA FOR EVALUATING THE COLLABORATION IN A ONE HEALTH SURVEILLANCE SYSTEM
PART IV: EFFECTIVENESS

Part IV: Effectiveness

For the attributes with an, you can find a reminder of the OASIS and/or EVA Tool description by clicking " here".*

Attributes' name	Definition
Coverage	Assess whether collaboration affects the value of coverage* at a component level.

Exhaustiveness	The appropriateness of sectoral components included in the surveillance system in relation to the surveillance objective and context.
Representativeness	Assess whether collaboration affects the value of representativeness* at a component level.
False alarm rate	Assess whether collaboration affects the value of false alarm rate* at a component level.
Precision	Assess whether collaboration affects the value of precision* at a component level.
Timeliness	Assess whether collaboration affects the value of timeliness* at a component level.
Sensitivity	Assess whether collaboration affects the value of sensitivity* at a component level.
Positive predictive value (PPV)	Assess whether collaboration affects the value of PPV* at a component level.
Negative predictive value (NPV)	Assess whether collaboration affects the value of NPV* at a component level.
Repeatability	How consistently the collaboration effectiveness can be maintained over time.

* 32. Are all those attributes **relevant** when it comes to the evaluation of collaboration within a One Health surveillance system?

- YES
- NO

If NO, please specify and be as detailed as you can. Thank you!

* 33. Do you identify some **missing evaluation attributes** to assess the collaboration in a One Health surveillance system?

- YES
- NO

If YES, please specify and be as detailed as you can. Thank you!

13. CRITERIA FOR EVALUATING THE COLLABORATION IN A ONE HEALTH SURVEILLANCE SYSTEM
PART V: VALUE

PART V: Value

Attributes' name	Definition
Cost	The evaluation should list and quantify each of the resources required to govern and to operate collaboration. These resources could include: time and personnel (labor), services (e.g. database development and maintenance), travel, meetings, etc.
Technical Impact	This indicates the changes that have been based on the results of the surveillance collaboration (data, learning/knowledge, social capital) providing a measure of the usefulness of the collaboration in relation to the surveillance objective. This should include details of actions taken as a result of the information provided by the surveillance system e.g. changes in protocols or behavior and changes in mitigation measures. This should also include the negative impacts.
Benefit	The benefit of collaboration quantifies the monetary and non-monetary positive and negative direct and indirect consequences (on global and ecosystemic health, the economy and the society) produced by the collaboration and assesses whether users are satisfied that their requirements have been met.
Economic acceptability	Ensuring that the benefits (= loss avoidance) generated by a mitigation policy based on collaboration at least cover the costs for collaboration.

* 34. Are all those attributes **relevant** when it comes to the evaluation of a collaboration within a One Health surveillance system?

- ◯ YES
- ◯ NO

If NO, please specify and be as detailed as you can. Thank you!

* 35. Do you identify some **missing evaluation attributes** to assess the collaboration in a One Health Surveillance System?

- ◯ YES
- ◯ NO

If YES, please specify and be as detailed as you can. Thank you!

One Health Surveillance System : Expert Opinion Elicitation

14.

36. Before we finish, do you have any other comments, insight you would like to make?

One Health Surveillance System : Expert Opinion Elicitation

15.

We would like to thank you deeply for completing this questionnaire and we give you feedback on our results as soon as possible.

Feedback on the 2nd round of expert opinion elicitation on the attributes for the evaluation of collaboration in a multi-sectoral surveillance system.

Goal of the 2nd round of the expert opinion elicitation (EOE)

Validation of the attributes to evaluate collaboration in a multi-sectoral surveillance system

Important element on the framework of the project

In the following work, we do not aim at evaluating the degree of integration needed for a surveillance system to be considered One Health or the degree of One Health-ness of a surveillance system. We evaluate collaboration that occurs in multi-sectoral surveillance system, including the governance of collaboration and the collaborative surveillance activities.

Planning of the EOE :

1. Feedback on the results of the 1rst round of the EOE and presentation of the amendments made to the original attributes
2. Discussion on specific points particularly discussed during the 1rst round of EOE:
    a. Leadership
    b. Information
    c. Function attributes

Participants :

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Pascal Hendrikx
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Jane Parmley
Simon Ruëgg
Esther Schelling
Katarina Stärk

Points of discussion

1. Leadership

a. Current situation exposed to the 2nd EOE

Currently the distributed leadership is being evaluated throughout the representativeness of stakeholders taking part in the governance mechanisms (steering, coordination, technical and scientific support) and the fact that they have an "appropriate voice". This last term is used to define the active participation of stakeholders in these mechanisms and the fact that they can talk freely and be heard. Contrary to the term "equal", the term "appropriate" allows, inside each mechanism, the possibility for people to have more voice than other and the emergence of champions. However, the presence of champions is not evaluated currently.

b. Comments collected during the 2nd EOE

During the second round of the EOE, four major concepts were discussed. First, the importance of evaluating leadership and especially "distributed leadership" was underlined. The following tools and method were proposed to better understand the concept of "leadership" and how to evaluate it: NEOH evaluation tool[1], Barrett value model[2] and Laloux distributed leadership framework[3]. The second concept discussed is the importance of identifying the champions that will push the operationalisation of collaboration ahead. The third concept underlined the necessity of adaptability in any leading entity. The last one concerned stakeholders' expectation which must be identified and shared to favour the development of a transparent environment and mutual understanding.

C. Amendments following the EOE collected during the 2nd EOE

Even if not explicitly mentioned, we believe, that the concept of "leadership" is captured in the evaluation of the mechanisms in place for governing collaboration. However, the EOE's outputs underlined the fact that the terminology needs to be better explained in the glossary and the scoring guidance to make it more explicit for evaluators.

We decided not to introduce the idea of champions in our attributes. To us, depending on the surveillance context and objective(s), champions might not be needed. Thus, establishing a generic attribute to evaluate the presence of champions is not appropriate, as it isn't always relevant. However, in the current tool, we evaluate if the planned collaborative activities are eventually being implemented, in line with the collaborative modalities defined (operational attributes). We consider that this implementation can be affected by several factors including the lack of champions to foster the operationalisation of the collaborative effort. During the evaluation process, it will be the role of the evaluator to identify if the lack of champion is hampering the implementation of the collaborative activities.

The capacity of the leaders to adapt is integrated throughout the attribute for governance mechanisms, by looking at the feedback loop. The feedback loop doesn't only address how governance mechanisms evolve and take decisions based on the outputs of the surveillance system or changes in context, but also the capacity of the surveillance system to bring back information to its leaders on the operationalisation and impacts of the surveillance system. Hence, we consider that the capacity of adaptation of the leadership is appropriately covered in the current tool.

In the current evaluation matrix, mutual understanding about all stakeholders' expectations isn't being directly evaluated. However, one criterion evaluates if the objective(s) are coherent with stakeholders' expectations and if the collaborative objective(s) are endorsed by stakeholders. Hence through those two criteria, we believe we are indirectly checking that actors expectations are known by all.

However, the current tool, only allows indirect evaluation of leadership and doesn't consider it as a main stand-alone characteristic of a multi-sectoral surveillance system.

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[1] https://doi.org/10.3389/fvets.2018.00023

[2] https://www.valuescentre.com/mapping-values/barrett-model

[3] http://www.reinventingorganizations.com

Therefore, we decided to create another function attribute called “distributed leadership” which will be fed with the scores of all the criteria evaluating the different elements discussed earlier. It will hence include the existence, functioning, inclusiveness of all governing mechanisms (steering, coordinating, and scientific supporting entities), the functioning of their feedback loop, as well as the relevance of the objective(s) and purpose regarding stakeholders’ expectations and their endorsement. We will also include the engagement of stakeholders in the surveillance system, as we consider engagement to be directly impacted by the quality of the leadership.

2. Information

a. *Current situation exposed to the 2nd EOE*

In the first round of EOE, experts underlined the need to distinguish clearly data exchange across sectors from knowledge and information sharing within the surveillance system. Therefore, we decided to address (i) the general information circulating in the multi-sectoral surveillance system at the governance level and (ii) the collaborative activities linked to surveillance data and results (data sharing, data management and storage information sharing, communication, dissemination) at the operational level.

At the governance level, we focus on the evaluation of the quality of the information, and its externally and internally communication. A new attribute was created and named “Information and communication”; it aims at evaluating the existence of, and the access to, an institutional memory, the relevance of the produced information compared to the collaborative objective(s), and appropriateness of the communication means and contents to the different groups of stakeholders. Internally to the system, this information exchange is expected to contribute to the system knowledge, which is evaluate as a function attribute (see discussion point about function attributes below). The impact of the knowledge generated is not evaluated as it is out of the scope of the evaluation matrix which is not covering the impact of collaboration nor of the collaborative surveillance outputs.

Then at the operational level, we focus on the evaluation, when relevant, of the collaborative activities related to surveillance data and results: data sharing or information exchange across sectors, joint dissemination to decision makers or joint external communication. These operational attributes are focusing at the potential joint activities at the different steps of the surveillance process, that concerns the surveillance data or results.

b. Comments

Three main ideas where introduced during the second round of the EOE. First, it is difficult to evaluate the quality of information without assessing its impact. However, in any case it is also important to evaluate the quality of information produced and circulating in a multi-sectoral surveillance system. The second idea was that the degree of integration for the information produced isn't evaluated with the current attributes. At last, it was underlined that actors of the multi-sectoral surveillance system must be informed about the intended use of the surveillance results.

c. Amendments following the EOE

The objective(s) of any surveillance system is to produce surveillance results upon which decisions will be taken. We agreed that it is difficult to assess the quality of surveillance without evaluating its impact. However, impact assessment is difficult, and the timeframe of this study did not allow us to consider this part of the evaluation. We believe this question should, however, be addressed in the future. The discussion underlines the need to clearly state the boundaries of this tool in the guidance.

This evaluation tool also doesn't have the objective to evaluate the degree of integration of the surveillance data or results. Hence, at the operational level, it evaluates if the level of integration is coherent with the collaborative modalities defined to implement the collaborative strategy and with the objective of collaboration. However, at the system level, the tool allows to evaluate if the overall information about, and produced by, the surveillance system is appropriate regarding the collaborative objective(s) and efficiently circulating among stakeholders. Additionally, we also look specifically if the decision-making process allows for information integration through a distributed leadership and a functional feedback loop. All those elements are necessary for the integration of information to happen.

Finally, concerning the last point, the tool, currently, allows for the evaluation of the degree of endorsement by the stakeholders of the rationale, objective(s) and purpose of collaboration. We consider that this endorsement can be assimilated to the stakeholders understanding about further use of the surveillance results.

3. Function attributes.

a. *Current situation*

Following the first round of EOE, the function attributes have been deeply modified to focus on the crucial functions of collaboration in a multi-sectoral surveillance system. Currently we have a list of 8 function attributes.

Function attributes	Definition
Stability	Collaboration is stable in time, it is formalised and endorsed by all relevant stakeholders (surveillance actors and end-users).
Usefulness	Collaboration is appropriate regarding the surveillance objective and context.
Effectiveness	Collaboration is functioning appropriately.
Acceptability	Surveillance actors demonstrate trust into the system, mutual understanding and willingness to collaborate. The objective(s) of collaboration and outputs of the multi-sectoral surveillance system meet stakeholders (surveillance actors and end-users) expectations.
Resources	The Mechanisms for resources allocation are defined. The resources are appropriate and available for the effectiveness of activities of collaboration.
Adaptability and flexibility	Collaboration can adapt and evolve upon changes in collaborative governance, knowledge and surveillance context.
Inclusiveness	Collaboration is well balanced: sectors, disciplines and decision-making scales have appropriate voices. Roles are adequately allocated to actors with regard their mandates and competencies. At the relevant dimensions, corresponding actors, data sources are considered to meet the collaborative objective(s).
System knowledge	The multi-sectoral surveillance system has an effective internal communication system and an institutional memory. Stakeholders (surveillance actors and end-users) have access to relevant information about the surveillance organisation and outputs.

These function attributes are scored based on the non-weighted scores of organisational and functional criteria which are considered to contribute to them.

b. Comments collected during the 2nd EOE

During the 2nd round of EOE, experts expressed the difficulty to assess the relevance of these attributes, as they were not aware of the detailed correspondence between the function attributes and the criteria for the evaluation of organisation and functioning of collaboration. However, concerns were expressed over the definition of the effectiveness function attribute, and the overlapping between the "information and communication" attribute for the evaluation of organisation and functioning of collaboration and the function attribute "system knowledge".

c. Amendments following the EO

The effectiveness attribute's definition has been redefined as follow: "The governance of collaboration is operational, and collaboration is effectively implemented to meet the collaborative objective(s) and purpose".

Also, as described previously, another function attribute named “distributed leadership” was added. The definition is: “The ability of governance mechanisms to guide collaboration in the multi-sectoral surveillance system. This ability includes the provision of a trustworthy environment where stakeholders can freely express their views and be heard, and the capacity to generate a mutual understanding.”

As requested, the list of criteria contributing to the scoring of each function attribute is detailed below:

Criteria contributing to stability

Formalisation of rationale behind the willingness to collaborate for surveillance.
Formalisation of the objective(s) and purpose of collaboration for surveillance.
Formalisation of the areas of responsibility of the actors in the multi-sectoral surveillance system.
Endorsement of the documents where all the previous statements are formalised by all actors from different sectors, disciplines and decision scales involved.
Formalisation of the collaborative modalities.
Formalisation of roles of actors involved in collaboration.
Endorsement of the documents where all the previous statements are formalised by all actors from different sectors, disciplines and decision scales involved or consistent across the institutions.
Definition of financial, material and human resources allocation mechanisms in the collaborative strategy.
Existence and formalisation of the mechanism for steering collaboration in the surveillance system.
Existence and formalisation of the mechanism for coordinating collaboration in the surveillance system.
Existence and formalisation of the mechanism for supporting scientifically and technically collaboration in the surveillance system.
Existence of designed and planned initial training for operating actors involved in collaborative activities.
Existence of designed and planned ongoing training for operating actors involved in collaborative activities.

Criteria contributing to usefulness

Relevance of the collaborative objective(s) and purpose regarding actors and end-users' expectations (including meeting the sectoral objectives).
Relevance of the collaborative objective(s) and purpose regarding the epidemiological, socio-political and economic context.
Relevance of the collaborative objective(s) and purpose regarding the international/regional guidance (regulations, recommendations, standards).
Relevance of the collaborative modalities regarding the collaborative objective(s) and surveillance context
Relevance of the dimensions (sectors, disciplines, decision making scales, mandates and public private partnership) regarding the collaborative objective(s) and surveillance context
Relevance of the data sources regarding the collaborative objective(s) and surveillance context.
Appropriateness of the outputs of collaborative activities, at all the relevant step of the surveillance process defined by the collaborative modalities, to meet the collaborative objective(s).

Criteria contributing to effectiveness

Functioning of the mechanism for steering collaboration including the capacity to advocate for change.
Existence of appropriate feedback loop for steering collaboration.
Functioning of the mechanism for coordinating collaboration including the capacity to advocate for change.
Existence of appropriate feedback loop for coordinating collaboration.
Functioning of the mechanism for supporting scientifically and technically collaboration including the capacity to advocate for change.
Existence of appropriate feedback loop for supporting scientifically and technically collaboration.
Relevance of the information produced by multi-sectoral surveillance system regarding the collaborative objective(s).
Relevance of the collaborative activities implemented at all the relevant steps of the surveillance process regarding the collaborative modalities and local context.
Appropriateness of the outputs of collaborative activities at all relevant steps of the surveillance process regarding the collaborative modalities, to meet the collaborative objective(s).

Criteria contributing to acceptability

Endorsement of the documents where all the previous statements are formalised by all actors from different sectors, disciplines and decision scales involved.
Relevance of the collaborative objective(s) and purpose regarding actors and end-users' expectations (including meeting the sectoral objectives).
Endorsement of the documents where all the previous statements are formalised by all actors from different sectors, disciplines and decision scales involved or consistent across the institutions.
Relevance between areas of responsibility assigned in the multi-sectoral surveillance system (collaborative and sectoral activities) and professional competencies.
Relevance of initial training for operating actors involved in collaborative activities with the collaborative modalities and surveillance context.
Relevance of ongoing training for operating actors involved in collaborative activities with the collaborative modalities and surveillance context.
Existence of an institutional memory including all information related to the rationale of collaboration, to the organisation and functioning of the multi-sectoral surveillance system and to the outputs of the multi-sectoral surveillance system.
Accessibility of the institutional memory to surveillance actors and end-users.
Appropriateness of the communication (both in terms of content and means) of the information produced by the multi-sectoral surveillance system to surveillance actors and end users.
Engagement of actors in their assigned areas of responsibility and roles in the multi-sectoral surveillance system.

Criteria contributing to resources

Definition of financial, material and human resources allocation mechanisms in the collaborative strategy.
Allocation of relevant financial, material and human resources for collaborative modalities.
Availability of all appropriate resources to support the mechanism for steering collaboration.
Availability of all appropriate resources to support the mechanism for coordinating collaboration.
Accessibility of initial training in relevant timeframe for operating actors involved in collaborative activities.
Accessibility of ongoing training in relevant timeframe for operating actors involved in collaborative activities.
Availability of appropriate resources (financial, technical, material and human), at all relevant steps of the surveillance process defined by the collaborative modalities, to implement the collaborative activities in the local context.

Criteria contributing to adaptability

Functioning of the mechanism for steering collaboration including the capacity to advocate for change.
Existence of appropriate feedback loop for steering collaboration.
Functioning of the mechanism for coordinating collaboration including the capacity to advocate for change.
Existence of appropriate feedback loop for coordinating collaboration.
Functioning of the mechanism for supporting scientifically and technically collaboration including the capacity to advocate for change.
Existence of appropriate feedback loop for supporting scientifically and technically collaboration.
Existence and relevance of specific performance indicators of collaboration routinely used.
Existence of periodic external evaluation of the surveillance system that considers an evaluation of collaboration.
Existence of periodic internal evaluation of the surveillance system that considers an evaluation of collaboration.
Implementation of corrective measures if relevant.

Criteria contributing to inclusiveness

Relevance of the dimensions (sectors, disciplines, decision making scales, mandates and public private partnership) regarding the collaborative objective(s) and surveillance context
Relevance of the data sources regarding the collaborative objective(s) and surveillance context.
Relevance between areas of responsibility assigned in the multi-sectoral surveillance system (collaborative and sectoral activities) and professional competencies.
Representativeness of all appropriate actors and end-users from relevant sectors, decisions scales and disciplines in the steering mechanism (inclusion, participation and appropriate voice).
Representativeness of all appropriate actors from relevant sectors, decisions scales and disciplines in the coordinating mechanism (inclusion, participation and appropriate voice).
Representativeness of all appropriate actors from relevant sectors, decisions scales and disciplines for supporting scientifically and technically collaboration (inclusion, participation and appropriate voice).

Criteria contributing to distributed leadership

Relevance of the collaborative objective(s) and purpose regarding actors and end-users' expectations (including meeting the sectoral objectives).
Endorsement of the documents where all the previous statements are formalised by all actors from different sectors, disciplines and decision scales involved.
Existence and formalisation of the mechanism for steering collaboration in the surveillance system.
Representativeness of all appropriate actors and end-users from relevant sectors, decisions scales and disciplines in the steering mechanism (inclusion, participation and appropriate voice).
Functioning of the mechanism for steering collaboration including the capacity to advocate for change.
Existence of appropriate feedback loop for steering collaboration.
Existence and formalisation of the mechanism for coordinating collaboration in the surveillance system.
Representativeness of all appropriate actors from relevant sectors, decisions scales and disciplines in the coordinating mechanism (inclusion, participation and appropriate voice).
Functioning of the mechanism for coordinating collaboration including the capacity to advocate for change.
Existence of appropriate feedback loop for coordinating collaboration.
Existence and formalisation of the mechanism for supporting scientifically and technically collaboration in the surveillance system.
Representativeness of all appropriate actors from relevant sectors, decisions scales and disciplines for supporting scientifically and technically collaboration (inclusion, participation and appropriate voice).
Functioning of the mechanism for supporting scientifically and technically collaboration including the capacity to advocate for change.
Existence of appropriate feedback loop for supporting scientifically and technically collaboration.

Criteria contributing to system Knowledge

Relevance of the dimensions (sectors, disciplines, decision making scales, mandates and public private partnership) regarding the collaborative objective(s) and surveillance context
Relevance of the data sources regarding the collaborative objective(s) and surveillance context.
Functioning of the mechanism for supporting scientifically and technically collaboration including the capacity to advocate for change.
Relevance of initial training for operating actors involved in collaborative activities with the collaborative modalities and surveillance context.
Relevance of ongoing training for operating actors involved in collaborative activities with the collaborative modalities and surveillance context.
Existence of an institutional memory including all information related to the rationale of collaboration, to the organisation and functioning of the multi-sectoral surveillance system and to the outputs of the multi-sectoral surveillance system.
Accessibility of the institutional memory to surveillance actors and end-users.
Relevance of the information produced by multi-sectoral surveillance system regarding the collaborative objective(s).
Appropriateness of the communication (both in terms of content and means) of the information produced by the multi-sectoral surveillance system to surveillance actors and end users.
Appropriateness of the outputs of collaborative activities for joint data interpretation and analysis if it is a modality, to meet the collaborative objective(s).

Attribute's name	**Measurable criteria**	**Scoring system for the criteria**					**Scoring guidance**
		Description of scales				information/ comments	
G.1 Formalisation of the collaborative surveillance strategy	1. Formalisation of rationale behind the willingness to collaborate for surveillance.	Score 3: The rationale behind the willingness to collaborate for surveillance is described in clear and detailed formal document(s).	Score 2: The rationale behind the willingness to collaborate for surveillance is described in formal document(s), but it lacks clarity and/or minor details.	Score 1: The rationale behind the willingness to collaborate for surveillance is poorly described and/or is unclear and/or lacks major details (whatever the degree of formalisation of the documents).	Score 0: The rationale behind the willingness to collaborate for surveillance is not formalised.	The collaborative strategy and the modalities can be in the same documents.	**Scoring based on information in II.A.1.**
	2. Formalisation of the objective(s) and purpose of collaboration for surveillance.	Score 3: The objective(s) and purpose of collaboration in the surveillance system are described in clear and detailed formal document(s).	Score 2: The objective(s) and purpose of collaboration in the surveillance system are described in formal document(s), but they lack clarity and/or minor details.	Score 1: The objective(s) and purpose of collaboration in the surveillance system are poorly described and/or are unclear and/or lack major details (whatever the degree of formalisation of the documents).	Score 0: The objective(s) and purpose of collaboration in the surveillance system are not formalised.		**Scoring based on information in II.A.2 and II.A.3.**

	3. Formalisation of the areas of action of main stakeholders in the multi-sectoral surveillance system, i.e. the tasks they are assigned with in term of collaboration and of coordination of sectoral surveillance	Score 3: The areas of actions of all actors involved in the multi-sectoral surveillance system are described in clear and detailed formal document(s).	Score 2: The areas of actions of actors involved in the multi-sectoral surveillance system are described in formal document(s), but they lack clarity and/or minor details.	Score 1: The areas of actions of actors involved in the multi-sectoral surveillance system are poorly addressed (lack of major details and/or missing of most actors) whatever the degree of formalisation of the document.	Score 0: The areas of actions of actors involved in the multi-sectoral surveillance system are not addressed.		**Scoring based on information in II.A.4.**
	4. Endorsement of the documents where all the previous statements are formalised by all actors from different sectors, disciplines and decision scales involved.	Score 3: The documents, where all previous statements are formalised, are endorsed by all actors.	Score 2: The documents, where all previous statement is formalised, are endorsed by most (more than half) actors or after consultation of most actors.	Score 1: The documents where all the previous statements are formalised, are endorsed by a few actors (less than half) or after consultation of a few actors.	Score 0: The documents, where all the previous statements are formalised, are endorsed by only one sector without any consultation.		**Scoring based on information in II.A.10 (only the documents referred to in II.A.1, II.A.2, II.A.3, II.A.4).**
G.2 Relevance of the collaborative purpose and objective	1. Relevance of the collaborative objective(s) and purpose regarding actors and end-users' expectations (including meeting the sectoral objectives).	Score 3: The collaborative objective(s) and purpose are relevant regarding actors and end-users' expectation.	Score 2: Some minor discrepancies are identified between the collaborative objective(s) and purpose and actors and end-users' expectation.	Score 1: Some major discrepancies are identified between the collaborative objective(s) and purpose and actors and end-users' expectation.	Score 0: The collaborative objective(s) and purpose is not relevant regarding the actors and end-users' expectation.		**Scoring based on the confrontation between the information in II.A.2 (objectives) and all the expectation listed in the surveillance actor table (column R and S).**

	2. Relevance of the collaborative objective(s) and purpose regarding the epidemiological, socio-political and economic context.	Score 3: The collaborative objective(s) and purpose are relevant regarding the epidemiological, socio-political and economic context.	Score 2: Some minor discrepancies are identified between the collaborative objective(s) and purpose and the epidemiological, socio-political and economic context.	Score 1: Some major discrepancies are identified between the collaborative objective(s) and purpose and the epidemiological, socio-political and economic context.	Score 0: The collaborative objective(s) and purpose are not relevant regarding the epidemiological, socio-political and economic context.		**Scoring based on the confrontation information II.A.2(objectives) and the context identified in I.3.**
	3. Relevance of the collaborative objective(s) and purpose regarding the international/regional guidance (regulations, recommendations, standards).	Score 3: The collaborative objective(s) and purpose are relevant regarding the regional/international guidance.	Score 2: Some minor discrepancies are identified between the collaborative objective(s) and purpose and the regional/ international guidance	Score 1: Some major discrepancies are identified between the collaborative objective(s) and purpose and the regional/international guidance.	Score 0: The collaborative objective(s) and purpose are not relevant regarding the regional and international guidance.		**Scoring based on the confrontation between information in II.A.2 (objectives) and the international guidance identified in I.4.**
G.3 Formalisation of collaboration modalities	1. Formalisation of the collaborative modalities.	Score 3: The collaborative modalities are described in clear and detailed formal document(s).	Score 2: The collaborative modalities are described in formal document(s), but they lack clarity and/or minor details.	Score 1: The collaborative modalities are poorly described and/or are often unclear and/or lack major details (whatever the degree of formalisation of the documents).	Score 0: The collaborative modalities are not formalised.	(endnote: at this stage we look if collaborative modalities have been defined, not if they are operational and functional)	**Scoring based on information in II.A.5.**

	2. Formalisation of roles and responsibilities of actors involved in collaboration.	Score 3: For all actors involved in collaboration, their roles and responsibilities are described in clear and detailed formal document(s).	Score 2: For most actors involved in collaboration, the roles and responsibilities are described in formal document(s), but they lack clarity and/or minor details.	Score 1: The roles and responsibilities are poorly described for a few actors involved in collaboration and/or are unclear and/or lack major details (whatever the degree of formalisation of the documents).	Score 0: The actors' roles and responsibilities in collaboration are not described.		**Scoring based on roles in collaboration identified in the column N, O and P of the table on surveillance actors.**
	3. Endorsement of the documents where all the previous statements are formalised by all actors from different sectors, disciplines and decision scales involved or consistent across the institutions.	Score 3: The documents, where all previous statements are formalised are endorsed by all actors or completely consistent across the institutions.	Score 2: The documents, where all previous statement is formalised, are endorsed by most (more than half) actors or after consultation of most actors.	Score 1: The documents where all the previous statements are formalised, are endorsed by a few actors (less than half) or after consultation of a few actors.	Score 0: The documents, where all the previous statements are formalised, are endorsed by only one sector without any consultation.		**Scoring based on information in II.A.10 (only the documents referred to in II.A.5 and the surveillance actors table- column N, O and P).**
G.4 Relevance of collaborative modalities	1. Relevance of the collaborative modalities regarding the collaborative objective(s) and surveillance context	Score 3: The modalities of collaboration are relevant regarding the collaborative objective(s) and surveillance context.	Score 2: Some minor discrepancies (extra, missing or inappropriate modalities) are identified between the collaborative modalities, and the collaborative objective(s) and/or surveillance context.	Score 1: Some major discrepancies (extra, missing or inappropriate modalities) are identified between the collaborative modalities, and the collaborative objective(s) and/or surveillance context.	Score 0: None of the collaborative modalities are relevant regarding the collaborative objective(s) and surveillance context		**Scoring based on the confrontation between information in II.A.5 (modalities), II.A.2 (objectives) and context I.3.**

G.5 Coverage	1. Relevance of the dimensions (sectors, disciplines, decision making scales, mandates and public private partnership) regarding the collaborative objective(s) and surveillance context	Score 3: The dimensions included in the multi-sectoral surveillance system are relevant regarding the collaborative objective(s) and surveillance context (no extra or missing dimensions).	Score 2: Some minor discrepancies are identified between the dimensions included in the multi-sectoral surveillance system and the collaborative objective(s) and/or surveillance context.	Score 1: Some major discrepancies are identified between the dimensions included in the multi-sectoral surveillance system and the collaborative objective(s) and/or surveillance context.	Score 0: None of the dimension are relevant regarding the collaborative objective(s) and surveillance context.		**Scoring based on the confrontation between information in II.A.7 (dimensions), II.A.2 (objectives) and context I.3.**
	2. Relevance of the data sources regarding the collaborative objective(s) and surveillance context.	Score 3: The data sources included in the multi-sectoral surveillance system are relevant regarding the collaborative objective(s) and surveillance context (no extra or missing sources).	Score 2: Some minor discrepancies (extra or missing sources) are identified between the data sources included in the multi-sectoral surveillance system, and the collaborative objective(s) and/or the surveillance context.	Score 1: Some major discrepancies (extra or missing sources) are identified between the data sources included in the multi-sectoral surveillance system, and the collaborative objective(s) and the surveillance context.	Score 0: None of the data sources included in the multi-sectoral surveillance system are relevant regarding the collaborative objective(s) and surveillance context.		**Scoring based on the confrontation between information in II.A.6 (data sources), II.A.2 (objectives) and context I.3.**

G.6 Governance of resources for collaboration	1. Definition of financial, material and human resources allocation mechanisms in the collaborative strategy.	Score3: The resources allocation mechanisms in the collaborative strategy are described in clear and detailed formal document(s).	Score 2: The resources allocation mechanisms in the collaborative strategy are described in formal document(s), but they lack clarity and/or minor details.	Score 1: The resources allocation mechanisms for collaboration are poorly described and/or are unclear and/or lack major details.	Score 0: The resources allocation mechanisms in the collaborative strategy are not formalised.		**Scoring based on information in II.A.8.**
	2. Allocation of relevant financial, material and human resources for collaborative modalities.	Score3: The allocation of financial, material and human resources is relevant regarding the resource allocation strategy and collaborative modalities.	Score 2: Minor discrepancies are identified between the allocation of financial, material and human resources and the resource allocation strategy and/or collaborative modalities.	Score 1: Major discrepancies are identified between the allocation of financial, material and human resources and the resource allocation strategy and/or collaborative modalities.	Score 0: The allocation of financial, material and human resources is relevant regarding the resource allocation strategy and/or collaborative modalities.		**Scoring based on information in II.A.9.**
	3. Relevance between areas of action, roles and responsibilities assigned in the multi-sectoral surveillance system (collaborative and sectoral activities) and professional competencies.	Score 3: The responsibilities assigned to actors in the multi-sectoral surveillance system are relevant regarding their respective professional competencies.	Score 2: Minor discrepancies are identified between the responsibilities assigned to actors in the multi-sectoral surveillance system and their respective professional competencies.	Score 1: Major discrepancies are identified between the responsibilities assigned to actors in the multi-sectoral surveillance system and their respective professional competencies.	Score 0: The responsibilities assigned to actors in collaboration in the surveillance system are not relevant regarding their respective professional competencies.		**Scoring based on the confrontation between actors roles and responsibility (column N, O and P) in collaborations and their respective field of competencies (column H and I) in the surveillance actors table.**

G.7 Mechanisms to steer collaboration	1. Existence and formalisation of the mechanism for steering collaboration in the surveillance system.	Score 3: The mechanism for steering collaboration is clearly existing and formalised.	Score 2: The mechanism for steering collaboration is existing and formalised but it lacks minor details.	Score 1: The mechanism for steering collaboration is unclear and/or the formalisation lacks major details.	Score 0: The mechanism for steering collaboration is missing.		**Scoring based on information in II.B.1.**
	2. Representativeness of all appropriate actors and end-users from relevant sectors, decisions scales and disciplines in the steering mechanism (inclusion, participation and appropriate voice).	Score 3: The mechanism for steering collaboration includes the participation from actors and end-users who are representative of all relevant sectors, decisions scales and disciplines and who all have an appropriate voice.	Score 2: The mechanism for steering collaboration includes the participation from most actors and end-users who are representative of relevant sectors, decisions scales and disciplines and their voice are appropriate.	Score 1: The mechanism for steering collaboration includes the participation from a few actors and end-users who are representative of the relevant sectors, decisions scales and disciplines and/or their voices are not appropriate, creating a major imbalance between the different actors and end-users.	Score 0: The mechanism for steering collaboration follows only one voice.		**Scoring based on information in II.B.2.**
	3. Functioning of the mechanism for steering collaboration including the capacity to advocate for change.	Score 3: The mechanism for steering collaboration is functional, including the capacity to advocate for changes internally and externally (policy changes, public awareness, etc.).	Score 2: The mechanism for steering collaboration is mainly functional including the capacity to advocate for changes internally and/or externally.	Score 1: The mechanism for steering collaboration is barely functional.	Score 0: The mechanism for steering collaboration isn't functional.		**Scoring based on information in II.B.3.**

	4. Existence of appropriate feedback loop for steering collaboration.	Score 3: A feedback loop is existing and enables consideration of any changes in knowledge and context.	Score 2: A feedback loop is existing and enables consideration of major changes in knowledge and context for updating steering needs.	Score 1: A feedback loop is existing but enables consideration of only biased changes in knowledge and context (bias because feedback come from only one actor or sector, etc.…).	Score 0: A feedback loop is missing in the steering mechanism.		**Scoring based on information in II.B.4.**
	5. Availability of all appropriate resources to support the mechanism for steering collaboration.	Score 3: All the appropriate resources to support the mechanism for steering collaboration are available.	Score 2: Most of the appropriate resources to support the mechanism for steering collaboration are available, but it doesn't affect strongly the performance of the steering entity.	Score 1: Few of the resources to support the mechanism for steering collaboration are available, affecting the performance of the steering entity.	Score 0: There are no resources to support the mechanism for steering collaboration.		**Scoring based on information in II.B.5.**
G.8 Mechanisms to coordinate collaboration	1. Existence and formalisation of the mechanism for coordinating collaboration in the surveillance system.	Score 3: The mechanism for coordinating collaboration is existing and formalised.	Score 2: The mechanism for coordinating collaboration is existing and formalised but it lacks minor details.	Score 1: The mechanism for coordinating collaboration is unclear and/or the formalisation lacks major details.	Score 0: The mechanism for coordinating collaboration is missing.		**Scoring based on information in II.C.1.**

	2. Representativeness of all appropriate actors from relevant sectors, decisions scales and disciplines in the coordinating mechanism (inclusion, participation and appropriate voice).	Score 3: The mechanism for coordinating collaboration includes the participation from actors who are representative of all relevant sectors, decisions scales and disciplines and who all have an appropriate voice.	Score 2: The mechanism for coordinating collaboration includes the participation from most actors who are representative of the relevant sectors, decisions scales and disciplines and their voices are appropriate.	Score 1: The mechanism for coordinating collaboration includes the participation from a few of actors who are representative of the relevant sectors, decisions scales and disciplines and/or their voices are not appropriate, creating a major imbalance between the different actors.	Score 0: The mechanism for coordinating collaboration follows only one voice.		**Scoring based on information in II.C.2.**
	3. Functioning of the mechanism for coordinating collaboration including the capacity to advocate for change.	Score 3: The mechanism for coordinating collaboration is functional including the capacity to advocate for changes internally and externally (policy changes, public awareness, etc.).	Score 2: The mechanism for coordinating collaboration is mainly functional including the capacity to advocate for changes internally and/or externally.	Score 1: The mechanism for coordinating collaboration is barely functional.	Score 0: The mechanism for coordinating collaboration isn't functional.		**Scoring based on information in II.C.3.**

	4. Existence of appropriate feedback loop for coordinating collaboration.	Score 3: A feedback loop is existing and enables consideration of any changes in knowledge and context.	Score 2: A feedback loop is existing and enables consideration of major changes in knowledge and context for updating coordination needs.	Score 1: A feedback loop is existing but enables consideration of only biased changes in knowledge and context (bias because feedback come from only one actor or sector, etc.…).	Score 0: A feedback loop is missing in the coordinating mechanism.		**Scoring based on information in II.C.4.**
	5. Availability of all appropriate resources to support the mechanism for coordinating collaboration.	Score 3: All the appropriate resources to support the mechanism for coordinating collaboration are available.	Score 2: Most of the appropriate resources to support the mechanism to coordinate collaboration are available, but it doesn't affect strongly the performance of the coordinating entity.	Score 1: Few of the resources to support the mechanism for coordinating collaboration are available, affecting the performance of the coordinating entity.	Score 0: There are no resources to support the mechanism to coordinate collaboration.		**Scoring based on information in II.C.5.**
G.9 Mechanisms to technically and scientifically support collaboration	1. Existence and formalisation of the mechanism for supporting scientifically and technically collaboration in the surveillance system.	Score 3: The mechanism for supporting scientifically and technically collaboration is existing and formalised.	Score 2: The mechanism for supporting scientifically and technically collaboration is existing and formalised but it lacks minor details.	Score 1: The mechanism for supporting scientifically and technically collaboration isn’t clear and/or the formalisation lacks major details.	Score 0: The mechanism for supporting scientifically and technically collaboration is missing.		**Scoring based on information in II.D.1.**

	2. Representativeness of all appropriate actors from relevant sectors, decisions scales and disciplines for supporting scientifically and technically collaboration (inclusion, participation and appropriate voice).	Score 3: The mechanism for supporting scientifically and technically collaboration includes the participation from actors who are representative of all relevant formal and informal disciplines and their voices are appropriate with the context.	Score 2: The mechanism for supporting scientifically and technically collaboration includes the participation from most actors who are representative of the relevant formal and informal disciplines and their voices are appropriate with the context.	Score 1: The mechanism for supporting scientifically and technically collaboration includes the participation from a few of actors who are representative of the relevant formal and informal disciplines and/or their voices are not appropriate regarding the context, creating a major imbalance between the different disciplines.	Score 0: The mechanism for supporting scientifically and technically collaboration follows only one voice.		**Scoring based on information in II.D.2.**
	3. Functioning of the mechanism for supporting scientifically and technically collaboration including the capacity to advocate for change.	Score 3: The mechanism for supporting scientifically and technically collaboration is functional including the capacity to advocate for changes internally and externally (policy changes, public awareness, etc.).	Score 2: The mechanism for supporting scientifically and technically collaboration is mainly functional including the capacity to advocate for changes internally and/or externally.	Score 1: The mechanism for supporting scientifically and technically collaboration is barely functional.	Score 0: The mechanism for supporting scientifically and technically collaboration isn't functional.		**Scoring based on information in II.D.3.**

	4. Existence of appropriate feedback loop for supporting scientifically and technically collaboration.	Score 3: A feedback loop is existing and enables consideration of any changes in knowledge and context.	Score 2: A feedback loop is existing and enables consideration of major changes in knowledge and context for updating scientific and technical support needs.	Score 1: A feedback loop is existing but enables consideration of only biased changes in knowledge and context (bias because feedback come from only few actors or one sector, etc.…).	Score 0: A feedback loop is missing in the scientific and technical support of collaboration.		**Scoring based on information in II.D.4.**
G.10 Training for collaboration	1. Existence of designed and planned initial training for operating actors involved in collaborative activities.	Score 3: Initial training for operating actors involved in collaborative activities is fully designed and planned in detail.	Score 2: Initial training for operating actors involved in collaborative activities is designed and planned but lacks details.	Score 1: Initial training for operating actors involved in collaborative activities is barely designed and planned.	Score 0: Initial training for operating actors involved in collaborative activities is missing.	NR if training is not necessary regarding the modalities (information sharing)	**Scoring based on information in II.E.1.**
	2. Accessibility of initial training in relevant timeframe for operating actors involved in collaborative activities.	Score 3: All operating actors involved in collaborative activities have access to initial training in a relevant timeframe (this notion includes appropriate resources).	Score 2: Most operating actors involved in collaborative activities have access to initial training in a relevant timeframe (this notion includes appropriate resources).	Score 1: Few operating actors involved in collaborative activities have access to initial training (this notion includes appropriate resources).	Score 0: None of the operating actors involved in collaborative activities have access to initial training.	NR if 8.1 is 0 or NR	**Scoring based on information in II.E.2.**

	3. Relevance of initial training for operating actors involved in collaborative activities with the collaborative modalities and surveillance context.	Score 3: Initial training for operating actors involved in collaborative activities is relevant to the collaborative modalities and surveillance context.	Score 2: Minor discrepancies exist between the initial training for operating actors involved in collaborative activities, the collaborative modalities and surveillance context, mainly due to outdated training contents	Score 1: Major discrepancies exist between the initial training for operating actors involved in collaborative activities, the collaborative modalities and surveillance context.	Score 0: The initial training for operating actors involved in collaborative activities, is not relevant with the collaborative modalities and surveillance context.	NR if 8.1 is 0 or NR	**Scoring based on the confrontation between information in II.E.1, II.A.4 (modalities) and context I.3.**
	4. Existence of designed and planned ongoing training for operating actors involved in collaborative activities.	Score 3: Ongoing training for operating actors involved in collaborative activities is fully designed and planned in detail.	Score 2: Ongoing training for operating actors involved in collaborative activities is designed and planned but lacks details.	Score 1: Ongoing training for operating actors involved in collaborative activities is barely designed and planned.	Score 0: Ongoing training for operating actors involved in collaborative activities is missing.	NR if training is not necessary regarding the modalities (information sharing)	**Scoring based on information in II.E.3.**
	5. Accessibility of ongoing training in relevant timeframe for operating actors involved in collaborative activities.	Score 3: All operating actors involved in collaborative activities have access to ongoing training in a relevant timeframe (this notion includes appropriate resources).	Score 2: Most operating actors involved in collaborative activities have access to ongoing training in a relevant timeframe (this notion includes appropriate resources).	Score 1: Few operating actors involved in collaborative activities have access to ongoing training (this notion includes appropriate resources).	Score 0: None of the operating actors involved in collaborative activities have access to ongoing training.	NR if 8.4 is 0 or NR	**Scoring based on information in II.E.4.**

	6. Relevance of ongoing training for operating actors involved in collaborative activities with the collaborative modalities and surveillance context.	Score 3: Ongoing training for operating actors involved in collaborative activities is relevant to the collaborative modalities and surveillance context.	Score 2: Minor discrepancies exist between the ongoing training for operating actors involved in collaborative activities, the collaborative modalities and surveillance context, mainly due to outdated training contents	Score 1: Major discrepancies exist between the ongoing training for operating actors involved in collaborative activities, the collaborative modalities and surveillance context.	Score 0: The ongoing training for operating actors involved in collaborative activities, is not relevant with the collaborative modalities and surveillance context.	NR if 8.4 is 0 or NR	**Scoring based on the confrontation between information in II.E.3, II.A.4 (modalities) and context I.3.**
G.11 Information and communication	1. Existence of an institutional memory including all information related to the rationale of collaboration, to the organisation and functioning of the multi-sectoral surveillance system and to the outputs of the multi-sectoral surveillance system.	Score 3: Existence of a complete institutional memory including all information related to the rationale of collaboration, to the organisation and functioning of the multi-sectoral surveillance system and to the outputs of the multi-sectoral surveillance system.	Score 2: Existence of an institutional memory missing minor information.	Score 1: Existence of an institutional memory missing major information.	Score 0: There are no institutional memory.		**Scoring based on information in II.F.1.**
	2. Accessibility of the institutional memory to surveillance actors and end-users.	Score 3: All surveillance stakeholders have access to the institutional memory.	Score 2: Most stakeholders have access to the institutional memory.	Score 1: Few stakeholders have access to the institutional memory.	Score 0: None of the stakeholders have access to the institutional memory.	NR if 9.1 is 0	**Scoring based on information in II.F.2.**

	3. Relevance of the information produced by multi-sectoral surveillance system regarding the collaborative objective(s).	Score 3: The information produced by multi-sectoral surveillance system is relevant regarding the collaborative objective(s).	Score 2: Minor discrepancies exist between the information produced by multi-sectoral surveillance system and the collaborative objective(s).	Score 1: Major discrepancies exist between the information produced by multi-sectoral surveillance system and the collaborative objective(s).	Score 0: The information produced by multi-sectoral surveillance system isn't relevant regarding the collaborative objective(s).		**Scoring based on the confrontation between the information in II. F3 and II.A.2 (objectives).**
	4. Appropriateness of the communication (both in terms of content and means) of the information produced by the multi-sectoral surveillance system to surveillance actors and end users.	Score 3: The information produced by collaboration is communicated appropriately and in a tailored fashion to all actors and end user's groups.	Score 2: The information produced by collaboration is communicated appropriately and in a tailored fashion to most actors and end user's groups.	Score 1: The information produced by collaboration is communicated to a few actors and in a tailored fashion to few actors and end user's groups.	Score 0: The information produced by collaboration is not communicated appropriately to any actors.		**Scoring based on information in II.F.4.**

G.12 Performance and evaluation	1. Existence and relevance of specific performance indicators of collaboration routinely used.	Score 3: Performance indicators of collaboration have been developed. The performance indicators of collaboration developed are complete and relevant and allow a precise and efficient follow up of the collaborative activities.	Score 2: Performance indicator system of collaboration have been developed. The performance indicators of collaboration developed still need to be completed and/or are not all relevant and/or could be more precise/efficient in the follow up of the collaborative activities.	Score 1: Some performance indicators of collaboration have been developed but they are poorly relevant to collaboration and/or many important relevant indicators are missing.	Score 0: There are no computed performance indicators of collaboration.		**Scoring based on information in II.G.1.**
	2. Existence of periodic external evaluation of the surveillance system that considers an evaluation of collaboration.	Score 3: Collaboration in the surveillance system is evaluated externally regularly (at least every three- four years) using a complete and rigorous methodology.	Score 2: Collaboration in the surveillance system has been evaluated externally but the frequency of the evaluation could be higher, and/or the used methodology could be completer and more rigorous.	Score 1: The surveillance system has been evaluated externally only once a long time ago and/or the used methodology isn't rigorous or complete.	Score 0: No external evaluation of collaboration has been done before this one.		**Scoring based on information in II.G.2.**

	3. Existence of periodic internal evaluation of the surveillance system that considers an evaluation of collaboration.	Score 3: Collaboration in the surveillance system is evaluated internally regularly (at least every one-two years) using a complete and rigorous methodology, along with external evaluation.	Score 2: Collaboration in the surveillance system has been evaluated internally but the frequency of the evaluation could be higher, and/or the used methodology could be completer and more rigorous (lack of external evaluation of collaboration is lack of methodological rigour).	Score 1: The surveillance system has been evaluated internally only once a long time ago and/or the used methodology isn't rigorous or complete.	Score 0: No internal evaluation of collaboration has been done before this one.		**Scoring based on information in II.G.3.**
	4. Implementation of corrective measures if relevant.	Score 3: All the corrective measures arising from evaluations and monitoring of performance indicators are implemented in a relevant timeframe regarding the rationale and objective(s) of collaboration.	Score 2: Most of the corrective measures recommended by external evaluation were implemented in a relevant timeframe regarding the rationale and objective(s) of collaboration (at least the most important ones).	Score 1: Few of the corrective measures recommended by external evaluation were implemented.	Score 0: None of the corrective measures recommended by external evaluation were implemented.	NR if criteria 1and 2 of evaluation =0	**Scoring based on information in II.G.4.**

G.13 Engagement	1. Engagement of actors in their assigned areas of responsibility and roles in the multi-sectoral surveillance system.	Score 3: All actors are engaged in their assigned areas of responsibility in the multi-sectoral surveillance system (undertaking assigned sectoral surveillance activities, participating in collaborative activities, etc.)	Score 2: Most actors are engaged in their assigned areas of responsibility in the multi-sectoral surveillance system (undertaking assigned sectoral surveillance activities, participating in collaborative activities, etc.)	Score 1: Few actors are engaged in their assigned areas of responsibility in the multi-sectoral surveillance system (undertaking assigned sectoral surveillance activities, participating in collaborative activities, etc.)	Score 0: Actors are not engaged in their assigned areas of responsibility in the multi-sectoral surveillance system (undertaking assigned sectoral surveillance activities, participating in collaborative activities, etc.)		**Scoring based on the confrontation between surveillance actors (column M and Q) and surveillance components tables (column C) to see who isn't participating in the multi-sectoral surveillance system as planned.**
O.1 Surveillance design	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Score 3: The collaborative activities implemented at this step of the surveillance process are relevant regarding the collaborative modalities and local context.	Score 2: Some minor discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 1: Some major discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities defined and local context.	Score 0: The collaborative activities implemented at this step of the surveillance process are not relevant regarding the collaborative modalities defined and local context.	If no modalities planned at this surveillance step= NR	**Scoring based on confrontation between information in III.A.1, III.A.3 and II.A.4 (modalities).**

	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Score 3: The collaborative outputs at this step of the surveillance process are appropriate to meet the collaborative objective(s).	Score 2: Some minor discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 1: Some major discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 0: The collaborative outputs at this step of the surveillance process are inappropriate to meet the collaborative objective(s) (the lack of output can be considered inappropriate depending on the surveillance objective(s))	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.A.1, III.A.3 and II.A.2 (objectives).**
	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Score 3: All the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context.	Score 2: Most of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The small discrepancies between the needs and the provision have a minimal impact on the output of the collaborative activities.	Score 1: Few of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision impacts strongly the output of the collaborative activities.	Score 0: None of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision don't allow the surveillance activities to produce output.	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.A.2, III.A.3.**

O.2 Data collection-sampling	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Score 3: The collaborative activities implemented at this step of the surveillance process are relevant regarding the collaborative modalities and local context.	Score 2: Some minor discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 1: Some major discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 0: The collaborative activities implemented at this step of the surveillance process are not relevant regarding the collaborative modalities and local context.	If no modalities planned at this surveillance step= NR	**Scoring based on confrontation between information in III.B.1, III.B.3 and II.A.4 (modalities).**
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Score 3: The collaborative outputs at this step of the surveillance process are appropriate to meet the collaborative objective(s).	Score 2: Some minor discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 1: Some major discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 0: The collaborative outputs at this step of the surveillance process are inappropriate to meet the collaborative objective(s) (the lack of output can be considered inappropriate depending on the surveillance objective(s))	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.B.1, III.B.3 and II.A.2 (objectives).**

	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Score 3: All the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context.	Score 2: Most of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The small discrepancies between the needs and the provision have a minimal impact on the output of the collaborative activities.	Score 1: Few of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision impacts strongly the output of the collaborative activities.	Score 0: None of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision don't allow the surveillance activities to produce output.	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.B.2, III.B.3.**
O.3 Data Collection - Laboratory testing	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Score 3: The collaborative activities implemented at this step of the surveillance process are relevant regarding the collaborative modalities and local context.	Score 2: Some minor discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 1: Some major discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 0: The collaborative activities implemented at this step of the surveillance process are not relevant regarding the collaborative modalities and local context.	If no modalities planned at this surveillance step= NR	**Scoring based on confrontation between information in III.C.1, III.C.3 and II.A.4 (modalities).**

	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Score 3: The collaborative outputs at this step of the surveillance process are appropriate to meet the collaborative objective(s).	Score 2: Some minor discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 1: Some major discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 0: The collaborative outputs at this step of the surveillance process are inappropriate to meet the collaborative objective(s) (the lack of output can be considered inappropriate depending on the surveillance objective(s))	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.C.1, III.C.3 and II.A.2 (objectives).**
	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Score 3: All the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context.	Score 2: Most of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The small discrepancies between the needs and the provision have a minimal impact on the output of the collaborative activities.	Score 1: Few of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision impacts strongly the output of the collaborative activities.	Score 0: None of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision don't allow the surveillance activities to produce output.	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.C.2, III.C.3.**

O.4 Data sharing	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Score 3: The collaborative activities implemented at this step of the surveillance process are relevant regarding the collaborative modalities and local context.	Score 2: Some minor discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 1: Some major discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 0: The collaborative activities implemented at this step of the surveillance process are not relevant regarding the collaborative modalities and local context.	If no modalities planned at this surveillance step= NR	**Scoring based on confrontation between information in III.D.1, III.D.3 and II.A.4 (modalities).**
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Score 3: The collaborative outputs at this step of the surveillance process are appropriate to meet the collaborative objective(s).	Score 2: Some minor discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 1: Some major discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 0: The collaborative outputs at this step of the surveillance process are inappropriate to meet the collaborative objective(s) (the lack of output can be considered inappropriate depending on the surveillance objective(s))	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.D.1, III.D.3 and II.A.2 (objectives).**

	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Score 3: All the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context.	Score 2: Most of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The small discrepancies between the needs and the provision have a minimal impact on the output of the collaborative activities.	Score 1: Few of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision impacts strongly the output of the collaborative activities.	Score 0: None of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision don't allow the surveillance activities to produce output.	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.D.2, III.D.3.**
O.5 Information sharing	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Score 3: The collaborative activities implemented at this step of the surveillance process are relevant regarding the collaborative modalities and local context.	Score 2: Some minor discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 1: Some major discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 0: The collaborative activities implemented at this step of the surveillance process are not relevant regarding the collaborative modalities and local context.	If no modalities planned at this surveillance step= NR	**Scoring based on confrontation between information in III.E.1, III.E.3 and II.A.4 (modalities).**

	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Score 3: The collaborative outputs at this step of the surveillance process are appropriate to meet the collaborative objective(s).	Score 2: Some minor discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 1: Some major discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 0: The collaborative outputs at this step of the surveillance process are inappropriate to meet the collaborative objective(s) (the lack of output can be considered inappropriate depending on the surveillance objective(s))	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.E.1, III.E.3 and II.A.2 (objectives).**
	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Score 3: All the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context.	Score 2: Most of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The small discrepancies between the needs and the provision have a minimal impact on the output of the collaborative activities.	Score 1: Few of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision impacts strongly the output of the collaborative activities.	Score 0: None of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision don't allow the surveillance activities to produce output.	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.E.2, III.E.3.**

O.6 Data management and storage	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Score 3: The collaborative activities implemented at this step of the surveillance process are relevant regarding the collaborative modalities and local context.	Score 2: Some minor discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 1: Some major discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 0: The collaborative activities implemented at this step of the surveillance process are not relevant regarding the collaborative modalities and local context.	If no modalities planned at this surveillance step= NR	**Scoring based on confrontation between information in III.F.1, III.F.3 and II.A.4 (modalities).**
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Score 3: The collaborative outputs at this step of the surveillance process are appropriate to meet the collaborative objective(s).	Score 2: Some minor discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 1: Some major discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 0: The collaborative outputs at this step of the surveillance process are inappropriate to meet the collaborative objective(s) (the lack of output can be considered inappropriate depending on the surveillance objective(s))	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.F.1, III.F.3 and II.A.2 (objectives).**

	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Score 3: All the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context.	Score 2: Most of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The small discrepancies between the needs and the provision have a minimal impact on the output of the collaborative activities.	Score 1: Few of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision impacts strongly the output of the collaborative activities.	Score 0: None of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision don't allow the surveillance activities to produce output.	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.F.2, III.F.3.**
O.7 Data analysis and interpretation	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Score 3: The collaborative activities implemented at this step of the surveillance process are relevant regarding the collaborative modalities and local context.	Score 2: Some minor discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 1: Some major discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 0: The collaborative activities implemented at this step of the surveillance process are not relevant regarding the collaborative modalities and local context.	If no modalities planned at this surveillance step= NR	**Scoring based on confrontation between information in III.G.1, III.G.3 and II.A.4 (modalities).**

	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Score 3: The collaborative outputs at this step of the surveillance process are appropriate to meet the collaborative objective(s).	Score 2: Some minor discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 1: Some major discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 0: The collaborative outputs at this step of the surveillance process are inappropriate to meet the collaborative objective(s) (the lack of output can be considered inappropriate depending on the surveillance objective(s))	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.G.1, III.G.3 and II.A.2 (objectives).**
	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Score 3: All the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context.	Score 2: Most of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The small discrepancies between the needs and the provision have a minimal impact on the output of the collaborative activities.	Score 1: Few of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision impacts strongly the output of the collaborative activities.	Score 0: None of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision don't allow the surveillance activities to produce output.	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.G.2, III.G.3.**

O.8 Communication to surveillance actons	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Score 3: The collaborative activities implemented at this step of the surveillance process are relevant regarding the collaborative modalities and local context.	Score 2: Some minor discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 1: Some major discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 0: The collaborative activities implemented at this step of the surveillance process are not relevant regarding the collaborative modalities and local context.	If no modalities planned at this surveillance step= NR	**Scoring based on confrontation between information in III.H.1, III.H.3 and II.A.4 (modalities).**
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Score 3: The collaborative outputs at this step of the surveillance process are appropriate to meet the collaborative objective(s).	Score 2: Some minor discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 1: Some major discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 0: The collaborative outputs at this step of the surveillance process are inappropriate to meet the collaborative objective(s) (the lack of output can be considered inappropriate depending on the surveillance objective(s))	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.H.1, III.H.3 and II.A.2 (objectives).**

	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Score 3: All the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context.	Score 2: Most of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The small discrepancies between the needs and the provision have a minimal impact on the output of the collaborative activities.	Score 1: Few of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision impacts strongly the output of the collaborative activities.	Score 0: None of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision don't allow the surveillance activities to produce output.	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.H.2, III.H.3.**
O.9 External communication	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Score 3: The collaborative activities implemented at this step of the surveillance process are relevant regarding the collaborative modalities and local context.	Score 2: Some minor discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 1: Some major discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 0: The collaborative activities implemented at this step of the surveillance process are not relevant regarding the collaborative modalities and local context.	If no modalities planned at this surveillance step= NR	**Scoring based on confrontation between information in III.I.1, III.I.3 and II.A.4 (modalities).**

	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Score 3: The collaborative outputs at this step of the surveillance process are appropriate to meet the collaborative objective(s).	Score 2: Some minor discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 1: Some major discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 0: The collaborative outputs at this step of the surveillance process are inappropriate to meet the collaborative objective(s) (the lack of output can be considered inappropriate depending on the surveillance objective(s))	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.I.1, III.I.3 and II.A.2 (objectives).**
	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Score 3: All the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context.	Score 2: Most of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The small discrepancies between the needs and the provision have a minimal impact on the output of the collaborative activities.	Score 1: Few of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision impacts strongly the output of the collaborative activities.	Score 0: None of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision don't allow the surveillance activities to produce output.	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.I.2, III.I.3.**

O.10 Dissemination to decision-makers	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Score 3: The collaborative activities implemented at this step of the surveillance process are relevant regarding the collaborative modalities and local context.	Score 2: Some minor discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 1: Some major discrepancies are identified between the implemented collaborative activities at this step of the surveillance process and regarding the collaborative modalities and local context.	Score 0: The collaborative activities implemented at this step of the surveillance process are not relevant regarding the collaborative modalities and local context.	If no modalities planned at this surveillance step= NR	**Scoring based on confrontation between information in III.J.1, III.J.3 and II.A.4 (modalities).**
	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Score 3: The collaborative outputs at this step of the surveillance process are appropriate to meet the collaborative objective(s).	Score 2: Some minor discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 1: Some major discrepancies are identified between the collaborative outputs at this step of the surveillance process and the collaborative objective(s).	Score 0: The collaborative outputs at this step of the surveillance process are inappropriate to meet the collaborative objective(s) (the lack of output can be considered inappropriate depending on the surveillance objective(s))	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.J.1, III.J.3 and II.A.2 (objectives).**

	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Score 3: All the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context.	Score 2: Most of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The small discrepancies between the needs and the provision have a minimal impact on the output of the collaborative activities.	Score 1: Few of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision impacts strongly the output of the collaborative activities.	Score 0: None of the appropriate resources to implement the collaborative activities at this step of the surveillance process have been identified, are available and mobilized in the local context. The large discrepancies between the needs and the provision don't allow the surveillance activities to produce output.	If no collaborative activities and no modalities planned at this surveillance steps = NR	**Scoring based on confrontation between information in III.J.2, III.J.3.**

Annexes 4 : Tableau de correspondance entre les critères et les attributs de fonctions et les indicateurs macros.

Attributes name	**Evaluation criteria**	**Function indicator**	**Collaboration quality approach**
G.1 Formalisation of the collaborative surveillance strategy	1. Formalisation of rationale behind the willingness to collaborate for surveillance.	Stability	Management
G.1 Formalisation of the collaborative surveillance strategy	2. Formalisation of the objective(s) and purpose of collaboration for surveillance.	Stability	Management
G.1 Formalisation of the collaborative surveillance strategy	3. Formalisation of the areas of action of main stakeholders in the multi-sectoral surveillance system, i.e. the tasks they are assigned with in term of collaboration and of coordination of sectoral surveillance	Stability	Management
G.1 Formalisation of the collaborative surveillance strategy	4. Endorsement of the documents where all the previous statements are formalised by all actors from different sectors, disciplines and decision scales involved.	Stability Acceptability Leadership	Management
G.2 Relevance of the collaborative purpose and objective	1. Relevance of the collaborative objective(s) and purpose regarding actors and end-users' expectations (including meeting the sectoral objectives).	Usefulness Acceptability Leadership	Management
G.2 Relevance of the collaborative purpose and objective	2. Relevance of the collaborative objective(s) and purpose regarding the epidemiological, socio-political and economic context.	Usefulness	Management
G.2 Relevance of the collaborative purpose and objective	3. Relevance of the collaborative objective(s) and purpose regarding the international/regional guidance (regulations, recommendations, standards).	Usefulness	Management
G.3 Formalisation of collaboration modalities	1. Formalisation of the collaborative modalities.	Stability	Management
G.3 Formalisation of collaboration modalities	2. Formalisation of roles and responsibilities of actors involved in collaboration.	Stability	Management
G.3 Formalisation of collaboration modalities	3. Endorsement of the documents where all the previous statements are formalised by all actors from different sectors, disciplines and decision scales involved or consistent across the institutions.	Stability Acceptability	Management
G.4 Relevance of collaborative modalities	1. Relevance of the collaborative modalities regarding the collaborative objective(s) and surveillance context	Usefulness	Management
G.5 Coverage	1. Relevance of the dimensions (sectors, disciplines, decision making scales, mandates and public private partnership) regarding the collaborative objective(s) and surveillance context	Usefulness Inclusiveness System knowledge	Management

G.5 Coverage	2. Relevance of the data sources regarding the collaborative objective(s) and surveillance context.	Usefulness Inclusiveness System knowledge	Management
G.6 Governance of resources for collaboration	1. Definition of financial, material and human resources allocation mechanisms in the collaborative strategy.	Stability Resources	Management
G.6 Governance of resources for collaboration	2. Allocation of relevant financial, material and human resources for collaborative modalities.	Resources	Support
G.6 Governance of resources for collaboration	3. Relevance between areas of action, roles and responsibilities assigned in the multi-sectoral surveillance system (collaborative and sectoral activities) and professional competencies.	Inclusiveness Acceptability	Support
G.7 Mechanisms to steer collaboration	1. Existence and formalisation of the mechanism for steering collaboration in the surveillance system.	Stability Leadership	Management
G.7 Mechanisms to steer collaboration	2. Representativeness of all appropriate actors and end-users from relevant sectors, decisions scales and disciplines in the steering mechanism (inclusion, participation and appropriate voice).	Inclusiveness Leadership	Management
G.7 Mechanisms to steer collaboration	3. Functioning of the mechanism for steering collaboration including the capacity to advocate for change.	Effectiveness Adaptability and flexibility Leadership	Management
G.7 Mechanisms to steer collaboration	4. Existence of appropriate feedback loop for steering collaboration.	Effectiveness Adaptability and flexibility Leadership	Management
G.7 Mechanisms to steer collaboration	5. Availability of all appropriate resources to support the mechanism for steering collaboration.	Resources	Management
G.8 Mechanisms to coordinate collaboration	1. Existence and formalisation of the mechanism for coordinating collaboration in the surveillance system.	Stability Leadership	Management
G.8 Mechanisms to coordinate collaboration	2. Representativeness of all appropriate actors from relevant sectors, decisions scales and disciplines in the coordinating mechanism (inclusion, participation and appropriate voice).	Inclusiveness Leadership	Management
G.8 Mechanisms to coordinate collaboration	3. Functioning of the mechanism for coordinating collaboration including the capacity to advocate for change.	Effectiveness Adaptability and flexibility Leadership	Management

G.8 Mechanisms to coordinate collaboration	4. Existence of appropriate feedback loop for coordinating collaboration.	Effectiveness Adaptability and flexibility Leadership	Management
G.8 Mechanisms to coordinate collaboration	5. Availability of all appropriate resources to support the mechanism for coordinating collaboration.	Resources	Management
G.9 Mechanisms to technically and scientifically support collaboration	1. Existence and formalisation of the mechanism for supporting scientifically and technically collaboration in the surveillance system.	Stability Leadership	Support
G.9 Mechanisms to technically and scientifically support collaboration	2. Representativeness of all appropriate actors from relevant sectors, decisions scales and disciplines for supporting scientifically and technically collaboration (inclusion, participation and appropriate voice).	Inclusiveness Leadership	Support
G.9 Mechanisms to technically and scientifically support collaboration	3. Functioning of the mechanism for supporting scientifically and technically collaboration including the capacity to advocate for change.	Effectiveness System knowledge Adaptability and flexibility Leadership	Support
G.9 Mechanisms to technically and scientifically support collaboration	4. Existence of appropriate feedback loop for supporting scientifically and technically collaboration.	Effectiveness Adaptability and flexibility Leadership	Support
G.10 Training for collaboration	1. Existence of designed and planned initial training for operating actors involved in collaborative activities.	Stability	Support
G.10 Training for collaboration	2. Accessibility of initial training in relevant timeframe for operating actors involved in collaborative activities.	Resources	Support
G.10 Training for collaboration	3. Relevance of initial training for operating actors involved in collaborative activities with the collaborative modalities and surveillance context.	System knowledge Acceptability	Support
G.10 Training for collaboration	4. Existence of designed and planned ongoing training for operating actors involved in collaborative activities.	Stability	Support
G.10 Training for collaboration	5. Accessibility of ongoing training in relevant timeframe for operating actors involved in collaborative activities.	Resources	Support
G.10 Training for collaboration	6. Relevance of ongoing training for operating actors involved in collaborative activities with the collaborative modalities and surveillance context.	System knowledge Acceptability	Support

G.11 Information and communication	1. Existence of an institutional memory including all information related to the rationale of collaboration, to the organisation and functioning of the multi-sectoral surveillance system and to the outputs of the multi-sectoral surveillance system.	System knowledge Acceptability	Support
G.11 Information and communication	2. Accessibility of the institutional memory to surveillance actors and end-users.	System knowledge Acceptability	Support
G.11 Information and communication	3. Relevance of the information produced by multi-sectoral surveillance system regarding the collaborative objective(s).	System knowledge Effectiveness	Operation
G.11 Information and communication	4. Appropriateness of the communication (both in terms of content and means) of the information produced by the multi-sectoral surveillance system to surveillance actors and end users.	System knowledge Acceptability	Support
G.12 Performance and evaluation	1. Existence and relevance of specific performance indicators of collaboration routinely used.	Adaptability and flexibility	Management
G.12 Performance and evaluation	2. Existence of periodic external evaluation of the surveillance system that considers an evaluation of collaboration.	Adaptability and flexibility	Management
G.12 Performance and evaluation	3. Existence of periodic internal evaluation of the surveillance system that considers an evaluation of collaboration.	Adaptability and flexibility	Management
G.12 Performance and evaluation	4. Implementation of corrective measures if relevant.	Adaptability and flexibility	Management
G.13 Engagement	1. Engagement of actors in their assigned areas of responsibility and roles in the multi-sectoral surveillance system.	Acceptability	Management
O.1 Surveillance design	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Effectiveness	Operation
O.1 Surveillance design	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Effectiveness Usefulness	Operation
O.1 Surveillance design	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Resources	Support
O.2 Data collection-sampling	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Effectiveness	Operation

O.2 Data collection-sampling	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Effectiveness Usefulness	Operation
O.2 Data collection-sampling	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Resources	Support
O.3 Data Collection - Laboratory testing	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Effectiveness	Operation
O.3 Data Collection - Laboratory testing	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Effectiveness Usefulness	Operation
O.3 Data Collection - Laboratory testing	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Resources	Support
O.4 Data sharing	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Effectiveness	Operation
O.4 Data sharing	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Effectiveness Usefulness	Operation
O.4 Data sharing	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Resources	Support
O.5 Information sharing	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Effectiveness	Operation
O.5 Information sharing	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Effectiveness Usefulness	Operation
O.5 Information sharing	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Resources	Support

O.6 Data management and storage	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Effectiveness	Operation
O.6 Data management and storage	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Effectiveness Usefulness	Operation
O.6 Data management and storage	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Resources	Support
O.7 Data analysis and interpretation	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Effectiveness	Operation
O.7 Data analysis and interpretation	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Effectiveness Usefulness System knowledge	Operation
O.7 Data analysis and interpretation	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Resources	Support
O.8 Communication to surveillance actors	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Effectiveness	Operation
O.8 Communication to surveillance actors	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Effectiveness Usefulness	Operation
O.8 Communication to surveillance actors	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Resources	Support
O.9 External communication	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Effectiveness	Operation
O.9 External communication	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Effectiveness Usefulness	Operation

O.9 External communication	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Resources	Support
O.10 Dissemination to decision-makers	1. Relevance of the collaborative activities implemented at this step of the surveillance process regarding the collaborative modalities and local context.	Effectiveness	Operation
O.10 Dissemination to decision-makers	2. Appropriateness of the outputs of collaborative activities at this step of the surveillance process to meet the collaborative objective(s).	Effectiveness Usefulness	Operation
O.10 Dissemination to decision-makers	3. Availability of appropriate resources at this step of the surveillance process (financial, technical, material and human) to implement the collaborative activities in the local context.	Resources	Support

Guidelines to use Tool1

A. What is TOOL1

TOOL1 is a semi-quantitative evaluation tool developed for an in-depth analysis of the organisation and functioning of collaboration taking place in a multi-sectoral surveillance system.

Most of health hazards are complex and need to be addressed with a holistic manner to better apprehend them. Hence under the One Health paradigm, many multi-sectoral surveillance systems are being developed, and governments and the scientific community strongly support their implementation. Hence, to create relevant multi-sectoral surveillance systems, collaboration needs to be established and strengthened across sectors, disciplines, decision making scales, and professions. However, there is not a single model for multi-sectoral surveillance system and collaboration must be consistent with the surveillance context and collaborative objective. Furthermore, collaboration is time and resource consuming, and needs to be properly designed and organised to ensure stakeholders' commitment and thus the sustainable operation of the collaborative surveillance system.

In this context, this tool aims at evaluating the organisation and functioning of current collaboration in a multi-sectoral surveillance system and at analysing their strengths and weaknesses. *In fine*, the evaluation results may support the formulation of recommendations to improve collaboration in the multi-sectoral surveillance system.

What TOOL1 is not doing:

- At this stage of development, this tool does not allow to assess the impact of collaboration on the surveillance value and on external changes (policy-making, behavioural changes, etc.).
- TOOL1 does not intend to evaluate the degree of collaboration or integration in the multi-

The basic principle behind the development of this tool is that, to ensure its effective operation within a multi-sectoral system, collaboration must be evaluated at 3 different levels, as defined below.

- The collaborative strategy.
    - The collaborative strategy describes the desired goals of developing collaboration for surveillance and the course of actions to achieve them. The strategy may be enunciated in various documents depending on the legal tradition of the country and on whom developed it (government, academia, professional organisations, etc): policy, strategy, memorandum, law, etc. These documents are developed at a high political level when it comes to official surveillance. The collaborative strategy for surveillance can be described in a stand-alone document or in an overarching document (control programme for a specific health issue, national One Health strategy, etc).

- The collaborative modalities.
    - The collaborative modalities elucidate the operational collaborative efforts needed to achieve the collaborative strategy. These modalities are usually

defined at the level of institutions in charge of implementing the collaborative strategy. They are usually expressed in terms of area of collaboration (i.e. the steps of the surveillance process where collaboration is implemented) and degree of integration (i.e. the strength of collaboration for each area of collaboration) (see Annexe 1 for the potential collaborative modalities taking place in a multi-sectoral surveillance system). The modalities are usually described in implementing texts, such as regulations, agreements, charters, etc.

- The collaborative surveillance activities.
    - They represent the implementation of the collaborative modalities at the ground level and ensure the routine operation of collaboration. They are usually supported by operational procedures.

For a surveillance system to be effective and sustainable, these 3 levels of collaboration must be clearly established and endorsed by surveillance actors. Furthermore, they need to be coherent with the surveillance context in which they are anchored, as well as which each other.

The figure 1 presents the 3 levels of collaboration and their articulation with each other.

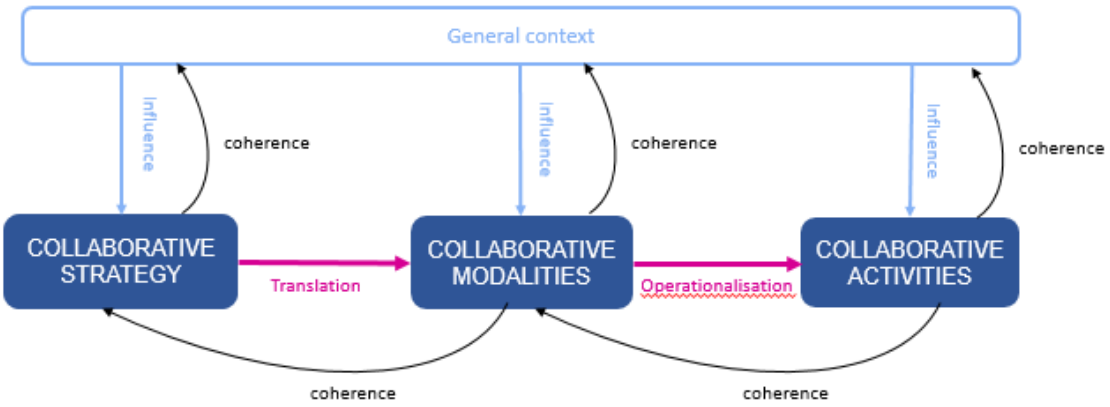

Fig 1. Levels of collaboration to be evaluated in a multi-sectoral surveillance system.

This tool is the result of a multi- stage development process.

A first list of attributes has been developed by combining information retrieved in:

1. A systematic literature review about characteristics of existing One Health surveillance systems[4]
2. Existing tools for evaluation of One Health initiatives: NEOH[5], P4P[6]
3. Existing attributes for evaluation of surveillance system: SurvTool[7], Oasis[8]

Defined attributes were then submitted to an expert opinion elicitation in 2 rounds. Based on experts' comments, the attributes were refined, and a new list established.

The final list includes 23 attributes for the evaluation of the organisation and functioning of collaboration within a multi-sectoral surveillance system. 13 attributes focus on the governance of collaboration, 10 on the operation of collaboration. These attributes were then split into 72 criteria, for which a semi-quantitative scoring system was developed (see Annexe 2).

The aggregation of these criteria led to the establishment two types of indicators:

- Macro indicators: they aggregate criteria into 3 distinct processes that provide a macro overview of the organisation and functioning of the collaboration; based on the quality management process approach[9], the following processes have been identified: the management process (related to all the elements in place to lead collaboration), the support process (related to all the elements in place to provide necessary resources for the effective operation of collaboration) and the operation process (related to the collaborative activities and their related outputs).
- The function indicators: they aggregate criteria depending on the function of collaboration they contribute to, among: "effectiveness", "stability", "adaptability and flexibility", "acceptability", "system knowledge", "resources", "usefulness", "shared leadership" and "inclusiveness" (see Annexe 3 for the definition of the function indicator).

B. TOOL1 overview

Prerequisite:

Despite effort to standardize the scoring process, the scoring remains highly evaluator-dependant. Hence the results and especially the indicators need to be properly communicated in a report with relevant explanation and contextualisation.

[4] Characteristics of One Health surveillance systems: a systematic literature review. PVM. M. Bordier, T. Uea-Anuwong, A. Binot, P. Hendrikx, F. L. Goutard. *Under review.*
[5] https://doi.org/10.3389/fvets.2018.00023
[6] https://www.onehealthapp.org/about
[7] https://survtools.org/wiki/surveillance-evaluation/doku.php?id=start
[8] https://www.plateforme-esa.fr/outils-et-methodes-methodes-oasis
[9] https://ccm.net/contents/618-quality-process- management),

TOOL1 is composed of 4 elements:

- 2 tables which allow the collection of preliminary information on all the different surveillance actors and components of the multi-sectoral surveillance system being evaluated. The corresponding spreadsheet contains on the first sheet the table to be filled with the required information, and on the second sheet the possible values for each type of information.
- An information collection form which allows a synthesis of all information describing precisely the governance and operation of collaboration in the multi-sectoral surveillance system that will be used to score the evaluation attributes. This form is divided in 3 sections: contextualisation, governance and operation of collaboration.
- A spreadsheet which contains the evaluation matrix and outputs.
    - The first sheet ("criteria scoring") contains the scoring grid for the evaluation attributes of organisation and functioning. The grid is divided into two sections: governance attributes (13) and operation attributes (10). Each attribute is split into measurable criteria (75), which number ranges from 1 to 5 depending on the attribute. Each criterion can be scored from 3 to 0: grade 3 if the criterion is perfectly fulfilled, grade 2 if well filled, grade 1 if a bit filled and grade 0 if not filled at all. For certain criteria, if they are not relevant to the studied multi-sectoral surveillance system, they can be classified as "Not Relevant" (NR). The scoring is done by following the scoring guide which defines the requirement for each grade and mentions the information needed to undertake the scoring. It is advised that if not all required elements for a grade are met, the corresponding lower grade should be given for improvement to be noticeable in the future.
    - The second sheet ("indicators scoring") presents how criteria are contributing to the 3 organisational indicators as well as to the 9 function indicators. These indicators are scored based on a non-weighted sum of the criteria that contribute to them.
    - The third sheet ("evaluation results") provides graphical outputs to visualise the evaluation results of the attributes (organisation and functioning) and indicators (macro organisation and function).
    - The fourth sheet ("calculation") contains all the formula to obtain the scoring of the indicators as well as the automatic outputs.

C. HOW TO USE TOOL1

TOOL1 is meant to be used in a participatory manner with individuals in charge of coordinating the surveillance components and/or involved in the governance or the operation of the collaborative effort in the multi-sectoral surveillance system. It can be supported by an external expert (not mandatory).

FIRST STEP: Collecting information

The information is collected by people in charge of the evaluation; it can be an external expert or person(s) designated by the network. The evaluator must have knowledge in surveillance and evaluation.

A preliminary desktop study should be done to collect all information to fill as much as possible both actor and component tables, and the information collection form. Once all the information analysed, a list of missing or unreliable information should be set. The main actors of the multi-sectoral surveillance system must be interviewed to clarify and collect necessary information. It is recommended to start filling out the two tables before the information collection form. However, the information collection process is not linear and a back and forth process between the tables and the form will most realistically occur.

The main actors that will be interviewed depend of the multi-sectoral surveillance system; they can be surveillance component coordinator, field agents or laboratory staff taking part in collaborative activities, a major end-user of the surveillance output or even an identified key informant who is not directly taking part of the system. It is however important to identify the knowledge, background of all interviewees to contextualise the collected information.

SECOND STEP: Scoring the criteria of the organisational and functioning attributes

To score the criteria for the organisational and functioning attributes, evaluators use the relevant information indicated in the scoring guide and select the corresponding grade. The grade is chosen in a concerted manner. The grade is then entered in the provided cell of the spread sheet and the justification for selecting this grade is detailed in the adjacent cell. This justification is finally much more important than the grade itself and should be filled in carefully.

THIRD STEP : Interpreting evaluation outputs

Once the scoring is done, the spreadsheet will produce automatically three graphical outputs on the third sheet, which correspond to the evaluation results of the attributes (organisation and functioning) and of the two types of indicators (organisation and function). These outputs need to be analysed and interpreted according to the justification and should always been contextualized when communicated. This interpretation should be done by people involved in the evaluation process and the results should be presented in a full report.

Output 1:

This display represents the evaluation results of the 23 organisation and functioning attributes (13 governance and 10 operation attributes) based on the grades entered in the scoring grid for each measurable criterion (sheet 1). Each attribute can be visualized by a pie graph. Each coloured area within pie chart represents the scoring result of the attribute according its maximal possible grade. This display allows for a visual representation of the satisfactory level of the organisational and functioning attributes of collaboration in the multi-sectoral surveillance system, both at the governance and operational levels. For each attribute, it’s possible to go back to the criteria contributing to their scoring (sheet 2) to better understand the reasoning behind the scoring and to investigate how criteria contribute to the score.

Output 2:

This display represents the evaluation results of the macro indicators. The result for each three-process indicator is displayed by a histogram. This output allows to visualize the strengths and weaknesses of the organisation of the collaborative effort at a macro level, from a management, support and operation perspectives. It can support the definition of macro priorities for the improvement of the organisation, in terms of management, support or operation.

Output 3:

This display represents the evaluation results of the 8 function indicators. The display as a spider chart allows for the visualization of the quality of the functions of the collaborative effort. It can support the identification of specific function of collaboration that need to be strengthened.

TOOL1 Glossary

A

Area of collaboration

Step(s) of the surveillance process (planning, sampling, laboratory testing, data storage and management, data analysis and interpretation, dissemination and communication) at which collaboration occurs within any given dimension.

Area of actions

The array of missions assigned to an actor in the governance and operation of the collaborative surveillance system.

Appropriate Voice:

All the represented actors at governing mechanisms (steering, coordination, technical and scientific support), have the possibility to talk freely, be heard in a trusted environment. The power of their voice is appropriate according to the context and their objectives.

C

Collaborative mechanism

Structure (committee, institutional body, working group) supporting the governance of collaboration, in terms of steering, coordination or technical and scientific advice.

Collaborative modality

The result of the combination of an area of collaboration and a degree of integration within any given dimension.

Ex: ongoing data sharing (area of collaboration = data collection) through the establishment of a common data base (degree of integration= inter-sectoral combination of data) for the animal and human sector (dimension = sectors)

Ex: annual reporting (area of collaboration = data collection) of aggregated results of antibiotic sales (degree of integration= information reporting) by pharmaceutical companies to the competent authority (dimension = PPP)

Collaborative strategy

The course of action by which it is intended to attain the goal(s) of the collaborative effort. Collaborative strategy encompasses the rationale behind collaboration, the objective and purpose of the collaboration, the coverage of the surveillance in terms of data sources and dimensions, the areas of responsibilities of the stakeholders involved, the mechanisms of resources allocation.

Communication

Flow of the information produced by the collaborative surveillance system (surveillance results, decisions, report from operational actors, etc), internally (among the surveillance actors operating in the different dimensions) and externally (to end-users, including decision-makers).

D

Degree of integration

The level of collaboration in the operation of the collaborative activities taking place at the different steps of the surveillance process (area of collaboration); for instance, at the data collection step, sampling can be done separately by each sector following a cross-sectoral harmonization of the method or, at a higher level of collaboration, jointly, by a multisectoral unit.

Combining the degree of collaboration with the step of the surveillance process where collaborative activities are implemented leads to the definition of a collaborative modalities

Dimension of collaboration

Where collaboration occurs in a collaborative surveillance system: between sectoral institutions belonging to different jurisdiction (Human Health, Animal Health, Environment, Food safety, etc…), between different scales of the decision-making process (supra-national, national, regional, etc...), between across actors working in different disciplines (medicine, ecology, epidemiology, public health, etc), between, professional groups or institutions assigned with different mandates (healthcare, risk management, risk assessment, diagnostic, etc...), between the public and the private sector.

Dissemination

The specific step of the surveillance process where surveillance results are communicated to decision makers who are intended to act upon them.

Domain

The source of data covered by a surveillance component.

E

End-users

Persons who might use the surveillance results, mainly policy makers but depending on the results it can also be members of the community or professional groups such as veterinarians, doctors, etc.

F

Feedback loop

The outputs of the surveillance system and lesson learnt (evaluation result, feedback from the operational actors, etc…) are routed back to the governance mechanisms (steering, coordinating and technically and scientifically supporting the collaborations) in place and are used as inputs by these mechanisms to take decisions and to adapt to changes

Formal document

Any written documents whose content is supported officially by an organisation (governmental organisation, academia, professional organisation, etc…).

I

Institutional memory

The repository of all the information about and produced by a surveillance system: surveillance results, information about the organisation of the surveillance, meeting minutes, etc.

M

Multi-sectoral surveillance system

A system in which collaborative efforts exist across at least two sectors (among human health, animal health, food safety, plant health, environmental health, etc.) during the surveillance process (from planning to results dissemination) to produce and disseminate information which leads to actions aimed at attaining optimal health of humans and/or animals and/or ecosystems.

R

Risk mitigation measures or intervention

The process of applying specific measures targeted at disease/hazard mitigation to reduce the intensity of the situation and its consequences.

S

Sector

A sphere of activity under one jurisdiction: food safety, animal health, human health, environmental health, wildlife, plant health, etc.

Surveillance component

The surveillance of one or more hazards in a specific domain with a defined sampling strategy. The addition of surveillance components defines the surveillance system.

Step of surveillance process

One set of activities of the surveillance process: planning, data collection (sampling, laboratory testing, data sharing, information exchange), data management, data analysis and interpretation, dissemination and communication).

Annexes 6 : Formulaire permettant le recueil des données pour l'évaluation des collaborations appliqués au cas d'étude du système de surveillance de l'antibiorésistance au Vietnam.

1. Contextualisation of the multi-sectoral surveillance system	
Quote the document or informants' narrative and state into brackets the source of the information	
1. Name the object (hazard, symptom, …) under surveillance	ABR (and ABU) in Vietnam
2. Name the territory under surveillance	National
3. Describe the main elements of the socio-economic and political context of the collaborative surveillance system	Evidences of high level of resistance prevalence in both humans and animals No evidence of the real health and economic burden Evidences of overuse of ABT in both humans and animals Strong involvement of the international community in that field Little to no barrier to the access to ATB
4. Identify the international and/or regional guidance related to the hazard under surveillance that may impact the establishment and operation of the surveillance system	WHO Global Action Plan FAO Global Action Plan AGISAR ABU monitoring system established by OIE OIE standards for AST testing

2. Governance of collaboration in the multi-sectoral surveillance system

Collaborative strategy and modalities

Quote the document or informants 'narrative and state into brackets the source of the information

1. Identify the rationale behind the willingness to collaborate for the surveillance of the object	Six rationale statements including "6. A government -led multi stakeholder and multisectoral engagement and action, fully supported by the public and by development partners is necessary; Now therefore, we collectively resolve and declare through this Aide Memoire our collaboration, engagement and concerted action to fight antimicrobial resistance in Viet Nam" (Aide Memoire)
2. Identify the objective(s) of collaboration for surveillance	"Jointly we commit to implement the following actions: 3. Strengthen the capacity of the country to generate evidence and timely information on AMR, including the establishment and operation of a national surveillance system" (Aide Memoire) => do not specify that collaboration is needed for surveillance "Promote prevention of drug resistance, contributing to improving the quality and effectiveness of the prevention and control of epidemics, medical examination and treatment to protect care for and improve people health" (NAP GAP) => general objective of the NAP "5. Allowing the development of mechanisms to share information and connect drug-resistant bacteria in humans surveillance system and antimicrobial resistance in agriculture to capture the national drug resistance big picture" (Decision 6211) => objective of collaboration according to the drug-resistant bacteria surveillance system in health care facilities "2.5 facilitate inter-sectoral collaboration activities related to AMR control." (NAP MARD) => the activities related to AMR control includes surveillance in the document Retained informal objective: "To collaborate and exchange information"

3. Identify the purpose of collaboration for the surveillance of the object	"… Objectif…to protect, care for and improve people's health." (NAP GAP) => public health purpose of the NAP, written after the objective, not specific of collaboration or even surveillance "Mitigate the public health risk of AMR by controlling the antibiotic usage in livestock production and aquaculture in Viet Nam" (NAP MARD) => an objective but we can read that the purpose is to protect public health, not specific of collaboration surveillance The aide Memoire can't be directly quoted on the purpose of collaboration for surveillance or generally on the question of AMR as it isn't properly stated. However, in the rationale AMR is described as affecting "human surveillance, public health, trade and economy and over-all sustainable development of the country." Also, in "role and action" it is stated that "the following roles and action which will collectively contribute to the goals set forth under the National Action Plan". This NAP GAP has cited above as a public health purpose to it. Hence if we read in between the line, the general goal of all those initiatives, which includes surveillance, has a general purpose "To improve the situation and protect public health".

4. Identify the areas of actions of the main stakeholders in the multi-sectoral surveillance system; i.e. the tasks they are assigned with in term of collaboration and in terms of sectoral surveillance	MARD/DAH: surveillance of ABR and ABU in livestock and aquaculture, sharing information with other stakeholders (Aide Memoire: “develop mechanisms and regulation on monitoring the use of antibiotics in livestock production, disease prevention and treatment for animal and aquaculture”/NAP MARD: “Monitor AMR, antibiotic residues and AMU in livestock production and aquaculture”/ MOH: “MARD assigns its agencies in collaboration with MOH to direct and guide relevant agencies to develop regulations on the use of antibiotics, list of antibiotics, antibiotic residues limits used in livestock, poultry, aquaculture and cultivation. Inspection, testing and monitoring the use of ATB in livestock, poultry, aquaculture and cultivation.”) => not consistent about AMR surveillance in animals but NAP MARD latest documents MOH/department of examination and treatment administration: surveillance of ABR and ABU in hospitals and community (GAP: “Establish the system of monitoring and reporting data on hospital infections from hospital under MOH and provincial and cities hospitals under central authority” + “Monitoring and evaluation of drug use, compliance monitoring, promoting activities of the Council of Drug and Treatment in health facilities” /decision 6211), coordination of the implementation of the GAP (GAP), coordination of collaborations (Aide Memoire: “take lead and overall coordinate the national action plan to fight AMR”/decision 5888) MOH/ GDPM: surveillance of ABR and ABU in the community (GAP: "Tracking, monitoring, doing research, evaluation of the use of ATB and ATB resistance in the community")

5. Identify, if any, the collaborative modalities which are planned at the different steps of the surveillance process	- ☐ **Surveillance design-** No - ☐ **Data collection: Sampling-** No - ☐ **Data collection: Laboratory testing:** No - ☐ **Data collection: Data sharing** Information sharing between DAH and MOH and MONRE: "Share data on AMR, AMU and residues monitoring between public health, animal health and environmental sectors" (NAPMARD) - ☒ **Data collection: Information sharing** "Allowing development of mechanisms to share information and connect the drug-resistant bacteria in humans surveillance system and antimicrobial resistance in agriculture system to capture the national drug resistance big picture" (Decision 6211) - ☐ **Data management and storage:** No - ☐ **Data analysis and interpretation** "Allowing development of mechanisms to share information and connect the drug-resistant bacteria in humans surveillance system and antimicrobial resistance in agriculture system to capture the national drug resistance big picture" (Decision 6211) - ☐ **Internal communication to actors of the surveillance:** No - ☒ **External communication to potential end-users of the surveillance results** Public awareness week (informants: FAO, WHO) - ☒ **Dissemination of the surveillance results to decision-makers and policy makers.** Joint report: "Disseminate results of AMR and AMU monitoring in a joint report between public health and animal health sectors" (NAP MARD)

6. Identify all the combination hazards/domain (and related risk factors) covered or not by the collaborative surveillance system and fill in the slots with the relevant information (you can refer to the Component Table)

Hazard	Population	Coordinator	Status	Inclusion in the collaborative strategy (Y/N)
Resistant clinical bacterial isolate	Diseased humans	VAMS/ MSA	Ongoing	Y
Resistant bacterial isolates in chicken and pork dropping in slaughter house	food producing animals	NCVHI I	One 6-month pilot phase renewed in sept 2018	Y
Resistant bacterial isolates in retailed chicken and pork meat (from local market, small retailed shop-groceries, and supermarkets)	Retailed meat	NIN (+Nha Trang Pasteur, HCMC Pasteur)	Ongoing	N
Resistant community based bacterial isolate	Community	NIHE	Prospective	Y
AMU hospital data	Hospitals	AMU surveillance unit in the drug administration of Vietnam	Active	Y
AMU import data	Farms	DAH-Veterinary Drug Management Division	Active	Y
AMU community data	Community	GDPM	Passive	Y

7. Identify all dimensions of collaboration for the surveillance of the object	☒ **Disciplines:** Active: Clinical medicine, microbiology, veterinary public health, data management, Animal production, Political sciences, law, biostatistics Prospective: Public health, pharmacology Not identified: Surveillance, epidemiology, food safety ☒ **Sectors:** Active: Human (hospital), Animal, Prospective: Human (community) Passive: economy and trade Not identified: Food safety ☒ **Decision making scales:** Active: International organisations, Central government and corresponding agencies, Prospective: provincial government and city government Passive: community ☒ **Profession:** Active: Risk Management, Policy making, Technical support, Standardisation Prospective: human health care professional from hospitals (active to passive depending on the hospitals) Passive: community, Not identified: antibiotics (human and animal) industry, health care professional (community doctor, veterinarians…), antibiotic sellers (pharmacist, gross sellers, feed mills, etc.), professional association groups, risk assessment

8. Identify the mechanism for the allocation of financial, human, material resources to collaboration	Aide Memoire: “Each participant shall accept full and sole responsibility for any and all expenses incurred by itself relating to this Aide Memoire.” + “The participants specifically acknowledge that this aide memoire is not an obligation of funds, nor does it constitute a legally binding commitment by any participant or create any right in any other party. “ NAP GAP: “Investment from the state budget, ODA funding and other legitimate funds to implement the National action plan to combat antimicrobial resistance in the period from 2013 to 2020: 1. In the country: the units ensure funding to implement activities within assigned missions and state budget distributed in the annual and 5-years plan. /2. Mobilize resources from international organizations, non-governmental organizations: WHO, UN forestry fund, GARP - Vietnam, UNAIDS, WB, ...” NAP MARD: “MARD is responsible for allocating budget to the assigned agencies under MARD to implement activities listed in the Appendix” + “National agencies assigned with responsibilities in this plan are responsible for mobilizing resources in their system to implement the assigned activities.” + provincial budget mechanism + funding from other resources.
9. Identify the financial, material and human resources allocated to collaboration	Decision 5888: “The National Steering Committee for prevention and control of AMR is located at the MSA Dept, MOH. Members of the Committee and Secretariats shall work on a part-time basis” => MOH in charge of allocating human resources to NSC – no specific allocation of resources for the collaboration This is the only allocation of resources to collaboration identified.
10. List all the documents, previously referred to and who endorsed them	Aide memoire: endorsed by MOH, MART, MOIT, MONRE and international partners (FAO, WHO, OUCRU, JICA). NAP GAP: Endorsed by MOH and appointing its relevant agencies to different role. Documents appointing responsibility to MARD without its endorsement/consultation. Consultation across decision scales probably occurred at some extent as well as consultation of international partner such as WHO and OUCRU (according to Vietnam political process- cf. actor transcript). NAP MARD: Endorsed by MARD and appointing its relevant agencies to different roles. Proposed consultation of the documents to MOH was offered, but MOH never answered MARD (according to actor transcript). Consultation across decision scale probably occurred at some extent as well as consultation of international partners such as FAO, OIE, OUCRU (according to Vietnam political process, cf. actor transcript).

B. Mechanism(s) for steering collaboration **Quote the document or informants' narrative and state into brackets the source of the information**	
1. Describe the mechanism for steering collaboration	NSC on prevention of AMR and its subcommittee 9 dedicated to surveillance (Decision 5888 and complementary documents). Function of the NSC defined in Article 3 of decision 5888
2. List all the actors and end-users taking part in the mechanism for steering collaboration and include information about their respective voices	NSC chaired by MOH and chaired deputy MARD, MOIT, MONRE. Members: director MSA/MOH, director DA, director GDPM, director DPF/MOH, director communication and emulation Dept/MOH, director of Food safety Dept/ Deputy director of environmental management, deputy chief inspector of MOH, Vice director of HIV/AIDS prevention and control Dept, 3 vice directors of MSA/MOH (one head of secretariat team), vice director of animal health dept/ MARD (vice head of secretariat team), vice director of market management Dept/MOIT (vice head of secretary, at team), Vice director det of pollution control/MONRE (vice head of secretariat team), director of NIMPE, director of NIHE, vice director HCMC Pasteur institute, director NIHE Tay Nguyen, Director Nha Trang Pasteur institute, director Cho Ray hospital, director of NHTD, Director of Bach Mai hospital, director of national paediatric hospital, director of nation lung hospital, director of Hanoi Health department, vice director of HCMC health department During meetings, all representatives have a voice and can participate (according to informant transcript, but information may not be reliable)
3. Identify if the mechanism for steering collaboration is functional (frequency of meetings, evidence of production of clear guidance for collaboration, etc.)	NSC has met only once since its establishment in 2016 (informant transcript)
4. Identify if there is a functional feedback loop for steering collaboration	"Article 3: 5. Periodic report, assessment of effectiveness of the plan" (Decision 5888) => planned feedback loop but only one meeting since 2016.

5. List the available financial, human, material resources to support the mechanism for steering collaboration	Each institution provides staff to participate in the NSC. The secretariat under MOH responsibility, doesn't have any available resources according to key informants
C. Mechanism(s) for coordinating collaboration **Quote the document or informants 'narrative and state into brackets the source of the information**	
1. Describe the mechanism for coordinating collaboration	Sectoral coordination units (in NIN, DAH, VAMS) Sub-committee 9 could be considered as a coordinating mechanism.
2. List all the actors and end-users taking part in the mechanism for coordinating collaboration and include information about their respective voices	Sub-committee 9 members: VFA, DAH and medical environment management (under MOH) (complementary document of decision 5888)
3. Identify if the mechanism for coordinating collaboration is functional (frequency of meetings, evidence of production of clear coordination of collaboration, etc.)	Sub-committee 9 has never met so far (informant transcript).
4. Identify if there is a functional feedback loop for coordinating collaboration	Unknown
5. List the available financial, human, material resources to support the mechanism for coordinating collaboration	No allocated resources identified.

D. Mechanism(s) for supporting scientifically and technically collaboration **Quote the document or informants' narrative and state into brackets the source of the information**	
1. Describe the mechanism for supporting scientifically and technically collaboration	OHP is an intergovernmental platform to share information between sectors (under MONRE, MARD and MOH), to support collaboration and to disseminate information to policy makers. It is clearly formalised however the platform isn't specific to AMR. (OHP documents and general system knowledge). NHTD and NIHE started working on a multi-sectoral support scientific support platform of MAR surveillance. (informant transcript) PATH organises meeting, in the human sector between the community and hospital components. (informant transcript)
2. List all the actors and end-users taking part in the mechanism for supporting scientifically and technically collaboration and include information about their respective voices	OHP isn't dedicated to AMR surveillance, hence even if all supporting actors are represented, many of those actors are not attending (the representative of the institute attending OHP meetings is not the AMR actor, the institute never attends to the meetings…).
3. Identify if the mechanism for supporting scientifically and technically collaboration is functional (frequency of meetings, evidence of clear technical and scientific support to collaboration, etc.)	OHP is functional + International partners support the surveillance system with a sectoral approach (bilateral agreements between actors and international partner) and they advocate strongly for collaboration (informant transcript) and most of them are collaborating at a higher level (tripartite agreement between FAO-OIE-WHO).
4. Identify if there is a functional feedback loop for the mechanism for supporting scientifically and technically collaboration	A lot of information on surveillance and surveillance outputs are presented during OHP meetings/workshops, however the attendance of the relevant actors is too low for the feedback loop to be properly functional. This is especially since OHP isn't dedicated to AMR, hence the institution representative isn't always an AMR actor (informant).

E. Training to support collaboration

Quote the document or informants 'narrative and state into brackets the source of the information

If you consider that training is not necessary because the collaborative modalities do not require specific skills from operational actors, justify it and skip to part F:

1. Describe briefly the planned initial training content and format for operating actors involved in collaborative activities	
2. List the operating actors involved in collaborative activities who had access to an initial training and specify if the timeframe was appropriate	
3. Describe briefly the planned ongoing training content and format for operating actors involved in collaborative activities	
4. List the operating actors involved in collaborative activities who had access to an ongoing training and specify if the timeframe was appropriate	

F. System knowledge in the multi-sectoral surveillance system **Quote the document or informants' narrative and state into brackets the source of the information**	
1. Identify if there is an institutional memory and, if relevant, briefly describe its content	OHP database can be considered as an institutional memory. They follow up on all activities related to ABR and maintain an extended data base on research undertaken in Vietnam. Accessible document: official governmental documents (especially from MARD, MOH and research institutes) and published surveillance and research results. missing documents: bilateral agreements between institutions, raw data.
2. List actors and end-users who have access to the institutional memory	Most stakeholders have access to the institutional memory; however, some stakeholders do not consider OHP database as an institutional memory and hence don't use it (Informant)
3. Describe the information produced by the collaborative surveillance system	Surveillance of AMR in hospitals data: not reliable and representative, not shared (informant transcript) AMR surveillance in food-producing animals data: pilot phase, so surveillance during only 6 months in 3 provinces (informant transcript). AMU surveillance result haven't been produced or communicated (informant transcript) No other information seems to have been produced by the collaborative surveillance system.
4. Describe the information being communicated internally (feedback to surveillance actors) and externally (end-users, including decision-makers) by its content, format and intended recipient	The sectoral information produced is currently shared during workshops where different categories of stakeholders and end-users are gathered. No attempt to tailor the information to the different categories of actors and end-users has been observed and the information shared across sectors seems to be mainly appropriate for researchers. (informant) The collaborative surveillance system is designed to protect public health and it does not meet expectation of some actors in the animal sector (Vets, sub-DAH) who would be more interested in also having AST results in pathogenic bacteria for animal (informant)

G. Performance and evaluation of collaboration **Quote the document or informants 'narrative and state into brackets the source of the information**	
1. Identify and describe the specific performance indicators of collaboration	Not identified
2. List all the periodic internal evaluation of collaboration that have been conducted and specify their frequency and the methodology used	ATLASS evaluation of the NCVHI 1 by FAO done in 2017: sectoral evaluation of laboratory capacity and looking a bit at collaboration.
3. List all the periodic external evaluation of collaboration that have been conducted and specify their frequency and the methodology used	No internal evaluation of collaboration identified.
4. Identify the implemented corrective measures after the evaluations (if relevant)	Not relevant

3. Operation of collaboration in a multisectoral surveillance system

Operationalisation of the planned collaborative modalities through the implementation of collaborative surveillance activities at the different steps of the surveillance process

A. Collaborative activities for surveillance design

Check as non-relevant and skip this part if there isn't a defined modality planned and if there is no collaborative activity implemented at this step of the surveillance process

☐ **Relevant** ☒ **Non-Relevant**

Quote the document or informants' narrative and state into brackets the source of the information

1. Identify the collaborative activities implemented at this step of the surveillance process and their corresponding outputs	
2. Identify the available financial, human, material resources for the implementation of the collaborative activities at this surveillance step	
3. Identify the elements of the local context affecting the implementation and well-functioning of the collaborative activities at this surveillance step	

B. Collaborative activities for sampling ***Check as non-relevant and skip the following question if it isn't a defined modality and there is no collaborative activity at this step of the surveillance process*** ☐ **Relevant** ☒ **Non-Relevant** **Quote the document or informants 'narrative and state into brackets the source of the information**	
1. Identify the collaborative activities implemented at this step of the surveillance process and their corresponding outputs	
2. Identify the available financial, human, material resources for the implementation of the collaborative activities at this surveillance step	
3. Identify the elements of the local context affecting the implementation and well-functioning of the collaborative activities at this surveillance step	

C. Collaborative for laboratory testing ***Check as non-relevant and skip the following question if it isn't a defined modality and there is no collaborative activity at this step of the surveillance process*** ☐ **Relevant** ☒ **Non-Relevant** **Quote the document or informants' narrative and state into brackets the source of the information**	
1. Identify the collaborative activities implemented at this step of the surveillance process and their corresponding outputs	
2. Identify the available financial, human, material resources for the implementation of the collaborative activities at this surveillance step	
3. Identify the elements of the local context affecting the implementation and well-functioning of the collaborative activities at this surveillance step	

D. Collaborative activities for data sharing ***Check as non-relevant and skip the following question if it isn't a defined modality and there is no collaborative activity at this step of the surveillance process*** ☒ **Relevant** ☐ **Non-Relevant** **Quote the document or informants 'narrative and state into brackets the source of the information**	
1. Identify the collaborative activities implemented at this step of the surveillance process and their corresponding outputs	**No activity has been implemented so far**
2. Identify the available financial, human, material resources for the implementation of the collaborative activities at this surveillance step	
3. Identify the elements of the local context affecting the implementation and well-functioning of the collaborative activities at this surveillance step	

E. Collaborative activities for information sharing ***Check as non-relevant and skip the following question if it isn't a defined modality and there is no collaborative activity at this step of the surveillance process*** ☒ **Relevant** ☐ **Non-Relevant** **Quote the document or informants' narrative and state into brackets the source of the information**	
1. Identify the collaborative activities implemented at this step of the surveillance process and their corresponding outputs	Many workshops or meetings are organised: not dedicated to AMR, not all participate end the frequency of workshop/dedicated to surveillance is around one/two a year, allowing only passive information sharing (if there is a presentation on surveillance results). Example: during the follow up meeting of the GAP, there was a will to create working groups to exchange information, but those working group were sectoral and, in the end, even if they were planned, they didn't occur, as actors were not available. (informant)
2. Identify the available financial, human, material resources for the implementation of the collaborative activities at this surveillance step	Sectoral resources used: sending human resources to meetings and workshop, allocating additional resources when organising meetings and/or workshops to be able to invite actors of the collaborative surveillance system from a different surveillance component and/or sector. (informant)
3. Identify the elements of the local context affecting the implementation and well-functioning of the collaborative activities at this surveillance step	A lot of information is also shared not formally as many of the actors are linked (went to school together, friends…) hence it is difficult to really know what information is being transferred and what people know or not. (informant)

F. Collaborative activities for data management and storage ***Check as non-relevant and skip the following question if it isn't a defined modality and there is no collaborative activity at this step of the surveillance process*** ☐ **Relevant** ☒ **Non-Relevant** **Quote the document or informants 'narrative and state into brackets the source of the information**	
1. Identify the collaborative activities implemented at this step of the surveillance process and their corresponding outputs	**No activity has been implemented so far**
2. Identify the available financial, human, material resources for the implementation of the collaborative activities at this surveillance step	
3. Identify the elements of the local context affecting the implementation and well-functioning of the collaborative activities at this surveillance step	

G. Collaborative activities for data analysis and interpretation

Check as non-relevant and skip the following question if it isn't a defined modality and there is no collaborative activity at this step of the surveillance process

☒ **Relevant** ☐ **Non-Relevant**

Quote the document or informants' narrative and state into brackets the source of the information

1. Identify the collaborative activities implemented at this step of the surveillance process and their corresponding outputs	
2. Identify the available financial, human, material resources for the implementation of the collaborative activities at this surveillance step	
3. Identify the elements of the local context affecting the implementation and well-functioning of the collaborative activities at this surveillance step	

H. Collaborative activities for external communication

Check as non-relevant and skip the following question if it isn't a defined modality and there is no collaborative activity at this step of the surveillance process

☒ **Relevant** ☐ **Non-Relevant**

Quote the document or informants 'narrative and state into brackets the source of the information

1. Identify the collaborative activities implemented at this step of the surveillance process and their corresponding outputs	
2. Identify the available financial, human, material resources for the implementation of the collaborative activities at this surveillance step	
3. Identify the elements of the local context affecting the implementation and well-functioning of the collaborative activities at this surveillance step	

I. Collaborative activities for external communication ***Check as non-relevant and skip the following question if it isn't a defined modality and there is no collaborative activity at this step of the surveillance process*** ☒ **Relevant** ☐ **Non-Relevant** **Quote the document or informants' narrative and state into brackets the source of the information**	
1. Identify the collaborative activities implemented at this step of the surveillance process and their corresponding outputs	"AMR awareness week": once a year, not tailored information to stakeholders, not specific to the communication AMR surveillance results (and no results for the moment) => outputs unidentified (informant transcript) The communication of the results to international partners such (FAO/ OIE/ WHO): AMU from animal side to OIE once (not a surveillance result but a one-year analysis results(informant)
2. Identify the available financial, human, material resources for the implementation of the collaborative activities at this surveillance step	Outside of "AMR awareness week", the communication is done by sectors: no additional funds, lack of human resources, no technical competencies in communication (informant transcript)
3. Identify the elements of the local context affecting the implementation and well-functioning of the collaborative activities at this surveillance step	No surveillance results ready to be communicated (informant transcript)

J. Collaborative activities for dissemination ***Check as non-relevant and skip the following question if it isn't a defined modality and there is no collaborative activity at this step of the surveillance process*** ☒ **Relevant** ☐ **Non-Relevant** **Quote the document or informants 'narrative and state into brackets the source of the information**	
1. Identify the collaborative activities implemented at this step of the surveillance process and their corresponding outputs	There are currently no activities implemented for joint dissemination which isn't appropriate regarding the collaborative modalities defined.
2. Identify the available financial, human, material resources for the implementation of the collaborative activities at this surveillance step	Unused tool: OHP platform (informant) no other human, financial and material resources to support joint dissemination activities (informant transcript)
3. Identify the elements of the local context affecting the implementation and well-functioning of the collaborative activities at this surveillance step	No surveillance results ready to be communicated (informant transcript)

DELAVENNE Camille

TITRE : EVALUATION DES COLLABORATIONS DANS LES SYSTEMES DE SURVEILLANCE « ONE HEALTH ». CAS D'ETUDE DE LA SURVEILLANCE DE L'ANTIBIORESISTANCE AU VIETNAM.

Thèse d'État de Doctorat Vétérinaire : Lyon, le 22 novembre 2018

RESUME :

L'application du concept « One Health » à la surveillance des dangers sanitaires à l'interface homme-animal-environnement est aujourd'hui largement promue, mais les collaborations intersectorielles et interdisciplinaires qu'elle requiert restent difficiles à mettre en œuvre. Cette étude vise à développer un outil d'évaluation de l'organisation et du fonctionnement des collaborations dans les systèmes de surveillance One Health, afin d'aider à identifier leurs forces et faiblesses.

L'étude est divisée en trois étapes : (i) la définition des attributs permettant d'évaluer les collaborations dans un système de surveillance et leur validation par élicitation d'opinion d'experts, (ii) le développement d'un outil d'évaluation des collaborations dans les systèmes de surveillance One Health et (iii) l'application de l'outil à l'évaluation des collaborations dans le système de surveillance de l'antibiorésistance au Vietnam.

L'outil développé est une matrice d'évaluation composée de 78 critères qui peuvent être évalués semi-quantitativement de 0 à3 grâce à un grille de notation. La matrice produit 3 représentations graphiques permettant de visualiser : (i) les attributs d'organisation et de fonctionnement des collaborations, (ii) les indicateurs macros des collaborations et (iii) les attributs de fonctions, afin d'accompagner l'évaluateur dans l'interprétation des résultats de l'évaluation. Un guide d'utilisation et un protocole de recueil des données ont également été développés pour standardiser la procédure d'évaluation. L'application de l'outil à l'évaluation des collaborations dans le système de surveillance de l'antibiorésistance au Vietnam est une première étape vers la validation et l'opérationnalisation de cet outil d'évaluation innovant.

MOTS CLES :

- Surveillance
- Évaluation
- Santé animale
- Santé publique
- Résistance aux antibiotiques

JURY :

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