

Building a Risk Management Machine

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I am honored to be asked to come and speak here at Risk 2002. It is a wonderful opportunity for me to expand my vision of how risk and safety are managed from an international perspective. This is particularly important since I think that in the U.S. we have taken a somewhat parochial attitude toward dealing with things like incident data collection and we (in the U.S.) have a lot to learn from how other countries deal with these issues.

When I am listening to someone at a conference, I always want to know something about the person. Who is she, what has she done, why am I here to listen? The answer to the last question is that there isn't anything else scheduled now. For answer to the others, let me say a little about my experiences over the past twenty-five years in the field of outdoor education....

- OA Program at Princeton – extracurricular program of wilderness orientation and outdoor leadership development. Began in 1974.
- Largest Wilderness Orientation Program in US – participant days
- Leader from 1975 – 1979. Returned to Princeton in 1981
- From a risk management perspective 1985 – my first big accident (Buttermilk Falls) in aftermath I said to myself, wow serious injuries but no death
- 1989 – death on highway. I had been looking at the issue of serious injury and death from the standpoint of control. In part it was naiveté, in part defensiveness, because I didn't really want to face the prospect of having something like this happen. I came to realize afterwards that I don't have such control to prevent all bad things from happening.

My goal in this talk is to try and be a little controversial, to push the envelope a little bit. The things that I am going to talk about aren't necessarily "the answers" to the question of what is risk management; in fact, I hope they raise more questions than I can try and answer. I leave the explorations and finding the answers up to you. What I do hope is that it can serve as a stimulus to your thought process in your organization about how you see risk management.

The first thing to say is that I think we are bogged down in the concept of Risk Management. Part of our problem as an industry is that we are, I think, confused about what risk is. We have so many different definitions of risk that we use interchangeably that the word ceases to have much meaning. I think our approach of looking at risk is too simplistic for our industry. I think the reason for that is that we have imported other models from other industries, like insurance and patching it on our own. As a result, we have missed some things. As I said, these ideas aren't necessarily new, but they may offer a new synthesis of various approaches that have been used before. What we are going to work on today is building what I call a Risk Management Machine.

Risk is Inherent, Integral, Expected, Manufactured

To start we need to come up with a working definition of Risk, certainly not a final definition, but our working definition for today. Risk has been defined in a number of ways.

- Simon Priest (1990) has defined it as “the potential of losing something of value.¹”
- Insurance industry defines risk as, “any uncertainty about a future event that threatens your organization’s ability to accomplish its mission.²”
- According to Preston Cline of Adventure incorporated in 20 different industries there are 46 different definitions of risk,

In many ways we have been limited by these definitions of risk as a negative concept. We see risk as this thing we have to battle against, we have to “manage” risk because it is the “enemy of safety.” There are other definitions of risk. In the financial industry risk is both the potential of losing something of value and also the potential for gaining something of value. In this definition either action or inaction can lead to both positive risk and negative risk. This is a much more dynamic definition of risk and perhaps more applicable to our field.

- **-R:** the potential for loss/injury/illness
- **+R:** the potential for gain/growth/development

We all know about the negative model of risk, what is the positive side of risk in our industry? Risk is an underlying principal in all of outdoor and adventure education. The fundamental philosophical principles of Kurt Hahn and others is that the exposure to risk/challenge is what impels people to personal growth.

- **Inherent: -R:** exists in outdoor adventure activities
- **Expected: -R** can occur at any time – expect the unexpected
- **Integral: -R and +R** are essential parts of our program
- **Manufactured:** we plan programs with the understanding that there is **-R**.

Somehow, we have to reconcile these two very different concepts of risk – risk as the destroyer and risk as the creator. Without trying to be overly philosophical, there is, perhaps, a kind of Yin-Yang relationship between risk as creator and risk as destroyer. Perhaps, it is not possible for risk to act as a creative (growth) force unless there are also potential negatives that can take place. The negatives are the whetstone that sharpens the blade of creativity. How do you look at risk globally and integrate **-R** and **+R** into your program? I hope that might be an interesting discussion to have some time within your organization.

- Risk as Destroyer - loss
- Risk as Creator - gain

Managing Activities to Prevent Loss

Since most of us are here at this conference to focus on **-R** let’s turn to a more in-depth look at how and why loss happens. We are going to look at how to **Manage our Program Activities to Prevent Loss**. At some other outdoor education conferences not focused on risk others can take up the discussion of how we **Manage our Program Activities to Create Gain**.

Models of Risk Management

There are several models of accident causation or risk management that our field has relied on. One of the earliest models still in use today is the Dynamics of Accidents Model first developed

¹ Priest

² Risk Web Site

by Alan Hale in the early 1980's. This approach is a hazard-based approach that defines two basic causality modes for accidents, Environmental Hazards and Human Factor Hazards. Combining these two factor results in an Accident Potential. The greater the interaction between the two types of hazards the greater the potential for an accident.

Dynamics of Accidents Model



Accident Matrix

Another major approach is the Accident Matrix developed by Dan Meyer and refined by Jed Williamson. This approach identifies three basic causes of accidents.

- Potentially Unsafe Conditions
 - Equipment/Clothing
 - Physical/Psychological Profile
 - Tightly Coupled System
- Potentially Unsafe Acts
 - Unauthorized/Improper Procedure
 - Lack of Protection
 - Lack of/Poor Supervision
- Potentially Unsafe Judgments
 - Peer Pressure
 - Keeping to a schedule
 - Fatigue
 - Misperception
 - Disregarding instincts

Unsafe Conditions

- Equipment/Clothing: Descending without proper boots and equipment
- Physical/Psychological Profile: The students were inexperienced and the staff were overconfident
- Tightly Coupled System: Roped together with no protection

Unsafe Acts

- Protection: Failure to use any
- Instruction: Inadequate
- Supervision: There were only two staff members for twelve students, not enough to go around
- Position: The groups were one on top of the next instead of spread out, so that when the top group fell, it hit the others, making the tightly-coupled system more dangerous
- Unauthorized/Improper Procedure: The improvised descent technique was untested

Errors in Judgment

- Desire to Please Others: The students wanted to please the instructors and the group
- Schedule: They could have taken the walk-off route but were running late
- Misperception: The staff misunderstood the dynamic forces that would result from tying ropes to the harnesses instead of to the ice axes themselves
- Disregarding Instincts: Students were afraid but did nothing about it
- Fatigue: It was late in the day and they were all tired

Both of these models use a **Negative Factors** approach, the idea that a series of negative events/conditions combine resulting in potential loss. In some instances, there is only one factor that creates the loss potential. In other cases, a series. The more factors there are, the greater the chance that a loss will occur. The event itself may develop in one of two ways:

- Creep – A slow increase of factors that ultimately overwhelm the system.
- Cascade – A series of events that collide in a domino-fashion resulting in “catastrophic failure.”

These approaches are useful tools. During an activity they provide a useful monitoring method to evaluate if potential risks exist and suggest methods for reducing the risk. Following an incident both provide useful analytical tools for evaluating what factors led up to the event and possible prevention in the future.

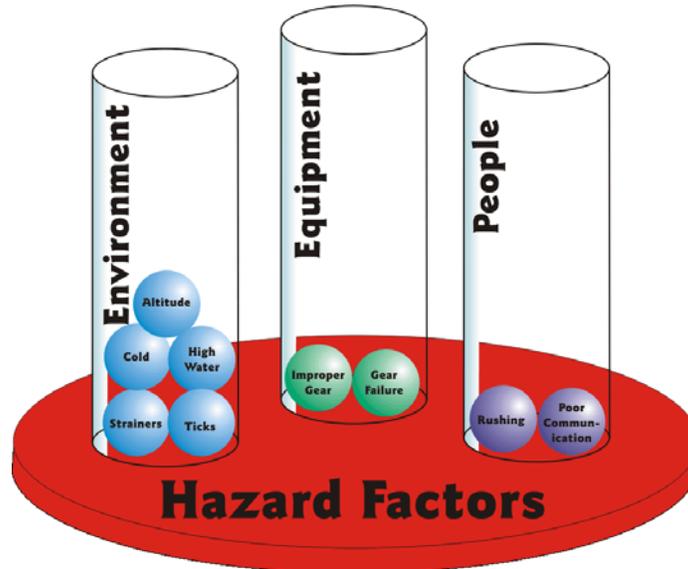
After an incident these tools provide a means for evaluating causes of an incident. The problem with these approaches is that they focus primarily on avoiding the negative causations of loss (the insurance model) but don't identify any of the positive factors that help reduce loss. They are more **reactive** than **proactive models**. For example, an analysis of the incident above gives us the negative factors that led up to it but not the positive ones that were helping to counterbalance it such as staff training and protocols. We need a more holistic model that combines the negative factors as well as the positive factors. That will allow us to focus our energies on positive steps to reduce the potential for loss, to think not just on the what can go wrong but also on what can go right.

Another drawback to the Negative Factors approach is that when you look at some of the factors that lead to potential risk, you have to ask yourself, “ow is it that we have the audacity to think that we can manage such things?” We can't manage many of the hazard factors, all we can do is recognize their presence. What we can do is manage/actively control the safety factors. Let's look at how we might conceptualize such a model that takes into account both the negative and the positive factors, let's build our risk management machine.

Hazard Factors

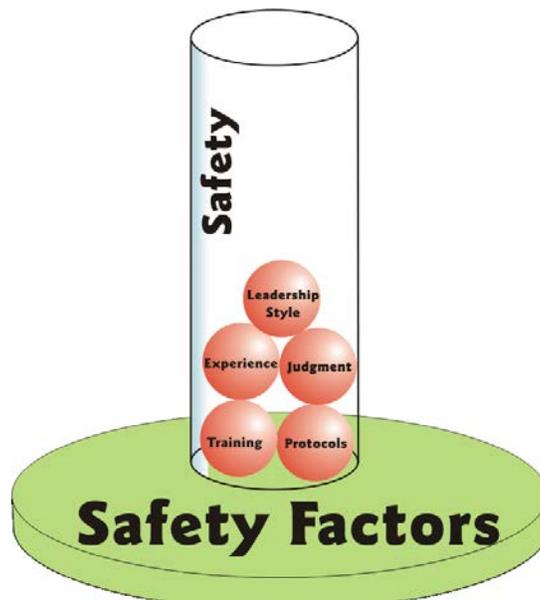
Adapting Hale's Model to a slightly different visual model let's imagine a balance with three different Hazard Cylinders—Environment, Equipment, and People. Into each of these we can add hazard factors. The more the factors the greater the potential for -R.

If we take a look at a sample scenario we can see each of the Hazard Factors as marbles, the more marbles in the cylinder the greater the "Hazard Weight" on the scale.



Safety Factors

Scales of course mean that there is something being balanced against; those are the positive factors – Safety Factors that work to reduce the potential for loss. Once again we can see each of the Safety Factors as marbles, the more marbles in the cylinder the greater the "Safety Weight" on the scale. Safety Weight acts to counterbalance Hazard Weight.

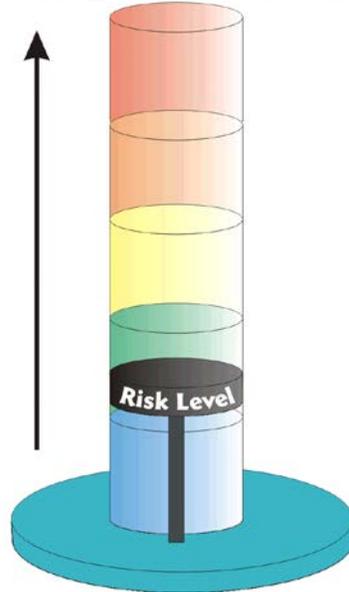


Here we can see things like Training, Protocols, Judgment, etc. all of which are things that we actively work to develop in our programs to counteract/counterbalance the Hazards Factors. Our model so far shows Hazard Factors and Safety Factors, but how do they interact to determine potential Risk/Loss?

Risk/Loss Potential/Level

We have two “competing” factors, Hazards and Safety. They combine to impact a third variable, the Risk Potential or Risk. In this case we see another cylinder; this one has a piston in the piston rises, the Risk Potential Rises.

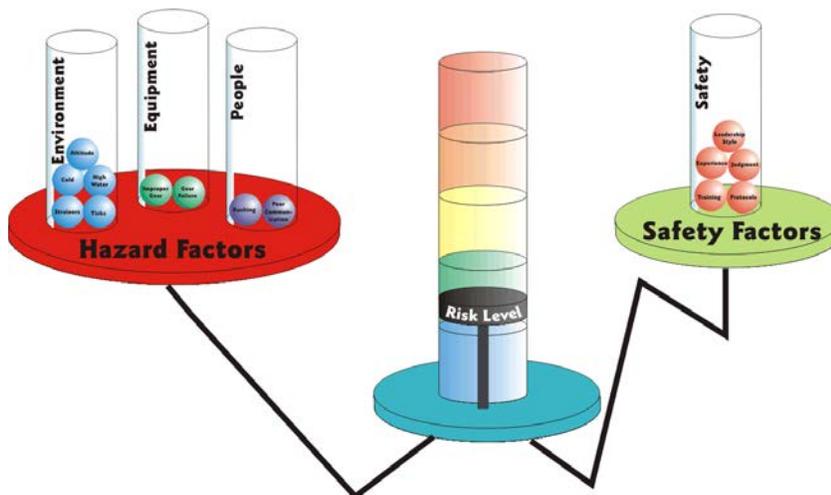
Increasing Risk/Loss Potential



Level. it. As

Creating the Risk Management Machine

Now that we have all of the components of our Risk Management Machine, let’s put them together.



The Hazard Factors operate to push the Risk Level up while the Safety Factors operate to pull the risk level down. For simplicities sake on the illustrations, all the "marbles" are shown as the same size. In fact, some may be much larger than others and weigh more having a much greater or lesser influence on the ultimate Risk Level.

DEFCON

In the event of a national emergency in the US, a series of different alert Conditions (LERTCONs) can be called. The 7 LERTCONs are broken down into 5 Defense Conditions (DEFCONs) and 2 Emergency Conditions (EMERGCONs).

Defense readiness conditions (DEFCONs) describe progressive alert postures primarily for use between the Joint Chiefs of Staff and the commanders of unified commands. DEFCONs are graduated to match situations of varying military severity, and are numbered 5,4,3,2, and 1 as appropriate. DEFCONs are phased increases in combat readiness. In general terms, these are descriptions of DEFCONs:

- **DEFCON 5** - Normal peacetime readiness
- **DEFCON 4** - Normal, increased intelligence and strengthened security measures
- **DEFCON 3** - Increase in force readiness above normal readiness
- **DEFCON 2** - Further Increase in force readiness, but less than maximum readiness
- **DEFCON 1** - Maximum force readiness.

SafeCon

In order to classify our Risk Level we are going to use a similar grading scale called SafeCon. As in the DEFCON model, the SafeCon model describes five progressive alert levels of safety conditions within an activity. SafeCons are graduated to match situations of varying risk, and are numbered 1,2,3,4, and 5 as appropriate. I chose to go up the scale since it fits with other scales in our industry such as climbing and paddling and also allows for a more open-ended structure for the future (e.g. 5.0 – 5.12 as in climbing).

SafeCons are phased increases in safety readiness. Obviously, we are always alert for hazards and are actively trying to reduce the potential for loss. However, as the SafeCon level changes, so must our actions and leadership behavior. We have to "boost the radar" in both Safety Alertness and in Risk Response Readiness, our capacity to respond.

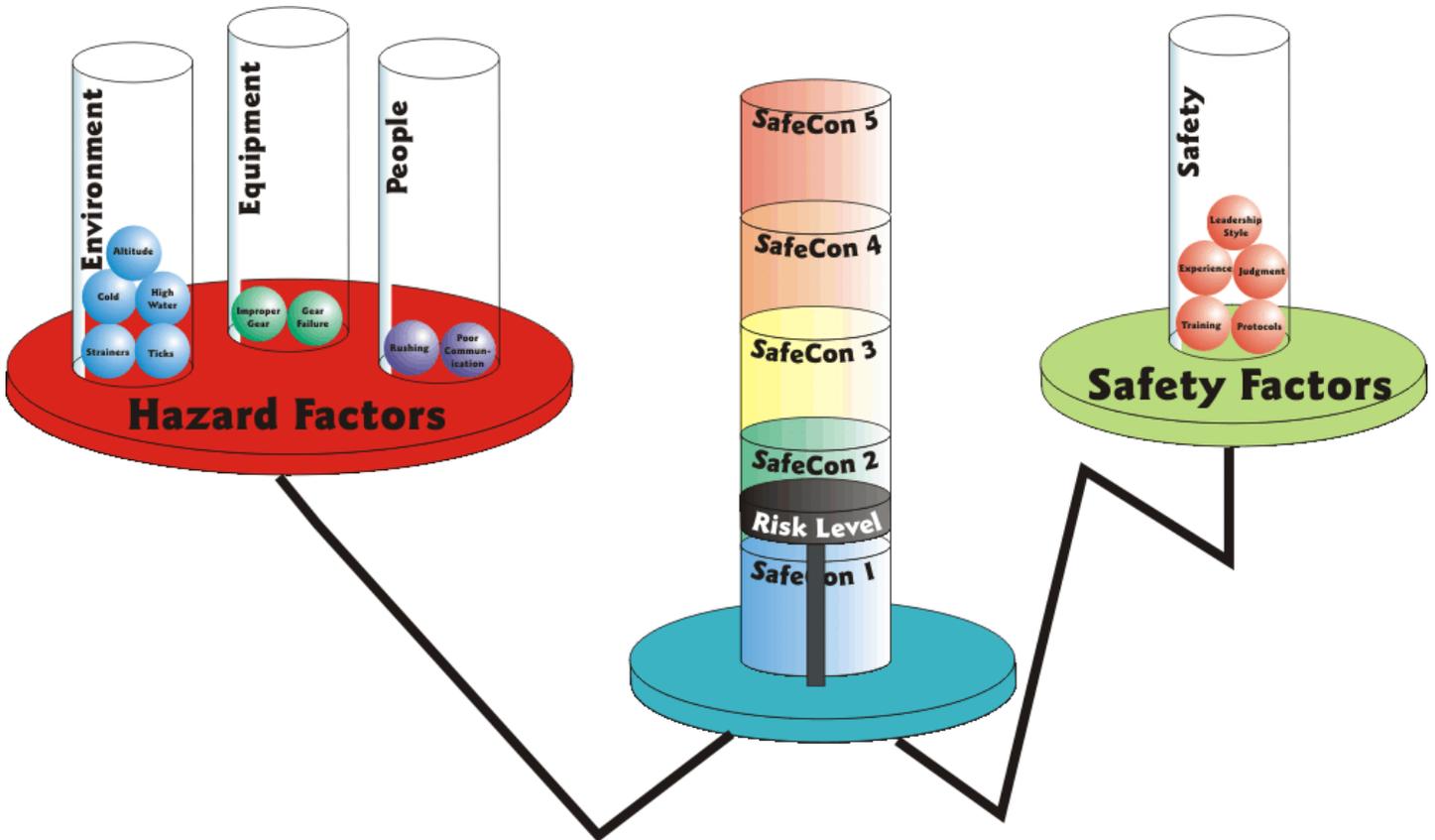
- **SafeCon 1** - Normal response readiness
- **SafeCon 2** - Normal response readiness, increased safety alertness
- **SafeCon 3** - Above normal response readiness, increased safety alertness,
- **SafeCon 4** - Further increase in safety readiness, but less than maximum readiness
- **SafeCon 5** - Maximum safety alertness & maximum response readiness.

SafeCon Levels

Level	Risk Response Readiness	Safety Alertness
SafeCon 1	Normal	Normal
SafeCon 2	Normal	Slight Increase
SafeCon 3	Slight Increase	Significant Increase
SafeCon 4	Significant Increase	Significant Increase
SafeCon 5	Maximum Increase	Maximum Increase

Okay so we have these different levels, what do we do with them? There are three aspects to using the SafeCon model.

1. Identification of the negative Hazard Factors that serve to increase the Risk Potential.
2. Identification of the positive Safety Factors embodied in your programs which are designed to counteract hazards.
3. Determining the Current SafeCon Level and applying the appropriate policies/procedures for that level.



We can think that as the Hazard Factors increase and/or Safety Factors decrease then the Risk Level goes up and the SafeCon Level rises. Safety Factors can also be thought of as your Resource Level, your capacity to respond to an emergency or incident. At each point where you cross into a higher SafeCon Level, your operating protocols and guidelines may need to change.

SafeCon Levels vary based on...

Level	Risk Level	Resource Level (Safety Factors) = Capacity to Respond (CTR)
SafeCon 1	Routine – the base level of program operations. It assumes the activity is exposed to the Inherent Risks identified.	Optimal – all standard program resources are operating in an optimal fashion
SafeCon 2	Increased	Optimal
SafeCon 2	Routine	Sub-Optimal
SafeCon 3	Significantly Increased	Optimal

SafeCon 3	Increased	Sub-Optimal
SafeCon 4	Significantly Increased	Sub-Optimal
SafeCon 5	Significantly Increased	Significantly Sub-Optimal

Capacity to Respond = Safety Factors

- Training
- Judgment
- Protocols
- Experience
- Equipment
- Other Resources

Probably the most familiar use of the concept of SafeCon Levels comes in whitewater paddling. The International River Classification Levels are comparable to SafeCon Levels, the higher the level the greater the potential for loss. What is also true in the River Classification system is as the level of difficulty increases, the Resource Level (skill level, judgment, etc.) of instructors and participants needs to increase in order to maintain operation at an acceptable SafeCon Level.

International River Classification System

- **Class 1: Easy.** Fast moving water with riffles and small waves. Few obstructions, all obvious and easily missed with little training. Risk to swimmers is slight; self-rescue is easy.
- **Class 2: novice.** Straightforward rapids with wide, clear channels which are evident without scouting. Occasional maneuvering may be required, but rocks and medium sized waves are easily missed by trained paddlers. Swimmers are seldom injured and group assistance, while helpful, is seldom needed. Rapids that are at the upper end of this difficulty range are designated "class ii+".
- **Class 3: Intermediate.** Rapids with moderate, irregular waves which may be difficult to avoid and which can swamp an open canoe. Complex maneuvers in fast current and good boat control in tight passages or around ledges are often required; large waves or strainers may be present but are easily avoided. Strong eddies and powerful current effects can be found, particularly on large-volume rivers. Scouting is advisable for inexperienced parties. Injuries while swimming are rare; self-rescue is usually easy but group assistance may be required to avoid long swims. Rapids that are at the lower or upper end of this difficulty range are designated "class iii-" or "class iii+" respectively.
- **Class 4: Advanced.** Intense, powerful but predictable rapids requiring precise boat handling in turbulent water. Depending on the character of the river, it may feature large, unavoidable waves and holes or constricted passages demanding fast maneuvers under pressure. A fast, reliable eddy turn may be needed to initiate maneuvers, scout rapids, or rest. Rapids may require "must" moves above dangerous hazards. Scouting may be necessary the first time down. Risk of injury to swimmers is moderate to high, and water conditions may make self-rescue difficult. Group assistance for rescue is often essential but requires practiced skills. A strong Eskimo roll is highly recommended. Rapids that are at the upper end of this difficulty range are designated "class iv-" or "class iv+" respectively.
- **Class 5: Expert.** Extremely long, obstructed, or very violent rapids which expose a paddler to added risk. Drops may contain large, unavoidable waves and holes or steep, congested chutes with complex, demanding routes. Rapids may continue for long distances between pools, demanding a high level of fitness. What eddies exist may be small, turbulent, or difficult to reach. At the high end of the scale, several of these factors

may be combined. Scouting is recommended but may be difficult. Swims are dangerous, and rescue is often difficult even for experts. a very reliable Eskimo roll, proper equipment, extensive experience, and practiced rescue skills are essential. Because of the large range of difficulty that exists beyond class iv, class 5 is an open ended, multiple level scale designated by class 5.0, 5.1, 5.2, etc... Each of these levels is an order of magnitude more difficult than the last. Example: increasing difficulty from class 5.0 to class 5.1 is a similar order of magnitude as increasing from class iv to class 5.0.

- **Class 6: Extreme and Exploratory.** These runs have almost never been attempted and often exemplify the extremes of difficulty, unpredictability and danger. The consequences of errors are very severe, and rescue may be impossible. For teams of experts only, at favorable water levels, after close personal inspection and taking all precautions. After a class vi rapid has been run many times, it's rating may be changed to an appropriate class 5.x rating.

In whitewater paddling moving from one level to a higher level often means changes in operations. Even on one river. Say a group is paddling on Class III and scouting from the river. They come to a class IV and scout from shore, potentially set up rescue lines below, add safety boats, etc.

Class	SafeCon Response
Class 1	Basic equipment, river knowledge, checking river conditions
Class 2	+ Lead & sweep boats or buddy system, basic river rescue equipment
Class 3	+ Scouting from boats, river rescue training
Class 4	+ Scouting from shore, Safety boats
Class 5	+ Screening of paddlers, Requires scouting from shore, Safety Lines set up
Class 6	+ Decision-making plan of running drop

In our program any change in **Action (Risk Level)** may require a **Reaction (SafeCon Change)** to compensate. Part of your program strategy has to be identifying the highest SafeCon Level your program can operate on. At the same time staff need to be able to assess the SafeCon Level. If you are operating at a SafeCon Level beyond your capacity, you are at significant risk for a catastrophic system failure.

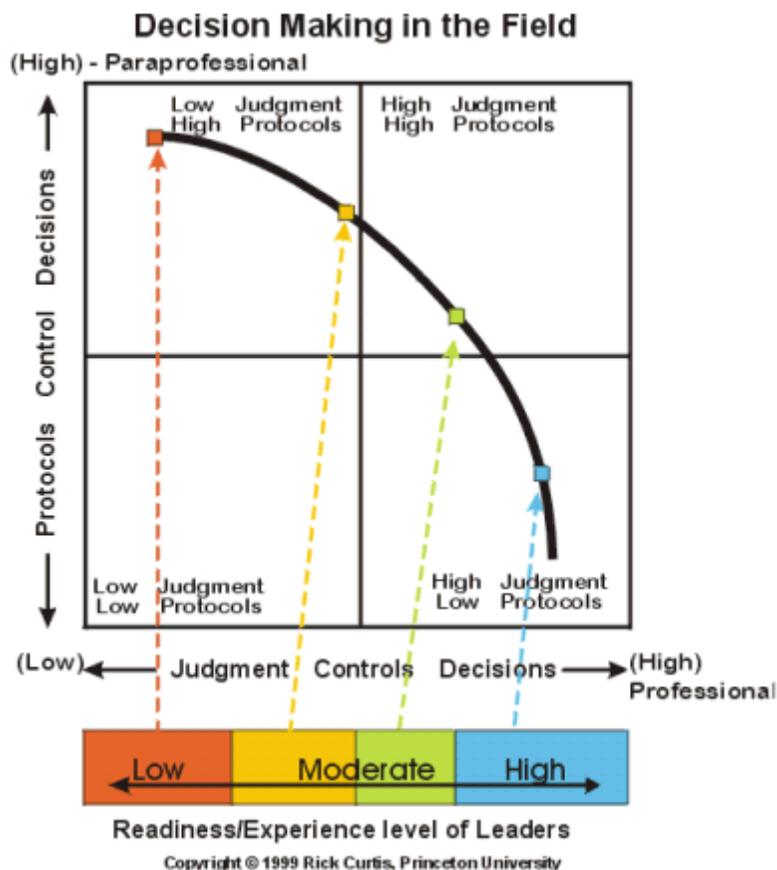
Protocols therefore should be looked at as SafeCon-dependent. There are minimum level protocols that are used in all aspects of your program (things like medical screening, equipment checks, etc.). These protocols exist at SafeCon Level 1 and remain in effect throughout. Others change as we saw in the whitewater paddling example. It is important to recognize when a threshold level is reached that places you in a different SafeCon Level and then know what changes in operating protocols are appropriate for that SafeCon Level. You will need to continue to monitor your Risk Level and Resource Level to check the SafeCon Level and modify your procedures accordingly.

“Rules are for Fools”

Paul Petzoldt, founder of NOLS and WEA once said, “Rules are for fools.” This has sometimes been misinterpreted to mean that there should be no rules simply rely on instructor judgment. Drew Leemon, the NOLS Risk Manager, once asked Petzoldt what he meant. He replies that what he meant was that there was no way to write a rulebook that would cover every situation an outdoor leader might encounter. So, you couldn’t have a rule for every situation. The real goal for instructor judgment is to be able to determine if you should implement the rule or if the situation required that you do something else.

The Place for Rules

So there must be a place for rules within the risk management context. We have to balance the rules, protocols, etc. developed as part of our SafeCon approach with sound judgment by instructors on when to apply those rules. The diagram below shows a basic model for identifying a balance between rules and instructor judgment. For working with a college outdoor education program my point on the curve is up and to the left. For an experienced mountain or river guide the point will be further down and to the right. This is part of your whole Risk Management Machine.





Conclusion

The final thought I'd like to leave you with is about our desire for risk. In our cultures, our socio-economic groups we can look at risk as something of a luxury. We don't have to worry or struggle for each day to stay alive like many in the developing world. For these people there is only **-R**. Activities like kayaking, ropes courses, rock climbing, are foreign concepts. My choice to go whitewater paddling and placing myself at risk is at the self-actualization end of Maslow's Hierarchy of Needs. I am pursuing **+R** by exposing myself to **-R**. Much of the rest of the world is still fighting just for the basics. They experience more than their share of **-R** with much more dire consequences. So I would ask each of us to think about how what we are doing to create self-actualization for those who already have so much, how that will come back as a positive impact on those who have so little. I hope that each of us will make the time within our organizations to wrestle with that question.

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