SME Input into Pipeline Risk Models

Chris McLaren - PHMSA

U.S. Department of Transportation

Pipeline and Hazardous Materials
Safety Administration

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Subject Matter Expert

- Important Aspect of Most Pipeline Risk Models
  - Relative Models
  - Quantitative Models
  - Probabilistic Models

- Complete and accurate records are not always available for every segment and some risk model inputs may not be obtainable from records

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2

- 2

Subject Matter Expert

- General Guidelines
  - SME's should actually be SME's – credentials, SKA's, etc.

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- General Guidelines
    - SME's should actually be SME's – credentials, SKA's, etc.
    - Take care to define each variable clearly with appropriate detail

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- General Guidelines
  - SME's should actually be SME's – credentials, SKA's, etc.
  - Take care to define each variable clearly with appropriate detail
  - Establish consistent rules for "scoring" values (explain what "good" vs. "medium" actually means)

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5

- 5

Subject Matter Expert

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  - Take care to define each variable clearly with appropriate detail
  - Establish consistent rules for "scoring" values (explain what "good" vs. "medium" actually means)
  - Details/Definitions should have sufficient specificity so as to have similar meanings to different SME's in order to obtain the most consistent results possible

Subject Matter Expert

- Process Guidelines
  - Process almost always requires a facilitated discussion for best consistency (best not to just send someone a survey to fill out)
    - INL nuclear industry data analogy in last meeting

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- 7

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- Process Guidelines
  - Process almost always requires a facilitated discussion for best consistency (best not to just send someone a survey to fill out)
  - Establish rules for handling differences of opinion (inevitable part of the process)
  - Distributions are a ready means to capture uncertainty or valid ranges of opinions (point estimates are not always reflective of reality)

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Subject Matter Expert

- Specific RMWG Information Presented To-date
  - Robert Patev (US Army Corps of Engineers) (Likelihood Meeting): Expert Opinion Elicitation (EOE)
    - Need proper guidance and assistance to solicit and train the experts to remove all bias and dominance
    - Process should be well documented

Take care to define each variable clearly

Establish consistent rules for "scoring" values

Process almost always requires a facilitated discussion

Subject Matter Expert

- Specific RMWG Information to-date
  - Andrew Kendrick (Kendrick Consulting) (Likelihood Meeting)
    - SME's needed for knowledge and evaluation in all risk model approaches
    - Don't throw out good knowledge for bad data

Some risk model inputs may not be obtainable from records

SME's should actually be SME's

Subject Matter Expert

- Specific RMWG Information to-date
  - Robert Youngblood (INL) (Likelihood Meeting)
    - If there is no practical alternative to using expert elicitation, consider using/adapting existing approaches (Kaplan, Cooke referenced)

Establish rules for handling differences of opinion

Distributions are a ready means to capture uncertainty or valid ranges of opinions

Subject Matter Expert

- Specific RMWG Information to-date
  - Kent Muhlbauer (WKM) (Consequence Meeting)
    - Use of estimates as measurements avoids need to standardize qualitative measures such as "high", "medium", "low"
    - Avoids interpretations and erosion of qualitative definitions over time and when different assessors become involved

Take care to define each variable clearly

Establish consistent rules for "scoring" values

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13

- 13

Subject Matter Expert

- Specific RMWG Information to-date
  - Skow (CFER) (R&D Summary at Consequence Meeting)
    - In context of estimating failure frequency, use structured approaches to elicit SME opinion:
      - o Delphi method – iterative process used to reach a consensus amongst a panel of experts
      - o US NRC guidelines for expert elicitation – a simplified version of the Delphi method

Establish rules for handling differences of opinion

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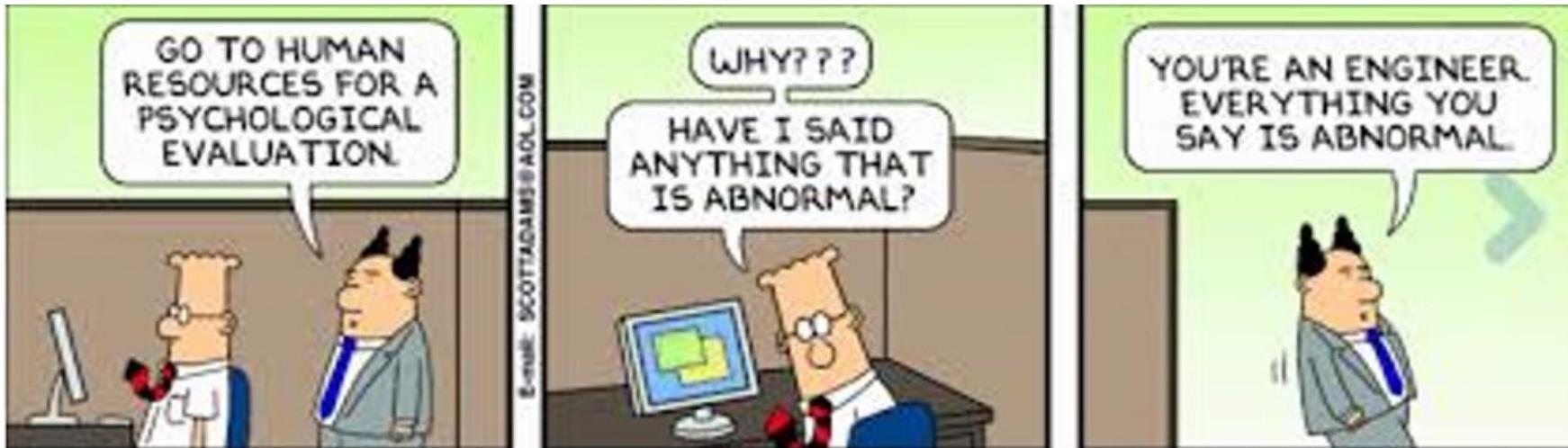
14

- 14

Subject Matter Expert

- Specific RMWG Information to-date
  - Robert Youngblood (INL) (Data Meeting)
    - BSEE PRA Guide: Appendix H – Expert Elicitation (*Future*)

Looking forward to approaches to be outlined in the final BSEE PRA Guide

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15

- 15

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* From Patev presentation

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16

- 16

Conclusion

- *The need for SME-derived input to pipeline risk models is a virtual certainty - inevitable*

- *Be careful to have guidelines and a clearly defined process to obtain these inputs*
  - *Improve consistency over entire pipeline system*
  - *Optimize future SME input from different personnel*
  - *Detailed process descriptions will help reduce scatter/uncertainty in SME collected data.*

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