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Company decision-making for geothermal projects

(GEOCAP course 1.07)

Topic: Decision Tree Analysis (DTA)

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Public document (GEOCAP-2016-REP-TNO-1.07-xx)

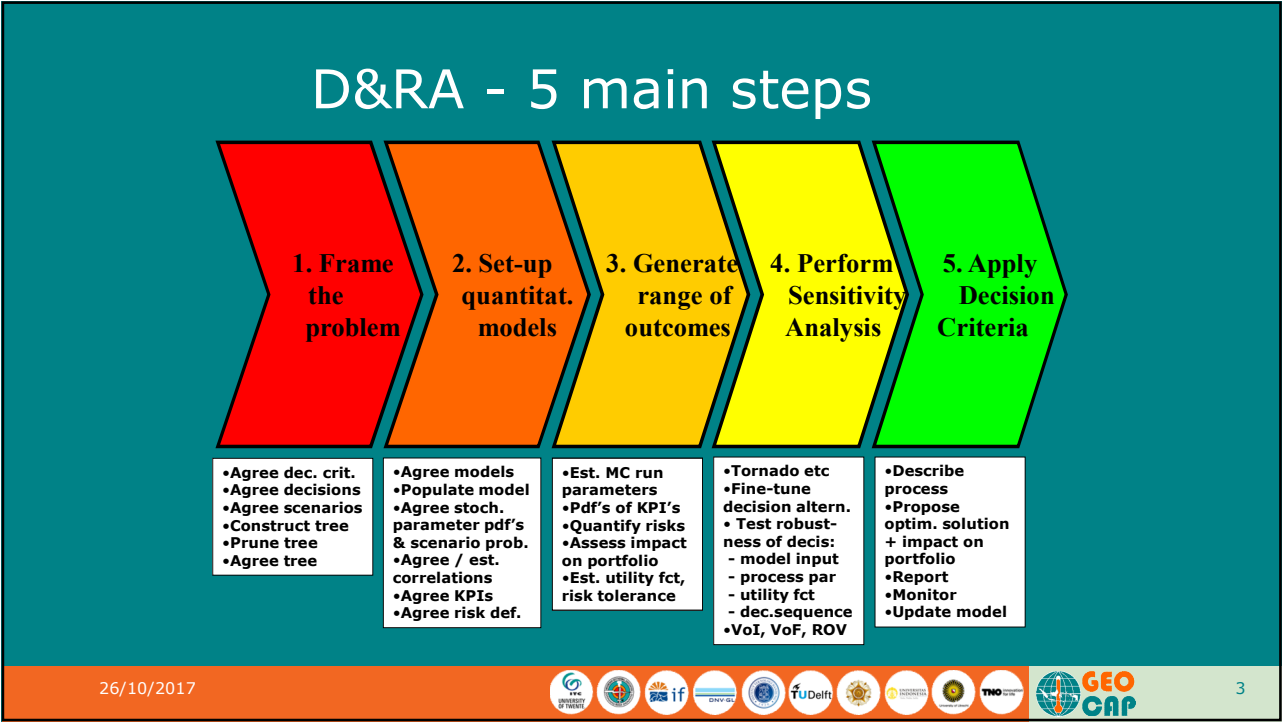
Decisions, decisions,

- Decision are our value optimization controls
- A decision-maker should investigate the framed decision alternatives, to select the optimal course of action
- Since decisions have to be made based on uncertain project outcomes, all decision paths have to be modelled together with the pertinent uncertainties
- Decisions can
 - be Static: now, vs. Dynamic or Contingent (depending on the value of future "state variables" = time-dependent output variables)
 - apply to investing in hardware, or investing in information (VoI)

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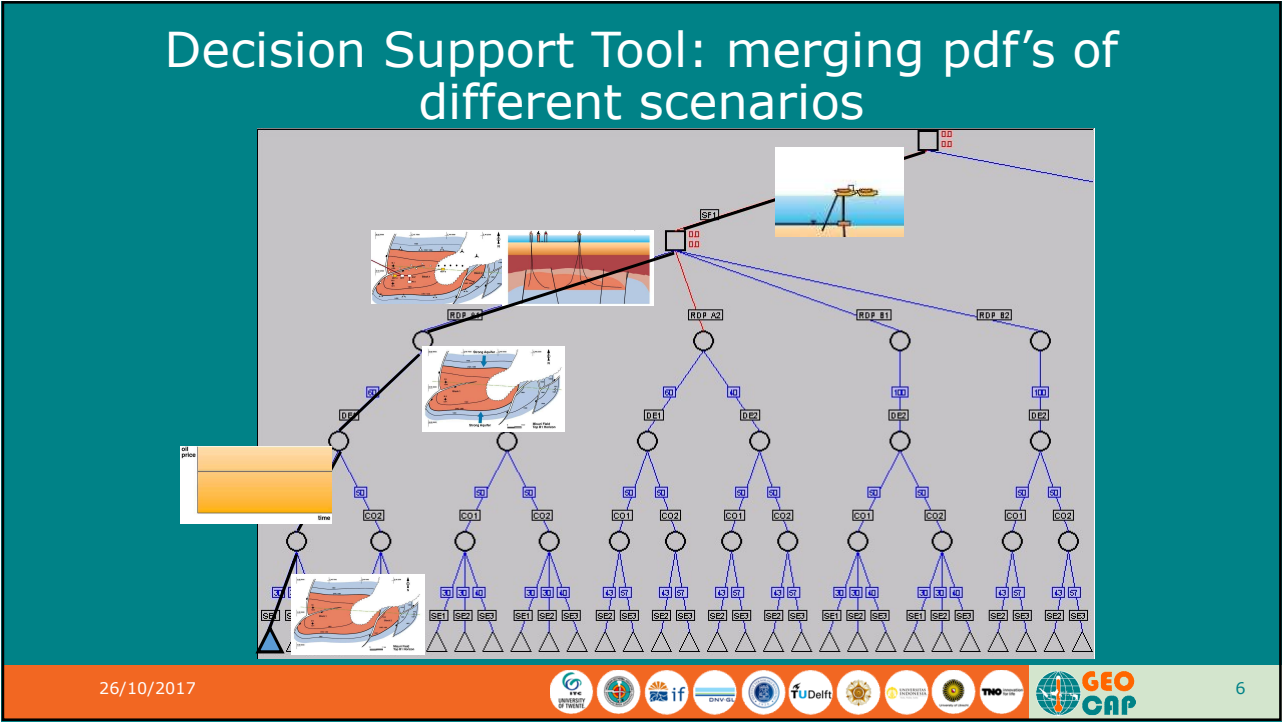
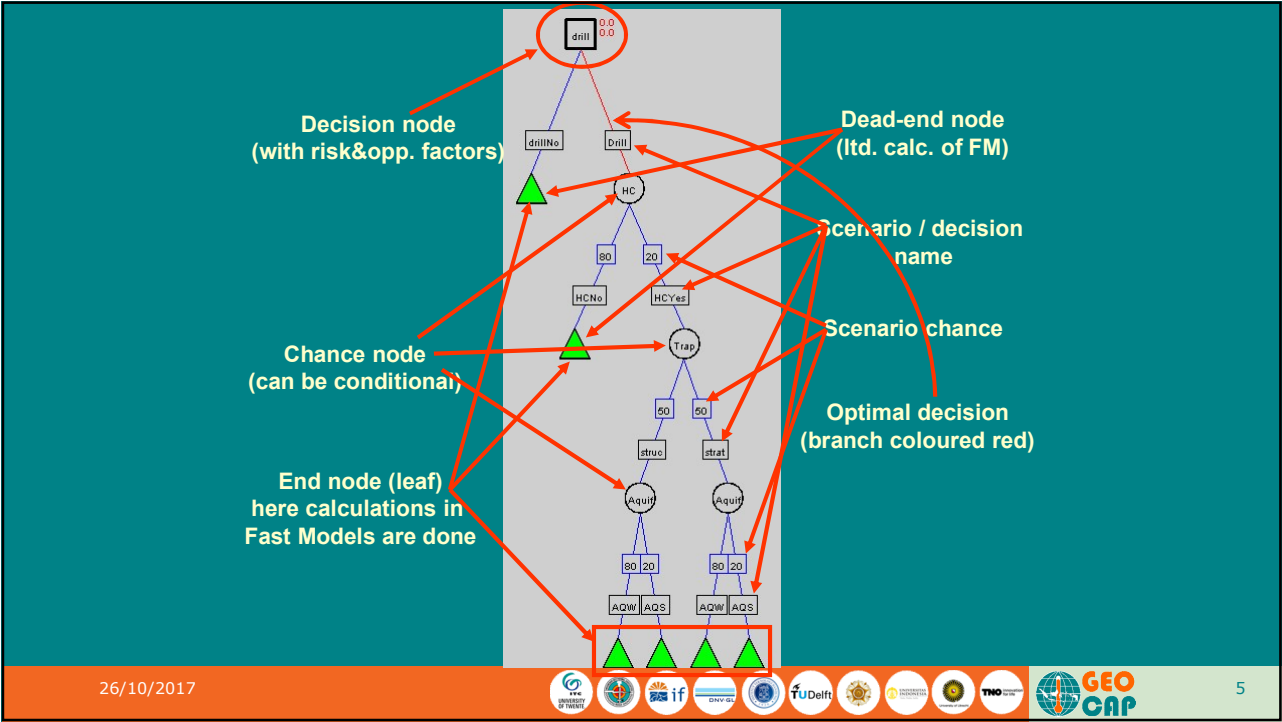
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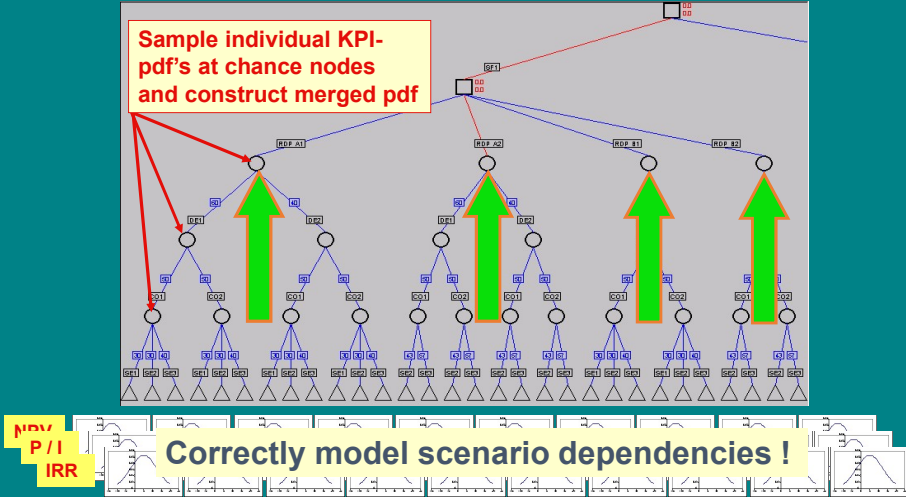
Discrete uncertainties (scenarios)

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Integrating discontinuous uncertainties by defining scenarios

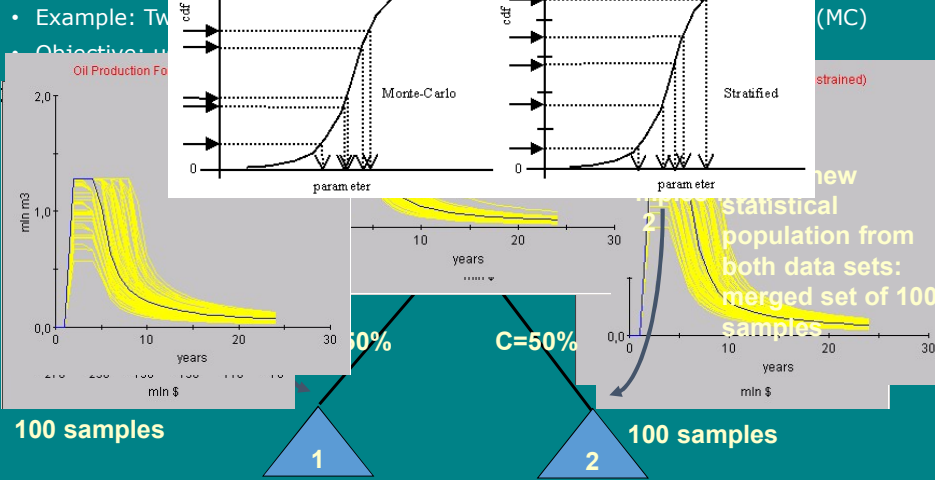


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Constructing merged pdf's in scenario trees



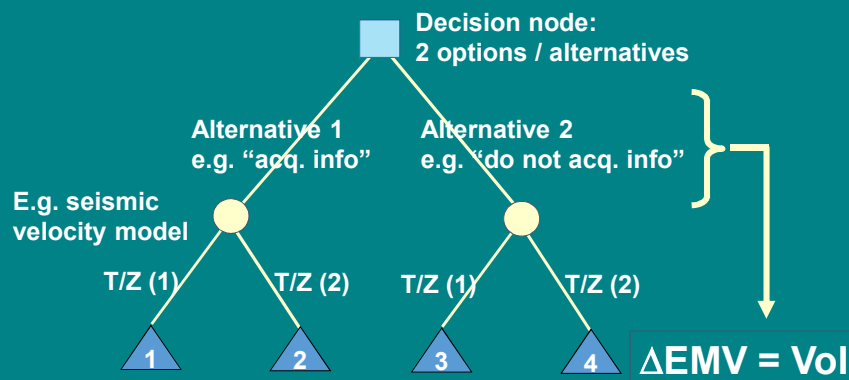
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Use full statistical information of each alternative branch for decision-making

- Combine continuous uncertainties from end-node input parameter pdf's (processed into KPI-pdf's) with discrete uncertainties from scenarios



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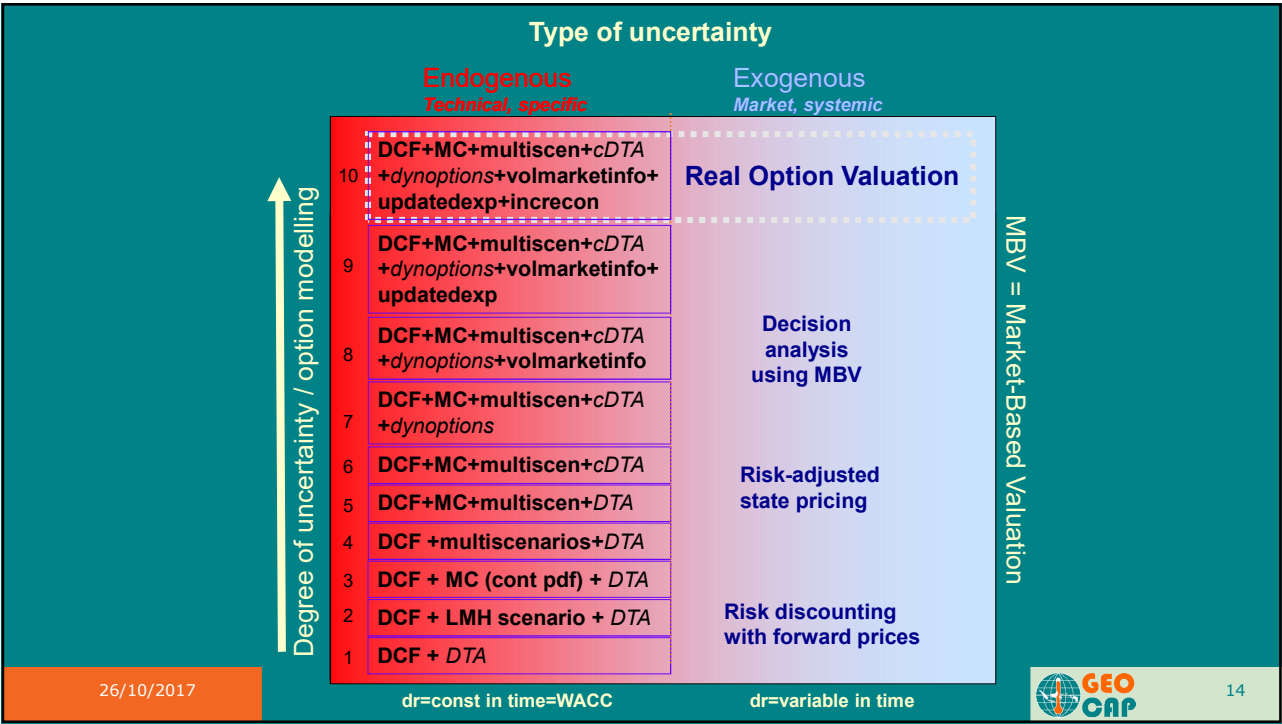
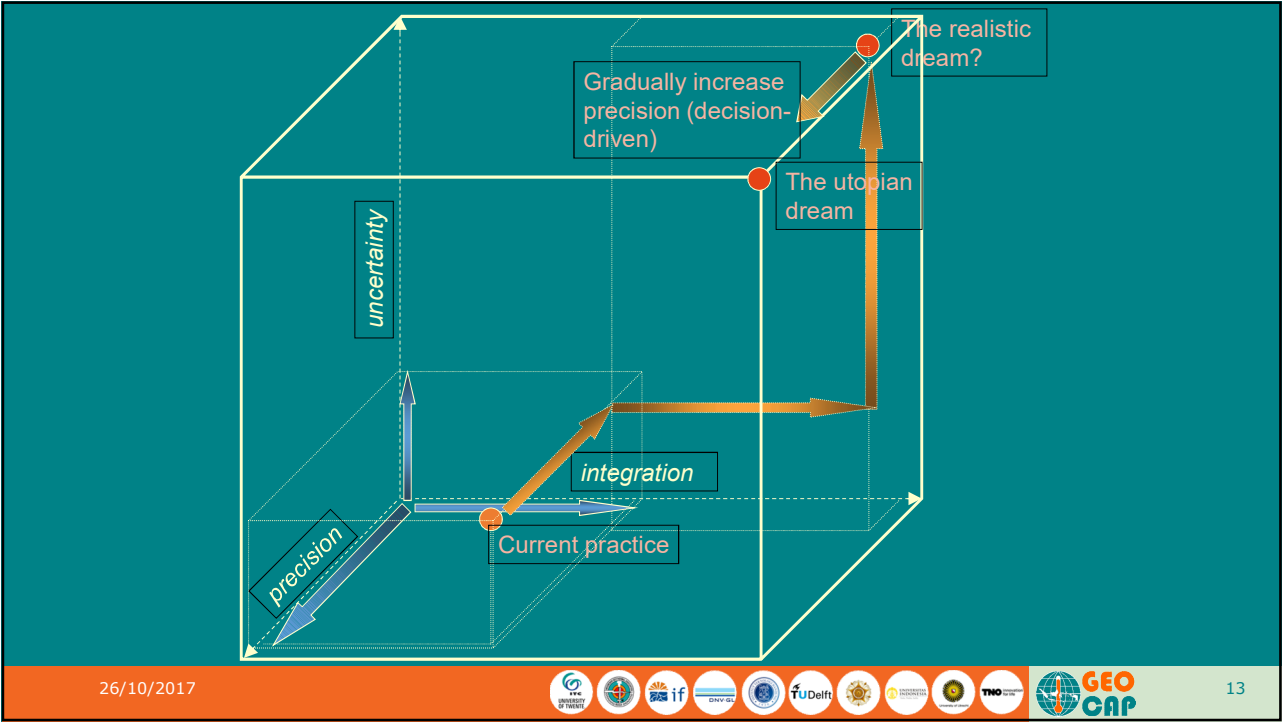
Type of decisions in tree and in IAM

- Static decisions
 - To be taken "now", i.e. with information currently available
 - I.e. not based on information still to be acquired
- Contingent decisions (or conditional decisions)
 - Decisions to be taken with information not yet available
 - In decision tree, these decisions normally follow some data acquisition activity + a scenario node
- Dynamic options
 - Option that is exercised as a function of the IAM's state variables (time-series model output)
 - Decision algorithm evaluated at each time-step.
 - Example: if $q_{oil} < \text{target}$, drill new well.
 - Other example: if $NCF < 0$ over last n years, close-in field

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Exercise - Decision on whether to explore a geothermal Prospect

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