



# A Systems Approach to Managing Risk

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Systems Thinking in Recreation & Outdoor Safety

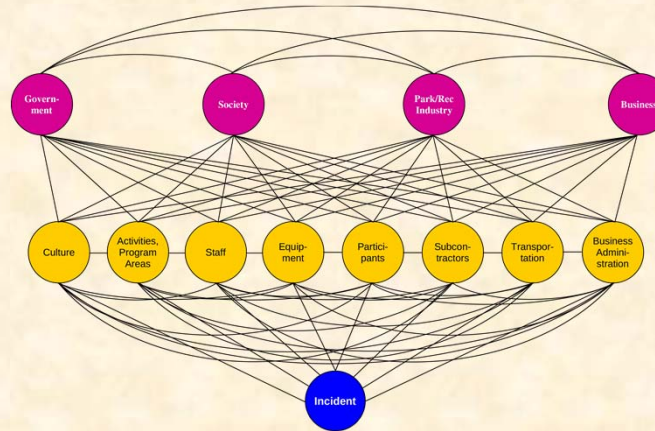
Jeff Baierlein, Director, Viristar  
[www.viristar.com](http://www.viristar.com)



Viristar Risk Management Services

# Overview

- Risk Domains
  - Policies, procedures, values & systems to manage risks to standards



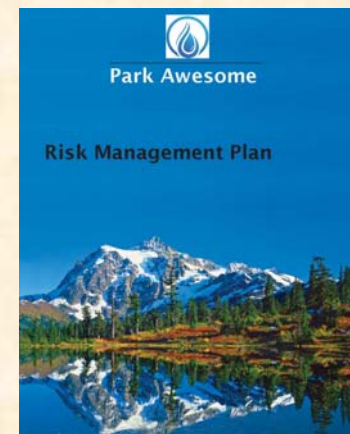
- Risk Management Instruments



- Documentation

[illegible]

- Risk Management Plan



- Systems Thinking

# Introduction

**What Is Risk?** The possibility of undesirable loss.

**What is Risk Management?** A systematic, intentional, and ongoing process of maintaining risk at a socially acceptable level.

**Risk Management Approaches:**



Eliminate



Reduce



Transfer



Accept

**Where Does Risk Come From?**

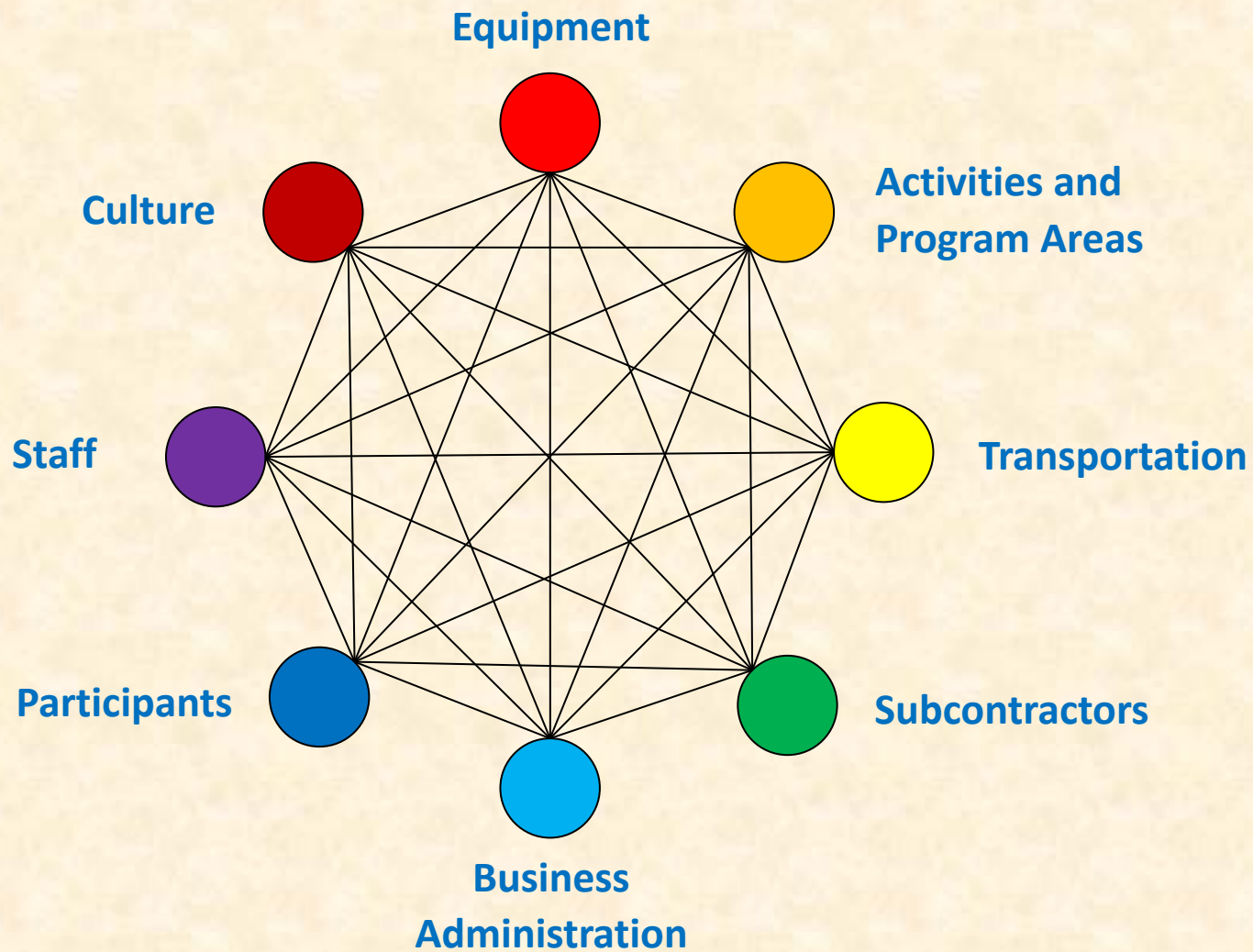


VIRISTAR



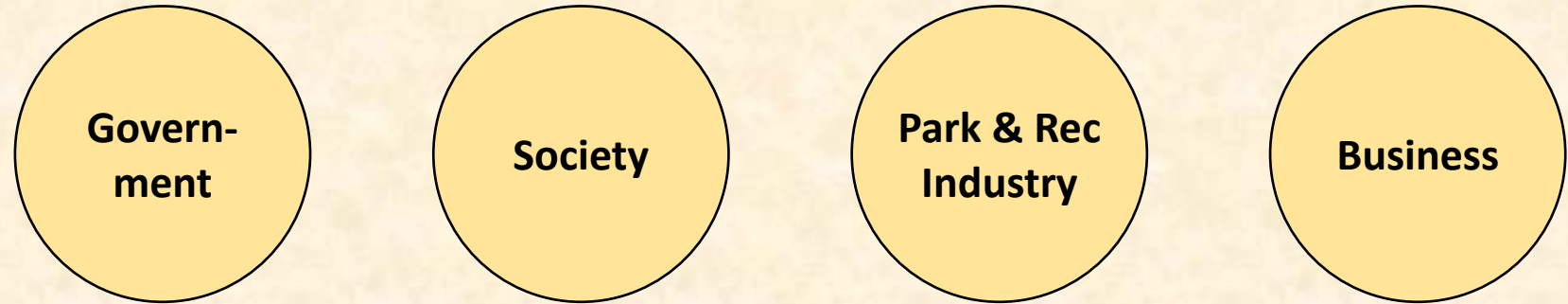
# Risk Domains

or “Risk Reservoirs”

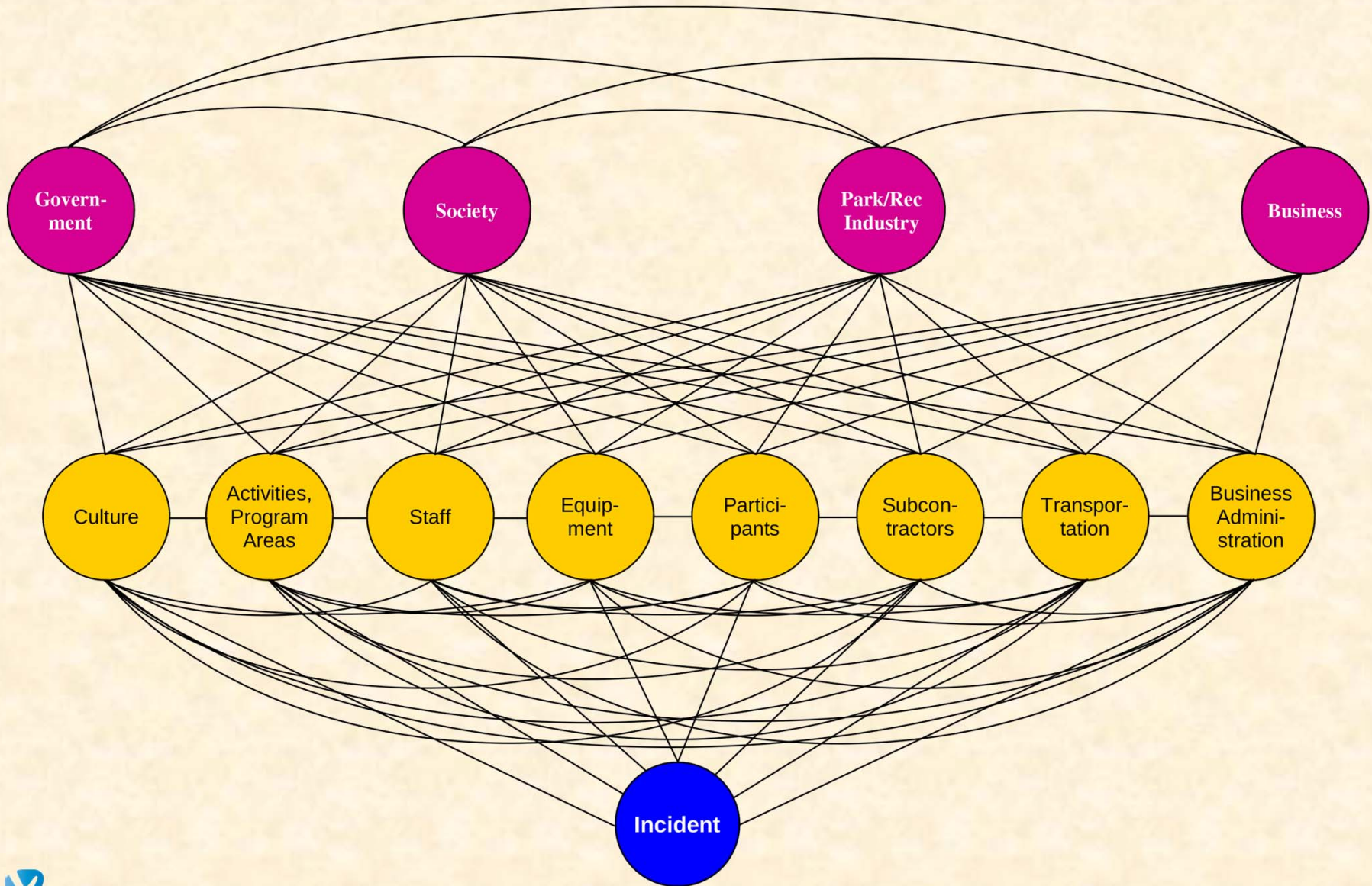


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# Underlying Risk Domains



# Risk Domains



# Managing Risks in Risk Domains

Manage risks in each Risk Domain by implementing policies, procedures, values & systems

## Single-pitch rock climbing

- **Policy:** Safety briefings before each activity, including climbing
- **Procedure:** Staff person checks helmet, harness before climber begins
- **Value:** Safety is a top priority
- **Systems:** Equipment management, staff training, medical screening, etc.





# Standards

How do you establish these policies, procedures, values, systems?  
One source: professional practice standards

## Industry Associations



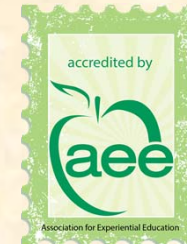
## Government



## Standards Bodies

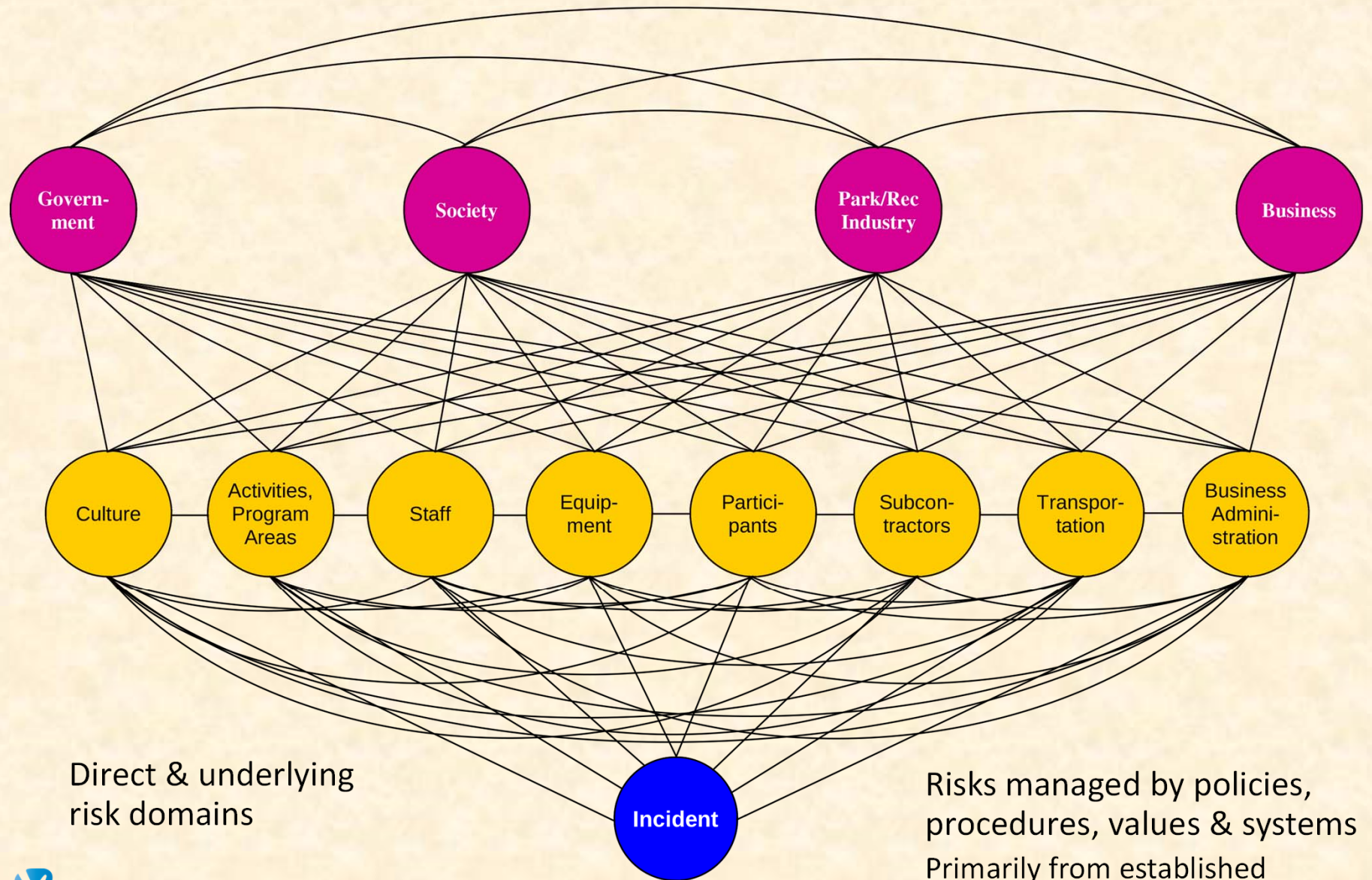


## Accreditors





# Risk Domains: Summary



Direct & underlying  
risk domains

Risks managed by policies,  
procedures, values & systems  
Primarily from established  
standards, professional experience

# Risk Management Instruments

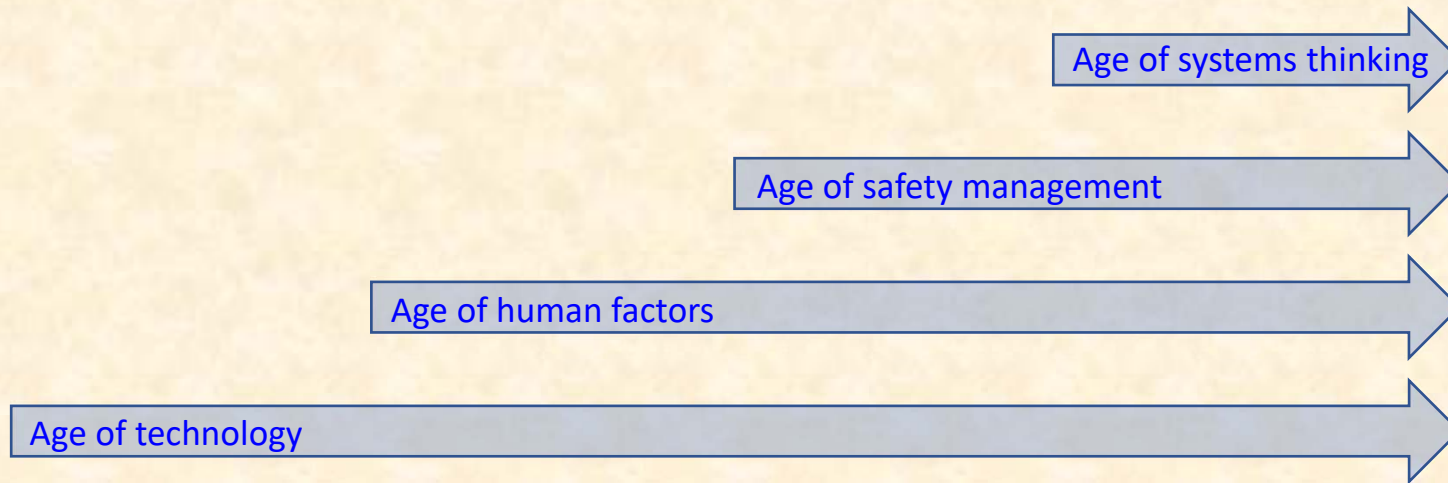


- Risk Transfer
- Incident Management
- Incident Reporting
- Incident Reviews
- Risk Management Committee
- Medical Screening
- Risk Management Reviews
- Media Relations
- Documentation
- Accreditation
- Seeing Systems





# Evolution in Safety Thinking



1800s

## Technology

Humans as cogs  
in an industrial  
machine

Domino Model,  
Root Cause  
Analysis

1970s

## Human Factors

Humans as  
hazards to be  
controlled

Rules-based  
safety

1980s

## Safety Management

Adapting  
dynamically to  
risk environment

Integrated safety  
culture

1990s

## Systems Thinking

Complex socio-  
technical systems

Resilience  
engineering

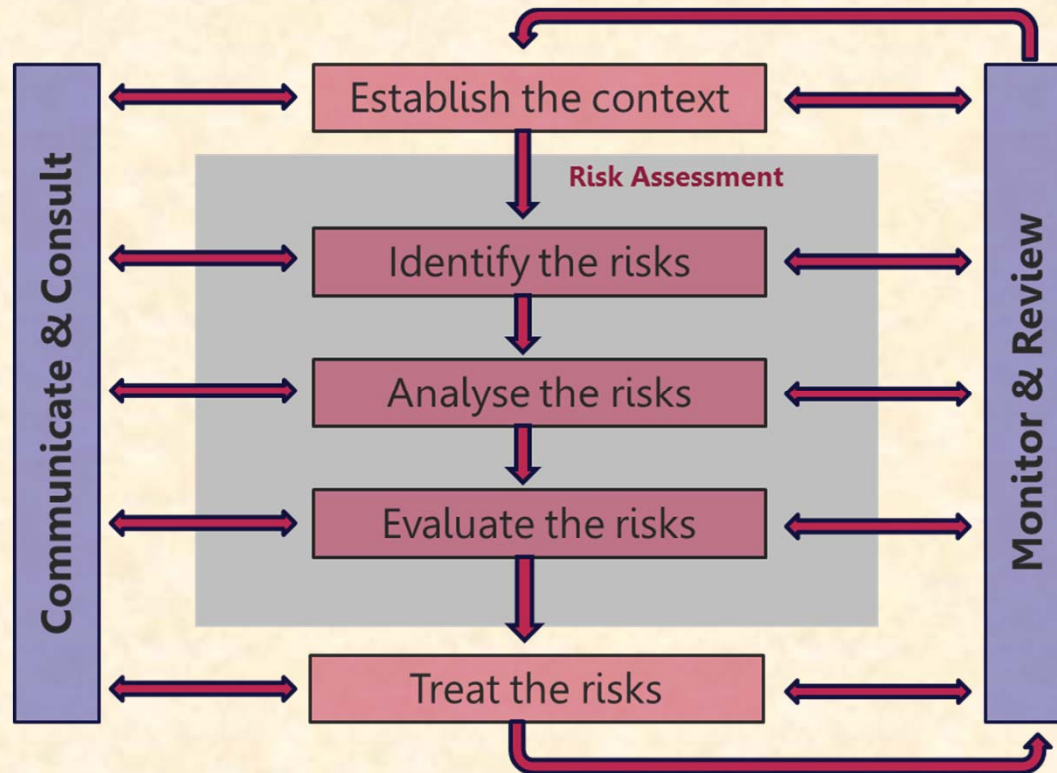


# Systems Thinking in Rec Safety

- Systemic nature of accident causation
  - Incidents usually have multiple direct causes
  - Those causes are brought about by other, underlying causes
  - Managing risk requires understanding the complex systems from which incidents arise
- Implications for Practice
  - Consider direct and underlying risks
  - Consider cumulative nature of risks
  - Employ systems thinking in direct risk domains
  - Employ systems thinking in risk management instruments
  - Consider unintended consequences
  - Build institutional resiliency



# Limitations of Risk Assessments



ISO 31000 Risk Management approach:

- Linear
- Weak on systems thinking
- Only applicable in limited situations

Risk	Probability	Magnitude	Treatment

		Magnitude		
		Slight	Moderate	Severe
	Unlikely			
	Possible			
	Likely			

# Limitations of Risk Assessments

- Does not correlate with what research in complex socio-technical systems and human factors in error causation tell us about how incidents occur
- Therefore ineffective as a comprehensive risk management tool or stand-alone indicator of good risk management

"...current risk assessment practice is not consistent with contemporary models of accident causation."



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Affiliated Conferences, AHFE 2015

**All about the teacher, the rain and the backpack: The lack of a  
systems approach to risk assessment in school outdoor education  
programs**

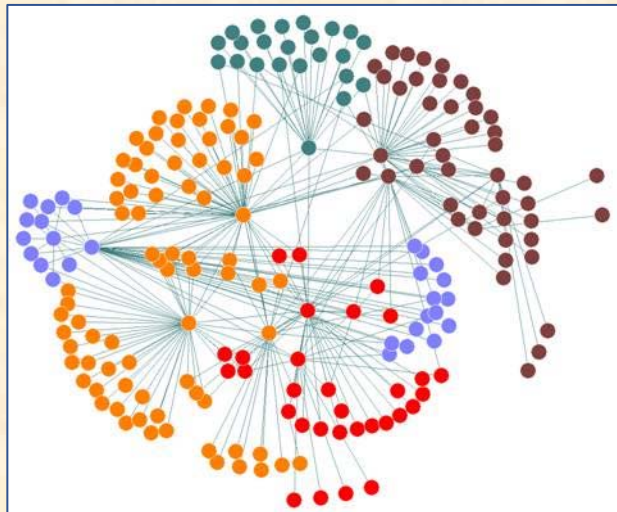
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*Centre for Human Factors and Sociotechnical Systems, University of the Sunshine Coast, Faculty of Arts and Business, Locked Bag 4,  
Maroochydore DC, QLD, 4558, Australia*



# Systemic Nature of Accident Causation

- Incidents usually have multiple direct causes
- Those causes are brought about by other, underlying causes
- Managing risk requires understanding the complex systems that from which incidents arise
- Looking at each domain in isolation not sufficient
  - Systems thinking: the components of a system will act differently when separated from the rest of the system.



# Systems Thinking: Auto Accident

Driver crashes vehicle. Do we blame the driver? Fire them?



Possible causes of accident:

- Insufficient driver training
- Driver asked to drive late at night in diminished conditions
- Unwritten expectation to exceed speed limit
- Unwritten expectation to talk on phone with supervisor & staff while driving
- Roadway not properly maintained and signed

# Ropes Course Incident

17 year old boy suffers fatal fall off home-made giant swing at ropes course, Victoria Australia



CORONERS REGULATIONS 1996

Form 1

State Coroners Office  
57-83 Kavanagh Street  
Southbank 3006  
Telephone: (03) 9684 4444  
(All Hours)  
Toll Free: 1800 136 852  
(Only Country Victoria)  
Fax: (03) 9682 1206

10th October, 2005  
**Case No: 1036/01**

## RECORD OF INVESTIGATION INTO DEATH

I, **JANE HENDTLASS**, Coroner,

**having investigated** the death of DALE WALTER MEASEY with Inquest held at Coronial Services Centre, Southbank on the 10th November to 12th November, 2004 and 10th



# Ropes Course Incident

## Causes cited by investigators

- Improper use of carabiners
- Lack of required backup systems
- Participant was improperly positioned upside-down
- Victorian WorkCover Authority failed to identify unsafe swing operation
- Camping Association of Victoria (accreditor) unable to prevent future incidents due to lack of authority
- Occupational safety legislation deficient
- Government certification and inspection of adventure facilities absent



# Goal: Prevent Blisters



# Goal: Prevent Blisters

- **Culture:** a safety culture where it's ok to stop and address hot spots, rather than push through pain
- **Activities and Program Areas:** blister prevention in safety briefing. Food check in early hours of first hike. Route planning for moderate initial travel distance.
- **Staff:** trained to understand, manage blister risk factors
- **Equipment:** boots and socks inspected before hike. Extra gear available if participant gear unsuitable.
- **Participants:** wear properly-fitted boots. Stop upon foot discomfort. Check for and address hot spots.
- **Business Administration:** enrollment materials discuss how to select and wear in boots. Managers ensure activity workload allows for safety briefings, foot checks





# Implications for Practice

- Consider direct and underlying risks
- Consider cumulative nature of risks
- Employ systems thinking in direct risk domains
  - Just culture
  - Avoid risk assessment dependence
  - Pre-mortem



# Implications for Practice

- Employ systems thinking in risk management instruments
  - Root cause analysis in incident review
  - Incident report information widely disseminated, acted upon
- Consider unintended consequences
  - Incident rate decrease objective leads to concealing incidents
- Build institutional resiliency
  - Backup systems, reserve resources (staff, equipment, etc.)
  - Multiple formats for identifying safety issues



# Systems Thinking Summary

- Systemic nature of accident causation
  - Incidents usually have multiple direct causes
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- Implications for Practice
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# Documentation

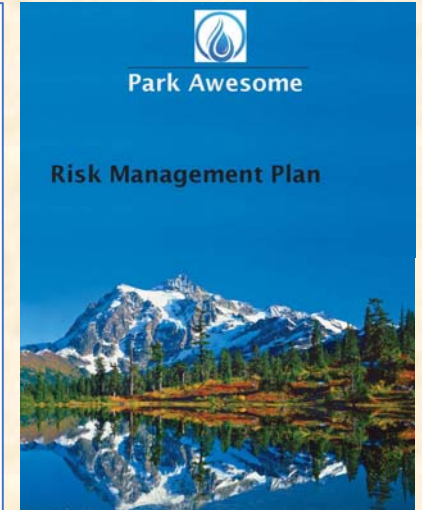
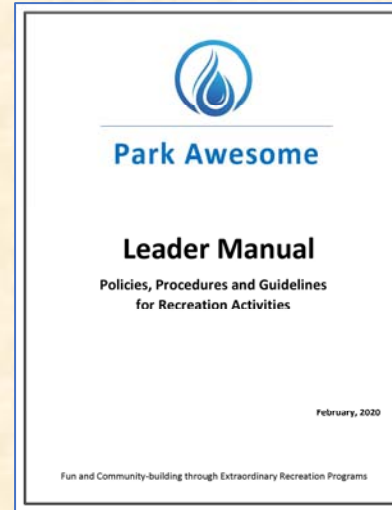
Records what *should be* done, what *was* done

## Documentation about what should be done

- Important information durably recorded
- Accessible, secured, centrally located

## Documentation about what has been done

- Shows if and that responsibilities were met




## Training sign-in sheets

[illegible]

## Proof of reading

[illegible]

## Test results



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# Vehicle Operator Written Test

**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

1. No one who will be driving a company vehicle shall have any drugs or alcohol in their system \_\_\_\_\_ hours prior to driving.
2. What is the organization's policy regarding seatbelts? \_\_\_\_\_
3. Vehicles shall be operated \_\_\_\_\_ or \_\_\_\_\_, the posted speed limit at all times.
4. What is the organization's policy regarding use of headlights (day or night)? \_\_\_\_\_
5. Drivers shall not operate a motor vehicle for more than \_\_\_\_\_ hours consecutively, or \_\_\_\_\_ hours in a day.
6. The \_\_\_\_\_ is completely in charge and responsible for the operation of the vehicle and the trailer and the safety of the passengers.
7. When shall a "pre-drive checklist" be filled out? \_\_\_\_\_
8. Most accidents are caused by a) \_\_\_\_\_ b) \_\_\_\_\_ c) \_\_\_\_\_
9. When are employees allowed to transport participants in their personal vehicles? \_\_\_\_\_
10. Where should you pull over if having mechanical trouble or a breakdown? Why? \_\_\_\_\_
11. What should you do if in a vehicle accident? \_\_\_\_\_
12. Should you plead guilty or assert or admit fault? \_\_\_\_\_
13. What should you do if the wheels of the vehicle travel off the paved roadway (and onto the shoulder)? \_\_\_\_\_
14. What should you NOT do if the wheels of the vehicle travel off the paved roadway? \_\_\_\_\_
15. What will minimize understeer problems and will reduce the risk of run-overs? \_\_\_\_\_

## Check-offs


**VIRISTAR**

# Activity Checkoff:

## Rappel Station Operation

<u>Employee Name</u>	<u>Date</u>	<u>Supervisor Initials</u>
<input type="checkbox"/> I have read and understood the Rack Climbing Manual, the Technical & Vertical Activities section of the Outdoor Education section of the Field Manual, and the First Aid First Aid Manual.	_____	_____
<input type="checkbox"/> I understand outcomes of rock climbing program and rappelling component.	_____	_____
<input type="checkbox"/> I understand policies, procedures and guidelines for rock climbing program and rappelling, and general technical & vertical activities.	_____	_____
<input type="checkbox"/> I understand rappel station format & progression.	_____	_____
<input type="checkbox"/> I can inspect rappel station for appropriateness of cables, including inspection of rappel and belay anchors and belay-releasing tools.	_____	_____
<input type="checkbox"/> I can tie, untie, re-tie and evaluate a lead-releasing hitch such as the Munter-mule overhand.	_____	_____
<input type="checkbox"/> I understand and can tie and check appropriate limits and shoulder clipping in technique.	_____	_____
<input type="checkbox"/> I can clip in participant to rappel and belay ropes.	_____	_____
<input type="checkbox"/> I can belay and manage others in standard belay techniques, including roles & positions, commands, and belay technique.	_____	_____
<input type="checkbox"/> I can explain rappel body position and how to avoid having knees caught in belay device.	_____	_____
<input type="checkbox"/> I have previously sent someone off the rappel as in standard institutional format for times.	_____	_____
Comments: _____ _____ _____		

Program Director signature \_\_\_\_\_ Date \_\_\_\_\_

I have read and understood the Rack Climbing Manual and the Technical & Vertical Activities section of the Outdoor Education section of the Field Manual and the First Aid Management Manual. I certify that I have all the competencies and capabilities described above.

Field Staff person signature \_\_\_\_\_ Date \_\_\_\_\_



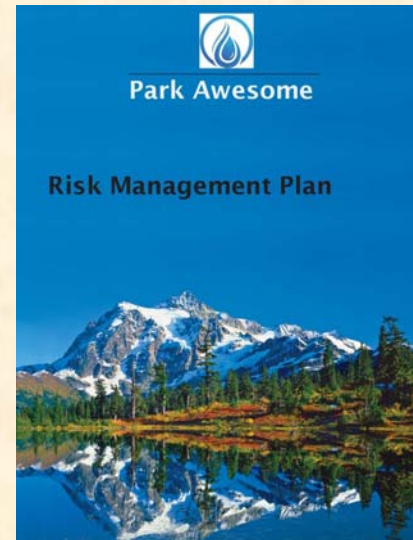
Applications: learning and improvement; legal defense

# Risk Management Plan

## A Risk Management Plan:

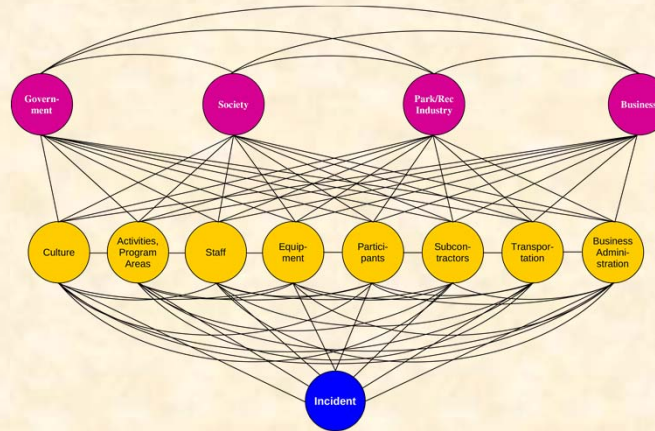
- Describes the organization's commitment to RM, and RM goals
  - Locates the policies and procedures used to manage risks in risk domains
  - Describes the organization's risk management instruments
- 
- Specific organization unimportant, as long as key elements present
  - Document outlines all aspects of organization's approach to RM
  - References other documents such as the field handbook and important administrative documentation

Every employee and volunteer should be provided with the risk management plan, review it thoroughly, and be given the opportunity to ask questions about it.



# Conclusion

- Risk Domains
  - Policies, procedures, values & systems to manage risks to standards



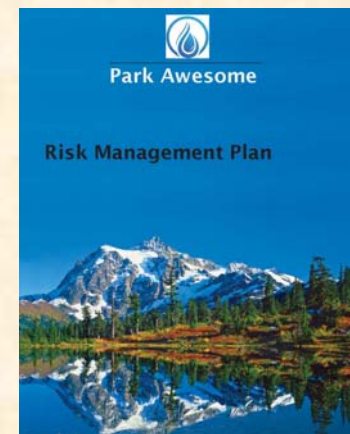
- Risk Management Instruments



- Documentation

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- Risk Management Plan



- Systems Thinking





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# Case Study

In small groups, pick a risk management situation that a group member faced or faces. Or, select a well-known incident familiar to most group members.



## Questions

1. What risk domains are or were involved?
2. Which Risk Management instruments are, were or could have been involved?
  1. Risk Transfer, Incident Management, Incident Reporting, Incident Reviews, Risk Management Committee, Medical Screening, Risk Management Reviews, Media Relations, Documentation, Accreditation, Systems Thinking
3. Was systems thinking applied to the management of the risk?
4. What are implications for future practice?

