Event Analysis Methods Evaluation Criteria

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Roles of Criteria

- Roles of Criteria is to
  - *Help user(s) to find method(s) fitting his/her (their expectations*
    - According to their "own" features (background, knowledge, resources…)
  - *Compare analysis methods in a way that makes their underlying characteristics obvious / clear*
  - *Give an understandable and comprehensive overview of a panel of analysis methods*

  => *Tool for choosing a method [or to assess method used by analyst(s)]*
- Role of Criteria is not to
  - *Classify methods against each other*

Quantitative or Qualitative Criteria

- Main stream
  - *Quantitative result is more objective*

  => *More reliable*

  ⇒ *More trustable*
- On the other hand
  - *An analysis is a matter of knowledge, skill, expertise, capability…*
  - *All features are not necessarily quantifiable*

⇒ Choice

⇒ *"Marking" criteria with values* ***which are not*** *(explicitly/directly)* ***quantitative***

Number of criteria

- "Golden number" is hard to define
  - *Depends on the person who wishes to choose between different methods*
    - More or less sensitive to each criteria
- Decision
  - *Provide with a set of criteria as large as possible in order the person can "do his/her shopping"*

Proposed Criteria (1/4)

- Name: **Self-supporting**
  - ***Description:*** *some methods intends to cover the whole event analysis process whereas others could be (are) used as input for other analysis methods*
  - ***"Values":*** *Yes / No*

- Name: **Graphical Output**
  - ***Description:*** *Some methods propose a diagram of the accident sequence (graphical representation of the scenario). It is supposed to help understanding of the event and to provide a tool for better communication between investigators.*
  - ***"Values":*** *Yes / No*

Proposed Criteria (2/4)

- Name: **Accessibility**
  - ***Description:*** *For some methods documentation is freely accessible while documentation has to be paid for other methods. We also note that according to a method, its documentation could be largely disseminated (e.g. access through internet) or not. Furthermore some methods request training which is charged*
  - *"**Values**": Yes/To some extend/No*

- Name: **Learning easiness**
  - ***Description:*** *Can method be used with no "extensive formal accident analysis training" and/or with no "deep" knowledge about some scientific domains (e.g. sociology, engineering science…)*
  - *"**Values**": Yes/To some extend/No*

Proposed Criteria (3/4)

- Name: **Scope of analysis**
  - ***Description:*** *A method will allow to address more or less levels of the sociotechnical system. Levels are:*
    1. *the work and technological system;*
    2. *the staff level;*
    3. *the management level;*
    4. *the company level;*
    5. *the regulators and associations;*
    6. *the Government level*
  - *"**Values**": Range of levels tackled (e.g. 1 -> 2; 1 -> 4; 1 -> 6…)*

See Rasmussen, J. (1997), Risk management in a dynamic society: a modelling problem, *Safety Science*, Vol. 27, N° 2/3, pp. 183-213.

Proposed Criteria (4/4)

- Name: Duration of the analysis
  - *Description: According to method used duration of an analysis could differ*
  - *"Values": Days/Weeks/Months*
- NB: Duration of an analysis also depends on the event itself (on its complexity)
- Name: Replication
  - *Description: Even if an analysis method allows some flexibility, it has to be strict enough, so that it results/outputs do not depend on the analyst(s) but on itself [different analyst(s) would reach (more or less) the same result applying the same method on a specific event]*
  - *"Values": Yes/To some extend/No*

For Concluding the Methods Assessment

- S.W.O.T. Analysis
  - ***Strengths:*** *Positive aspects of any kind, e.g., ease of use, results, logic used…*
  - ***Weaknesses:*** *Negative aspects of any kind, e.g., ease of use, results, logic used…*
  - ***Opportunities:*** *What kind of positive outcomes may result from the strengths?*
  - ***Threats:*** *What kind of negative outcomes may result from the weaknesses?*

  - *So to say*
    - "**Opportunities**" can be defined as the consequences of "**Strengths**"
    - "**Threats**" can be defined as the consequences of "**Weaknesses**"

References

- Munson, S. (2000), *Assessment of accident investigation methods for wildland firefighting incidents by case study method*. Theses, Dissertations, Professional Papers.Paper 1616, The University of Montana, USA.

- Sklet, S. (2002), *Methods for accident investigation*, ROSS (NTNU) 200208, NTNU, Trondheim, Norway.
- For Concluding the Methods Assessment

Brief Summary of Results (1/5)

- Result of 1 team not (yet) available
- 16 "methods" were tested
  - *Storybuilder, ARIA3, OAoS, ECFA/ETBA/MORT, ESReDA Cube, Chronology Description, Event Tree, Fault Tree, STEP, MTO, Event and Causal Factors Chartering, Barrier Analysis, Tripod beta, CAST, Accimap, Bow-Tie,*
- 6 teams "active"
  - *2 teams tested 1 method*
  - *1 team tested 2 methods*
  - *1 team tested 3 methods*
  - *1 team tested 4 methods*
  - *1 team tested 9 methods?????*
- 4 methods tested twice
  - *Event Tree, Fault Tree, STEP, Accimap*
    - Replication ?
      - ***Not always same results*** *regarding criteria*

Brief Summary of Results (2/5)

- Self-supporting
  - *YES: 5 out of 16*
    - NB: 1 phase out of 3 for MORT, different results for Event Tree, Fault Tree, STEP, Accimap (NTiA), no answer for ESReDA Cube
- Graphical Output
  - *YES: 14 out of 16*
    - NB: 2 phase out of 3 for MORT
- Accessibility
  - *YES: 5 out of 16*
  - *TO SOME EXTENT: 5 out of 16*
  - *NO: 2 out of 16*
    - NB: different results for Event Tree, Fault Tree, STEP, Accimap (NTiA)

Brief Summary of Results (3/5)

- Learning easiness
  - *YES:* *5 out of 16*
  - *TO SOME EXTENT:* *5 out of 16*
  - *NO:* *2 out of 16*
    - NB: different results for Accimap (NTiA), 1 no answer for Event Tree, Fault Tree, STEP
- Scope of analysis

Brief Summary of Results (4/5)

- Learning easiness
  - *YES: 5 out of 16*
  - *TO SOME EXTENT: 6 out of 16*
  - *NO: 4 out of 16*
    - NB: different results for Accimap (NTiA), 1 no answer for Event Tree, Fault Tree, STEP
- Scope of analysis
  - *1->4: 5 out of 16*
  - *2->4: 1 out of 16*
  - *1->6: 7 out of 16*
    - NB: different results for Event Tree, Fault Tree, STEP (NTiA)

Brief Summary of Results (5/5)

- Duration of the analysis
  - *DAYS: 3 out of 16*
  - *WEEKS : 5 out of 16*
  - *MONTHS: 12 out of 16*
    - No Answer: StoryBuilder, MTO, Event and Causal Factors Chartering, Barrier Analysis, STEP
    - 1 no answer for Event Tree, Fault Tree
- Replication
  - *??????*
  - *Look at results for Accimap,Event Tree, Fault Tree, STEP*
- SWOT Analysis
  - *See document "Summarymethodsevaluation" (M. Wood)*