STRATEGIC INTERACTIONS BETWEEN STAKEHOLDERS IN OH-AMR

Guillaume Lhermie[1,2], Lisa Vors[2], Lea Vitorino[2], Mehdi Berrada[2]

guillaume.lhermie@ucalgary.ca

1 University of Calgary, School of Public Policy
2 National Veterinary school of Toulouse, CIRAD

UNIVERSITY OF CALGARY | THE SCHOOL OF PUBLIC POLICY

THE SIMPSON CENTRE. THOUGHT FOR FOOD.

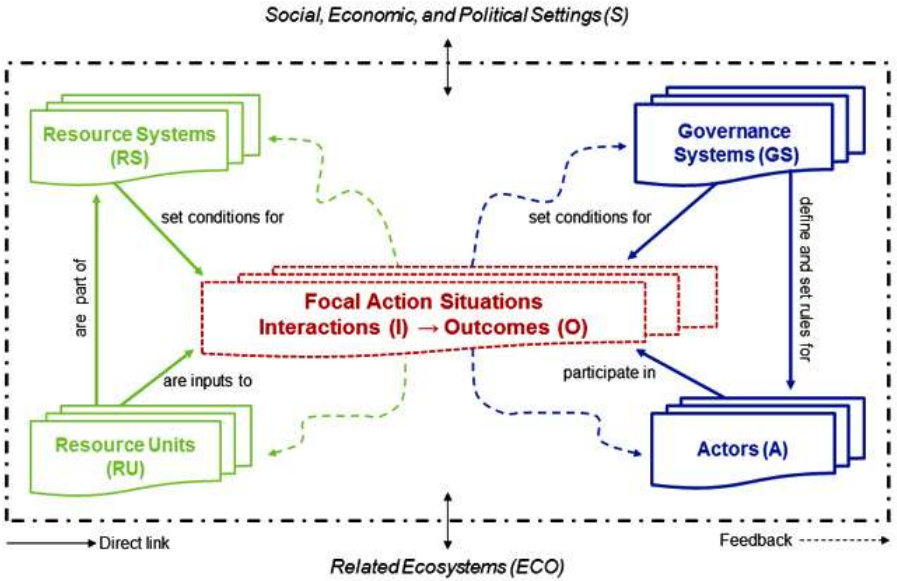
AMR One Health Consortium

Background and objectives

Mc Ginnis & Ostrom, 2014

Erasmus & Gilson, 2008

- Social-ecological system approach for conservation of bacteria susceptibility
  - Common pool resources
  - Actors



- Actors

Power Knowledge Experience Belief

Utility

- Interactions
  - Space and time bound
  - Individuals *vs* organizations
  - Micro-meso-macro
  - Position in the ecosystem

Measuring interactions in OH-AMR

- To evaluate the state of the OH-AMR policy agenda?

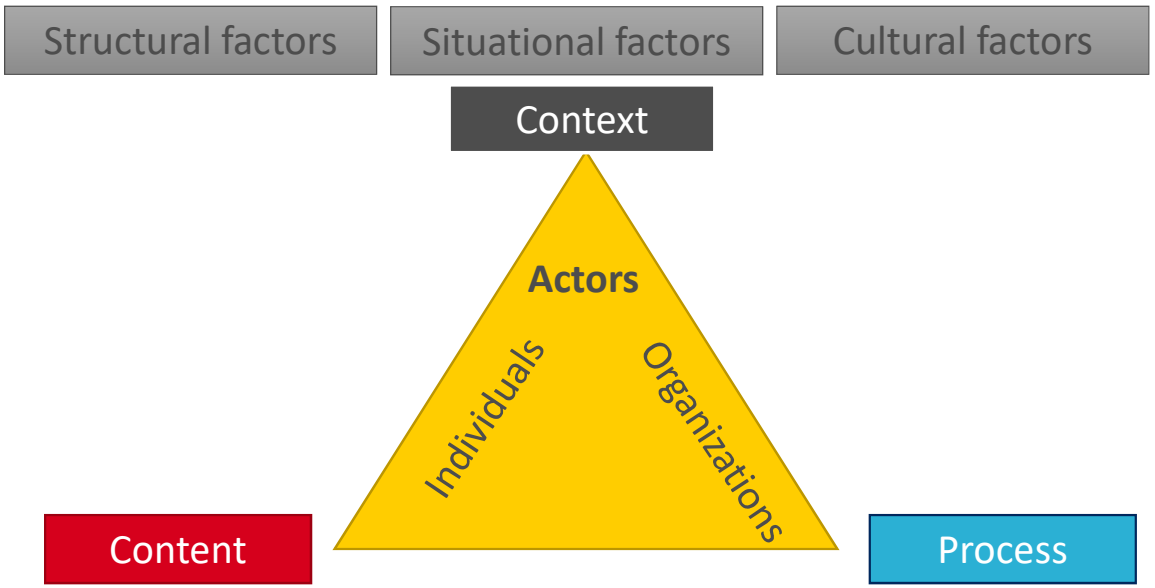
- To support policy implementation in OH-AMR

1. Evaluating the state of OH-AMR policy agenda

- What's in research?
- What's in the public sphere?

Policy triangle

Walt & Gilson, 1994



- Problem emergence
- Agenda setting
- Policy options
- Decision making
- Implementation
- Evaluation

Approach

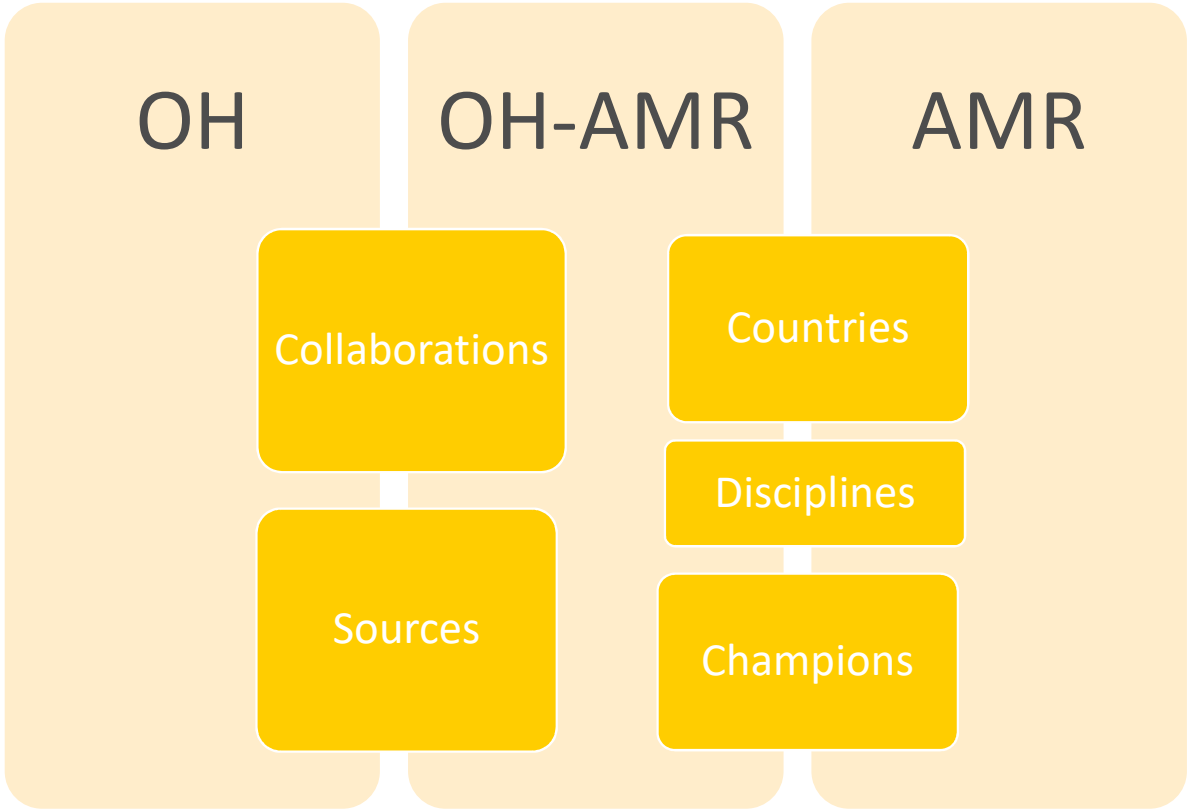
Vors et al., forthcoming

- Literature source

Clarivate Web of Science™

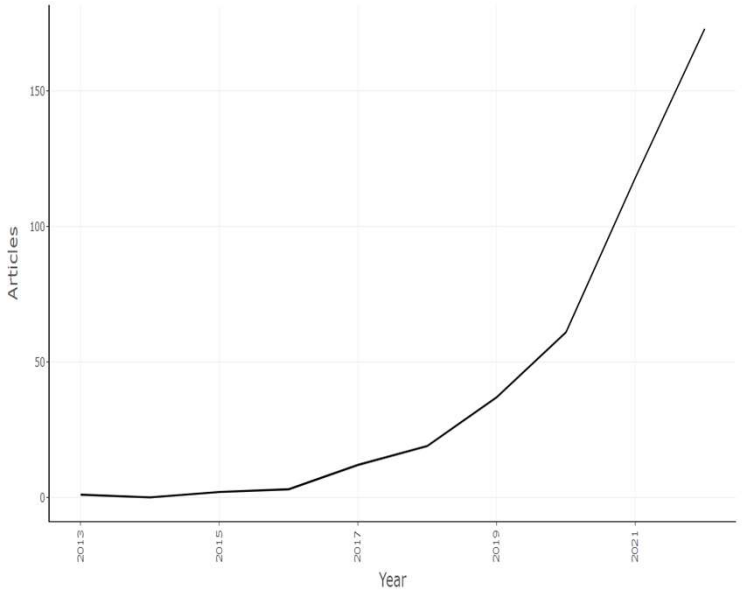
- Tool

BIBLIOMETRIX



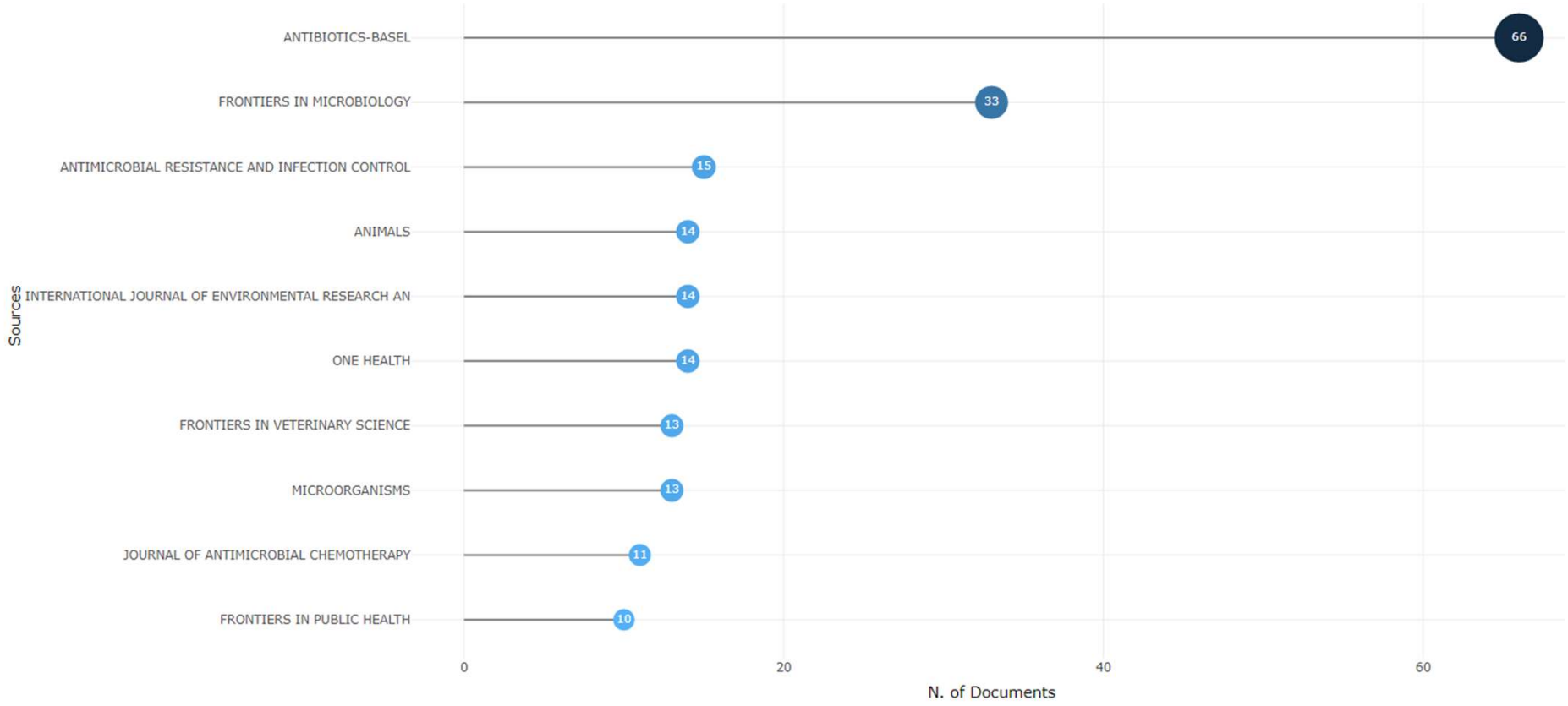
Main information

Timespan 2013:2023	Sources 186	Documents 499	Annual Growth Rate 50.85 %
Authors 3231	Authors of single-authored docs 13	International Co-Authorship 53.71 %	Co-Authors per Doc 7.88
Author's Keywords (DE) 1169	References 23905	Document Average Age 1.96	Average citations per doc 10.04

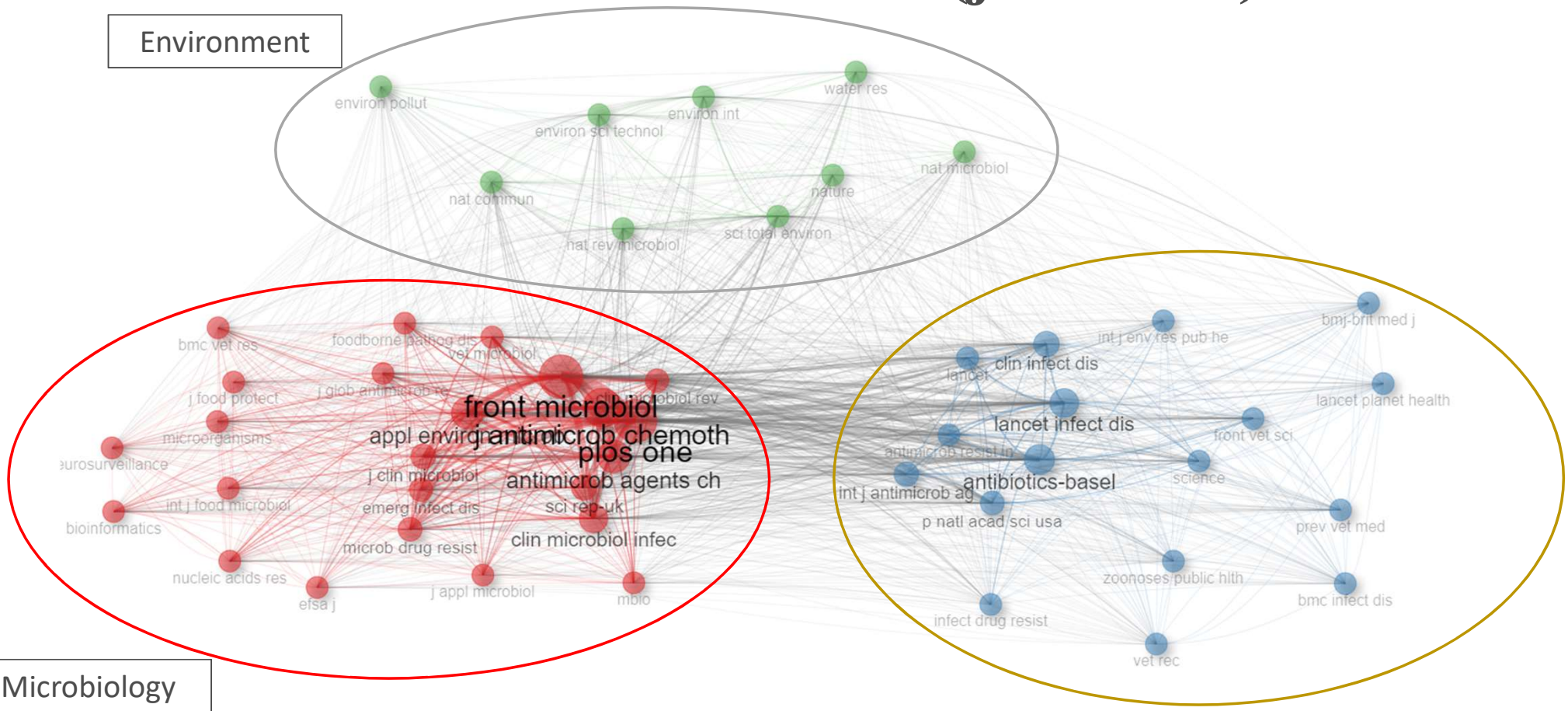


2022 : 173 publications

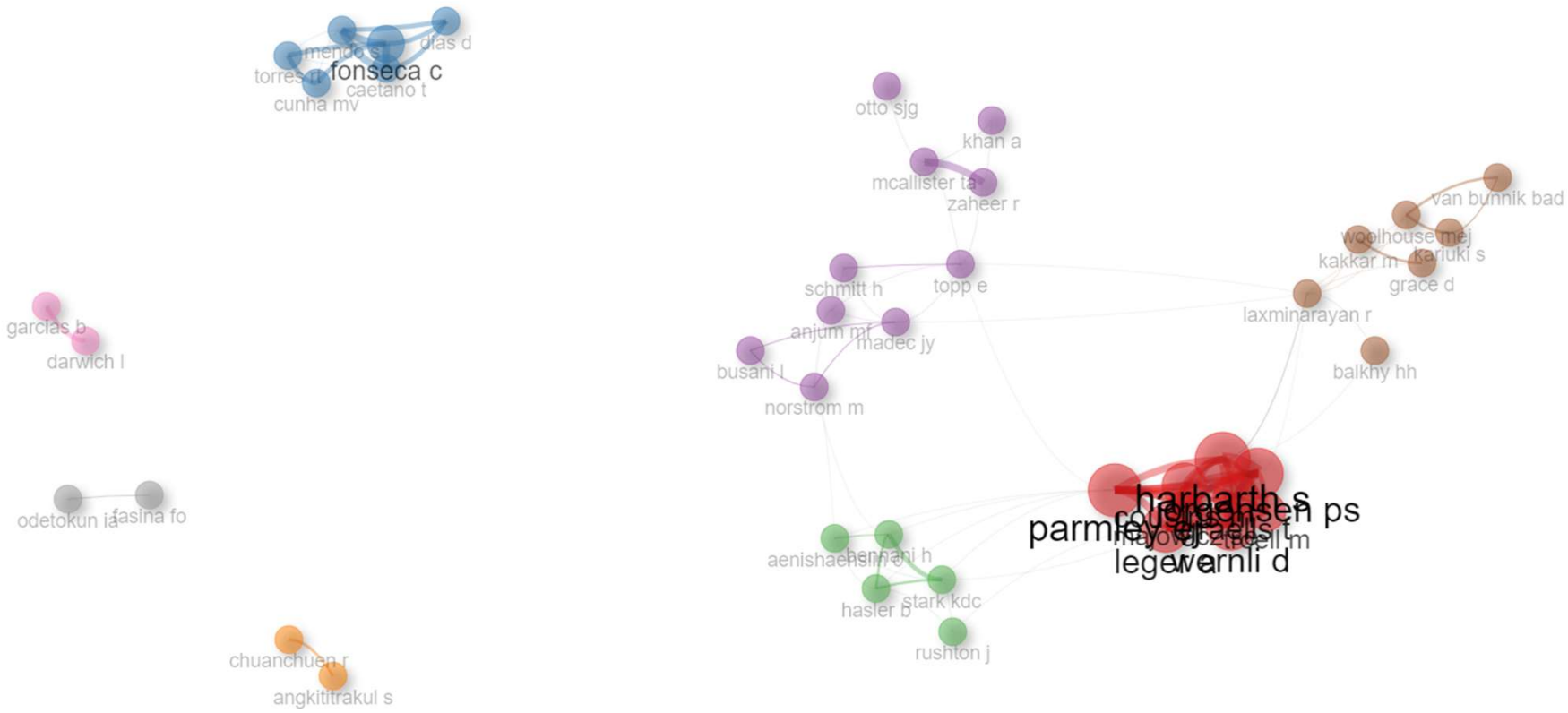
Most relevant sources



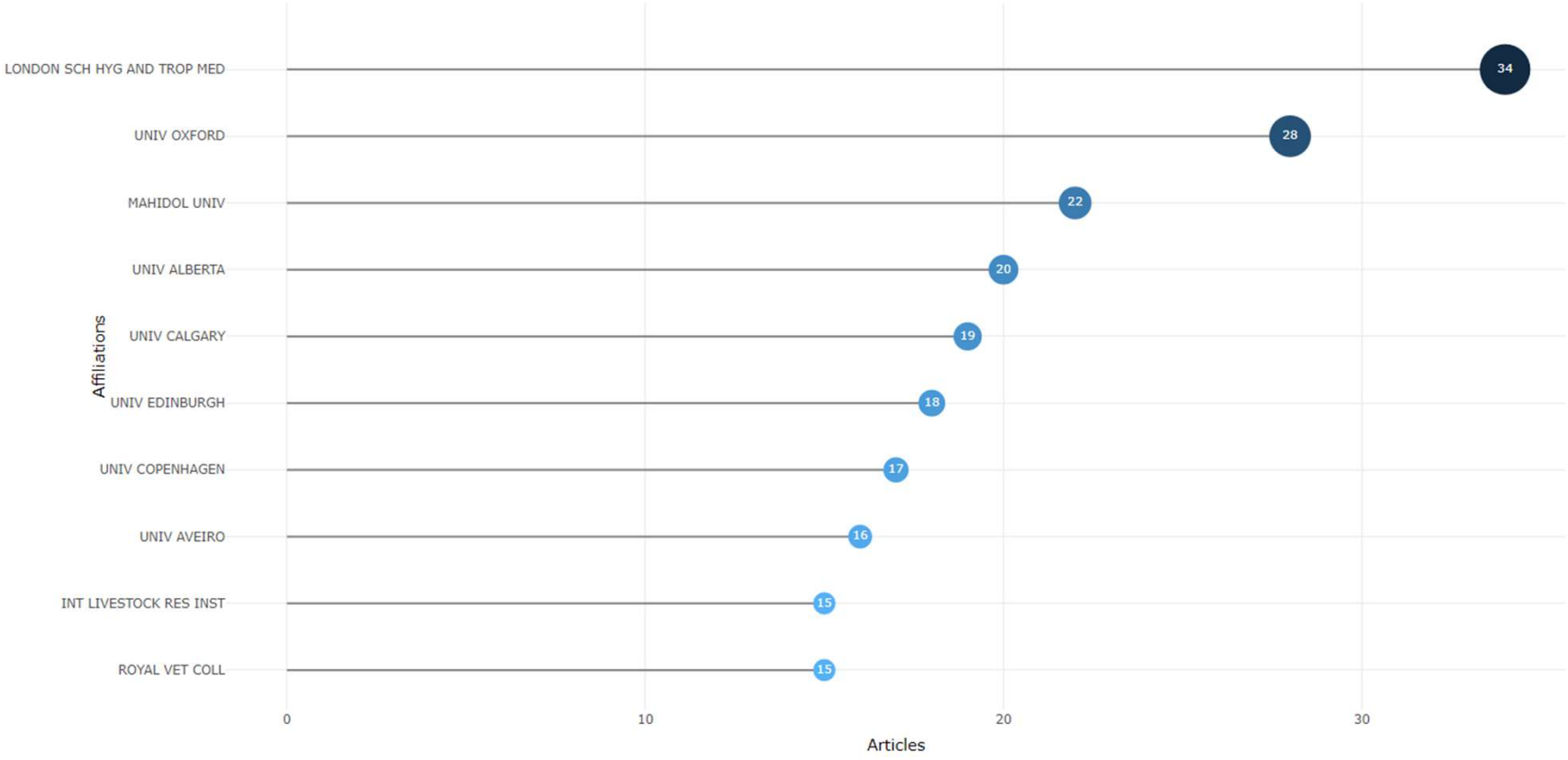
Co-citation Networks Sources (journals)



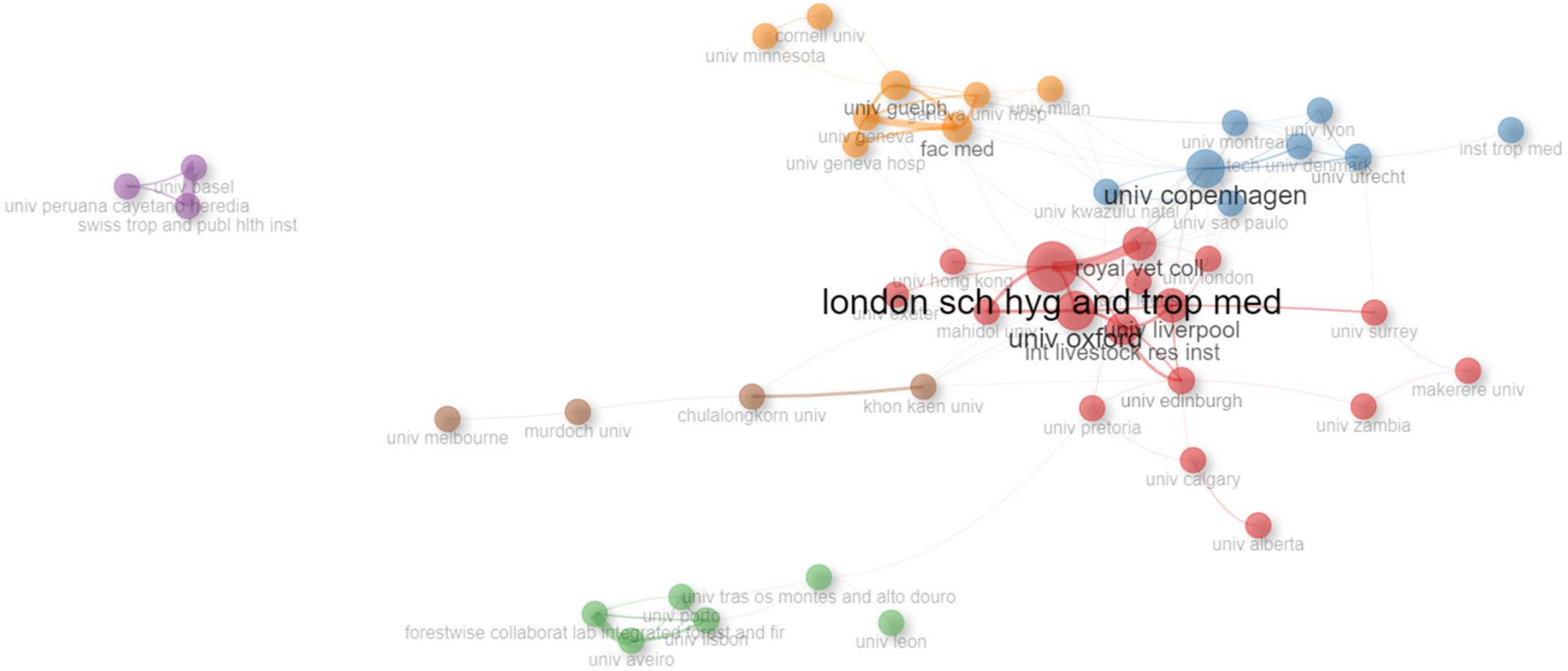
Collaboration Network - Authors



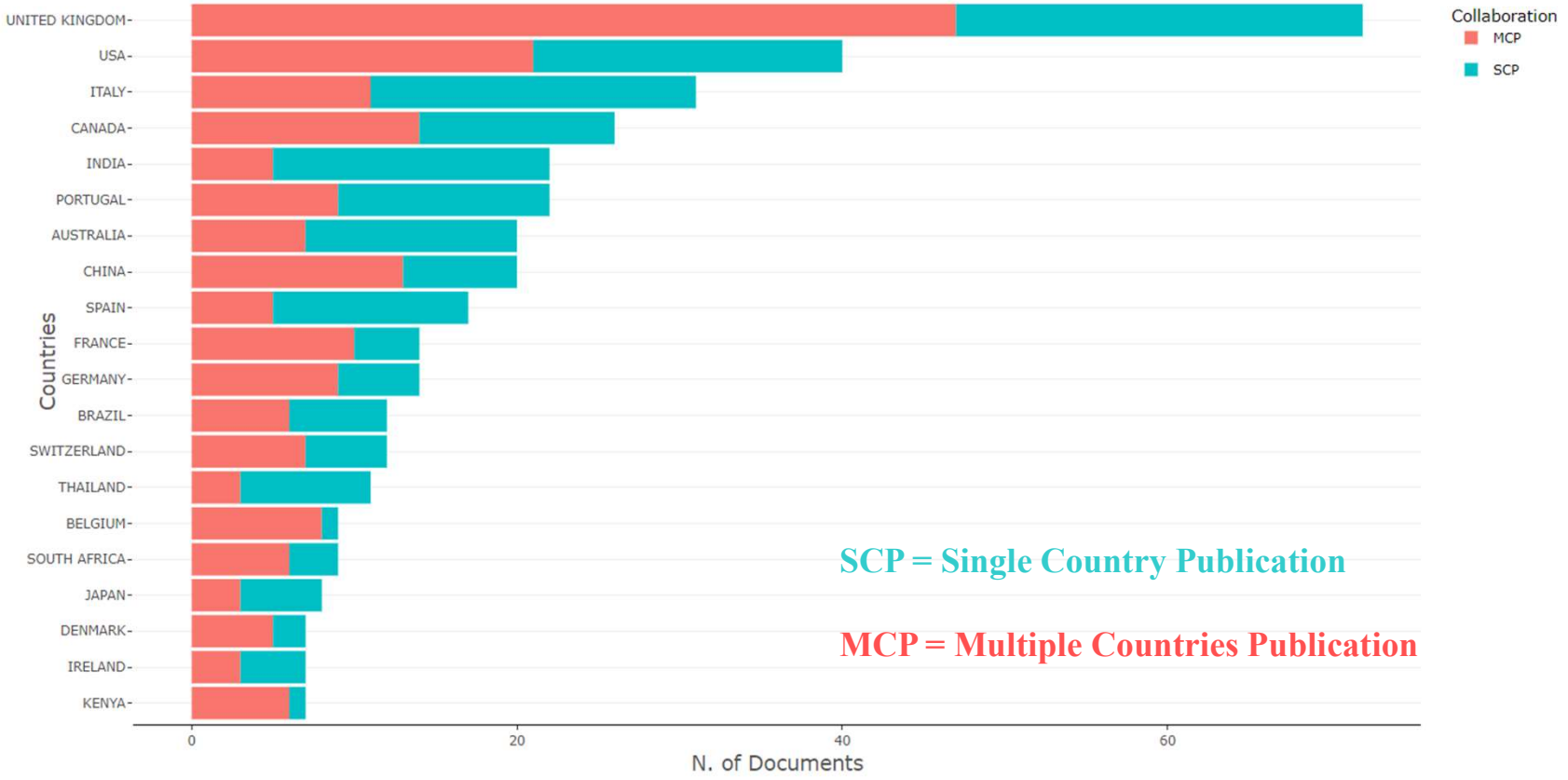
Institutions



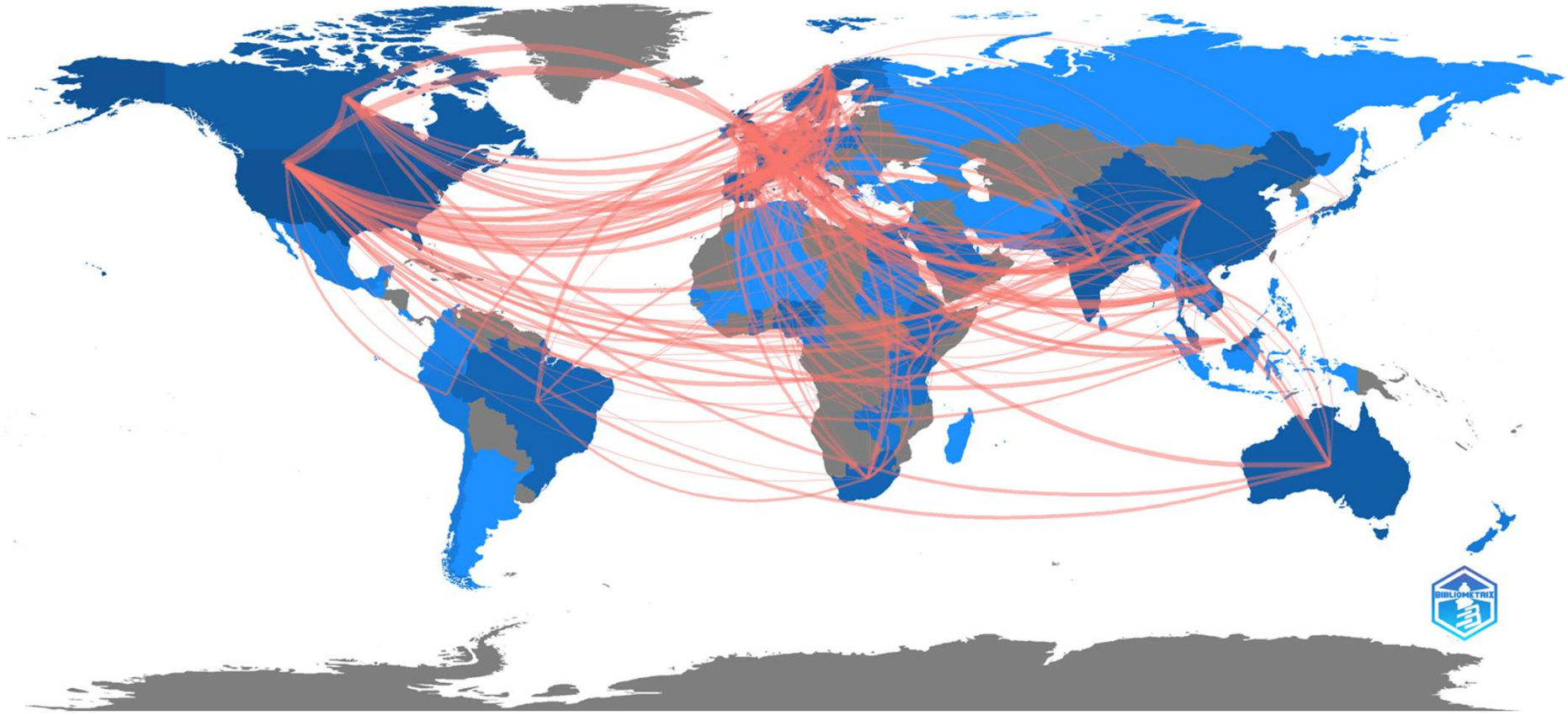
Affiliations



Corresponding Author's Countries



Countries' Collaboration World Map

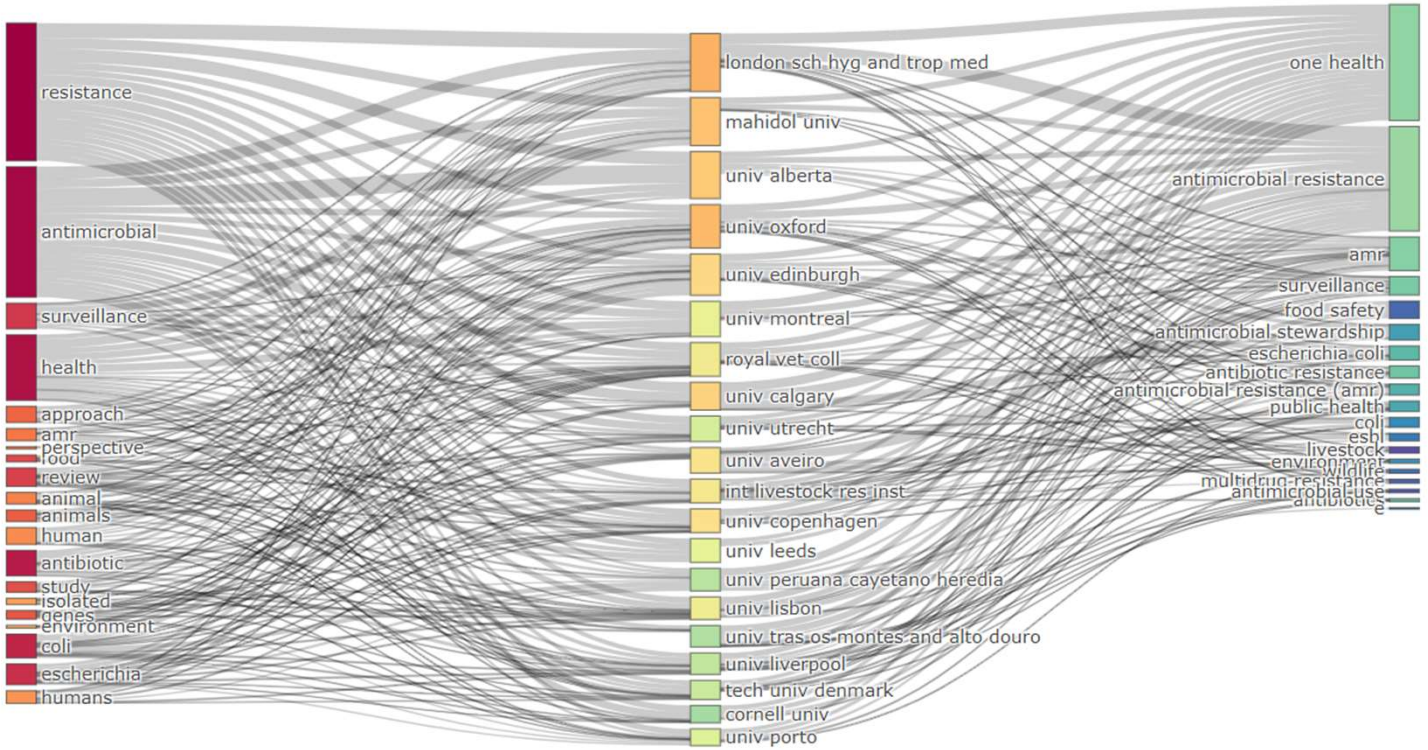


Tree-field Plot

Titles

Affiliations

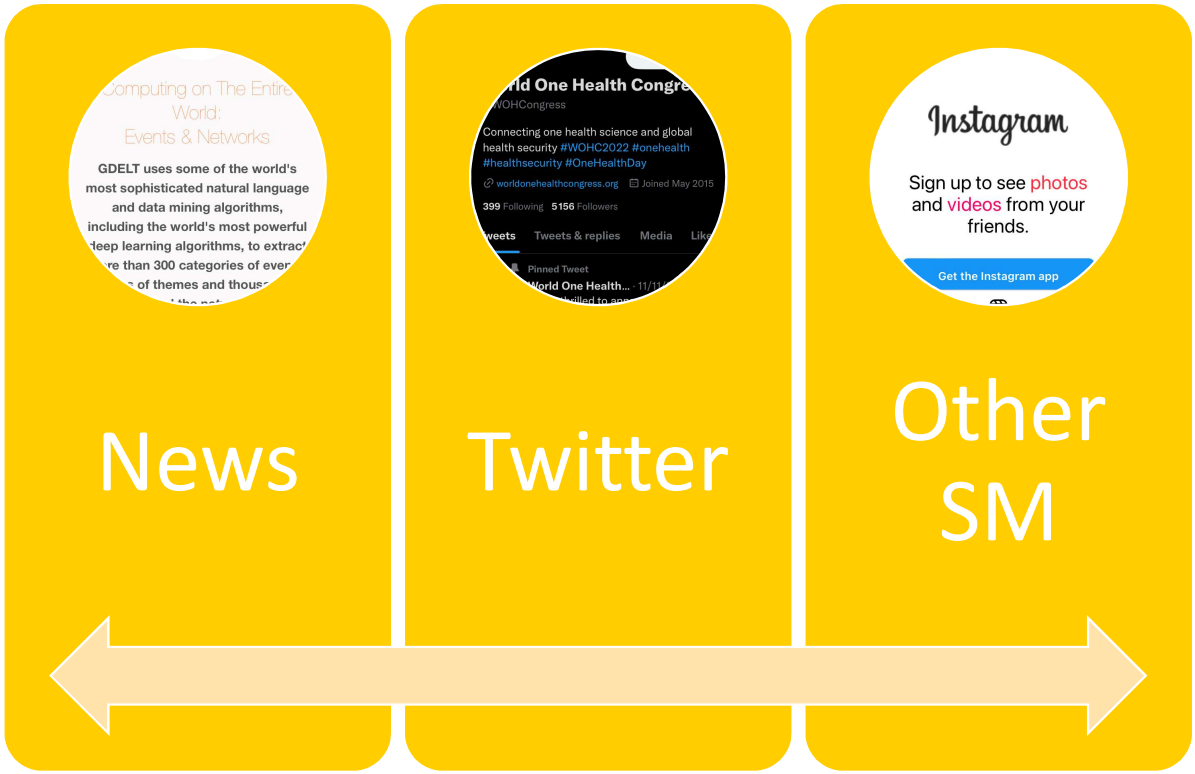
Author's Keywords



Approach

Vitorino et al., forthcoming

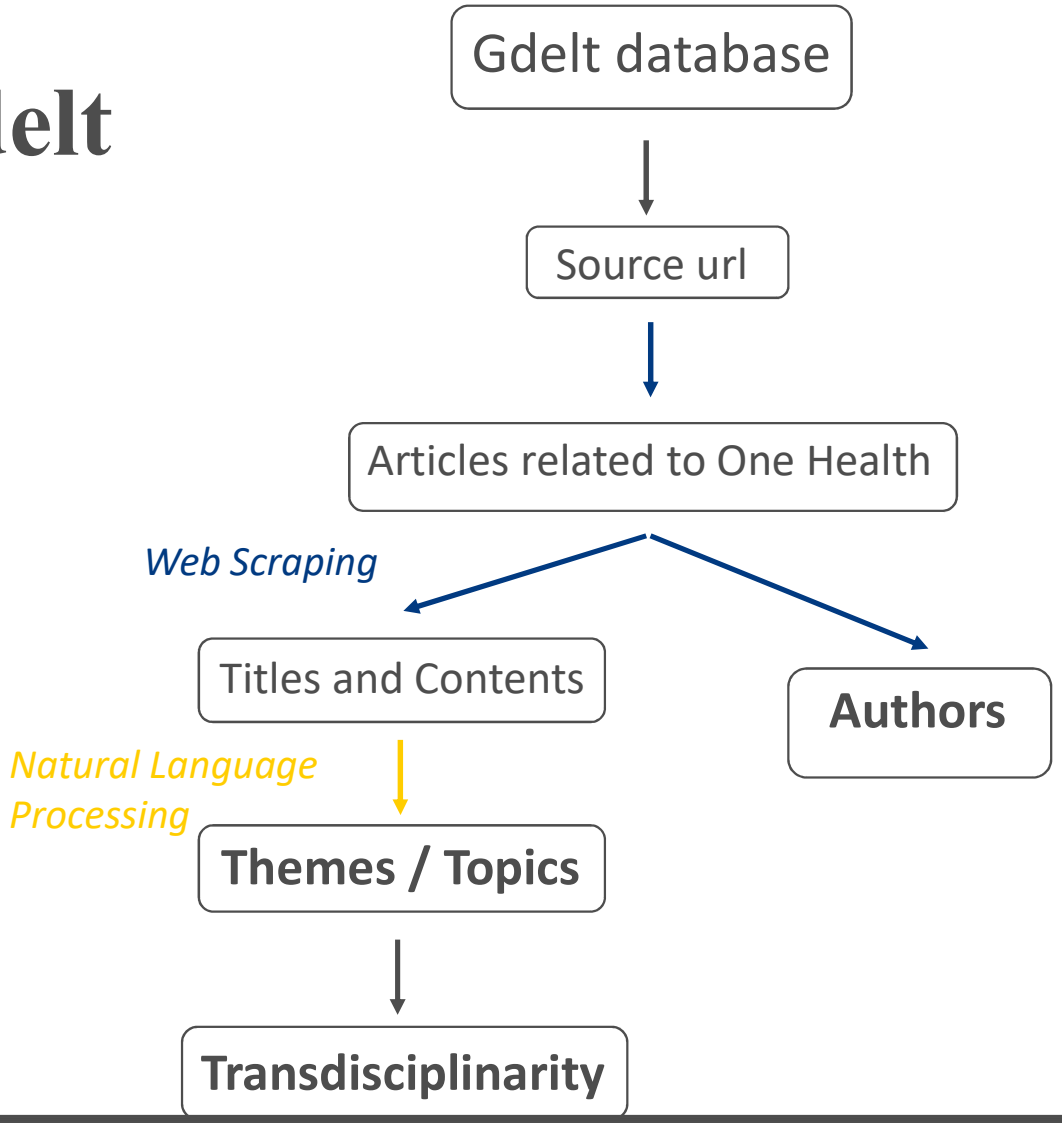
- Media scraping



The first Tool : The Gdelt Project

The Gdelt project is a data base of all articles published and similar publications in the world since 1979.

Principal sources : online newspapers, news websites, blogs, news agencies, government organizations, international organizations, NGOs.



Preliminary findings & discussion

- To be confirmed
  - OH-AMR is still siloed
  - Not a public problem
- Hypotheses
  - Not novel enough
  - Not severe enough
  - Who are the champions?

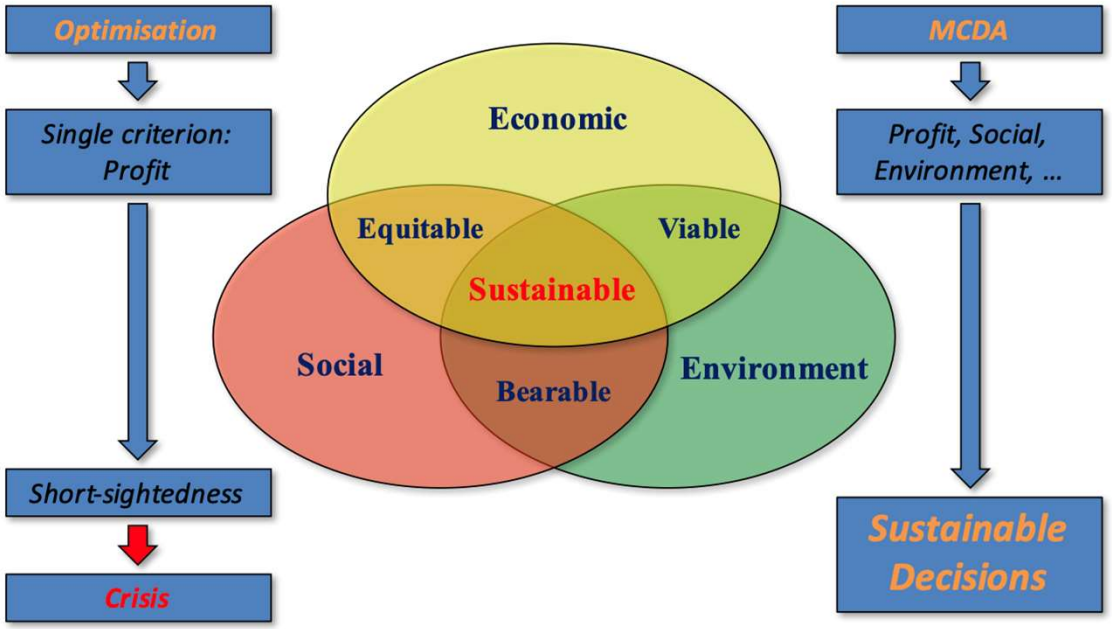
2. Approaches to support policy change

- Rational approaches
  - Multicriteria decision analysis
  - Game theory

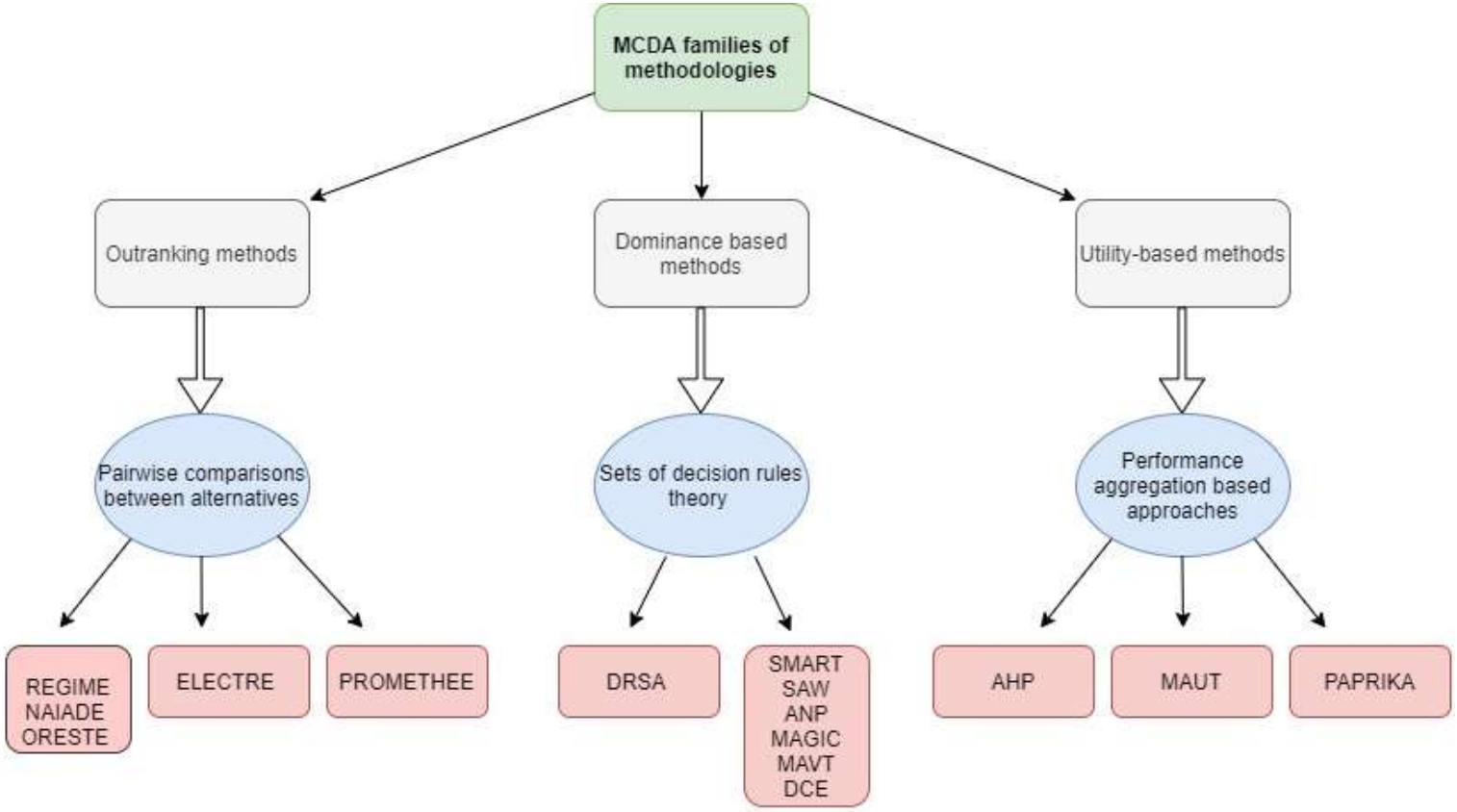
Multicriteria decision analysis

Marechal, 2016
http://www.promethee-gaia.net

- Set of methods used as decision support tool
  - Support decision-making process by taking into consideration multiple criteria simultaneously
  - Participatory approach
- Ability to set individual preferences for each stakeholder in the weighting criteria process
- Advantage : quantitative and qualitative data in the analysis.



MCDA families



Evaluating the societal acceptability of reducing AMU : a pilot study in the French dairy sector

1) Define problem and identify stakeholders

2) Identify key decision issues and define indicators

3) Identify interventions or strategies to compare

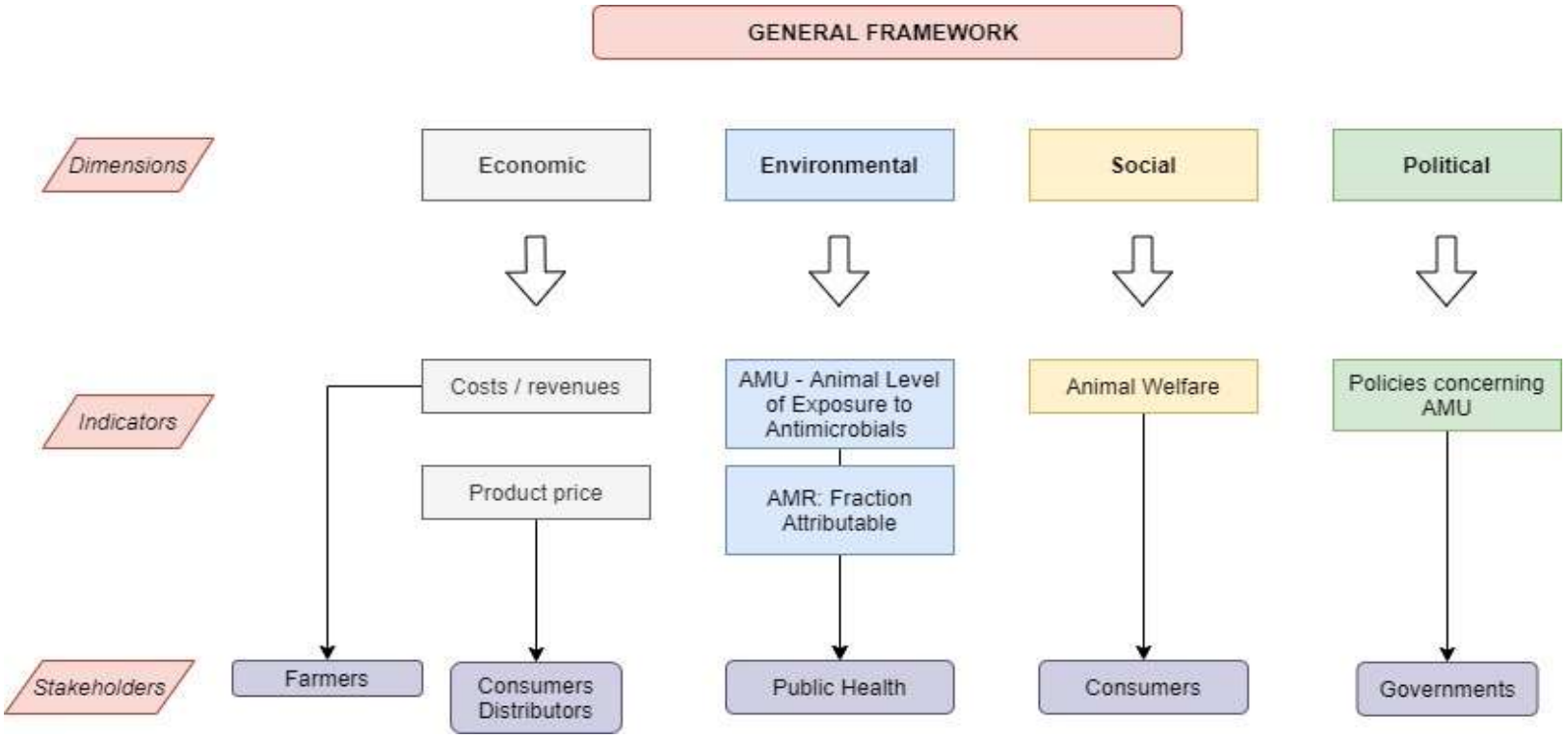
1.Current AMU scenario

2.Prohibition scenario (antibiotic free)

3.Subsidies to reduce antibiotic use by 25%

4.Preventive and metaphylaxis prohibition

Manriquez et al., 2022



Calibration

- Literature review

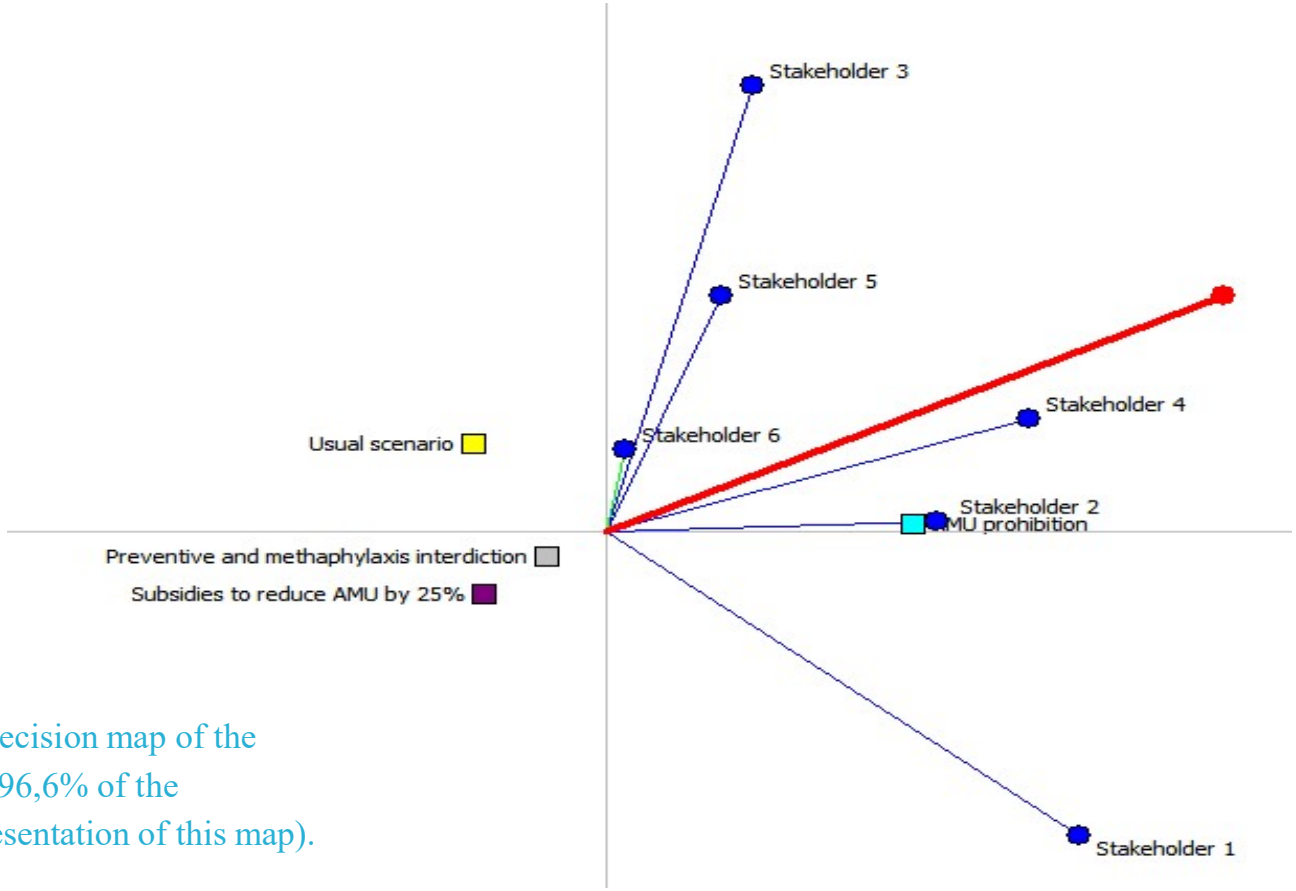
Dimensions	Indicators	Current AMU Scenario	Antibiotic prohibition	Subsidies to reduce antibiotic use by 25%	Preventive and metaphylaxis prohibition
Economic	PC: production cost	494 € / 1000L	684 € / 1000L	617,5 €/ 1000 L	667 €/ 1000 L
	FR: farmers revenues brut	334€ / 1000L	473 €/ 1000 L	417.5 €/ 1000 L	451 €/ 1000 L)
	PCU: price of cull cow	2.4 €/ kg net	2.64 €/ kg net	2.4 €/ kg net	2.4 €/ kg net
	PCA: price of 15-day calf	115 €	126, 5€	115 €	115 €
	PP: product price	0.78€/L	1,85 €/L	0,97 €/L	1,05 €/L
Environment	ALEA	0.273	0	0.204	0.177
	FA: fraction attributable	4%	0	3%	2.6%
Social	MR: mortality rate	3.8%	4.8%	4.04%	4.1%
	CR: culling rate	21.3%	50.5%	28.6%	31.5%
Political	PN: regulatory framework	Moderate	Very high	Moderate	High
	PI: policies investments	High	High	Very high	Moderate

Weighing and ranking

- Each stakeholder individually

	Indicators	Weights					
		S1	**S2**	**S3**	**S4**	**S5**	**S6**
EcoD	PC	8	2	0,5	15	10	7
	FR	20	4	0,5	20	10	7
	PCU	10	2	0,5	15	10	2
	PCA	8	2	0,5	15	10	2
	PP	5	4	8	10	10	6
	Total	**51**	**14**	**10**	**75**	**50**	**24**
EnvD	ALEA	15	25	10	5	10	17
	FA	15	25	30	5	10	17
	Total	**30**	**50**	**40**	**10**	**20**	**34**
SocD	MR	3	6	15	5	10	8
	CR	2	6	10	5	10	8
	Total	**5**	**12**	**25**	**10**	**20**	**16**
PolD	PN	12	12	10	2,5	5	13
	PI	2	12	15	2,5	5	13
	Total	14	24	25	5	10	26
	TOTAL	**100**	**100**	**100**	**100**	**100**	**100**

Interpretation of results



GAIA (Geometrical Analysis for Interactive Aid) decision map of the different stakeholders and scenarios (Delta = 96,6% - 96,6% of the information is conserved in the two-dimensional representation of this map).

Challenges

- Defining the indicators
- Valuing the indicators (inc. weighing)
- Closely ranked scenarios can exhibit high differences

The Nature of Policy Change and Implementation: A Review of Different Theoretical Approaches

Lucie Cerna, Analyst, OECD
2013

Game theory principles

- Game: defined by three parameters:
  - a set of players (or agents)
  - their action sets (or strategy sets)
  - their payment functions (or utility functions)
- Rational players
  - Maximize their utilities
  - Know that the others, too
- Different forms of game
  - Cooperative/non cooperative
  - Symmetric/asymmetric
  - Perfect/imperfect information

Game theory: application 1

- 2 games:
  - Cooperative vs non cooperative
- 2 pay-off criteria
  - Profitability : annual cost savings (ACS) and the annualized cross-plant piping cost
  - Sustainability : overall reduction of fresh water and wastewater flowrates upon the implementation of IPWI.
- An IPWI scheme with a lower overall water flowrates will achieve higher sustainability payoff as it is more environmental friendly

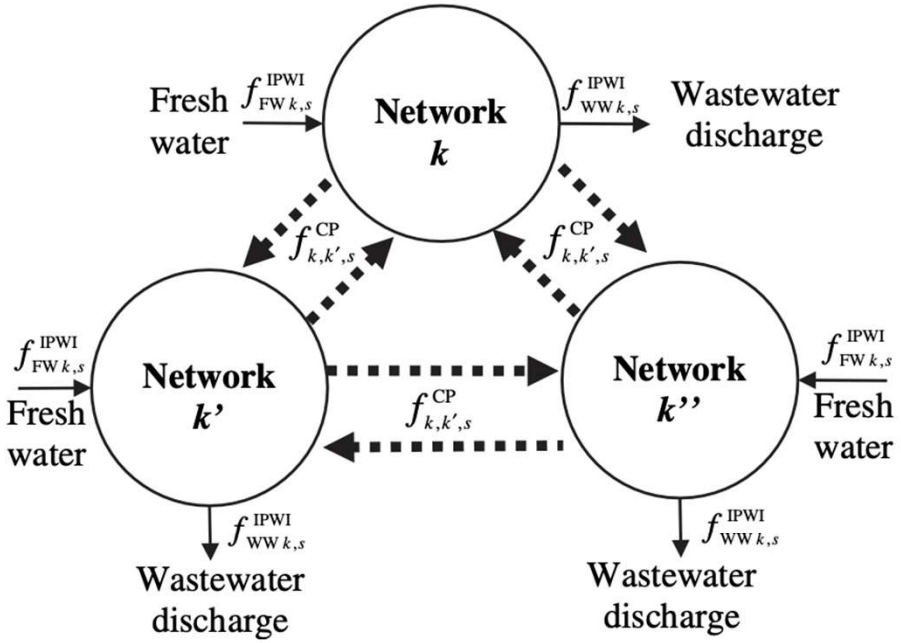


Fig. 1. Direct integration scheme.

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

Game theory approach to the analysis of inter-plant water integration in an eco-industrial park

Irene Mei Leng Chew [a], Raymond R. Tan [b], Dominic Chwan Yee Foo [a,*], Anthony Shun Fung Chiu [b]

Game theory: application 2

- Testing policy effects
- Coordination among service providers

Applied Ergonomics 90 (2021) 103242

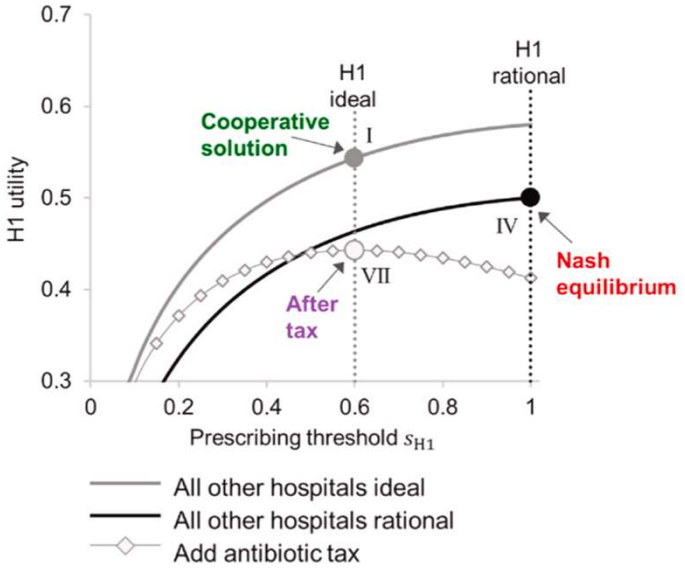
Contents lists available at ScienceDirect

Applied Ergonomics

journal homepage: http://www.elsevier.com/locate/apergo

Antibiotic stewardship from a decision-making, behavioral economics, and incentive design perspective

Brendan Bettinger [a], James C. Benneyan [b,*], Tannaz Mahootchi [c]

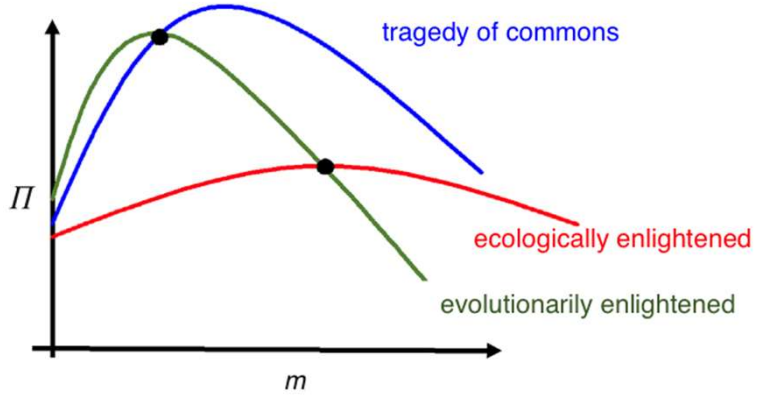


	All hospitals
(I)	ideal (before tax)
(IV)	rational (before tax)
(VII)	rational (after tax)

Fig. 7. Impact of an antibiotic use tax on utility for healthcare system H1 as a function of prescribing threshold s_{H1}.

Game theory: application 3

- Players: insects, farmers, manufacturers, regulators
- Evolutionary game for insects
- Strategic game for human beings
- Ecologically enlightened management
- Evolutionary enlightened management



ELSEVIER

Available online at www.sciencedirect.com

ScienceDirect

Current Opinion in Insect Science

Game theory as a conceptual framework for managing insect pests

Joel S Brown[1,2] and Kateřina Staňková[3]

CrossMark

Challenges

- Oversimplification
- Need for high resolution data

- Theory is better at explaining outcomes when arguments are settled
- Uncertainty and lack of institutionalization

The Nature of Policy Change and Implementation: A Review of Different Theoretical Approaches

Lucie Cerna, Analyst, OECD
2013

Summary

- Quantitative approaches for
  - Modeling AMR policies
  - Monitoring AMR discussions
- Many tools have been developed and used to study other challenges
  - AMR is a little bit more complex (indicators of resistance, bacteria evolution, multiple AMs, multiple AM users, local and global governance…)
- Does AMR require a OH approach?

Acknowledgments

Team

Organizing committee

Questions?

guillaume.lhermie@ucalgary.ca

THE SIMPSON CENTRE.™

UNIVERSITY OF CALGARY | THE SCHOOL OF PUBLIC POLICY

FOOD & AGRICULTURAL POLICY.

simpsoncentre.ca