APPLYING **NEW UNCERTAINTY** RELATED **THEORIES** AND **MULTICRITERIA DECISION ANALYSIS** METHODS TO **SNOW AVALANCHE RISK** MANAGEMENT

Jean-Marc TACNET[1] , Mireille BATTON-HUBERT[2], Jean DEZERT[3] , Didier RICHARD [1]

[1] *Cemagref* – ETGR (Snow Avalanche engineering and torrent control research unit) - 2, rue de la papèterie - B.P. 76 – F-38402 Saint Martin d'Hères Cedex - (France)- *e-mail* : jean-marc.tacnet@cemagref.fr

[2] ENSM-SE/SITE - Ecole Nationale Supérieure des Mines de Saint-Etienne - Centre SITE - 29, rue Ponchardier - 42100 Saint Etienne Cedex - (France) - *e-mail* : batton@emse.fr

[3] ONERA - The French aerospace lab - DTIM/SIF, Bât. N, Chemin de la Hunière, FR-91761, Palaiseau Cedex, France - *e-mail* : jean.dezert@onera.fr

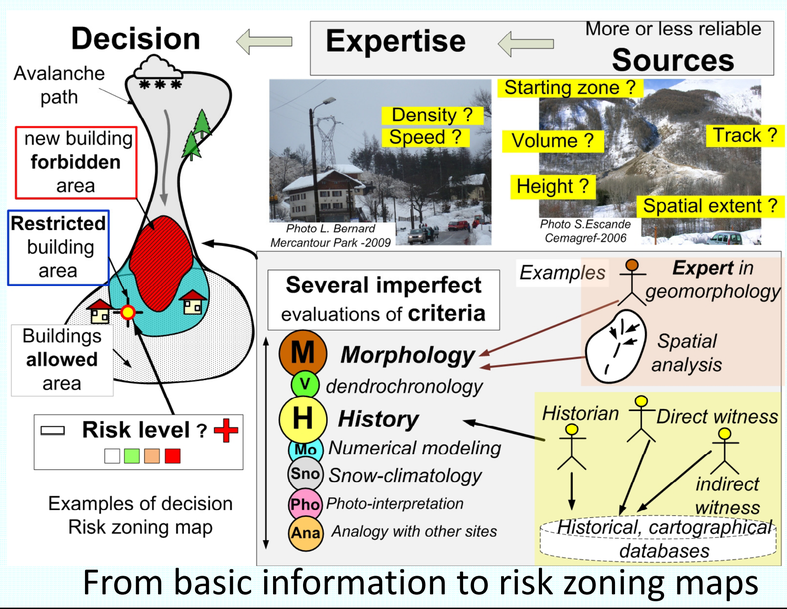
1 Expert assessments

are (often) based on imperfect information

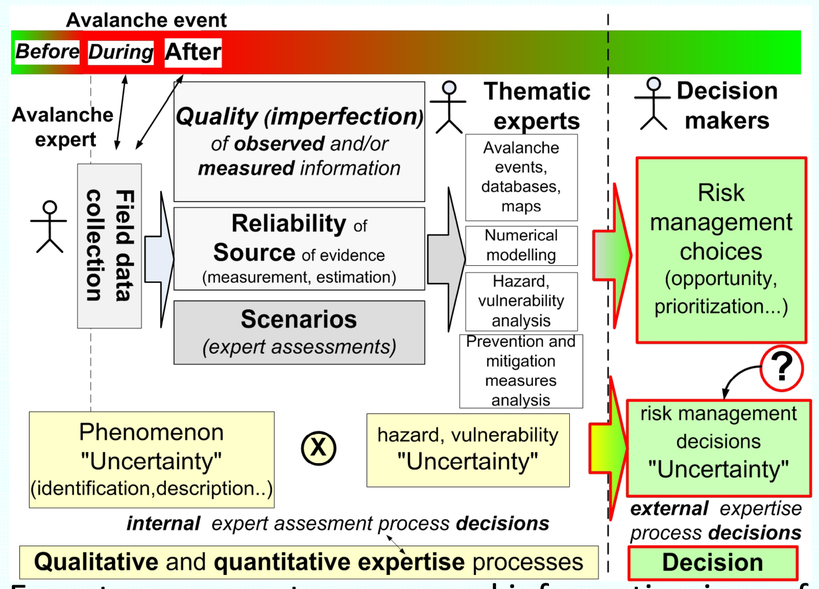
How can we make a decision ?

How far can we be confident in the result ?

How can we make a difference between information contexts (availability, quality, reliability, conflict…) ?



From basic information to risk zoning maps



Expert assessment process and information imperfection

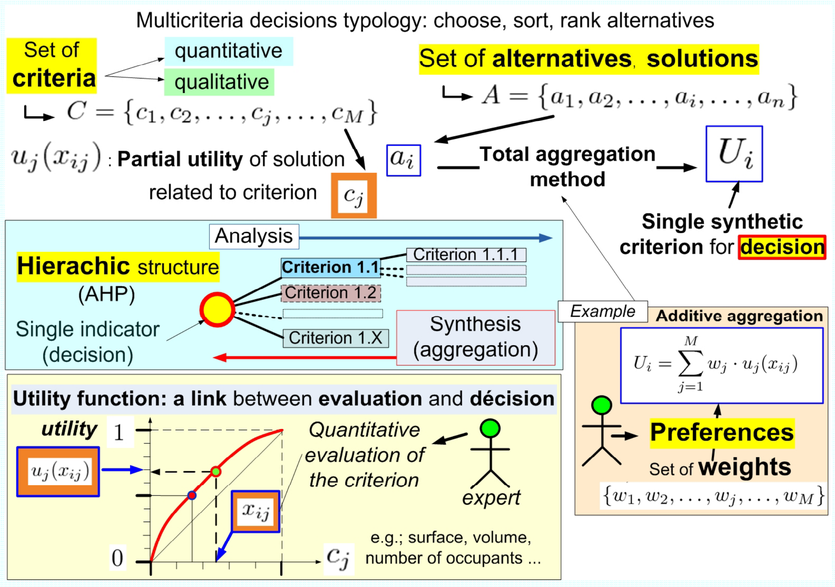
2 (Classical) Multi-Criteria Decision Analysis (MCDA)

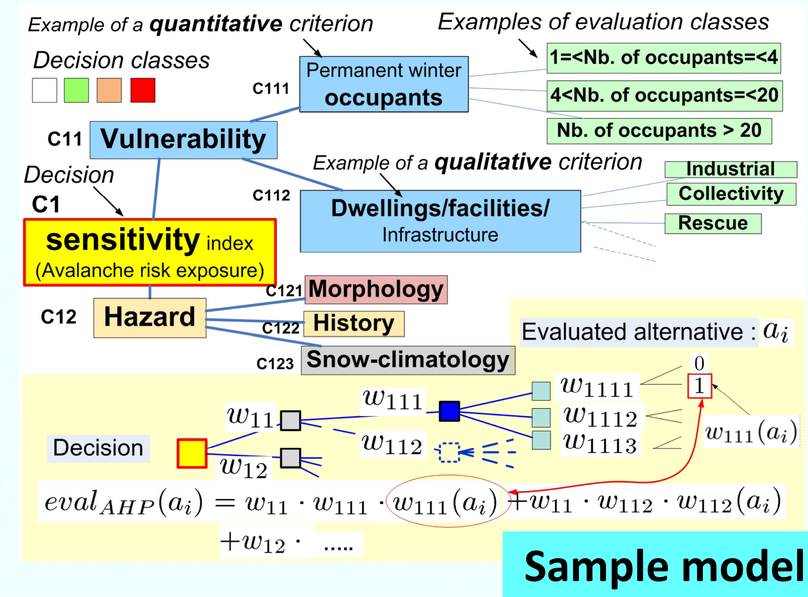
Principles of:

- (classical) **total aggregation based MCDA methods**

- Analytic **H**ierarchy **P**rocess (AHP)
viewed as a special case of Multi Attribute Utility Theory (M.A.U.T)

A conceptual framework used (only) for decision problem description and preferences assessment.

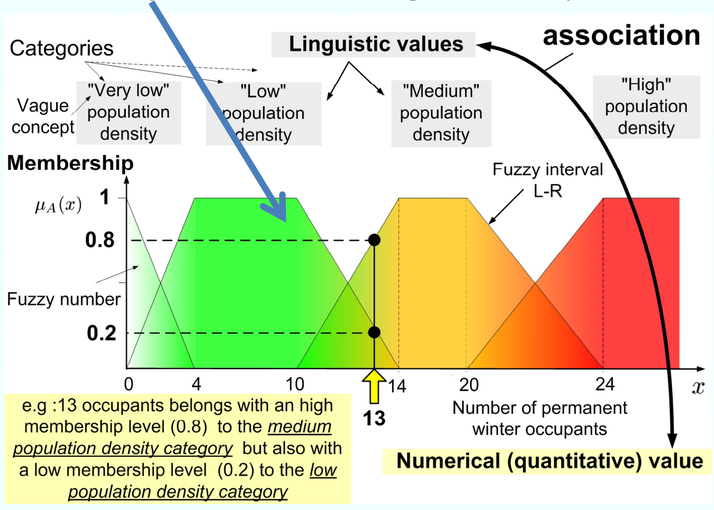




Sample model

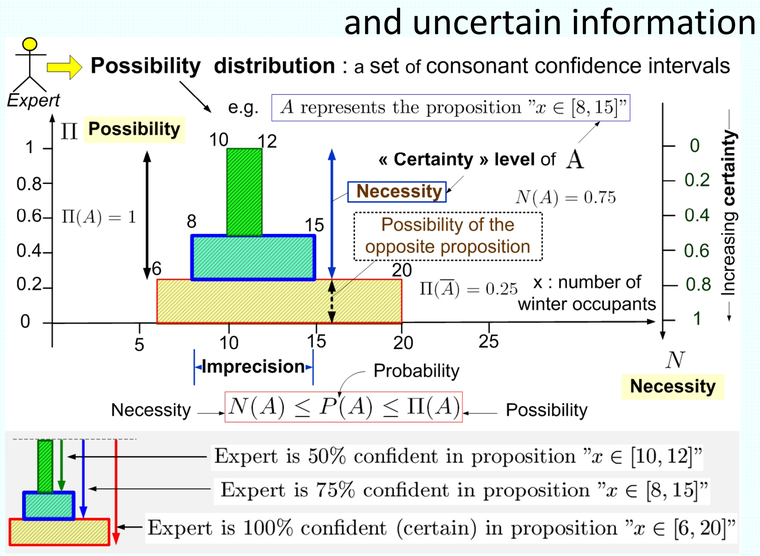
3 Representation of information imperfection

Fuzzy intervals for vague concepts



Fuzzy sets theory

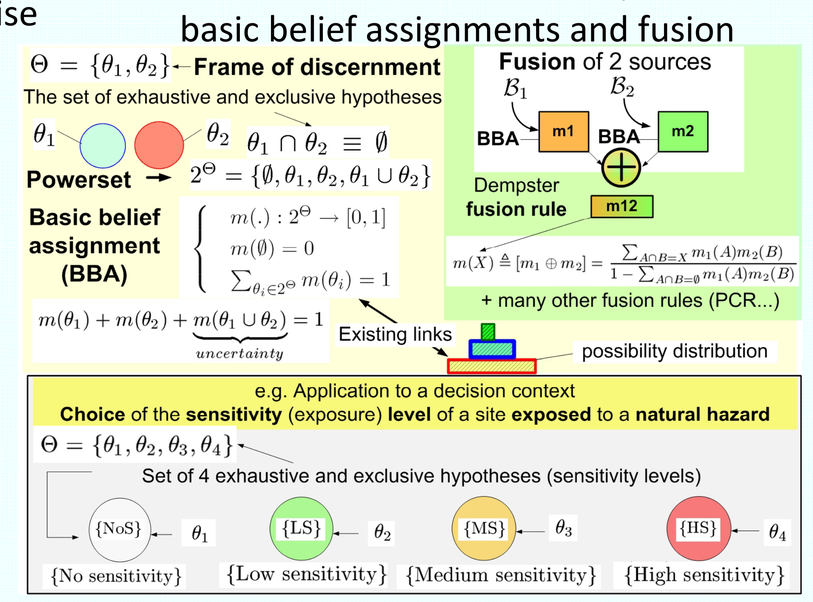
Possibility distributions for imprecise and uncertain information



An easy-to-use method for experts

Possibility theory

Frame of discernment, basic belief assignments and fusion

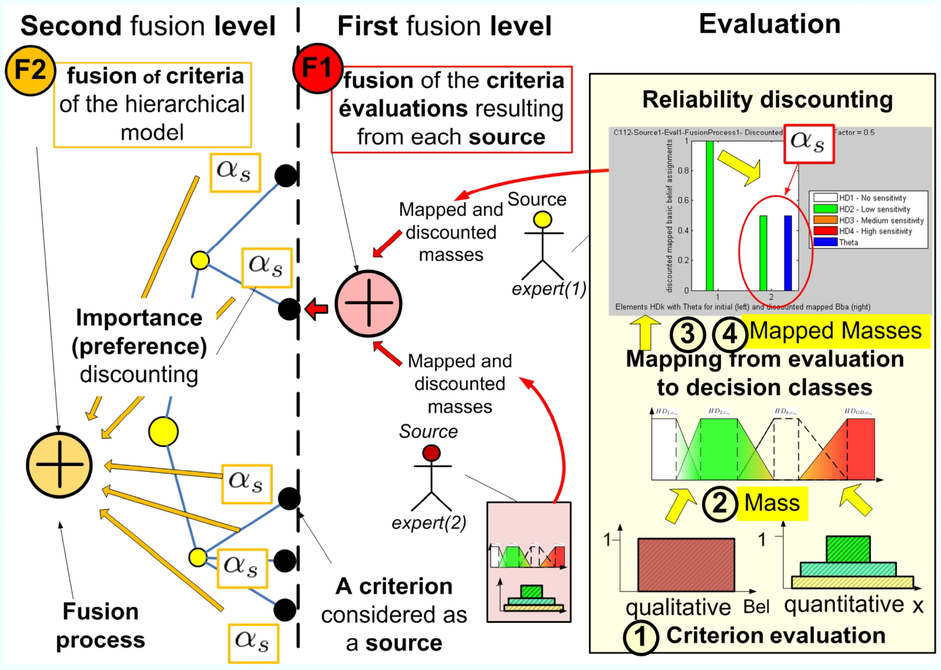


Belief Function theory

1 + 2 + 3 → 4 ER[1]-MCDA methodology

[1]Evidential Reasoning – Multicriteria Decision Analysis

ER-MCDA methodology mixes aid-decision and information imperfection propagation. Fusion information is used instead of classical aggregation methods



Process description

The ER-MCDA methodology considers **information quality**, decision makers **preferences** and **sources reliability** and **conflict**.

Decision (profile)

Imprecise, uncertain expert assessment

PARAmount

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