Atelier A1

Changement des fréquences en évènements climatiques et impact sur la réassurance

2 février 9h-10h30

Atelier A1

Intervenants

Alix ROUMAGNAC	**Président**	predict – Risques sous haute surveillance
Robert MUIR	**Chief Research Officer**	RMS
Ernst RAUCH	**Head Corporate Climate Centre**	Munich RE

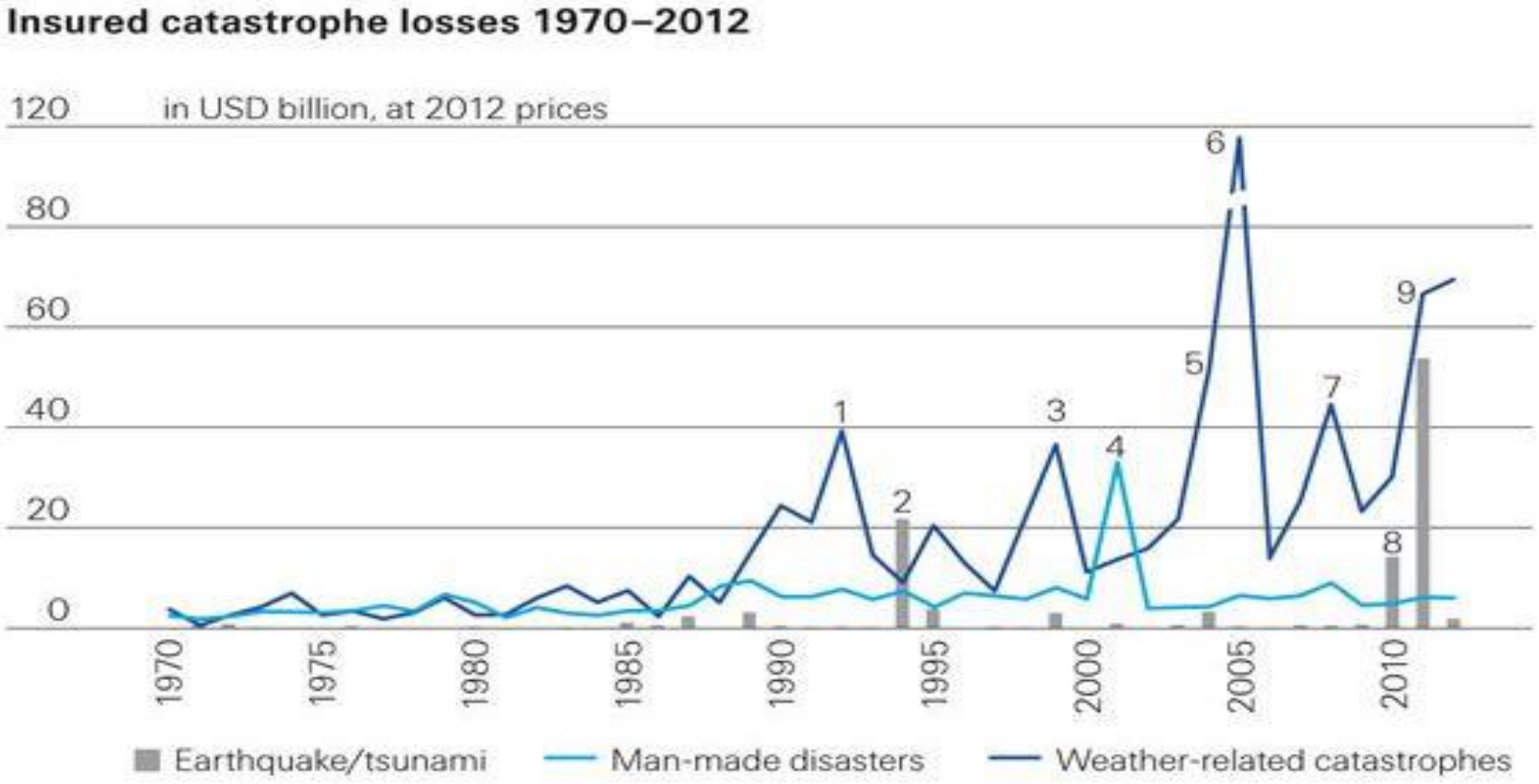
Modérateur

Michel JOSSET	**Responsable assurances et immobilier**	faurecia

Œuvrer pour la diminution des conséquences des événements climatiques

Alix Roumagnac : Predict services

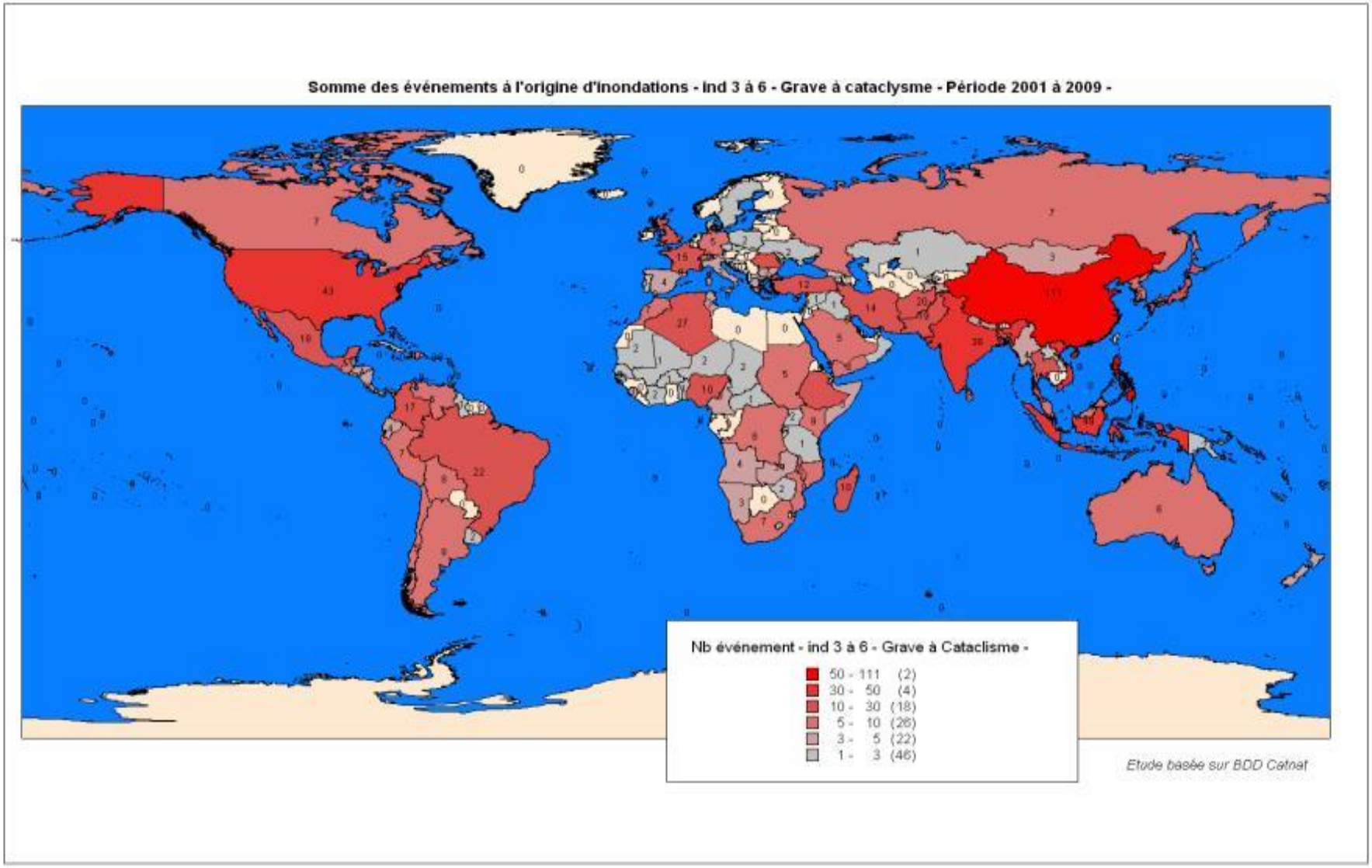
L’impact des catastrophes : une évolution marquée



1 1992: Hurricane Andrew
2 1994: Northridge earthquake
3 1999: Winter Storm Lothar
4 2001: 9/11 attacks
5 2004: Hurricanes Ivan, Charley, Frances
6 2005: Hurricanes Katrina, Rita, Wilma
7 2008: Hurricanes Ike, Gustav
8 2010: Chile, New Zealand earthquakes
9 2011: Japan, New Zealand earthquakes, Thailand flood

Source Swiss-re

Les inondations, un phénomène planétaire

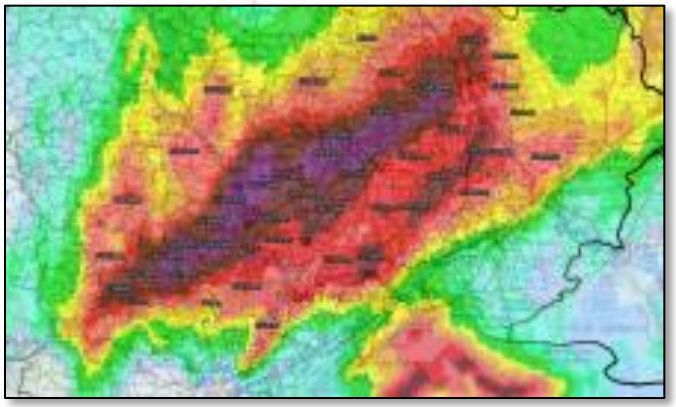


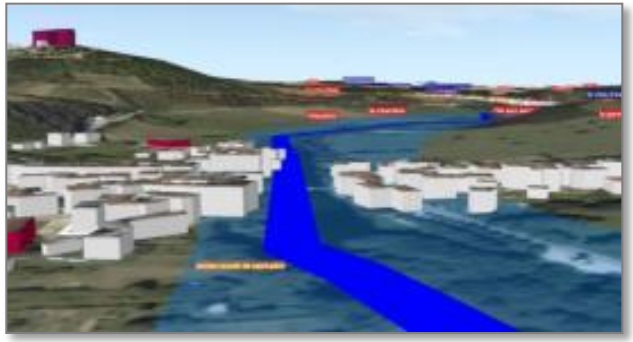
Les risques Naturels : mieux les comprendre pour mieux les gérer

predict

28 ingénieurs spécialistes de la gestion des risques
en astreinte **24h24 et 7jours/7**

Les Clefs de la gestion du risque



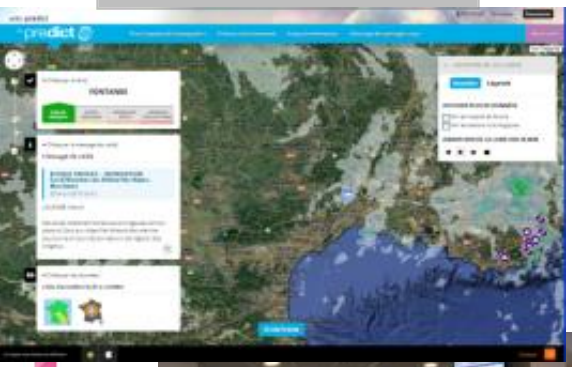


APRES
Retour d'expérience et information

AVANT
Prévention Organisatio : PCS

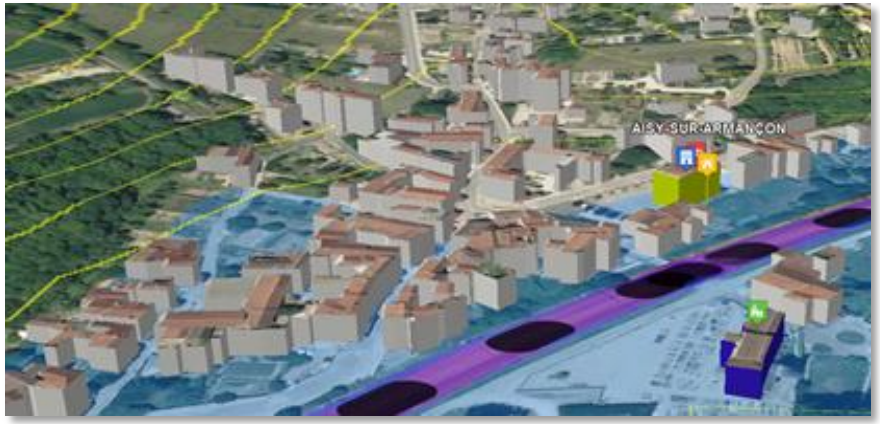
GESTION DU RISQUE

PENDANT
Anticipation et Gestion

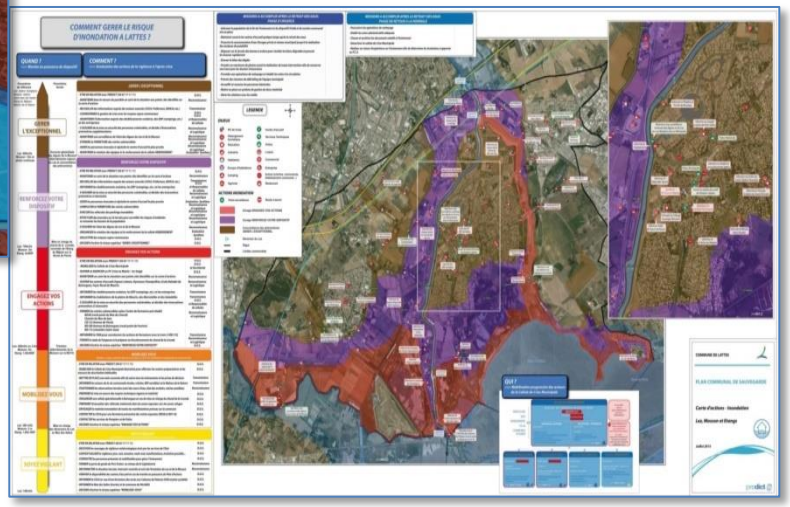


AMRAE RENCONTRES

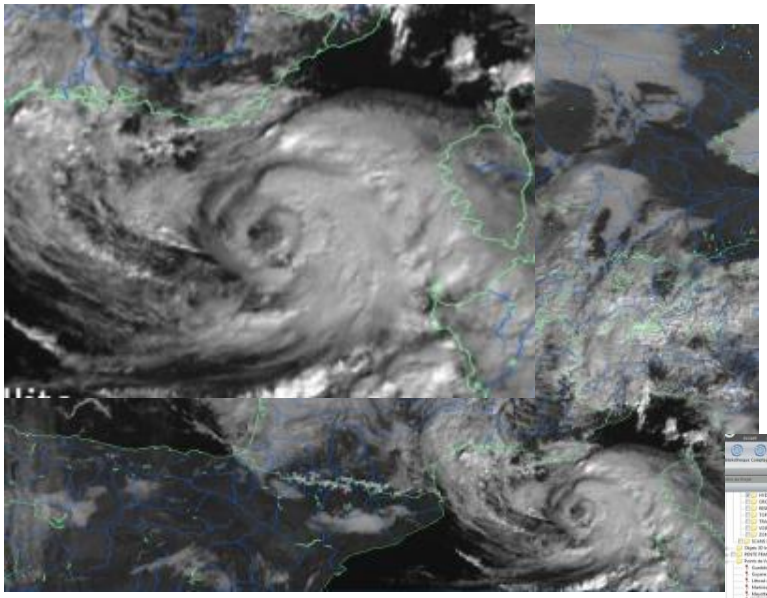
SE PREPARER, organiser la réponse opérationnelle



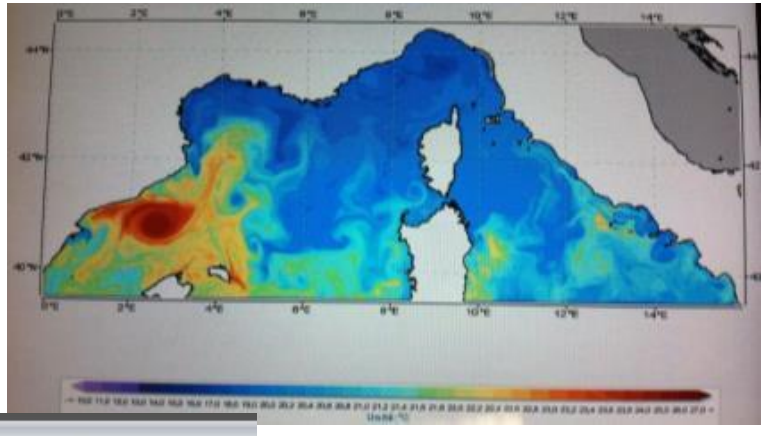
Analyser la vulnérabilité



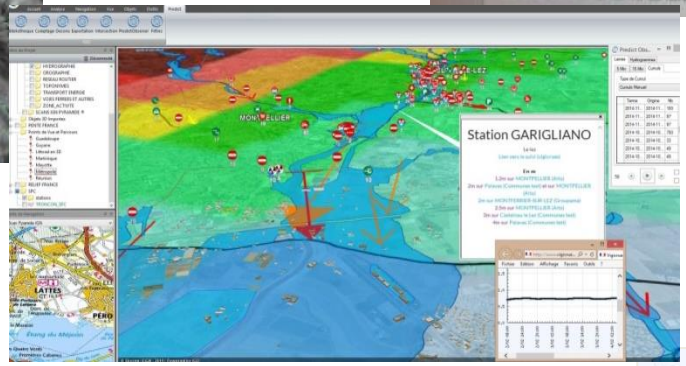
Concevoir une organisation opérationnelle de gestion des risques



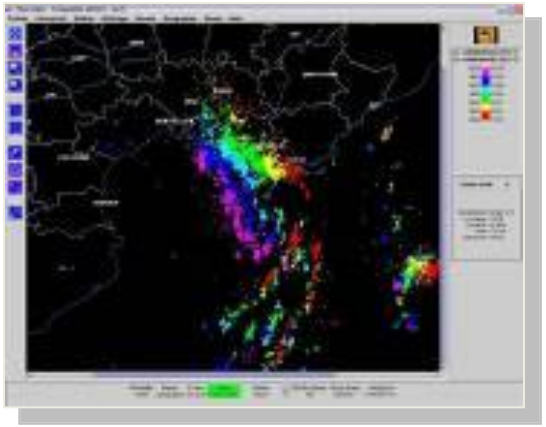
Masses nuageuses - donnée satellite nov 2011



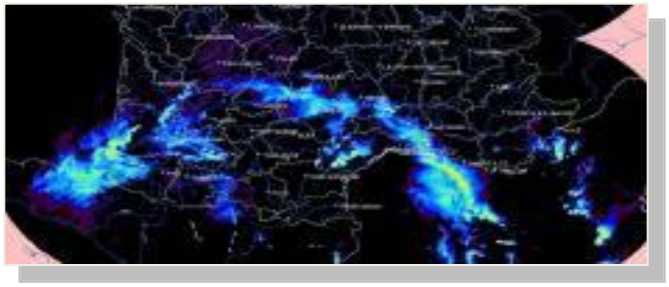
Température Mer Nov 2011

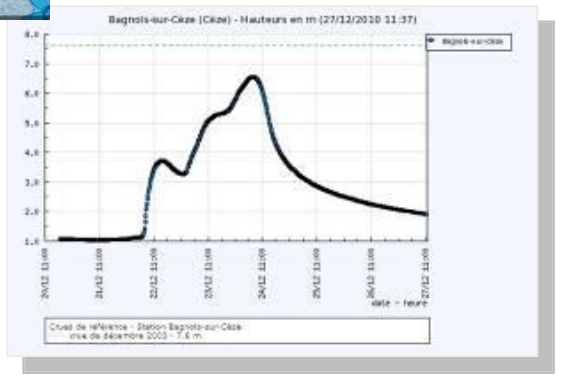


Intensité des précipitations au km²
chaque 5 minutes



Impacts de foudre ,donnée radar pluie

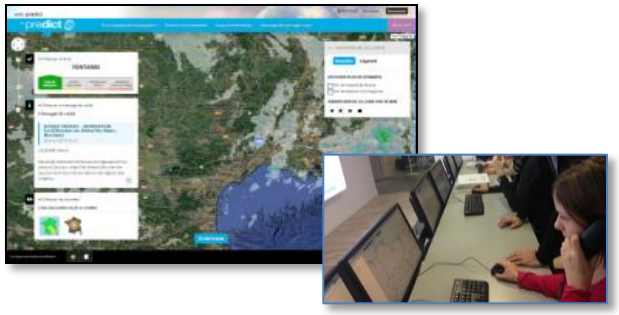




Hauteur/débit via les stations de mesure

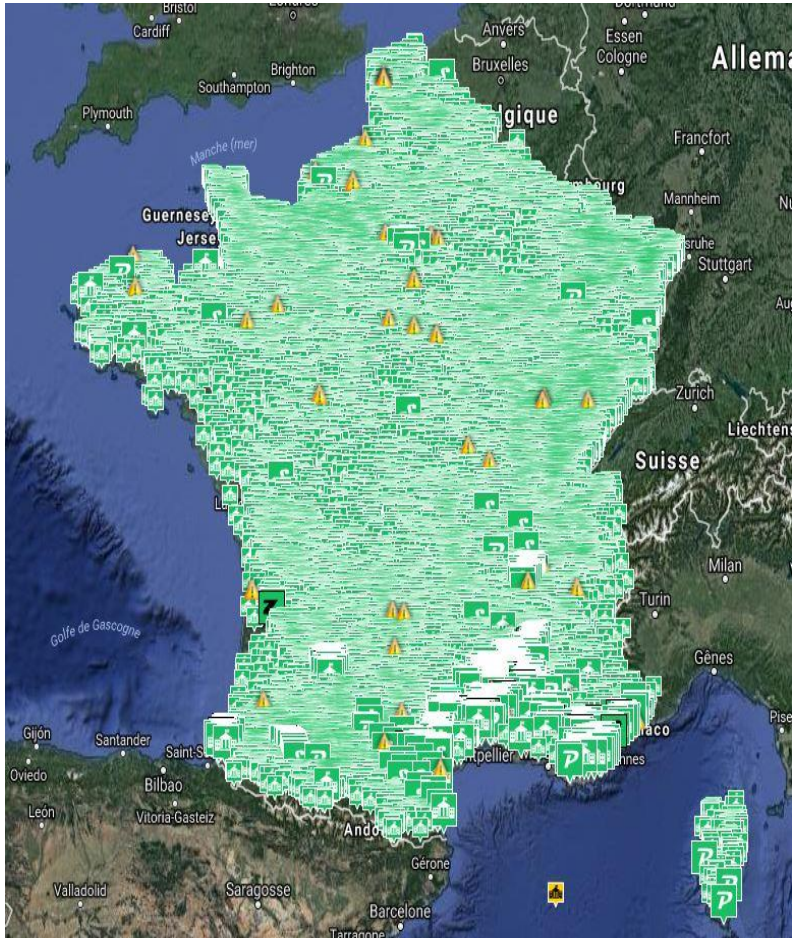
1/ Information et aide à la décision
depuis le vigie PREDICT services

@



2/ Prise de décision

3/ Action



EN 2017

Prés de 30 000 Communes Françaises

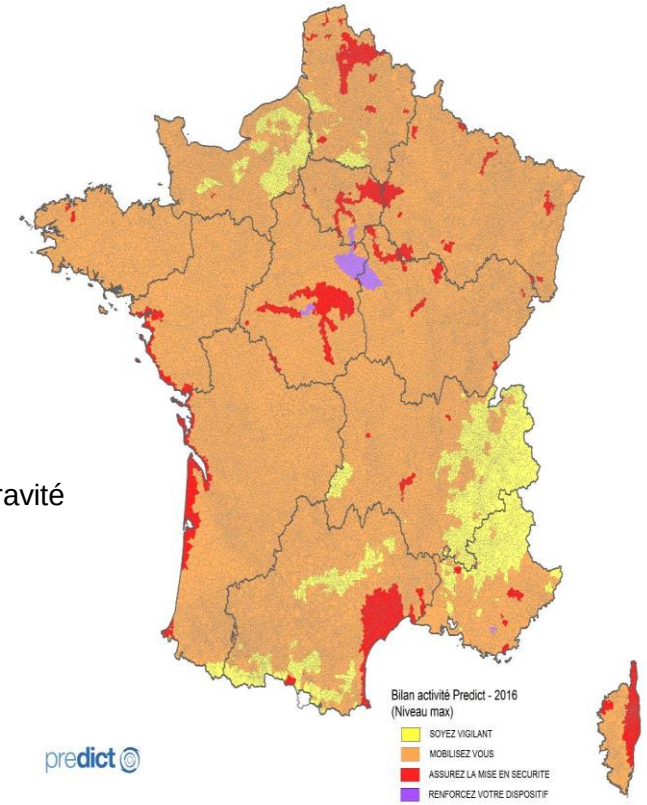
Font face aux risques avec les Services de Predict et de Météo France

- Une vigie **activée en H24 pendant 111 jours** pour le suivi de phénomènes à risque avec un record de 24 jours consécutifs pour les inondations du bassin Parisien en juin.

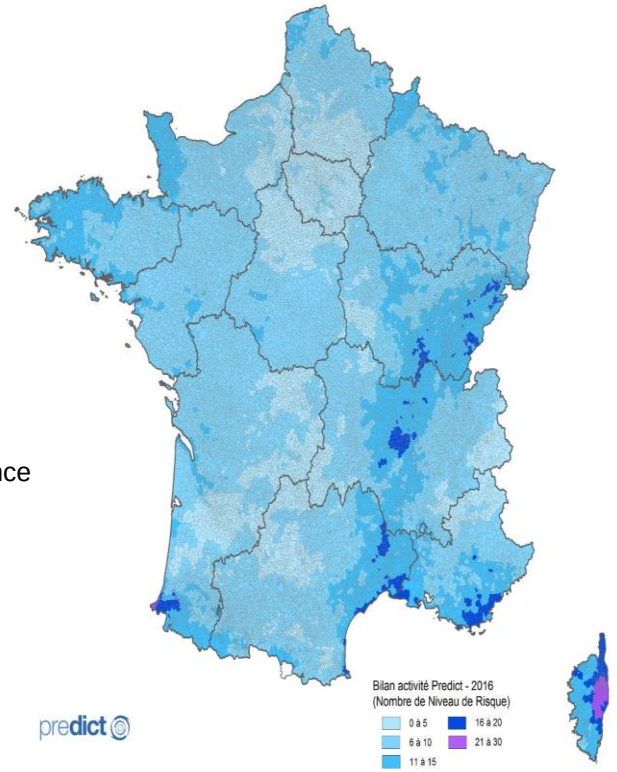
- **La quasi-totalité des communes ont bénéficié du service en 2016**
  1988 messages ont été envoyés pour conseiller les communes à activer leur plan communal de sauvegarde .

- Des Retours d'expérience systématiquement réalisés, plus de 95% de satisfaction.

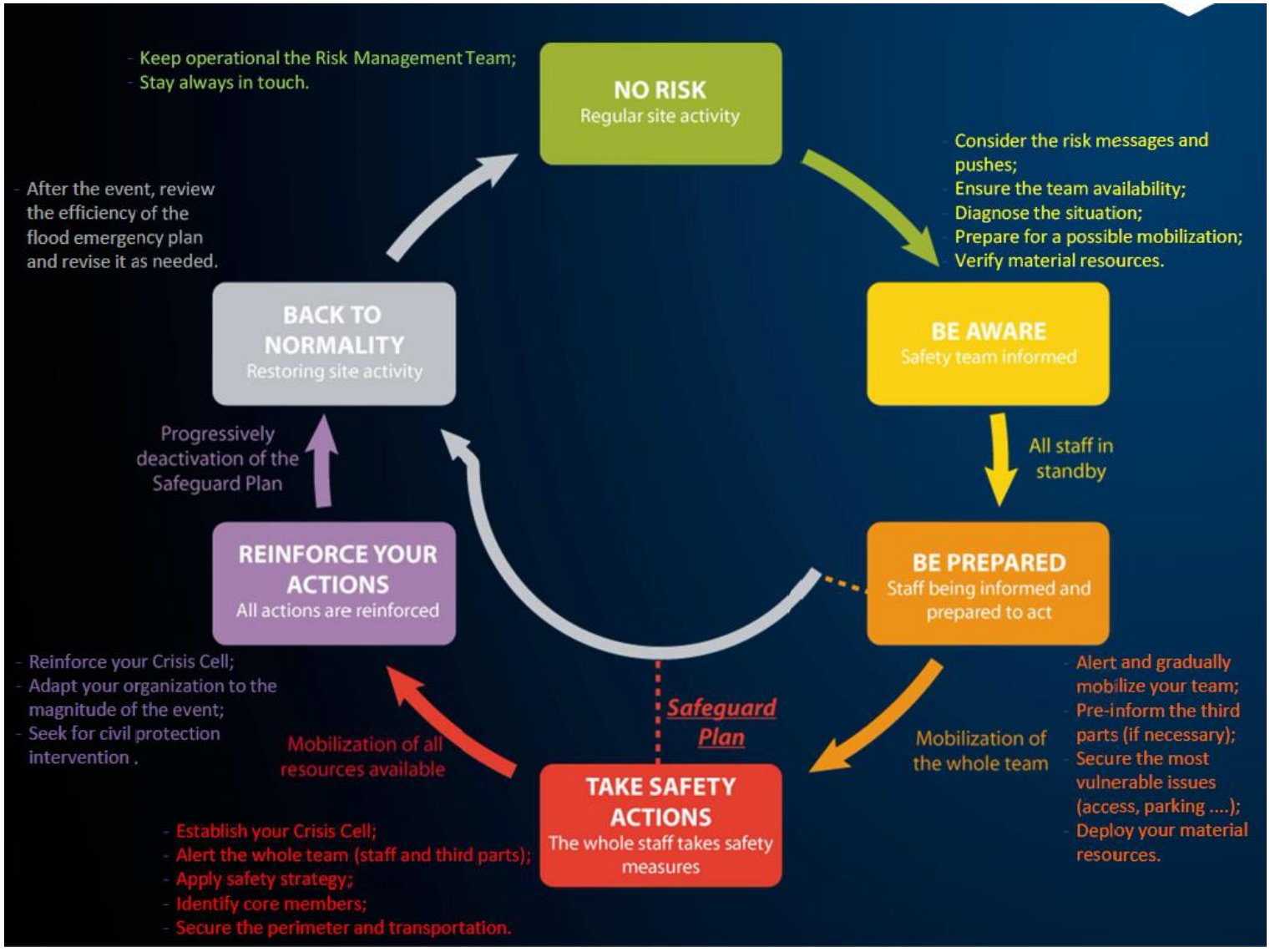
gravité



fréquence



Présentation générale du schéma d'alerte Prédict Services



Présentation générale du schéma d'alerte Prédict Services

- Le footprint industriel de Faurecia est surveillé constament par les spécialistes de Predict Services
- Les risques suivis sont : inondation par débordement de rivière, pluies torrentielles, sumersion côtière, tornades, chutes de neige
- Une alerte est également générée en cas de séisme important
- Les alertes sont générées manuellement par Predict Services quand un évènement menace un ou plusieurs sites de Faurecia
- L'alerte est graduée en fonction de l'intensité de la menace et de son développement

Présentation générale du schéma d'alerte Prédict Services

- Les alertes sont communiquées par mail et SMS pour chaque site concerné :aux personnes suivantes : Directeur d'usine, HSE site, Resp. maintenance, Directeur des Opérations, Resp HSE de la division

- La personnée alertée est invitée à se connecter sur la plate forme de Predict services pour consulter des informations sur l'évènement en cours et les recommandations associées

- Les superviseurs (assurance Groupe, Assureurs, HSE Groupe) sont informés à partir du stade "Take action"

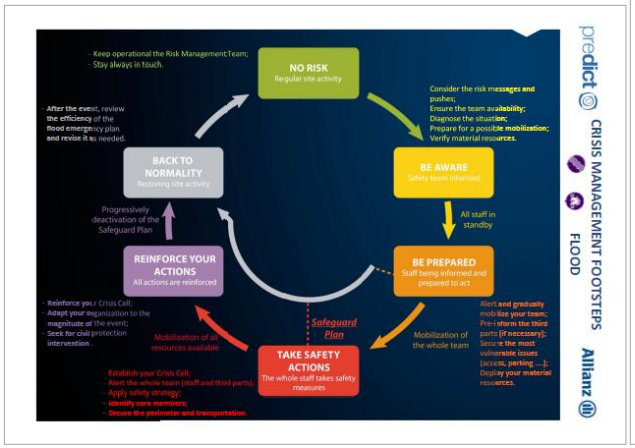
- L'historique des évènements est disponible

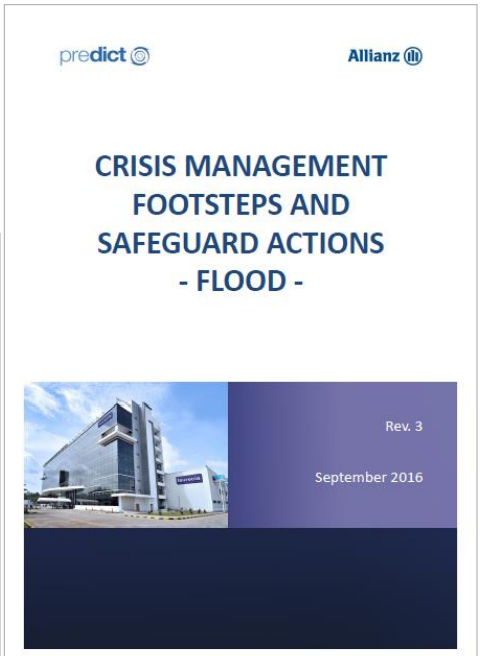
- Le service est opérationnel depuis juillet 2016

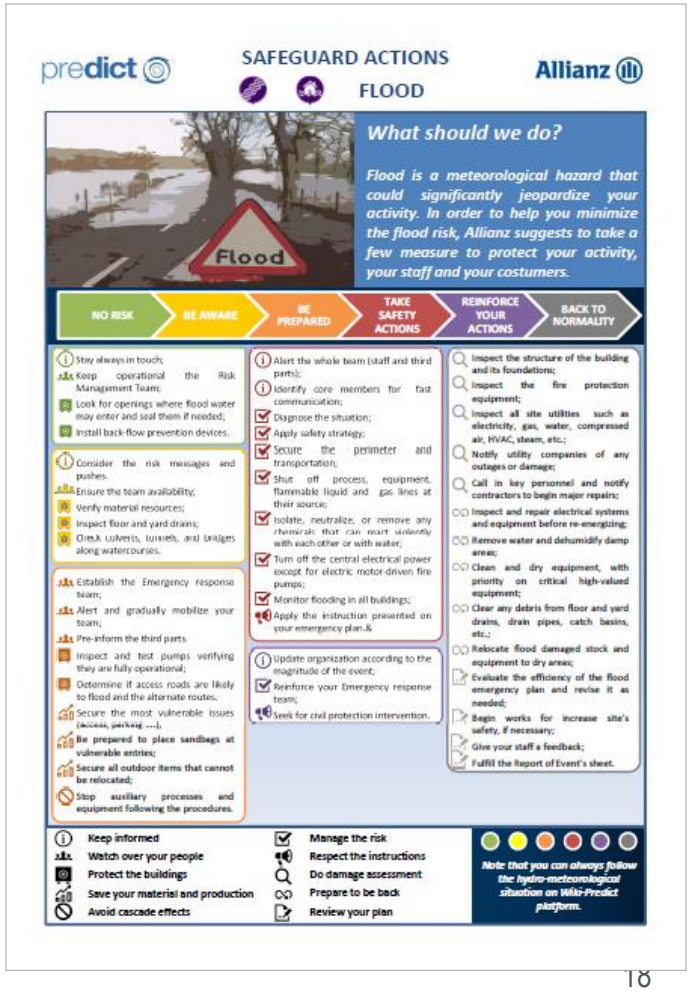
Page d'acueil plateforme Predict Services

Recommendations en cas d'alerte

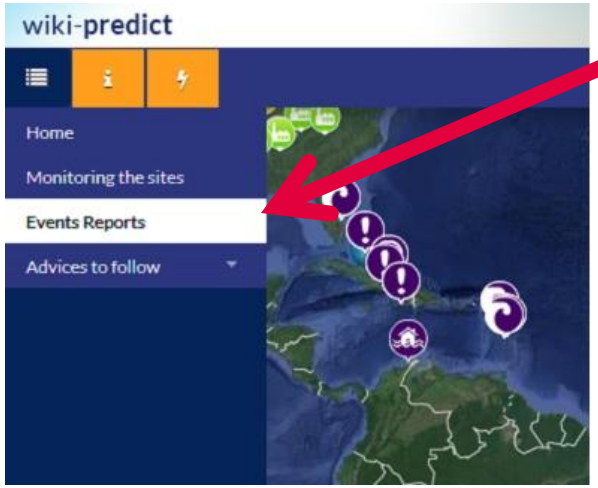
Recommandations en cas d'inondation, séisme, tempêtes…



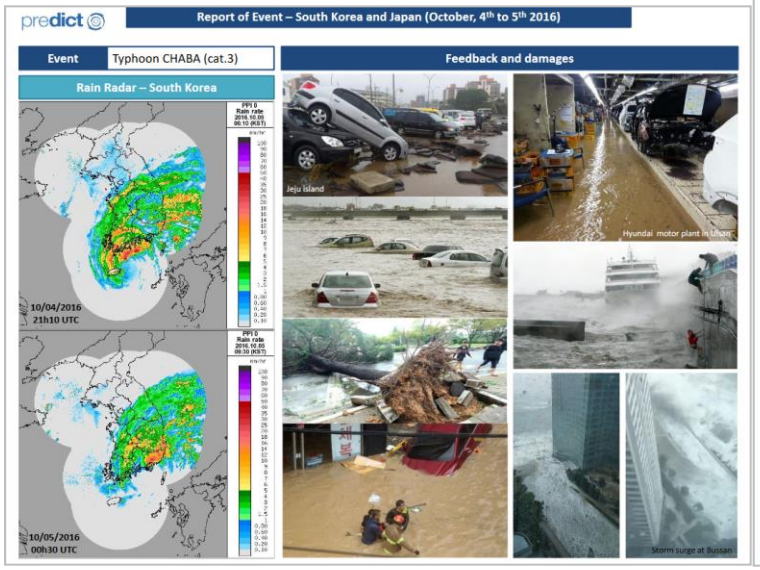


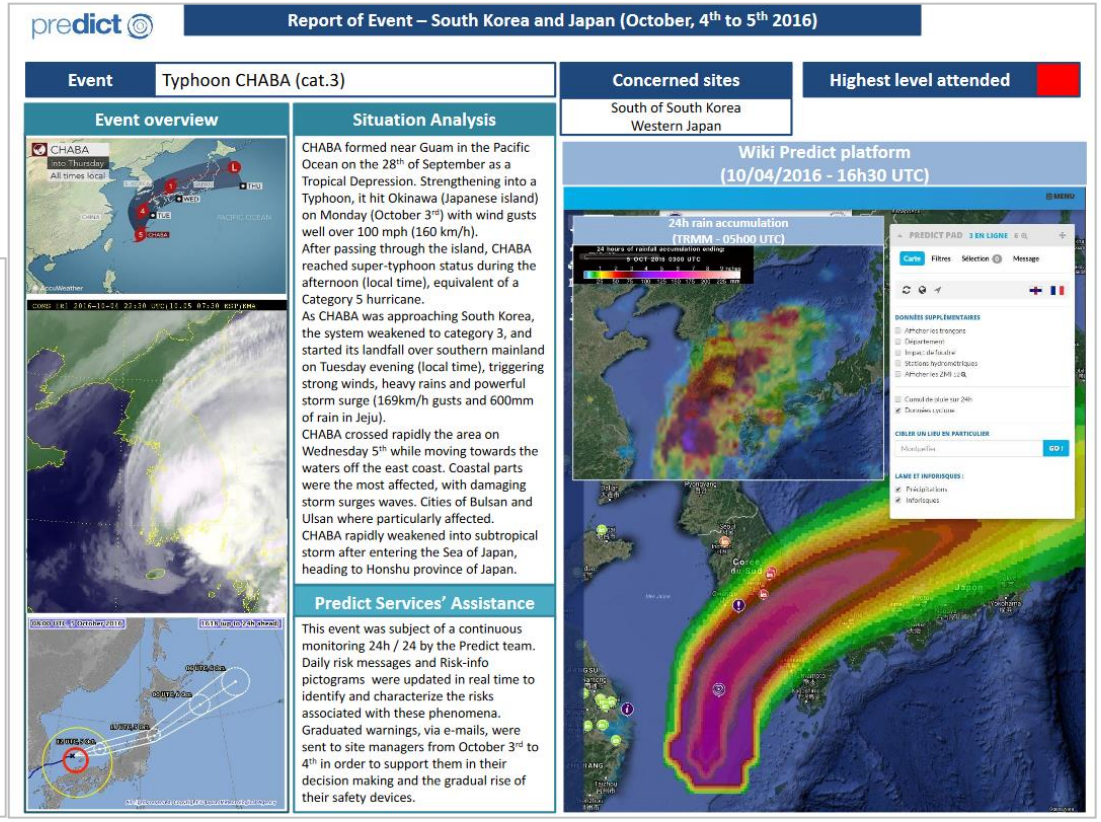


Rapports d'évènements extêmes



Rapport d'évènement





Back office et mise à jour du footprint

- Le footprint sur lequel travaille Predict Services footprint et la liste des contacts sera raffarîchie quotidiennement à partir de la base de données centrale risques et immobillier de Faurecia

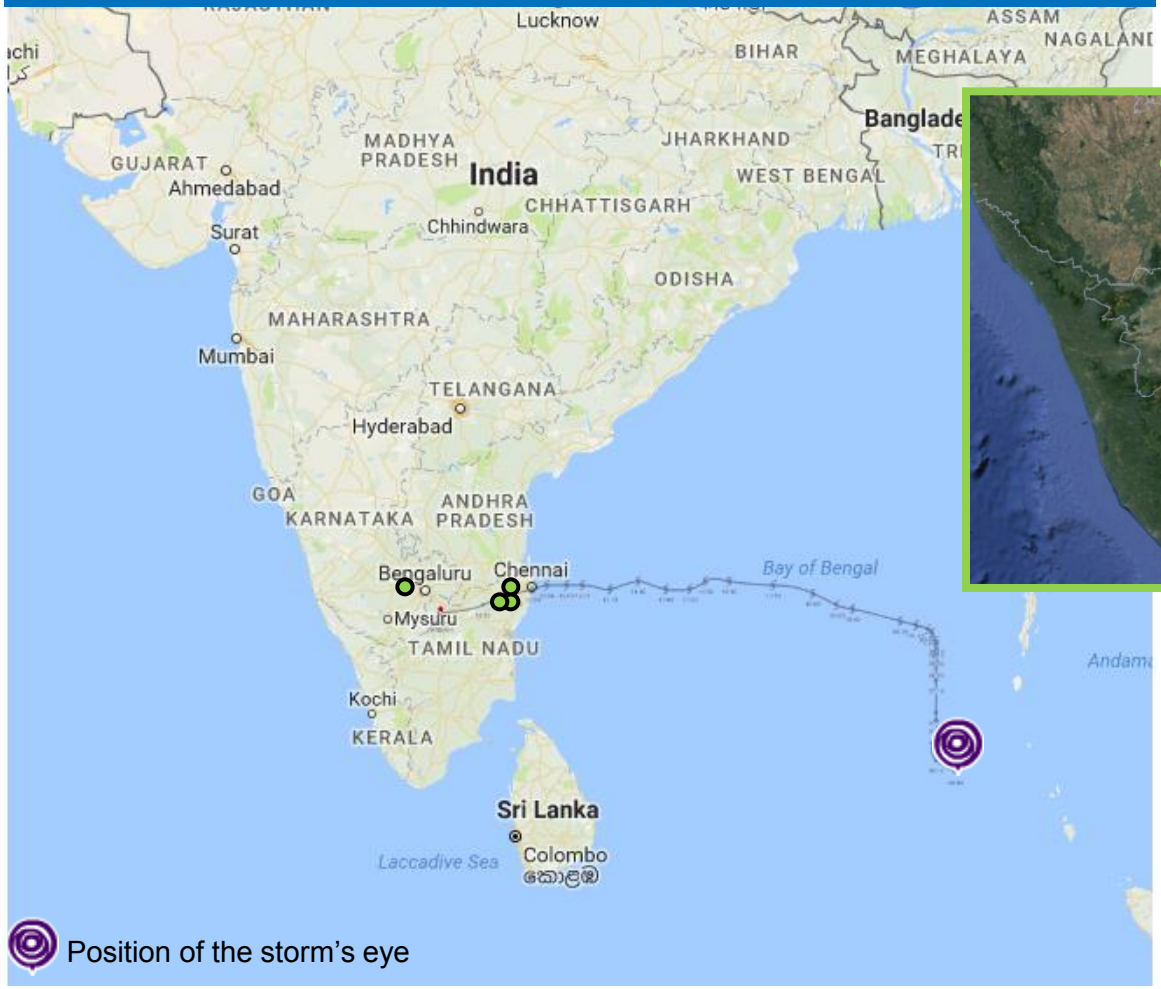
Daily web service :
footprint + contacts

RIMS real estate database

Predict services footprint


wiki-predict
Veilles
Rapports
Message Predict
Administration usagers
Rejeu
Satellite
STORM EGON
12/01/17
TC CHABA
30/09/16
NEWTON
07/09/16
MATTHEW
28/09/16 – 05/10/2016
TC SARIKA - HAIMA
14/10/16
TC VARDAH
06/12/16
FLOODS
15/10/16
AMRAE
LES RENCONTRES

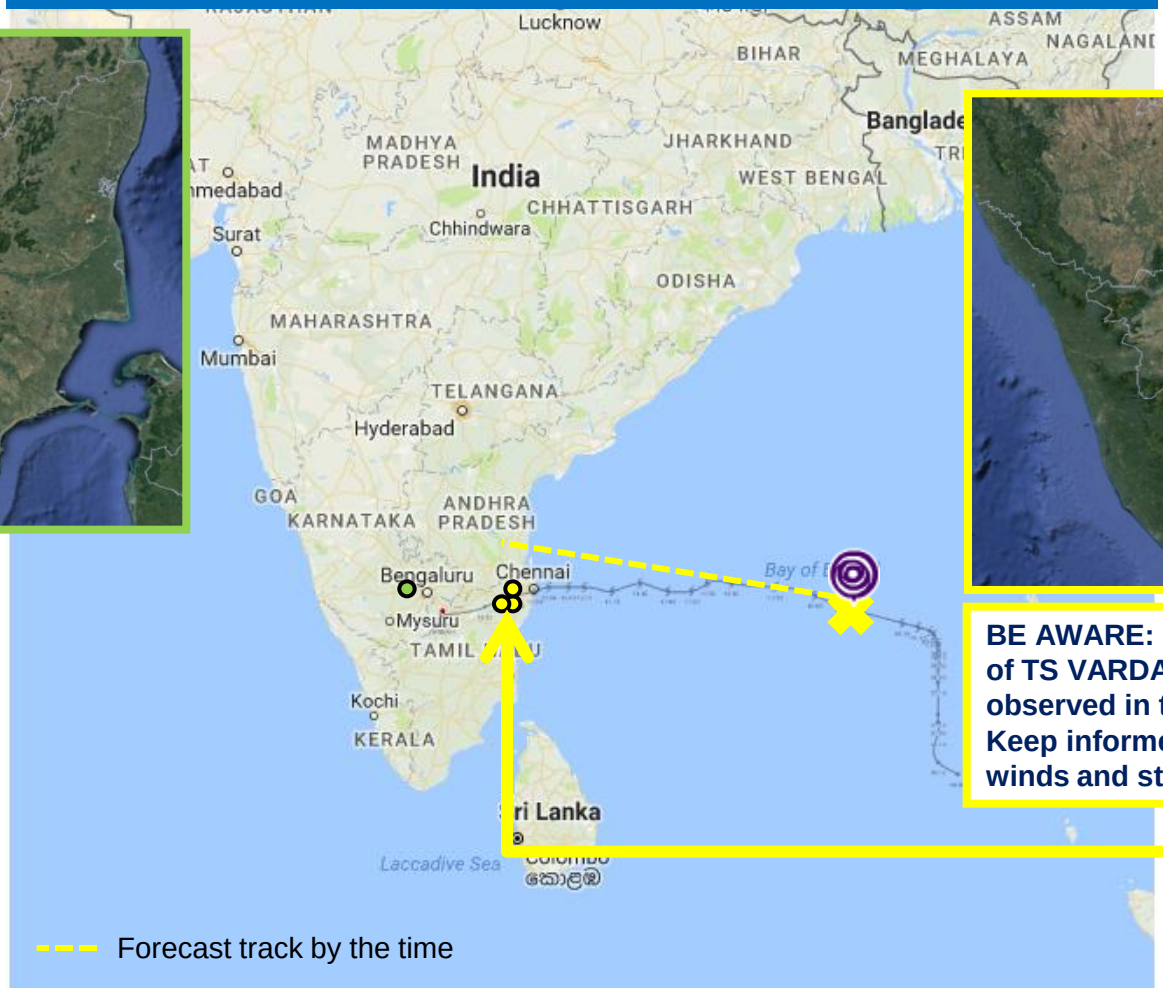
Very Severe Cyclonic Storm VARDAH in INDIA



December, 6th

No risk
03h30 UTC (09h00 loc)

Very Severe Cyclonic Storm VARDAH in INDIA



BE AWARE: Marginal effects of TS VARDAH may be observed in the next 48h. Keep informed for strong winds and stormy rains.

December, 09th

BE AWARE
19h45 UTC (01h15 loc)

Very Severe Cyclonic Storm VARDAH in INDIA

BE AWARE: Marginal effects of Cyclone VARDAH may be observed in the next 48h. Keep informed for strong winds and stormy rains.

BE PREPARED: Cyclone VARDAH approaching your area. Preventive measures advised for strong winds and stormy rain.

December, 10th

BE PREPARED
21h15 UTC (02h45 loc)

Very Severe Cyclonic Storm VARDAH in INDIA

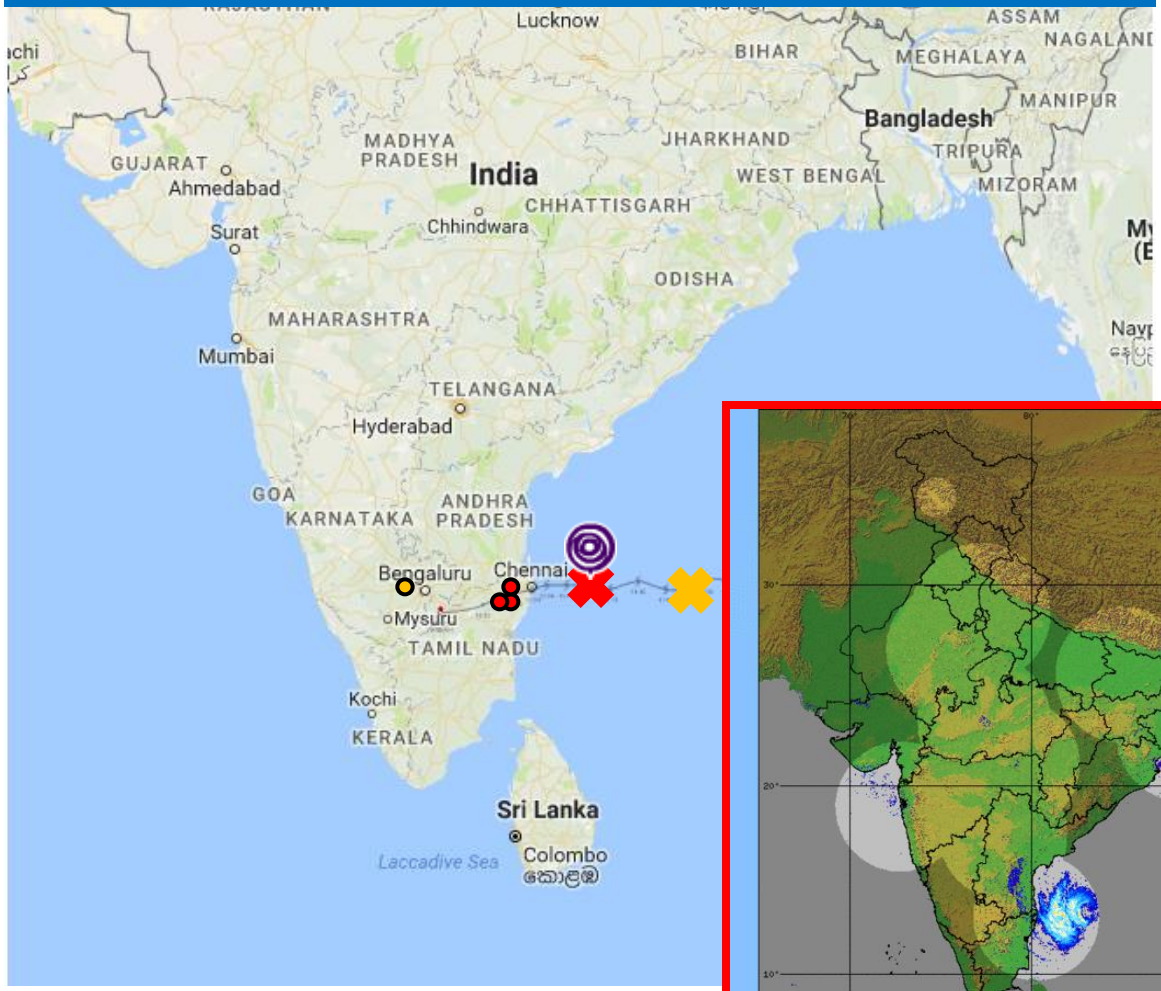
BE PREPARED: Marginal effects of Cyclone VARDAH. Preventive measures advised for strong winds and stormy rain.

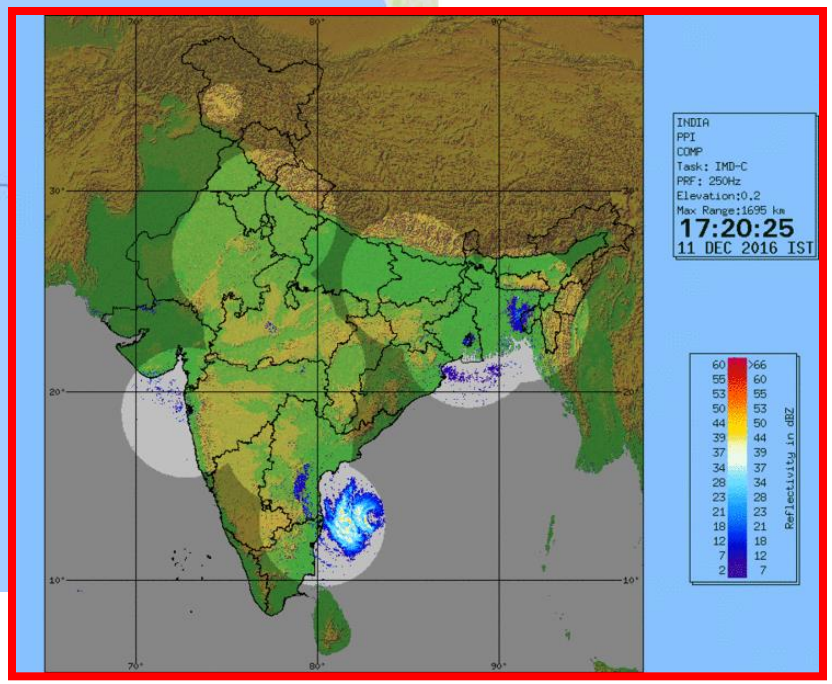
TAKE ACTION: Tropical storm VARDAH expected to cross your area. Protective mobilization required against damaging winds and stormy rain.

December, 11th

TAKE ACTION
13h30 UTC (19h00 loc)

Very Severe Cyclonic Storm VARDAH in INDIA





December, 11th

TAKE ACTION
13h30 UTC (19h00 loc)

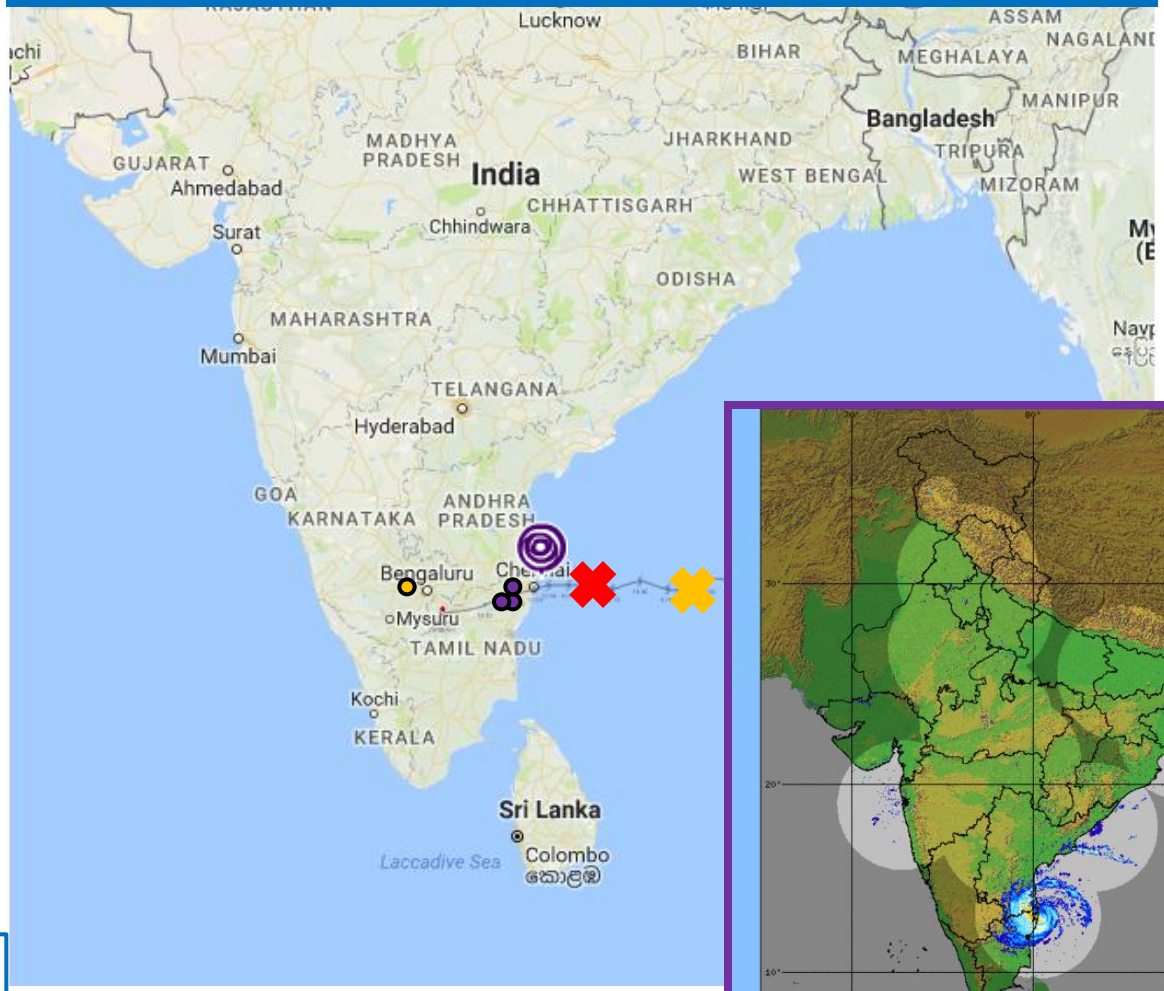
Very Severe Cyclonic Storm VARDAH in INDIA

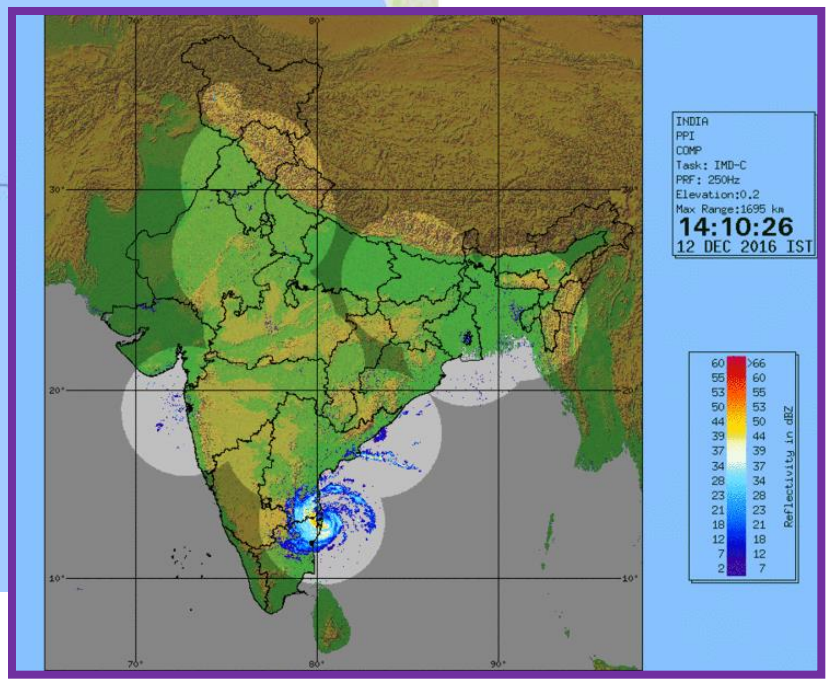
REINFORCE YOUR ACTIONS: Extreme weather affecting your area due to VARDAH. Severe risk of gusts and floods ongoing. Reinforce your crisis management.

December, 12th

REINFORCE YOUR ACTIONS
08h15 UTC (13h45 loc)

Very Severe Cyclonic Storm VARDAH in INDIA





December, 12th

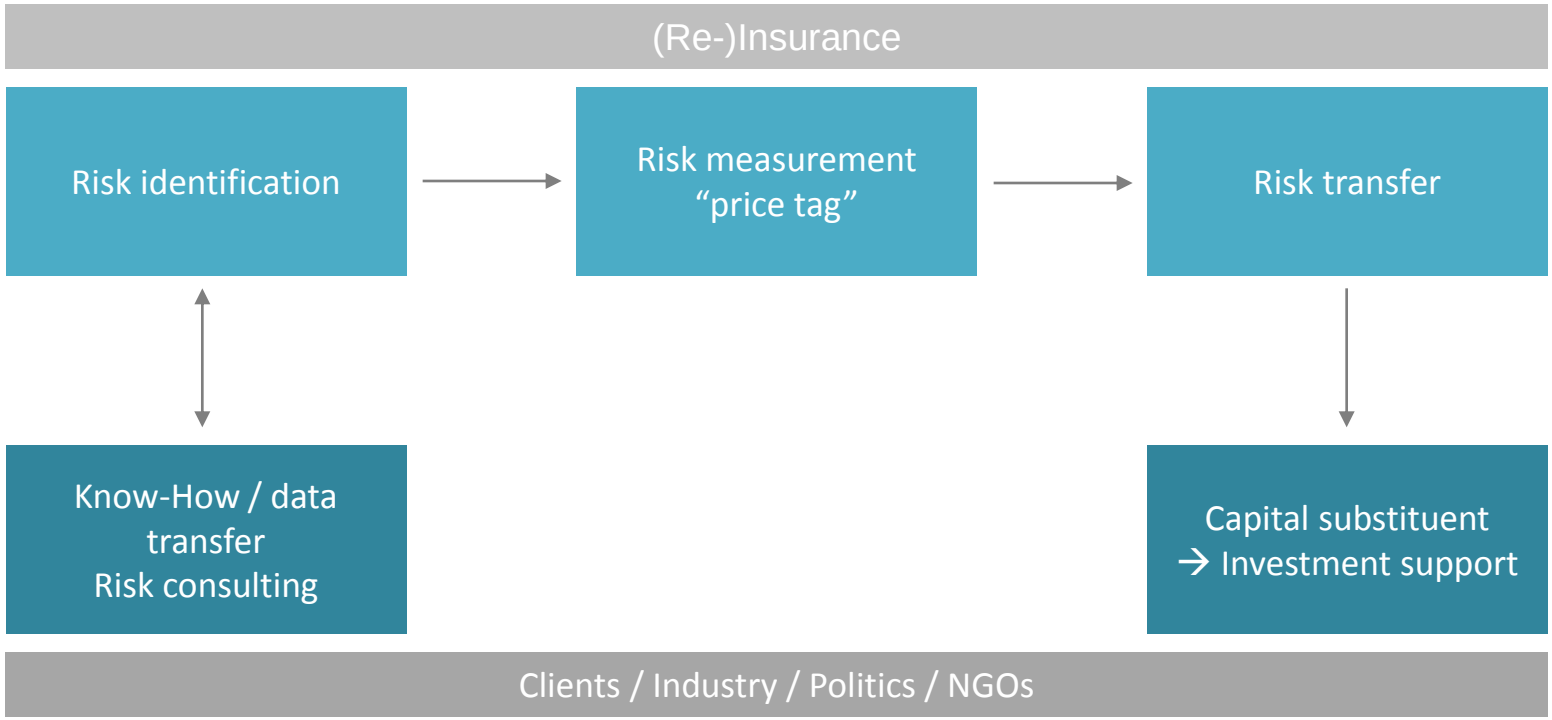
REINFORCE YOUR ACTIONS

08h15 UTC (13h45 loc)

Natural Catastrophes: Trends and Impact on Insurance

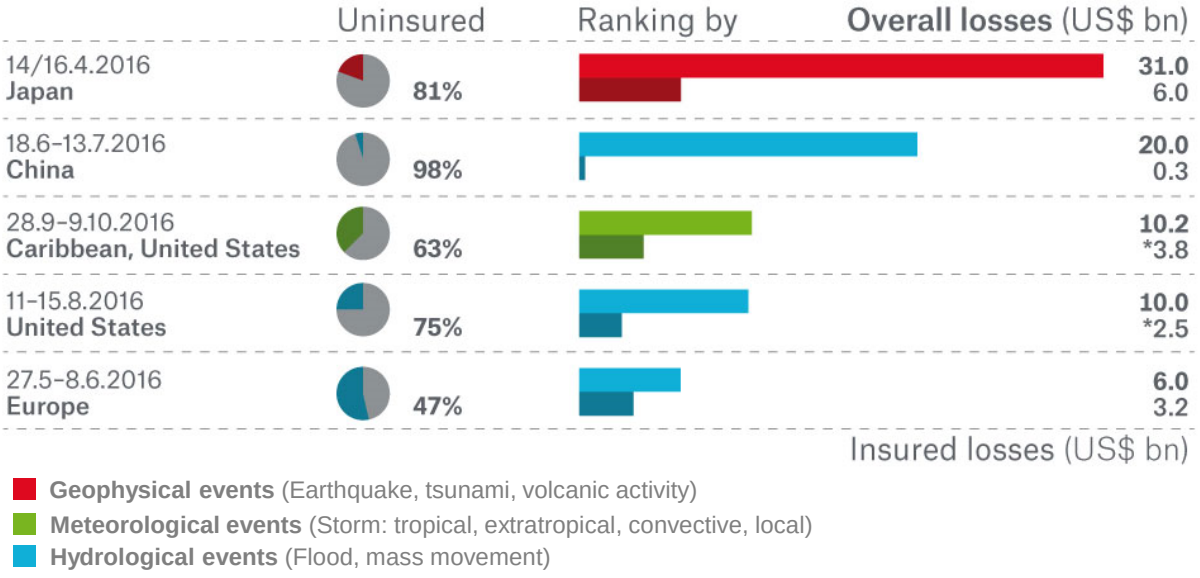
Ernst Rauch, Munich Re
(CorporateClimateCentre@munichre.com)

Role / business model of the insurance industry



2016: mind the gap…

The five costliest natural catastrophes of the year 2016 – Overall and insured losses



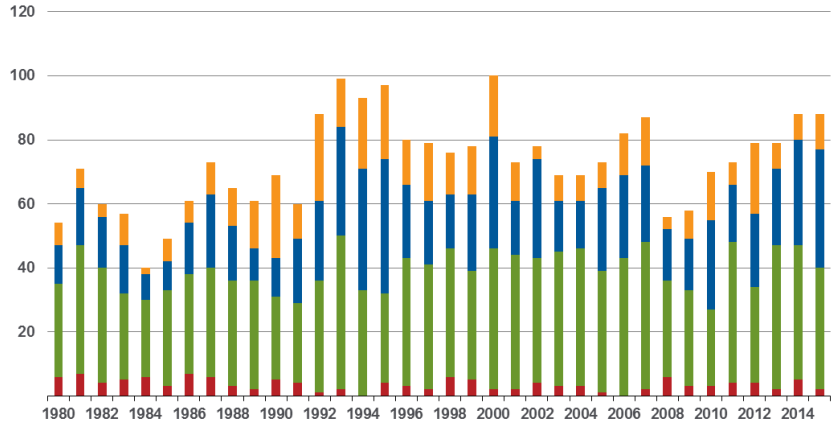
2016:
US$ 175 bn economic losses;
only US$ 50 bn were insured

*Source: Property Claim Services (PCS)

… and the future of insurability of natural catastrophes?

Relevant loss events in Europe 1980-2015

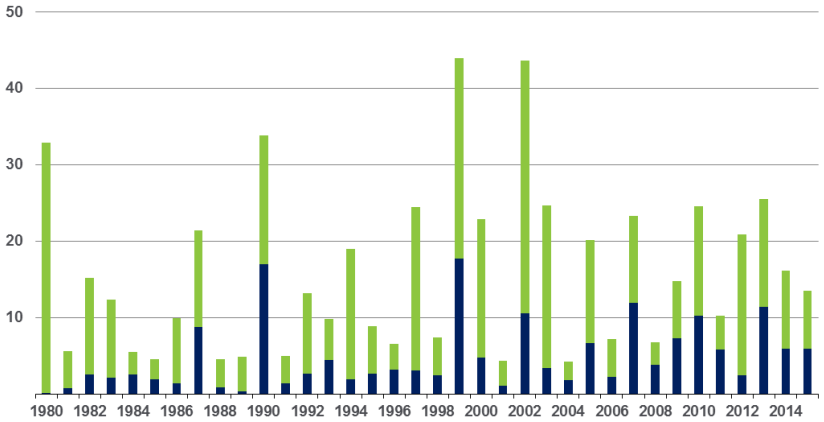
Number of loss events



- **Geophysical events** (Earthquake, tsunami, volcanic activity)
- **Meteorological events** (tropical storm, extratropical storm, convective storm, local storm)
- **Hydrological events** (Flood, mass movement)
- **Climatological events** (Extreme temperature, drought, forest fire)

Accounted events have caused at least one fatality and/or produced normalized losses ≥ US$ 100k, 300k, 1m, or 3m (depending on the assigned World Bank income group of the affected country).

Overall and insured losses (US$ bn)

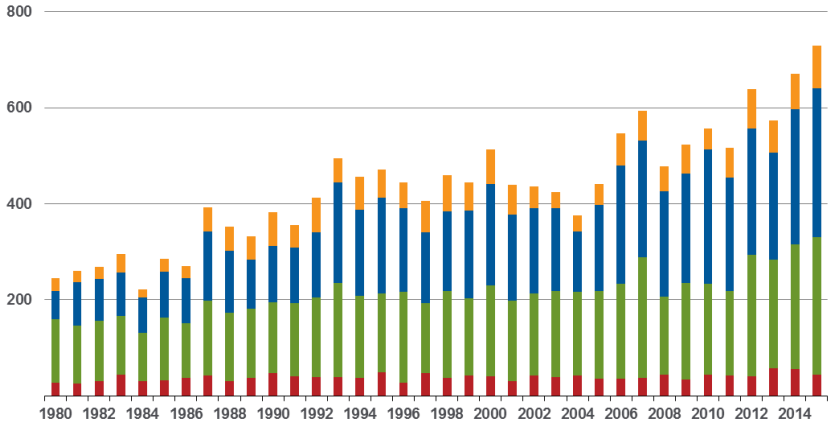


- **Overall losses (in 2015 values)**
- **Insured losses (in 2015 values)**

Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US$.

Relevant loss events worldwide 1980-2015

Number of loss events



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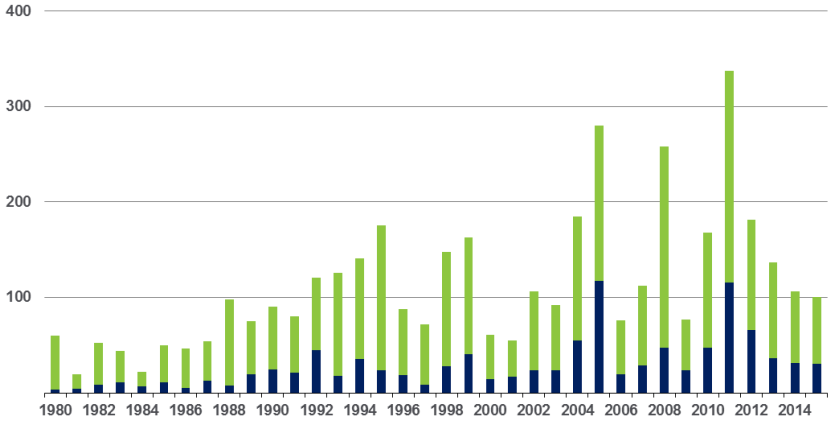

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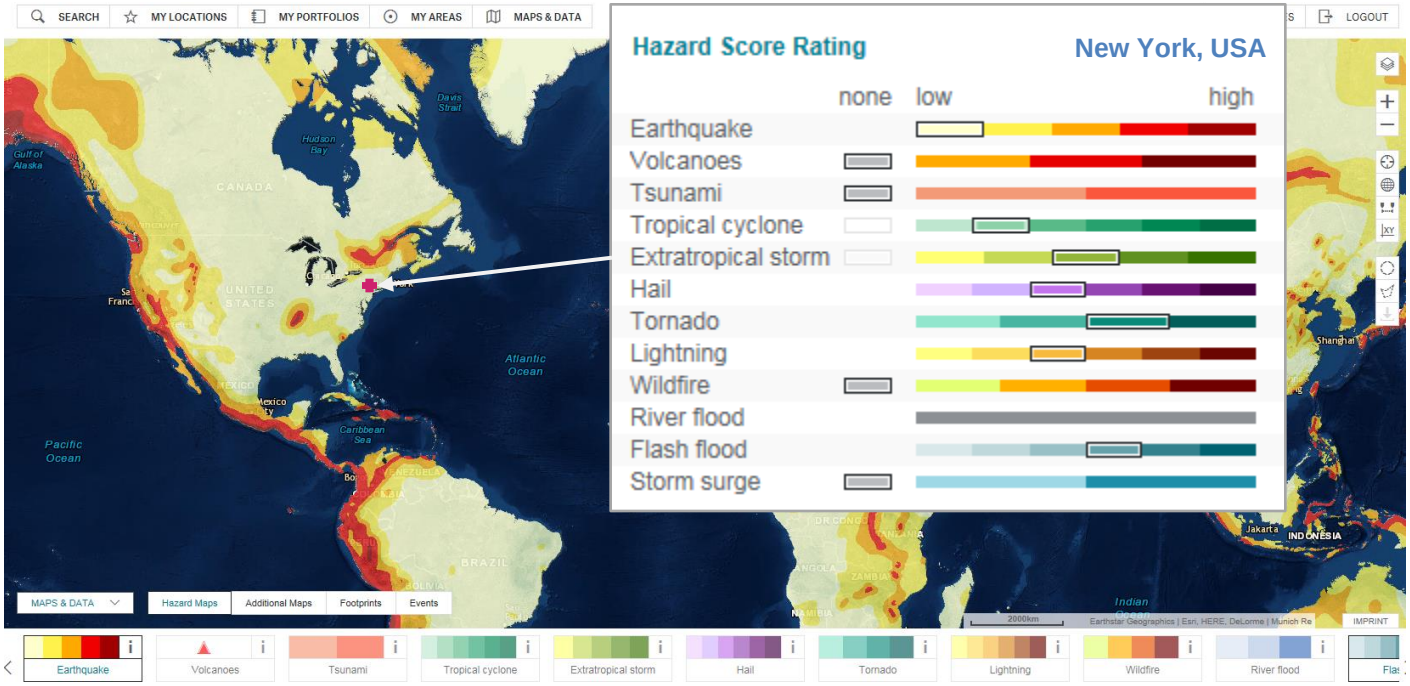
Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US$.

Munich Re NATHAN Risk Suite (www.munichre.com)

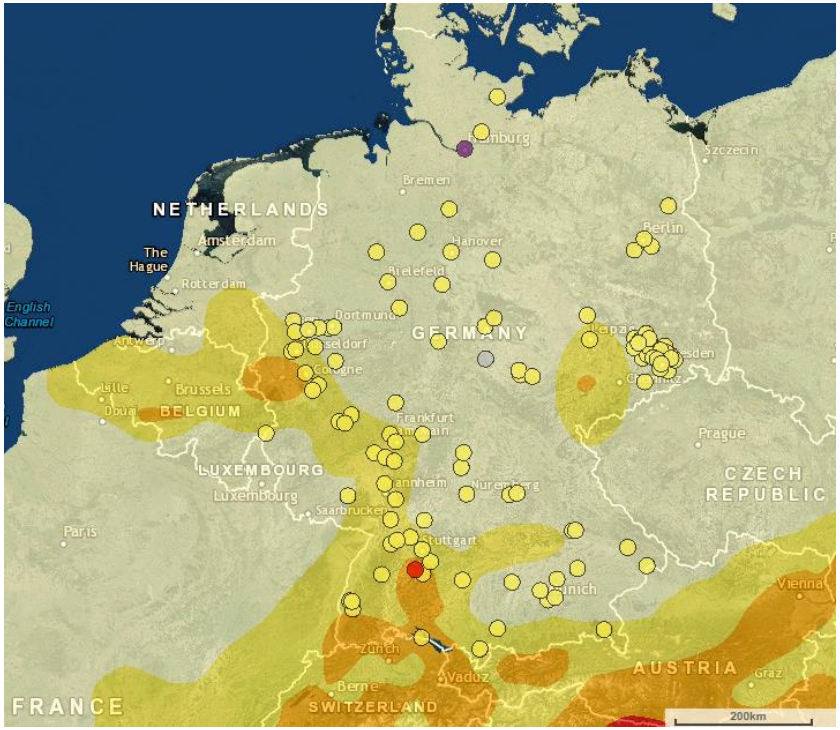
Risk information for single risks / locations



- Natural hazard exposure analysis tool
- Combining client risk data with Munich Re natural hazard zoning system
- Creating risk transparency / information

Munich Re NATHAN Risk Suite (www.munichre.com)

Risk information for risk portfolios



Hazard Analysis

Earthquake

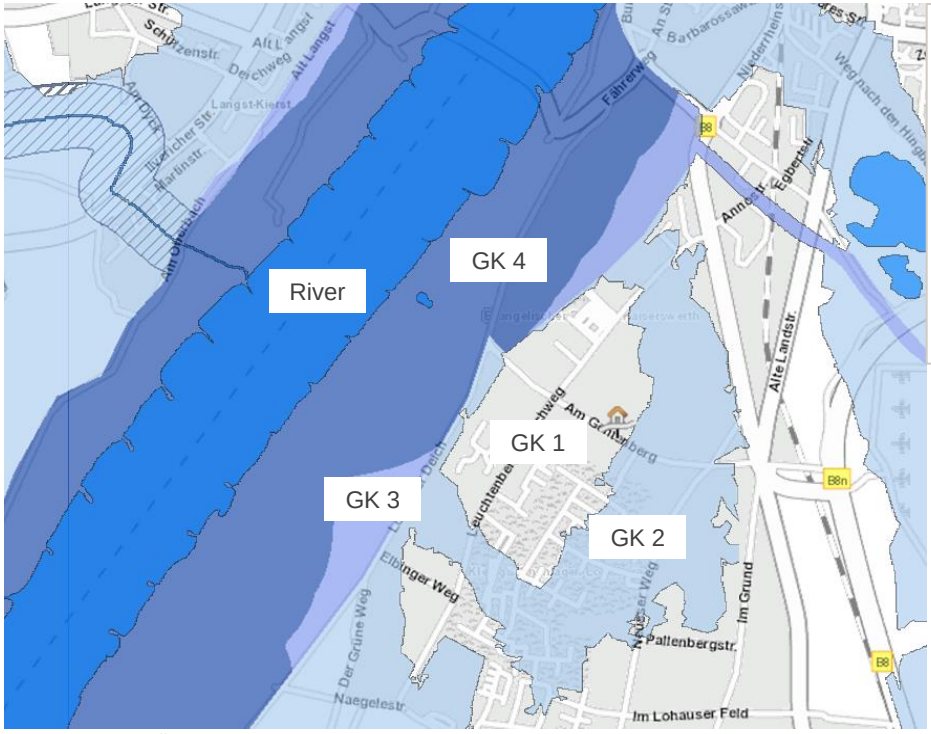
Munich Re hazard Zone	Number of Risk Locations	Percent
Zone 0: MM V and below	367	85.3%
Zone 1: MM VI	39	9.1%
Zone 2: MM VII	5	1.2%
Zone 3: MM VIII	0	0.0%
Zone 4: MM IX and above	0	0.0%
No information available	0	0.0%
Invalid coordinates	19	4.4%

Main drivers changing natural hazard risk assessment

- Digitalization: resolution of hazard / vulnerability data
- Climate Change: risk of change (changes of frequency and / or intensity of extreme weather events)

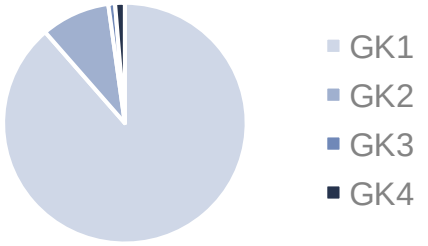
From global / regional hazard zoning schemes to high resolution hazard information

ZÜRS – zoning system for flood (Germany)



Source: GDV, ZÜRS-Geo 2013

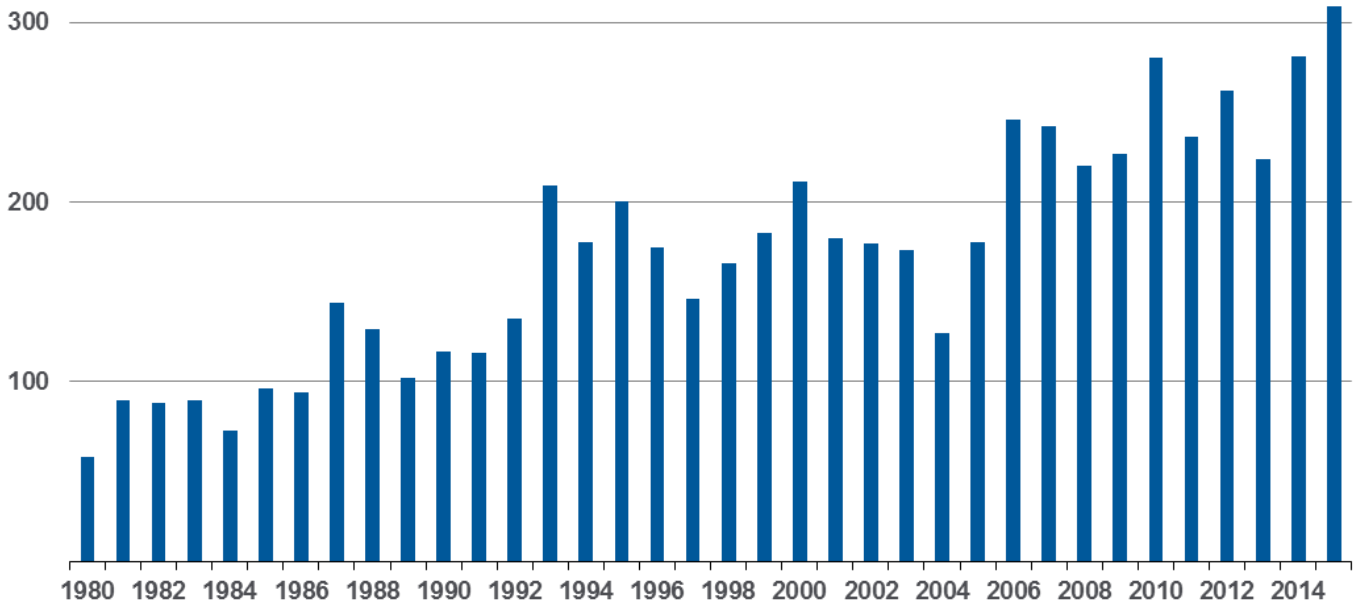
Flood risk: address distribution to risk category / hazard classes (GK)



- GK 1, extremely low: flooding less than once in 200 years
- GK 2, low: once in 50-200 years (dyke protected area)
- GK 3, medium: at least once in 10-50 years
- GK 4, high: at least once in 10 years

(statistical mean)

Increasing number of relevant flood events worldwide 1980– 2015



Hydrological events
(General flood/river flood, flash flood, landslide, storm surge, subsidence)

Accounted events have caused at least one fatality and/or produced normalized losses ≥ US$ 100k, 300k, 1m, or 3m (depending on the assigned World Bank income group of the affected country).

Impact on insurance situation (1)

- Globally, there is currently (as per 2016) (re-)insurance capacity available to cover also highly exposed risks

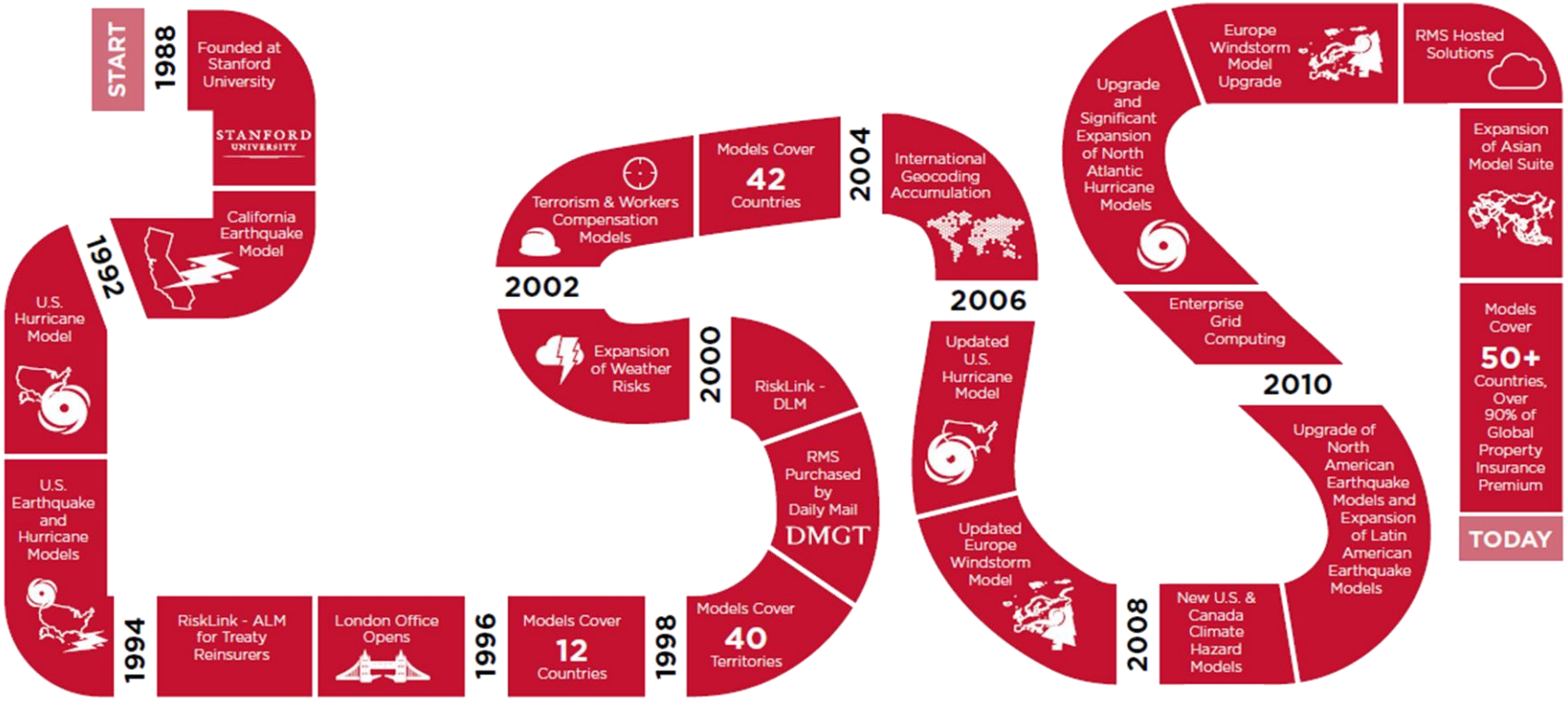
- Regionally / locally insurance capacity is tight in regions with significant adverse loss experience and / or loss trends

Impact on insurance situation (2)

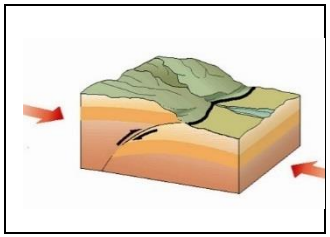
- Potential deterioration of losses from natural catastrophes will likely impact supply of risk transfer solutions

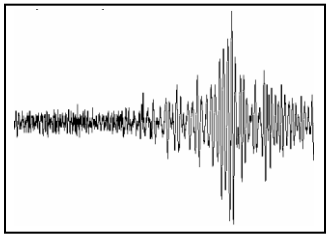
- Proper selection of risk locations and vulnerability reduction measures (including supply chain management) contribute to long-term stability of insurability

OUR HISTORY OF INNOVATION



Framework for Catastrophe Risk Modeling





Define Events → **Assess Ground Motion** → **Calculate Damage** → **Quantify Risk**

Create a universe of events that characterize long-term probabilities

Calculate the hazard parameter for all sites due to each stochastic event

Calculate the average damage and associated uncertainty for the specific exposure.

Calculate the financial impact for all perspectives

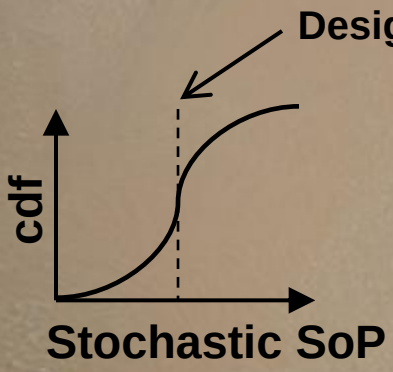
Stochastic and hazard module

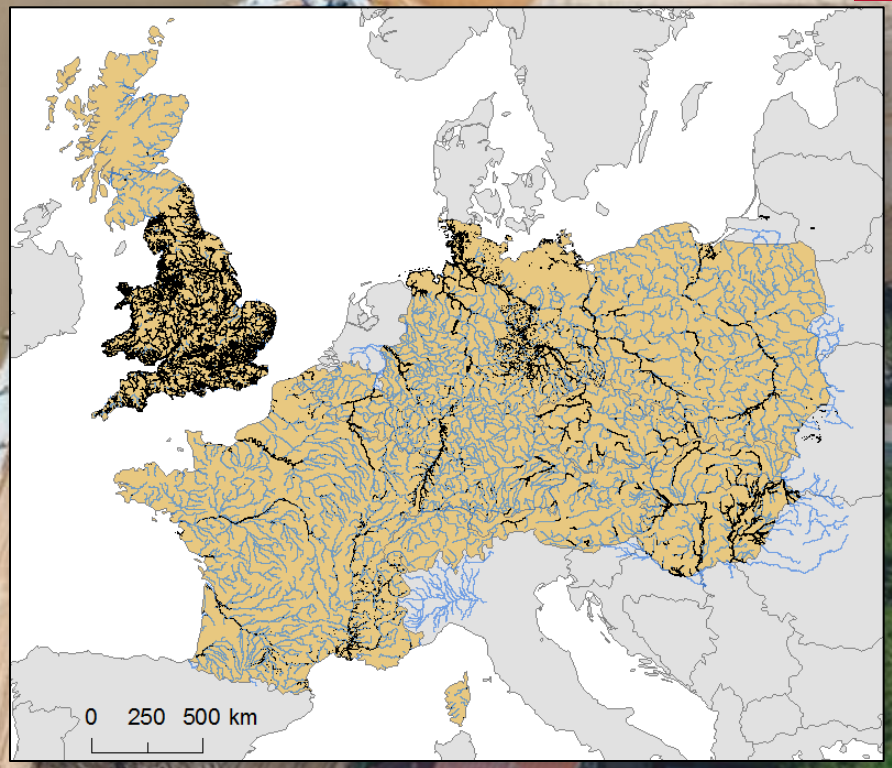
Seasonality & clustering of events ➔ **MORE REALISTIC TAIL LOSS**

Events have daily time-stamp ➔ **APPLICATION OF HOURS CLAUSE**

FLOOD DEFENSES

- **Bespoke flood defenses**
- Third party data
- Defenses fail stochastically





Peril rating database across whole of Europe

PRDs, together with the return period hazard maps enable clients to understand risk at location level and **define risk adequate premium** by relating severity of loss to level of financial loss.

Hazard component:

•Hazard values used to set internal underwriting guidelines for screening purposes

Postcode Hazard – Flood Depth (m)

Postcode	River Catchment	50 year	100 year	250 year
12345	Basin X	0.2	0.8	1.2
12346	Basin X	0.6	1.5	2.1

Decline | Refer | Addtnl Conditions | Write

Loss component:

•Postcode Annualised Loss Ratio's (ALR's) = Expected loss per $ insured for building/contents.

•Combining ALR's with building/contents values produces a technical rate.

PRD Differentiation:
Coverage type – buildings/contents
Line of business – residential/commercial

Postcode Contents ALR

Postcode	Unknown	Residential	Commercial
12345	0.000724	0.000842	0.000799
12346	0.000470	0.000510	0.000524

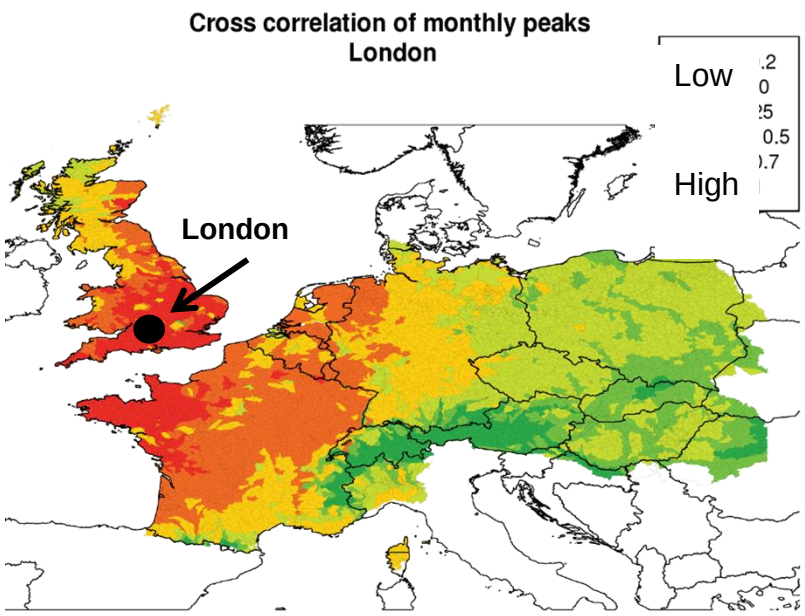
Residential

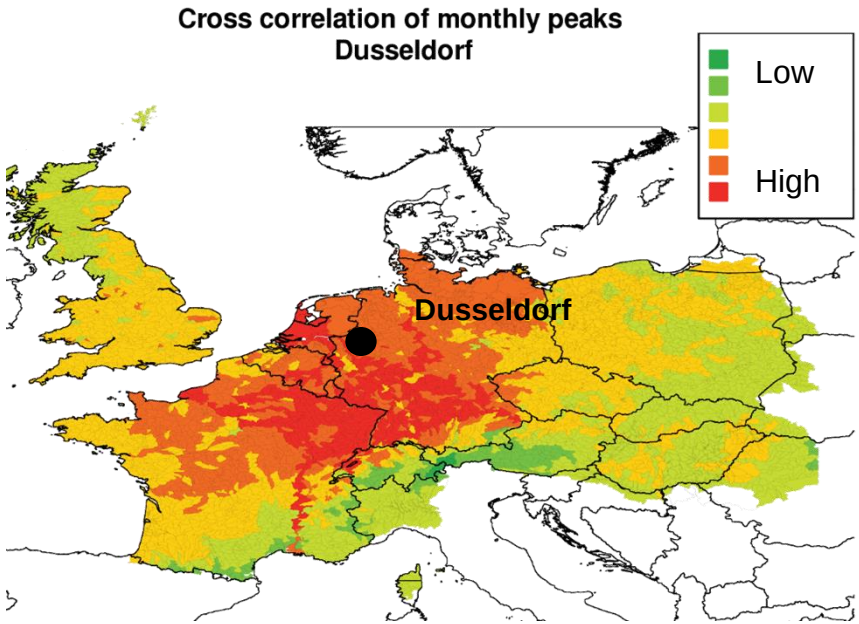
Postcode: 12345

Building Value: €250,000
Contents Value: €15,000

Technical rate =
(Building value * Building ALR) + (Contents value * Contents ALR) = €174.86

SPATIAL CORRELATION OF INLAND FLOOD





Spatial correlation amplifies tail losses

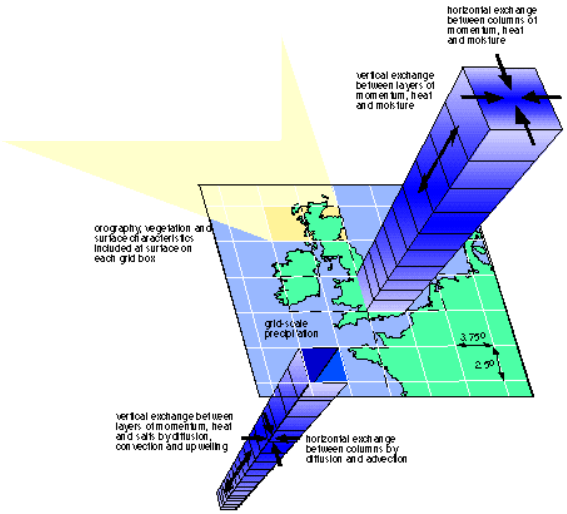
Germany and Czech Republic → **200yr loss +20%** when accounting for correlation

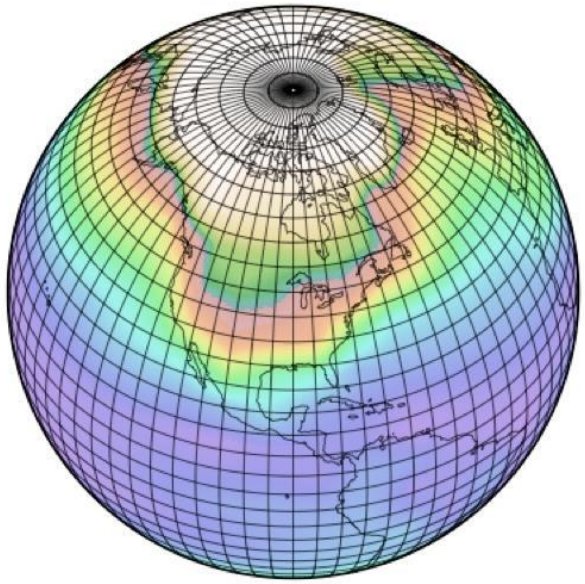
Is climate change altering the occurrence of extremes?

Attribution studies

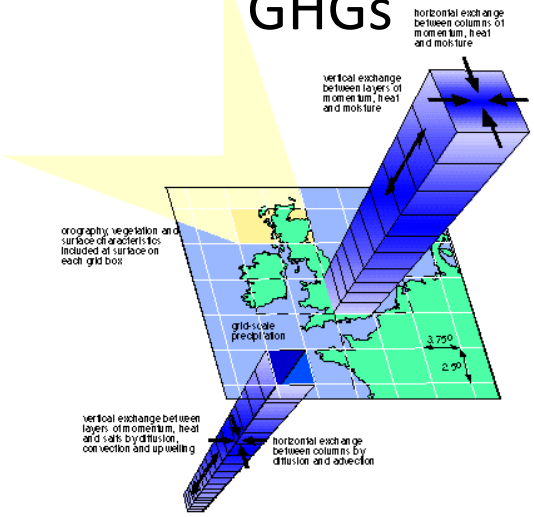
20,000 years of climate simulation

Without post 1950 increase in GHGs





With post-1950 increase in GHGs



The fractional attribution rating scorecard

Heatwave

Intense Rainfall

Cold Wave

ETC Storm

Wildfire

Tropical Cyclone

River Flood

Severe Convective Storm

The fractional attribution rating scorecard

Heatwave

Intense Rainfall

Cold Wave

ETC Storm

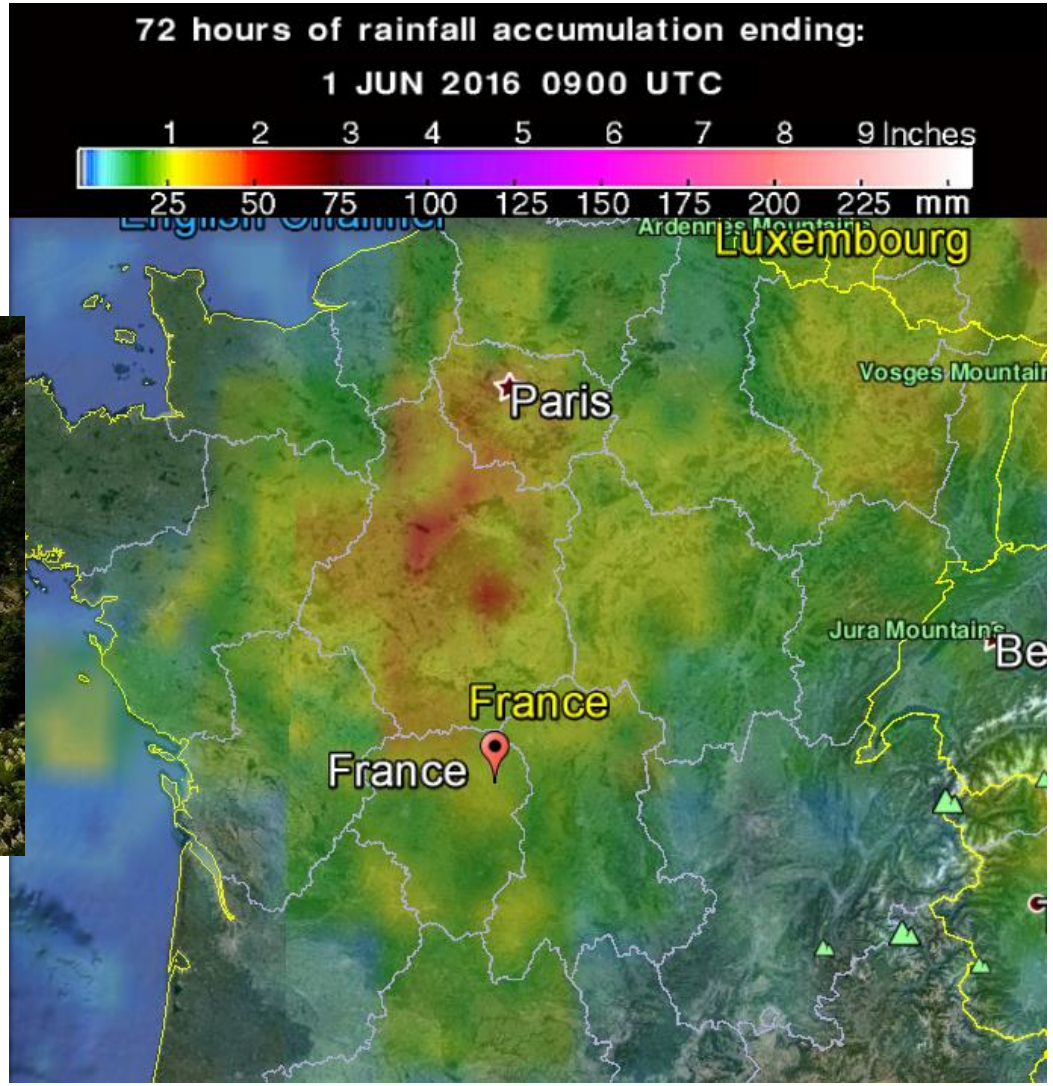
Wildfire

Tropical Cyclone

River Flood

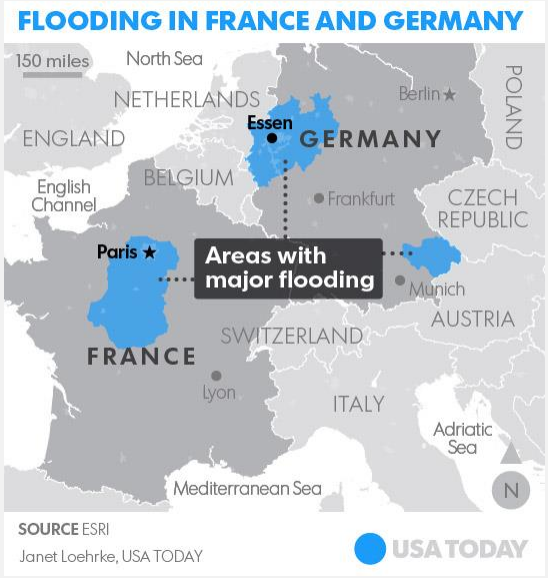
Severe Convective Storm

May/June 2016 Flood Event



MAY/JUNE 2016 FRENCH FLOOD

CLIMATE CHANGE ATTRIBUTION?



'For the Seine River Basin an event like this is now expected to occur roughly 80 percent more often due to climate change than it was in the past'

'For the Loire River Basin 3-day precipitation extremes in April-June, the team found that an event like this is now expected roughly 90 percent more often due to climate change than it was in the past.

'In both cases, the increases are at least 40 percent.'

https://wwa.climatecentral.org/analyses/european-rainstorms-may-2016/

Catastrophe models and peril rating databases for Corporate risk management

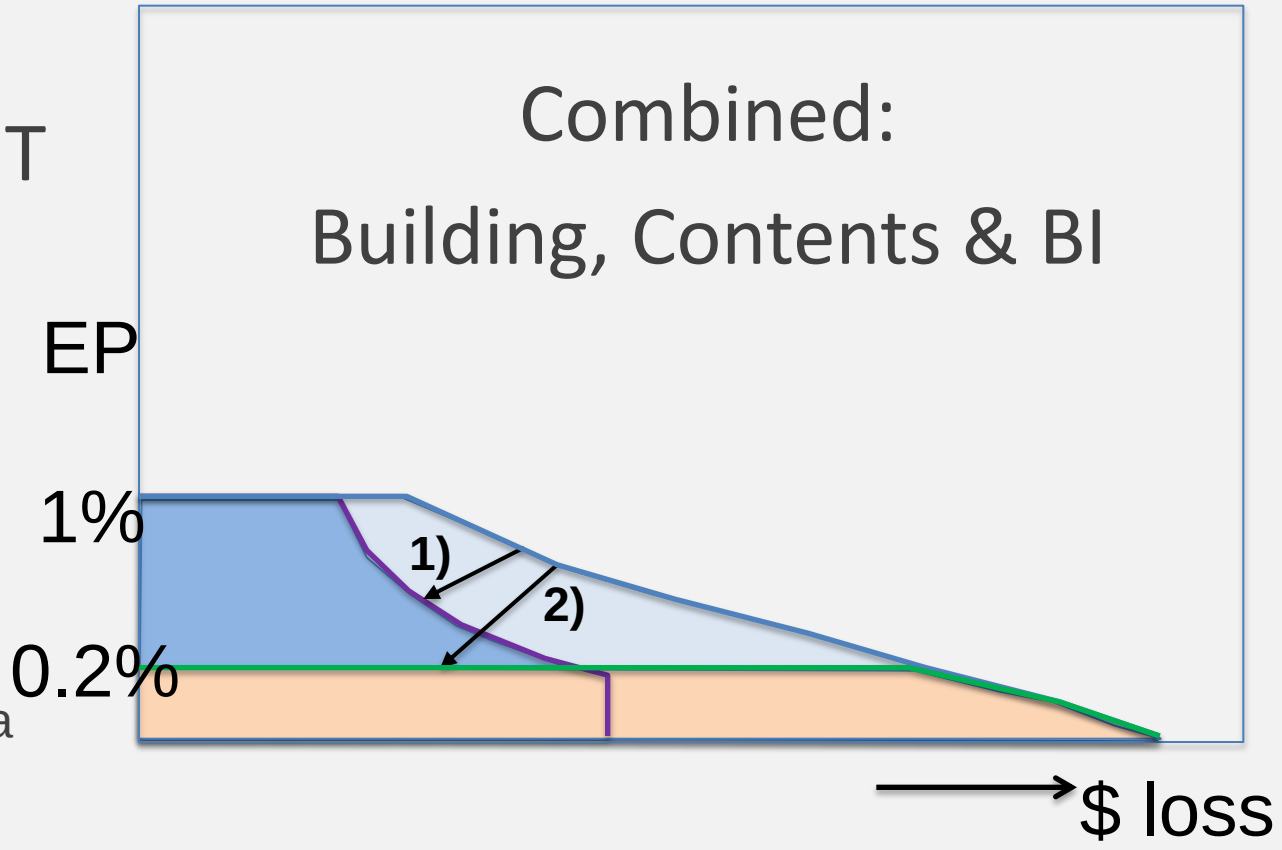
RISK MANAGEMENT TOOLS FOR CORPORATES

- **Tools widely used by insurers and reinsurers are now being applied by corporates themselves for how they manage their risks**
- **Across all significant perils (natural and man-made)**
- **Identification of key risk hot spots – as well as actions that can be taken to reduce the risk**
- **Key supply chain risks both for internal and external suppliers**
- **Identify bottlenecks, critical suppliers, critical ports, and model a wide range of potential interrupts**
- **Explore greater redundancy and alternative suppliers (ensuring they cannot be hit by the same catastrophes)**

DRIVING BETTER FLOOD RISK MANAGEMENT

- 1) Relocate all ‘mission critical’ equipment above the floodable space
- 2) Modify heights of defences to withstand a 500 year flood

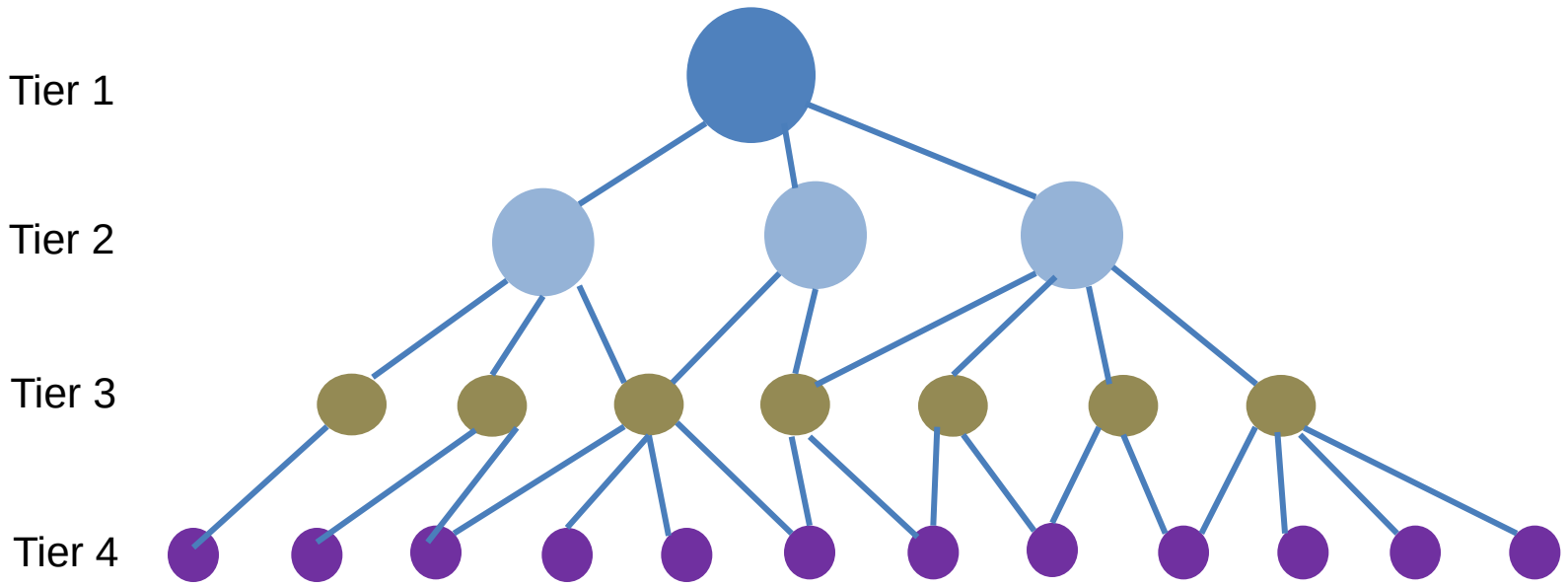
Measure benefits in reduced long term risk costs.



EACH ELEMENT OF SUPPLY CAN BE TRACKED USING THE ‘SUPPLIER’S DATA SCHEMA’

- High Res location of supplier
- Buildings, Ages, Construction, etc
- Lifelines of the supplier
- Details (Code) for what is being supplied
- Flow of supplies (per day/week)
- Route of supply
- Key ports/airports
- Destination

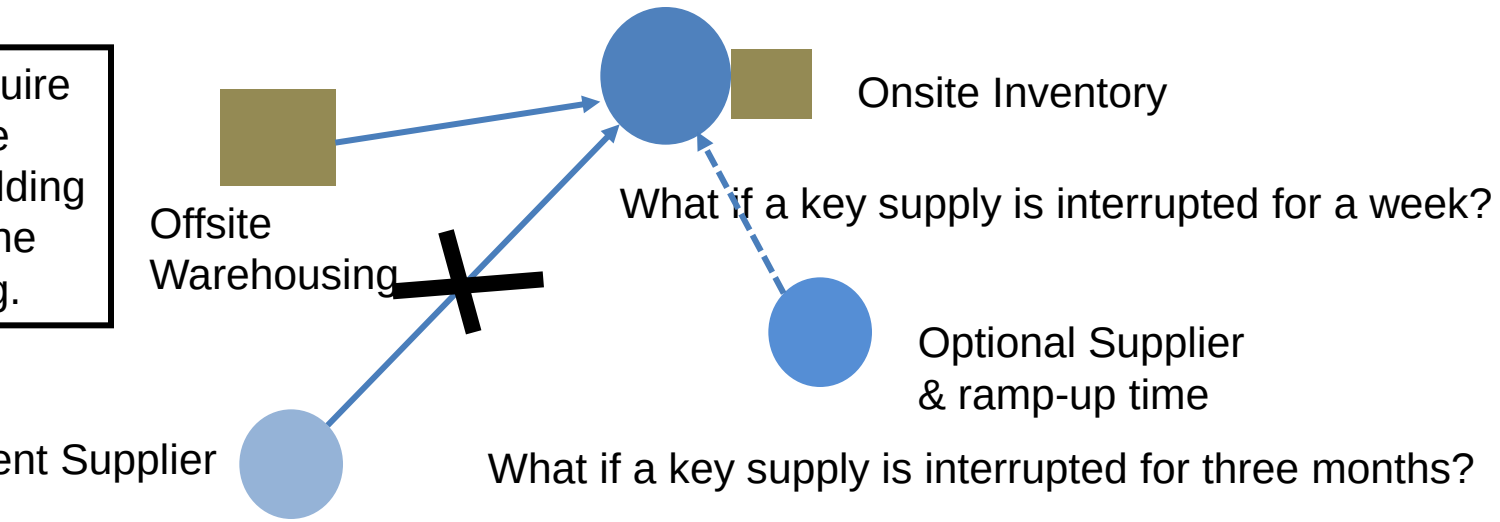
INDIVIDUAL LINKS IN THE SUPPLY CHAIN



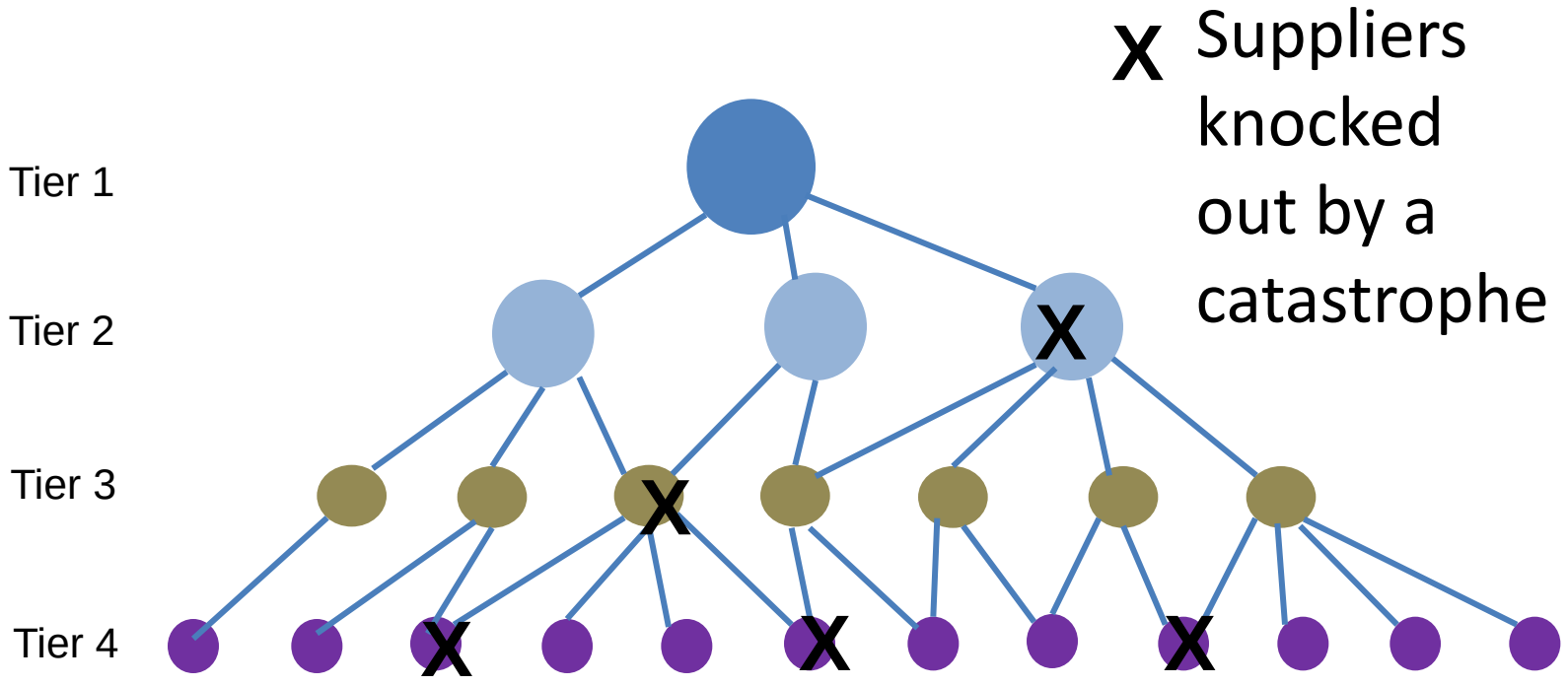
THE SUPPLY CHAIN RISK MANAGEMENT SYSTEM IS USED TO EXPLORE REDUNDANCY AND MANAGE SHOCKS

Flows are viewed passing through the supply chain

Will also require details of the location, building type etc of the warehousing.



PROBABILISTIC AND SCENARIO MODELING CAPABILITIES

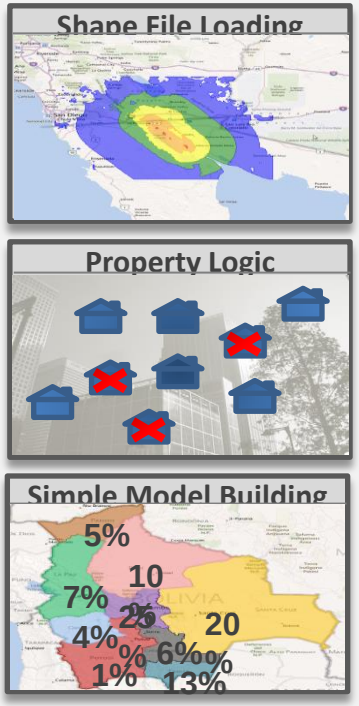


BLENDING ACCUMULATION MANAGEMENT WITH RESILIENT CATASTROPHE MODELLING

BEST PRACTICE IN CORPORATE RISK MANAGEMENT

INTEGRATED USE OF RMS EXPOSURE MANAGER™

- Capability to explore all potential accumulation concentrations
- Full insurance and reinsurance structure capability
- Complete flexibility about potential event footprints
- Peril-independent correlation modelling
- Potential to apply full range of potential non-modelled loss footprints



Merci

Les slides seront en ligne dès la semaine prochaine sur www.amrae.fr