SOC

Safety Oversight Circular

U.S. Department
Of Transportation

Federal Aviation Administration

SOC **07-05**
DATE: September 28, 2007

Air Traffic Safety
Oversight Service (AOV)

Subject: **AOV Guidance on Safety Risk Modeling of High-Risk Hazards**

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1. REFERENCED DOCUMENTS: Air Traffic Organization Safety Management System (SMS) Manual version 1.0, SOC 07-02 "AOV Concurrence/Approval at Various Phases of Safety Risk Management Documentation and Mitigations for Initial High-Risk Hazards."

2. PURPOSE: This safety oversight circular (SOC) provides information and guidance on how the Air Traffic Organization (ATO) may design and conduct modeling in support of safety risk analyses of initial high-risk mitigations documented in Safety Risk Management Documents (SRMD) submitted to the Air Traffic Safety Oversight Service (AOV). Specifically, this SOC describes a process for AOV concurrence at several phases of modeling activity, consistent with SOC 07-02 "AOV Concurrence/Approval at Various Phases of Safety Risk Management Documentation and Mitigations for Initial High-Risk Hazards."

This SOC addresses restrictive cases where AOV-approval of high risk mitigations is required. ATO could choose to expand the requirements for modeling beyond the criteria enumerated here (e.g., in its Safety Management System Guidance Manual). For example, ATO could perform modeling in cases that are not subject to AOV-approval. AOV recognizes that there may be situations where there is benefit to modeling a scenario in order to better understand safety risks, even though modeling is not required by this document.

3. BACKGROUND:

a. As noted in SOC 07-02, there have been cases where ATO has spent months or years of work towards the development of an SRMD, the conclusions with which AOV subsequently disagreed. Differences in opinion have delayed approvals and have the potential to cause programmatic delays in the future if steps are not taken to facilitate earlier AOV engagement in ATO risk assessment work.

b. In particular, discussions between AOV and ATO identified modeling as a source of potential disagreement. Both organizations agreed that additional clarification was needed on two issues: (i) when should modeling be conducted, and (ii) what guidelines should be considered in a modeling project.

4. DEFINITIONS. These definitions are part of the framework relating hazards, scenarios, outcomes, risks, and hazard controls.

a *Hazards*: Any real or potential condition that can cause injury, illness, or death to people; damage to or loss of a system, equipment, or property; or damage to the environment. A hazard is a condition that is a prerequisite to an accident or incident. *High Risk Hazard (HRH)*: hazard that is associated with a high risk as defined in ATO guidance material (ATO SMS Manual). High risks are defined as "unacceptable risks" and must be "mitigated so that the risk is reduced to a medium or low level." *High Risk Mitigation*: hazard control applied to a high risk hazard.

b. *Hazard control.* The means by which the resulting risk associated with a hazard is mitigated or reduced to an acceptable level.

c. *Likelihood.* Probability of an *outcome*. Likelihood is an expression of how often one expects an event to occur.

d. *Model.* Symbolic representation of a system or subsystem, that may or may not be based on quantitative data.

e. *Outcome.* Result, consequence. *Adverse Outcome*: an unwanted outcome; e.g., collision, loss of air traffic control capability, increase in flight crew workload, etc.

f. *Risk.* The composite of predicted severity and likelihood of the potential effect or outcome of a hazard.

g. *Scenario*: *Ordered set* of events, conditions, and controls resulting in an outcome. A sequence of events, conditions, and controls where the presence and order of occurrence could be important; e.g., hazard set (*A*, *B*, *C*, *D*) may be associated with a different risk relative to hazard set (*B*, *A*, *C*). *Adverse Scenario*: A sequence of events, conditions, and controls that results in an adverse outcome.

h. *Severity.* Impact associated with an *outcome* measured in terms of harm to persons, loss of capability, property loss, loss of function, etc.

5. DISCUSSION:

a. Given the goal of achieving hazardous and catastrophic outcome probabilities on the order of 10^{-7} and 10^{-9}, respectively, it is unrealistic to expect that human/subjective judgment will be able to differentiate between these values. The intent of this SOC is twofold: (i) To ensure that, rather than assigning completely subjective ratings to high-risk adverse outcomes, risk assessments are based on structured modeling processes, the results of which can be evaluated by AOV and other subject matter experts (SME). (ii) To ensure that mitigations are logically linked to the associated high-risk hazards (HRH) and that the effects of mitigations can be estimated via modeling.

b. In the context of this SOC, modeling refers to any symbolic representation of a system (see paragraph 4.d.). Some models may be based on statistical (e.g., flight operations counts), observational (e.g., electronically recorded flight tracks), or subjective (e.g., expert judgment) inputs. Examples of modeling approaches are fault/event trees, simulation models, Petri nets, and statistical models.

c. AOV, as part of its oversight function, requires detailed understanding of any modeling work conducted in support of approvals for HRH mitigations and "changes or waivers to provisions of handbooks, orders, and documents including FAA Order 7110.65" that pertain to separation minima. This level of understanding includes: (i) statistical information used to estimate model relationships or to generate models, (ii) exogenous assumptions that may be based on non-statistical sources (such as expert judgment), (iii) the sensitivity of model results to alternative data or assumptions.

d. This SOC has two limitations. First, it is unlikely that written guidance, by itself, will guarantee a successful model result. It is unrealistic, for example, to expect that this material will anticipate all possible sources of disagreement among participants with respect to modeling technique and interpretation. Therefore, early communication among affected stakeholders, modeling and programming experts, and AOV is essential in order to maximize the likelihood that critical issues are identified and appropriately addressed. Safety Oversight Circular SOC-07-02 provides guidance on how to engage AOV early in the SRM process. Second, the choice of a particular analytical approach will reflect the unique conditions associated with each particular NAS change. Thus, the criteria presented here should be interpreted as broad, high level modeling considerations. For any given problem, there may be many appropriate analytical approaches; our intent is not to dictate a specific methodology.

6. DISPOSITION: This guidance does not constitute a change to any requirement contained in FAA orders, manuals, etc. However, appropriate standard operating procedures should be changed to reflect the processes defined in this SOC. Adherence to this guidance will facilitate AOV approvals of HRH mitigations.

7. GUIDANCE: Similar to the process described in SOC 07-02, ATO may obtain concurrence at specified phases of the modeling process before submission of a completed SRMD. This SOC assumes that if ATO seeks AOV concurrence with respect to the phases of model development, then ATO also will seek concurrence with respect to the SRM process as a whole. That is, model-process concurrence will require SRM-process concurrence as described in SOC 07-02. In the context of an SRMD, the primary objective of the modeling activity is to provide information on the risks of adverse outcomes associated with the proposed change, conditional on factors or conditions that apply at locations where the change is being implemented. AOV is prepared to provide concurrence at the conclusion of each of the following identified modeling phases. AOV recognizes that the actual modeling process may not be in the order described below, so the sequence of concurrences may require consultation between AOV and ATO.

a. Model Development Phase 0: Safety Definition (SOC 07-02 Phase 1). Following SOC 07-02, ATO should have already completed a "full description of the system and its interfaces or changes being considered." In addition, a Preliminary Hazard List (PHL) and expected severity of each hazard should be established. These are prerequisites for the design and development of any model(s) of the system change. Therefore, AOV initial concurrence for this phase should be obtained before the start of modeling work.

b. Model Development Phase 1: Identification of Adverse Scenarios. Based on the PHL, the first step in the model development process is to identify adverse scenarios associated with the proposed change. A single change to the NAS may result in many different adverse outcomes, and hence the Safety Risk Management Document (SRMD) may address multiple scenarios. Scenario descriptions help ATO and the modeler determine which, if any, aspects of the NAS change require modeling. Considerations for adverse scenario identification are provided in the Appendix 1.

- **AOV Response to Model Development Phase 1**. AOV will review the list of adverse scenarios and provide initial concurrence regarding the completeness of the list and the thoroughness of the scenario descriptions.

c. Model Development Phase 2: Determination of adverse scenarios to be modeled. Detailed scenario descriptions define problem statements for the change agent, subject matter experts (SME), and modeler. Since mitigations involving HRH require AOV approval, the determination of scenarios to be modeled should be based on severity. The ATO SMS Manual specifies that outcome severity be considered independently of likelihood. If, during the SRM planning phase there is preliminary evidence that a possible outcome is "major", "hazardous" or "catastrophic", then a modeling effort should be undertaken. Potential outcomes that require modeling include: (i) reduction in separation, (ii) significant reduction in ATC capability, (iii) collision with other aircraft, terrain or obstacles, (iv) significant increase in flight crew workload, (v) significant reduction in safety margins or functional capability, (vi) physical distress, and (vii) injuries, fatalities. Considerations regarding when ATO should develop models in support of SRMD's are provided in Appendix 2.

- **AOV Response to Model Development Phase 2**. AOV will provide initial concurrence regarding the list of adverse scenarios that will be subjected to modeling.

d. Model Development Phase 3: Quantitative and qualitative methods. Some modeling techniques, such as event tree analysis, permit either statistical or judgmental inputs. If modeling is required and data are available, the risk assessment should be based on statistical or observational data (e.g., radar tracks). Where there is insufficient data to construct purely statistical assessments of risk, judgmental inputs can be used but they should be quantitative. For example, the true rate of a particular type of operation may be unknown, but can be estimated using judgmental input. Where subjective preferences are difficult to quantify, methods such as the voting method or analytical hierarchy process may be used. In all cases, quantitative measures should take into consideration the fact that historical data may not represent future operating environments. In such cases, some adjustment to the input data may be required.

- **AOV Response to Model Development Phase 3**. Before the start of modeling work, AOV will provide initial concurrence regarding modeling approach, data inputs, and assumptions.

e. Model Development Phase 4: Sensitivity analysis. Modeling results should not be presented as point-estimates from a "black box" process. Modeling is subject to uncertainty due to inherent random characteristics of the system under study. Models are generally approximations and require simplifying assumptions, further adding to their uncertainty. Therefore, model findings should be presented in a way that conveys the stochastic nature of the system and the sensitivity of the results to different assumptions. Sensitivity analysis assists stakeholders and AOV in developing an intuition about the operation of the model and, as a result, gives more confidence in the results. In addition, the modeling effort is not directed at typical operations, and the thresholds for unacceptable event probabilities are very small. Thus, the range of modeling assumptions should include extremely rare behaviors or conditions, in order to fully understand system dynamics. Finally, the sensitivity analysis should account for anticipated near term changes to the operating environment.

- **AOV Response to Model Development Phase 4**. The modeler should document sensitivity analysis to ATO, and this documentation should be provided to AOV for initial concurrence.

f. Model Development Phase 5: Model baselines. Where appropriate, model baselines should be established. In other words, scenarios should be modeled excluding the effect of hazard controls in order to facilitate a quantitative evaluation of these controls.

- **AOV Response to Model Development Phase 5**. The modeler should document the results of the model baseline results to ATO, and this documentation should be provided to AOV for initial concurrence.

g. Model Development Phase 6: Hazard controls. The modeling work should identify the linkage between the hazards and the hazard controls. This might include (but is not limited to) showing the range of risk estimates conditional on the absence/presence of the hazard controls. This would give a means to quantitatively assess the effect of alternative hazard controls on risk. The determination of which hazard controls to evaluate via modeling is the responsibility of ATO. Modeling may reveal that there are multiple hazard control options that can each achieve the desired risk reduction. However, each option may have different non-safety related implications (e.g., some options may be less costly or more efficient than others). In such cases, decisions regarding the selection of the most efficient hazard control options are the responsibility of ATO. In this regard, AOV's role is limited to a determination that the selected options will reduce risks to an acceptable level.

- **AOV Response to Model Development Phase 6**. The modeler should document the model-predicted hazard-control effects to ATO, and this documentation should be provided to AOV for initial concurrence.

8. OTHER CONSIDERATIONS.

a. Report of model results. A report of the modeling results should be prepared with the following elements: (i) A technical description of the model. Mathematical representations should be related to written descriptions of real world components. (ii) Listing of model variables and their data sources. (iii) Listing of model parameters and assumptions and sources. (iv) Results including sensitivity and hazard-control analyses. Results should be provided in a format that gives affected parties the capability to view the effects of different permutations of input assumptions (e.g., pivot table/chart). (v) Weaknesses in the modeling results. For example, assumptions for which there is significant uncertainty due to a wide dispersion in expert opinion, small data sample, and so forth.

b. Coordination among modeling experts, SME and other participants. Modeling frequently involves the solution of complex systems of equations—e.g., through Monte Carlo simulation, numerical methods, or direct analytical solution. Moreover, the system under study may be very complicated. This opens the possibility for miscommunication between the modeling experts and SRM panel—in particular, regarding how to frame the model and the question that the model is intended to address. In practice, the selection of a modeling technique, the design of the modeling problem, and the interpretation and communication of the model results should be an iterative process between the SRM panel and the modelers. The SRM process should allow for early engagement between the SRM panel and modeler, and should allocate sufficient time for the panel to critique, evaluate, and, if necessary, request changes to the modeling work.

c. Model and Simulation Record Retention Requirement. ATO should establish a system of record requirements in accordance with SMS guidelines. These records would need to be filed in one location, and include information such as a purpose statement, assumptions, inputs, and a copy of the report. This information would facilitate future safety reviews of the proposed NAS change, ongoing monitoring of system safety and hazard tracking.

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APPENDIX 1. IDENTIFICATION OF ADVERSE SCENARIOS INCLUDING EXAMPLES

An adverse scenario is a sequence of events and conditions (hazards) that results in an unwanted outcome. By the criteria enumerated in Appendix 2, AOV requires modeling for all adverse scenarios that could potentially involve a major, hazardous, or catastrophic outcome (ATO SMS Manual definitions).

The following approach (illustrated in Figure A.1.2) is provided to demonstrate an example of a method that could be utilized to construct scenarios. It is similar to the root cause analysis "5-why's" methodology: start with outcome descriptions and then add more detail by successively asking why a given condition might occur. The objective of this approach is to build a well-defined, logical framework to facilitate model development. ATO, SME, and modelers should work together to ensure that scenarios are described at a level of detail appropriate for each modeling project.

Step 1: Outcomes. One approach for identification of adverse scenarios starts by specifying the outcomes of interest. For example, the following checklist could be used to identify possible outcomes related to a proposed change.

Example. Airport XYZ is proposing a procedure to increase capacity during reduced visibility conditions for two closely spaced parallel runways. The Safety Risk Management (SRM) panel identifies the following possible outcomes (without regard to outcome probability).

Example Table A.1.1: Outcome Identification

MAJOR SEVERITY	YES	NO
Reduction in separation or significant reduction in ATC capability?	☒	☐
Significant increase in flight crew workload?	☐	☐
Significant reduction in functional capability?	☐	☐
Physical distress possibly including injuries?	☐	☐
HAZARDOUS SEVERITY	**YES**	**NO**
Total loss of ATC capability (ATC Zero)?	☐	☐
Large reduction in safety margin or functional capabilities?	☒	☐
Serious or fatal injury to small number of occupants or cabin crew?	☒	☐
Physical distress/ excessive workload?	☐	☐
CATASTROPHIC SEVERITY	**YES**	**NO**
Collision with other aircraft, obstacles, or terrain?	☒	☐
Hull loss?	☒	☐
Multiple fatalities?	☒	☐

Step 2: High-Level Scenario Descriptions. In the example table in Step 1, the SRM panel checked off the following outcomes.

- Reduction in separation or significant reduction in ATC capability
- Large reduction in safety margins or functional capabilities
- Serious or fatal injuries to a small number of occupants or cabin crew
- Collision with other aircraft, obstacles, or terrain
- Hull Loss
- Multiple Fatalities

These descriptions are generic, and sometimes overlapping, severity descriptions from the ATO SMS Manual. For example, a collision between two aircraft is a special case of "reduction in separation," and a "hull loss" likely would result in "multiple fatalities". The next step, then, is to specify how these generic outcomes may arise from the specific change being proposed.

A. Operating Environment. One of many possible ways to develop high-level scenarios is to begin with the "operating environment"—classification of which depends on the particular change being studied. Example classification schemes include: (1) runway configuration (e.g., single-runway, parallel runway, and intersecting) for changes affecting terminal-ground procedures; (2) sectors (e.g., high versus low) for changes affecting Air Route Traffic Control Center airspace, (3) medium and high density terminal airspace, (4) airport type (e.g., primary hub, primary non-hub, non-primary) for national level changes affecting airports, etc.

Example (continued). The SMR panel identifies two domains in which the proposed change may be associated with increased risk. In the terminal-ground environment more arrivals and departures result in more traffic taxiing across runways; thus increasing the risks associated with runway incursions in reduced visibility. In the terminal-airspace environment, the SRM panel determines that reduced-visibility approaches to parallel runways are associated with an increased risk of a loss of separation.

Example Table A.1.2: Affected Operating Environments

AFFECTED OPERATING ENVIRONMENT	YES	NO
Terminal-ground?	☒	☐
Terminal-airspace?	☒	☐
En Route airspace?	☐	☐
Other?	☐	☐

B. Scenario Development. High level scenario descriptions can then be built under the given operating environments. In practice, scenarios would reflect conditions unique to a particular facility.

Example (continued). SME identify the following high level scenario descriptions for each of the operating environments checked off in Example Table A.1.2. In this example, the outcomes identified in Step 1 are reorganized by scenario. Again, in some cases, a specific outcome can be assigned to more than one scenario.

Example Table A.1.3: High Level Scenario Descriptions

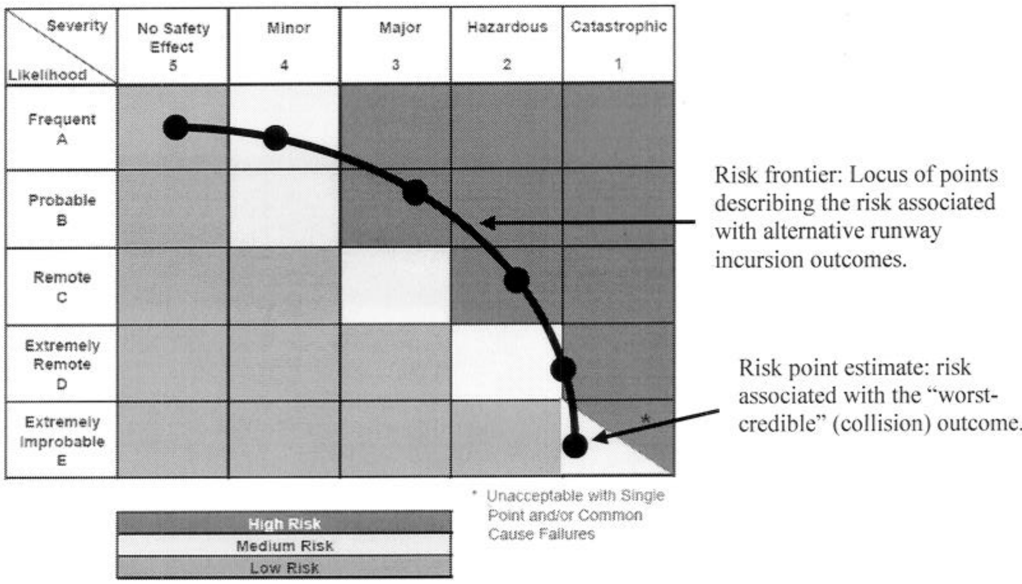
Operating Environment	Scenario	Worst Outcomes
Terminal-Ground	Runway Incursion	Loss of separation Collision with other aircraft Hull Loss Serious or fatal injuries
Terminal-Airspace	Wake Encounter	Reduction in safety margins (a/c loss of control) Hull Loss Serious or fatal injuries
Terminal-Airspace	Blunder	Reduction in separation Collision with other aircraft (mid-air) Hull Loss Serious or fatal injuries

Table A.1.3 draws a distinction between *scenarios* and *outcomes*. Outcomes are simply descriptions of the consequences or results of a scenario. Scenarios are high level statements explaining how outcomes are generated. ATO, subject matter experts, and the modeler may determine that a simple statement such as "runway incursion" is enough information to begin modeling work. On the other hand, Step 3 describes ways to give more detail for each scenario. This provides a means for ATO to develop a more explicit proposal for modeling.

C. Clarification of "worst credible outcome" criterion. ATO guidance material refers to the "worst credible outcome" in evaluating the risk associated with a NAS change (Table A.1.3 also focuses on worst-outcomes). However, in some cases it is inappropriate to model only the worst-credible outcome. For example, in the "Terminal-Ground" example in Table A.1.3, the objective of modeling might be to determine the distribution of horizontal-vertical separation given a runway incursion. A special case of this analysis would be zero-zero separation.

This follows since a point-estimate of worst-outcome probability may give an incomplete picture of risk. Figure A.1.1 uses a severity-likelihood matrix to illustrate the difference between a risk-point estimate and a risk frontier (a locus of points in the risk matrix defining combinations of severity and likelihood associated with various outcomes). In this example, the catastrophic result is so rare that it is rated a medium risk—the point estimate of a runway incursion collision, is extremely improbable E. However, the full risk frontier for runway incursions shows that there are less severe outcomes that are associated with higher probabilities, such that runway incursion risk is high.

Figure A.1.1: Notional Risk Frontier for Runway Incursions

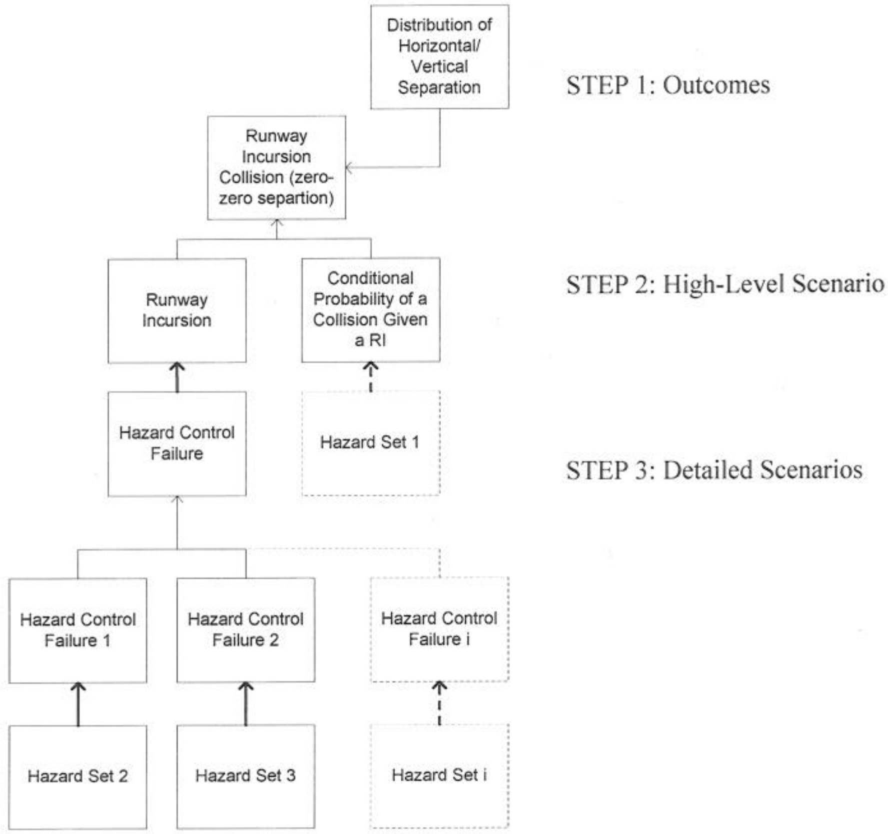


Step 3: Detailed Scenario Descriptions. High-level scenario descriptions, such as those in Table A.1.3, may be sufficient to start model development. However, in many cases it may be appropriate for the ATO and SRM panel to provide the modeler with more direction. In particular, ATO may find it useful to give guidance regarding the range of conditions to be considered in the model. For example, the SRM Panel and modeler may want to explicitly consider, say, collision probability conditional on other factors, X_i ($P[X_1] + \ldots. + P[X_n] = 1$).

$$\text{Prob[Collision]} = \text{P[Collision}|X_1]\times \text{P}[X_1] + \ldots. + \text{Prob[Collision}|\, X_n]\times \text{P}[X_n]$$

One way to qualitatively evaluate these conditional probabilities is via a tree-type framework as in figure A.1.2. As noted above, this is similar to the "5-why" root cause analysis methodology. Since the number of detailed scenarios can grow geometrically using this methodology, the trade-off between added detail (and, concomitantly, the cost of modeling) and the benefits from more detail, need to be considered. For relatively simple NAS changes for which the anticipated risk is "low" simple, high-level models may be appropriate.

Figure A.1.2. Example: Tree Description of Runway Incursion Scenario Development



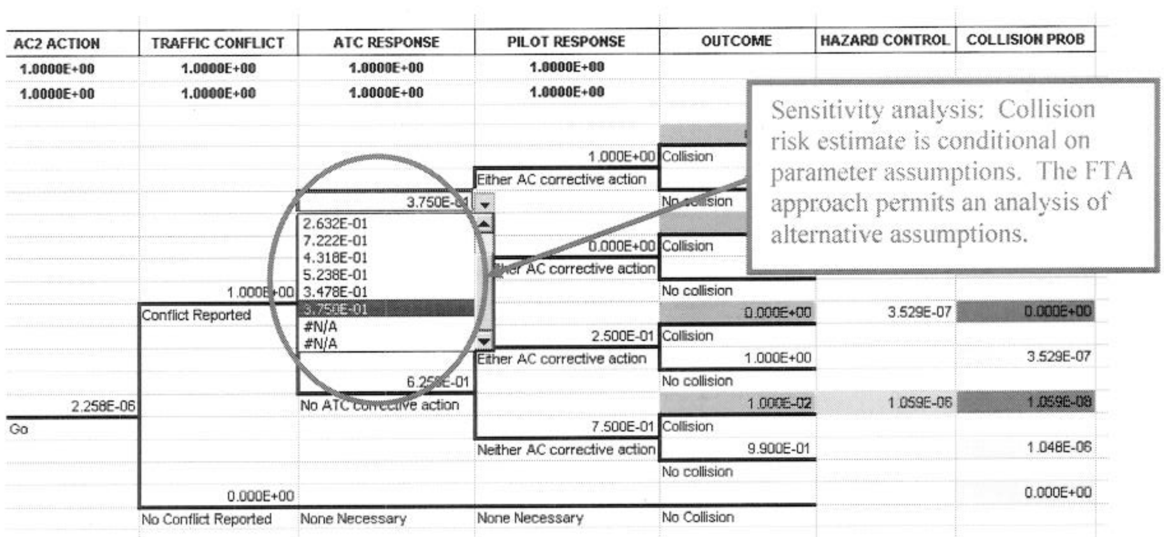
Example (continued):
Step 1: Outcomes. *In this example, the desired output of the modeling process is the distribution of horizontal/vertical separations between two aircraft involved in a runway incursion (under the conditions associated with the proposed change). A special case is zero-zero separation; that is, a collision. ATO is interested in the distribution of separations, rather than a point-estimate of collision probability for two reasons: (1) as mentioned above, aircraft collision may not be associated with the highest risk, and (2) the model-predicted separation distribution can be compared with actual distributions for the purpose of model validation and verification.*

Step 2: High-level scenario descriptions. *The high-level scenario that generates the loss of separation in this example is a runway incursion. The probability of a runway incursion collision can be decomposed into two broad components: (1) the probability of a runway incursion, and (2) the probability of a collision given a runway incursion. A model could be built based on this broad description using, for instance, aggregated national runway incursion data. However, an aggregated model glosses over particular conditions that may have a disproportionate effect on safety risks. Information on conditional risk could be helpful in designing efficient mitigations—that is, mitigations that result in the least cost for a given net reduction in risk.*

Step 3: Detailed scenario descriptions. *The SRM panel determines that a high level scenario description is insufficient to develop a statement of work for the modeler. This follows for two reasons: First, vertical/horizontal separation distribution (and, in particular, zero-zero* *separation), given a runway incursion, is conditional on other hazards (e.g., aircraft performance, runway/taxiway configurations, etc.) collectively labeled "Hazard Set 1" in the figure. Second, runway incursions are themselves the result of a failure of hazard controls (e.g., controller scanning, Airport Movement Area Safety System, etc.) labeled "Hazard Control Failure 1", "Hazard Control Failure 2", etc. In turn, each hazard control failure may be conditional on other hazards (e.g., airport layout, environmental conditions, etc.) labeled "Hazard Set 2", "Hazard Set 3", etc. In principle, the failure of a given hazard control may have multiple causes.*

Figure A.1.3 illustrates an event tree approach to evaluate the causes and effects of various hazard control failures. Each branch of the event tree represents the fail/no-fail of a hazard control, and the right-most column shows possible outcomes given different combinations of control failures. The example permits the consideration of alternative failure probabilities derived from different sources (for sensitivity analysis). While this framework does not explain the causes of control failures, further analyses of could be conducted (e.g., using fault tree analysis).

Figure A.1.3. Example: Event-Tree Analysis of Runway Incursion Scenarios



APPENDIX 2. WHEN SHOULD ATO MODEL?

Since a single change to the NAS may be associated with several potential adverse outcomes, the SRMD may include analyses of multiple scenarios, some of which require modeling and some of which may not. The following checklist describes an acceptable methodology for determining when modeling is required.

		YES	NO
Question 1	**Is ATO initiating change to any of the four (4) areas of integrated and complex systems within the ATO environment?**	**YES**	**NO**
	Acquisition and Implementation of New Systems	☐	☐
	Air Traffic Control Functions (including airspace changes)	☐	☐
	Equipment and Facility Maintenance Functions	☐	☐
	Flight Procedure Development Functions	☐	☐
	If **YES** is chosen for any of the four (4) areas in Question 1, proceed to Question 2. If **YES** is **NOT** chosen for any of the four (4) areas in Question 1, **STOP!** An SRM is not required; therefore modeling and/or simulation is not required.		
Question 2	**Does the proposed change affect NAS Safety? (Determining if a SRM is required)**	**YES**	**NO**
	Does the change affect pilot and controller interaction?	☐	☐
	Does the change affect existing controller processes or procedures?	☐	☐
	Does the change represent a change in operations?	☐	☐
	Does the change modify form, fit, function of a critical NAS system?	☐	☐
	If **YES** is chosen for any of the four (4) questions in Question 2, proceed to Question 3. If **YES** is **NOT** chosen for any of the four (4) areas in Question 1, **STOP!** An SRM is not required and modeling and/or simulation is most likely not required.		
Question 3	**Could the change potentially result in major, hazardous, or catastrophic outcomes (ATO SMS Manual definitions)?**	**YES**	**NO**
	Reduction in separation or collision with another aircraft or terrain?	☐	☐
	Significant reduction or total loss of ATC capability?	☐	☐
	Significant increase in flight crew workload?	☐	☐
	Significant reduction in safety margins or functional capability?	☐	☐
	Physical distress, injuries, or fatalities?	☐	☐
	If **YES** is chosen for any of the five (5) questions, then a model/simulation should be developed. If **YES** is **NOT** chosen, **STOP!** Based on the preliminary analysis, a HRH is not involved. Modeling may not be required (see paragraph 7 regarding AOV concurrence).		