

MULTI-CRITERIA, MULTI STAKEHOLDER NEGOTIATION ¹ AND DECISION AID AS AN INNOVATIVE APPROACH TO MANAGING ZONOSIS: RESULTS FROM A PILOT STUDY ON LYME DISEASE IN CANADA.

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Presentation outline

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- Introduction
- Objectives
- Methodology
- Results
- Discussion

Lyme disease in Quebec

Background

- Caused by *Borrelia burgdorferi*, transmitted via the blacklegged tick (*Ixodes scapularis*)
- Endemic in the USA since 2009, 25 000 cases/year
- Since 2005: *Ixodes scapularis* in the Montérégie region
- Climate change: migration corridors of fauna

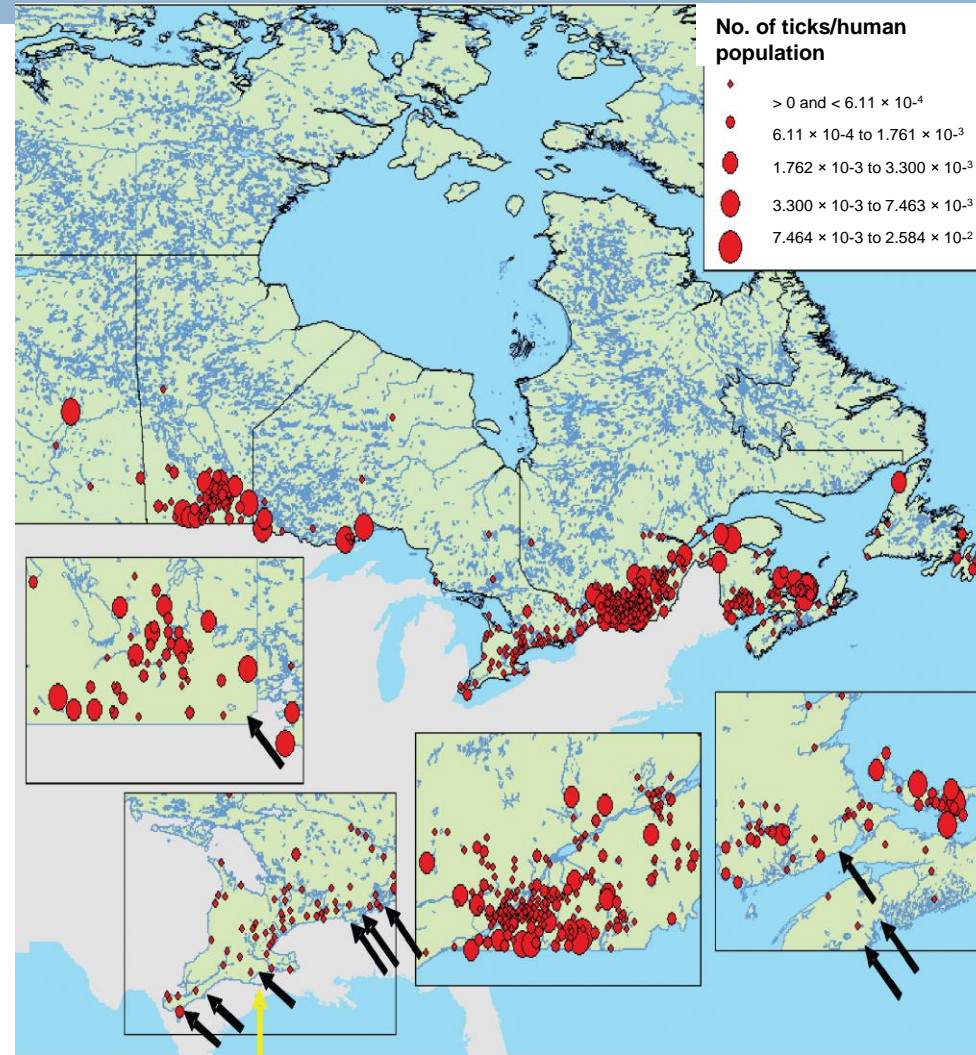


Lyme disease in Quebec

Background

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- Surveillance (passive) of ticks since 1990;
- Rapid increase since 2002;
- 61% of ticks analyzed are from Montérégie;
- 50 reported human cases from 2004 to 2009 (8 indigenous: 7 in Montérégie).



Why MCDA/multi stakeholder context?

1. To allow the integration of several criteria relevant to decision making: *Complexity, multidisciplinary*
2. To allow the integration and comparison of actions (interventions) based on quantitative (ex: effect on the incidence of human cases) or qualitative criteria (ex: acceptance by the general public): *Uncertainty*
3. To allow the integration of data which capture public values and preferences of different actors relative to the choice of actions or interventions : *Importance of public perception and opinion*

Transparency – Coherence - Legitimacy

Objectives of the research project



To facilitate decision making and guide public health authorities in the management of vector-borne diseases, in light of the need to adapt to climate change.

1. Identify, evaluate and rank *Actions* of surveillance, prevention and control for the management of LD;
2. Evaluate the applicability and usefulness of the MCDA approach within the context of vector-borne disease management.

Problem setting

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Management of Lyme disease:

- Three types of action
 1. Surveillance → Provincial level
 2. Prevention (communication strategy) → Regional level, Montérégie
 3. Control → Provincial level (Focus of this presentation)

- Two contexts: Normal (P3) vs crisis (P4)

MCDA steps



1. Problem setting: focus group
2. Stakeholder identification and involvement: focus group
3. Alternatives identification : literature review, focus group
4. Concerns and identification of issues: literature review, focus group, questionnaires
5. Criteria and indicators : literature review, focus group, questionnaires
6. Assessment and scoring of alternatives: literature, questionnaires

MCDA steps



7. Weighting criteria: questionnaires (present situation, epidemic situation)
8. Analysis and rankings: PROMETHEE and GAIA approaches (D-Sight software)
9. Sensitivity and robustness analysis
10. Recommendations to decision makers

RQ.: literature means that some preparation was been done by the research team to build a starting proposal for discussion. This included a scientific literature review.

Stakeholders involved

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1. Institut national de santé publique du Québec
 - ▣ Santé publique – Zoonoses
 - ▣ Santé environnementale
2. Laboratoire national de santé publique
3. Ministère de l'agriculture, des pêcheries et de l'alimentation du Québec
4. Ministère des ressources naturelles et de la faune du Québec
5. Université de Montréal (GREZOSP)

Participatory approach (institutions)

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Stakeholders contribute to:

- Identification of issues and criteria
- Identification of alternatives
- Weighting criteria

Focus groups and
Individual interviews

Questionnaires
(Two scenarios)

Results: criteria

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| Categories (4) | Criteria (12) |
|--|--|
| Public health (CSP) | CSP1 Incidence on human cases |
| | CSP2 Reduction of entomological risk |
| | CSP3 Impacts and adverse effects on human health |
| Animal and environmental health(CEN) | CEN1 Impact on habitat |
| | CEN2 Impact on fauna |
| Social impacts(CSO) | CSO1 Acceptability level |
| | CSO2 Percentage of population which is benefiting from the alternative |
| Strategic, economic and operational criteria (COP) | COP1 Costs assumed by public stakeholders |
| | COP2 Costs assumed by private sector |
| | COP3 Delay before observing results |
| | COP4 Complexity |
| | COP5 Potential impact on public confidence |

Results: alternatives (16)

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15 control alternatives selected + CONT0 (Status quo)

1. CONT0 Status quo, preventive basic communications
2. CONT1a Application of acaricides in the environment (small scale on public properties)
3. CONT1b Application of acaricides in the environment (large scale on public properties)
4. CONT2 Application of desiccants or insecticide soap
5. CONT3a Habitat Modification to reduce good habitats for ticks (small scale)
6. CONT3b Habitat Modification to reduce good habitats for ticks (large scale)
7. CONT4 System 4 - poster

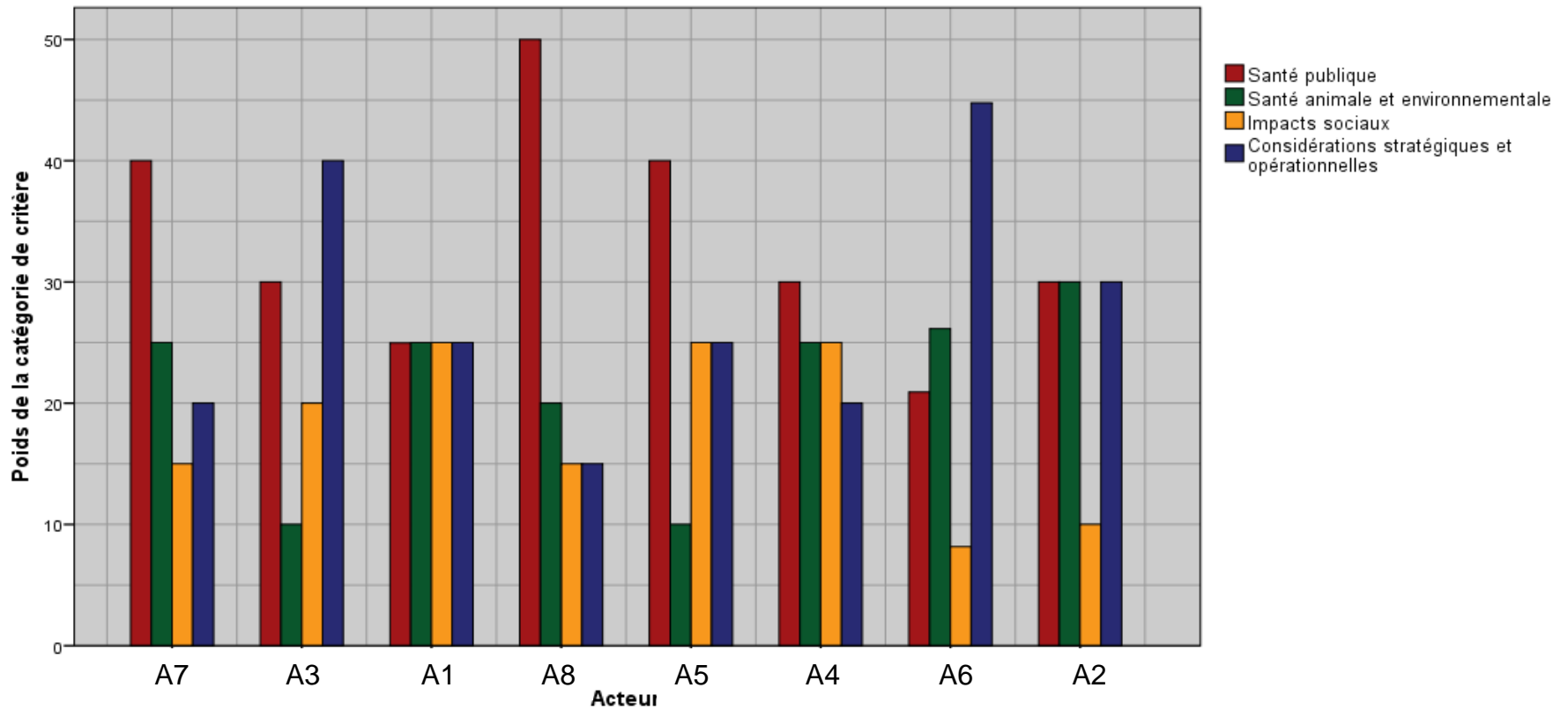
Identification of alternatives

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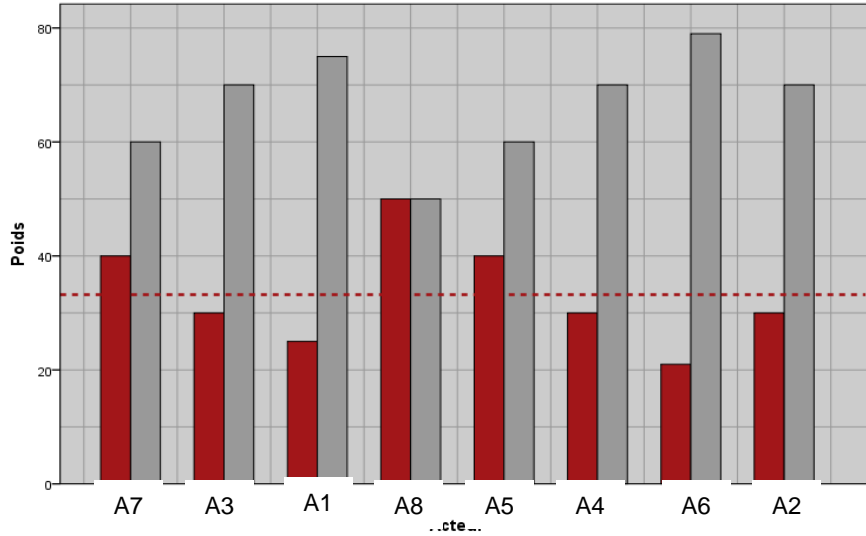
8. CONT5 Deer's oral treatment
9. CONT6a Deer's population reduction by increasing hunting quota
10. CONT6b Deer's population reduction (hunting)
11. CONT7 Deer's exclusion by fencing
12. CONT8 "Damminix System"
13. CONT9 Baiting boxes installation
14. CONT10 Exclusion of individuals from public zones at high level of risk
15. CONT11 Vaccination
16. CONT12 Special clinics for diagnosis and treatment of LD

Weighting criteria

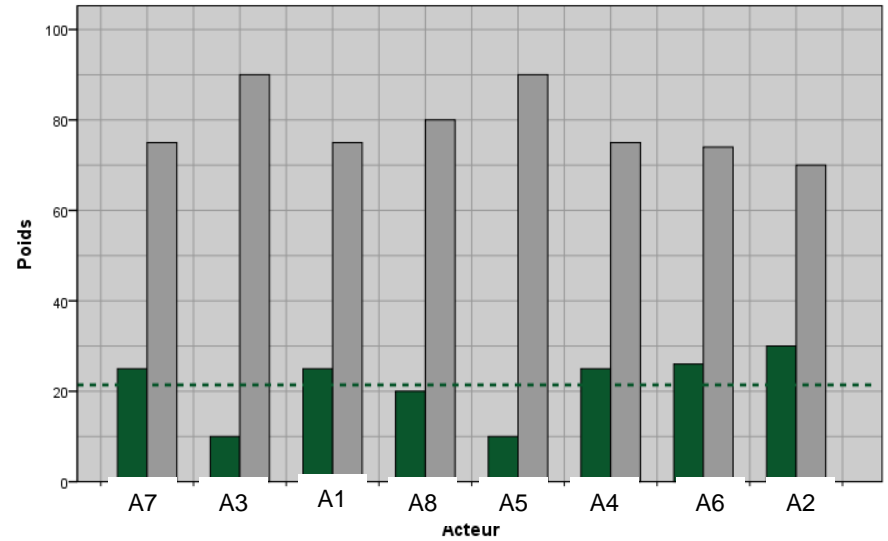
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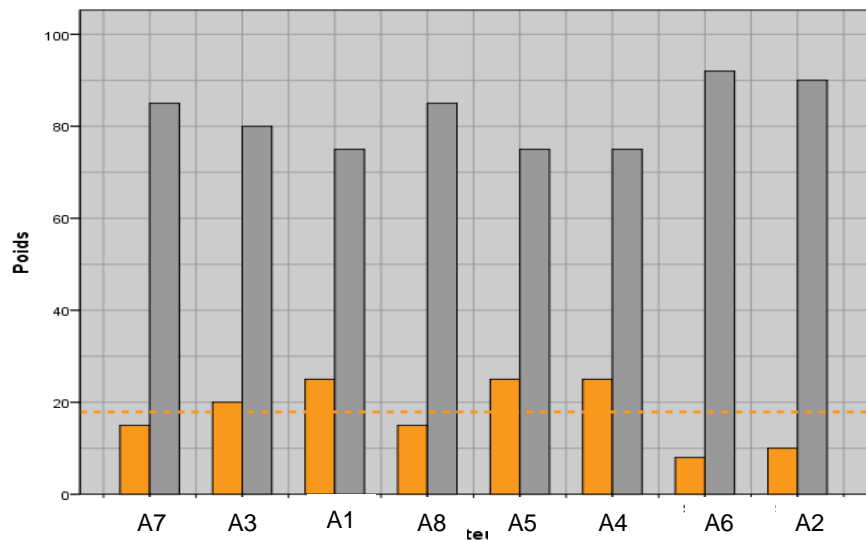
A) Public health



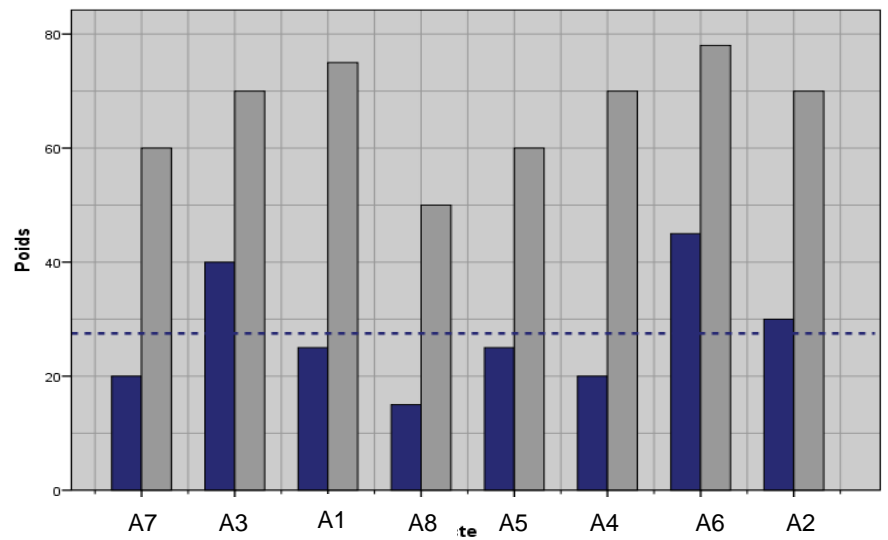
B) Animal and environmental health



C) Social impacts



C) Strategic, economic and operational criteria

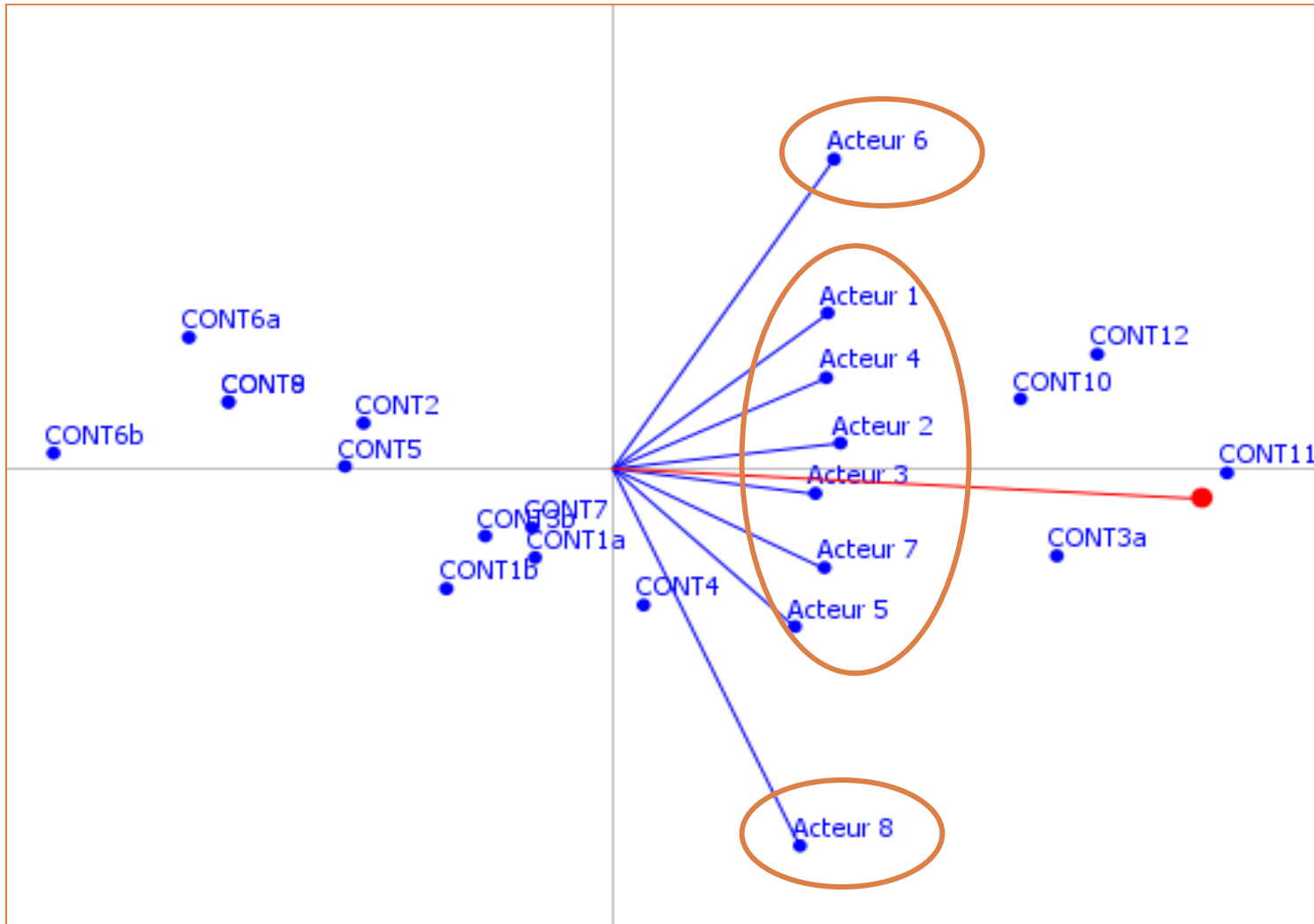


Alternative scoring: level of confidence

| | | CSP1 | CSP2 | CSP3 | CEN1 | CEN2 | CSO1 | CSO2 | COP1 | COP2 | COP3 | COP4 | COP5 |
|---------------------|--------|------|------|------|------|------|------|------|------|------|------|------|------|
| Actions de contrôle | CONT0 | 1 | 0 | 0 | 1 | 1 | 3 | 4 | 1 | 0 | 3 | 1 | 1 |
| | CONT1a | 2 | 3 | 2 | 16 | 8 | 2 | 1 | 1 | 1 | 2 | 4 | 3 |
| | CONT1b | 2 | 3 | 2 | 48 | 18 | 2 | 4 | 2 | 0 | 2 | 4 | 3 |
| | CONT2 | 1 | 2 | 2 | 24 | 8 | 2 | 1 | 1 | 0 | 2 | 4 | 2 |
| | CONT3a | 2 | 3 | 1 | 20 | 4 | 3 | 1 | 1 | 0 | 2 | 4 | 2 |
| | CONT3b | 2 | 3 | 2 | 30 | 9 | 2 | 1 | 1 | 0 | 2 | 4 | 3 |
| | CONT4 | 2 | 3 | 2 | 3 | 12 | 3 | 1 | 2 | 1 | 4 | 4 | 2 |
| | CONT5 | 1 | 2 | 2 | 3 | 12 | 3 | 1 | 1 | 1 | 4 | 4 | 3 |
| | CONT6a | 0 | 2 | 2 | 3 | 18 | 2 | 2 | 0 | 0 | 4 | 4 | 3 |
| | CONT6b | 1 | 2 | 2 | 3 | 27 | 1 | 2 | 2 | 0 | 4 | 4 | 4 |
| | CONT7 | 1 | 2 | 0 | 12 | 6 | 3 | 1 | 2 | 2 | 4 | 4 | 2 |
| | CONT8 | 0 | 1 | 2 | 3 | 8 | 3 | 1 | 2 | 1 | 3 | 4 | 2 |
| | CONT9 | 0 | 1 | 2 | 3 | 8 | 3 | 1 | 2 | 1 | 3 | 4 | 2 |
| CONT10 | 1 | 0 | 0 | 3 | 1 | 3 | 3 | 0 | 0 | 2 | 4 | 3 | |
| CONT11 | 2 | 0 | 2 | 1 | 1 | 3 | 3 | 1 | 0 | 2 | 5 | 2 | |
| CONT12 | 0 | 0 | 0 | 1 | 1 | 4 | 3 | 1 | 0 | 2 | 5 | 2 | |

| Level of confidence | |
|---------------------|------------------------------------|
| 1 | One expert |
| 2 | Two or more experts or survey |
| 3 | Published in scientific literature |
| 4 | Tested and validated on the field |

Stakeholders : Gaïa



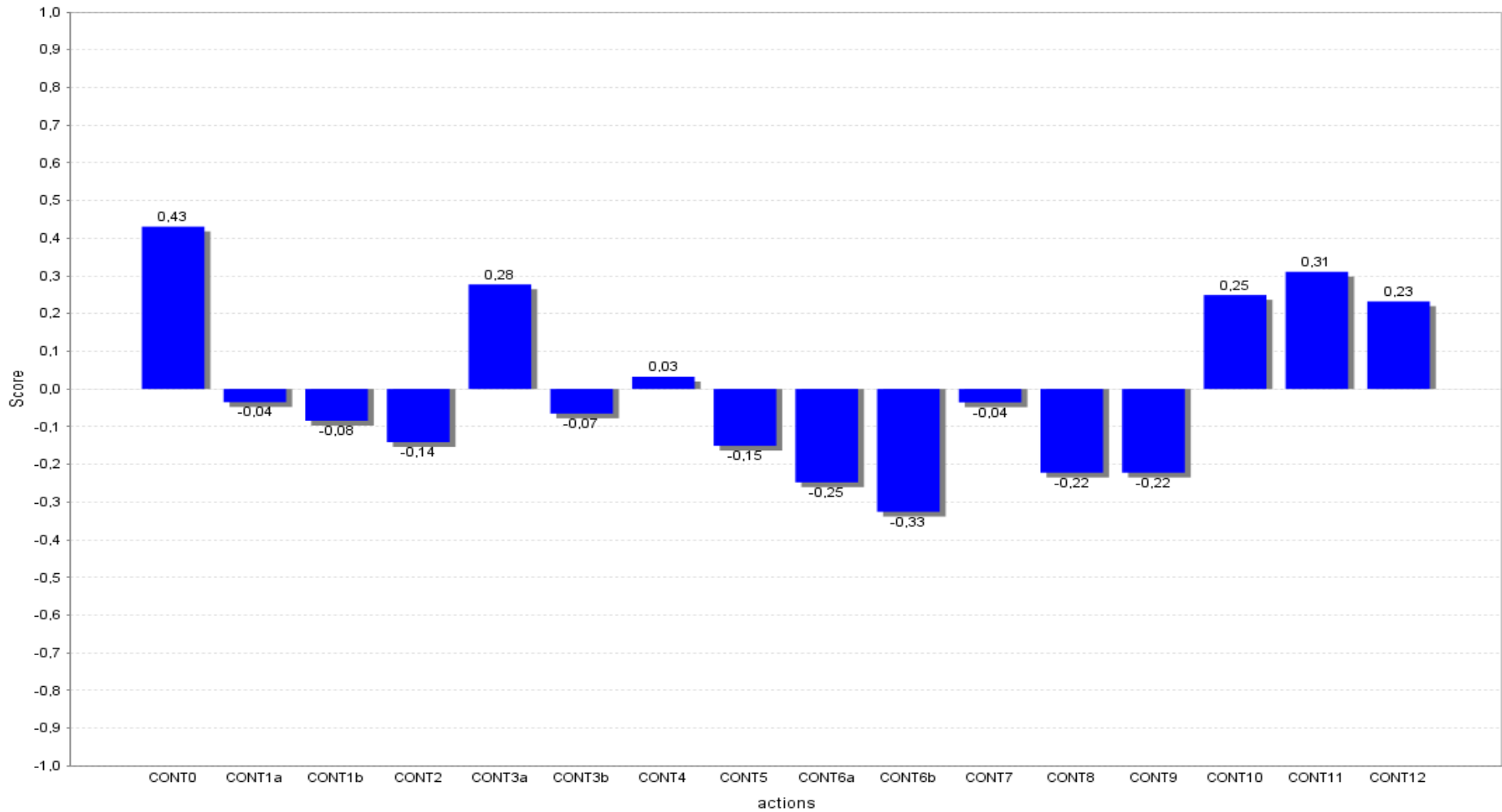
Global ranking

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| Rank | Alternative | Score |
|------|---|-------|
| 1 | • CONT0 – CONT0 Status quo, preventive basic communications | 0.43 |
| 2 | • CONT11- Vaccination | 0.31 |
| 3 | • CONT3a Habitat Modification to reduce good habitats for ticks (small scale) | 0.28 |
| 5 | • CONT10 – Exclusion of individuals from public zones at high level of risk | 0.25 |
| 6 | • CONT12 - Special clinics for diagnosis and treatment of LD | 0.23 |
| 8 | • CONT4 - “System 4-poster” | 0.03 |
| 9 | • CONT7 – Deer’s exclusion by fencing • CONT1a - Application of acaricides in the environment (small scale on public properties) | -0.04 |
| 10 | • CONT3b - Habitat Modification to reduce good habitats for ticks (large scale) | -0.07 |
| 11 | • CONT1b Application of acaricides in the environment (large scale on public properties) | -0.08 |
| 12 | • CONT2 Application of desiccants or insecticide soaps | -0.14 |
| 13 | • CONT5 - Deer’s oral treatment | -0.15 |
| 114 | • CONT8 - “System Damminix” • CONT9 – Baiting boxes installation | -0.22 |
| 15 | • CONT6a -Deer's population reduction by increasing hunting quota | -0.25 |
| 16 | • CONT6b - Deer’s population reduction (hunting) | -0.33 |

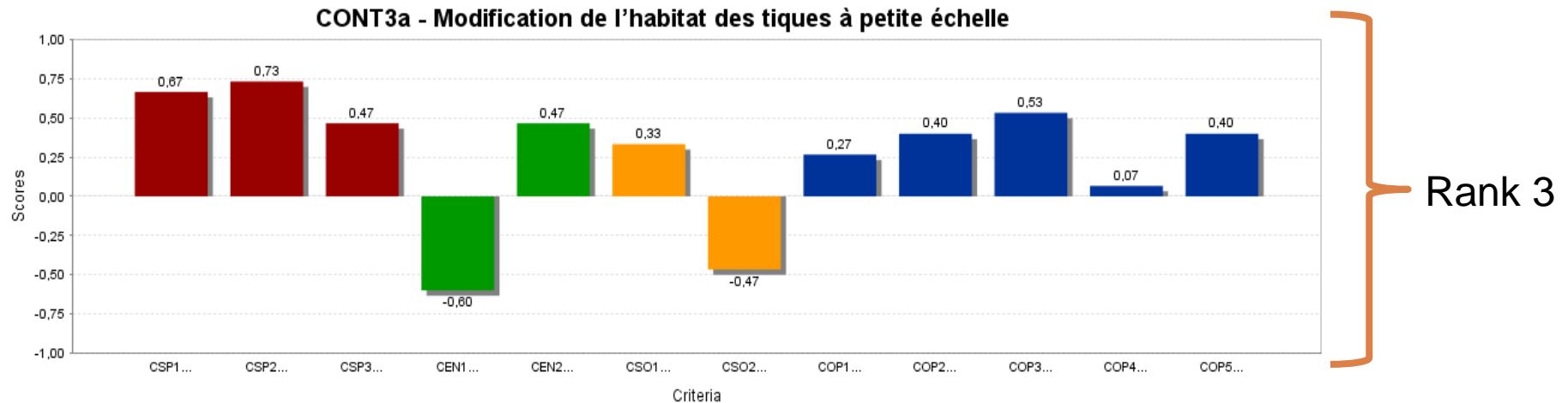
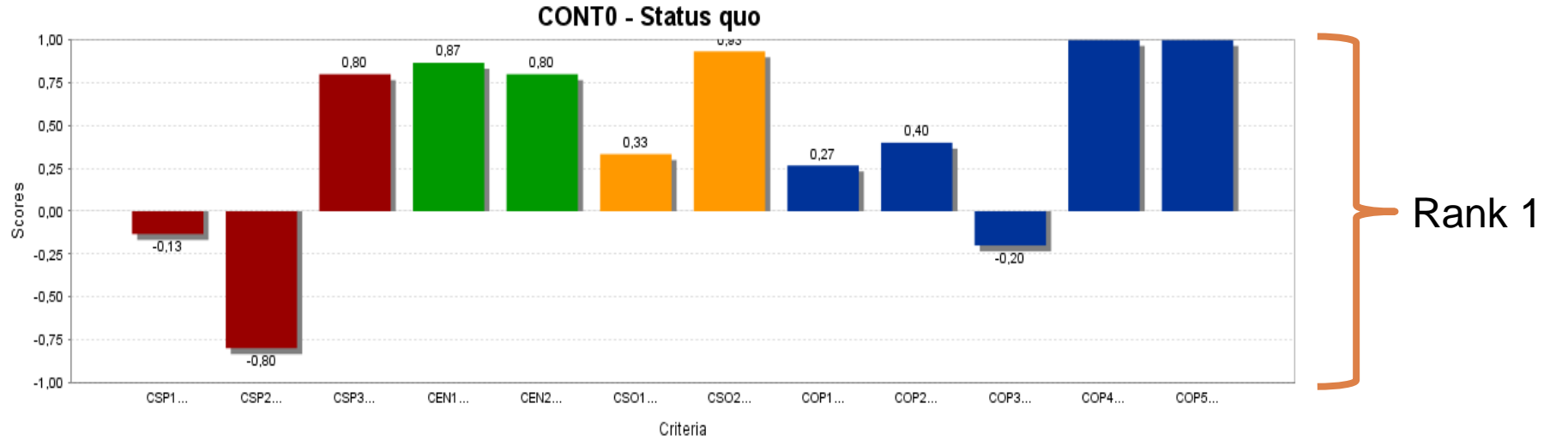
Global ranking

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Alternative profiles

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“Crisis” scenario

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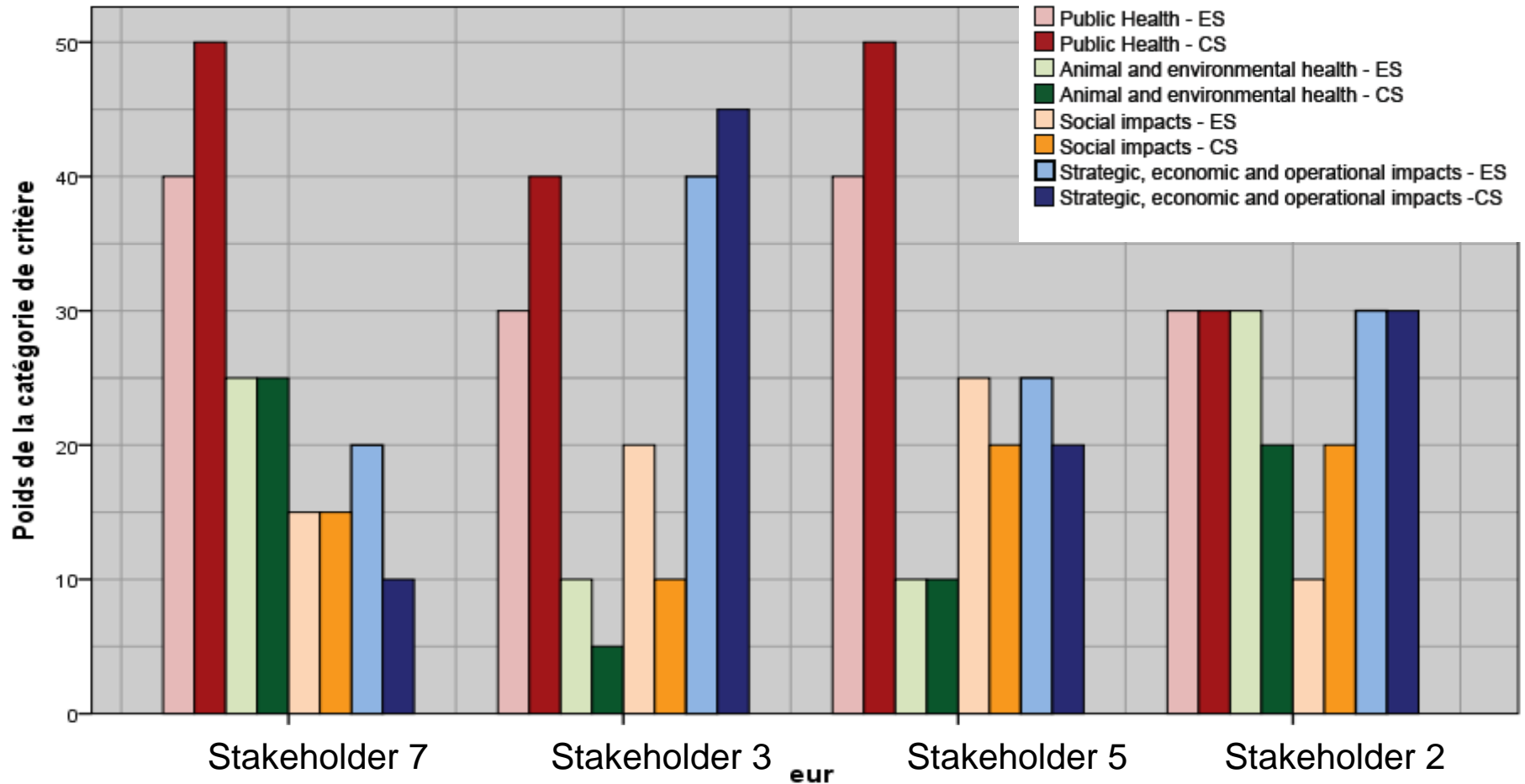
- ❑ Better consensus level
- ❑ Little differences between global rankings (P3 and P4)

Scenario P4 : « Crisis » epidemiologic situation for Lyme disease in Quebec

- *more than 50 reported human cases per year;*
- *important media coverage (interviews);*
- *peoples are phoning public health authorities for information about tick bites ($10 < x < 100$ each week);*
- *implementation of a surveillance strategy for gathering useful information for public health authorities.*

Stakeholder weighting strategies according scenarios

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Discussion

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- Results
 - ▣ Consensus level inside the group
 - ▣ Complementary alternatives versus best ones
 - ▣ Crisis scenario versus normal conditions: other definition?

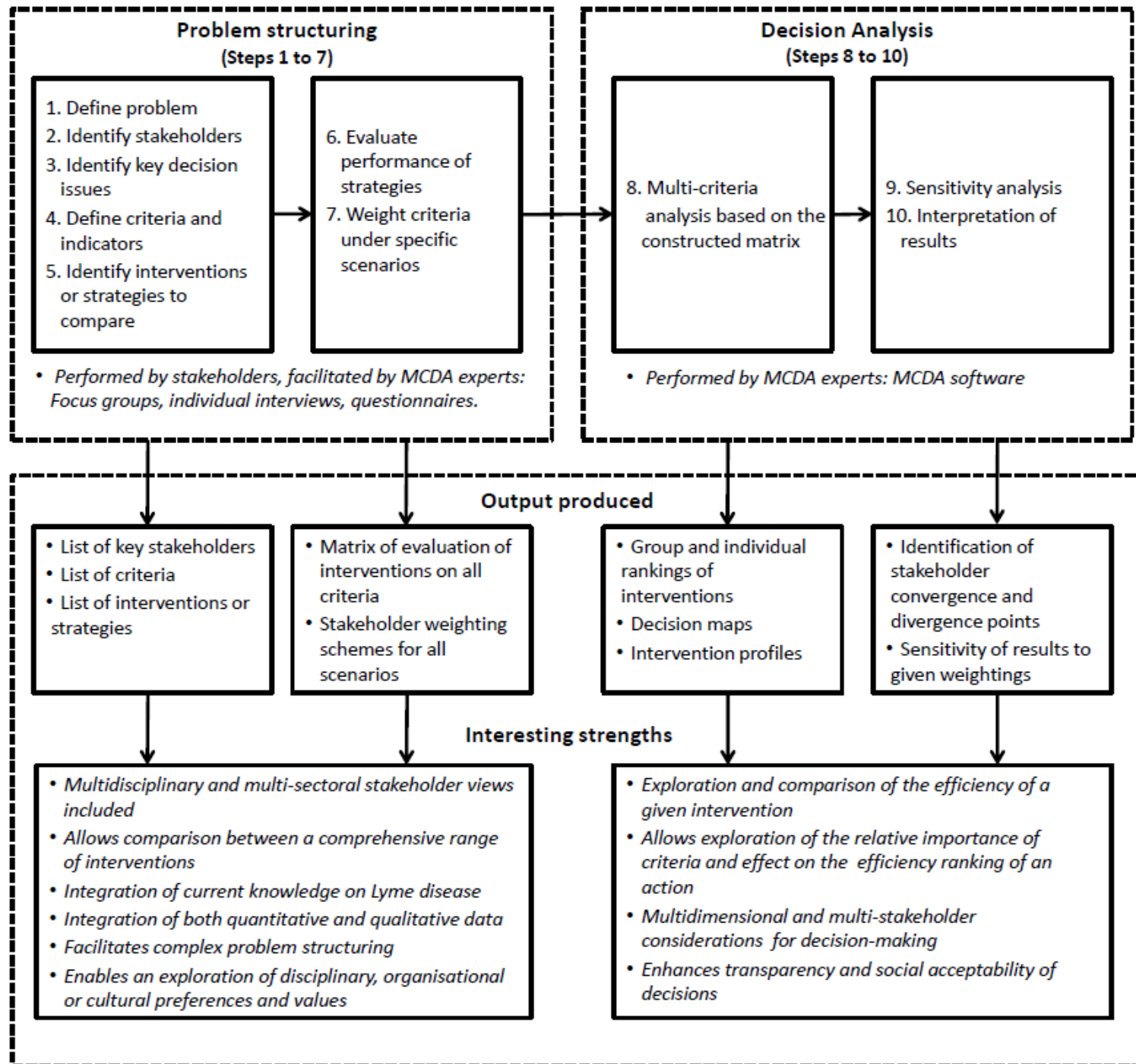
- Tool usefulness
 - ▣ Good tool for complex problem setting
 - ▣ Strengths and weaknesses analysis of alternatives
 - ▣ Systematic approach for identifying scientific gaps

Discussion

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- Challenges:
 - Time and resources
 - Availability of good quality data
 - Opening the participatory approach

Good for strategic decision but still a challenge for crisis management



Thanks

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Disclaimer: this presentation is not reflecting official position from Public Health Agency of Canada

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