Devising frameworks and identifying uncertainties in animal disease management

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- RELU project
  - 'Reducing *Escherichia coli* O157 risk in rural communities'

Uncertainty & O157 Management

Uncertainty regarding:

How people get ill

Effectiveness of measures

Likelihood of measures being adopted

Managing Uncertainty

Many potential measures

+

Absence of hard (eg RCT) evidence on measures to reduce risk

+

A (perceived) need to act

= a problem

Managing Uncertainty

1. Identify all possible interventions
2. Elicit 'expert' opinion on interventions

Aim: Identify best candidate interventions

Ideally =

highly effective

+

highly practical

Managing Uncertainty

Which experts?

– Experts (effectiveness)

- *Inter alia*; Public Health, Veterinary Microbiology (Food), Microbiology (Agricultural/Environmental/Clinical), Risk Assessment, Business, Land Management

– Farmers (practicality)

How elicit their views?

– Novel method: Best Worst Scaling

Best-Worst Scaling

- Market research tool

  - Possible to carry out
    - over distance; no face to face; anonymous
  - Multiple choice
  - Scaled results
  - Allows respondents to rank long lists without the associated cognitive gymnastics (bite-sized chunks)

Best-Worst Scaling

Please consider the 5 measures below

Thinking about the measures' **Effectiveness** and no other criteria, please identify the measure you think would be **most effective** & the measure you think would be **least effective**

So don't worry if a measure seems totally impractical or expensive to undertake, instead just consider how effective / ineffective it would be in reducing human exposure to E. coli O157 if it were implemented.

Most Effective		Least Effective
○	Require In-house water troughs to be cleaned every day.	○
○	Eliminate contamination of ready-to-eat crops from aerosol and windborne **drift** during manure spreading by prohibiting spreading within c500m of ready-to-eat-crops.	○
✔	Locate solid manure heaps and slurry pits at least 50m away from **watercourses**, field drains and ready-to-eat crops.	○
○	Require manure handling to be included in a food safety hazard analysis, or HACCP plan, and a COSHH assessment, if growing ready to eat crops and spreading manure on same site.	○
○	Keep livestock and pets out of ready-to-eat crop areas, using fencing for example.	✔

Best-Worst Scaling

Take all the "most effective" & "least effective" choices

Statistically retrieve the "effectiveness weights" driving those choices

Maximises the ability to predict peoples choices

Respondent sample

- Results of the expert elicitation

  <u>Experts</u> (Effectiveness)

  Round 1

  – Contacted 53 experts

  – 31(75%) completed survey

  – Reduced initial list of 100 to 30

  Round 2

  – Contacted 70 experts

  – 41 (60%) complete survey of 30 interventions

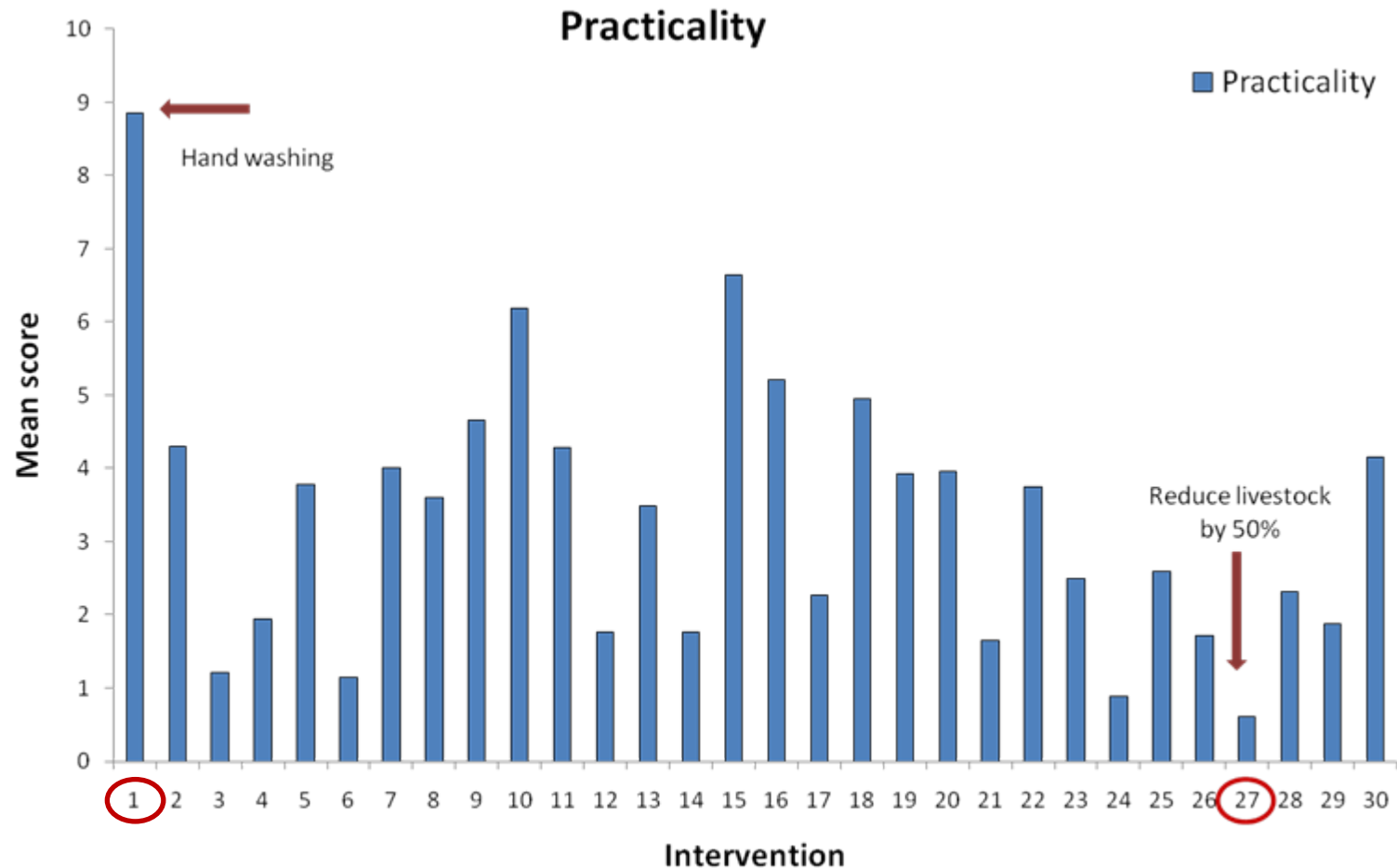 <u>Famers</u> (Practicality)

  Round 3
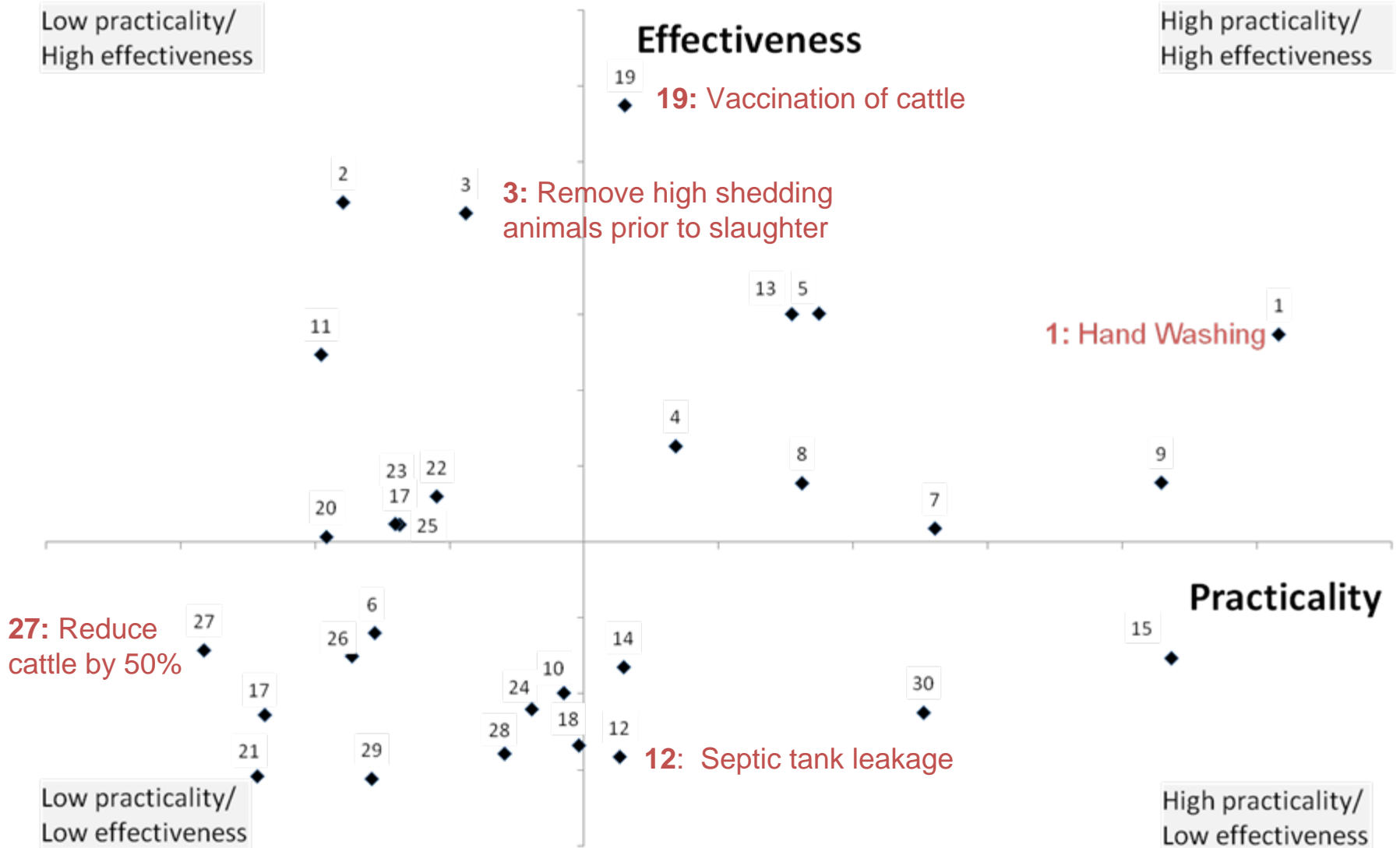
  – 50 in Wales

  – 50 in Scotland

Intervention descriptions

- **Encourage Farmers and farm visitors to wash hands following contact with farm animals.**

- **Remove high shedding animals prior to slaughter (possibly using some form of cow-side test).**

- **Reduce leakage from septic tanks in rural areas (e.g. an annual inspection with owner required to pay for any necessary works/repairs).**

- **Vaccinate cattle to control pathogen colonisation and faecal excretion of *E. coli* O157.**

- **Reduce cattle stocking densities by 50%.**
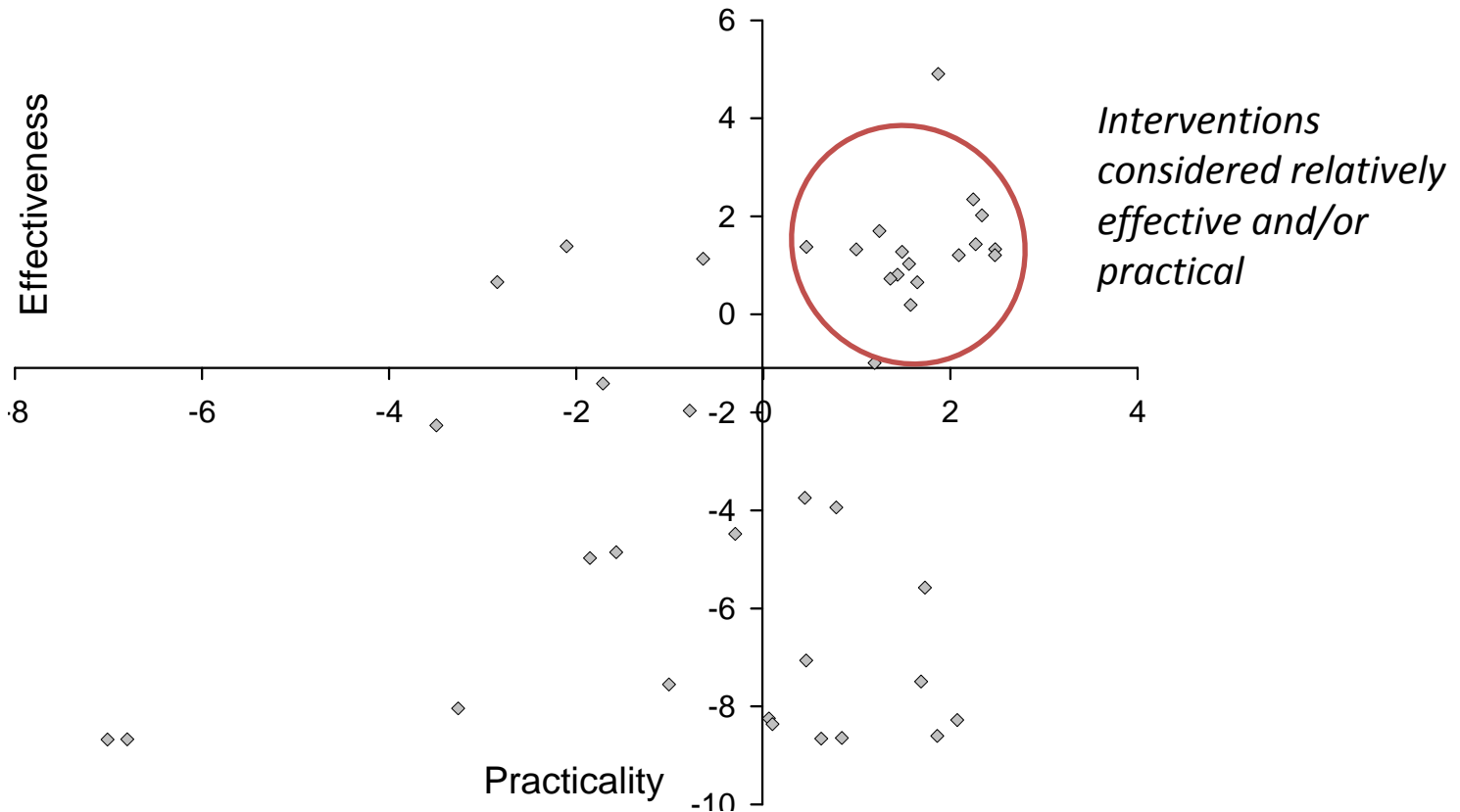
Practicality scores
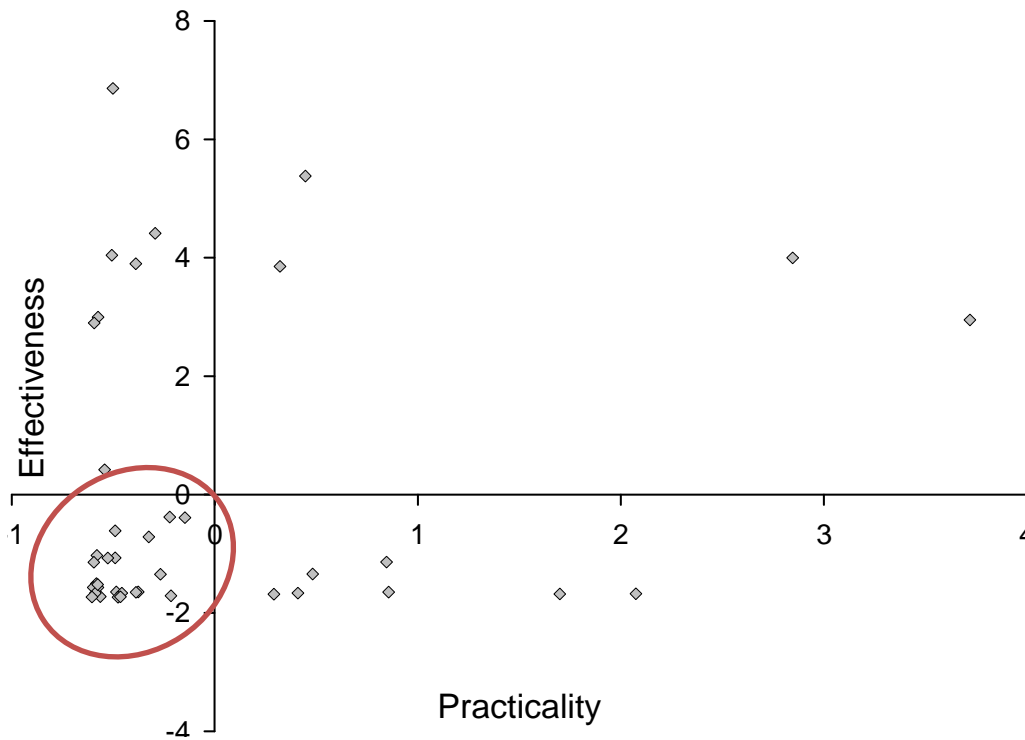
Best-Worst Scaling 2 x 2 plots

Low practicality/
High effectiveness

Effectiveness

High practicality/
High effectiveness

19

19: Vaccination of cattle

2

3

3: Remove high shedding animals prior to slaughter

13 5

1

1: Hand Washing

11

4

8

7

9

23 22

17

20

25

Practicality

27

27: Reduce cattle by 50%

26

6

15

17

24 10

14

30

28

18

12

12: Septic tank leakage

21

29

Low practicality/
Low effectiveness

High practicality/
Low effectiveness

Clustered positive agreement

Intervention 1 (hand washing)

Effectiveness

Practicality

Interventions considered relatively effective and/or practical

Clustered negative agreement

Intervention 27 (Reduce livestock by 50%)

Interventions considered both ineffective and impractical

No agreement

Intervention 16 (HACCP for manure handling)

P &E Scores are widely distributed indicating poor agreement amongst respondents
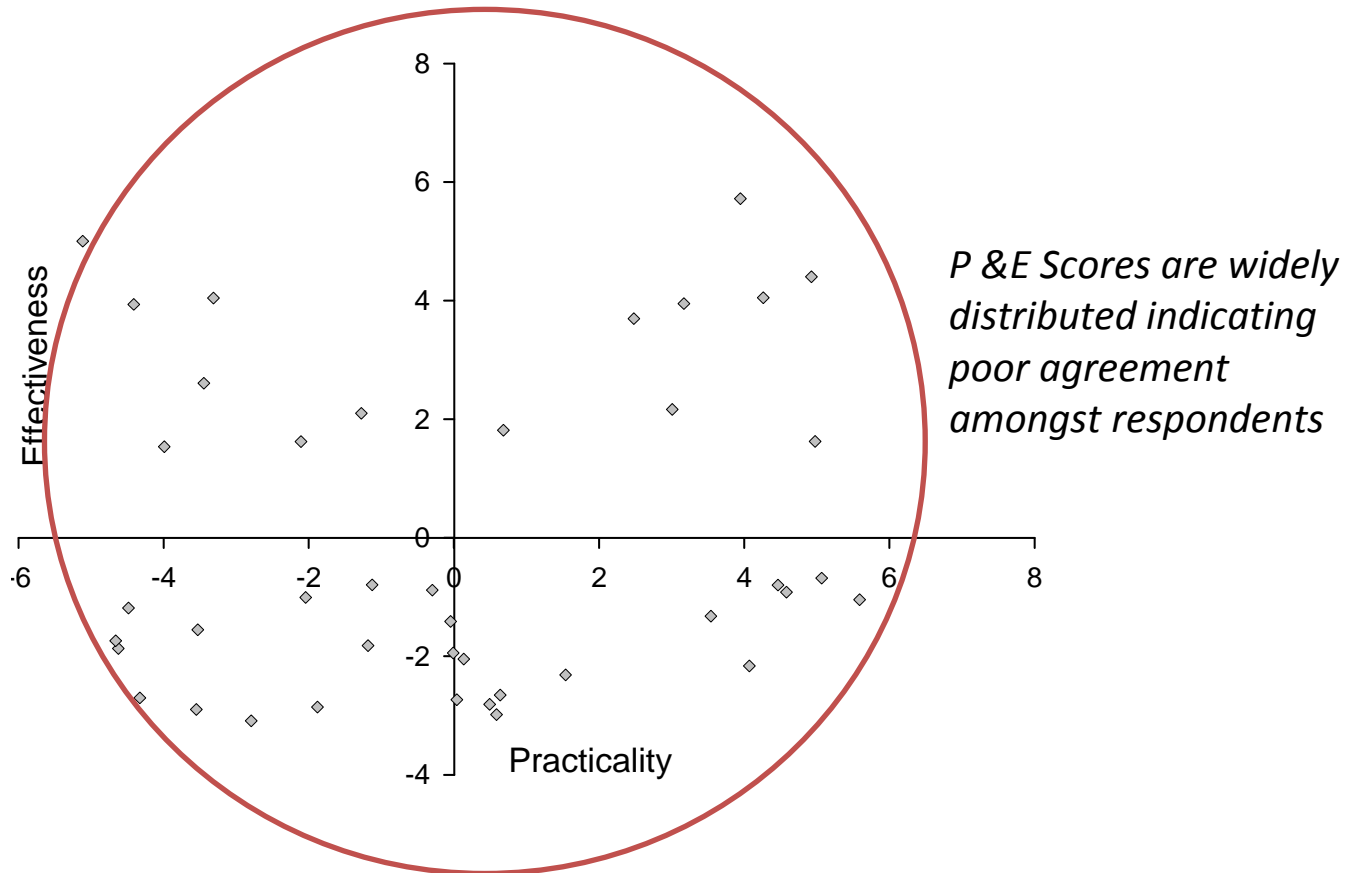
Future

- Focus groups

- Bundles of interventions

- Modelling of interventions

- Development of MACCs