Use of Analytic Hierarchy Process to elicit stakeholder preferences for prioritizing research

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on behalf of the CONCERT Investigators

Outline

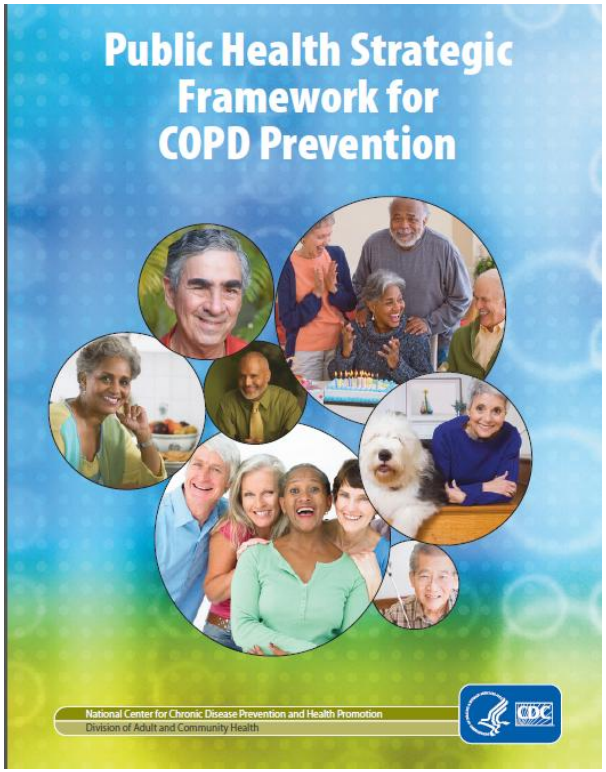
1. Chronic obstructive pulmonary disease (COPD) as a key health condition.

2. Rating importance and simple ranks to establish priorities.

3. Analytic hierarchy process to establish priorities.

Chronic Obstructive Pulmonary Disease (COPD)

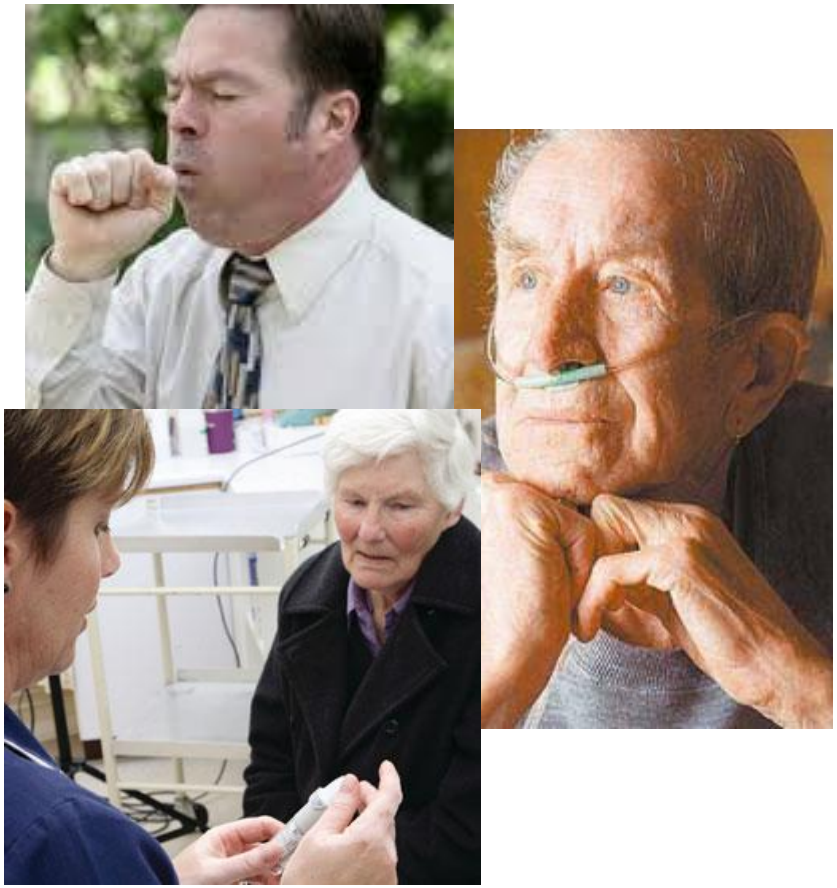
- Key health condition in US
  - Most common lung disorder
    - 24,000,000 persons
  - 3rd leading cause of death
    - Deaths rising
    - Heart disease, Cancer, ***COPD,*** CVA, Accidents
  - 3rd leading cause of hospital readmissions
  - $49.9 billion / yr



NHLBI Chartbook

Chronic Obstructive Pulmonary Disease (COPD)

- Key health condition in US
- Model complex medical condition
  - *Multiple* co-morbid conditions
  - *Multiple* healthcare providers
  - *Multiple* healthcare settings



"Setting effectiveness and translational research priorities to improve COPD care"

Year 1 (Importance, simple ranks)

May 21-22, 2009
Hard Rock Cafe
San Diego, CA

- Chronic COPD care
- Care coordination in COPD

Year 2 (AHP)

May 20-21, 2010
New Orleans

- Acute COPD care
- Transitions in care in COPD

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Who? What? When?

- Stakeholders
  - Patient advocacy groups
    - COPD foundation
  - Funders of health care
    - CMS, Wellpoint
  - Quality
    - Joint Commission, AHQA
  - Professional societies
    - ATS, ACP, ACCP, AARC, AACVPR,SHM,AASM, CAEM,ACEP, ASPH
  - Research funders
    - NHLBI, AHRQ, NINR

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- Phases of stakeholder engagement (2 years)
  - **Pre-conference TCs**
    - Goals, procedures
    - Elicit topics
    - Provisional voting
  - **In person meeting**
    - Presentations by topic experts
    - Discussion of provisional votes
    - Final ranking
  - **Post-conference**
    - Review / comment on priorities
    - Submit for peer review

Importance (1 (most) to 9 (least))

	Topic	Median (IQR)
1.	A	2 (1 - 3)
2.	B	3 (1 - 3)
3.	C	3 (1 - 4)
4.	D	3 (2 - 4)
5.	E	3 (2 - 4)
6.	F	3 (3 - 4)
7.	G	3 (4 - 9)
8.	H	3 (5 - 10)
9.	I	4 (3 - 5)

Importance (1 (most) to 9 (least))

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7.	G	3 (4 - 9)
8.	H	3 (5 - 10)
9.	I	4 (3 - 5)

- Several topics identified
- Preferences variable
- All topics important to someone
  - Simple rating of importance does not provide separation
  - Rationale (criteria) for rating unclear

Simple ranks

	Topic	Median (IQR)
1.	A	3 (2 - 5)
2.	B	3.5 (2 - 8)
3.	C	5 (4 - 8)
4.	D	6 (2 - 7)
5.	E	6 (3 - 8)
6.	F	6.5 (4 - 9)
7.	G	6.5 (5 - 10)
8.	H	7 (5 - 8)
9.	I	7 (6 - 8)

Simple ranks

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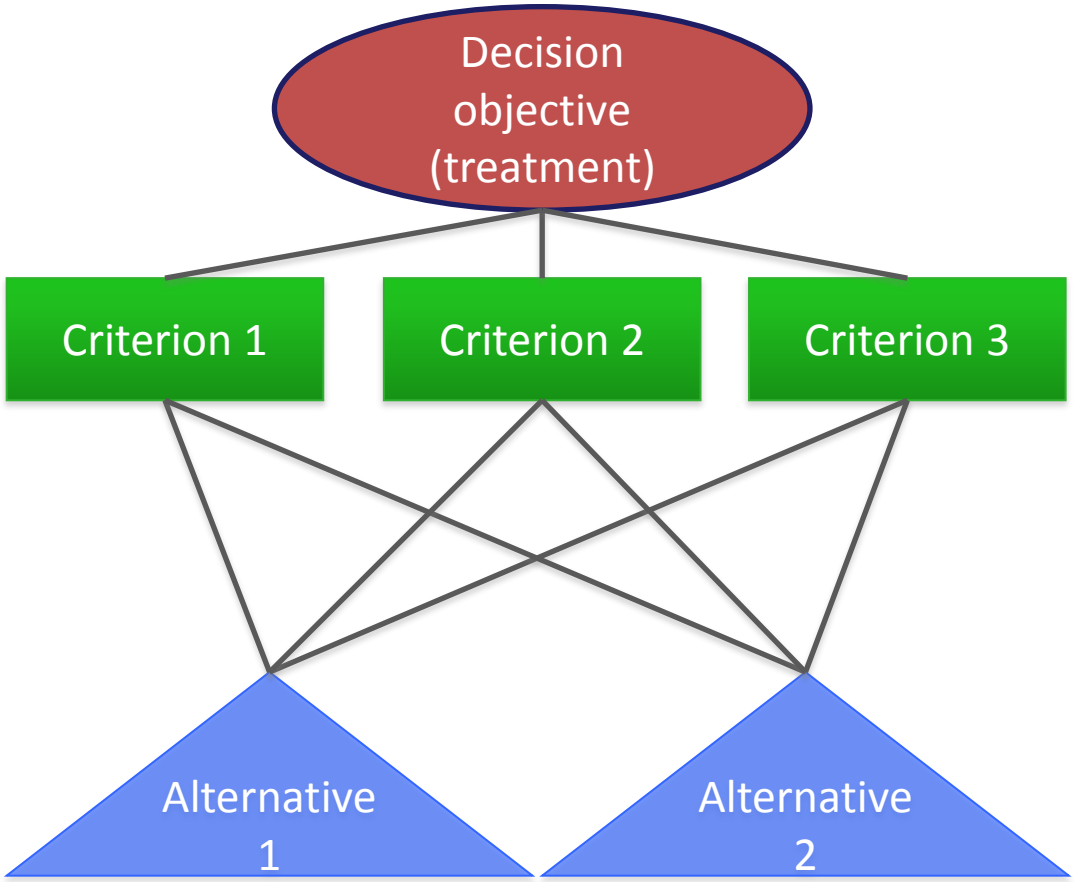
- Several topics identified
- Preferences variable
- Simple ranks do not measure relative importance of topics
- Rationale (criteria) for ranking unclear

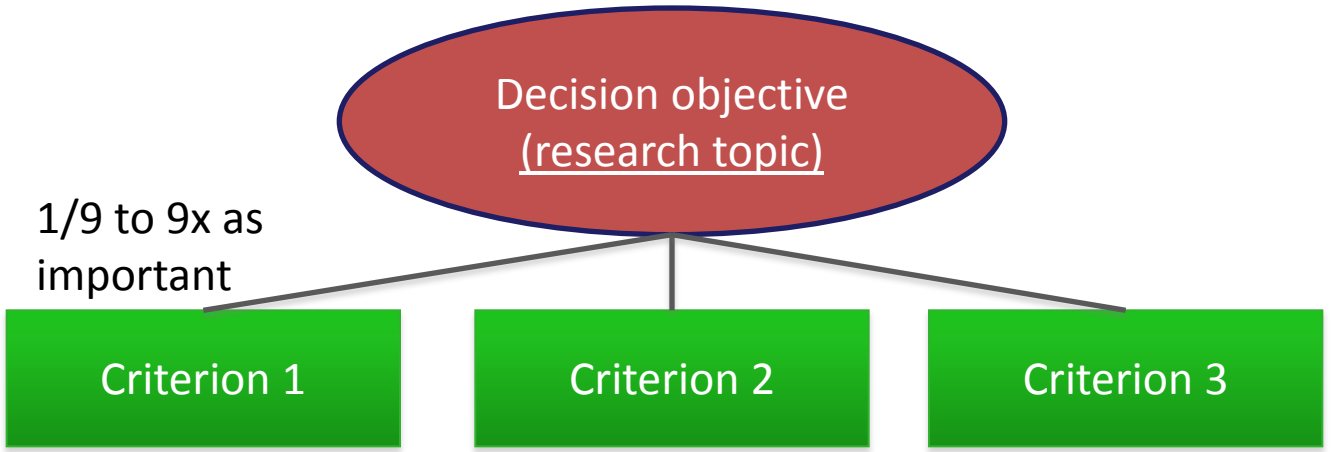
MCDA methods: the Analytic Hierarchy Process



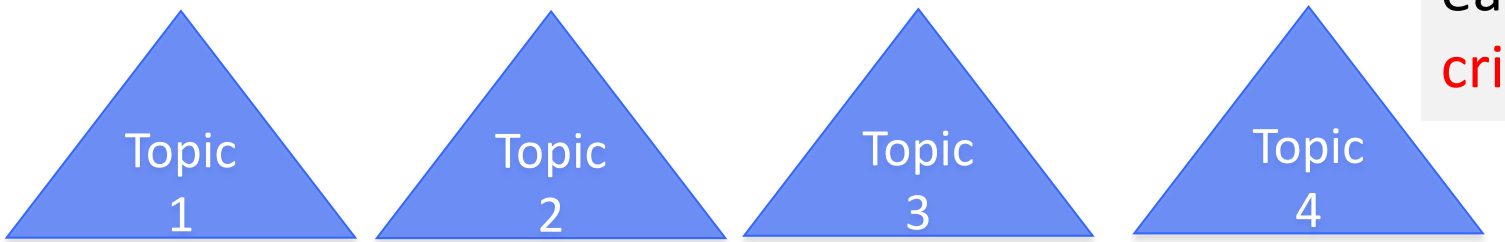
- Rating explicitly linked to criteria
- **Normalized Priority:** proportion of the total importance that is attributed to a particular decision alternative

Courtesy of MJ IJzerman

MCDA methods: the Analytic Hierarchy Process



Series of pairwise comparisons between alternatives (research topics) for a each criterion



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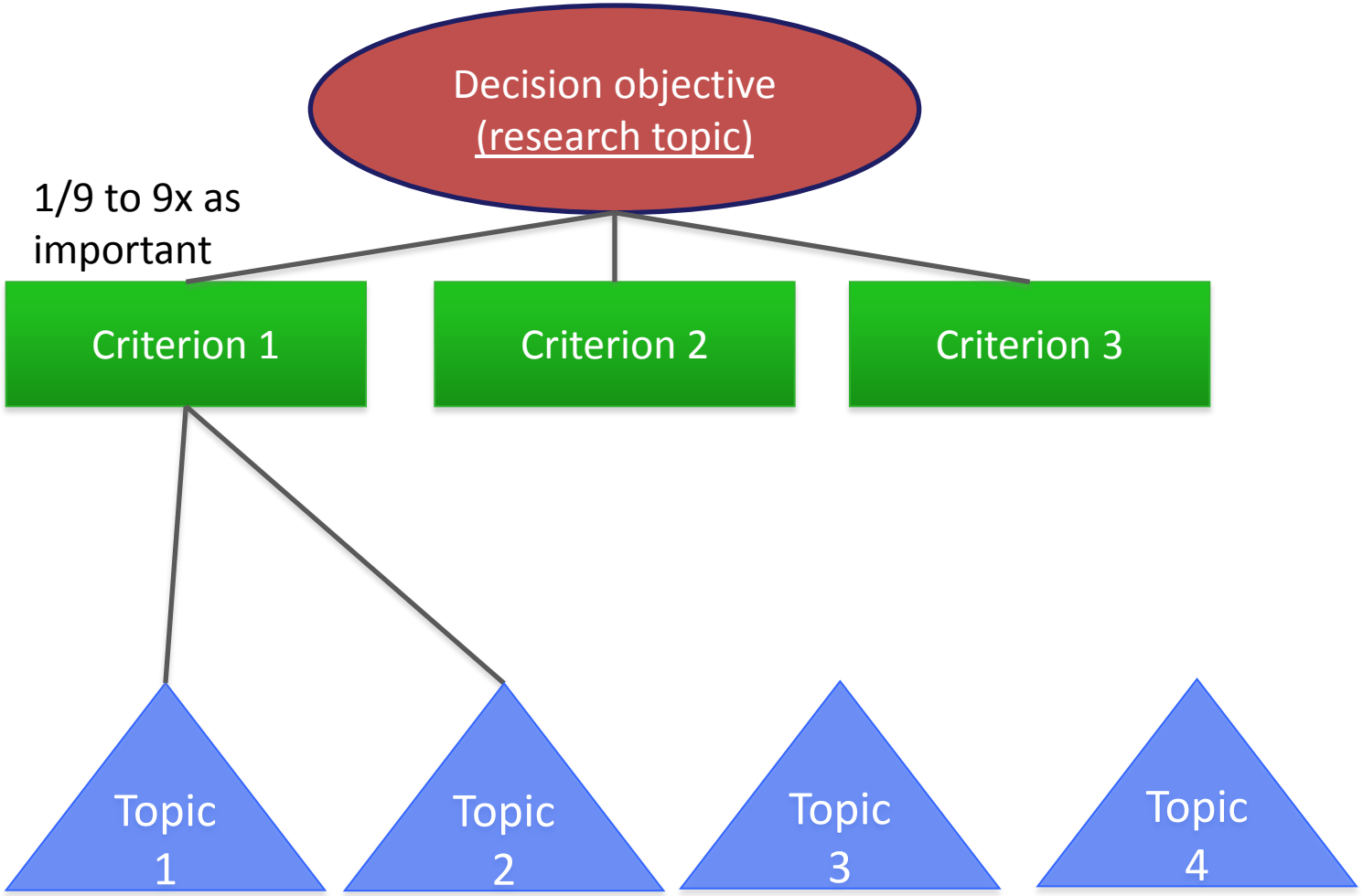

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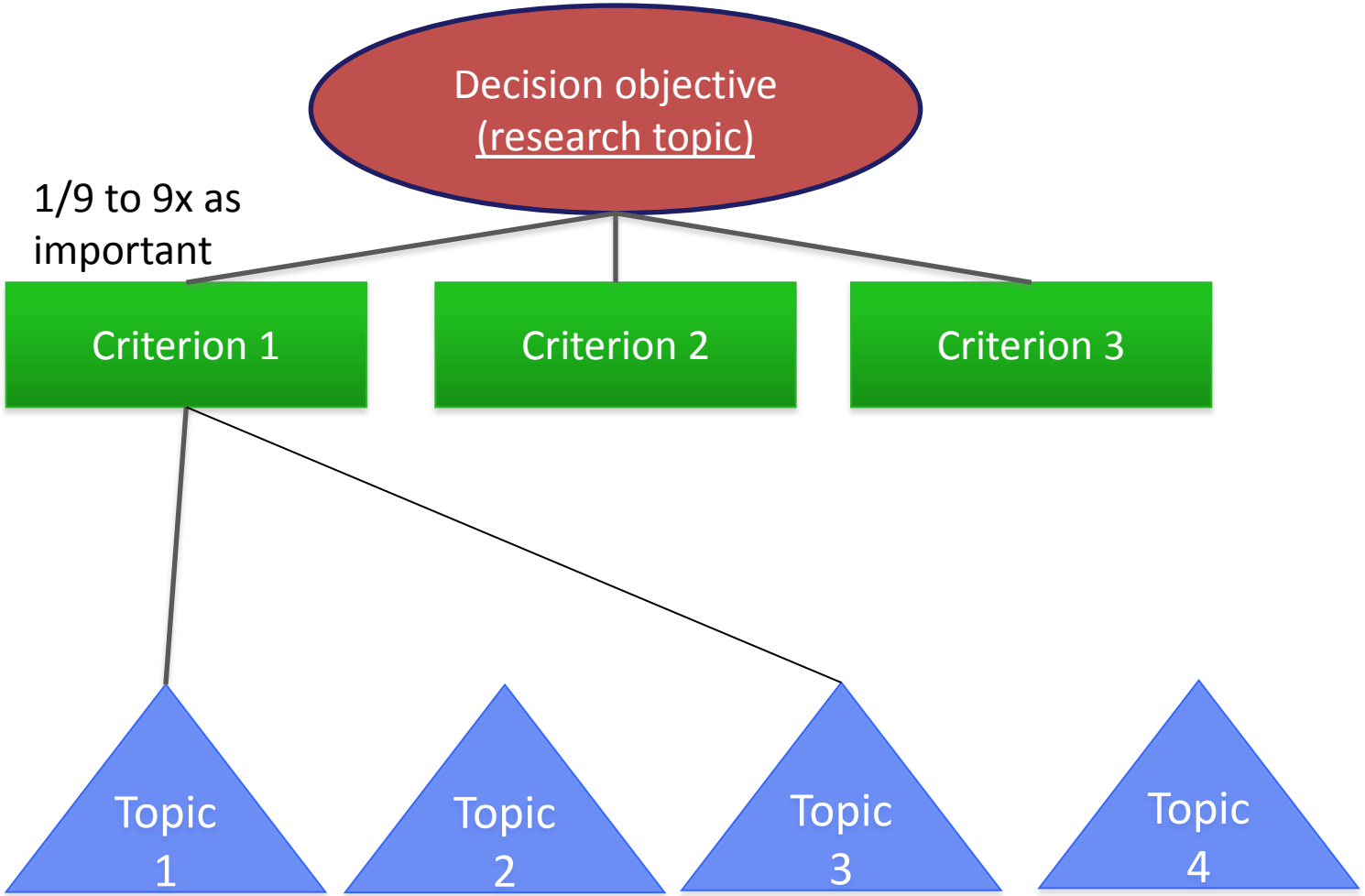

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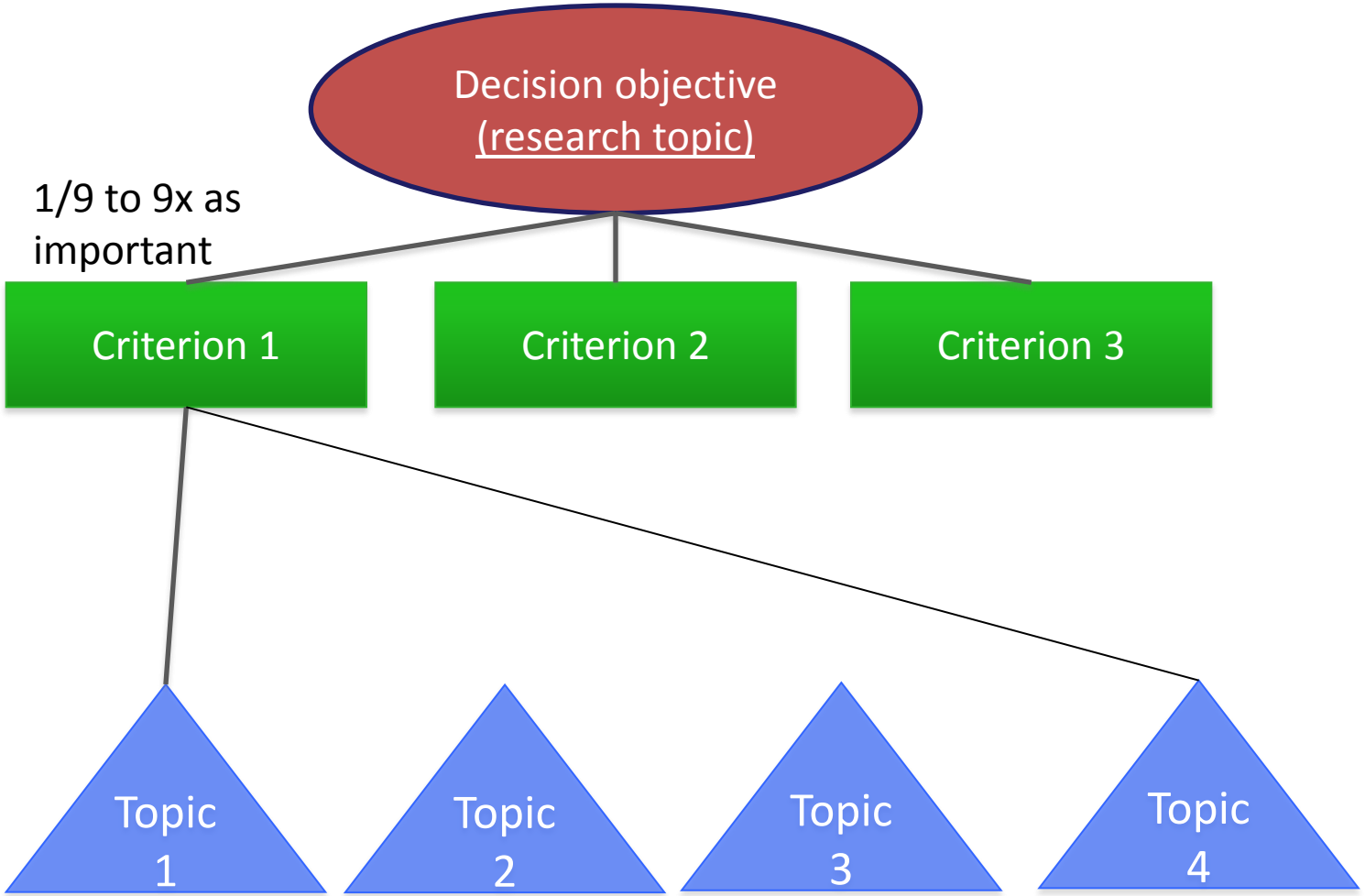

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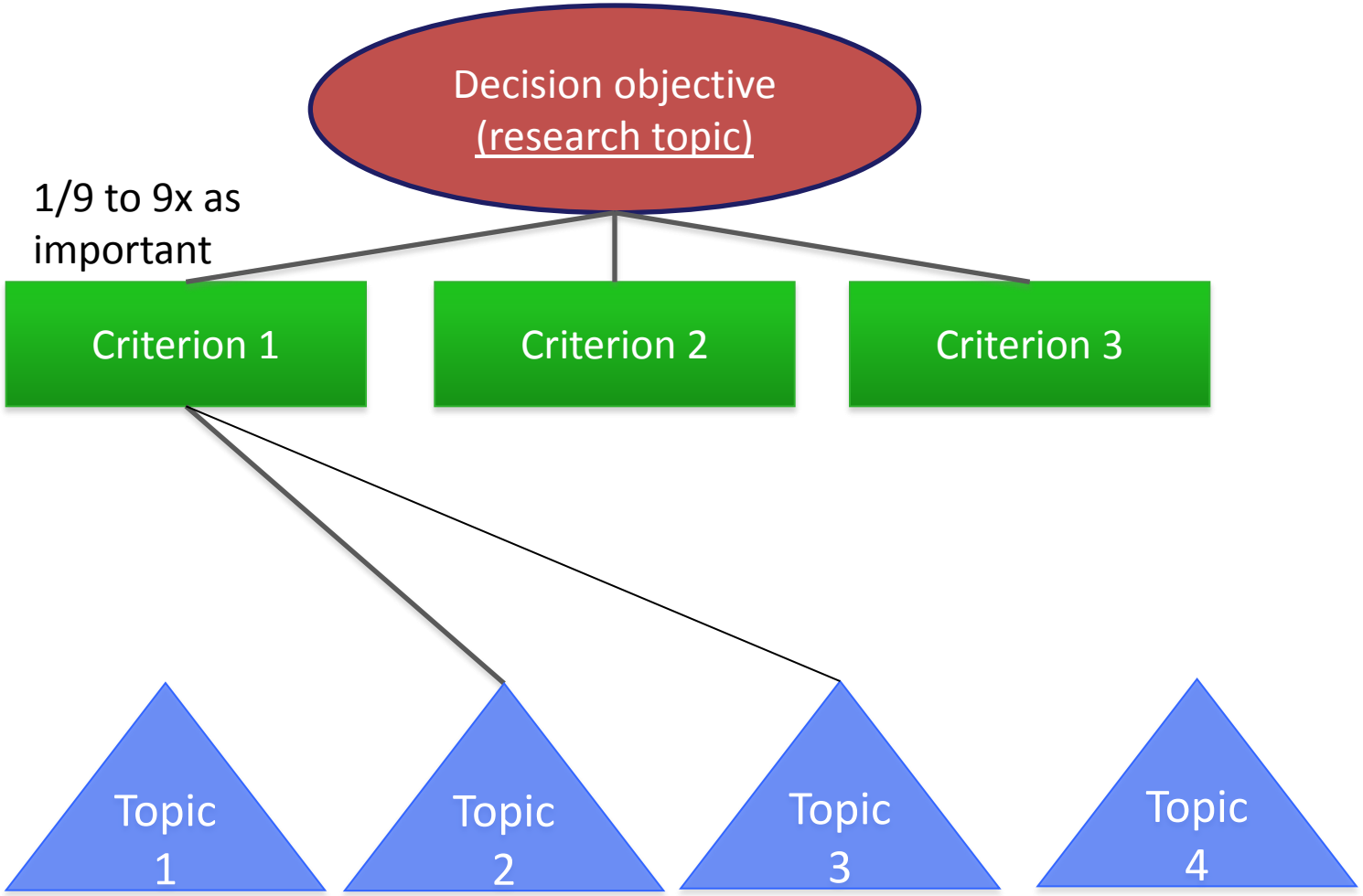

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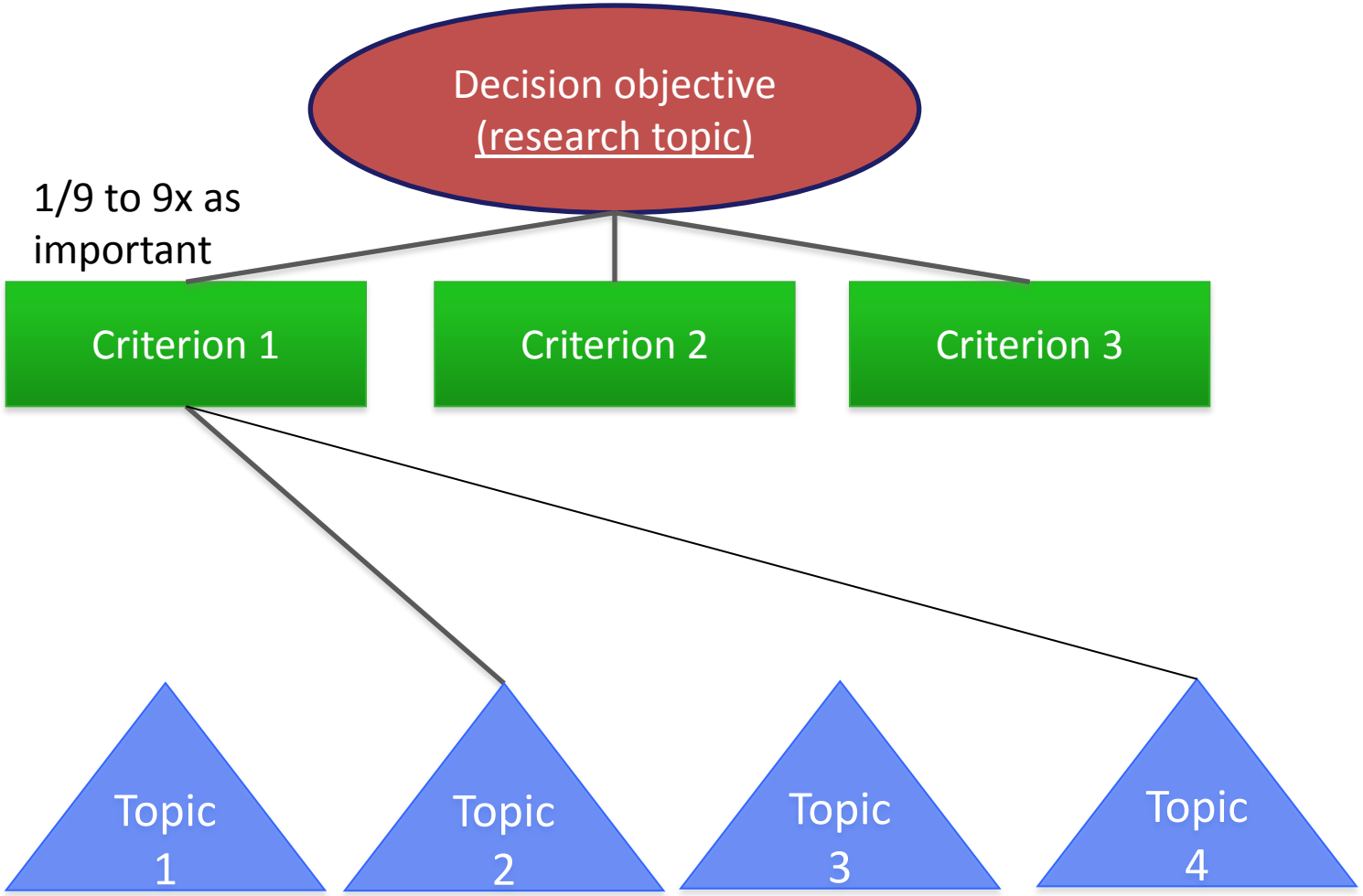

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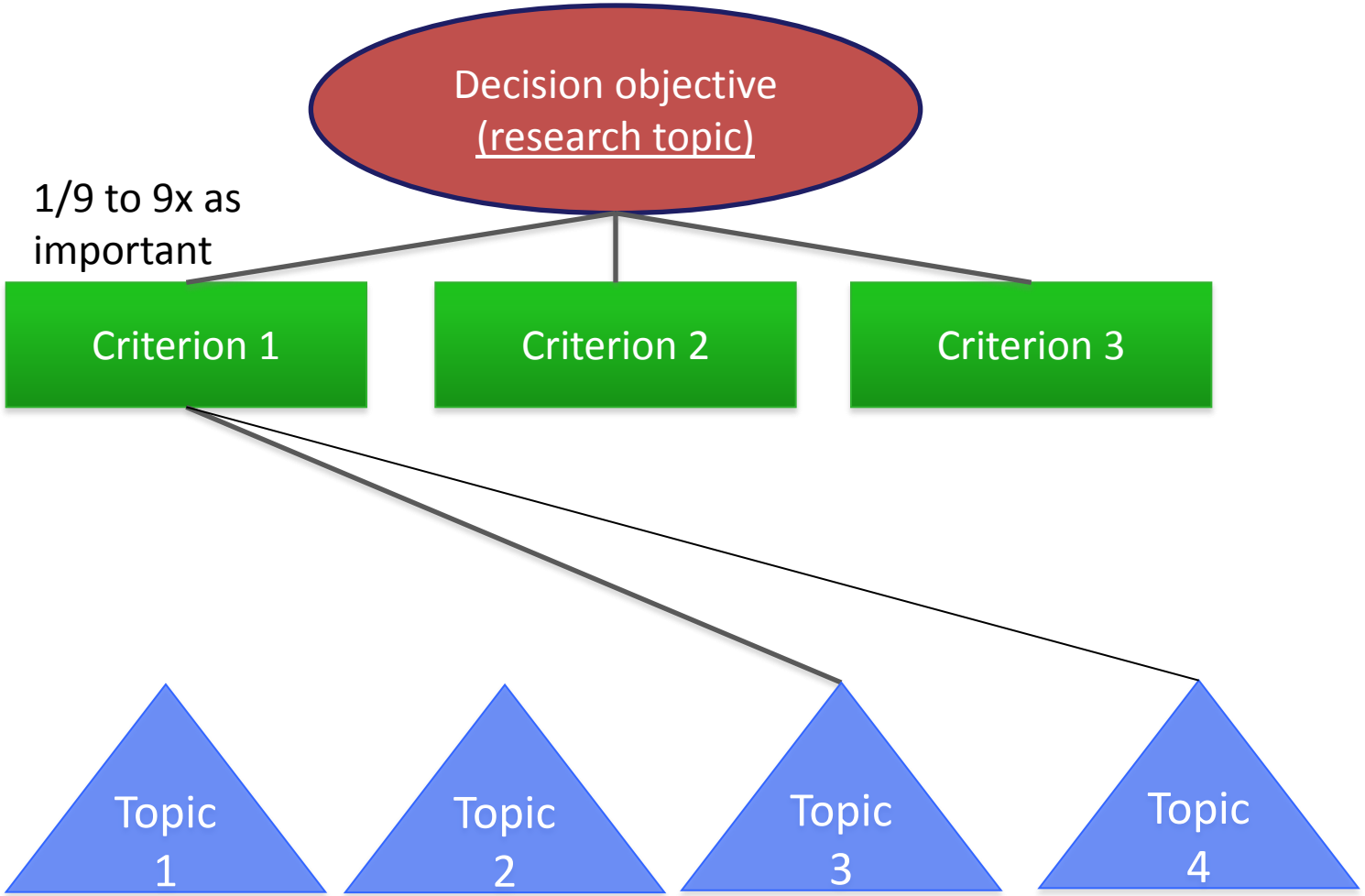

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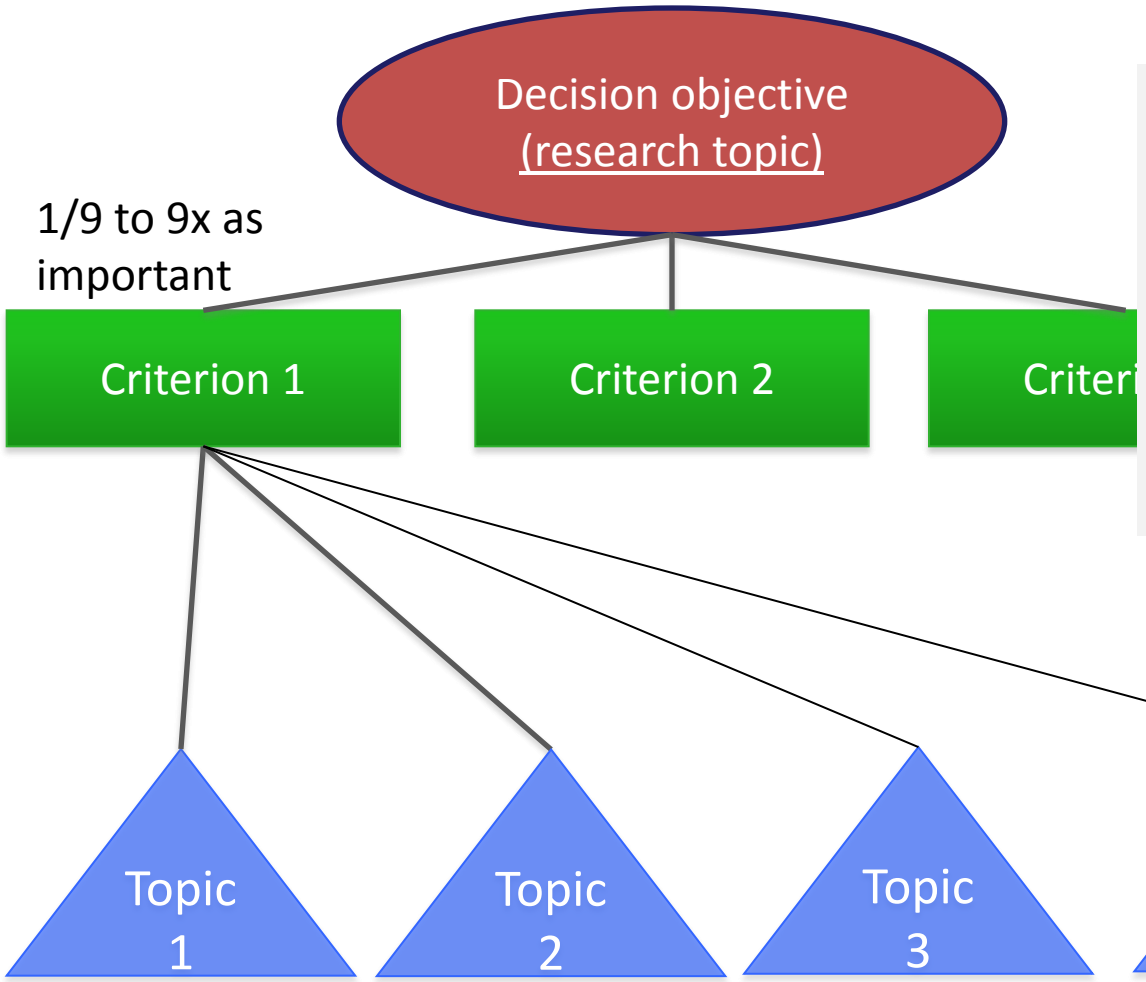
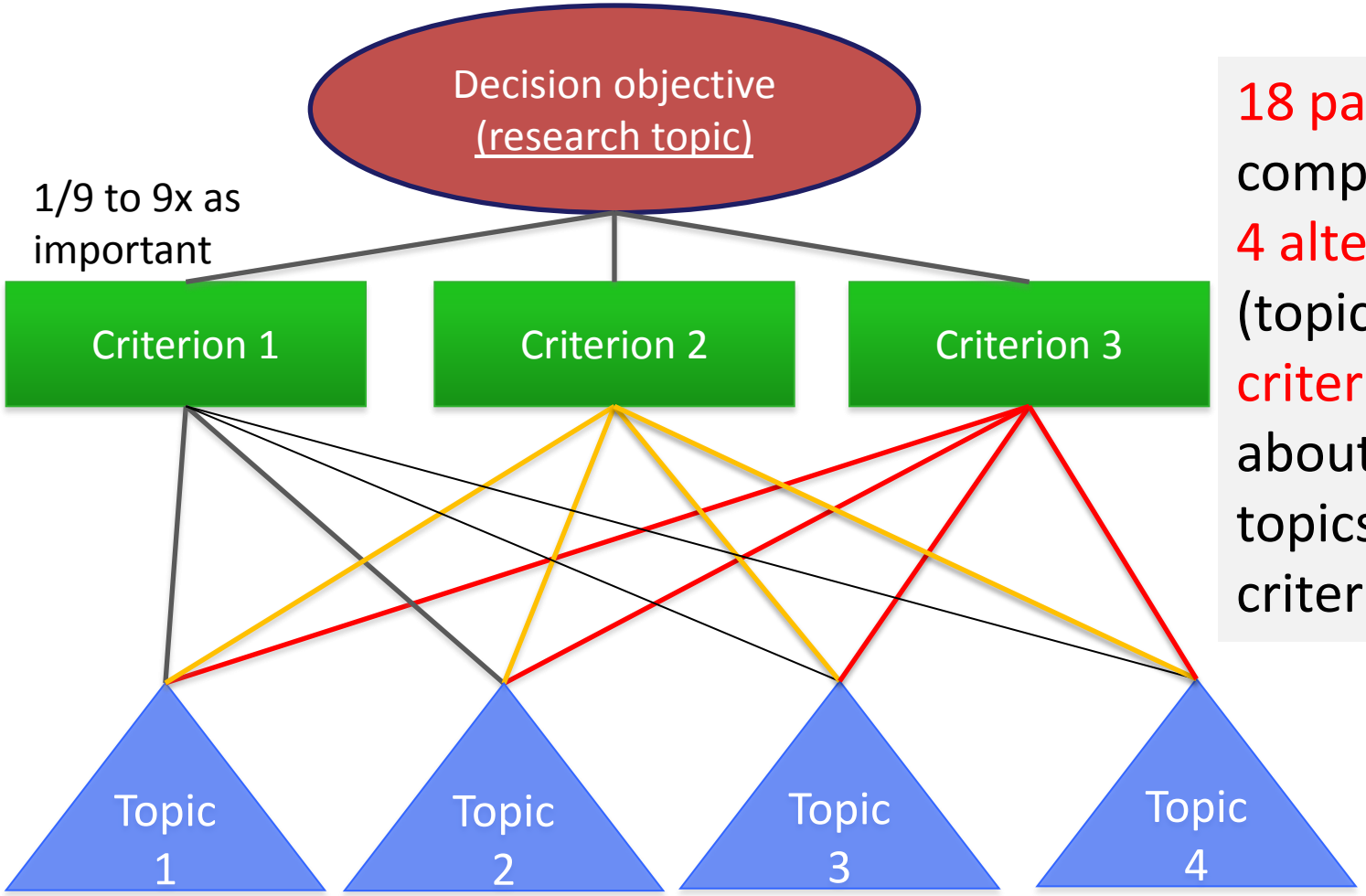


6 pairwise comparisons for 4 alternatives (topics) for 1 criterion.

MCDA methods: the Analytic Hierarchy Process

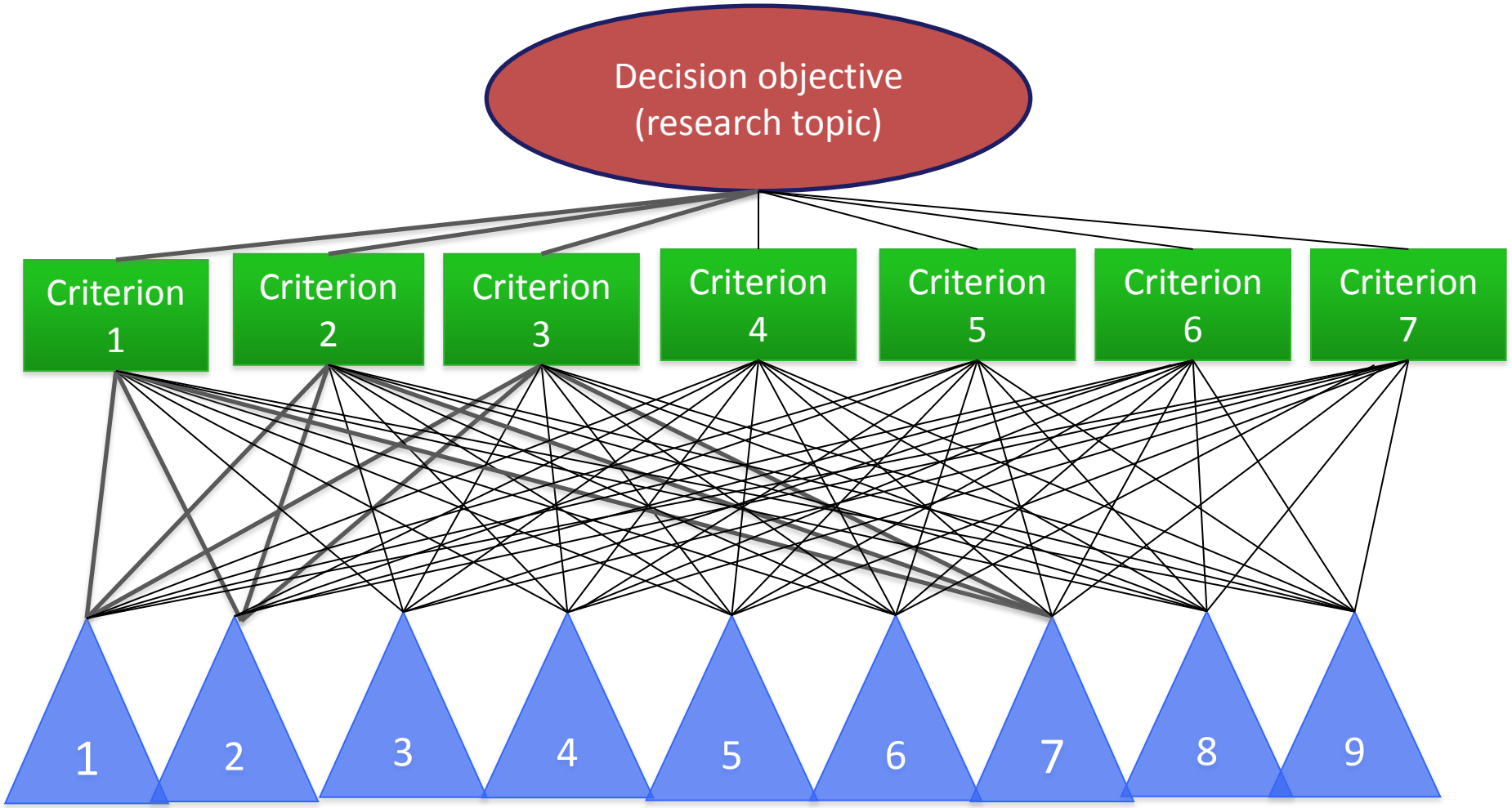


18 pairwise comparisons for 4 alternatives (topics) for 3 criteria. What about more topics, and more criteria?

Criteria used by stakeholders

1. Uncertainty about effectiveness
2. Impact on patient centered outcomes in efficacy studies
3. Quality of evidence in efficacy studies
4. Variability in care in real world settings
5. Societal cost
6. Feasibility of effectiveness studies
7. Results would inform care in diverse settings

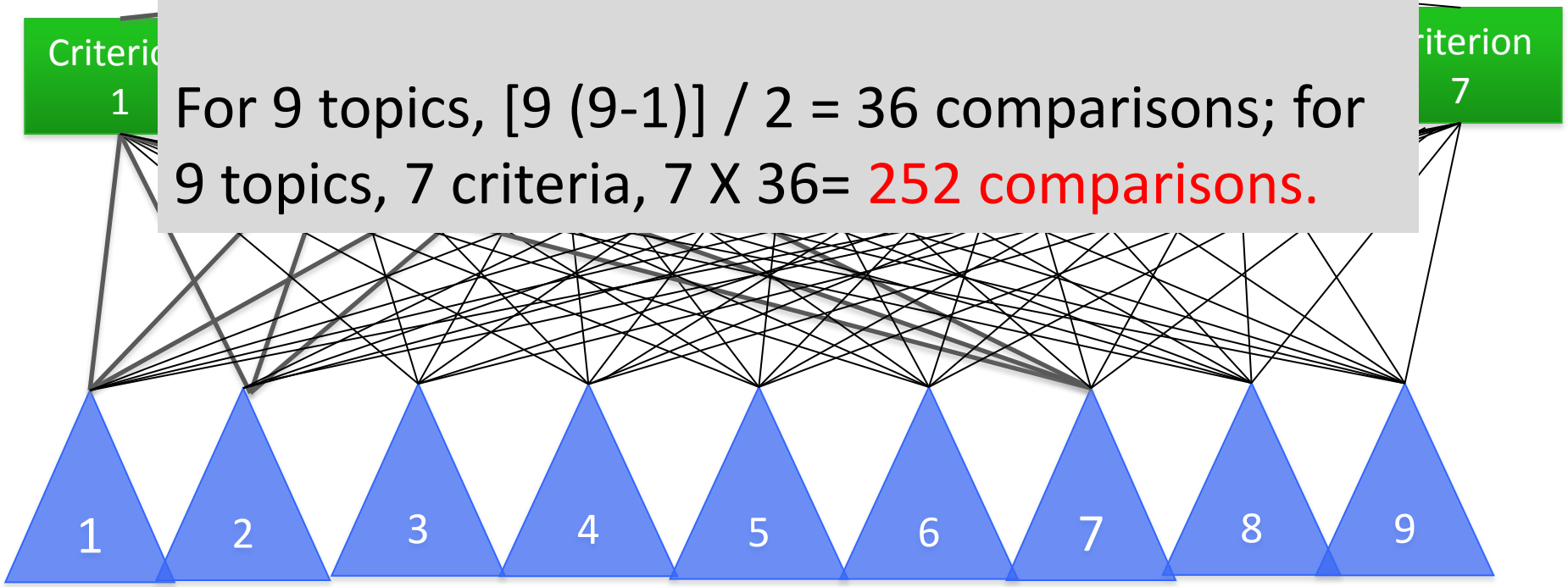
MCDA methods: the Analytic Hierarchy Process



MCDA methods: the Analytic Hierarchy Process

For each criterion, there would be [*n(n - 1)*]/2 pairwise comparisons, where *n* is the number of research topics being compared.

For 9 topics, [9 (9-1)] / 2 = 36 comparisons; for 9 topics, 7 criteria, 7 X 36= 252 comparisons.



Modified AHP, to triage topics: 1/9 to 9x as overall important

Topic	1	2	3	4	5	6	7	8	9
1									
2	1/9								
3	1/3								
4	9								
5	2								
6	1/2								
7	3								
8	1/5								
9	4								

Modified AHP, to triage topics: 1/9 to 9x as overall important

Topic	Normalized priority	IQR
1	0.22	0.1 – 0.3
2	0.20	0.1 – 0.4
3	0.17	0.1 – 0.2
4	0.14	0.06 – 0.15
5	0.12	0.04 – 0.19
6	0.07	0.03 – 0.08
7	0.04	0.02 – 0.05
8	0.02	0.01 – 0.04
9	0.02	0.01 – 0.04

Reflections on AHP for setting CER priorities

1. Quantifies relative priorities and can be used to link voting patterns to criteria

2. Not practical when 'large' # topics, criteria
   - 9 topics, 7 criteria → 252 comparisons
   - 5 topics, 5 criteria → 50 comparisons
   - 3 topics, 3 criteria → 9 comparisons

3. CONCERT's experience
   - Use pragmatic version of AHP (or other approach) to triage topics and criteria
   - Fully deploy AHP on highest scoring topics and most important criteria
   - Given variation in preferences, collaborate with different sets of stakeholders on separate CER topics

Acknowledgements

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