Risk Task Group – Meeting Report

May 15, 2017

Present: Francisco Joglar (Chair), Russ Bainbridge, Jason Butler, Luca Fiorentini, Kevin Frank, Timothy Hawthorne, Vladimír Mózer, Tod Ossmann, Rob Plonski, Steven Scandaliato, Armin Wolski, Yaping He, and Chris Jelenewicz (Staff).

Apologies: Brian Ashe, David Charters, Håkan Frantzich, and Ai Sekizawa,

The following was discussed (the official meeting agenda is provided in the Appendix of this report):

1. **Review of SharePoint site organization** – All important committee information will be placed the SharePoint site. The site currently has four folders (original guide, committee member contact information, meeting reports and meeting agendas).

2. **Review action items from previous meeting –** After the last meeting, each committee members was asked to:

   - Access the SharePoint site. – It appears most committee members have done this.
   - Review the existing guide and determine what sections need to be modified and where there are GAPS in information. This information is summarized in the Appendix of this report.
   - Propose specific sections of the guide they would like to work on. A listing of the volunteers is provided in the Appendix.

3. **Development of guide outline --** Francisco reviewed the main flowchart from original guide (see Appendix -- Figure 1.1 - Fire Risk Assessment Flow Chart).

   Vladimir presented an alternative flowchart that is also in the Appendix. It provided several new items to consider: Fire risk management, Risk acceptance, Risk communication, Residual risk management and System management and risk monitoring. Vladimir indicated that this flowchart demonstrates how risk assessment is an ongoing process.

   The Chair asked each committee member to review both flowcharts before the next meeting. Each committee member was also asked to provide suggestion on what elements should be in the flowchart for the next edition of the guide. It is possible that elements from both flowcharts could be used. Based on this input, the chair will make a presentation to the committee at the next meeting and the committee will decide on a first draft of this flowchart. The flowchart will serve as a roadmap for the development of the guide.

4. **Identification of task/chapter leads** – A few committee members have volunteered to work on the different sections of the report. A listing of the volunteers is proved in the Appendix. The Chair asked each member to volunteer for at least one section. If you have not volunteered, please send your suggestions to the Chair and CJ ASAP.

5. **Review of task group member suggestions –** Since the last meeting, a few of the committee members and Bill Koffel who regularly teaches the SFPE Risk Course provided suggestions for the new guide. These suggestions are listed in the Appendix of this report. Specifically, the following suggestions were discussed:

   - It was agreed that practical examples from industry that can make the point are needed.
   - The committee should develop some type of a ranking matrix as suggested by Koffel. See Appendix.
   - Consideration should be given on how the chapters related to risk in the SFPE Handbook can be used in the guide. It was agreed that the revised guide be a stand-alone document. But references to the SFPE Handbook will be made when needed.

6. **Summary of action items** – Each committee member was asked to complete the following before June 9 (send this information to the chair and CJ before June 9):

   - Item 4 -- Volunteer to work on at least one section of the guide.
   - Item 3 - Provide recommendations on the flowchart.
   - Item 5 -- Review the list of suggestions from members that is provided in the Appendix. If you have additional suggestions, please send to the Chair.

7. **Round table** – At the end of the meeting, each member in attendance was asked to provide final suggestions:

   - There should be an electronic version of the guide along with a hard copy version. The committee should consider non-traditional ways to display information in the electronic version.
   - Along with industry examples, the guide should include vulnerable populations (i.e. health care, incarceration, night clubs, etc).
   - The guide must be user friendly and must be practical.

8. **Next Meeting** – The next meeting will be scheduled for the next 4 to 5 weeks via a Doodle Poll.

End of Report

Appendix – Meeting Agenda

Agenda:

1. **Roll call,** *Chris Jelenewicz*
2. **Review of sharepoint site organization,** *Francisco Joglar*
3. **Review action items from previous meeting,** *Francisco Joglar*
4. **Development of guide outline,** *Francisco Joglar*
5. **Identification of task/chapter leads,** *Francisco Joglar*
6. **Summary of action items,** *Chris Jelenewicz*
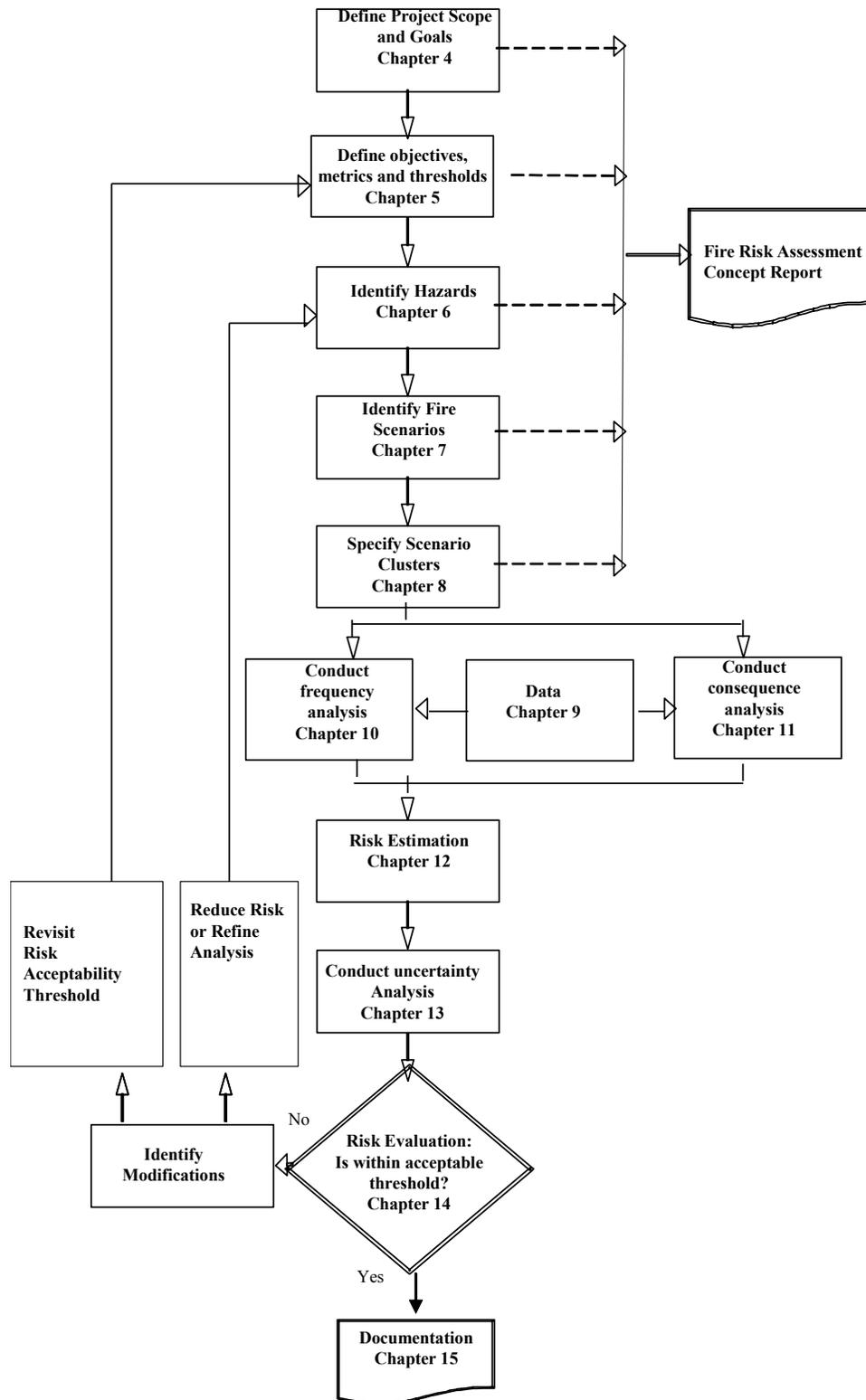7. **Round table,** *Chris Jelenewicz*

Action Items from last meeting:

- Access the SharePoint site. If you have having difficulties accessing the site please contact CJ.
- Review the existing guide and determine what sections need to be modified and where there are GAPS in information. Provide your recommendations before the next meeting.
- Propose specific sections of the guide you would like to work on.

Current Organization of the Guide

- Chapter 2 provides the definitions for terms used throughout the document. Generally accepted meanings should be used for terms not defined in Chapter 2.
    - o Contributors: Tim Hawthorne
    - o Russell Bainbridge

- Chapter 3 provides an overview of fire risk assessment, and the role of fire risk assessment in risk management programs and fire safety design.
    - o Contributors: Kevin Frank
    - o Dr. Håkan Frantzich

- Chapter 4 provides guidance on defining the scope of the fire risk problem, and identifying the impacted stakeholders.
    - o Russell Bainbridge

- Chapter 5 provides guidance on the selection of appropriate risk metrics and acceptability criteria to be utilized in the risk assessment.
    - o Contributors: Kevin Frank
    - o Armin Wolski

- Chapter 6 provides guidance on identifying and characterizing fire hazards to support the development of fire scenarios for assessment.
    - o Contributors: Tim Hawthorne
    - o Contributors: Kevin Frank
    - o Dr. Håkan Frantzich

- Chapter 7 provides guidance on developing fire scenarios and defining the events which make up the individual scenarios.
    - o Contributors: Dr. Mozer, Tim Hawthorne
    - o Dr. Håkan Frantzich

- Chapter 8 provides guidance on selection of scenarios, defining scenario clusters, and developing scenario structures.
    - o Dr. Håkan Frantzich

- Chapter 9 provides guidance on the sources, uses, and limitations of data in fire risk assessments.
    - o Contributors: Kevin Frank
    - o Armin Wolski

- Chapter 10 provides guidance on frequency analysis, and the methodologies available to assist in quantification of event frequencies.
  - o Contributors: Kevin Frank

- Chapter 11 provides guidance on consequence analysis, and the methodologies available to assess and quantify scenario consequences.

- Chapter 12 provides guidance on calculating fire risk, based upon the frequency and consequence output from Chapters 10 and 11.
  - o Contributors: Kevin Frank

- Chapter 13 provides guidance on uncertainty analysis, and how data and calculation uncertainties should be addressed in the review and consideration of assessment results.
  - o Contributors: Tim Hawthorne
  - o Contributors: Kevin Frank

- Chapter 14 provides guidance on analysis of risk assessment results, and the use of fire risk assessment results in the decision making process.

- Chapter 15 provides guidance on documenting the risk analysis process, decisions, and results, so that all stakeholders understand the scope, methods, limitations, and conclusions of the risk analysis.
  - o Contributors: Kevin Frank
  - o Dr. Håkan Frantzich

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                    │ Define Project Scope│ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ▷
                    │      and Goals      │
                    │      Chapter 4      │
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                    │ Define objectives,  │ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ▷
                    │metrics and thresholds│
                    │      Chapter 5      │            ┌─────────────────────┐
                    └─────────────────────┘            │ Fire Risk Assessment│
                              │                        │   Concept Report    │
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                    │   Identify Hazards  │
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                    │   Identify Fire     │ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ▷
                    │     Scenarios       │
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                    │  Specify Scenario   │ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ▷
                    │      Clusters       │
                    │      Chapter 8      │
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Figure 1.1 - Fire Risk Assessment Flow Chart

Conduct frequency analysis Chapter 10

Data Chapter 9

Conduct consequence analysis Chapter 11

Risk Estimation Chapter 12

Revisit Risk Acceptability Threshold

Reduce Risk or Refine Analysis

Conduct uncertainty Analysis Chapter 13

Identify Modifications

No

Risk Evaluation: Is within acceptable threshold? Chapter 14

Yes

Documentation Chapter 15

The following is a suggestion from Dr. Mozer to consider in the development of the guide outline.
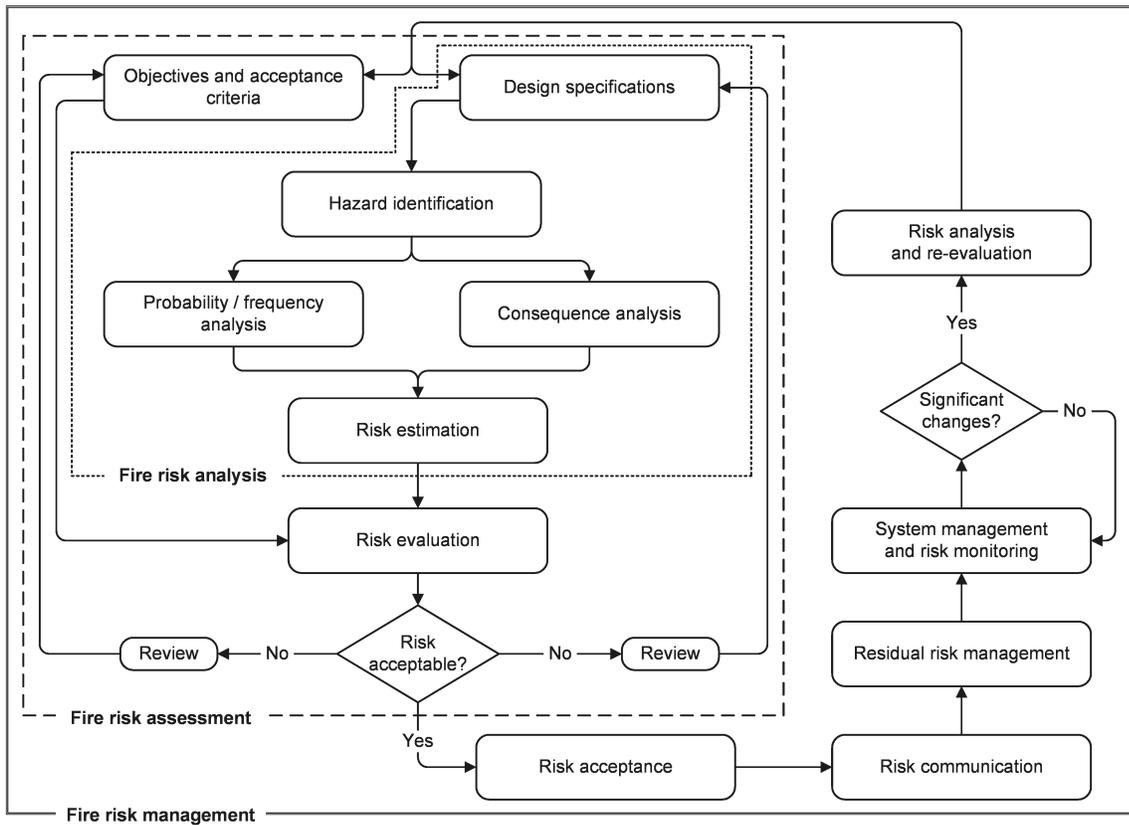
8   Fire risk analysis, assessment and management
8.1   General
8.2   Scope, objectives and goals
8.3   Fire risk analysis
8.3.1   Design specifications
8.3.2   Hazard identification
8.3.3   Probability / frequency analysis
8.3.4   Consequence analysis
8.3.5   Risk estimation
8.4   Fire risk assessment
8.4.1   Scope, objectives and acceptance criteria
8.4.2   Risk evaluation
8.5   Fire risk management
8.5.1   Risk acceptance
8.5.2   Risk communication
8.5.3   Residual risk management
8.5.4   System management and risk monitoring

SFPE Risk Task Group

Suggestions from Mr. Kevin Frank

- Should we discuss improper or unintended activation of fire safety systems (eg. sprinkler system floods) in Section 5.2.8?
- Section 5.4.6 – ALARP – a term that is used in New Zealand (particularly in regards to work on existing buildings) is ANARP or *As Near As Reasonably Practicable.* This is different than ALARP in that it looks at the comparative cost-benefit of bringing existing non-compliant buildings to full (generally prescriptive) compliance. Would it be worthwhile including this somewhere?
- Section 6.2.5 – should we add a detection event after the ignition event? Detection might not necessarily be included in protection or mitigation.
- Section 6.8 – more details on the characteristics of the listed tools might be useful. Eg. a HAZOP is most useful for process applications, and doesn't typically address causes, modes, or frequencies. Also hazards that could result from normal operation (eg. no deviations) are not generally addressed.
- Section 8.4.1 – combination of the two – would a description of bow tie analysis be appropriate?
- Section 13.3.17 – should there be some discussion of approaches to sensitivity analysis? Eg. correlation coefficients, scatter plots, Q-Q plots, tornado plots, etc
- The wording and terminology in Chapter 13 seems to need some cleaning up. For example, the terms "error" and "uncertainty" seem to be used interchangeably (not really a gap).
- Communication and/or consultation with stakeholders is mentioned in a few places but not really as an ongoing, iterative part of the fire risk assessment process – for example for hazard identification input.
- A reference to ISO 31000 – Risk Management might be useful in the Selected Readings.

SFPE Risk Task Group

Suggestions from Mr. Bill Koffel

1. Especially with an exam as part of the SFPE seminar now, the participants would like an Index.
2. The most frequent request I get is for an example of what the risk assessment should look like. I typically respond that one size does not fit all and secondly we don't want to provide a template that people might use to simply fill in the blank spaces. However, I note that Chapter 7 of NFPA 551 indicates this is the documentation that should be provided. While the NFPA 551 material is well coordinated with the SFPE Guide, it is in a different format and essentially gives people an outline to complete. It looks more like a sample risk assessment report.
3. More examples of the tools etc.
   a. There are multiple matrices that are out there and could be included as examples. The Joint Commission is now using a SAFER Matrix that many people like as a way to illustrate the risk based upon findings. The ICC Performance Based Code has a matrix that could be included.
   b. In the seminar I work through the FSES and NFPA 550 as examples. Would this be good Annex material?
   c. Similarly, a completed fault tree, maybe a screen shot from a HAZOP software display, etc. would be good examples to show. There are some good examples from papers presented at SFPE conferences.
4. I probably need to compare material in the new edition of the Handbook with the Guide. I suspect there is some useful information in the Handbook that could be included in the Guide (again as examples—everyone wants to see examples of the tools, methodologies, and final report).
5. Should the concept of Layers of Protection be included in the Guide?
6. Chapter 5 references the "five candidate strategic goals" but they are not presented in that manner in Chapter 4.
7. The Fire Scenario material may need to be revised to be consistent with the work of the Design Basis Fire group.
8. Section 9.2 is very US centric. Can some members of the task group make the content more global?

Visual Presentation

Suggestions from Mr. Brian Ashe

1. Guide on the tolerable / acceptable risk from other sectors / countries.
2. Discussion on individual risk and societal risk and the importance of both in fire risk assessment.

SFPE Risk Task Group

Suggestions from Dr. Håkan Frantzich

Finally, I have made it through the current version of the sfpe guide on risk assessment. I can see that there are some room for improvement and I think we should consider to narrow down the scope for the guide. Today it covers a wide range issues related to fire and risk, not being too specific on anything. I ==think it is time to be slightly more specific and provide a pragmatic guide on risk assessment that practitioners can use as a guide, rather as an introduction to risk assessment as it can be sen today.== Methods not used very much could be eliminated especially if they are not directly fire related such as HazOp (in my opinion). This shall not be seen as a criticism of the current guide, but just some reflections from my side. I may be wrong, (it has happened before ;-).

I think a first thing to discuss is what we want the end product to look like. What shall it be used for? In my way I think we shall focus on ==typical fire risk problems that engineers are faced with in their ordinary work. Of course we must recognise that this area may be wide but perhaps we could try to provide a little more practical guidance on how to perform risk assessment==. We must also think about what differs between a traditional risk assessment for a chemical plant and what is typi¨cal for a fire risk assessment. In the first fire is just one hazard among others but in a fire risk assessment fire is the dominant hazard and the consequences related to the fire is what we are experts on. Therefore I would like to see more on this side in the guide, i.e. the consequence part. I have colleagues working on the ISO documents doing almost the same and much focus is on defining scenarios for not just the fire but the protection targets for example people. Evacuation scenarios are as important as fire scenarios. Actually, I think we can benefit from some parts of the ISO FSE work.

SFPE Risk Task Group

Suggestions from Luca Fiorentini

- we should include some specific fire risk requirements for the industrial sector (both onshore and offshore installations) where specific methods and tools are used with a particular emphasis to probabilistic safety assessment (process industry is quoted only at 11.2.17);
- some schematic examples should be given for the most used methods (hazop, hazid, fault tree, even tree, lopa, bow-tie) this could be given in a specific Annex if not directly in the guide;
- we should give an overview about the use of fire risk assessment results (e.g. identified top events should be included in the emergency plan);
- we should expand (see par. 6.6 "contributing factors" and also par. 10.6 "reliability of systems") the discussion related with reliability of safety systems (with some examples) and in particular their probability of failure on demand (PFD according to functional safety standards linke ISA S84 and IEC 61511/61508);
- fire/gas mapping methods (2D/3D) should be quoted to verify the positioning of fire/gas detection systems;
- we should expand the "near miss" treatment (see par. 9.2.11) and identify potential methods to study near-misses (e.g. Root Cause Analysis, Tripod beta, etc.);
- perhaps a specific reference to NFPA 551 proposed content for the risk assessment report should be made.

SFPE Risk Task Group