



When silos cannot be broken: Rethinking integration and coexistence in one health

Júlio Belo Fernandes^{a,b,*}

^a Egas Moniz Center for Interdisciplinary Research (CiüEM), Egas Moniz School of Health & Science, 2829-511 Caparica, Almada, Portugal

^b Nurs* Lab, 2829-511 Caparica, Almada, Portugal

ARTICLE INFO

Keywords:

One health
Silos
Interdisciplinary collaboration
Governance
Systems integration
Epistemology
Bridge-building

ABSTRACT

One Health is increasingly promoted as a collaborative approach for addressing interconnected challenges across human, animal, and environmental health. Central to this vision is the recurrent call to “break down silos” between disciplines, sectors, and institutions. This article critically examines the assumptions underlying the “breaking down silos” narrative and argues that silos should not be understood solely as barriers to collaboration. They also function as repositories of expertise, accountability structures, and mechanisms that sustain institutional coherence. The analysis explores how institutional, disciplinary, data, geographical, and cultural silos influence One Health practice. Rather than eliminating silos, the challenge lies in developing sustainable bridges that support coordination while preserving specialised expertise. These bridges include technical, relational, and governance mechanisms that sustain collaboration across systems. Ultimately, One Health may be better understood as a process of negotiating productive coexistence across diverse forms of knowledge and governance.

1. Introduction

Calls for collaborative action across human, animal, and environmental health have positioned One Health as an important approach for responding to increasingly complex global challenges [1,2]. Over recent years, One Health, as a field of thought and practice, has made important conceptual advances, yet translating these principles into concrete action is challenging [3–5]. Collaboration across sectors and disciplines is shaped not only by goodwill or shared goals, but by structural, organisational, political, and epistemological boundaries that influence how actors communicate, govern, and make decisions [5].

These boundaries, commonly described as “silos”, emerge across institutions, disciplines, governance systems, information infrastructures, and cultural frameworks [3–7]. Within One Health discourse, silos are frequently portrayed as barriers that should be “broken” to enable integration and collaboration [7–9].

This article critically examines the assumptions underlying the “breaking down silos” narrative in One Health and explores how sustainable bridges between systems can support coordination while preserving specialised expertise and institutional coherence.

2. Understanding silos in one health

In practice, the One Health landscape is shaped by multiple overlapping forms of siloisation. Institutional, sectoral, disciplinary and epistemological, data, geographical, and cultural/value-based silos each create distinct but interconnected barriers to coordination, shaping how knowledge, authority, information, and action are organised across One Health systems.

Institutional silos are among the most visible [3,4,10]. Ministries, agencies, and organisations operate under distinct legal mandates, funding mechanisms, accountability systems, and reporting structures. Health ministries may prioritise clinical preparedness; agriculture ministries, livestock productivity and food safety; and environment ministries, biodiversity and ecosystem protection. These institutions often work in parallel, with limited mechanisms for coordination and shared decision-making. As a result, even when problems are recognised as interconnected, governance structures remain fragmented. Importantly, these institutional divisions also reflect historical distributions of authority and legitimacy that influence which actors define priorities and shape One Health agendas.

Sectoral silos introduce additional challenges for cross-sector collaboration, as public institutions, private organisations, academia,

* Corresponding author at: Campus Universitário, Quinta da Granja, 2829-511 Monte de Caparica, Almada, Portugal.

E-mail address: jfernandes@egasmoniz.edu.pt.

<https://doi.org/10.1016/j.onehlt.2026.101522>

Received 15 May 2026; Received in revised form 13 July 2026; Accepted 15 July 2026

Available online 16 July 2026

2352-7714/© 2026 The Author(s). Published by Elsevier B.V. This is an open access article under the CC BY-NC license (<http://creativecommons.org/licenses/by-nc/4.0/>).

and field services often operate according to different priorities, incentives, and timelines [3,4,10]. Public sector actors are typically oriented towards regulation, enforcement, and long-term policy cycles; private organisations respond primarily to market demands and profit-driven timelines; academic institutions are shaped by research funding cycles, publication requirements, and disciplinary reward systems; and field services, including non-governmental organisations and community-based programmes, are driven by immediate operational needs and donor-defined targets [10–12]. These divergent logics mean that even actors who share a common commitment to One Health may pursue misaligned strategies, complicating the negotiation of joint priorities and the pooling of resources across sectors.

Disciplinary and epistemological silos reflect the coexistence of different scientific worldviews [9,13]. Biomedical sciences tend to prioritise mechanistic explanations and clinical outcomes, ecological sciences systems dynamics and interdependence, while social sciences emphasise behavioural, socio-cultural, political, and economic dimensions. Although this diversity enriches understanding, it also creates difficulties when actors must interpret evidence produced outside their epistemic traditions. Importantly, not all forms of expertise occupy equal positions within One Health governance. Biomedical, epidemiological, quantitative, and surveillance-oriented approaches often dominate policy and operational systems, while relational, contextual, qualitative, and practice-based forms of knowledge may remain comparatively peripheral despite their relevance for implementation, trust, and community engagement [4,5].

Data silos remain a major operational obstacle because surveillance and information systems are often developed independently, using incompatible standards, which restricts information exchange and limits coordinated responses [3]. Human health, animal health, and environmental monitoring agencies frequently rely on distinct taxonomies, case definitions, and reporting formats, housed in IT systems that were not designed to interoperate [14]. As a result, a signal detected within one system may not be readily cross-referenced with laboratory data on animal disease or with environmental monitoring records, delaying the recognition of interconnected events and weakening early-warning capacity across the human–animal–environment interface.

Geographical silos create further obstacles to cross-jurisdictional collaboration, particularly for transboundary threats such as wildlife migration, infectious diseases, and environmental contamination [3,15]. Administrative boundaries rarely coincide with ecological or epidemiological systems: a shared watershed, migratory corridor, or disease reservoir may span several countries or sub-national regions, each with its own regulatory frameworks, surveillance capacities, and reporting obligations [16,17]. Consequently, a threat identified and acted upon in one jurisdiction may go unrecognised or unaddressed just across an administrative line, allowing spread to continue despite localised awareness.

Cultural and value-based silos also shape how communities and institutions interpret health, risk, and human–animal–environment relationships, influencing responses to conservation, disease control, and public health interventions [18]. Communities may hold beliefs about animals, land, and disease causation that differ substantially from biomedical or regulatory framings [19,20]. When interventions are designed without engaging these locally embedded understandings, they risk being perceived as illegitimate or coercive, undermining trust and reducing the likelihood of sustained cooperation.

Taken together, these forms of siloisation shape and often constrain the operationalisation of One Health. They cannot simply be “broken down” because they sustain expertise, accountability, and institutional coherence. The challenge for One Health is therefore not elimination but connection: developing relational, organisational, and sociotechnical bridges that enable coordination across distinct systems while preserving specialised knowledge and institutional responsibilities.

3. Why the “breaking down silos” narrative falls short

When we advocate for the elimination of silos, such calls often rest on assumptions that do not reflect the complexity of real systems. One assumption is that integration will emerge naturally once boundaries are removed. However, coordination requires explicit governance structures, communication pathways, and operational tools [21,22]; it does not arise spontaneously, even when actors share common goals.

A second assumption is that collaboration can occur smoothly without identity tensions. However, different disciplines, sectors, and institutions interpret problems through distinct conceptual and operational lenses. Without mechanisms to translate these perspectives, misunderstandings, friction, and inconsistent priorities are inevitable [10,23].

Another common assumption is that uniformity enhances collaboration. In reality, when identities, professional, institutional, disciplinary, or cultural, are threatened, actors tend to reinforce their boundaries to protect autonomy and legitimacy [24]. This defensive posture undermines the potential for cooperation and reduces the openness required for genuine collaboration.

Finally, the idea that silos themselves are the core problem oversimplifies a multifaceted issue. Silos perform indispensable functions: they enable accountability, preserve quality standards, maintain specialised knowledge, and support organisational coherence. The real challenge is the lack of bridges that enable these silos to work in concert without eroding the identities and expertise embedded within them.

4. Building bridges

If silos represent repositories of expertise and governance, bridges represent the mechanisms that enable coordination. Effective One Health practice depends less on dismantling silos than on strengthening the interfaces between them through sustained organisational, relational, and governance mechanisms [5].

Bridges may include interoperable information systems, integrated surveillance platforms, shared terminology, joint analytical frameworks, and cross-sector review mechanisms that support information exchange and operational alignment across systems [1,25]. However, technical interoperability alone does not guarantee collaborative culture, epistemological alignment, or mutual trust. Different sectors and disciplines may continue to interpret shared information through distinct priorities, values, and operational logics, even when connected through common infrastructures.

Bridges must therefore also operate relationally through communities of practice, joint research teams, interprofessional education, mentorship networks, and long-term collaborative structures that cultivate trust, reciprocal legitimacy, and shared understanding across disciplines and institutions [23]. Importantly, strong relational collaboration may persist despite technical fragmentation, while highly integrated infrastructures may still fail to produce meaningful cooperation in the absence of trust and shared interpretative frameworks.

Bridge-building is also not politically neutral. Some actors and sectors may possess greater capacity to define shared terminology, establish operational standards, shape collaborative agendas, or determine which forms of expertise become prioritised within integrated systems. As a result, bridges themselves may reproduce asymmetries of influence and legitimacy if governance mechanisms fail to ensure equitable participation across disciplines and sectors.

Bridges may additionally take the form of co-created frameworks, including integrated surveillance systems, multisector emergency response protocols, One Health competency frameworks, and joint guidelines [5]. These structures support collective action while preserving disciplinary and institutional autonomy. Sustainable collaboration, therefore, depends not only on integration mechanisms but also on governance structures capable of maintaining dialogue, negotiating differences, and managing tensions between autonomy and

coordination over time.

Reframing silos as reservoirs of expertise rather than obstacles to cooperation offers a more realistic basis for operationalising One Health. Each silo contains distinct forms of knowledge, methods, standards, and values that illuminate different facets of complex problems. The challenge is therefore not to erase these distinctions, but to create bridges capable of mobilising them in coordinated ways.

However, not all forms of siloisation are equally constructive. Some forms of differentiation support clarity of expertise, accountability, and methodological rigour. Others become maladaptive when boundaries inhibit systems' learning, delay coordination, restrict information flow, or reinforce incompatible priorities during periods of urgency and complexity. The challenge, therefore, is not simply to preserve silos but to distinguish between productive differentiation and dysfunctional isolation. Effective One Health systems depend not on eliminating expertise boundaries, but on ensuring that they remain sufficiently open, reflexive, and responsive to support collective action under changing conditions.

5. What it means to live with silos

Recognising silos as structural, cultural, and epistemological realities within One Health leads to an uncomfortable but necessary reflection: perhaps integration has been imagined as a destination when, in fact, it is better understood as a process of continuous negotiation. The coexistence of diverse systems, each with its own history, norms, and mandates, means that One Health operates in a terrain where complete unity is neither attainable nor desirable. If silos provide stability, coherence, and identity, then the aspiration for integration risks overlooking the complexities that make collective action challenging and meaningful.

What emerges is not a simple question of how to overcome silos, but rather how to inhabit a world in which they will continue to exist. This raises deeper considerations: how do systems maintain their distinctiveness while remaining open to influence? How can different ways of knowing coexist without being forced into uniformity? And what forms of relationship might allow separate structures to work together without collapsing into each other?

Rather than treating fragmentation as a failure, it may be more productive to consider it an inherent characteristic of multifaceted health systems. Fragmentation reflects the plurality of evidence, values, responsibilities, and worldviews. The challenge then is not to erase this plurality but to understand what it enables and what it constrains. It invites us to consider how moments of connection emerge, how they are sustained, and how they are shaped by the very boundaries they seek to traverse.

This perspective opens space for a more nuanced appreciation of One Health itself. Its strength does not lie in achieving seamless integration but in cultivating the capacity to engage with difference, consistently, respectfully, and reflexively. Such an understanding shifts the focus from imagining a world without silos to asking what kinds of relationships become possible when we acknowledge their permanence. The future of One Health may depend less on dismantling the structures that separate us and more on deepening our understanding of how we navigate the spaces in between.

Parte superior do formulário.

CRedit authorship contribution statement

Júlio Belo Fernandes: Writing – review & editing, Writing – original draft, Conceptualization.

Consent for publication

Not applicable.

Ethics approval and consent to participate

Not applicable.

Funding

This work was supported by FCT - Fundação para a Ciência e Tecnologia, I.P. by project reference UID/4585/2025 and DOI identifier <https://doi.org/10.54499/UID/04585/2025>

Declaration of competing interest

The author declares that he has no competing interests.

Data availability

No data was used for the research described in the article.

References

- [1] FAO, UNEP, WHO, WOA, One Health Joint Plan of Action (2022–2026): Working Together for the Health of Humans, Animals, Plants and the Environment, FAO, Rome, 2022, <https://doi.org/10.4060/cc2289en>.
- [2] A.S. Winkler, C.M. Brux, H. Carabin, C.G. das Neves, B. Häslér, J. Zinsstag, et al., The lancet one health commission: harnessing our interconnectedness for equitable, sustainable, and healthy socioecological systems, *Lancet* 406 (2025) 501–570, [https://doi.org/10.1016/S0140-6736\(25\)00627-0](https://doi.org/10.1016/S0140-6736(25)00627-0).
- [3] D.S. Yopa, D.M. Massom, G.M. Kiki, W.R. Sophie, S. Fasine, O. Thiam, et al., Barriers and enablers to the implementation of one health strategies in developing countries: a systematic review, *Front. Public Health* 11 (2023) 1252428, <https://doi.org/10.3389/fpubh.2023.1252428>.
- [4] C. Dos S Ribeiro, L.H.M. van de Burgwal, B.J. Regeer, Overcoming challenges for designing and implementing the one health approach: a systematic review of the literature, *One Health* 7 (2019) 100085, <https://doi.org/10.1016/j.onehlt.2019.100085>.
- [5] J.B. Fernandes, Why one health struggles: a critical analysis, *One Health* 22 (2026) 101379, <https://doi.org/10.1016/j.onehlt.2026.101379>.
- [6] J.B. Fernandes, D. Sousa-Catita, J. Fonseca, Nutrition as a missing link in one health: from conceptual invisibility to strategic action, *Front. Nutr.* 13 (2026) 1884842, <https://doi.org/10.3389/fnut.2026.1884842>.
- [7] J.B. Fernandes, D. Vareta, Can nursing strengthen one health initiatives? *One Health* 21 (2025) 101288 <https://doi.org/10.1016/j.onehlt.2025.101288>.
- [8] Q. Zhong, F. Fouque, Break down the silos: a conceptual framework on multisectoral approaches to the prevention and control of vector-borne diseases, *J. Infect. Dis.* 222 (Suppl. 8) (2020) S732–S737, <https://doi.org/10.1093/infdis/jiaa344>.
- [9] A. Antonielli, C. Flamand, Integrating one health: beyond buzzwords and silos, *One Health* 21 (2025) 101174, <https://doi.org/10.1016/j.onehlt.2025.101174>.
- [10] K.L. Bardosh, J.C. Scoones, D. Grace, G. Kalema-Zikusoka, K.E. Jones, K. de Balogh, et al., Engaging research with policy and action: what are the challenges of responding to zoonotic disease in Africa? *Philos. Trans. R. Soc. Lond. Ser. B Biol. Sci.* 372 (1725) (2017) 20160172, <https://doi.org/10.1098/rstb.2016.0172>.
- [11] K.M. Pepin, K. Carlisle, D. Anderson, M.G. Baker, R.B. Chipman, J. Benschop, et al., Steps towards operationalizing one health approaches, *One Health* 18 (2024) 100740, <https://doi.org/10.1016/j.onehlt.2024.100740>.
- [12] G.C. Gray, J.A.K. Mazet, To succeed, one health must win animal agriculture's stronger collaboration, *Clin. Infect. Dis.* 70 (3) (2020) 535–537, <https://doi.org/10.1093/cid/ciz729>.
- [13] K.R. Manlove, J.G. Walker, M.E. Craft, K.P. Huyvaert, M.B. Joseph, R.S. Miller, et al., "One health" or three? Publication silos among the one health disciplines, *PLoS Biol.* 14 (4) (2016) e1002448, <https://doi.org/10.1371/journal.pbio.1002448>.
- [14] J. George, B. Häslér, I. Mremi, C. Sindato, L. Mboera, M. Rweyemamu, et al., A systematic review on integration mechanisms in human and animal health surveillance systems with a view to addressing global health security threats, *One Health Outlook* 2 (2020) 11, <https://doi.org/10.1186/s42522-020-00017-4>.
- [15] Y. Tu, B. Chen, C. Liao, S. Wu, J. An, C. Lin, et al., Inequality in infrastructure access and its association with health disparities, *Nat. Hum. Behav.* 9 (2025) 1669–1682, <https://doi.org/10.1038/s41562-025-02208-3>.
- [16] J.C. Blackwood, M.M. Malakhov, J. Duan, J.J. Pellett, I.S. Phadke, S. Lenhart, et al., Governance structure affects transboundary disease management under alternative objectives, *BMC Public Health* 21 (2021) 1782, <https://doi.org/10.1186/s12889-021-11797-3>.
- [17] J.D. Cook, E.H.C. Grant, H.S. Ginsberg, D.J. Prosser, M.C. Runge, Enhancing one health outcomes using decision science and negotiation, *Front. Ecol. Environ.* 23 (2025) e2827, <https://doi.org/10.1002/fee.2827>.
- [18] M. Wolf, Is there really such a thing as "one health"? Thinking about a more than human world from the perspective of cultural anthropology, *Soc. Sci. Med.* 129 (2015) 5–11, <https://doi.org/10.1016/j.socscimed.2014.06.018>.
- [19] H. Majiwa, S.A. Bukachi, D. Omia, E.M. Fèvre, Knowledge, perceptions, and practices around zoonotic diseases among actors in the livestock trade in the Lake

- Victoria crescent ecosystem in East Africa, *Front. Public Health* 11 (2024) 1199664, <https://doi.org/10.3389/fpubh.2023.1199664>.
- [20] L. Kallas-Silva, M.T. Couto, M.E.M. Soares, S.N. Ferreira-Silva, V.I. Avelino-Silva, Myths and misinformation associated with vaccine incompleteness: a survey study, *Patient Educ. Couns.* 131 (2025) 108556, <https://doi.org/10.1016/j.pec.2024.108556>.
- [21] Cross-agency One Health Task Force, Framework for Action 2024–2026, ECDC, Stockholm, 2024. <https://www.ecdc.europa.eu/sites/default/files/documents/cross-agency-one-health.pdf> (accessed 15 May 2026).
- [22] European Centre for Disease Prevention and Control, ECDC One Health Framework, ECDC, Stockholm, 2024. <https://www.ecdc.europa.eu/sites/default/files/documents/One-Health-Framework-Directors.pdf> (accessed 15 May 2026).
- [23] M. Hitziger, R. Esposito, M. Canali, M. Aragrande, B. Häsler, S.R. Rüegg, Knowledge integration in one health policy formulation, implementation and evaluation, *Bull. World Health Organ.* 96 (3) (2018) 211–218, <https://doi.org/10.2471/BLT.17.202705>.
- [24] J. Waring, G. Currie, Managing expert knowledge: organisational challenges and managerial futures for the UK medical profession, *Organ. Stud.* 30 (7) (2009) 755–778, <https://doi.org/10.1177/0170840609104819>.
- [25] WHO, FAO, WOA, Surveillance and Information Sharing Operational Tool: An Operational Tool of the Tripartite Zoonoses Guide, World Health Organization, Geneva, 2022.