Slide 1

**Cost IC0602 International Doctoral School
Applying Decision Analysis to Real Problems**

Consultancy Skills

Theo Stewart

Introduction

Workshops

Finalizing Structure

Implementation

Developing consultancy skills: the decision analytic process

Theodor Stewart

Manchester Business School

University of Manchester, 10th to 13th April 2011

Slide 2

Why do we need consultancy skills?

Consultancy Skills

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- MCDA is an applied science . . . it has no meaning in the abstract
- "Decision makers" (or other stakeholders/actors) are people too!
- We have to match our tools and skills to the needs of the client:
  - Make sure you solve the right problem
  - Make sure you choose methods appropriate to the problem, and to the psycho-social characteristics of the client (probably a group)
- Learn to get the best out of the group, and to construct answers that will stand the test of time

Slide 3

Establishing the Contract

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- What is required (the "problematique")? – To establish a once-off solution or a process? A definite recommendation, a short-list, or a classification?
- What is expected of the analyst? To drive the process? To facilitate parts of the process? To compile recommendations or just to minute discussions?
- What is to be delivered? Full documentation (within what time frame)? Brief minutes of discussions? Software to be used by the client?
- What commitments are being made by the client? How much time; How many people; Are these commensurate with the expectations?

Slide 4

Planning The Process (Discussions/Workshops)

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- Will problem structuring need substantial time/effort
- Where is structuring most needed? Alternatives? Criteria? Risks?
- Which stakeholders, experts need to be involved?
- One-on-one meetings (followed by a final review) or structured decision workshops?
- Number and duration of workshops; Numbers of participants; Venues and dates
- Who is responsible for physical organization, notices of meetings, etc.

Running the Workshop

Some personal approaches

- Brainstorming with "post-its" (or ovals, or hexagons, . . .)
  - Needs clearly defined question(s), e.g. *"What are the key concerns in developing long term strategies for water use in the region"*
  - Do we separate components of the problem (such as objectives, alternatives, . . .)??

Post-It Session 1

Running the Workshop

Some personal approaches

- Brainstorming with "post-its" (or ovals, or hexagons, . . .)
  - Needs clearly defined question(s), e.g. *"What are the key concerns in developing long term strategies for water use in the region"*
  - Do we separate components of the problem (such as objectives, alternatives, . . .)??
- Clustering by CAUSE (*criteria, alternatives, uncertainties, stakeholders, environment*)

Post-It Session 2

Running the Workshop

Some personal approaches

- Brainstorming with "post-its" (or ovals, or hexagons, . . .)
  - Needs clearly defined question(s), e.g. *"What are the key concerns in developing long term strategies for water use in the region"*
  - Do we separate components of the problem (such as objectives, alternatives, . . .)??
- Clustering by CAUSE (*criteria, alternatives, uncertainties, stakeholders, environment*)
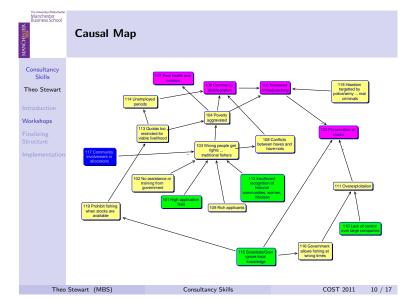- Representation by causal maps / spray diagrams

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Causal Map

Running the Workshop

Some personal approaches

- Brainstorming with "post-its" (or ovals, or hexagons, . . .)
  - Needs clearly defined question(s), e.g. *"What are the key concerns in developing long term strategies for water use in the region"*
  - Do we separate components of the problem (such as objectives, alternatives, . . .)??
- Clustering by CAUSE (*criteria, alternatives, uncertainties, stakeholders, environment*)
- Representation by causal maps / spray diagrams
- Create the value tree for further analysis

CAUSE Checklist

Check agreed understanding of:

- Criteria (value tree)
- Alternatives (decision space structure)
- Uncertainties – How to take into account?
- Stakeholders – Do we need multiple analyses?
- Environment – Effect on decision space

Agreed Structure for Intervention/Analysis

- The problematique (extension to Roy!) – Choice, Sorting (into classes, including portfolio problems), Ranking, Description, Design (creating a "best" action)
- What level of interaction with clients can be expected:
  - At rare meetings only
  - Regular
  - More-or-less continuous
- Infinite (mathematical, incl. integer programming) *vs.* discrete problems
- How are uncertainties going to be handled:
  - Formally via probability distributions
  - Consideration of explicit scenarios
  - Left to sensitivity analyses

Selecting the MCDA Approach

Vital to match chosen approach to the agreed structure

Constructive value measurement
- Implies quite intensive interaction with client
- More suited to discrete choice, but applicable to continuous problems

AHP
- Discrete choice problems
- Interactions typically at a single workshop, but "black-box" danger

Outranking methods
- Discrete choice problems
- Suitable with limited/ambiguous interaction

Inverse preference methods
- Suitable when little direct interaction available
- More transparent for discrete problems

Selecting the MCDA Approach (Cont.)

Goal programming (and generalizations)
- Primarily for math. programming problems
- Can operate with limited degrees of interaction
- Applicable even with large numbers of criteria

Interactive multiobjective optimization (e.g. NIMBUS)
- Math. programming problems
- Relatively frequent interactions needed
- Probably limited to moderate numbers of criteria (± 10?)

Pareto frontier methods (e.g. EMO)
- Math. programming problems
- Interactions only on preliminary structure and final solutions
- Limited in practice to 2 or 3 criteria

Eliciting Judgements and Preferences

ALL MCDA requires elicitation of values, judgements, preferences, weights, probabilities, etc.

- Operational clarity of questions
  - Simple ordinal preferences probably unambiguous
  - Even Likert scales (1–5) can have widely differing interpretation
  - What about: "*How much more important is A than B?*" or "*What is the worst case scenario?*"
- Discrepancies between group members
  - Can it be due to ambiguity?
  - Can we use a group "average" plus sensitivity?
  - Might it be better to do separate analyses for distinct views (sub-groups)?

Seeking Closure

- Has an answer to the appropriate problematique been identified?
- Is this solution unambiguously specified?
- Has there been enough sensitivity analysis so that robustness of the answer and/or existence of alternative answers been verified?
- Has the client been empowered to defend this answer to superiors and/or other role-players or stakeholders?
- Will the client approach us again? When and with what problems?