ClimateWest, a central hub for climate services in Manitoba, Saskatchewan, and Alberta, is proud to host Alberta's Adaptation Resilience Training module recordings and resources.

Check out climatewest.ca for all training material available through ART and other initiatives.

ClimateWest
Building Prairie Resilience

The aim of the Adaptation Resilience Program (ART) is to build the capacity of professionals in Alberta to adapt to climate change. This module was recorded in September, 2021.

Professionals across the Prairie region may find this training useful.

Supported by the Natural Resources Canada's Building Regional Adaptation Capacity and Expertise (BRACE) Program and the Government of Alberta

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Adaptation Resilience Training

Risk Management: Learning which Climate Risks are Important to Manage and How

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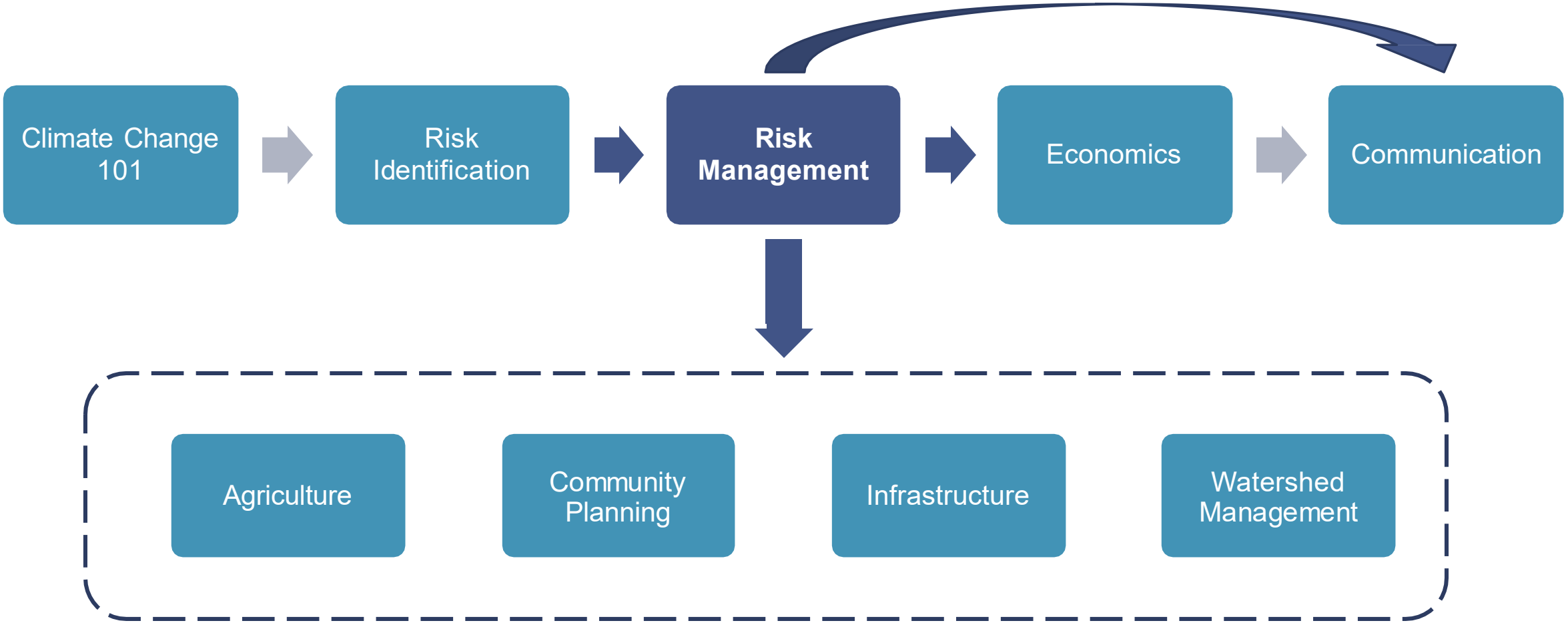
September 8, 2021

Module Overview

- Introduction
- Purpose of risk management
- Topic 1: Principles
- Topic 2: Overview of the risk management process
- Topic 3: Evaluating risk – what to do about it.
- Topic 4: Evaluating treatment options and making decisions
- Topic 5: Treatment and monitoring and general discussion
- Questions and discussion

Preamble: Purpose of Risk Management

Context and relationships with other modules



Risk management is. . .

Taking positive action to understand and manage risk.

Topic 1: Principles

Principles of risk management

Continual Improvement

Continually improved through learning and experience.

Integrated

An integrated part of organizational activities

Human & Cultural Factors

Takes account of behaviour and cultural considerations

Structured / Comprehensive

A structured and comprehensive approach to risk management leads to consistent and comparable results

Best Available Information

Evidence based drawing on historical and current information and future expectations

Customized

Processes are customized and proportionate to context and objectives

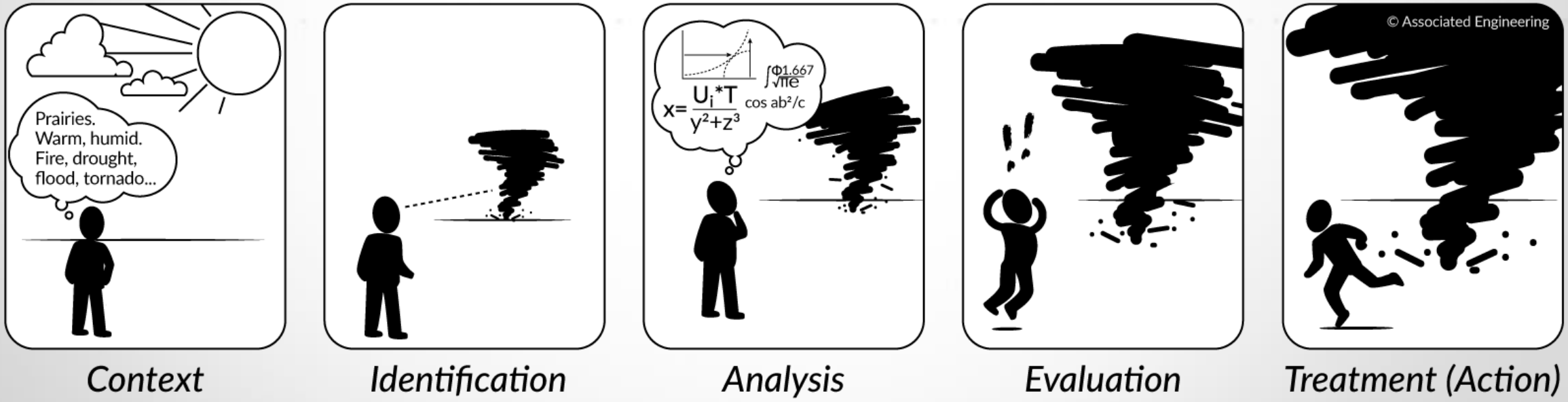
Dynamic

Recognizes the changing nature of risk and anticipates, detects and responds to changes in a timely manner

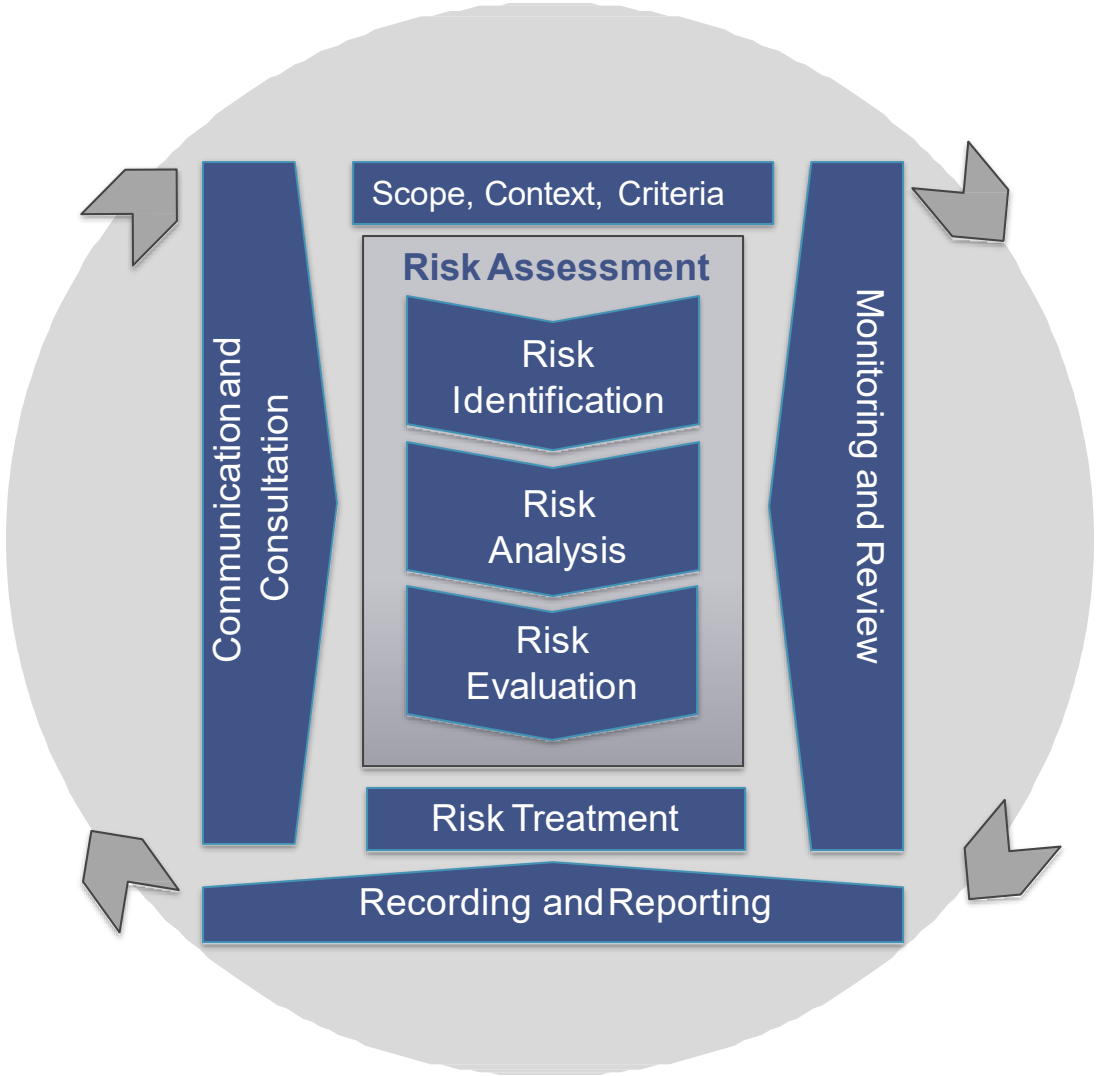
Inclusive

Includes timely involvement of stakeholders

Topic 2: Overview of Risk Management Process

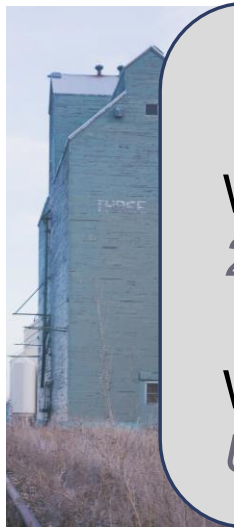


ISO 31000 risk management process



- ISO 31000 is the international standard for risk management.
- It is generally adopted by most frameworks that consider risk – e.g. 14001, 55001, 14090,

Step 1: Scope, context, criteria



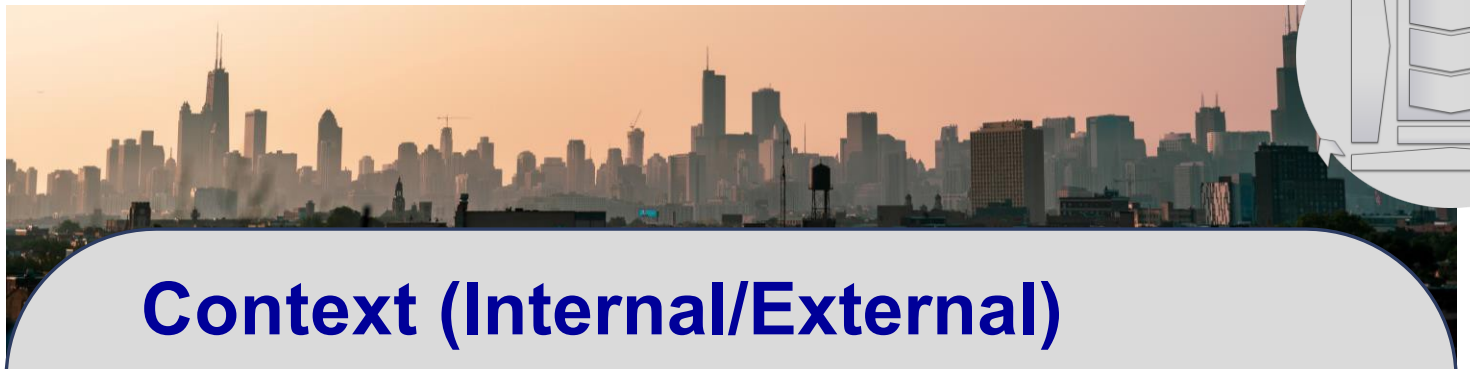
Scope

What time horizon?
2050? 2080?

Where?
Urban? Rural?

Criteria

What criteria will you use to evaluate risk?



Context (Internal/External)

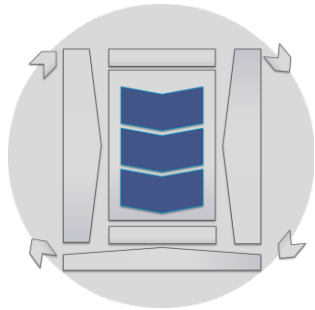
What is important to customers/stakeholders?
Community resilience?

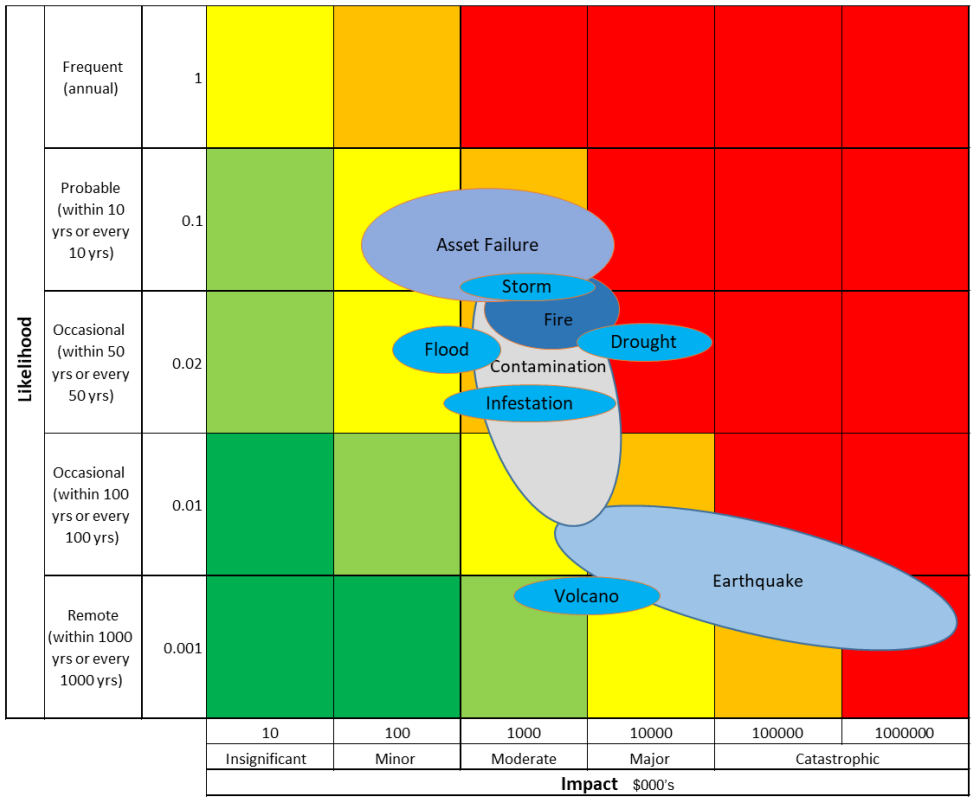
What is the social, economic, physical environment?
River proximity, transportation routes, economic status?

What is important to employees/organization?
Supply chain reliability, safety, . . .

Data, information systems, standards, culture, policies:
Asset data, design standards, staff beliefs, climate policy

Steps 2 – 4: Risk Assessment





*This is for a water system in BC. The position of these hazards will change based on local hazards and vulnerabilities.

Note: The scope of this assessment includes climate and other types of risk.

2. Identify

- Sources of risk (hazards & vulnerabilities), areas of impact, possible events

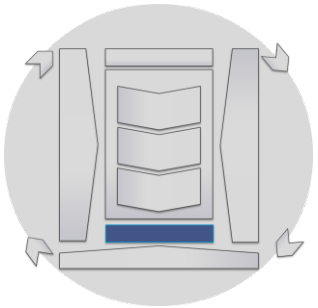
3. Analyze

- Cause analysis, consequence and likelihood analysis, existing controls,

4. Evaluate

- Comparison with risk criteria – tolerability, treatment need

Step 5: Treat Risks



- Identify and select treatment options
- Planning and implementing treatments
- Assessing the effectiveness of treatments
- Confirming if residual risk is acceptable and potentially taking further action

Step 6 & 7: Monitor, Review & Communicate

Monitor & Review

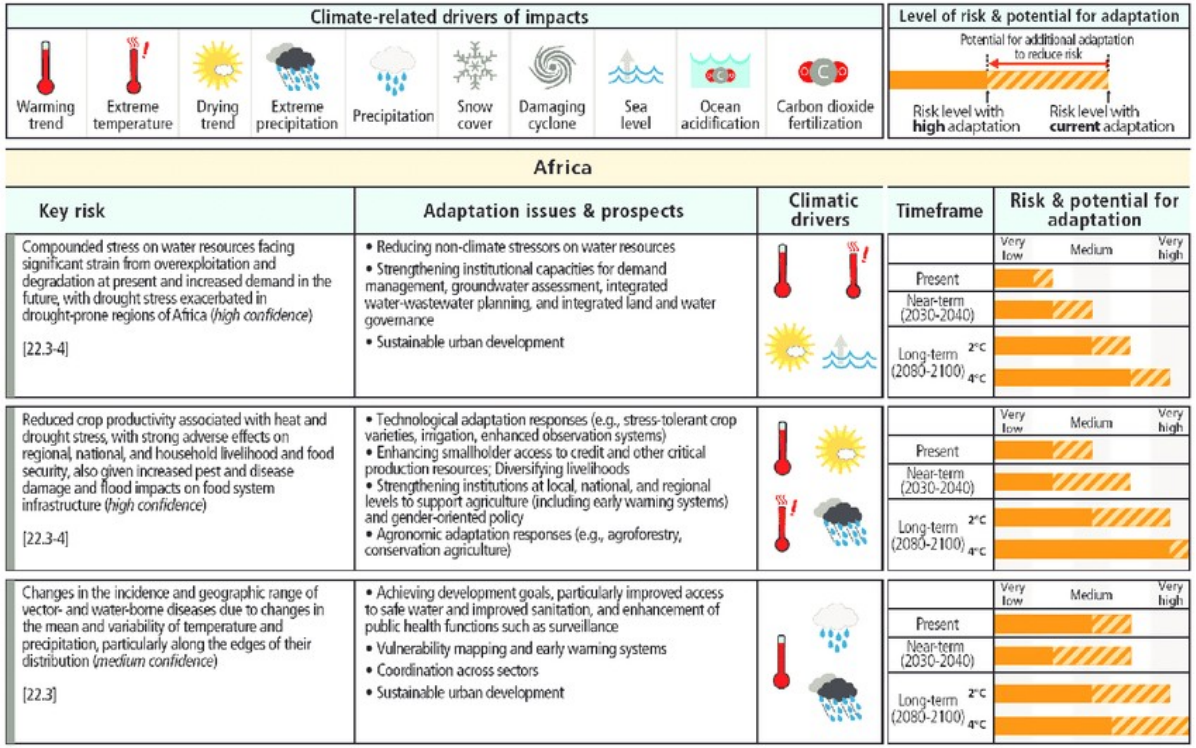
- Monitor risks, emerging risks and trends
- Monitor effectiveness of controls
- Analyze lessons learned

Communicate & Consult

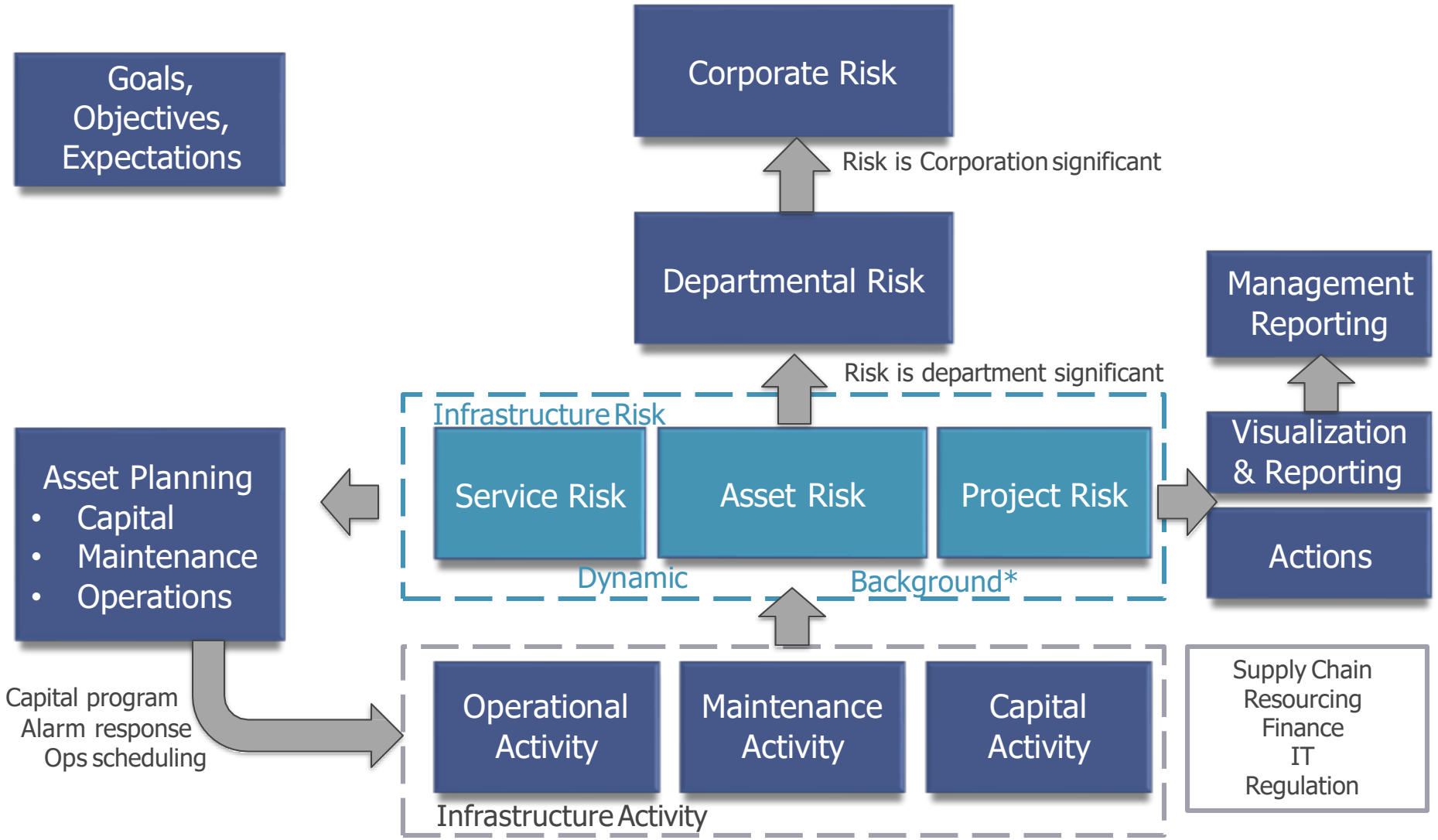
- Who needs to know?
- Who can help?

Step 8: Record and report

- Document the risk assessment and actions to be taken (risk registers)
- Document outcomes of actions (treatments)
- Provide information for decision making
- Report through organization
- Consider frequency, method, information to be reported



Risk context and reporting



Background* - slowly changing risks, e.g. asset deterioration

Polling Question No. 1

Topic 3: Determining what to do about risks

Treat risks

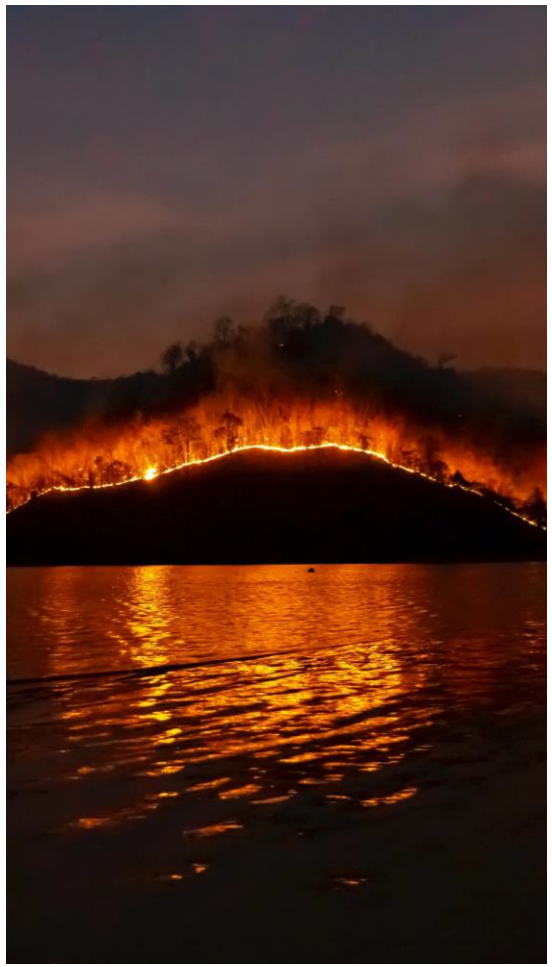
Avoid – Eliminate the causes

Reduce – Reduce or mitigate the likelihood or consequence

Share / Transfer – Outsource, Insure

Accept – Contingency plan, react

Solutions to treat risks



CAUSE
Proximity to forest and potential wildfire

PROBLEM
Property at risk of burning

CONSEQUENCE
Loss of working space

Preventive Solutions

Corrective Solutions

Intermediate solutions

Create fire break & fire smart actions

Install sprinklers

Have alternative work location

Treatment of risk

Where a risk sits in ***risk space*** can help us understand what to do about it.

Likelihood		Consequence				
		Insignificant	Minor	Moderate	Major	Severe
		1	2	3	4	5
Frequent	5	5	10	15	20	25
Likely	4	4	8	12	16	20
Possible	3	3	6	9	12	15
Unlikely	2	2	4	6	8	10
Rare	1	1	2	3	4	5

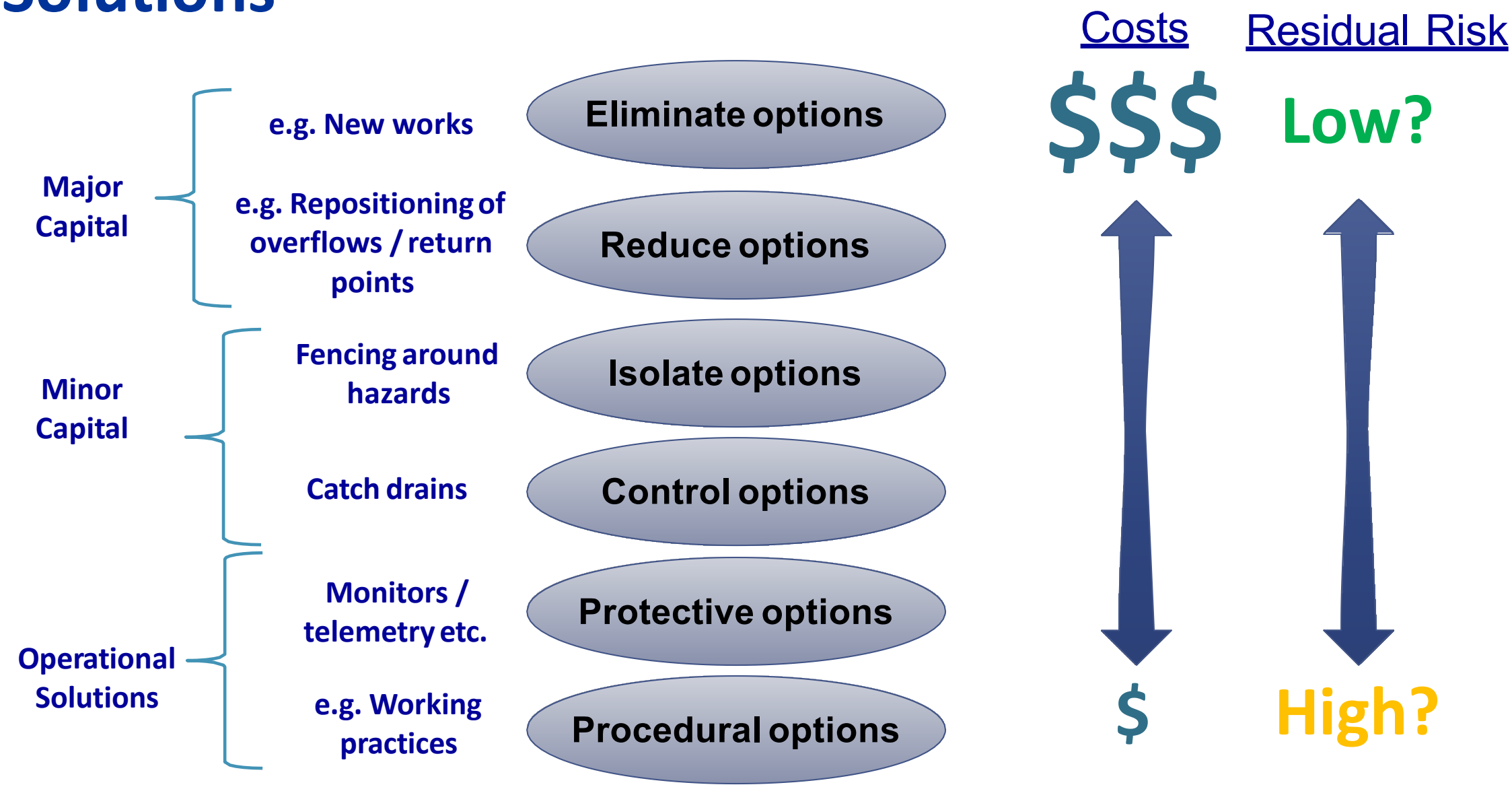
Business process / outsource

AVOID!

Accept

Emergency Planning / Insure

Solutions


Costs
Residual Risk
$$$
Low?
$
High?
Major Capital
e.g. New works
e.g. Repositioning of overflows / return points
Minor Capital
Fencing around hazards
Catch drains
Operational Solutions
Monitors / telemetry etc.
e.g. Working practices
Eliminate options
Reduce options
Isolate options
Control options
Protective options
Procedural options

Case Study

You have a pond that ices up over the winter. As temperatures increase due to climate change, that ice may be too thin to go on.

A.What would be a low-cost adaptation action?

B. What might be an “eliminate” type adaptation action?

Put your responses in the chat window.

- Eliminate options
- Reduce options
- Isolate options
- Control options
- Protective options
- Procedural options

Q&A

Topic 4: Evaluating treatment options and making decisions

“One day Alice came to a fork in the road and saw a Cheshire cat in a tree.

‘Which road do I take?’ she asked.

‘Where do you want to go?’ was his response.

‘I don’t know,’ Alice answered.

‘Then,’ said the cat, ‘it doesn’t matter.’”

- Lewis Carroll

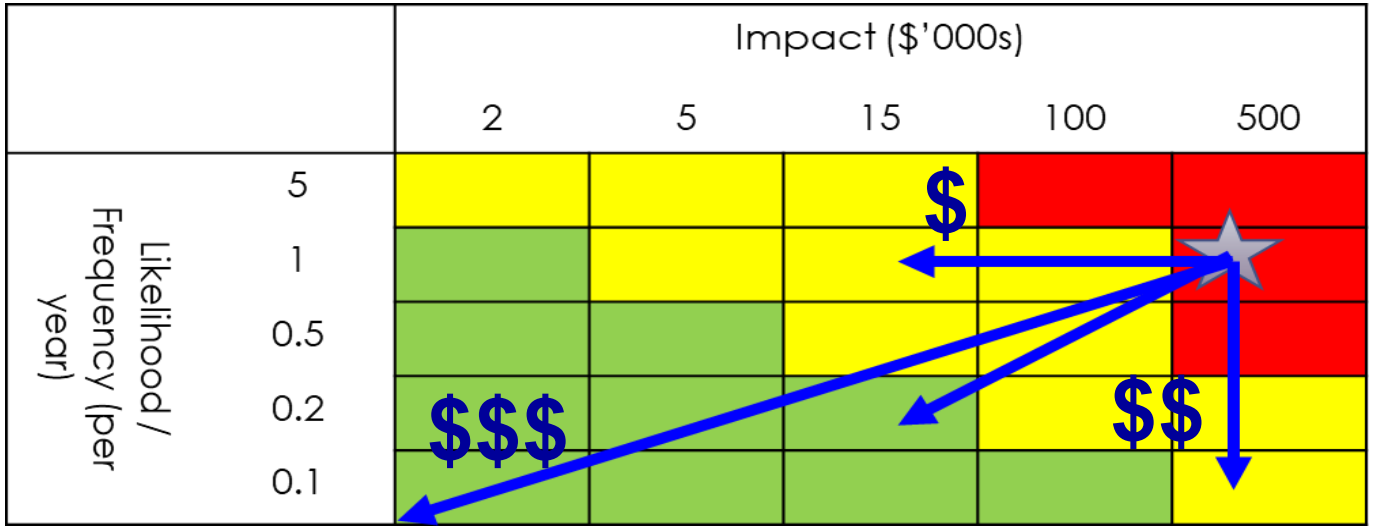
Decision making

Baseline risk
Is it unacceptable?

Residual risk
Is it acceptable?

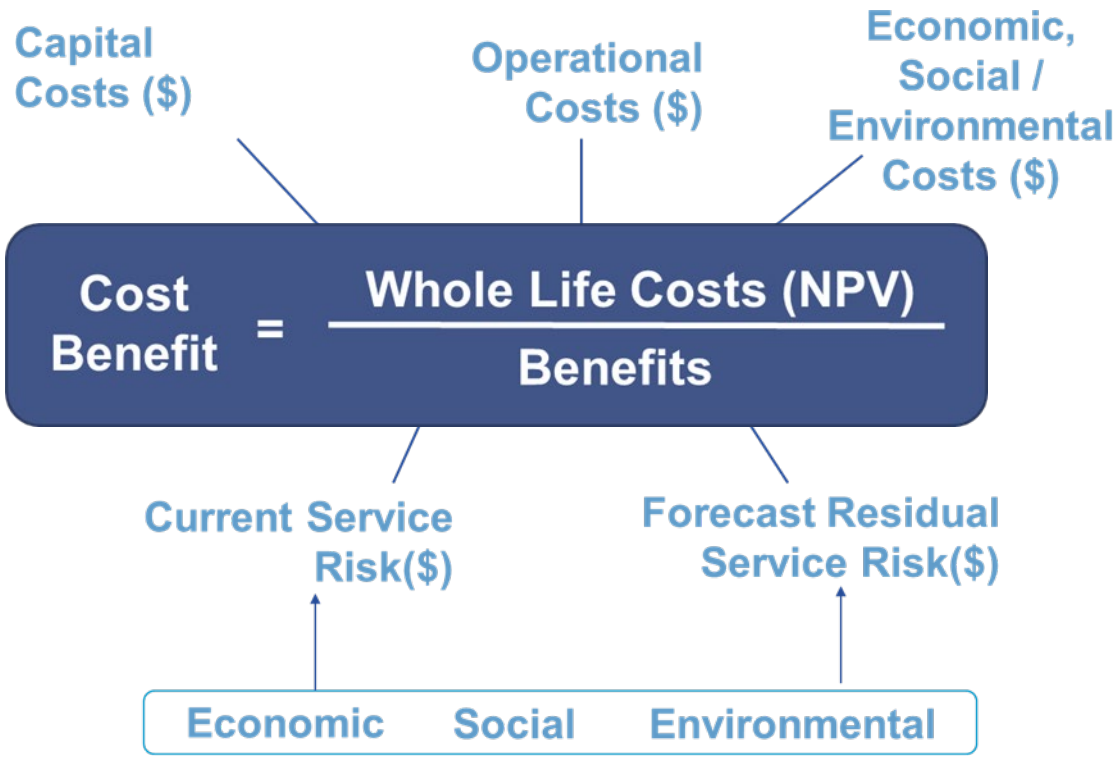
Affordability
What can we afford?

Cost benefit
Do the benefits outweigh the costs?



Alignment
How does it align to corporate policies, political profile, strategic direction, community resilience?

Cost benefit evaluation



- Keep it simple
- Detail appropriate to the stage
- Engage others to help
- What's driving the decision?

*NPV = Net Present Cost ($)

"Ranchlands Grain Facility" Case Study

$$\text{Cost Benefit} = \frac{\text{Whole Life Costs (NPV)}}{\text{Benefits}}$$

Your facility is vulnerable to river flooding. ($300k annualized risk)

Option 1: Raise the building ($1,000k)

Option 2: Construct floodgates ($100k)

	Option 1	Option 2	
Base Risk	$300k	$300k	✓
Cost	$1,000k	$100k	✓
Residual Risk	10	50	?
Risk Benefit	290	250	
Cost Benefit	3.4	0.4	✓

* It can be difficult to quantify the environmental and social benefits but these are essential to consider.

Topic 5: Treatment monitoring

Using a risk register to help monitor risks

With the right information in a risk register, we can use it to help us monitor risks.

Base/ Uncontrolled risks

Control measures

Current risks

Actions (investment needs)

						Inherent Risk					Current Risk				
Master ID	Date Added	Service Area	Risk	Asset(s)	Causes	Impact	Likelihood	Risk	Explanation	Mitigating Controls	Impact	Likelihood	Risk	Explanation	Action Plans
1	4-Dec-14	Admin	Health and Safety risk to Admin Building employees due to exposure to poor air quality		Building is aging, high groundwater, delayed maintenance			NS	Roof, plumbing issues known. Structural unknown. Air quality and structural issues need further evaluation.				NS		Building inspections and documentation
2	4-Dec-14	Airport	Inability to provide service or damage to planes due to asphalt degradation	Airport	Inadequate maintenance due to underfunding. No collection of user fees.	7000	0.1	700.0	Damage to aircraft; potential for major incident or fatality	Inspection programs, patch repair, closure of one runway	500	0.1	50.0	Current runway surface is in disrepair, existing maintenance may result in aircraft damage as opposed to major incident/fatality Currently receive complaints	Review airport fee strategy and/or keeping the airport facility
3	4-Dec-14	Airport	Airport shutdown due to regulatory non-compliance for snow clearing maintenance	Airport	Snow Clearing required by FAA year round	500	1	500.0	Negative PR; legal process; proceedings against City	Clearing of runway by PW crews	50	1	50.0	Regulatory impact negated, consequence is excessive maintenacne for underused facility	Review airport fee strategy and/or keeping the airport facility
4	4-Dec-14	Fire Department	Inadequate fireflows availability due to failed/inoperable hydrants or hydrants with low pressure/flows		Age and Deterioration Freezing Damage from vehicles Water system design or system operation	25	1	25.0	Higher damage due to increase fire response/set-up times.	Public woks responsible for maintaining hydrants Process in place for out of service hydrants	25	0.2	5.0	Assume 1 occurrence every 5 years where hydrant status impedes response	Flagging or noting low pressure hydrants Winter maintenance program
5	4-Dec-14	Fire Department	Inability to fight multi-story fires due to lack of access to ladder truck from Nov. To April (winter months)		Currently no place to store in off times	268	0.1	26.8	Assume 1 complete commercial property destroyed every 10 years	Mutual agreement with Yorkton - time to respond	268	0.01	2.7	Ladder truck is available through agreement with College.	
9	4-Dec-14	Parks and Rec	Injury/Accident on City play equipment - Kinsmen Park	Equipment	old equipment that does not meet current standards	52	0.5	26.0	Busiest park in City. Now has spray park. An injury could result in liability to the City and social cost to the community. 1 in 5 years significant injury or could be higher likely hood of minor injury	Equipment checked occasionly by staff for damage	52	0.2	10.4	Equipment does not meet current standards, including some significant gaps in current safety criteria. But major issues are mitigated through operational works	Cost estimate to upgrade: $250,000
6	4-Dec-14	Parks and Rec	System failure at HCUC causing service interruptions	mechanical unit failures	- design & construction issues? - staff competence in operation and maintenance of equipment	30	1	30.0	Ice quality issues and heating/cooling issues have resulted in decreased levels of service. Lost ice time / complaints etc. Some reputational impact	- have outside contractor monitoring approx. monthly; frequency not explicitly known - Contract with Danritch to monitor system remotely	10	0.5	5.0	No one internal monitoring, or trained to monitor system Outside contractor changing personel, Internal training not provided. Could impact service & reputation but less likely.	Training and development
8	4-Dec-14	Parks and Rec	Interruption of service at MMSP due to equipment failure	Ice plant	Equipment age and maintenance issues	5	2	10.0	Impact lower due to lower utilization than at HCUC but is more likely	Routine inspections of the facility and associated systems	5	1	5.0	Failures have resulted in ocasional closures of the facility	

Monitoring Risk

Basic principles

It is not a one-off exercise! – Review on a regular basis

- Monitor the risk
- Monitor the completion of actions
- Monitor the effectiveness of controls
- Monitor / track risk events
- Review the effectiveness of the risk framework

Forest River Property Flooding Case study

Part of the risk register for the community of Forest River shows the following . . .

Risk	Inherent Risk	Controls	Controlled Risk
Property flooding	HIGH	New flood gates (manual) Gauging station (to provide 4 hr warning)	LOW

What would you want to check?

Key takeaways for risk management . . .

1. Risk management is really about taking action
2. The principles of risk management encourage us to think broadly and holistically
3. ISO 31000 provides a tried and tested process to risk management
4. When we treat risks, we should also consider *no-build* solutions
5. Cost benefit can be used to help us make adaptation decisions
6. We should always circle back and check what has changed and if things worked

DISCLAIMER

THANK YOU!

If you have any questions, please contact info@climatewest.ca

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