Using Risk Information to Improve Decision-Making

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1330 to 1430
200 Coventry Road

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Outline

- Risk, Uncertainty, Objectives
- An illustrative example
- The value of explicit consideration of risk
- Examples
- Scenario Analysis
- Identifying Key Risks to monitor

Uncertainty

Uncertainty is the state, even partial, of deficiency of information. Uncertainty means that there may be more than one possible outcome, multiple possibilities that might occur.

It may result from information that, alone or in combination:

- Is not available;
- Is available but is not accessible;
- Is of unknown accuracy;
- Is invalid or unreliable;
- Involves factors whose relationship or interaction is not known;
- Is variable or subject to different interpretations;
- Exceeds the organisation's capacity to process;
- Is random or chaotic;
- Is conflicting or inconsistent;
- Involves a range of known possibilities, whether and when they could occur;
- Changes over time.

Risk

- Risk is defined[1] as the

  "effect of uncertainty on the achievement of objectives"

[1] CAN/CSA ISO 31000:2010

Departmental Objectives

Objectives

The TBS Policy on Results states

3. Objectives and expected results

3.1The objectives of this policy are to:

3.1.1Improve the achievement of results across government; and

3.1.2 Enhance the understanding of the results government seeks to achieve, does achieve, and the resources used to achieve them.

3.2 The expected results of this policy are:

3.2.1 Departments are clear on what they are trying to achieve and how they assess success;

3.2.2 Departments measure and evaluate their performance, using the resulting information to manage and improve programs, policies and services;

3.2.3 Resources are allocated based on performance to optimize results, including through Treasury Board submissions, through resource alignment reviews, and internally by departments themselves; and

3.2.4 Parliamentarians and the public receive transparent, clear and useful information on the results that departments have achieved and the resources used to do so.

An illustrative example

The concepts, ideas and observations about using risk information to improve decision making will be presented in the context of adapting to climate change.

Managing in the presence of the uncertainties of climate change is essential for all large organizations, particularly federal departments.

Other relevant external uncertainties include changes in fuel cost, international trade, regulations, interest and currency exchange rates, diseases and changes in the behaviour of partners and third parties.

In the context of climate change

Departmental objectives fall into two main categories:

1) Achievement of departmental results
2) To manage risks linked to a public interest. *Examples*:
   - To protect Canada's food, plant and animal resource-base
   - To sustainably manage fisheries and aquaculture
   - To ensure the security and prosperity of Canada by managing the access of people and goods to and from Canada.

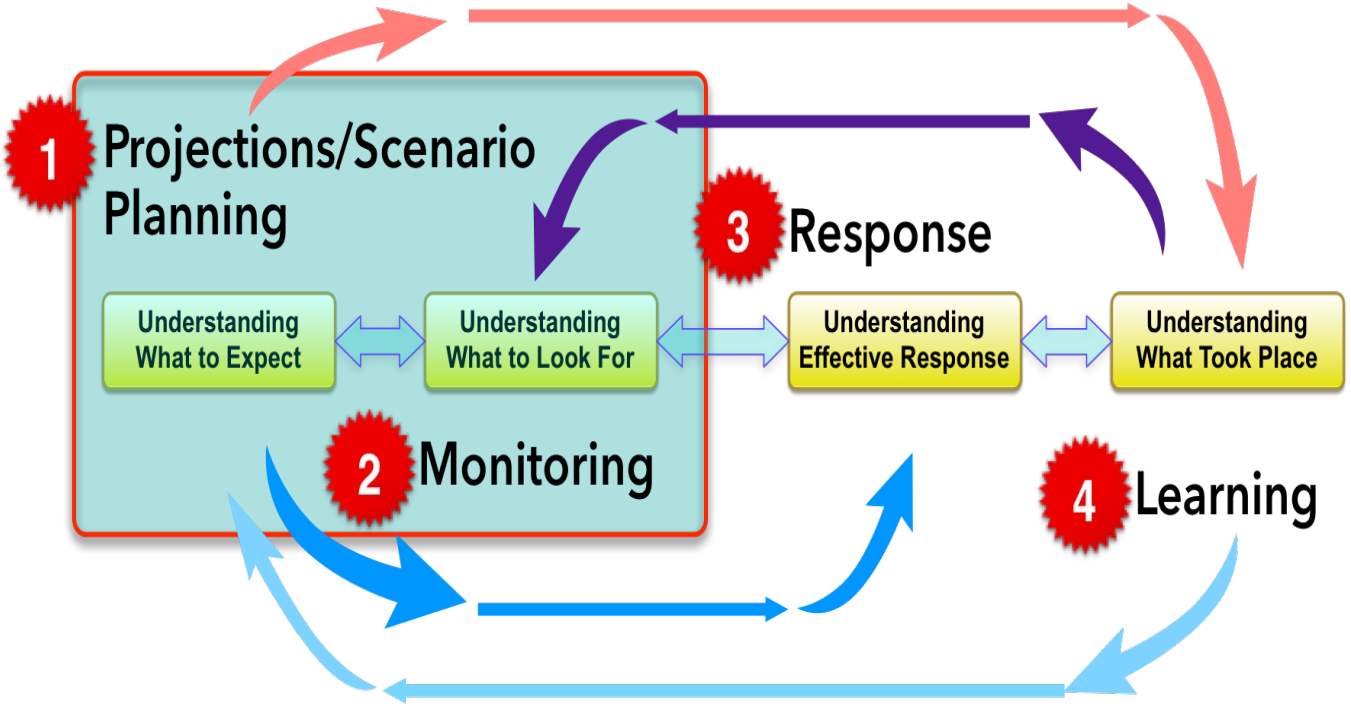
Managing Risk

Adapting your department to the uncertainties associated with climate change includes the identification, analysis and assessment of how climate change may affect your ability to achieve departmental objectives.

Managing Climate Change Impacts

Many communities and organizations have made good progress on emissions mitigation but have done little adaptation planning to manage climate-induced risks

Four Key Actions for Resilience to Climate Risks



Adapted from: Resilience Engineering in Practice: Guidebook

- Update knowledge
- Identify Thresholds
- Data gaps
- Monitor for trends
- Monitor for critical thresholds

Using Risk Information to Support Decision-Making

- Building a culture of results
  - Culture of understanding and coping with uncertainty
- Strengthening links between results and budgeting, planning and policy
  - Execution requires all of these to work together
- Reporting: Telling the performance story
  - Maintaining and improving performance is evidence of successful risk management

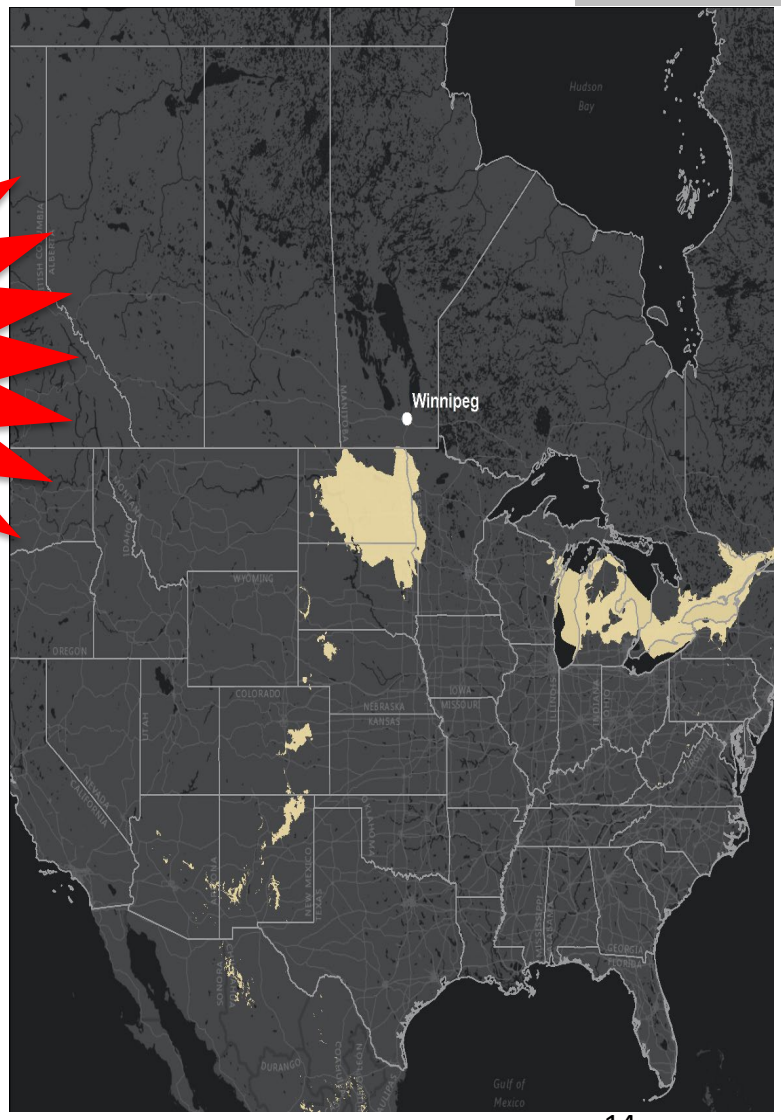
Using Risk Information to Support Decision-Making

- Building a culture of results
  - Which departmental results (organizational and public) may be affected by climate change?
- Strengthening links between results and budgeting, planning and policy
  - Include risk information when planning and budgeting in order to improve resilience of Department to climate change
- Reporting: Telling the performance story
  - Adapting the Department to achieve results despite climate change
  - Includes enhancing existing adaptive capabilities and developing new ones.

WHAT KINDS OF CHANGES ARE ANTICIPATED?

Prairie Climate Centre

By the 2020's Winnipeg can expect the climate of North Dakota



Summer

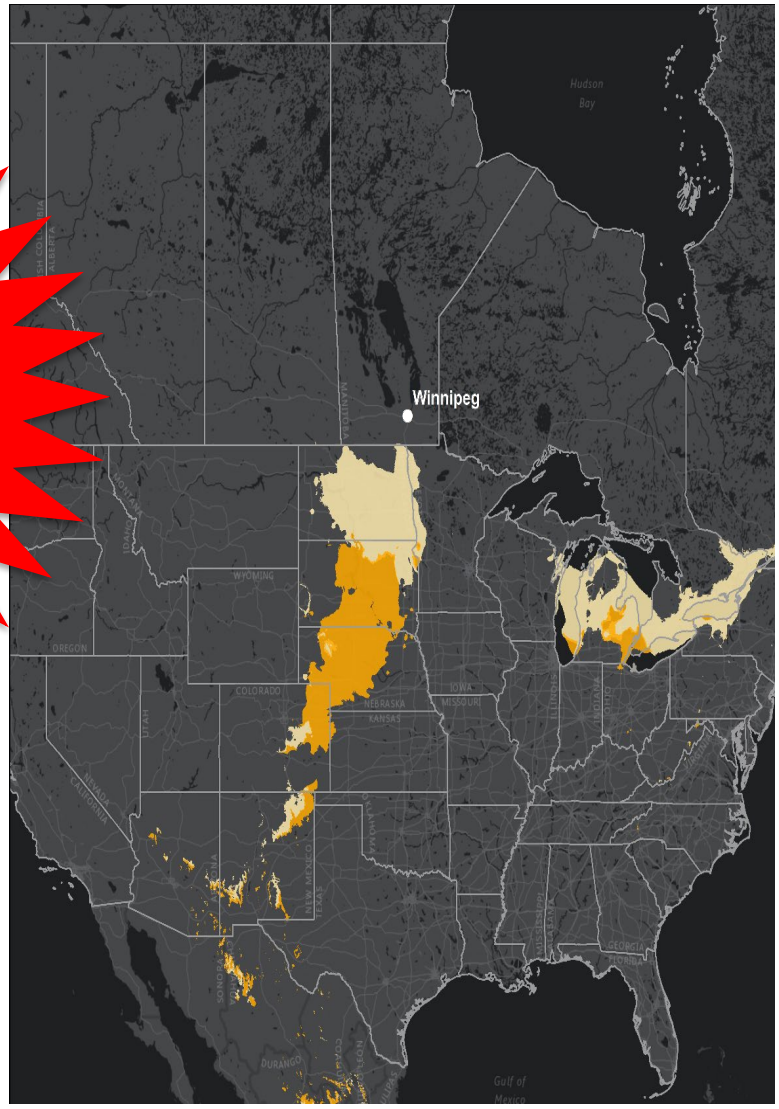
High Carbon

Low Carbon

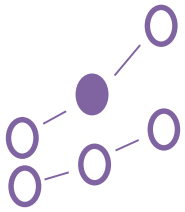
2020s 2050s 2080s

Prairie Climate Centre

By the 2050's Winnipeg can expect the climate of Nebraska



Summer



High Carbon

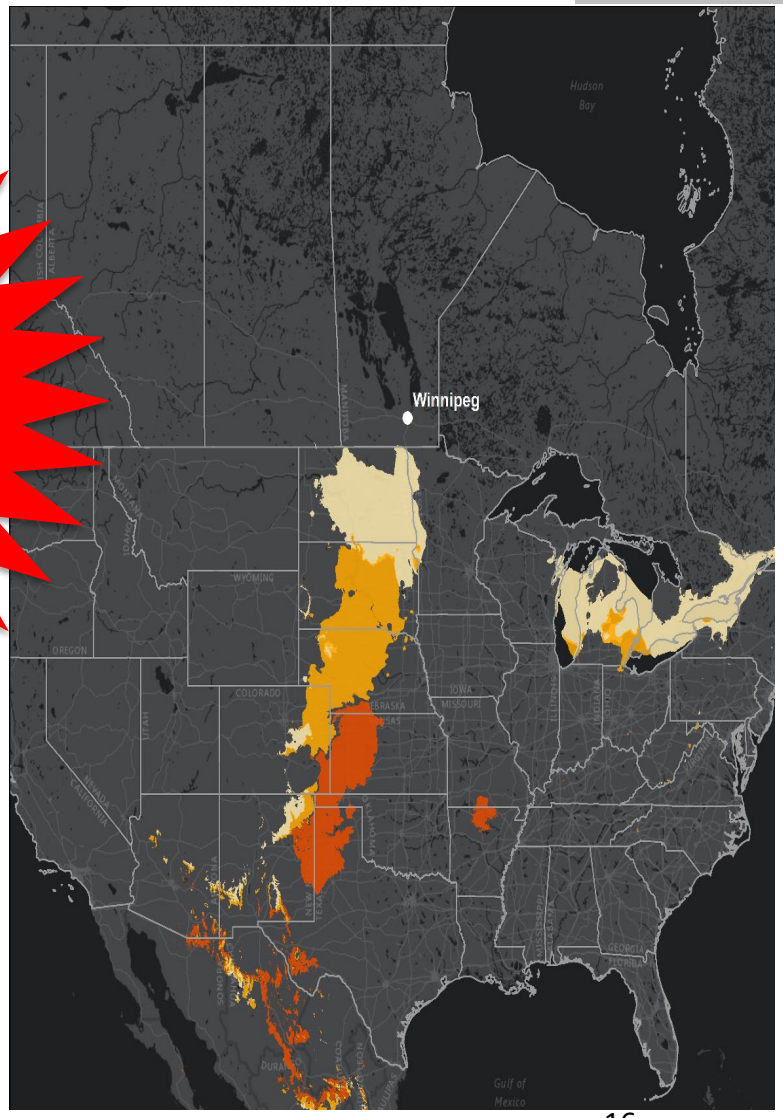
Low Carbon

2000s 2050s 2080s

RSI

Prairie Climate Centre

By the 2080's Winnipeg can expect the climate of Kansas and North Texas



Summer

High Carbon

Low Carbon

2020s 2050s 2080s

Climate Change Data - Uncertainty

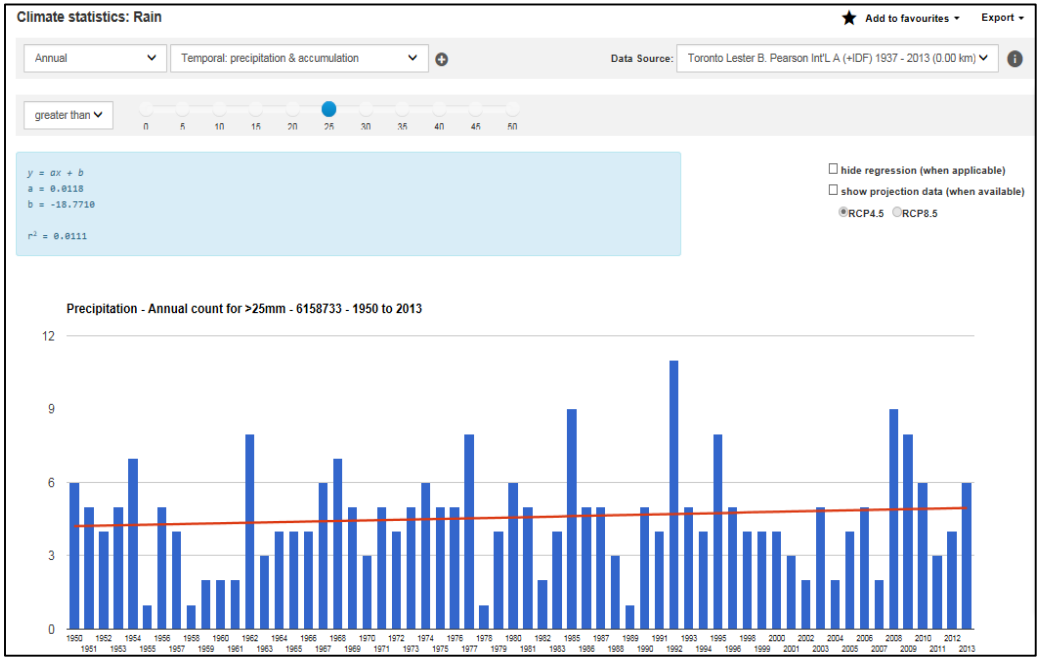
Source of risk:

- All engineered design relies on codes and standards. **But these codes and standards have not been updated to include consideration for a changing climate**.
- Designs under construction today, in some cases, are reliant upon climate ranges that are historical, and ***climate change means the future climate will depart from the ranges shown in historical climate***.
- The **gap between historical climate design and designing for future climate represents unmanaged risk**.
- **Many asset owners are held back from risk reduction/adaptation planning due to lack of detail on the scope and nature of the specific climate changes that are relevant to them?**

Using Risk Information to Improve Decisions

- **Managing for Climate Vulnerabilities requires knowledge of *Critical Thresholds***
  - **When does something 'break or fail'?, e.g. a 50mm/day rainfall?**

1. **How often has this 'breaking threshold' occurred in the past?**
2. **Given Climate Change projections from the IPCC climate models – how often is this expected to occur going forward?**
3. **Prioritize adaptation options based upon increasing or decreasing risk.**



A tool to identify thresholds.

Examines historical exceedances

Projections can estimate future critical values

Applying Climate Analytics to Assets

Some scenarios based on **real projects** and **real needs** for climate resilience planning

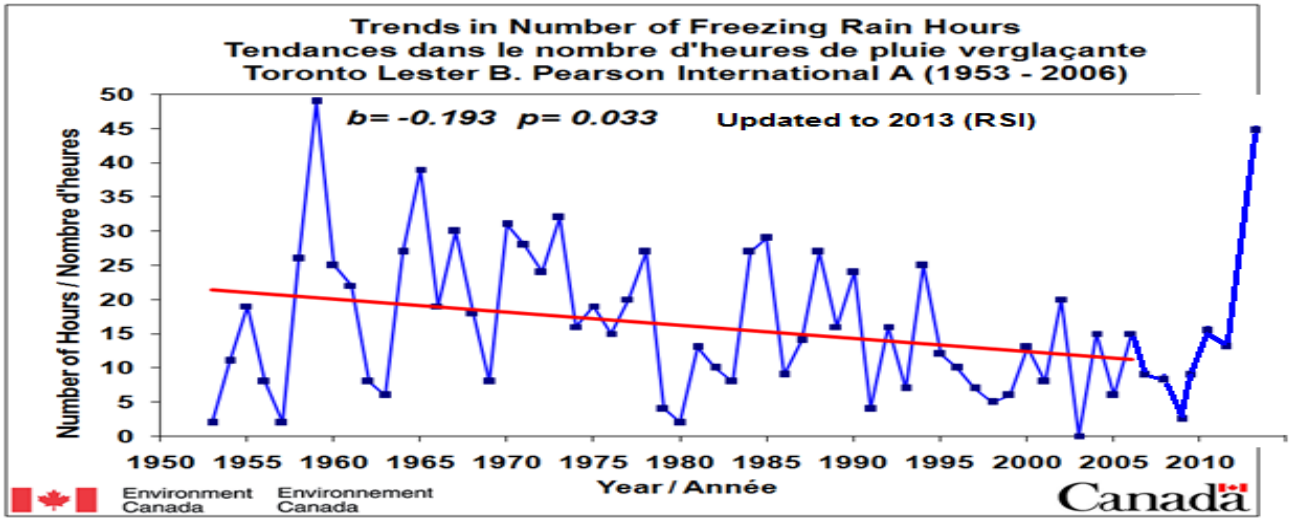
- **Scenario 1**: Electric Utility assessment of ice storm impacts to transmission infrastructure
- **Scenario 2**: Rail operator concern about high temperature-induced impacts to rail service
- **Scenario 3**: Snow loads in Atlantic Canada

RSI

Scenario 1 – Electrical Distribution and Ice Storms

Climate change vulnerability assessment of large urban electrical distribution network. Power outages occur when the ice on power lines exceeds 12.5 mm (radius)

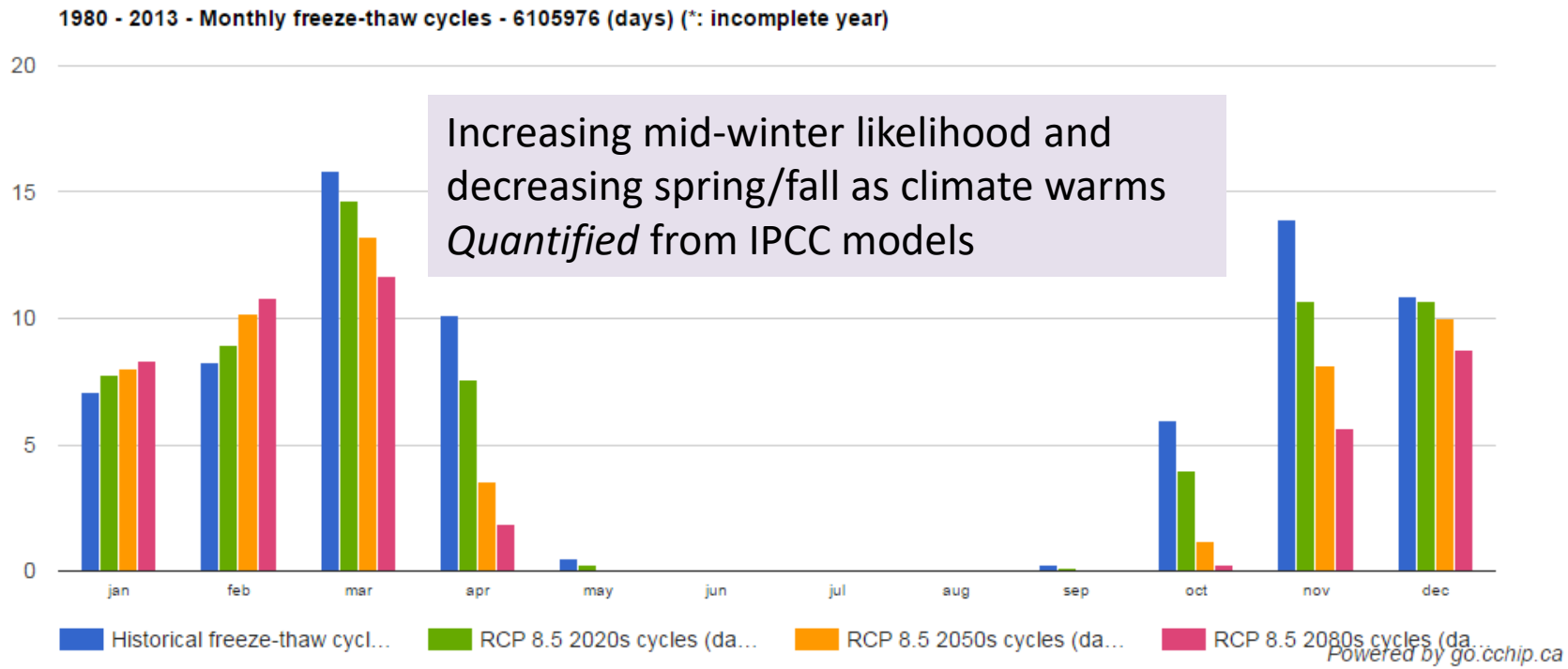
Risk Infomation:



Projected: Representative indicators include hours of freezing rain, number of freeze-thaw cycles and amount of winter precipitation.

Risk Information on Ice Storms

Using models, analyse historical freeze-thaw cycles and estimate risks



Increasing mid-winter likelihood and decreasing spring/fall as climate warms *Quantified* from IPCC models

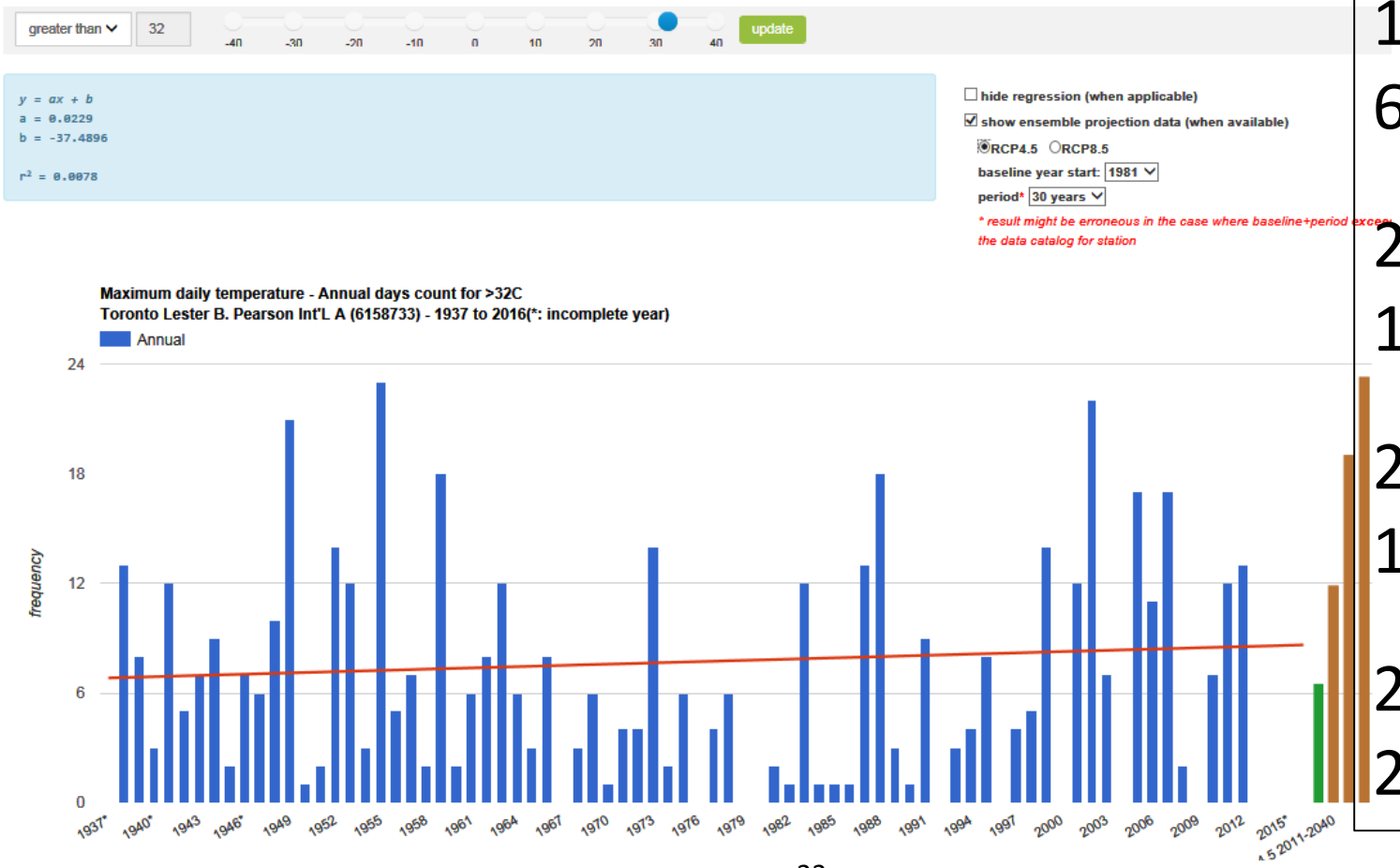
Scenario 2 – Impact of Extreme Temperatures

Commuter rail lines in Toronto-Hamilton

- Expansion and bending of rails under extreme heat
- Max temps +32°C – “slow-down” orders for trains

Risk Information on Extreme Temperatures

Extreme heat can affect, outdoor workers building HVAC (human comfort and safety), equipment tolerances and critical infrastructure



1981-2010:
6.5 days/yr

2020s:
11.9 days/yr

2050s:
19.0 days/yr

2080s:
23.3 days/yr

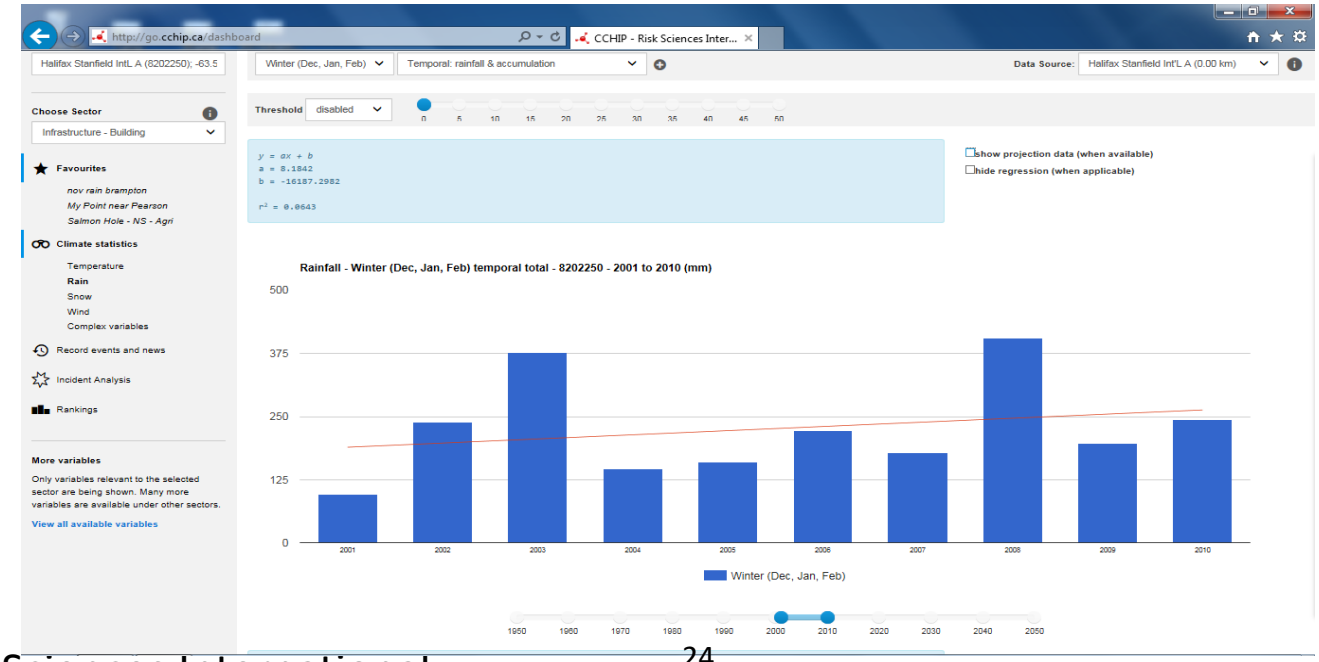
Scenario 3 – Dangerous Snow Loads

Impact: Many roof collapses

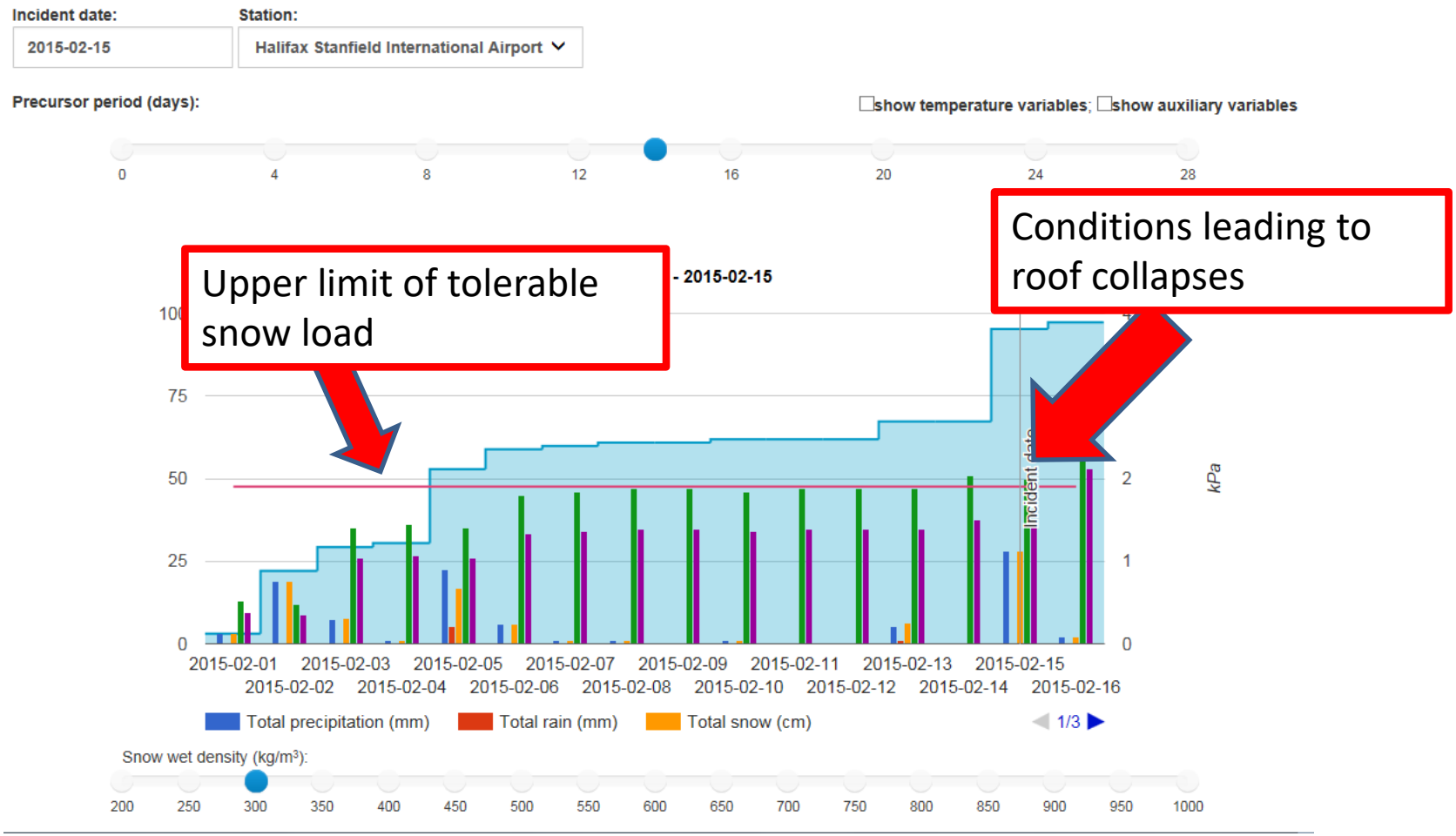
Risk Sources:

- Heavy snowfall followed by rain
- Loads exceeded building code

Use of site-based risk information to and review key data



Risk Information on Future Snow Loads



Current Canadian projections indicate a future with more rain on snow events

Using Risk Information to Improve Decision-Making

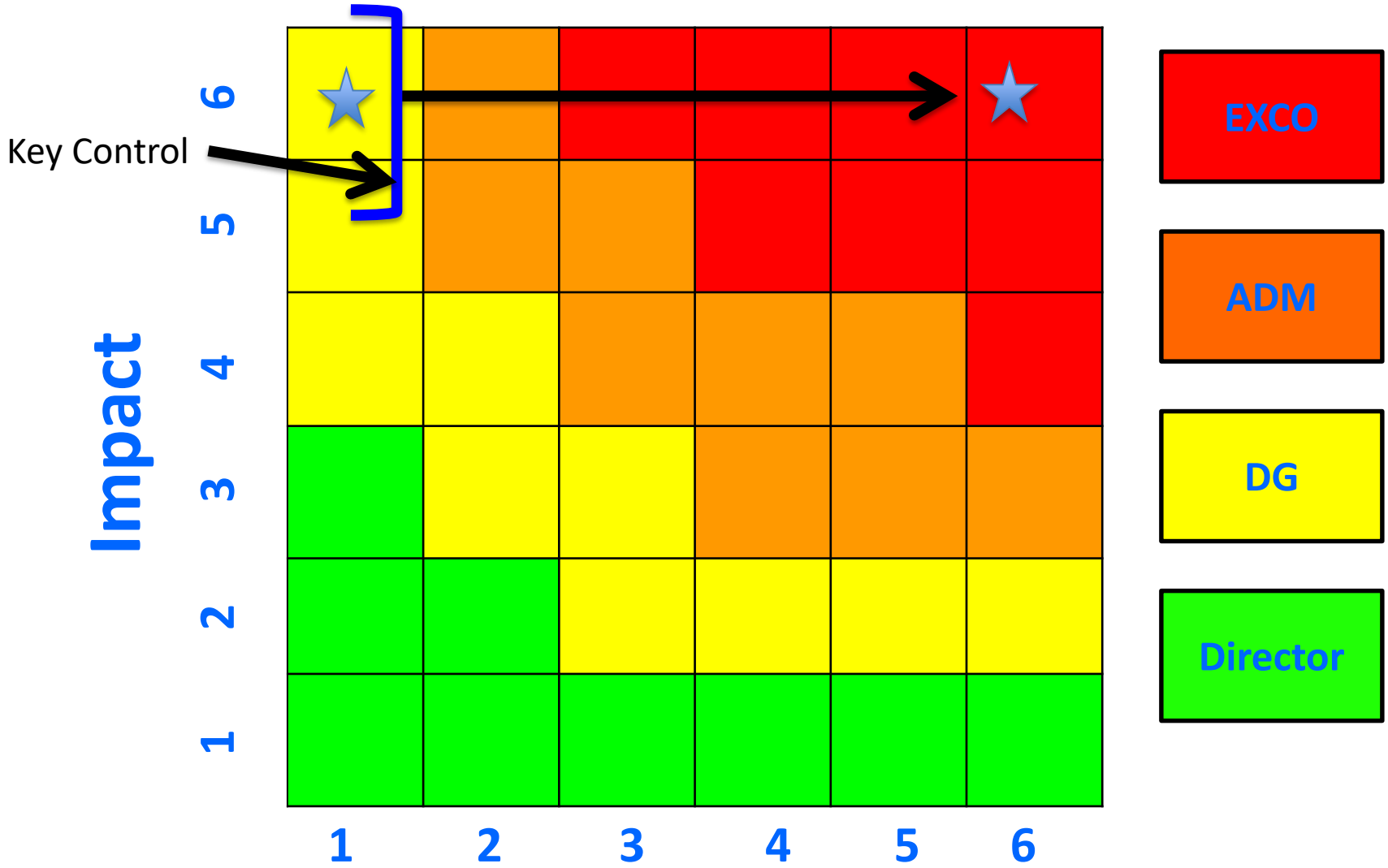
1) Identify the programs, assets or inputs that are critical to your success
2) Identify;
   a) The objectives for your analysis
   b) The time horizon
   c) Tolerable reduction in the achievement of objectives
   d) The changes that your programs, assets or inputs are vulnerable to
   e) The sources and nature of these vulnerabilities
   f) The investments and adjustments that are required to prevent intolerable impacts

What Uncertainties Affect Your Objectives?

As we noted additional potentially relevant external uncertainties include:

- Legal Decisions;
- Changes in fuel cost;
- Interest and currency exchange rate;
- Invasive plants, animals or diseases;
- International trade;
- Regulations and,
- Changes in the behaviour of partners and third parties.

Identify and Monitor Key Controls



What is Critical to Your Organization?

- What enables your organization?
  - Funding
  - Public support
  - Threat level
  - Policy alignment
- What limits your organization?
  - Capacity and capability
  - Funding
  - Public support
  - Technology

Scenario Planning & Uncertainty

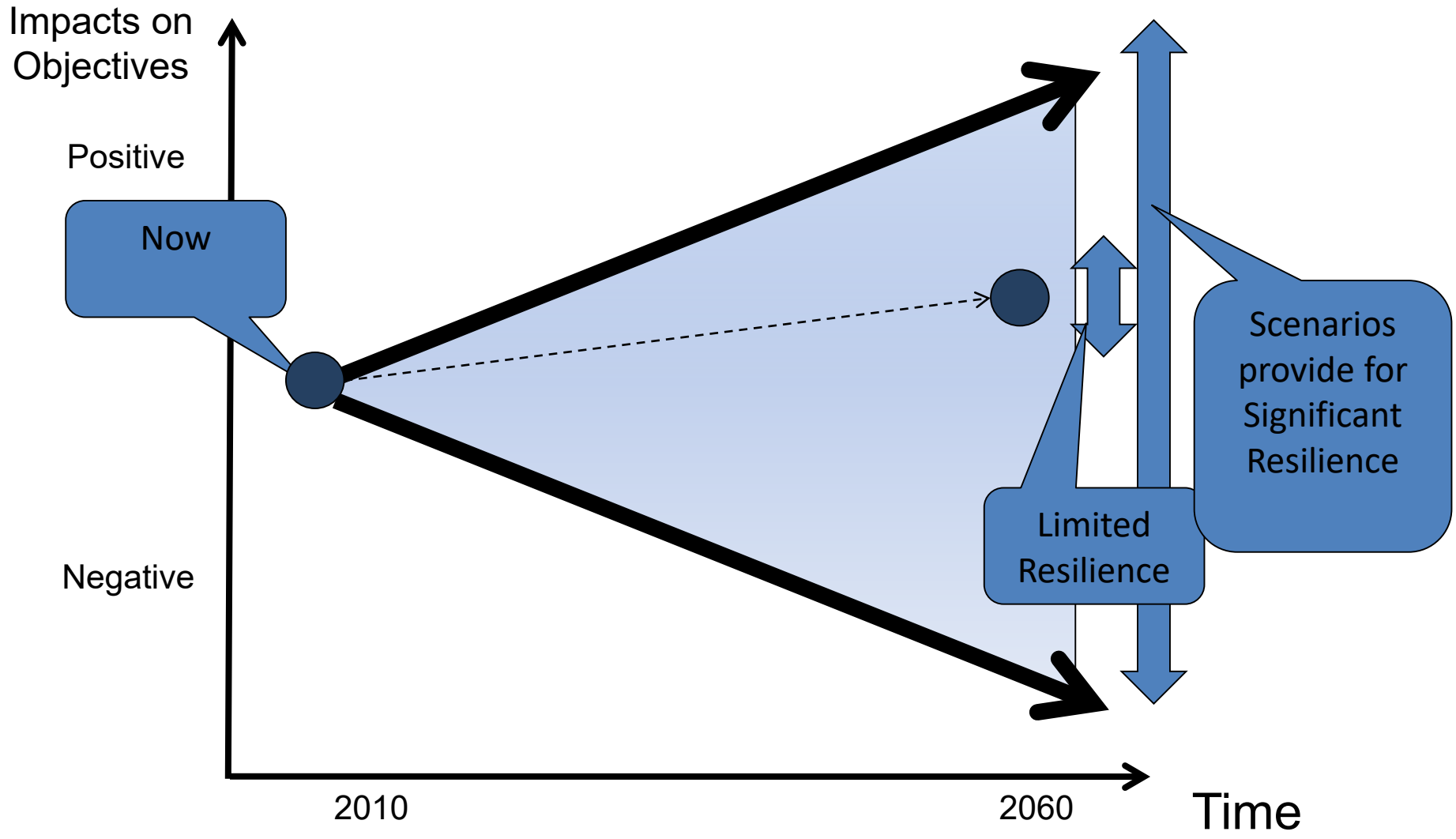
- Scenario Planning finds its origins in military planning,
  - The intention was to be resilient to future conditions that were difficult to predict.
- Shell used this to prepare for a scenario, one which later arrived as the creation of OPEC, a global cartel of suppliers that acted to coordinate the supply and price of oil.

What are “scenarios”?

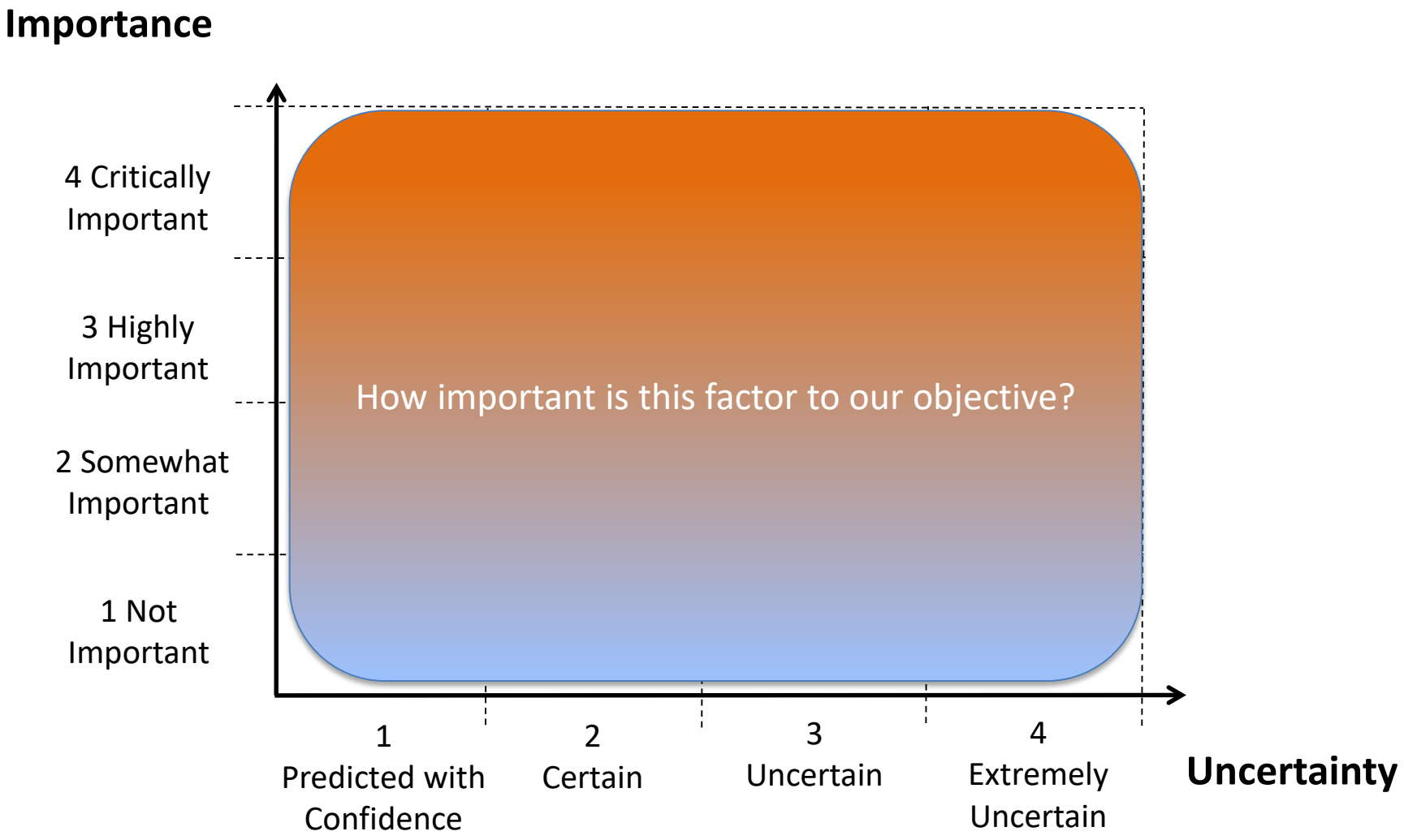
“Scenarios” are stories or descriptions of plausible future outcomes. They are used for strategic planning purposes when the time horizon is of a sufficiently distant scale to render point-specific risk likelihood meaningless. The methodology was first pioneered by Shell International in the 1970s and is now widely used for longer term strategic planning. They can be purely qualitative, semi-quantitative or completely quantitative.

How they are used	How they are **not** used
• To inform decisions that need to be made or considered with a long time horizon (e.g. An investment with a long pay-back period, a policy with long-term implications, etc.) • To test resiliency under a range of alternative outcomes	• As predictions or forecasts of the future (probabilities are never assigned to scenarios) • In isolation from specific long-term decisions that need to be made or informed

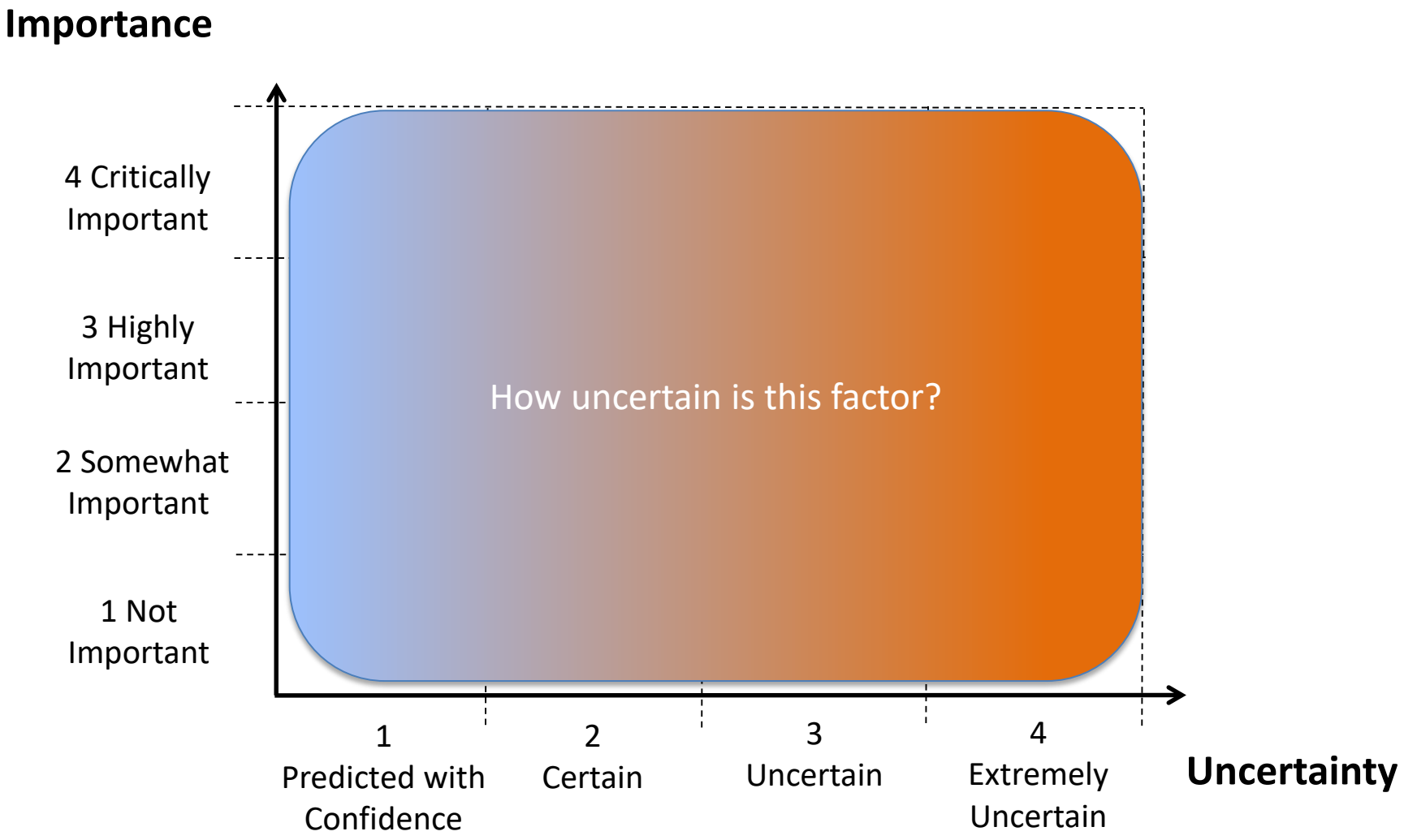
Scenarios and Resilience



Importance



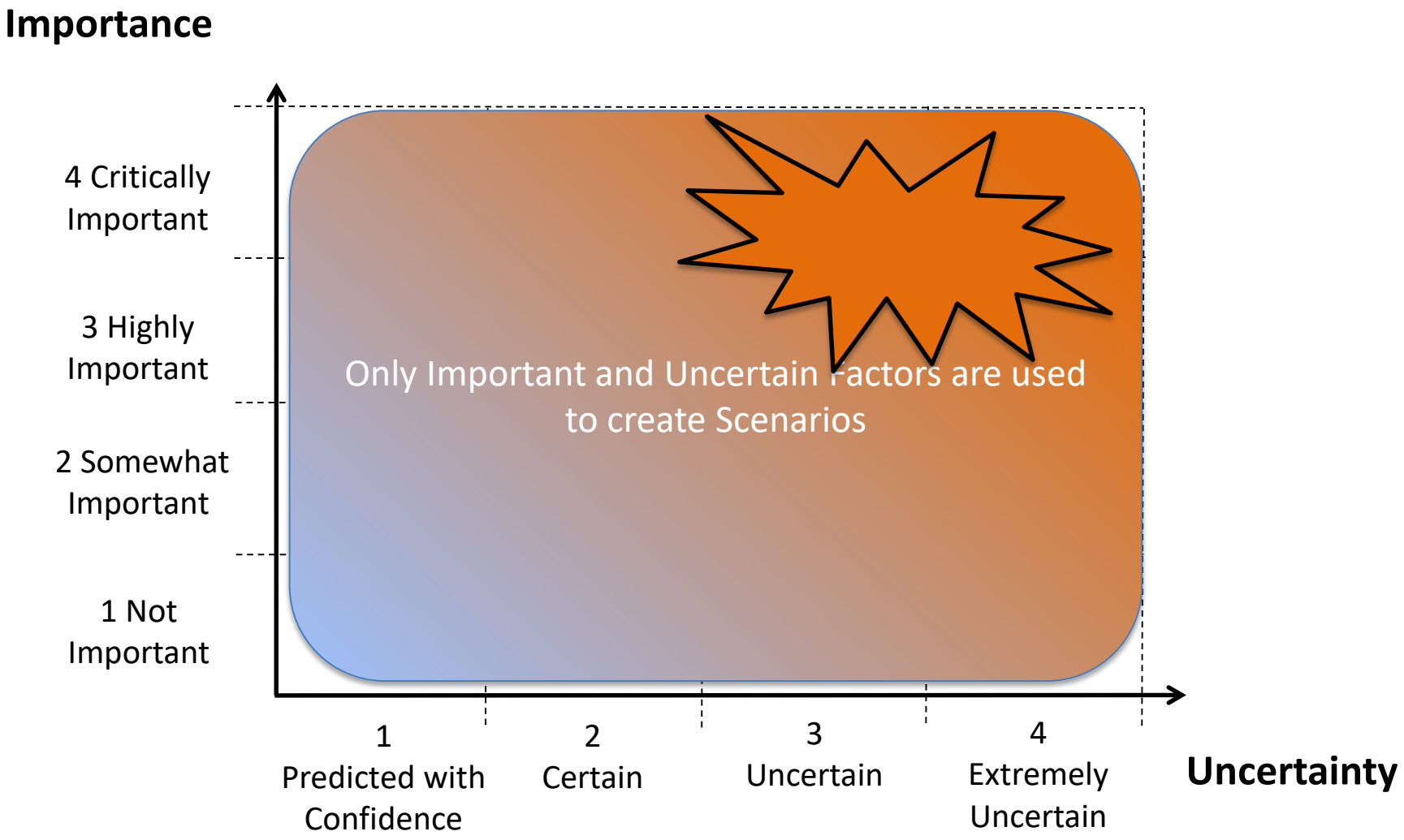
Uncertainty



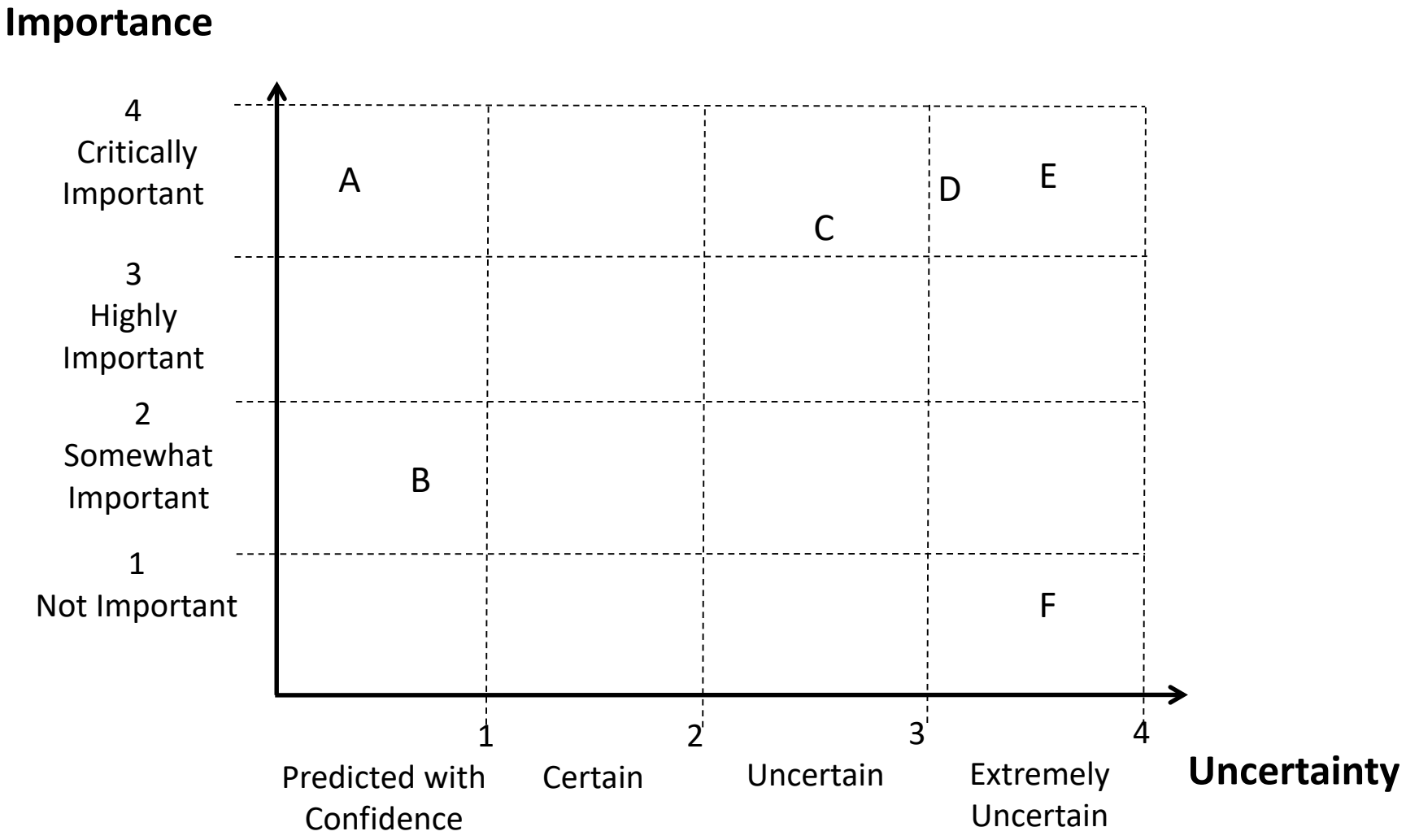
Criteria – Uncertainty

Level	Meaning
4 Extremely Uncertain	It is impossible to predict how this issue will unfold – less than 10% certainty about it in 2050.
3 Uncertain	It is difficult to predict how the issue will unfold – Greater than 10% but less than 40% certainty about it in 2050.
2 Certain	Current studies suggest that it is possible to predict how this issue will unfold – Greater than 40% but less than 80% certainty of the 2050 condition
1 Predicted with confidence	Current studies suggest that it is clear how this issue will unfold – greater than 80% certainty of the 2050 condition

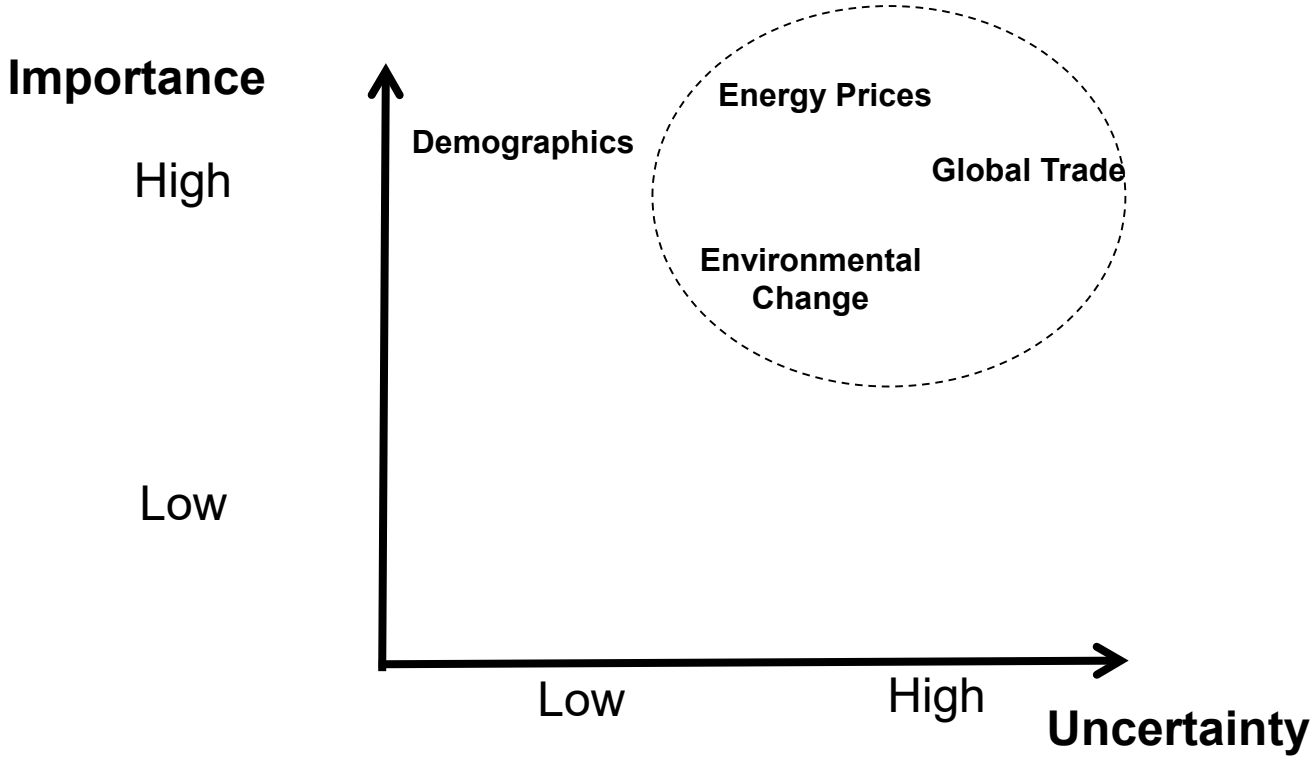
Which Factors will we include in Scenarios?



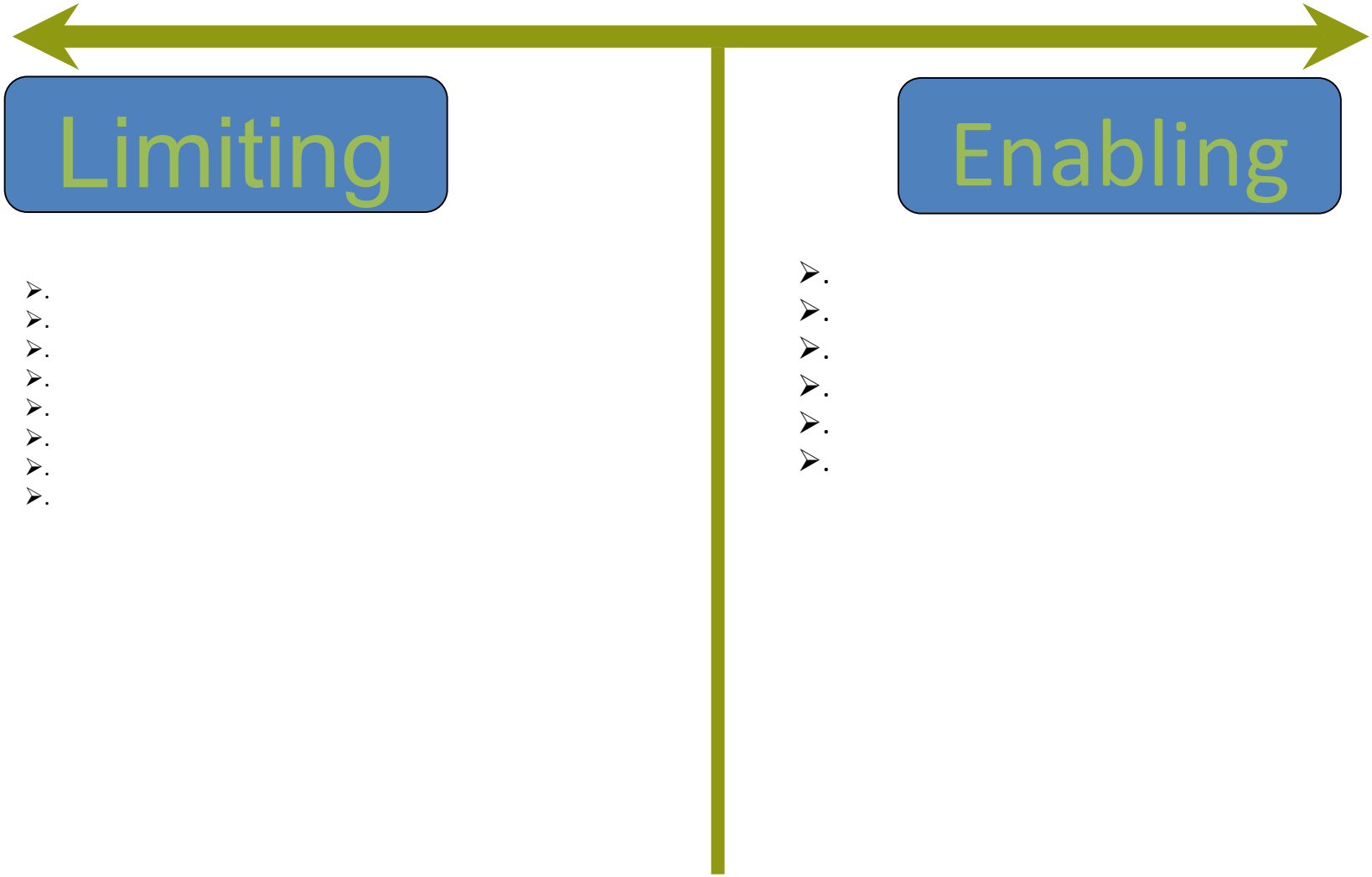
Importance and Uncertainty Levels



Identifying What Matters



Range of Impacts for a Factor



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Key Messages

In order to achieve your objectives:

- Identify, understand and manage relevant risks
- Some risks may act indirectly over a long time horizon
- Identify the information on the risks and how they can be expected to change
- Identify the investments and actions that can secure your objective in the presence of the range of anticipated future conditions

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DISCUSSION

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