Austin Bergstrom International Airport

Safety Risk Management

Overview and Training Exercises,

“Train the Trainer”

September 16, 2008

Presented by: Jacobs Carter Burgess SMS Project Team

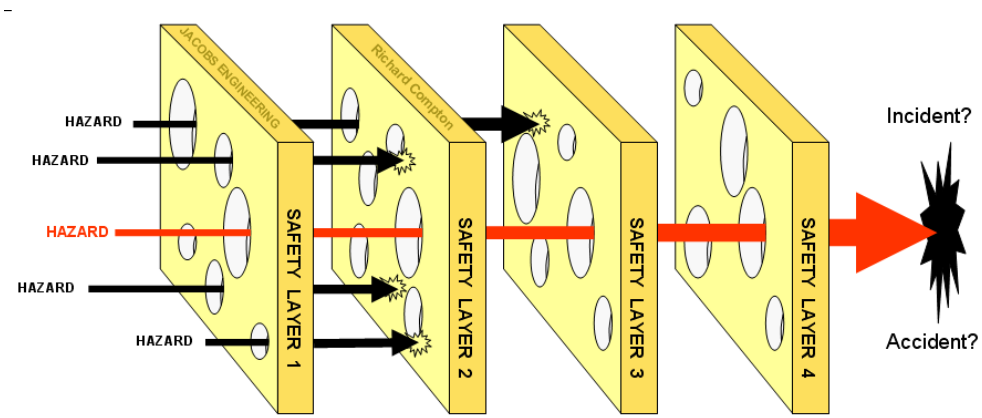
What is a Safety Management System?

What is Safety Risk Management?

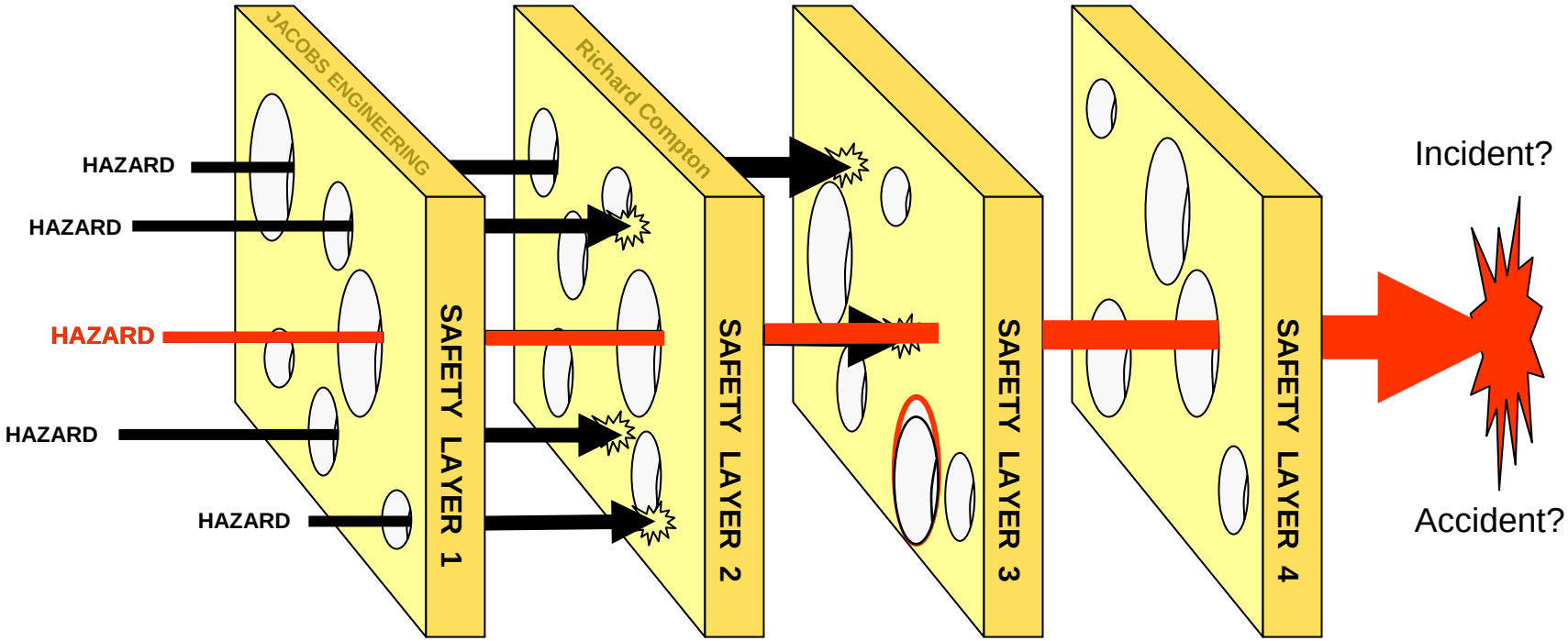
- Safety Risk Management means being both reactive from a historical perspective and proactive from a speculative or anticipatory analysis.
- By reviewing past occurrences and considering changes in progress, a probability and severity assessment can be utilized to mitigate hazards and potential hazards to an acceptable level.

Safety Risk Management, continued

- The SRM process is utilized when changes in a system (i.e. the airports' configuration, operation, procedures, new equipment, expanded or personnel responsibilities, etc.) are either planned or occur.
- Any changes to an existing system or systems can introduce adverse hazards which may result in incidents or accidents.



Reason Swiss Cheese Multi-Layer Safety Model



Reason Swiss Cheese Multi-Layer Safety Model

Safety Risk Management, continued

- Risk is the assessment of the likelihood of occurrence and the predictable severity of each identified hazard.

- SRM provides the process for evaluation of the various risks and the systematic analysis, mitigation and corrective course of action to:
  - Either eliminate the risk(s), or
  - Reduce the probability and severity of the risk(s) to an acceptable level.

Safety Risk Management Examples

- Examples when SRM would be required are:
  - Configuration changes at the airport, whether temporary or permanent;
  - The design of new systems, procedures, and/or organizations;
  - Any proposed changes to an existing operation, procedures, equipment, personnel and/or environment; or
  - Hazards identified during operations or safety assurance functions, such as audits or safety reports.

Safety Risk Management Process

- Once hazards have been identified, they are assessed and analyzed for their potential impact on safety.
- Mitigation of the potential hazard is developed to minimize the risk to an acceptable level.
- The mitigation of the risks, development of revisions, modifications, contingency arrangements and the implementation of mitigation strategies, requires conscious management decisions to approve, fund, schedule, and implement one or more risk strategies.

Safety Risk Management Process

The Safety Risk Management Process consists of five functional phases:

1. Describe the System, Procedure, or Organization
2. Hazard Identification
3. Analyze the Risk
4. Assess the Risk
5. Treat the Risk & Monitor for Effectiveness

Safety Risk Management – Phase 1

Describe the System, Procedure, or Organization;

- Project, procedure, activity, equipment, and/or organization
  - In describing the system (current & proposed):
    - Define, the configuration, use, intended operation, function and/or task descriptions
    - Define what changes are proposed
    - Define, the scope, objectives and implementation interactions

Safety Risk Management – Phase 2

- Hazard Identification
  - All potential hazards will be listed,
    - Hazard identification comes from;
      - Planning meetings,
      - Reports, safety concerns,
      - Data collection & assessment,
      - Locally developed “Check-Lists”, or
      - “Lessons Learned” and previous experiences

Hazard Identification Table

- Each hazard that is identified will be added to the list, without pre-judgment.

ID	Description	Cause
1	Construction haul route crosses active taxiway	No Flagman
2	Construction equipment height at the work area	Contractor could use wrong height equipment
3	Temporary FAA maintenance personnel route will crosses an active taxiway	Assume FAA understands the rules
4		
5		

Safety Risk Management – Phase 3

- Analyze the risk for each hazard
  - Group hazards for commonality
    - Re-write for consolidation
  - Ask the open-ended questions
    - What if….?, Why did….?
  - Determine the trigger mechanisms and their various outcomes
  - Identify existing controls

Hazard Identification Table

ID	Description	Cause
1	Construction haul route crosses active taxiway	No Flagman
2	Construction vehicle height at the work area	Contractor could use wrong height equipment
3	Temporary FAA maintenance personnel route will crosses an active taxiway	Assume FAA understands the rules

Consolidate common hazards!

Preliminary Hazard Analysis Worksheet

SRMDR Hazard Tracking Number: _____

ID	Description	Cause	System State	Potential Effect	Severity	Existing Control(s)	Likelihood	Current Risk	Recommended Safety Mitigation	Residual Risk	Comments
1	Vehicles crossing active Taxiway "A" between "A1" and "A2"	Unrestricted access									

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Safety Risk Management – Phase 4

Assess the hazard

- Assess the severity and likelihood of occurrence by use of Risk Matrix
- Prioritize the risk and results from the Risk Matrix

Preliminary Hazard Analysis Worksheet

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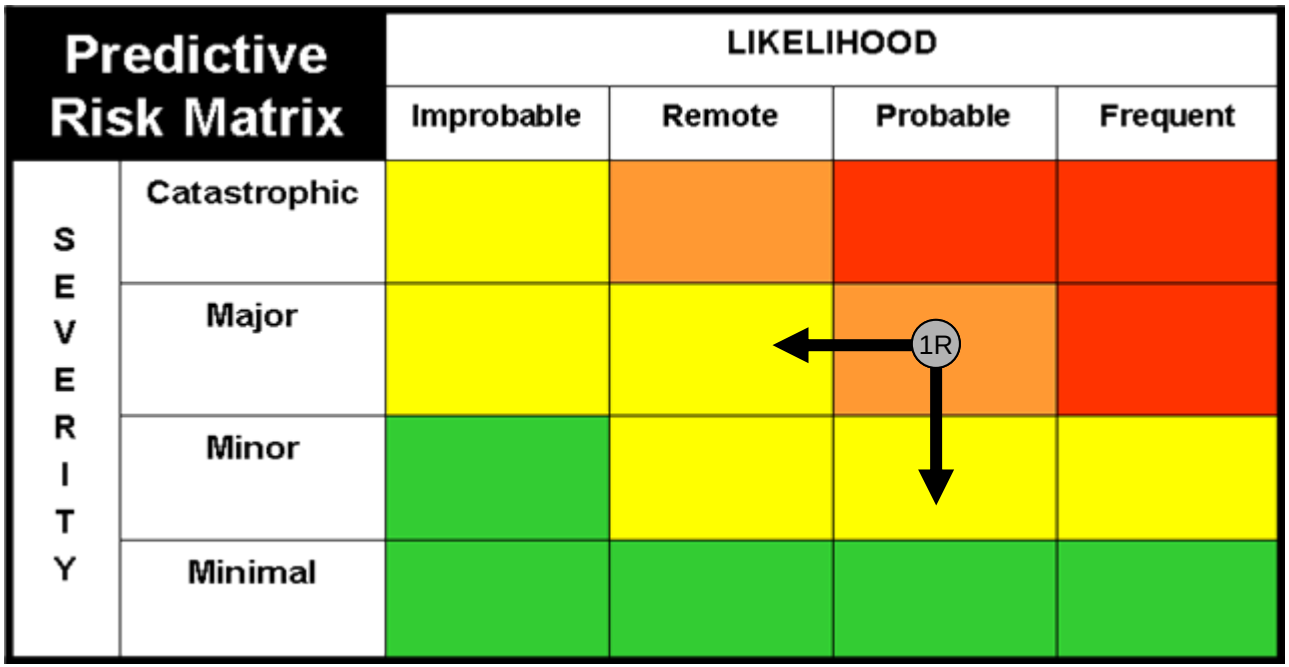
Safety Risk Management - Matrix

- Mitigating Risk to an acceptable level



HIGH RISK
MODERATE HIGH RISK
MEDIUM RISK
LOW RISK

LIKELIHOOD LEVELS	
Frequent	Probability happening from a daily to weekly basis
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SEVERITY LEVELS	
Catastrophic	Loss of aircraft, loss of structures, fatalities
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Safety Risk Management – Phase 5

- Mitigate/Treat the Risk
  - Identify risk mitigation options
    - Hazard reduction or elimination
  - Select best-suited option & implementation strategy
    - As Low As Reasonably Possible (ALARP)
  - Identify monitoring strategies for effectiveness of mitigation
  - Identify management level(s) for risk mitigation decisions

Safety Risk Management – Phase 5 (cont.)

- Hazard Reduction or Elimination
  - Design and/or modify the hazard for minimization or elimination
  - Reduce exposure and severity – physical guards or barriers
  - Warnings, advisories, and/or signals
  - Procedural and/or operational changes
  - Training for hazard avoidance
  - Upon completion, re-apply SRM process on the substituted or eliminated risks
  - Track changes to system, procedure, equipment, personnel and/or environment through data capture, monitoring, reporting, and debriefs

Decision Reporting

Safety Risk Management – SRMDR

Safety Risk Management – SRMDR

- Safety Risk Management Decision Report (SRMDR)
  - The development of a SRMDR, is the formal documentation of SRM decisions.
  - Each SRMDR must:
    - Describe the hazard and analysis process
    - Explain mitigating options and implementation strategy
    - Identify the responsible management organization for this task or activity
    - Identify stakeholders for implementation, communications, and training requirements
    - Identify monitoring strategies for effectiveness of mitigation

SRMDR Forms

SRMDR Supplemental Hazard Analysis Worksheet

(To be completed for each identified hazard)

Date:

Hazard Tracking Number: **Hazard Element Number:**

Hazard Description:

Cause of Hazard:

System State:

Possible Effect:

Human Factors:

Existing Controls or Requirements:

Severity:

Severity Rational:

Likelihood:

Likelihood Rational:

Current/Initial Risk:

Recommended Mitigation:

Predicted Residual Risk:

Enhancing our Safety Culture through Safety Management System Processing

ABIA - Safety Risk Management Decision Report (SRMDR)

1. **Report Date:**
2. **Project Name:**
3. **Current System, Procedure, or Activity:**
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5. **Project, Re-configuration, Operation, Equipment, Task or Activity:**
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7. **Risk Analysis:**
8. **Trigger mechanisms**
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10. **Human Factors:**
11. **Risk Assessment:**
    a. Severity
    b. Likelihood
12. **Mitigation and/or Treatment of Risks:**
13. **Implementation Strategies and Timelines**
14. **Communications and Training Requirements:**
15. **Monitoring and Tracking Responsibility:**

Safety Risk Management Decision Report Approval:

ABIA SMS Coordinator		Approval Date	
Is Director Level Approval Required?		**Yes / No**	
ABIA Director of Operations		Approval Date	
ABIA Director of Maintenance		Approval Date	

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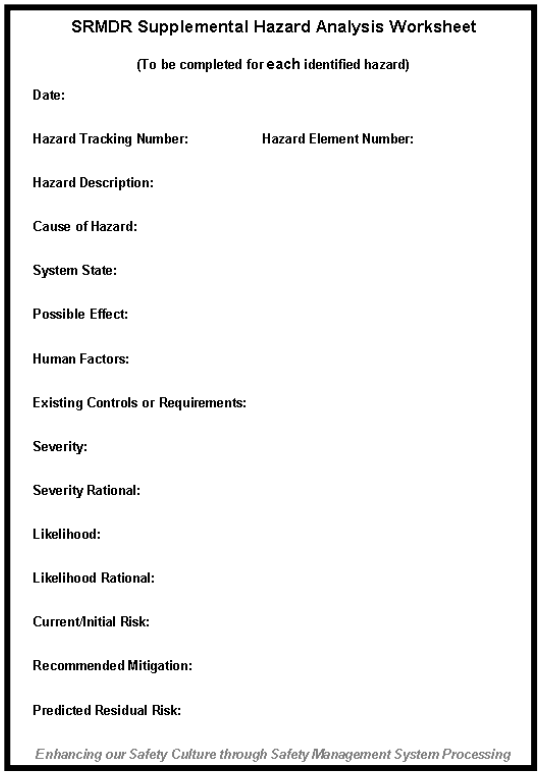
SRMDR Forms



SRMDR Supplemental Hazard Analysis Worksheet

(To be completed for each identified hazard)

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Cause of Hazard:

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Severity Rational:

Likelihood:

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System State:

Possible Effect:

Human Factors:

Existing Controls or Requirements:

Severity:

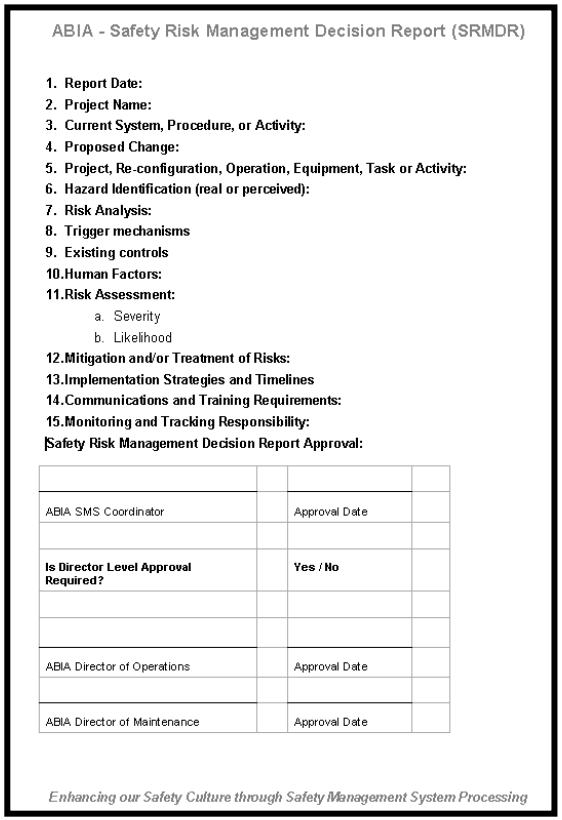
Severity Rational:

Likelihood:

Likelihood Rational:

SRMDR Forms

- Simplified, or
- Expanded



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7. **Risk Analysis:**
    a.
8. **Trigger mechanisms**
    a.
9. **Existing controls**
    a.
10. **Human Factors:**
    a.
11. **Risk Assessment:**
    a.
    b. Severity
        i.
    c. Likelihood
        i.
12. **Mitigation and/or Treatment of Risks:**
    a.
13. **Implementation Strategies and Timelines**

Safety Risk Management – SRMDR

- Safety Risk Management Decision Reports should be completed by the SMS Coordinator
- Approvals of SRMDR's should be at the division head level or above.
- Approval of the SRMDR certifies that:
  - It was developed properly.
  - Hazards were systematically identified.
  - Risks were appropriately assessed, mitigated and the risks are acceptable

Safety Risk Management (SRM) Training

Practical Training Exercises

- 2 Projects Planned for SRM Determinations
  - #1 - Roadway within Runway Clear Areas
  - #2 - ABIA identified project

Training Exercise #1

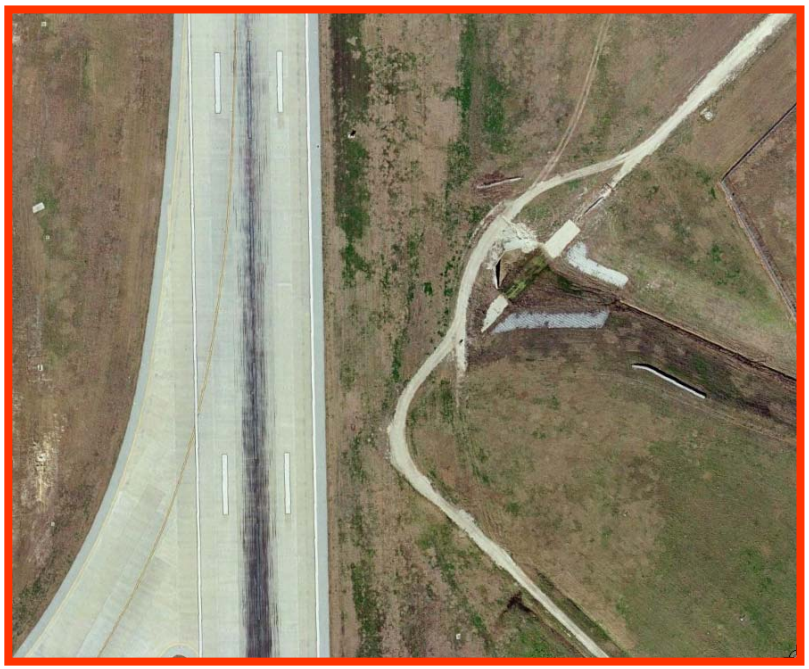
Roadway

within

Runway Airport Operations Areas

Training Exercise #1 – Project Area

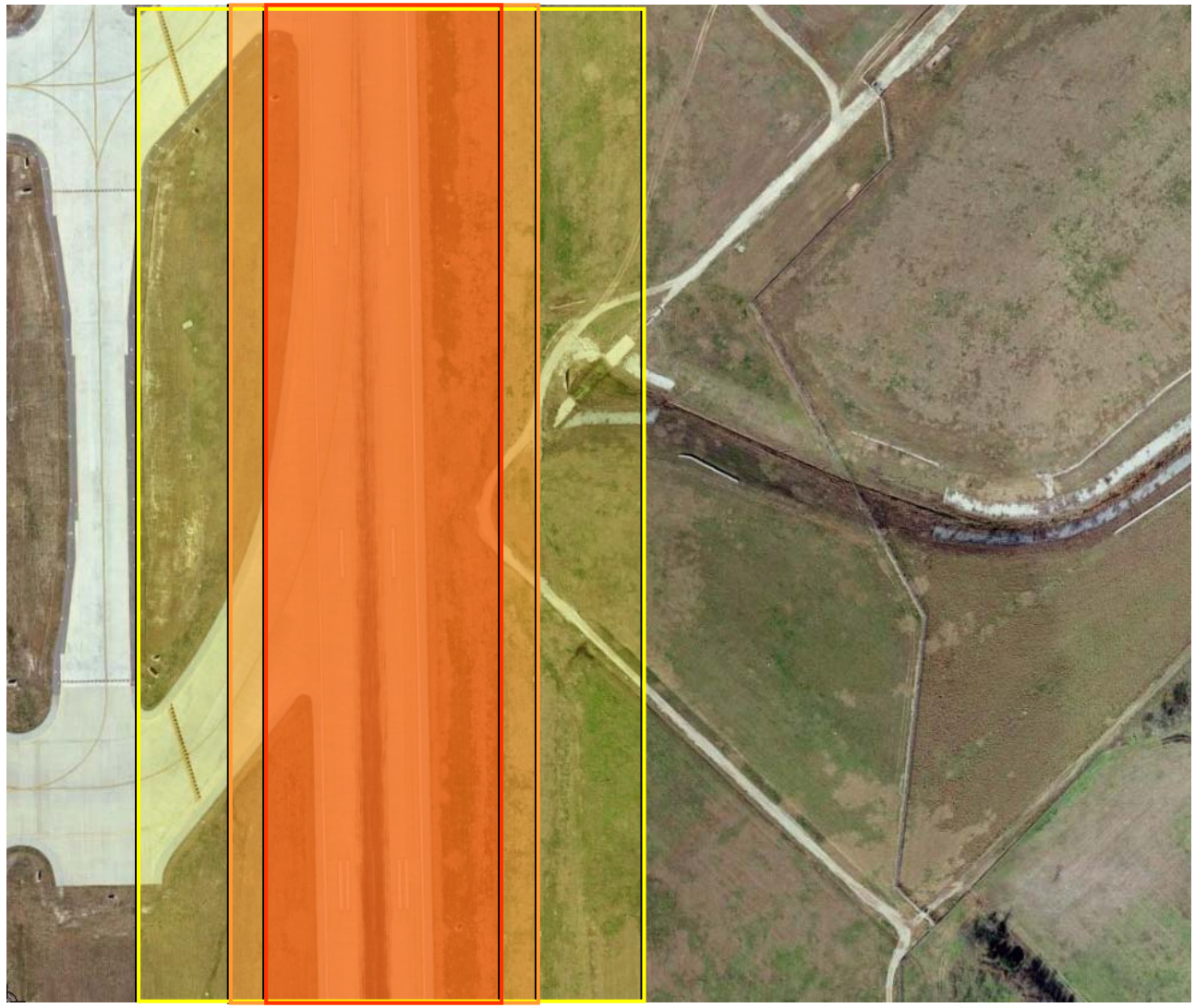
- Roadway within the Airport Operations Area



Training Exercise #1 - Issues

Roadway penetrates;

- OFZ
- RSA
- OFA



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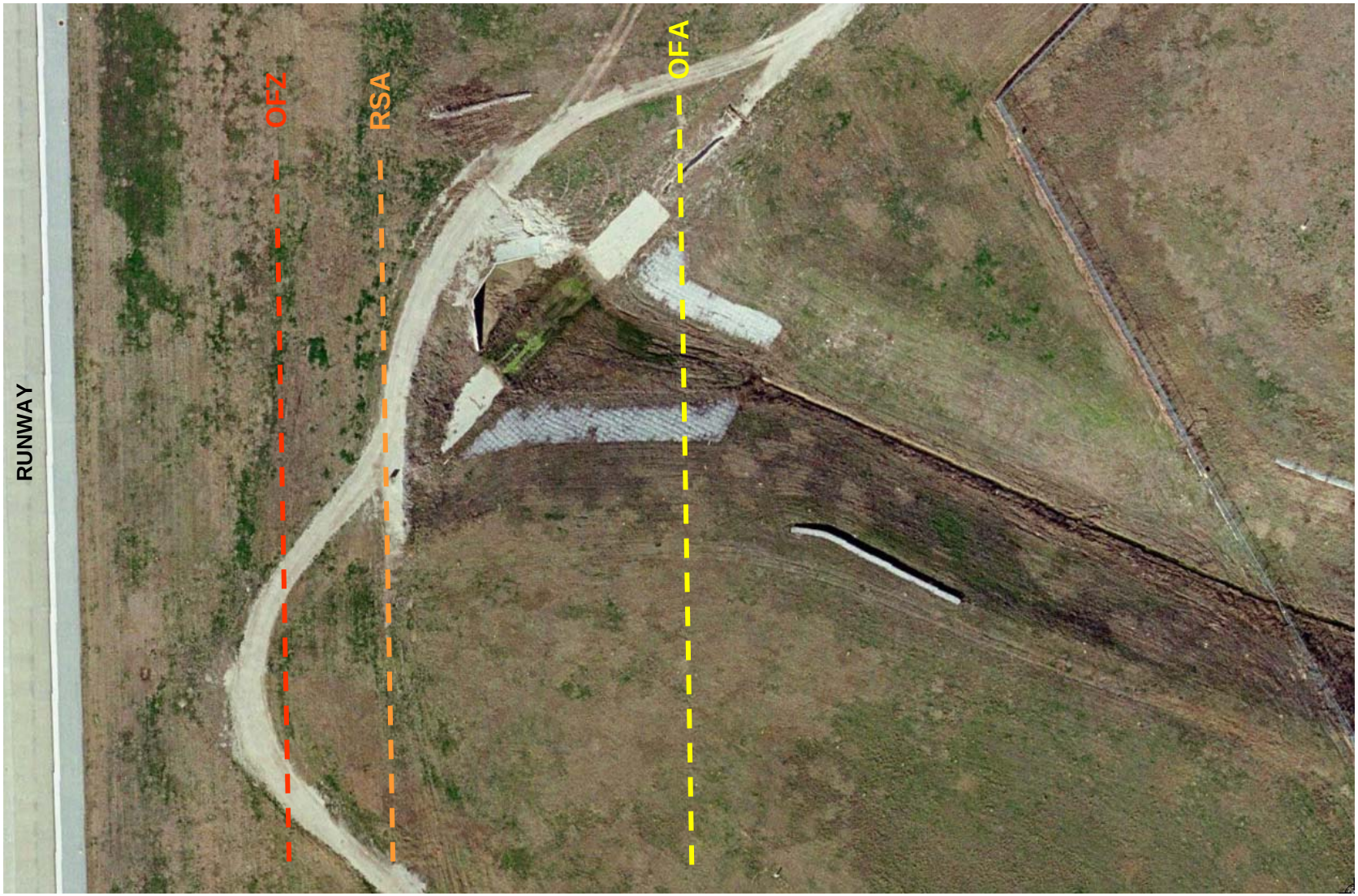
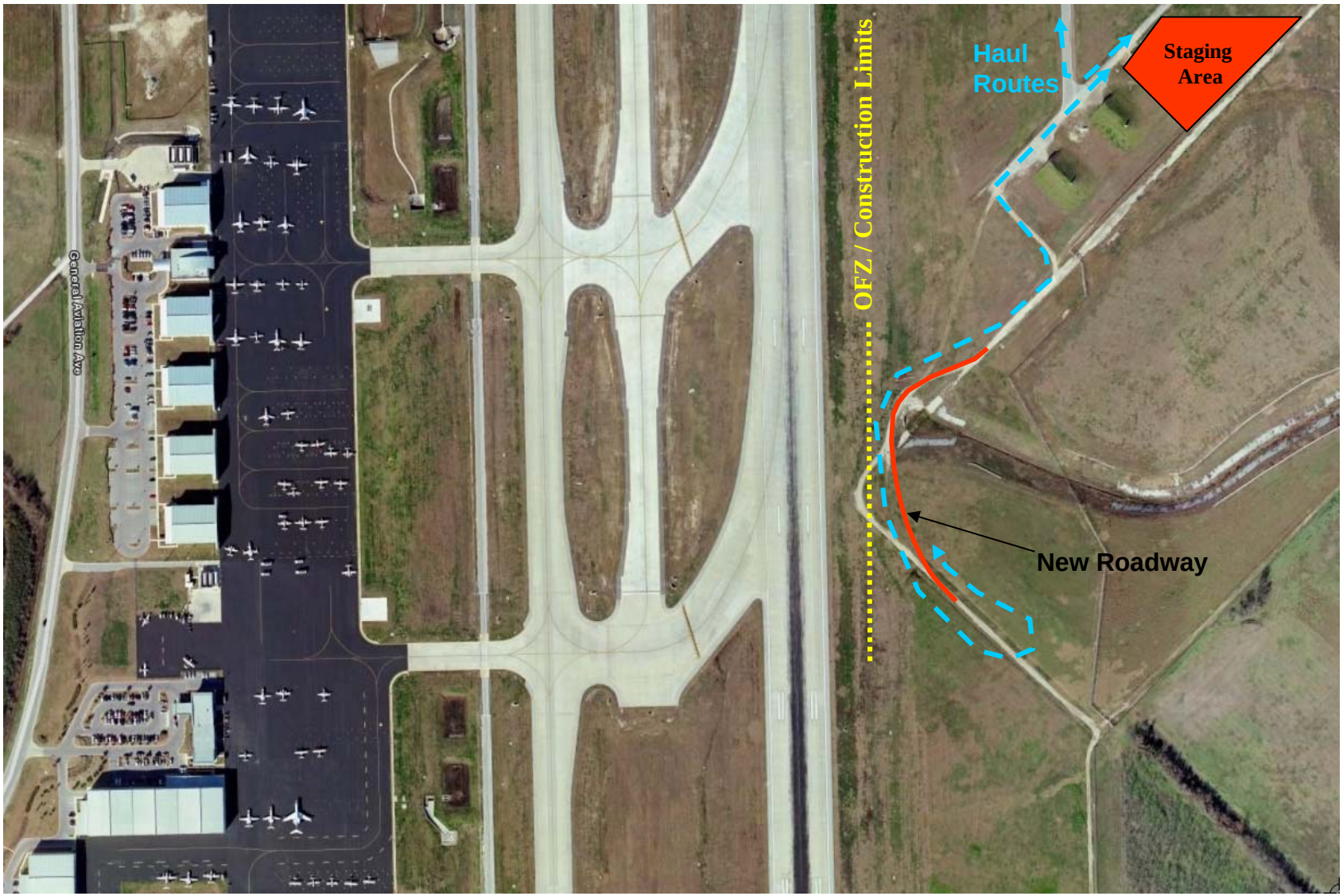
Training Exercise #1 – Detailed Issues



Training Exercise #1 – Project Access

Training Exercise #1 – Project Plan



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Populating the Hazard List

ID	Description	Cause
1	Staging area location	
2	Haul route	
3	Construction equipment type	
4	Runway Operations	
5	Work within OFZ, RSA or OFA	
6	Weather	
7	Low visibility	
8	Navaids	
9	Pilot Distractions	
10	Dust	

Construction & Maintenance Checklist

✓ **Construction and Maintenance Safety Issues Checklist**

- ☐ Safety Plan (Rules for Construction and Maintenance on AOA)
- ☐ Contractor staging area accessibility and security
- ☐ Air Operations Area (AOA) access control and security requirements
- ☐ Airspace Study
  - o Imaginary Surfaces
  - o Safety ILS Protection Surfaces
  - o Use of temporary equipment
  - o Permanent improvements
  - o Environmental impacts
  - o Electronic frequency emissions
  - o Line of sight
  - o Radar systems interruption
- ☐ Wildlife control and management
- ☐ Training of contractor personnel on safety and security requirements
- ☐ Part 139 inspection of construction area
- ☐ Issuance of NOTAMS
- ☐ Airfield closures/restrictions
- ☐ Use of artificial lighting systems
- ☐ Impacts to essential power systems
- ☐ Supplemental or temporary use of airfield marking and lighting
- ☐ Storage and staging of construction equipment, materials, and supplies
- ☐ Limits of construction work area(s)
- ☐ Haul routes and escort requirements for contractor access to construction work areas
- ☐ Owner representation during construction activities within the AOA
- ☐ Management of contractor
- ☐ Restrictions on work hours (day/night)
- ☐ Meteorological limits or restrictions (poor visibility, temperature, or precipitation requirements)
- ☐ Construction or work phasing requirements
- ☐ Airport flow – wind direction
- ☐ Marking and lighting of work area, equipment, vehicles, excavations
- ☐ Dust and debris control due to high winds
- ☐ Control of FOD
- ☐ Vacuum/sweeper requirements for paved surfaces
- ☐ Contractor use of flag-personnel for control of workers and mobile equipment
- ☐ Pre-coordination and approval of daily construction activities
- ☐ Worker cessation requirements due to emergency situations
- ☐ Construction site ingress/egress by emergency response personnel
- ☐ Owner investigation of construction related incidents and accidents
- ☐ Consequences of contract non-compliance of safety and security rules and regulations
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

Safety Risk Management - Matrix

- Mitigating Risk to an acceptable level

Predictive Risk Matrix		LIKELIHOOD			
		Improbable	Remote	Probable	Frequent
SEVERITY	Catastrophic			HIGH RISK	
	Major			MODERATE HIGH RISK	
	Minor		MEDIUM RISK		
	Minimal	LOW RISK			

LIKELIHOOD LEVELS	
Frequent	Probability happening from a daily to weekly basis
Probable	Probability happening from a weekly to monthly basis
Remote	Probability happening on an annual basis
Improbable	Probability assumed unlikely to occur

SEVERITY LEVELS	
Catastrophic	Loss of aircraft, loss of structures, fatalities
Major	Damage to aircraft, structures, serious injuries
Minor	Slight damage, functional impairment, slight injuries
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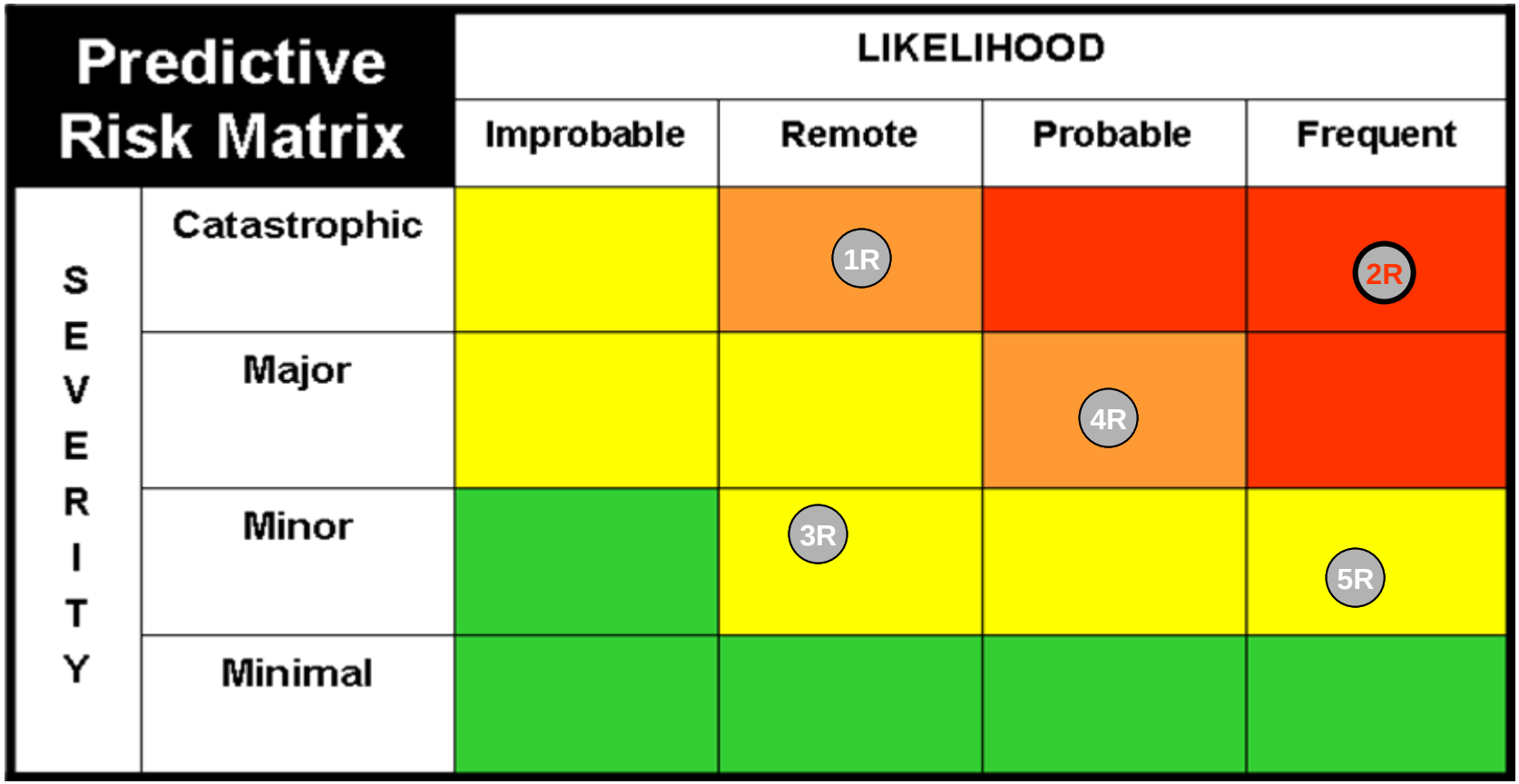
Hazard Identification Table

ID	Description	Cause	System State	Potential Effect	Severity	Existing Control(s)	Likelihood	Current Risk	Recommended Safety Mitigation	Residual Risk	Comments
1											
2											
3											
4											
5											
6											
7											
8											
9											

Safety Risk Management - Matrix

- Mapping the Risk



SRMDR Hazard Form

ABIA - Safety Risk Management Decision Report (SRMDR)

SRMDR Supplemental Hazard Analysis Worksheet

(To be completed for each identified hazard)

Date:

Hazard Tracking Number: Hazard Element Number: 1

Hazard Description:

Cause of Hazard:

System State:

Possible Effect:

Human Factors:

Existing Controls or Requirements:

Severity:

Severity Rational:

Likelihood:

Likelihood Rational:

Current/Initial Risk:

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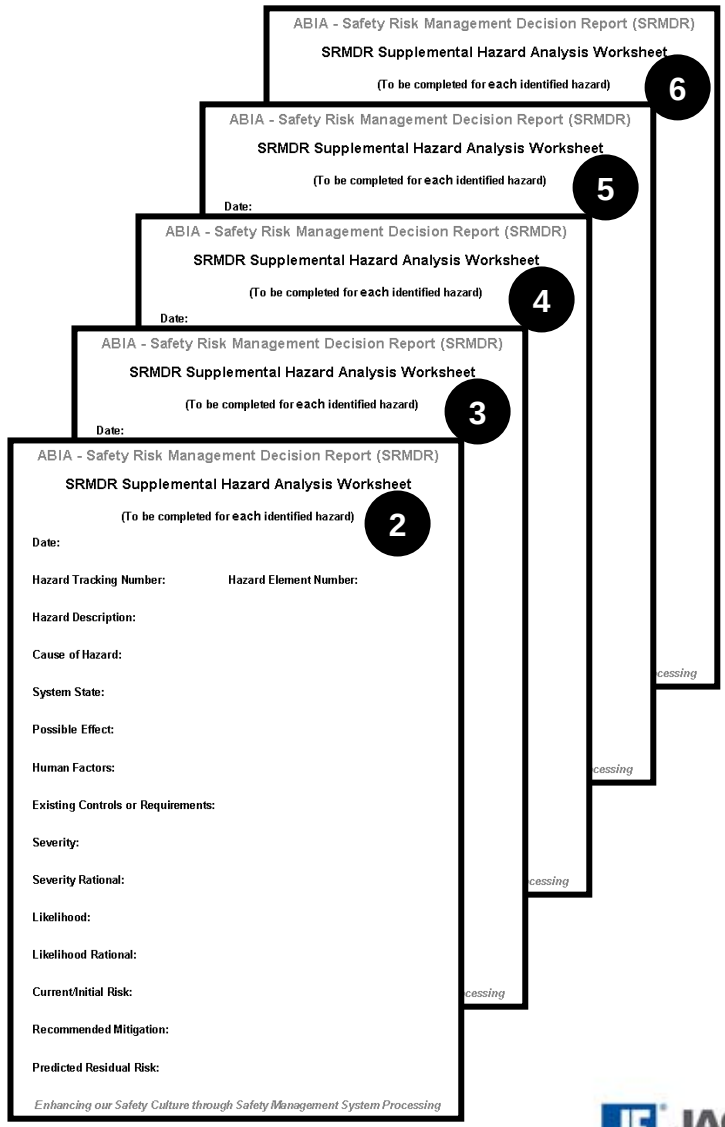
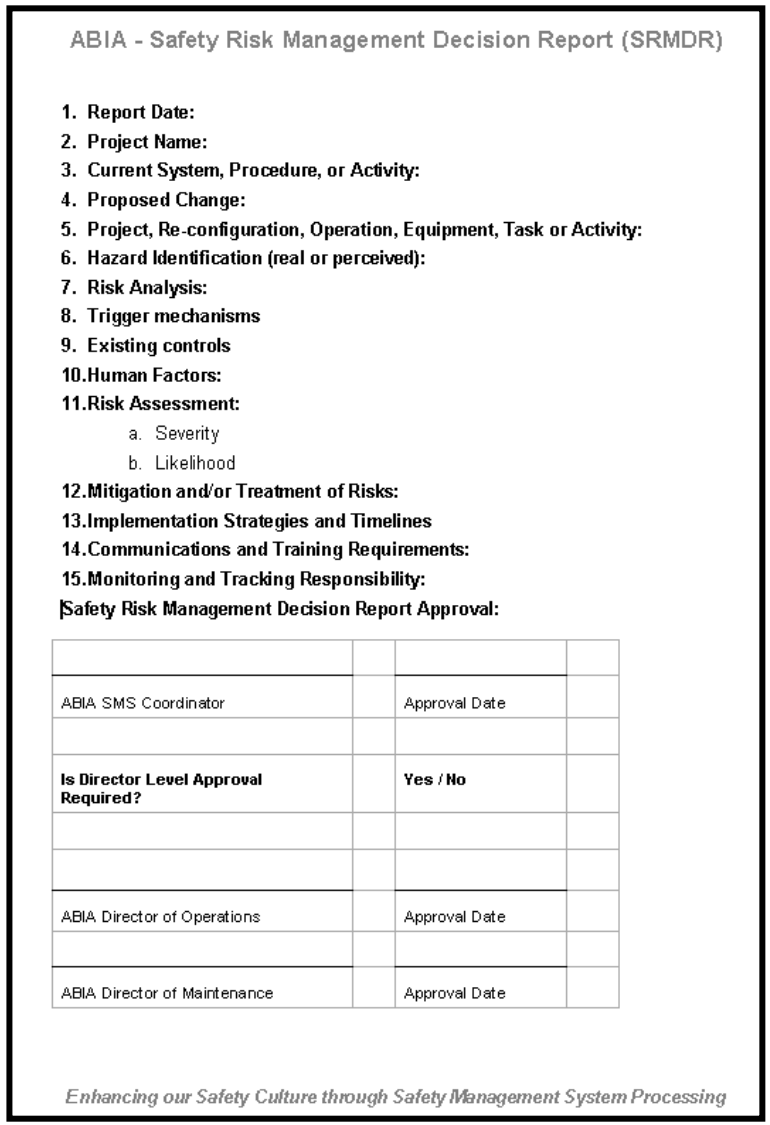


SRMDR Report Form

- Simplified, or Expanded.
- The SRMDR Report can be as brief or complex as need / risk demands.



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8. **Trigger mechanisms**
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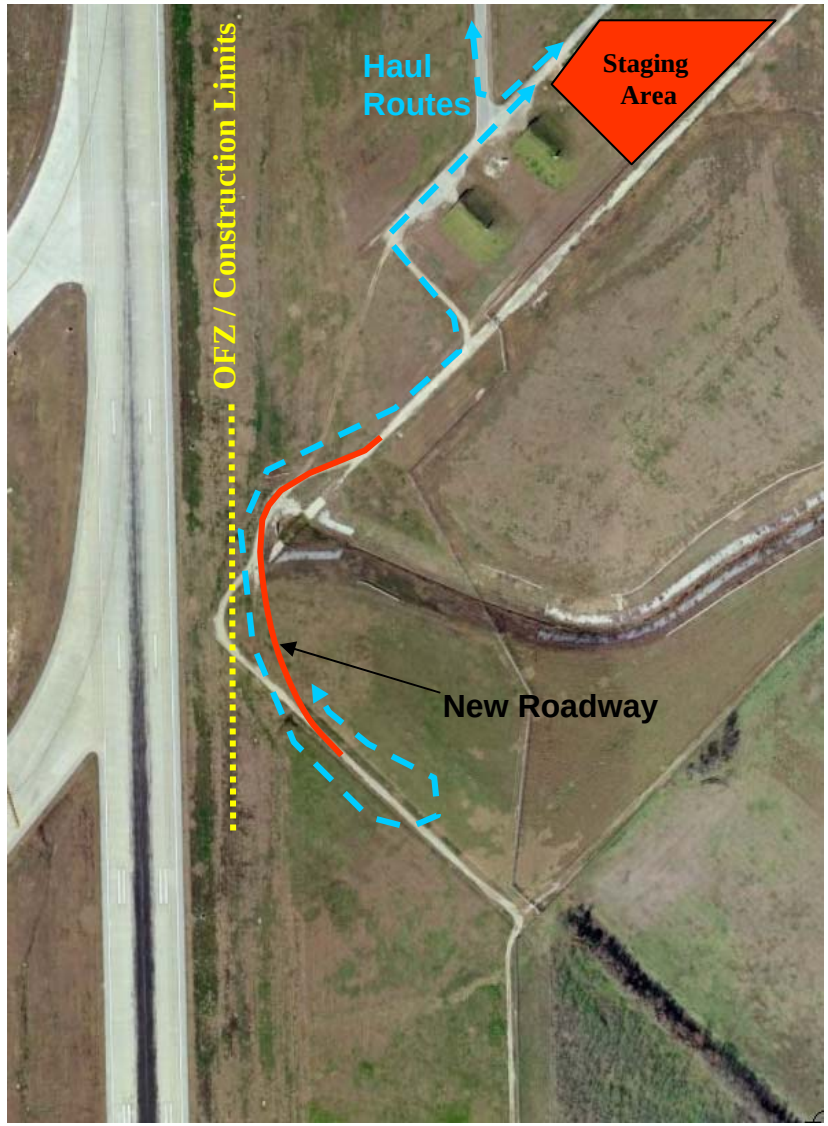
Training Exercise #1 - SRMDR

- Hazard Identification
- Analyze Each Risk
- Assess the Risk



Training Exercise #1

- Treat the Risk
- SRM Determination
- Tracking Mitigation Effectiveness

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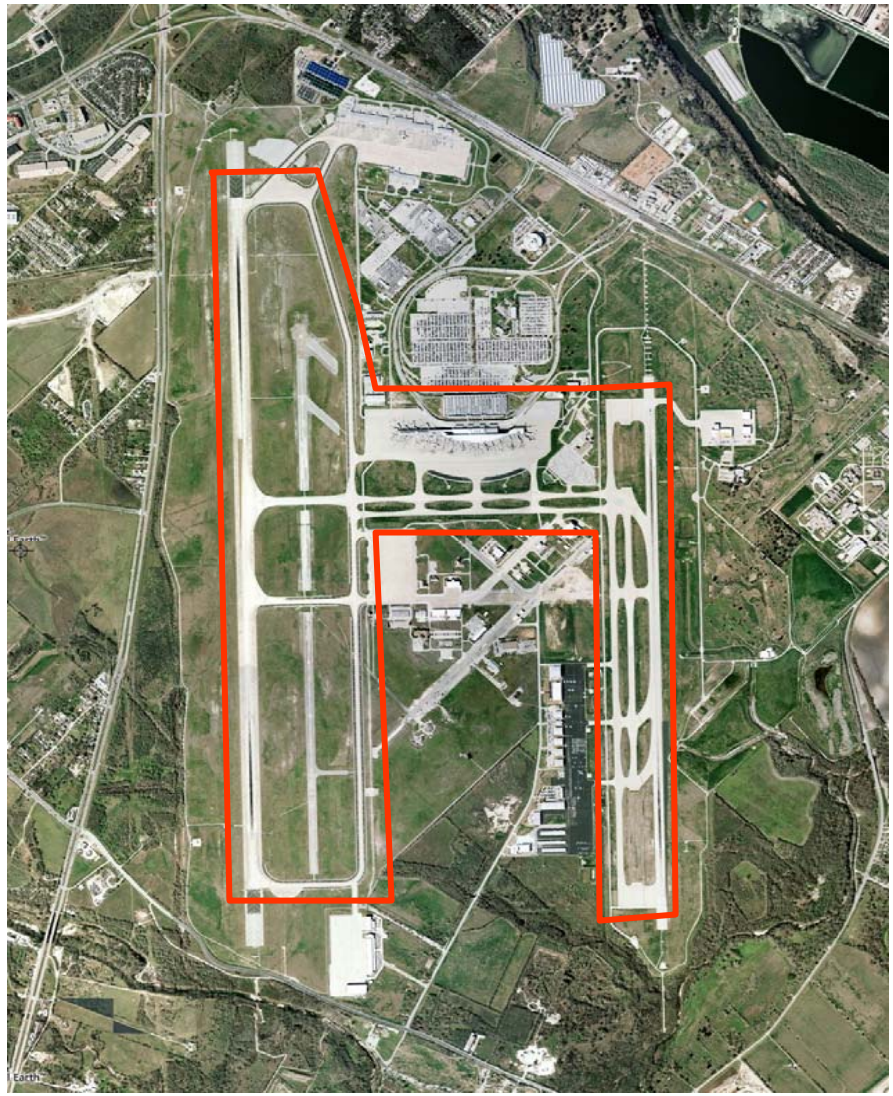
Training Exercise #2

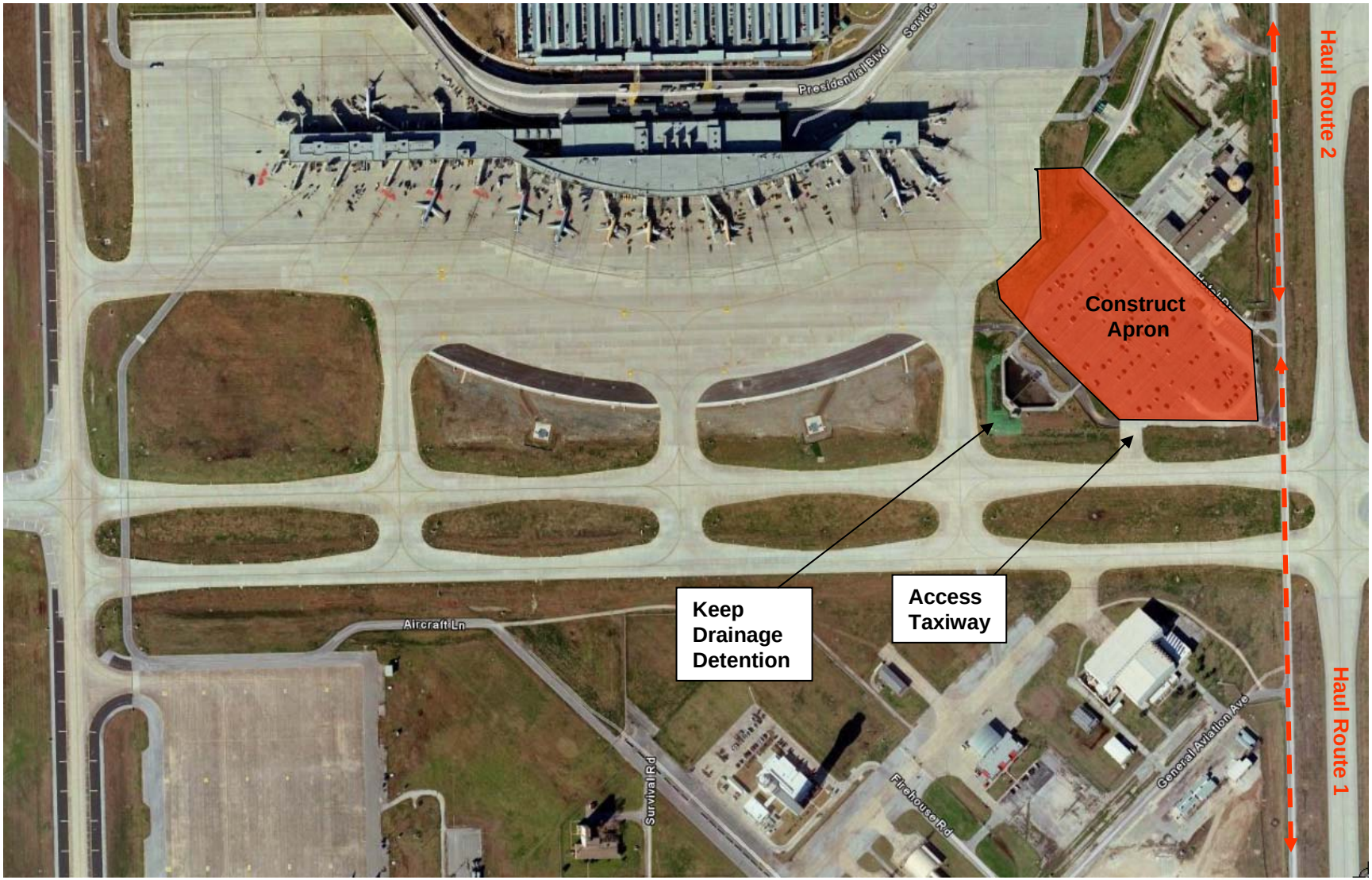
_____ Project

Training Exercise #2

- Project Selection
  - Select a project within the area identified in RED, for SRM Approval
  - Not too simple
  - Challenge yourself!
  - Time limit – 90 minutes
  - Project Scope
  - Hazard List
  - Hazard Analysis Worksheets
  - Preliminary Hazard Analysis Worksheet
  - Risk Matrix Mapping
  - SRMDR



Training Exercise #2 – ABIA Project



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Training Exercise #2

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Training Exercise #2

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Training Exercise #2

SRMDR Form – Hazard List

ID	Description	Cause

SRMDR Form – Hazard Analysis Worksheet

ABIA - Safety Risk Management Decision Report (SRMDR)

SRMDR Supplemental Hazard Analysis Worksheet

(To be completed for **each** identified hazard)

Date:

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Hazard Description:

Cause of Hazard:

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Possible Effect:

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Severity Rational:

Likelihood:

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Enhancing our Safety Culture through Safety Management System Processing

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Safety Risk Management - Matrix

Mitigating Risk to an acceptable level

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HIGH RISK
MODERATE HIGH RISK
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SRMDR Form – SMRDR Report

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14. **Communications and Training Requirements:**
15. **Monitoring and Tracking Responsibility:**

Safety Risk Management Decision Report Approval:

ABIA SMS Coordinator		Approval Date	
Is Director Level Approval Required?		**Yes / No**	
ABIA Director of Operations		Approval Date	
ABIA Director of Maintenance		Approval Date	

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ABIA - Safety Risk Management Decision Report (SRMDR)

11. Risk Assessment:

a.

b. Severity

i.

c. Likelihood

i.

12. Mitigation and/or Treatment of Risks:

a.

13. Implementation Strategies and Timelines

a.

14. Communications and Training Requirements:

a.

15. Monitoring and Tracking Responsibility:

a.

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SRMDR Form – SMRDR Report

ABIA - Safety Risk Management Decision Report (SRMDR)

1. **Report Date:**
2. **Project Name:**
3. **Current System, Procedure, or Activity:**
4. **Proposed Change:**
5. **Project, Re-configuration, Operation, Equipment, Task or Activity:**
6. **Hazard Identification (real or perceived):**
7. **Risk Analysis:**
8. **Trigger mechanisms**
9. **Existing controls**
10. **Human Factors:**
11. **Risk Assessment:**
    a. Severity
    b. Likelihood
12. **Mitigation and/or Treatment of Risks:**
13. **Implementation Strategies and Timelines**
14. **Communications and Training Requirements:**
15. **Monitoring and Tracking Responsibility:**

Safety Risk Management Decision Report Approval:

ABIA SMS Coordinator		Approval Date	
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ABIA Director of Operations		Approval Date	
ABIA Director of Maintenance		Approval Date	

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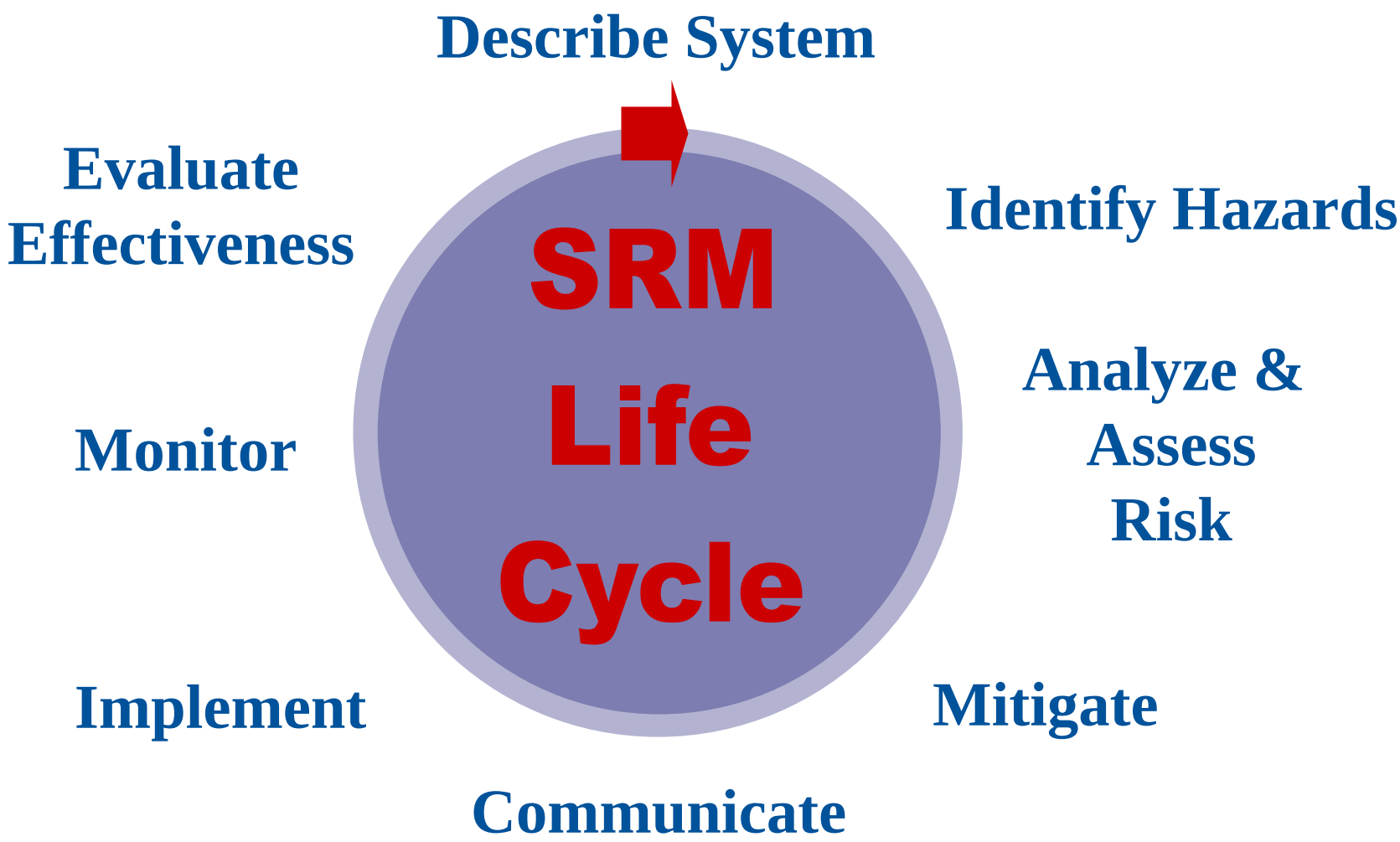
SRM Life Cycle / Style



Thank You!

Your

Jacobs Carter Burgess SMS Team