

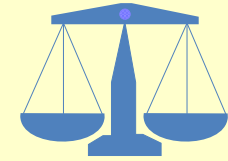
Experience with the application of multi-criteria decision analysis in public planning

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Valuing the Future - Public Investments and Social Return
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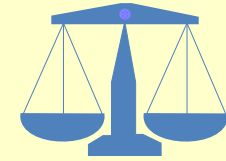
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Experience with the application of multi-criteria decision analysis in public planning

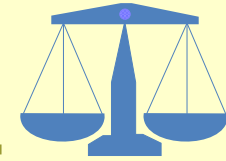
Concept Symposium 2012

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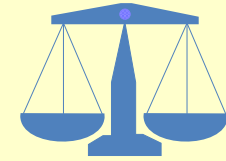
MCDA and BCA

- Benefit-Cost analysis (BCA)
 - One tries to infer *people's* willingness-to-pay for projects from what they reveal through market behaviour or state in surveys.
- Multicriteria decision making (MCDA)
 - One tries to elicit the preferences of *experts, decision-makers or stakeholders* through structured processes
 - Usually computer-assisted
 - Seminal reference:
 - KEENEY, R. & RAIFFA, H. 1976. *Decision with Multiple Objectives*, New York, John Wiley & Sons.

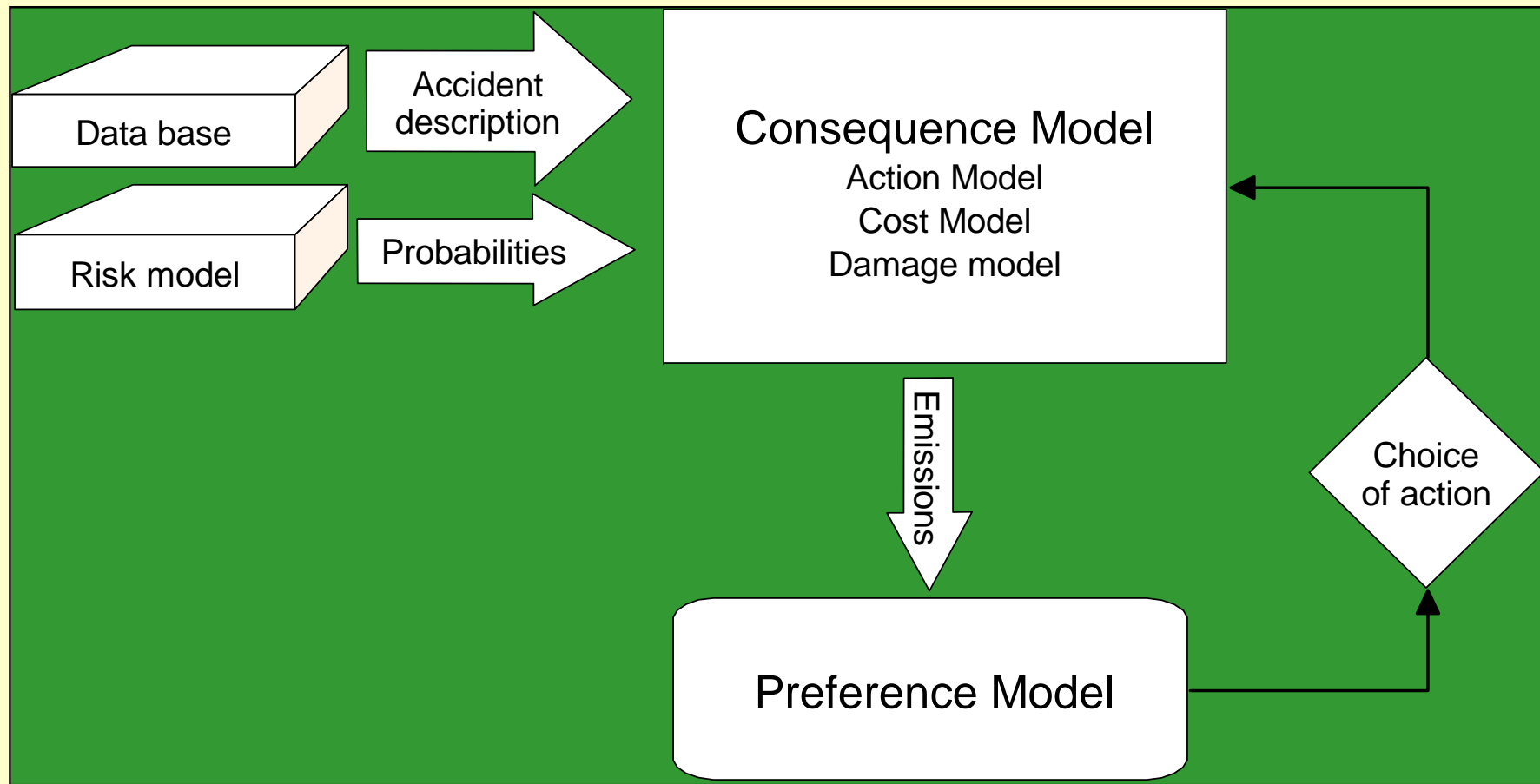


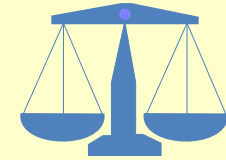
Norwegian oil spill combat strategy analysis, 1980

- The objective
 - To evaluate oil pollution combat strategies in Norway over the next 10 years
- Sponsor
 - The Ministry of Environment
- Polluters
 - Oil tankers in costal waters
- Expected size of problem
 - 1.7 oil spills per year

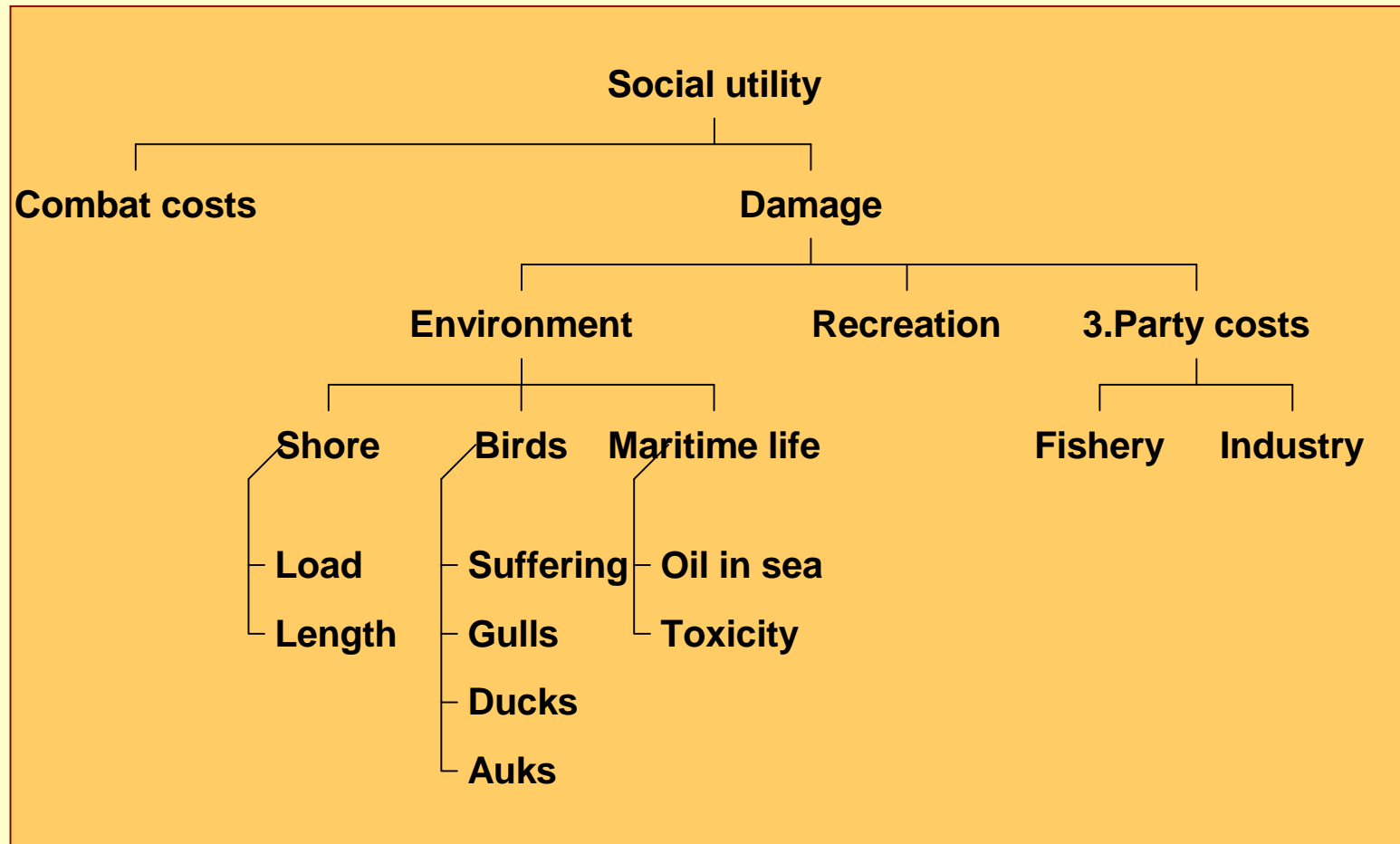


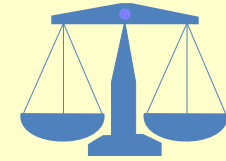
Oil spill combat strategy: Model structure





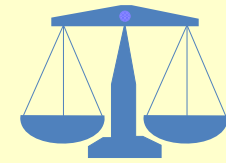
Goal hierarchy





Decision Criteria

- Shore
 - Load: year, restitution time
 - Length: km
- Birds
 - Suffering: bird, number killed
 - Gulls: year, restitution time
 - Ducks: year, restitution time
 - Auks : year, restitution time
- Maritime life
 - Oil in sea: ton, dispersed
- Recreation
 - Visibility:
 - x_9 = number of exposures
- Costs
 - mill NOK, combat costs and 3rd party costs



Three decision panels

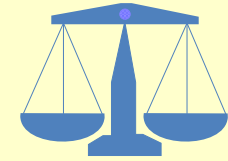
The Board of the program

NPCA: Norwegian Pollution
Control Authority

(Statens forurensningstilsyn SFT)

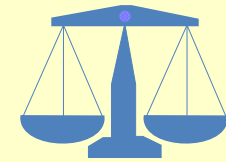
NGO: Norwegian Society for the
Conservation of Nature
(Norges Naturvernforbund NNF)

Weights	Board	NPCA	NGO
Cost	27	36	3
Recreation	41	20	1
Industry	50	48	45
Fishery	50	48	45
Shore time	99	97	100
Shore length	98	99	78
Bird deaths	74	43	50
Gulls	3	6	8
Ducks	41	65	41
Auks	100	98	83
Oil in sea	31	20	9



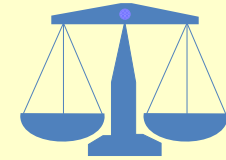
Willingness to pay Principles

- When a utility function has been constructed for a decision maker, his willingness to pay for any action with known consequences can be calculated.
- The WTP is the combat cost which makes the utility before the action equal to the utility after.
- If the real combat cost is lower, the action should be carried out.



Tactics: WTP for the three panels

Criterion	Unit	No action	Collect oil	Direct oil
Recreation	1000 exp.	200	200	1000
Industry	mill NOK	2,1	2,1	1,4
Fishery	mill NOK	1,5	1,5	1,3
Shore time	year	3	3	2,5
Shore length	km	201	201	135
Bird deaths	bird	9450	9450	6800
Gulls	year	3,1	3,1	3,1
Ducks	year	6	6	6
Auks	year	12	12	12
Oil in sea	ton	9500	8000	8000
WTP	mill NOK	0	1, 1, 1	10, 25, 126
Combat cost	mill NOK	0	11	12



WTP to avoid real cases:

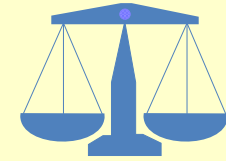
MS. Stylis bound for Oslo from Rotterdam leaked ballast water

MS. Drupa bound for Sola was shipwrecked outside Solavika

Criterion	Unit	Stylis	Drupa
Recreation	1000 exp.	10	500
Industry	mill NOK	0,1	10
Fishery	mill NOK	0	2
Shore time	year	2	5
Shore length	km	50	120
Bird deaths	bird	250000	2000
Gulls	year	3	0,5
Ducks	year	6	2
Auks	year	14	5
Oil in sea	ton	20	20

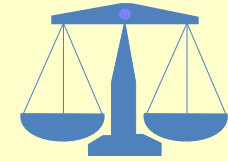
After one year the NGO asked to reassess their utility function. The new function is used to compute their WTP here

WTP	mill NOK	9, 30, 3900	51, 128, 1200
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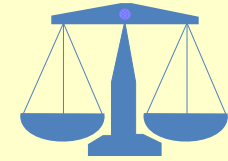
Oil spill combat Conclusions

- Alternative organizational change strategies
 - Expected reduction in social economic costs over the next 10 years (mill. NOK):
 - Adjustment and increased effectiveness: 1,5 - 2,0
 - Private oil spill Protection Company: 0,7 - 1,5
 - Private with State as part owner: 2,0 - 3,5
 - Total costs of preparedness over the next 10 years: 980 mill NOK
- Expected costs of current level are from 60 to 450 times higher than the WTPs of the Board and NPCA
- Break even for NGO
 - NGO's WTP is NOK 17500 per bird in the Styli scenario



The situation today

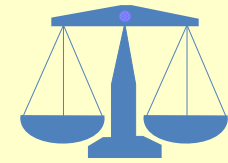
- A significant number of MCDA of public projects are reported in Operation Research journals
 - Primarily in connection with environmental consequences
- Sophisticated theory-based software
 - Group decisions
 - Weighting of stakeholders
 - Non-compensatory procedures
- MCDA runs often in parallel to political processes and provides input to them



Epilogue



- Four dimensions of rationality
 - logical consistency
 - well-foundedness of beliefs
 - well-foundedness of values
 - rationality of action
 - Føllesdal 1992



Thank you

