The Reaction of Primary Insurance to Climate Changes

Sylvain Nolet & Frédérick Guillot

CAS In Focus Seminar

October 27-28, 2016

Agenda

- Introduction
- Climate Change, a Significant Risk?
- Multi-Facet Approach
- Modeling The Impact of Climate Change Risks
- Big data
- Case Study – Flood insurance at Co-operators
- Conclusion

The Co-operators. Who are we?

Cooperative owned by 42 Canadian cooperatives

the co-operators®

CUMIS®

Sovereign General

FEDERATED AGENCIES LIMITED

HB GROUP INSURANCE MANAGEMENT LTD.

Addenda Capital

COSECO INSURANCE COMPANY

PREMIER

INSURANCE NEXUS

Canadian analytics carrier of the year 2016

BEST 50 CORPORATE CITIZENS

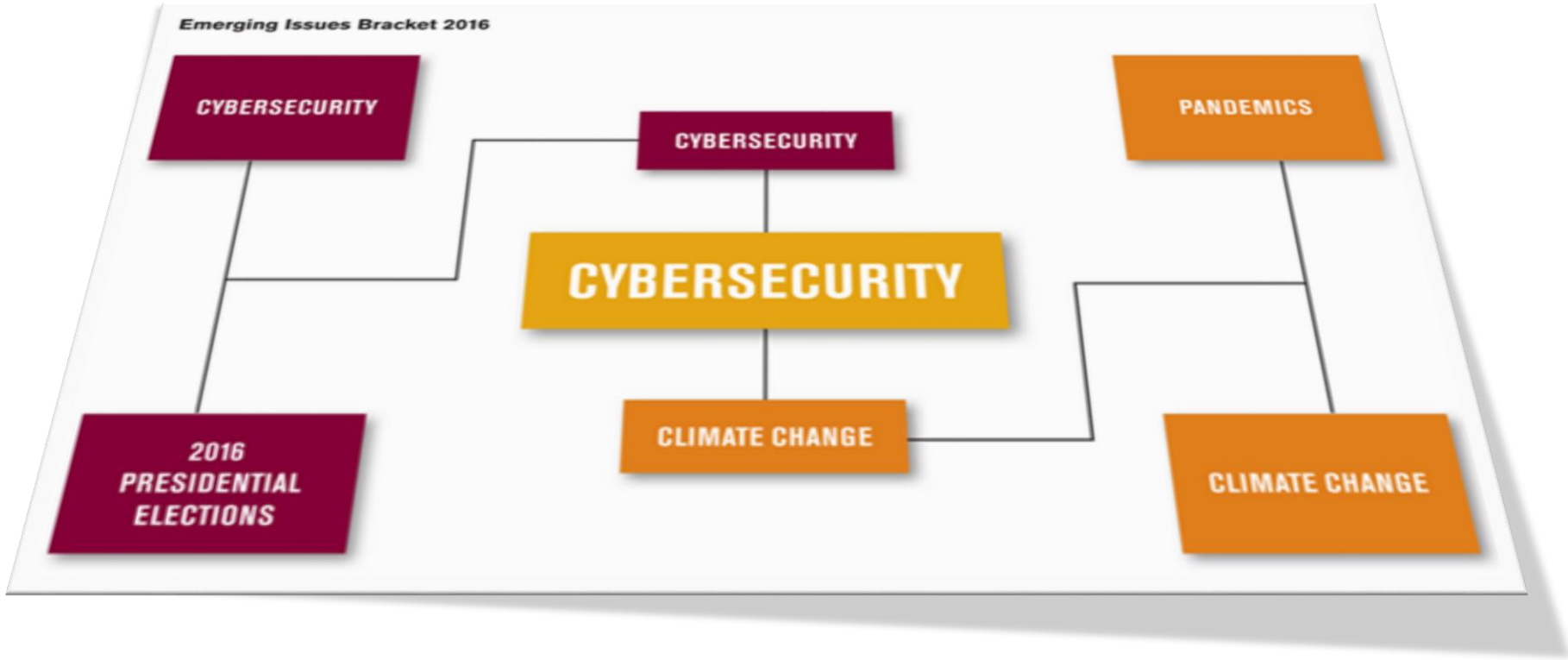
2015 Clean50 Outstanding Contributors to Clean Capitalism

AON BESTEMPLOYER PLATINUM | CANADA | 2016

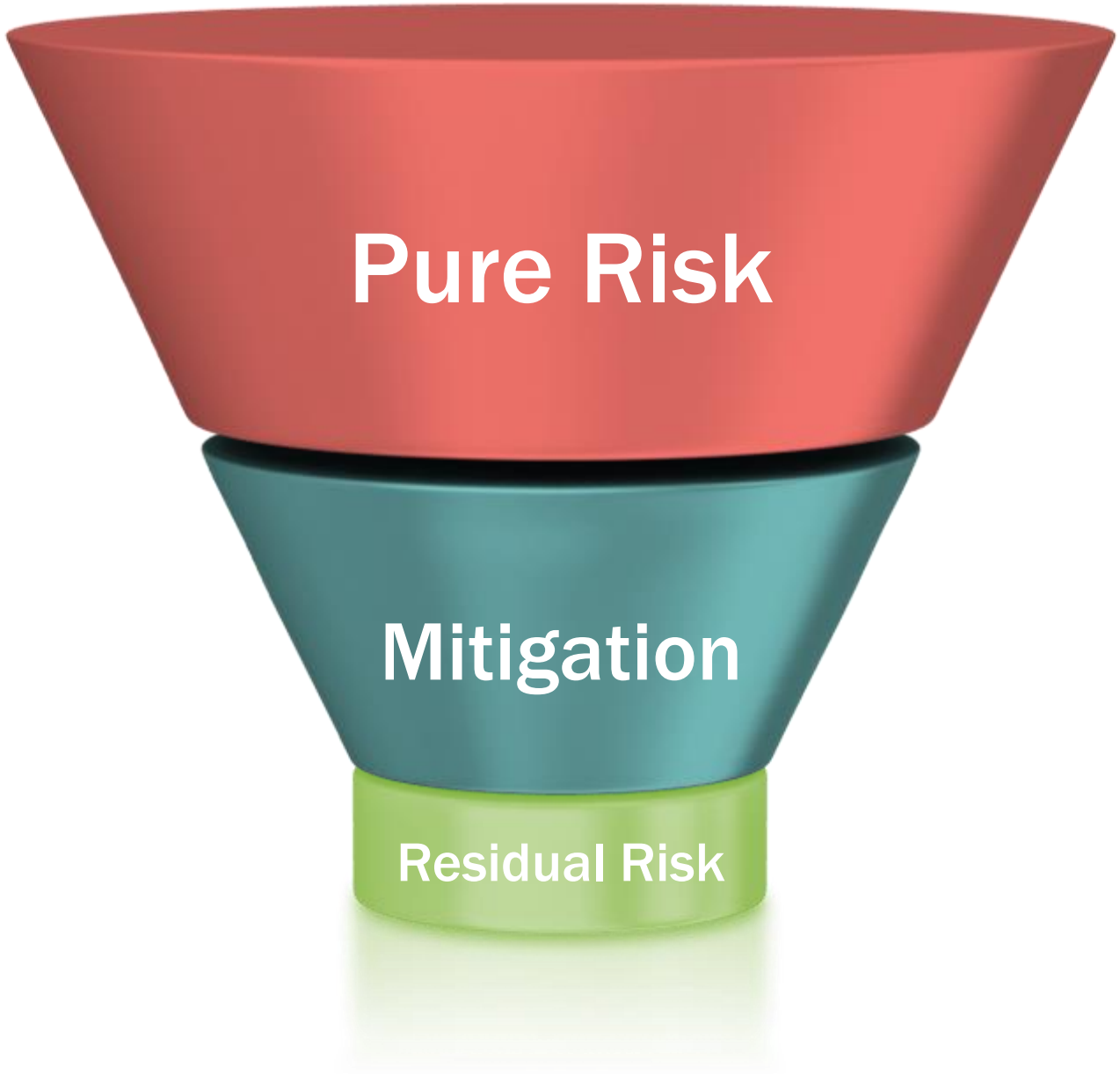
JD Powers 2016
Best Canadian insurer, auto and home
Alberta, Ontario, Atlantic provinces

Climate Change a Significant Risk?

How Significant a Risk is Climate Change?

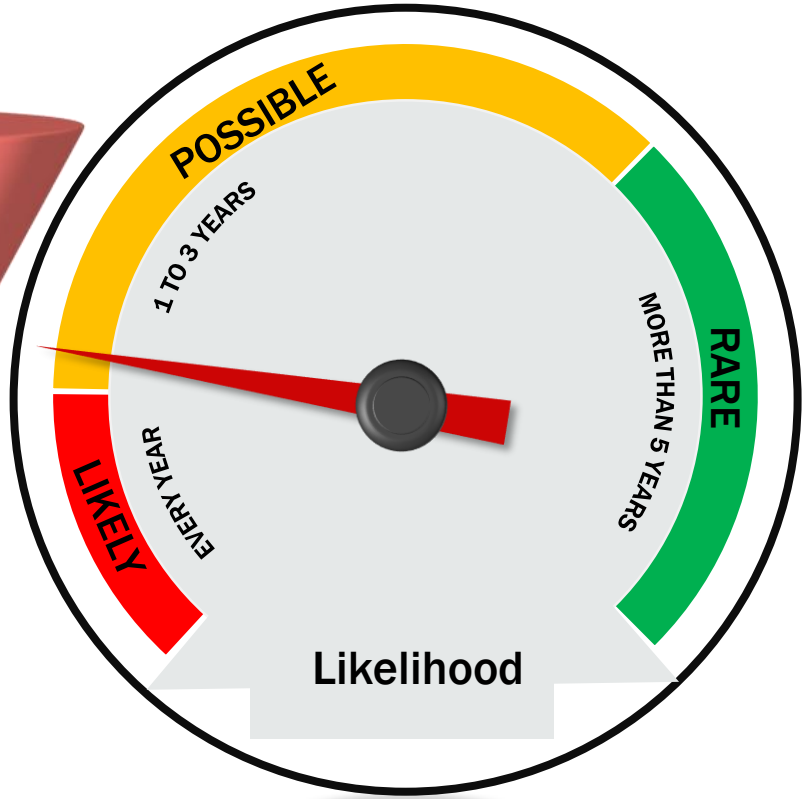


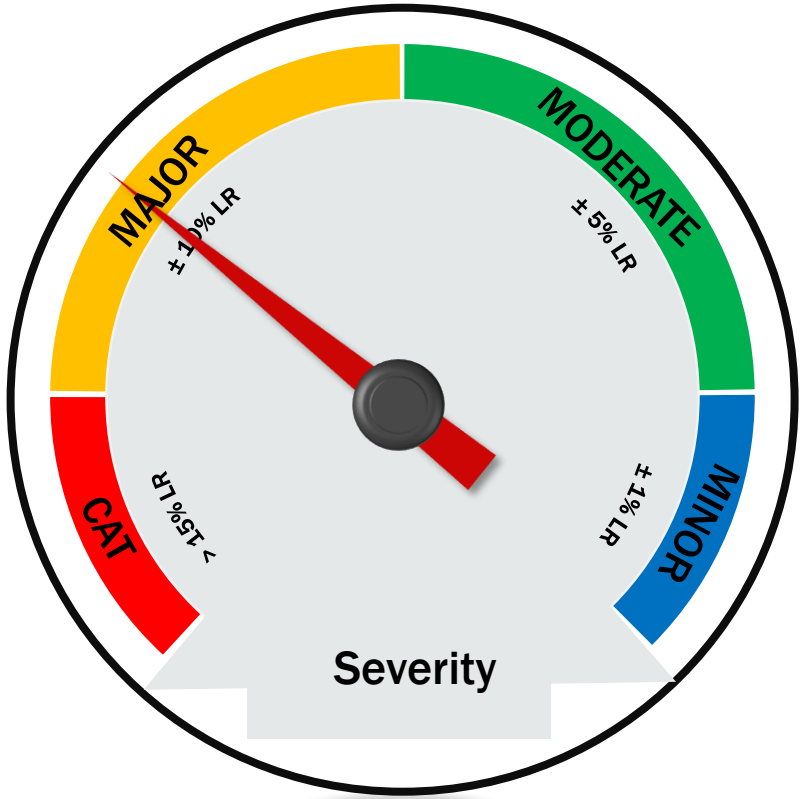
* From 2016 CAS Spring Meeting in Seattle



Risk Evaluation Process

Risk Evaluation Process – Pure Risk

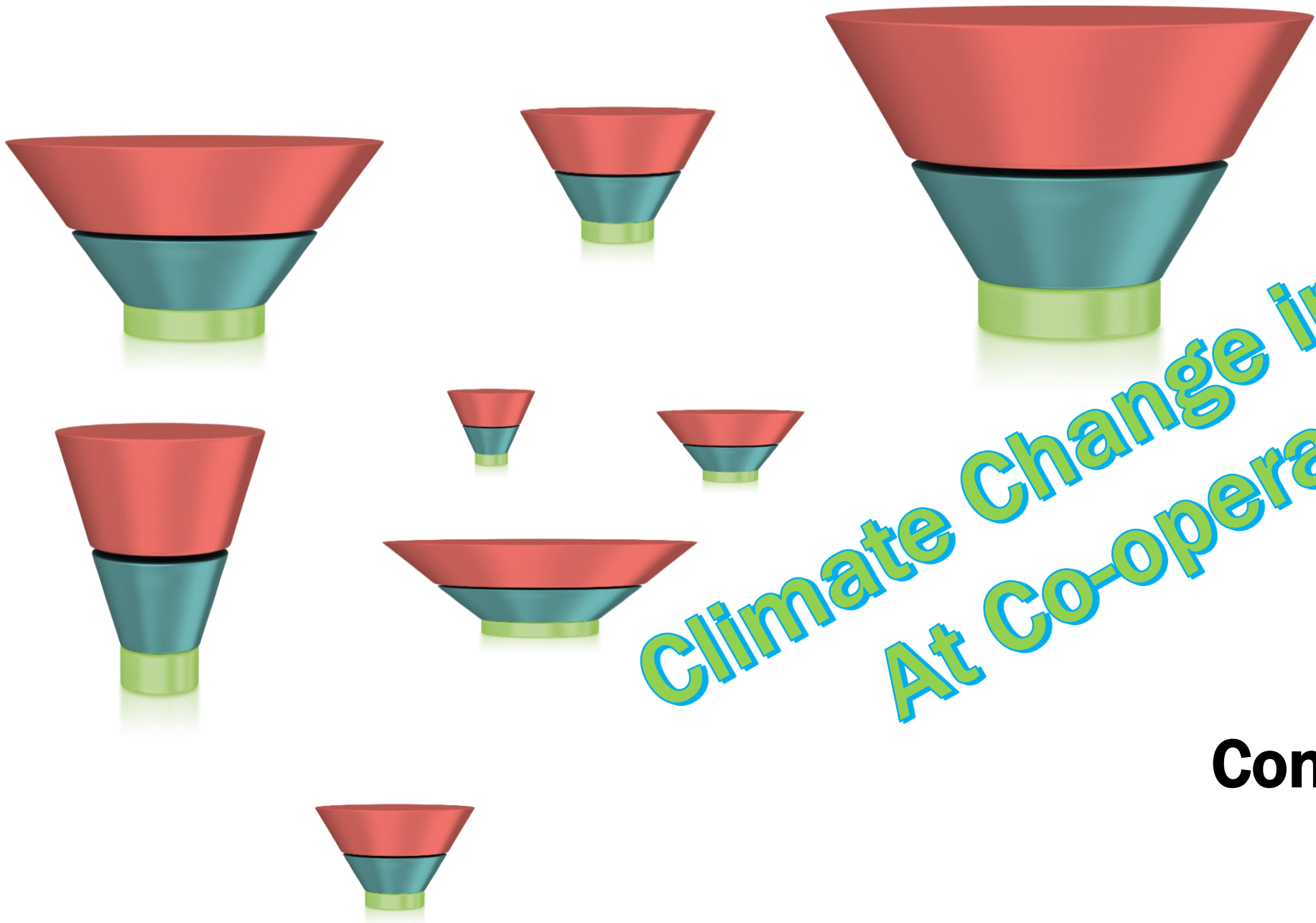




Risk Evaluation Process - Mitigation

Risk Management Controls & Practices

- Collaboration with ICLR
- Policy coverage limits management
- Pricing
- Reinsurance
- Sustainability advocacy plan
- Product development
- ……



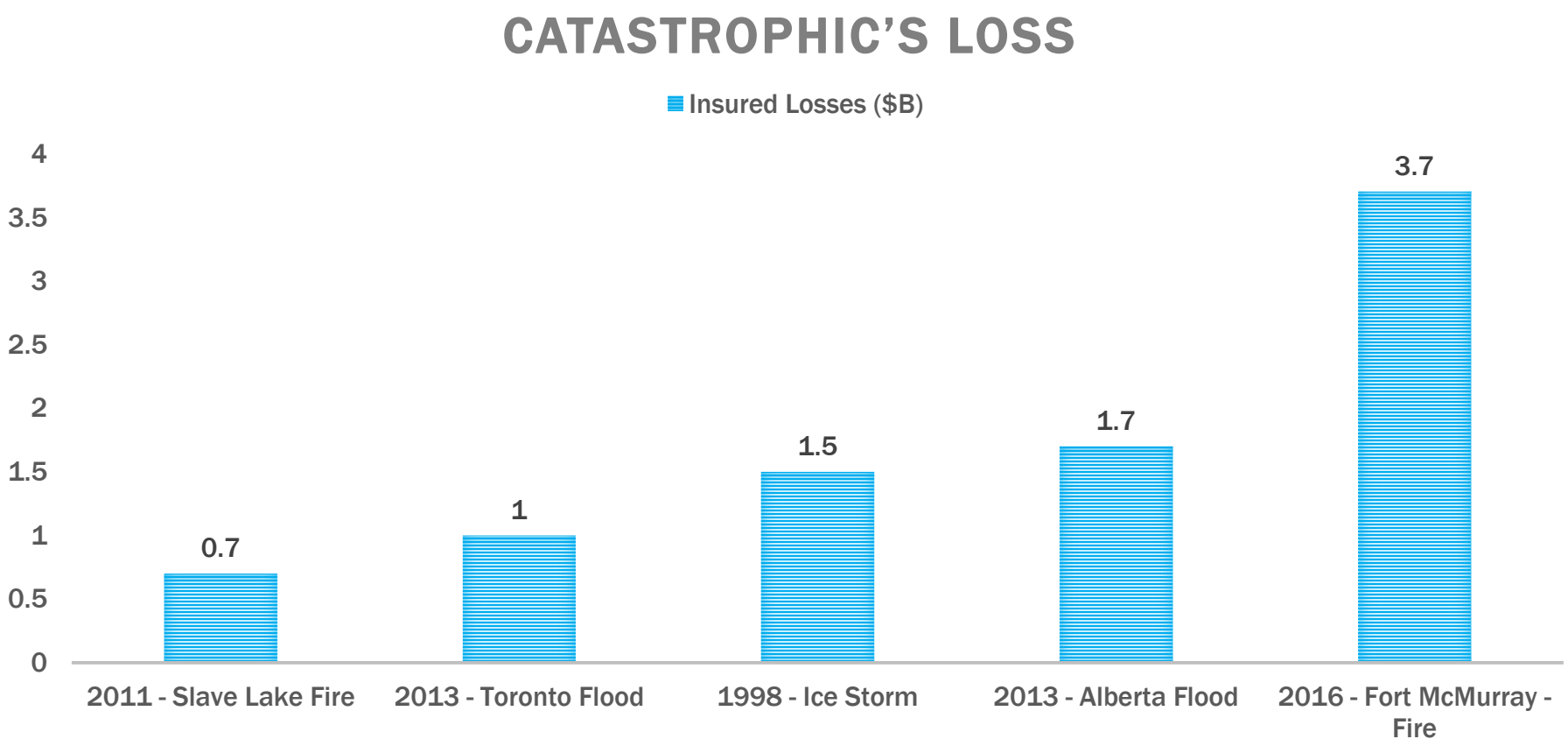
Climate Change in top 2
At Co-operators

Company Risk
Universe

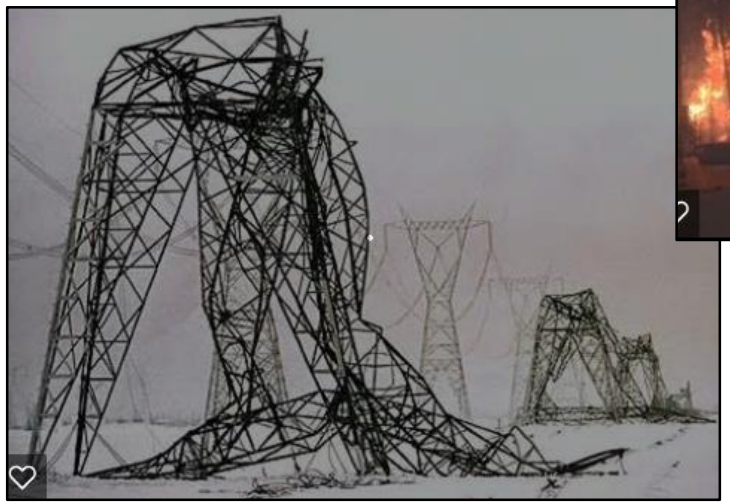
Risk Management is More About Protecting Companies ?

What about Clients Financial Protection ?

Canadian Catastrophies – Last 20 Years



The 5 Biggest Events in Pictures



A Multi-Facet Approach to « New » Risk

A Multi-Faceted Approach to Building Resilience

SUSTAINABILITY

the co-operators

Partnership & Collaboration - Case Study Canadian Flood

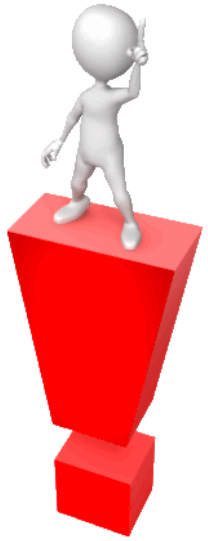
PARTNERS FOR ACTION

Round Table Discussion

60 Senior Executives from Banks, Insurers, Reinsurers, Actuarial Society, Governement from all levels, realtors, construction companies, water conservation authorities

Winning Condition #1

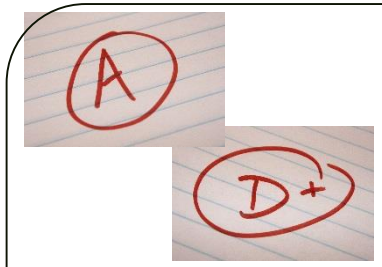
- Canadians and stakeholders will have a transparent **understanding** of the flood **risk** that they are exposed to and the **economic impact** of that **risk**



Understanding Risk

Winning Condition #2

- Canadians and Stakeholders will utilize the understanding to make **sound adaptation decisions**, to **incent** the **right behavior**



"Preparedness of Fifteen Canadian Cities to Limit Flood Damage" Report

Winning Condition #3

- **Canadians have access to a means to transfer the risks associated with flood damage that remain after adaptation**

Modeling The Impacts of Climate Change Risk

4 Questions to Underwrite a New Risk

- Do you understand the nature of the risk ?
- Do you have the internal capacity ?
- Can you get the right conditions ?
- Do you want to expose your capital ?

Journey : Understanding to Pricing the Risk

Gather Information

UNIVERSITÉ LAVAL

Google

Model Research

Understand Model

Convert in risk indicator

Frequency
X
Severity
=
Lost Cost

Operationalize pricing

- *Policy conditions*
- *Clients needs*
- *Include risk factor*
- *External data*
- *Other models*

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Operationalize Pricing

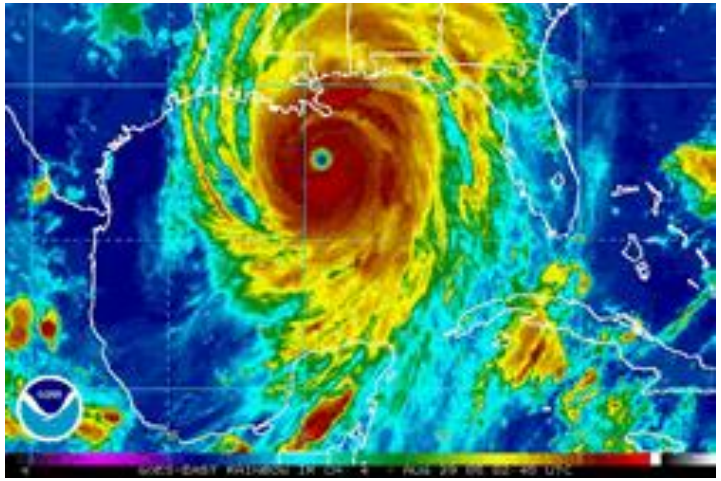
- *Policy Conditions*
- *Clients Needs*
- *Include Risk Factor*
- *External Data*
- *Other Models*

Big Data

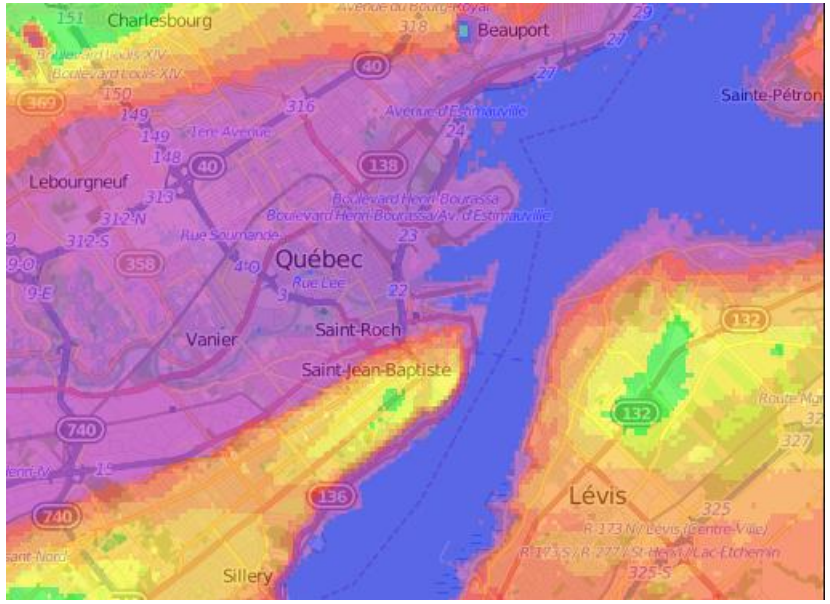
Past is no longer predictive of the future … or a lot less

There is a lot out there … for FREE !

Geocoded risk elements



Meteorology



Topography

Big Data also means UNSTRUCTURED

Claim Notes

"… severe flooding …
… 3 feet of water."

"6 inches of water …
… clear water."

"… 3-4 feet of water …
… in basement."

Innovative ways to leverage Big Data … ALL TOGETHER

Government of Canada | Gouvernement du Canada

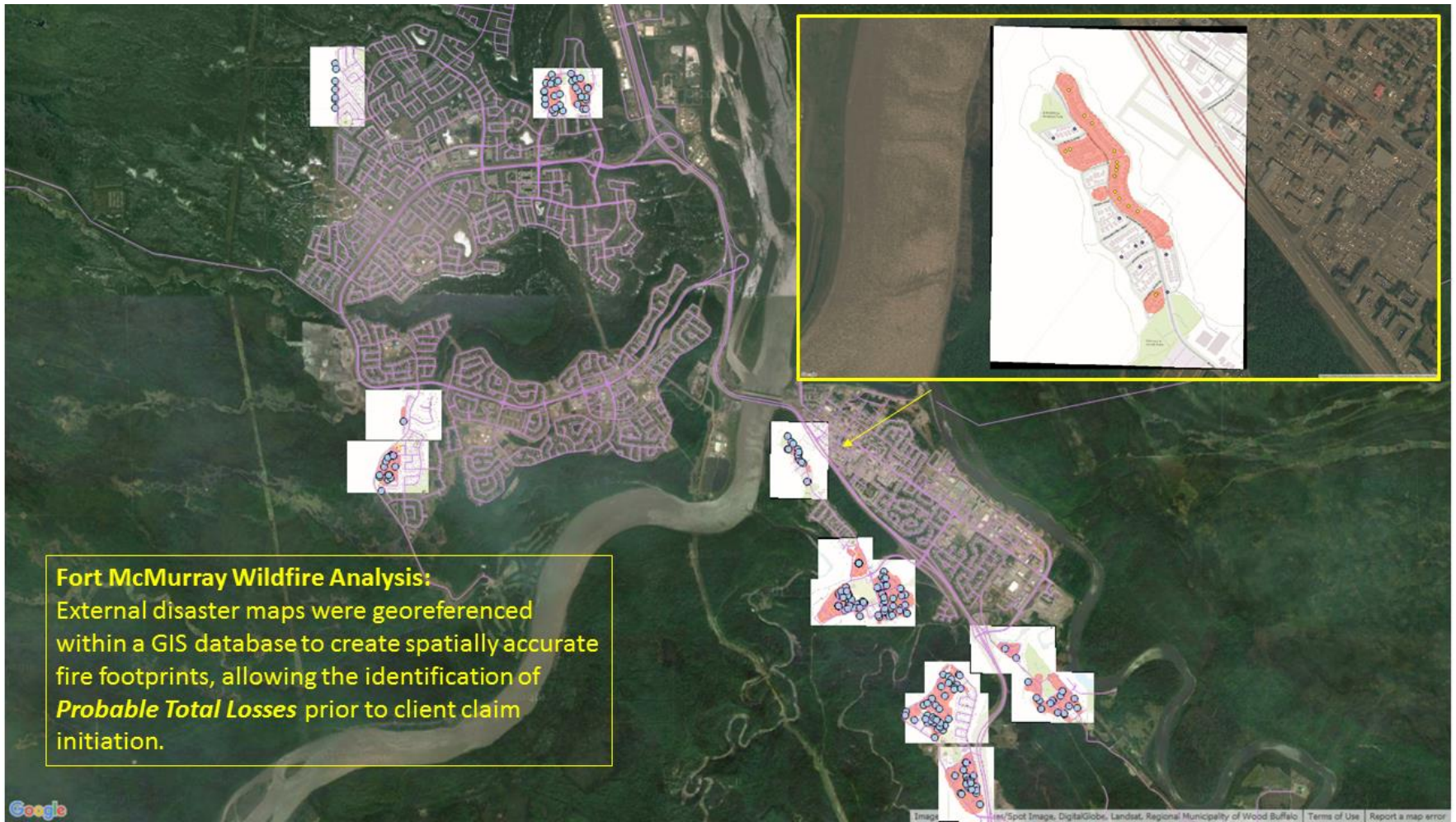
Open Data Portal

121,612 datasets found

[Co-operators Internal Big Data & Analytic Lab]

The Fort McMurray Example

Imagine if we had this during the 1998 Ice Storm



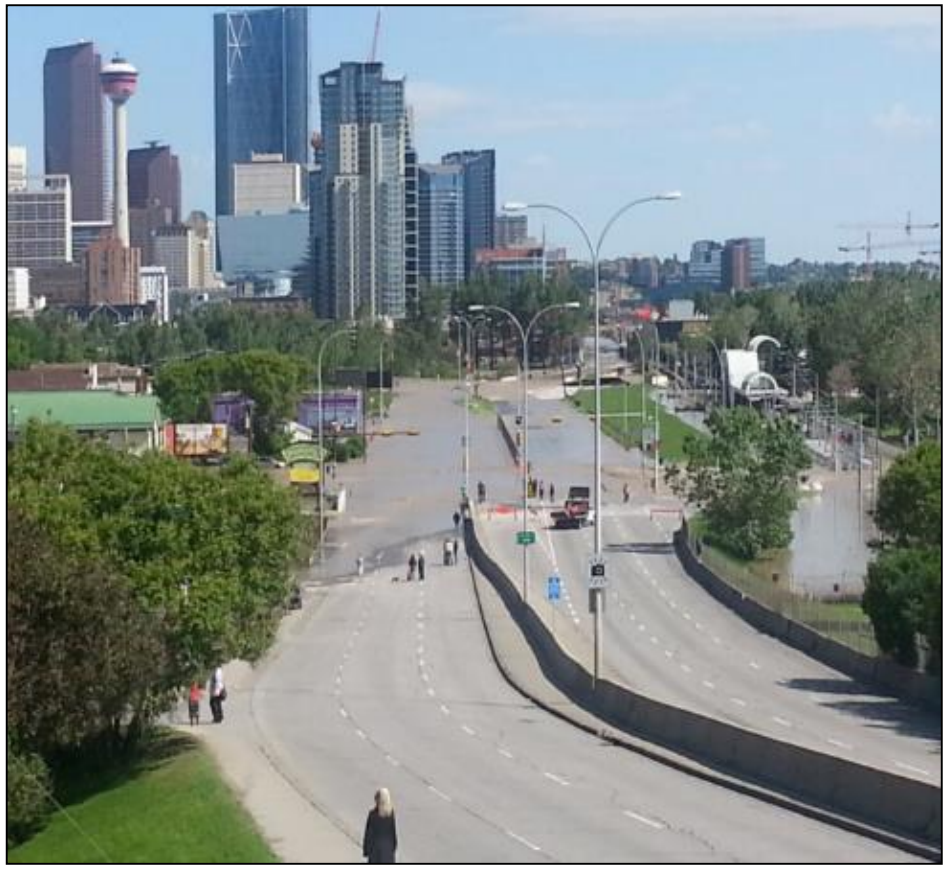
Case Study

Flood Insurance at Co-operators

2013: 2 floods in 2 weeks

+

Canada was the only G8 country without flood insurance



Challenge #1- Misunderstandings

Coverages

"70% of insureds believed they are covered for flood"

Confusion with Sewer Backup, DFAA, …

Risk

"Insureds are underestimating their flood risk potential"

1 in 100/500 years events don't occur in a lifetime …

Challenge #2- Complex New Phenomenon

Causes

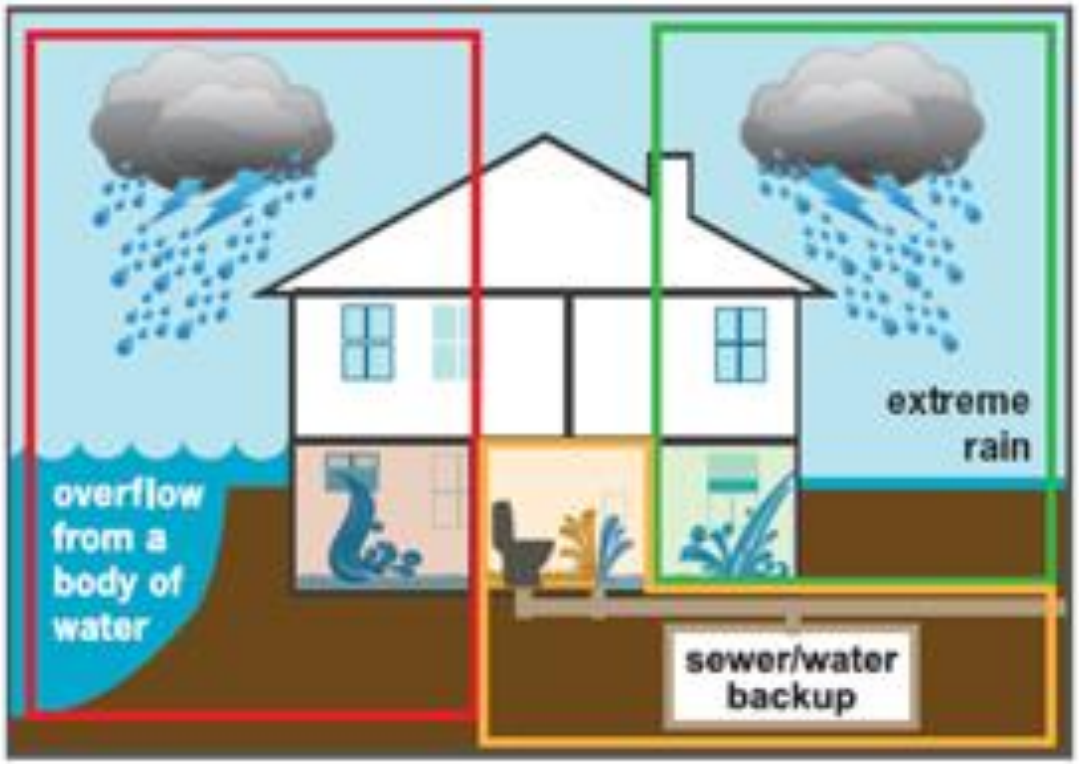
Fluvial, Pluvial, Coastal

Hydrology

Flow, depth, floodplains

Computations

Geocoding, Point-in-polygons



Challenge #3- No Claim Experience Data

No Coverage

↓

No internal data

↓

Can you imagine a traditional actuary without data ?

Challenge #3- No Claim Experience Data

No Coverage

↓

No internal data

↓

Can you imagine a traditional actuary without data ?

How can I assess flood deductible / limit relativities ?

Challenge #3- No Claim Experience Data

No Coverage
↓
No internal data
↓
Can you imagine a traditional actuary without data ?

As useless as a skier without snow …

Fortunately, will still had creativity!

Solution #1- Involve Academics

Find specialists + Research opportunities

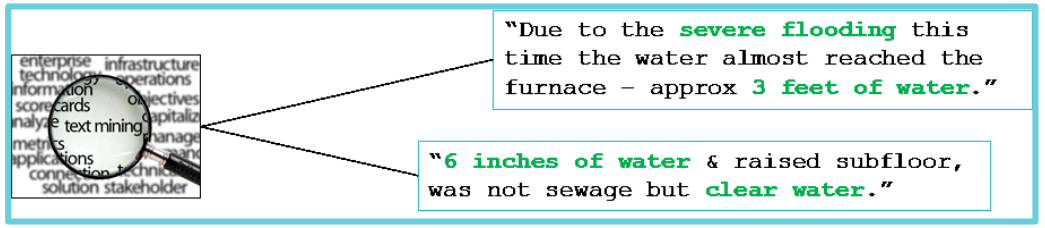
Solution #2- Ask Experts

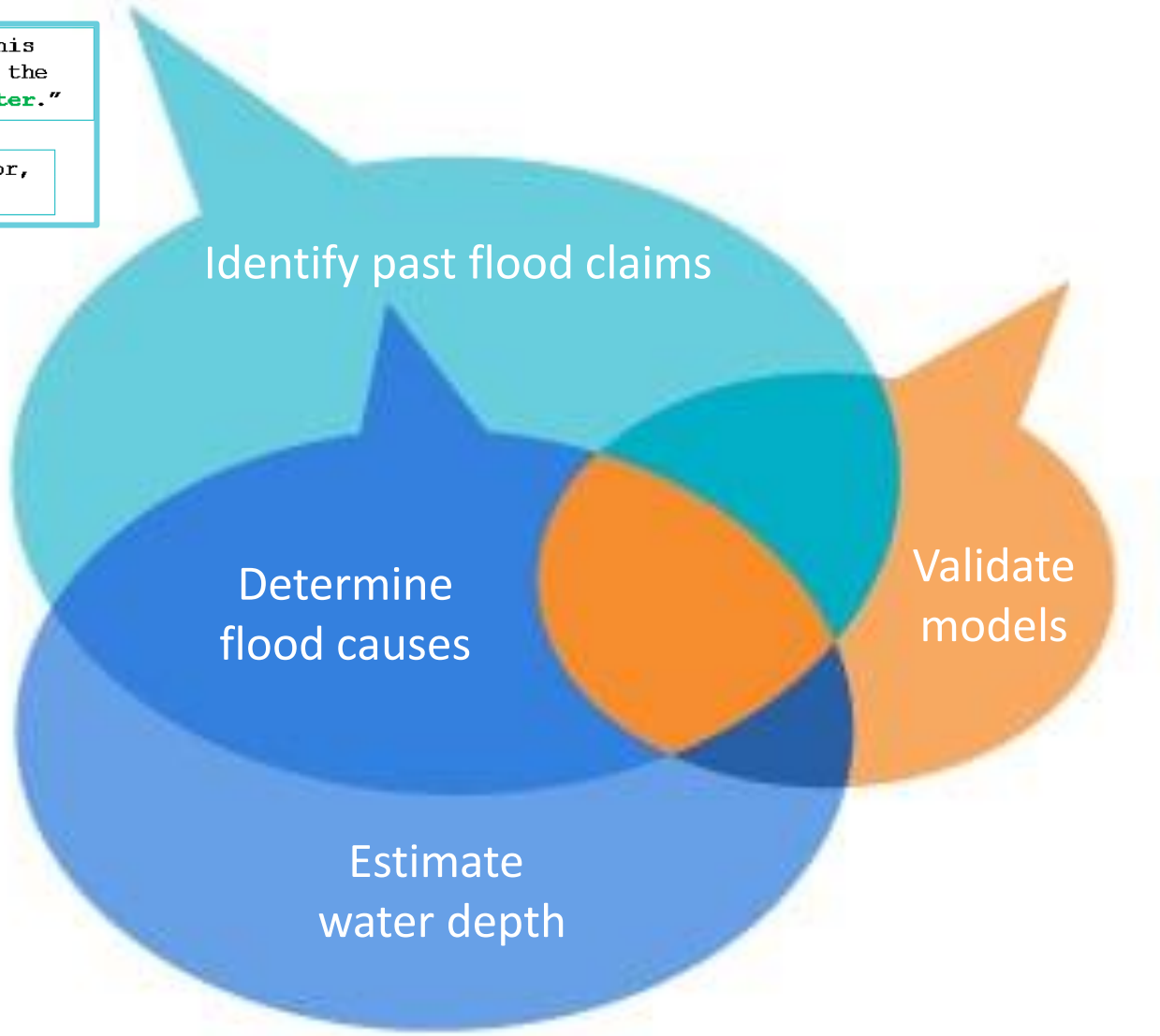
Validate findings + Create partnerships

Solution #3- Use Big Data … And Transform it !

Elevation	• Resolution • Canadawide (?)
Watercourses	• Geolocation • Flow
Rainfalls	• Averages • Observations
Floodplains	• Internal vs external model • Canadawide (?)
Other Sources	• Soil type – Past events – Defenses • Other partners

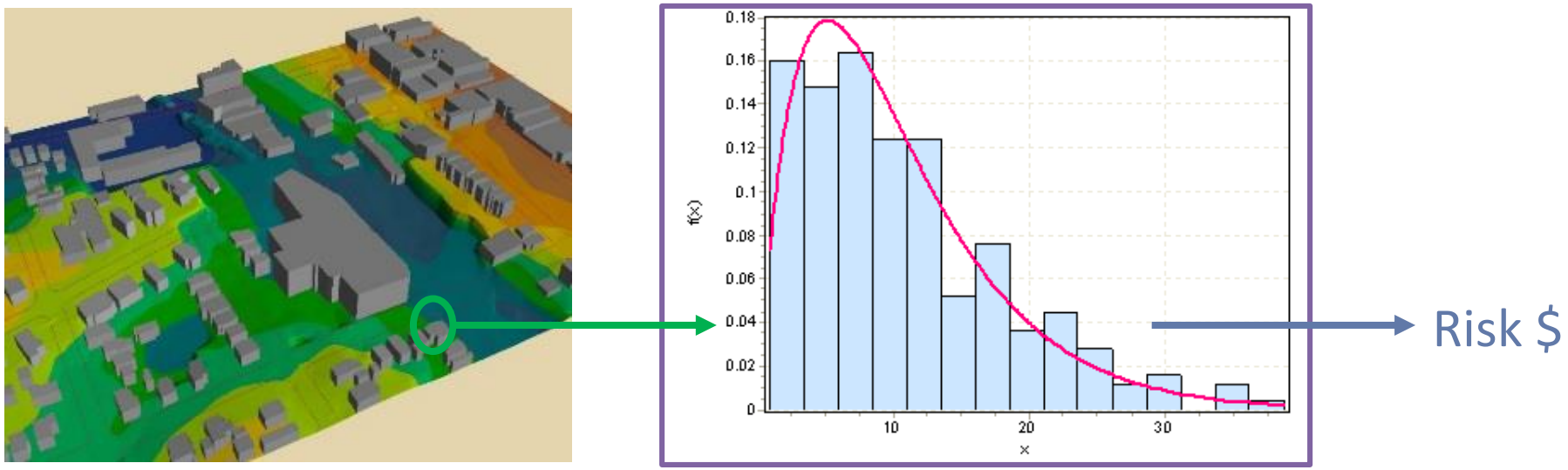
Solution #4- Use text mining





Solution #5- Involve Hydrologists

Model water / Assess pure risk !



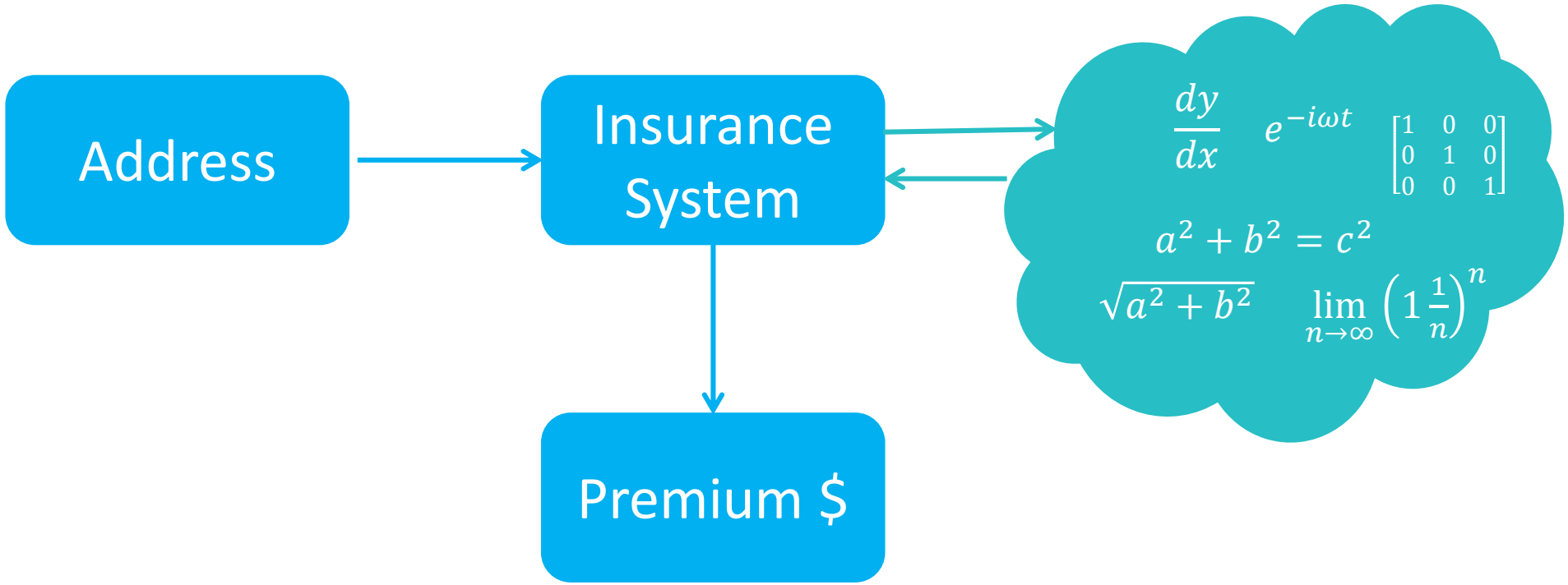
INRS
Université d'avant-garde

Solution #6- Involve Civil Engineers

Assess performance of man-made flood defenses

Solution #7- Leverage Cloud Computing

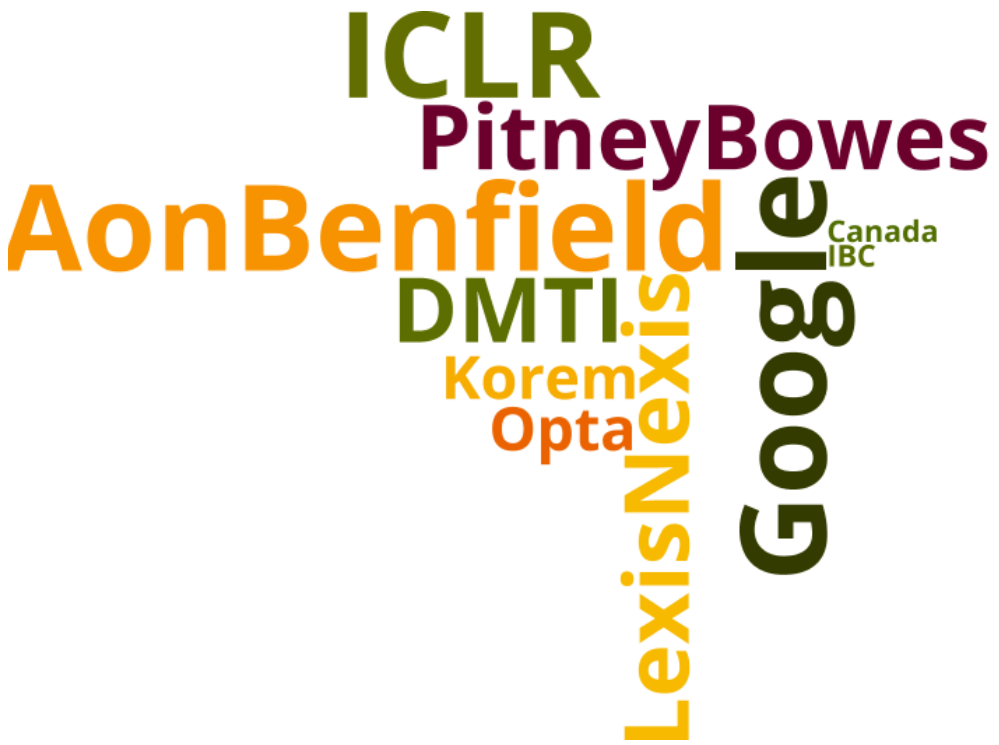
Geocoding + Nearest Watercourse + Flood Zoning



Solution #8- Actuaries & Data Scientists

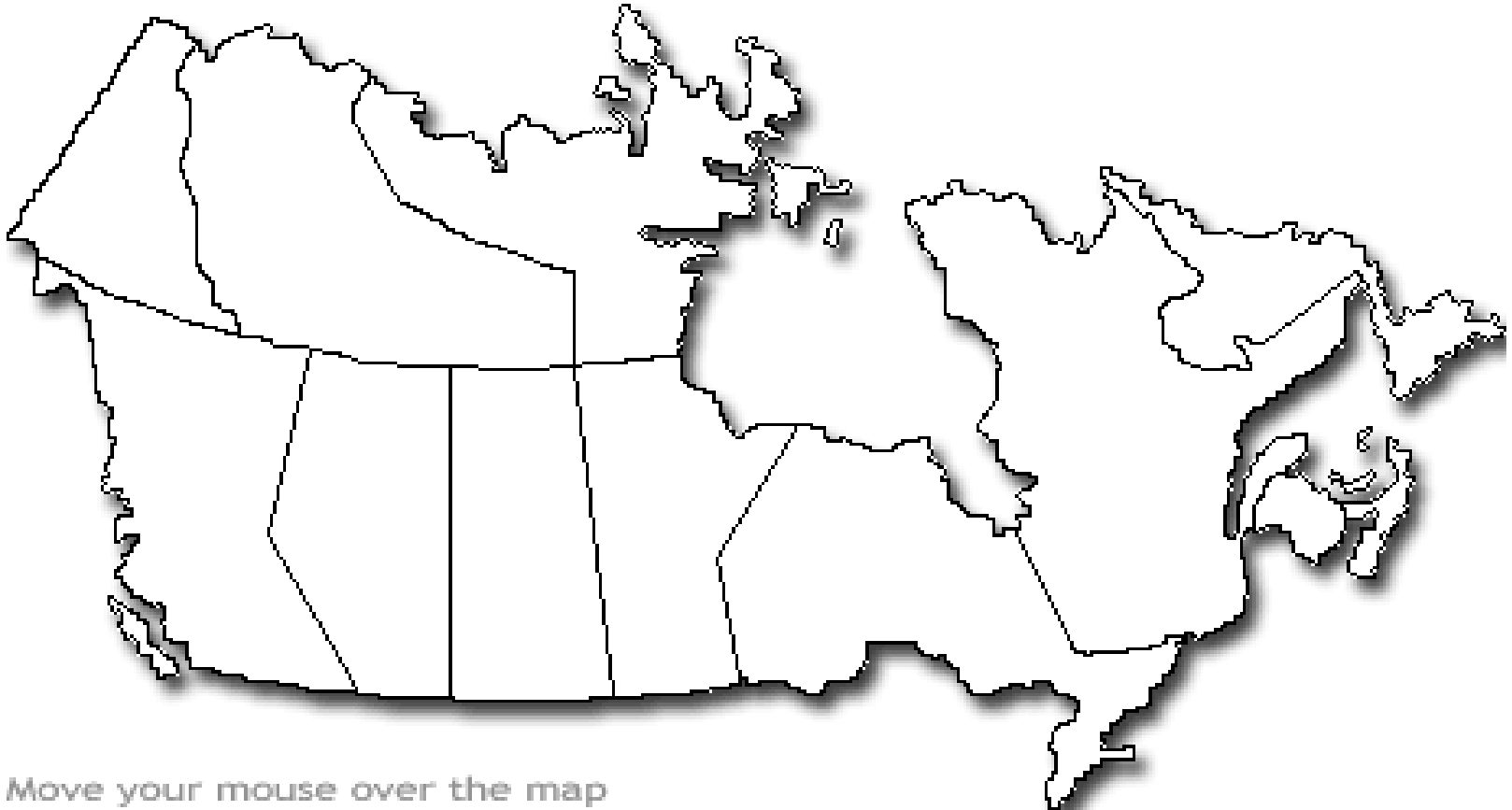
Convert Risk Indicators into Premiums

Solution #9- Involve All Sectors

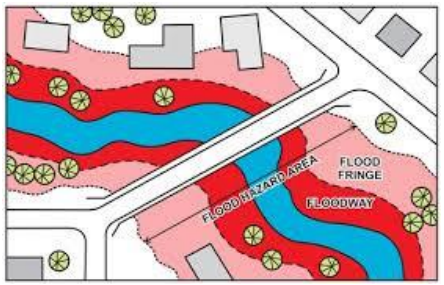


Solution #10- Floodplain Maps

Urgent Need for Canada + Let's Work Together on it!



The Model Framework



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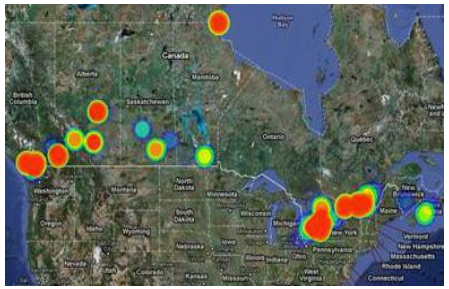

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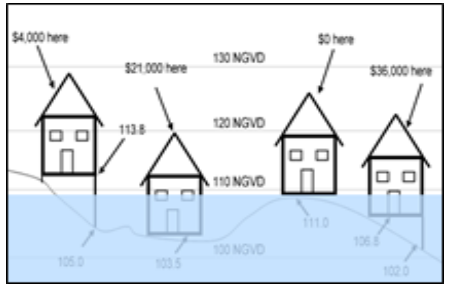
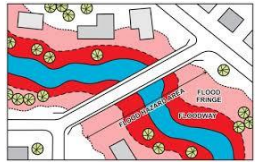


= **Loss**

Events | Exposure | Damages

Frequency | Severity

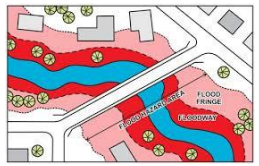


Event Component

Statistical Distribution of Water Levels

Digital Terrain Model

Events of Various Probabilities



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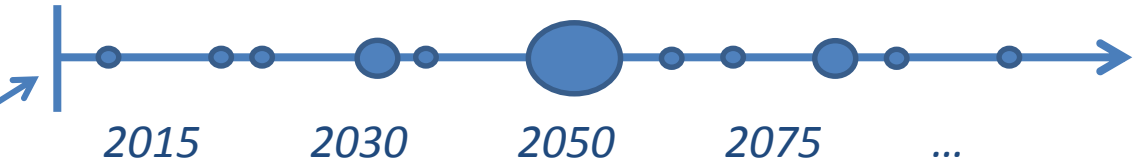

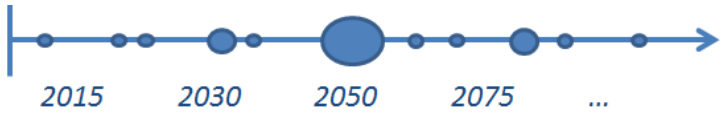

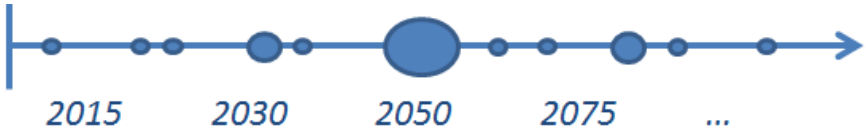

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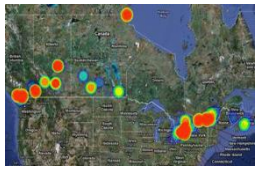


Exposure Data

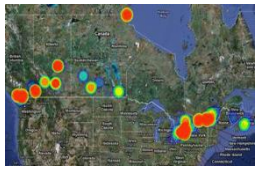
Statistical Distribution of Water Levels

Digital Terrain Model

Events of Various Probabilities

Who is Flooded?

Location of Insured Properties



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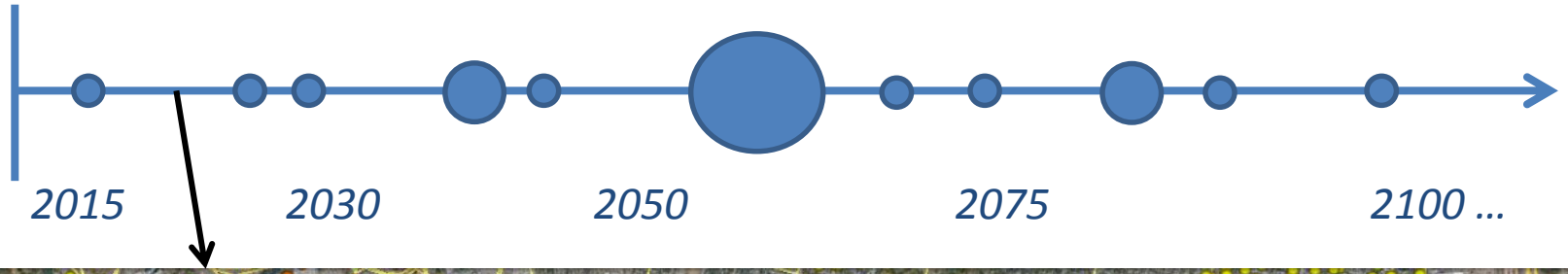

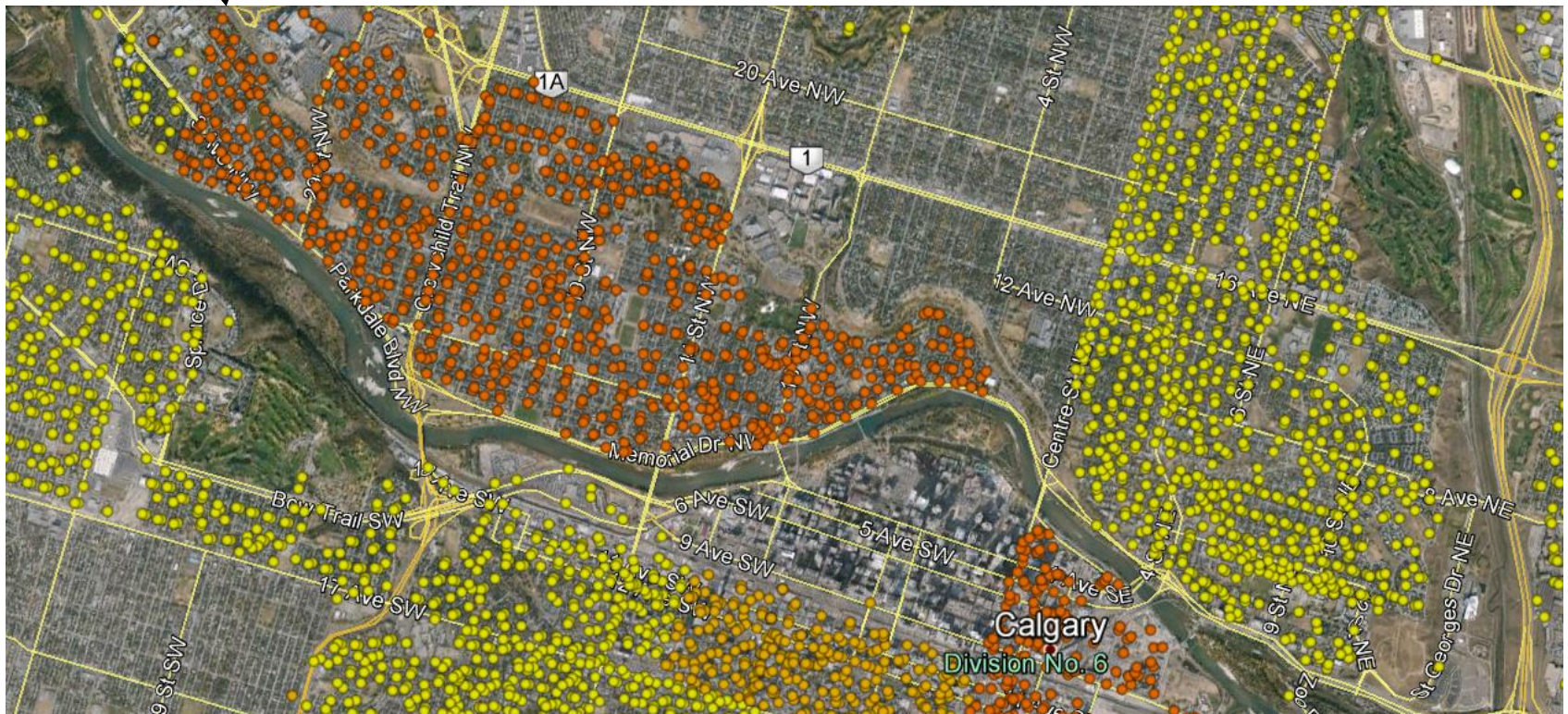

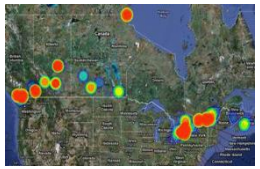

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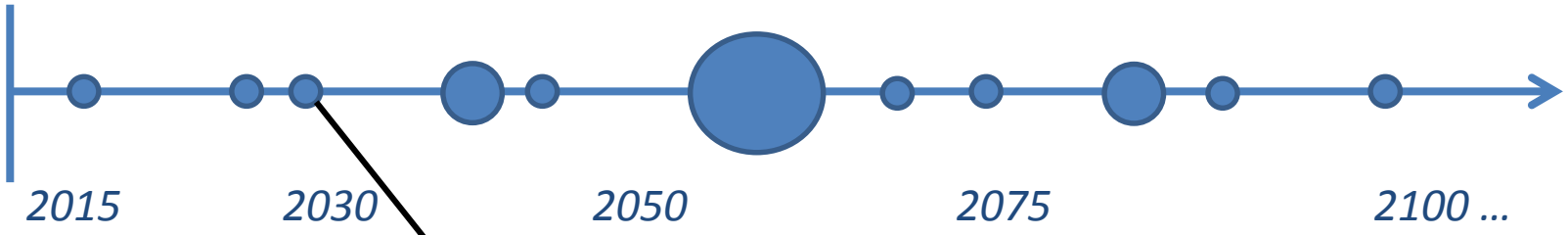

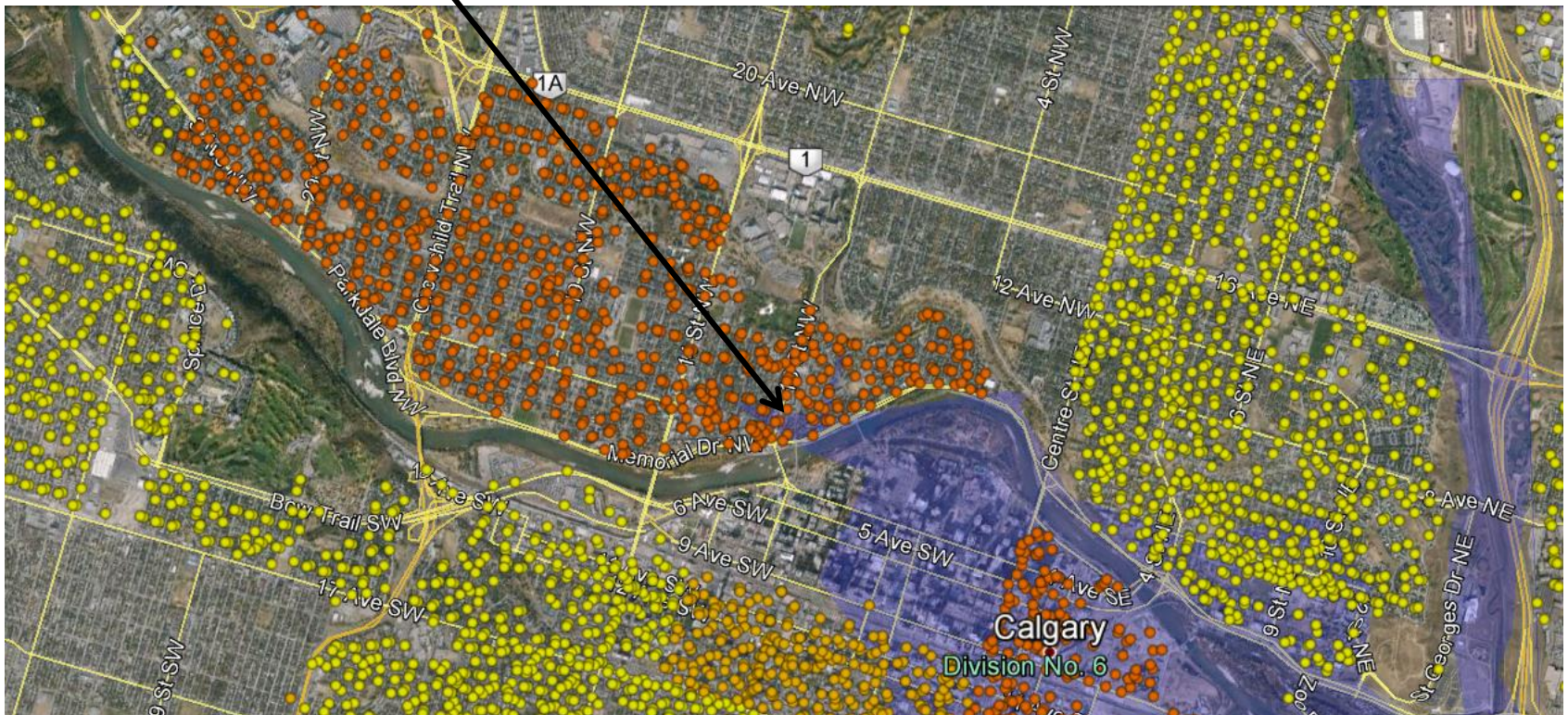

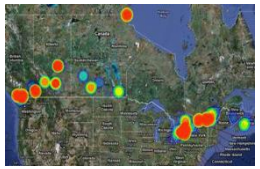

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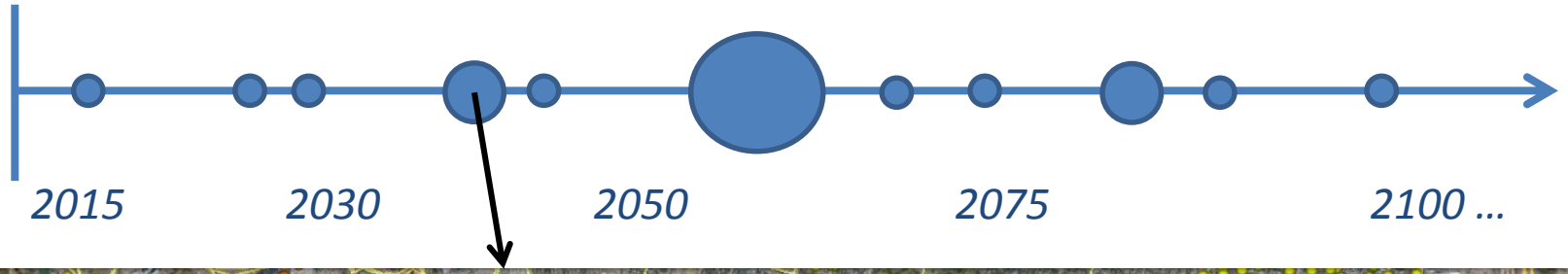

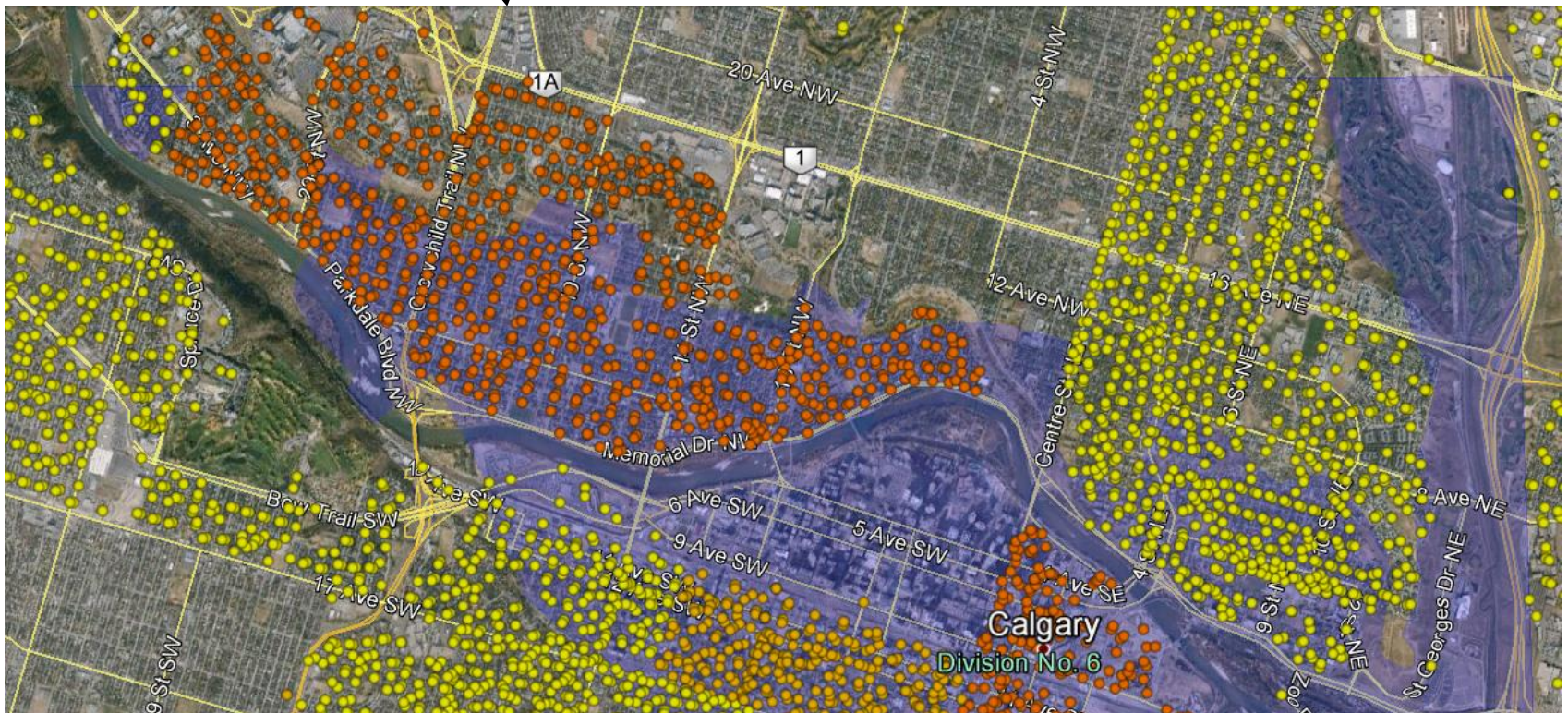

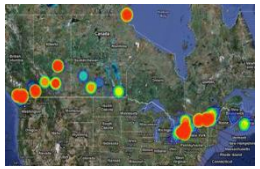

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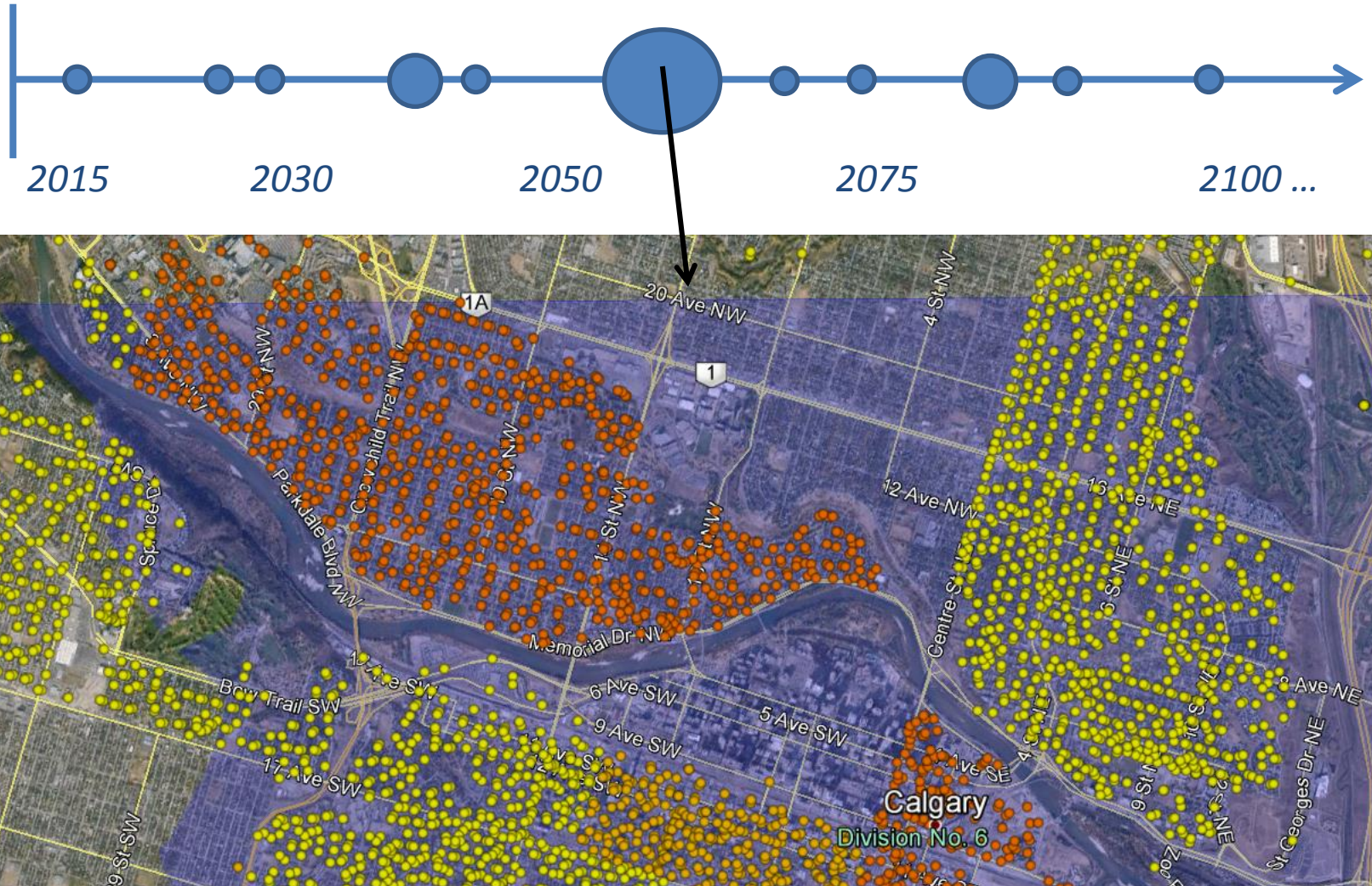
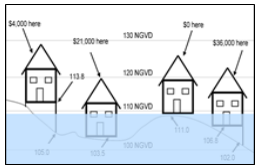




Damage Function

Events of Various Probabilities

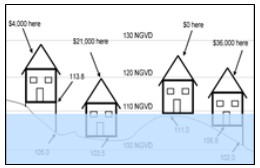
Location of Insured Properties

Who is Flooded?

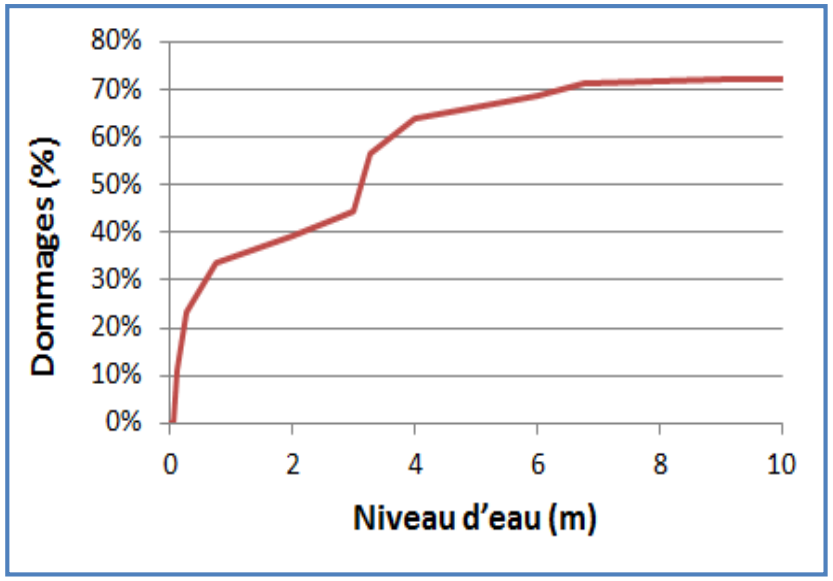
- Deductible & Limit
- Building type
  …

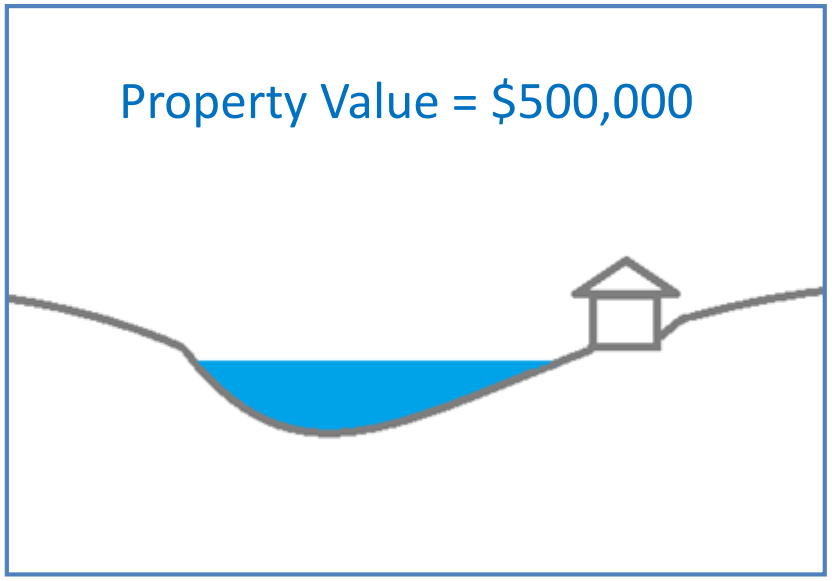
Engineers' Damage Curves

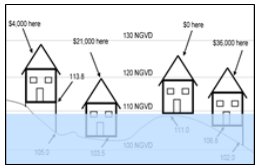
Insured Losses



Damage Function







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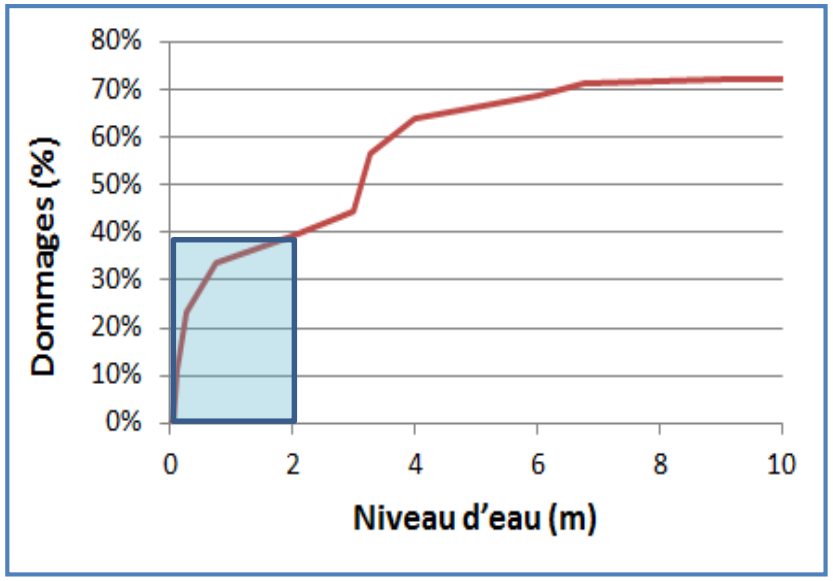
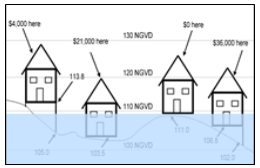
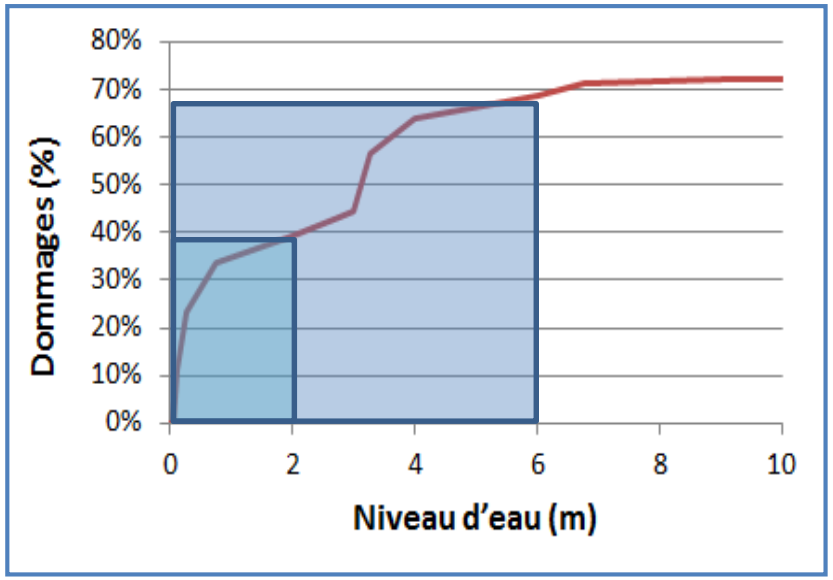
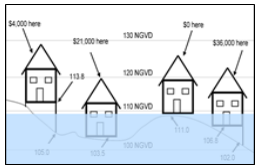




Damage Function





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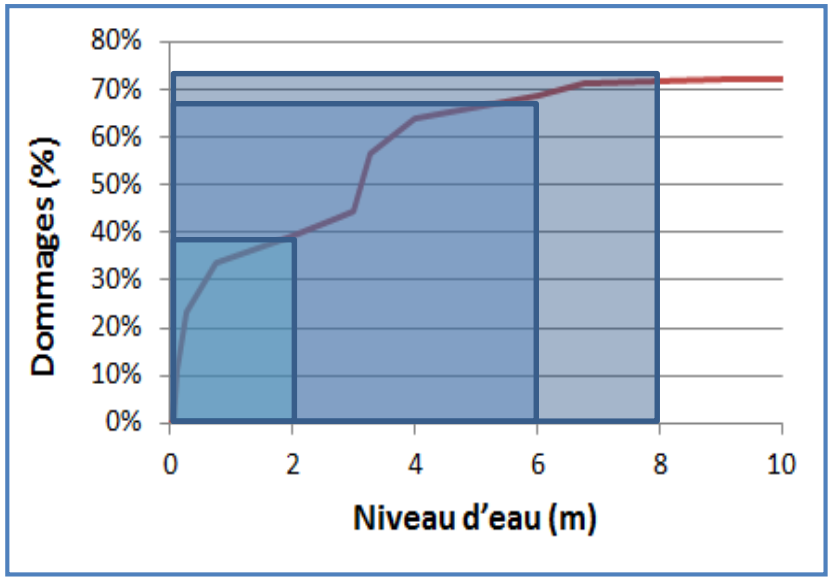
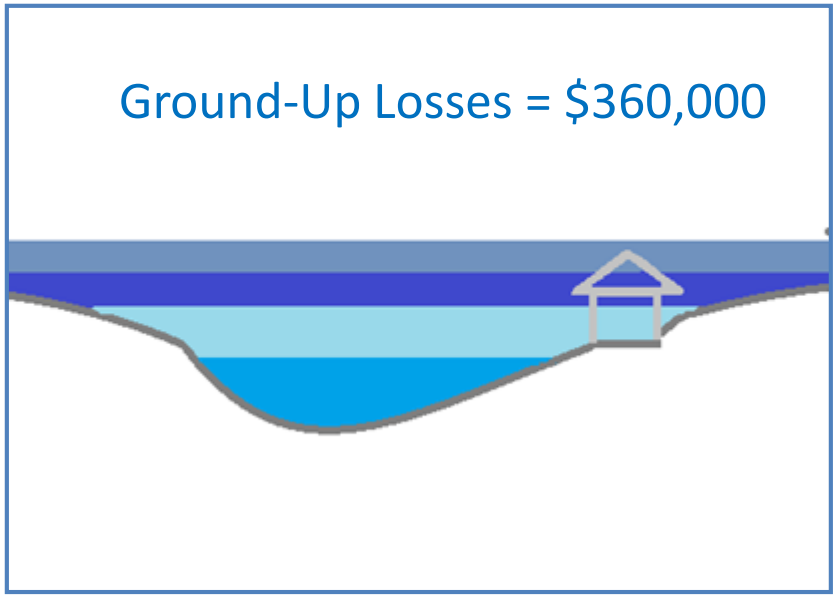




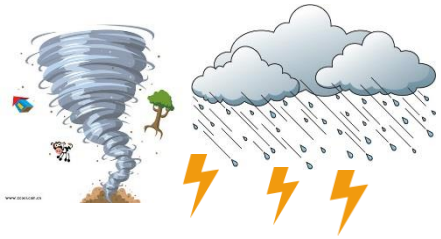
Conclusion

5 Lessons Learned

1. Don’t neglect the model understanding part
2. Involve every key partners
3. Leverage Big Data
4. Be creative and innovate
5. Plan enough time to convert risk indicator into a price

Conclusion

Let’s BETTER cover our clients by collaborating together!




Thank You !