Swiss Re

Sigma Event 2017

Simulating man-made casualty risks

Big *Simulated* Data from Computational Fluid Dynamics (CFD)

- Project employs **CFD** to assess single risk casualty effects **deterministically**
- Physics analytics methodologies are enriched with real-world surrounding data and past event experience to estimate impact of events that have not yet occurred
- Current focus on HazMat transport (crude oil) and storage (mining waste)

The method

Information that is missing can be calculated

CFD
- Numerical Solution of Navier-Stokes Equations
- Use of real geometries
- **No statistics** involved, only physical laws

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Real-world input data
- Locations
- Topographies
- Population density

Thousands of CPUs

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Disaster Analysis Severity Modelling

Accurate quantitative prediction of any disaster involving fluid flow (floods, spills, fires, explosions)

The examples

HazMat transportation

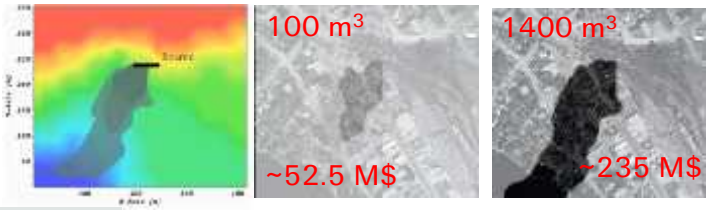
Input

Rail Network

e.g. Detailed Topography

Results

Lac-Mégantic disaster prediction



Insights
- Accurate disaster analysis
- Monetary impact estimation of predicted event
- Extraction of risk map covering whole countries

HazMat storage

Input

Locations with topography

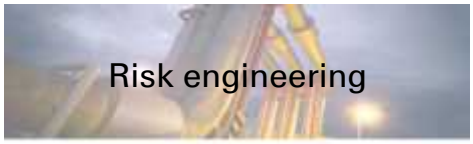
Properties of stored material

Results

Ajka dam disaster prediction

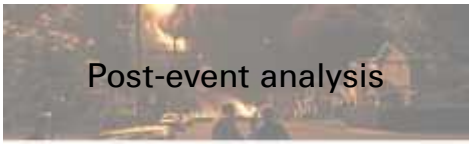
Insights
- Prediction of temporal evolution of the disaster
- Assessment of environmental footprint
- Estimation of economic loss and liability

The business value



- Identification of risk factors, previously not considered (e.g. terrain slope in HazMat Transport)

- Ground-up cost estimate of individual scenarios
- Parametrized scenario analysis
- Additional input in UW landscape



- Quick first loss estimates
- Complements expert judgement