

PartnerRe

GIS in Reinsurance: Estimation of Losses due to Natural Hazards

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Agenda

1. Exposure Management of a (Re)insurance Operation
2. PRECED Architecture and Network
3. Underwriting Process
4. Exposure Recording & Visualization
5. Exposure Control
6. Portfolio Analysis
7. Event Loss Estimation
8. Geographic Underwriting
9. Conclusions

Exposure Management of a (Re)insurance Operation

- **Exposure Analysis and Limitation is a key element in the insurance and reinsurance industry.**
- **Windstorm and Earthquake exposure is considered to be most critical**

⇒ Insured Market Losses:

Hurricane Andrew: USD 20'900Mio

Northridge Earthquake: USD 17'300Mio

- **Flood , Hail, Tornados and major man made perils such as Terrorism, Nuclear, Asbestosis, Nanotechnology etc. are also challenging the (re)insurance industry.**

⇒ Insured Market Losses:

European Floods 2002: USD 2'500Mio

Terrorist Attacks Sept 2001: USD 21'000Mio – excl. Liability and Life

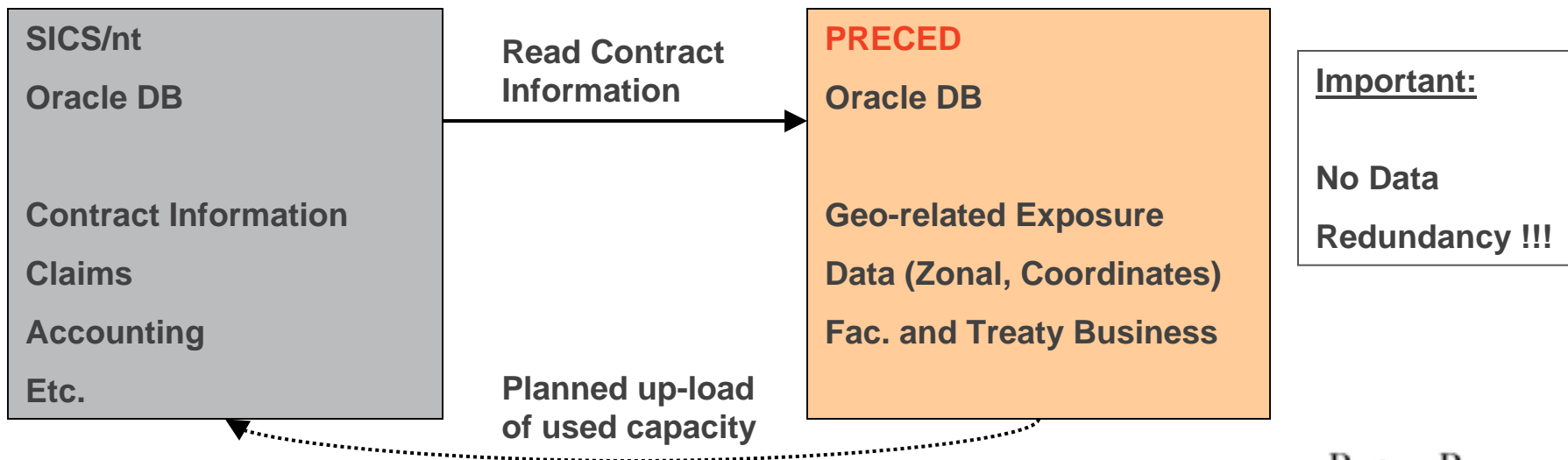
Problem: Data availability, reliability and geographic resolution in most parts of the world is still insufficient!!!



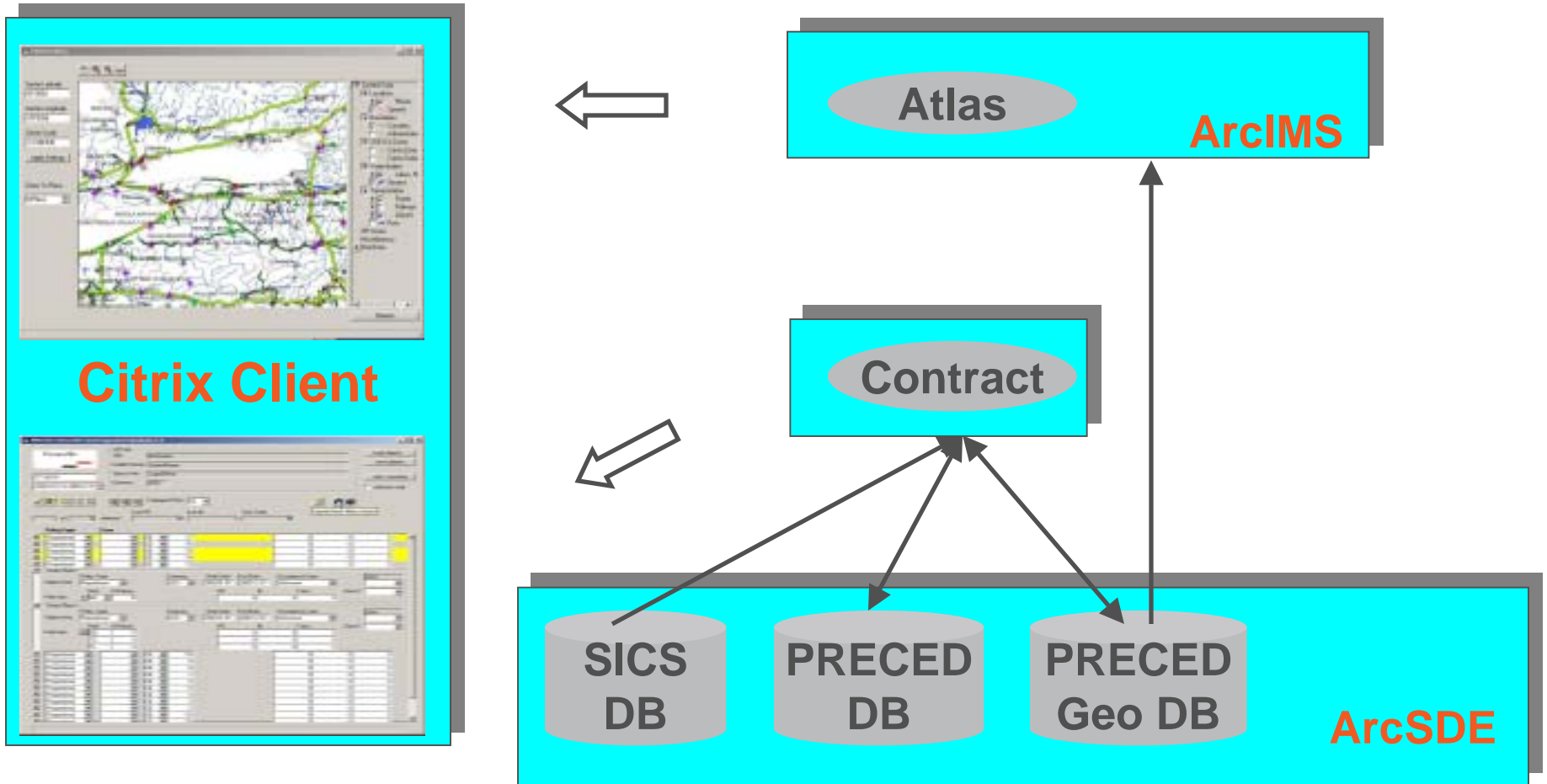
Exposure Management of a (Re)insurance Operation

In the year 2000 **Partner Re** in co-operation with **Ernst Basler & Partners** decided to develop a geographic information system which should be accessible for all underwriters of the company (Idea: Geographic Underwriting).

A centralized data base – **PRECED** – recording all actual and historical geo-related information was developed.



PRECED - Architecture

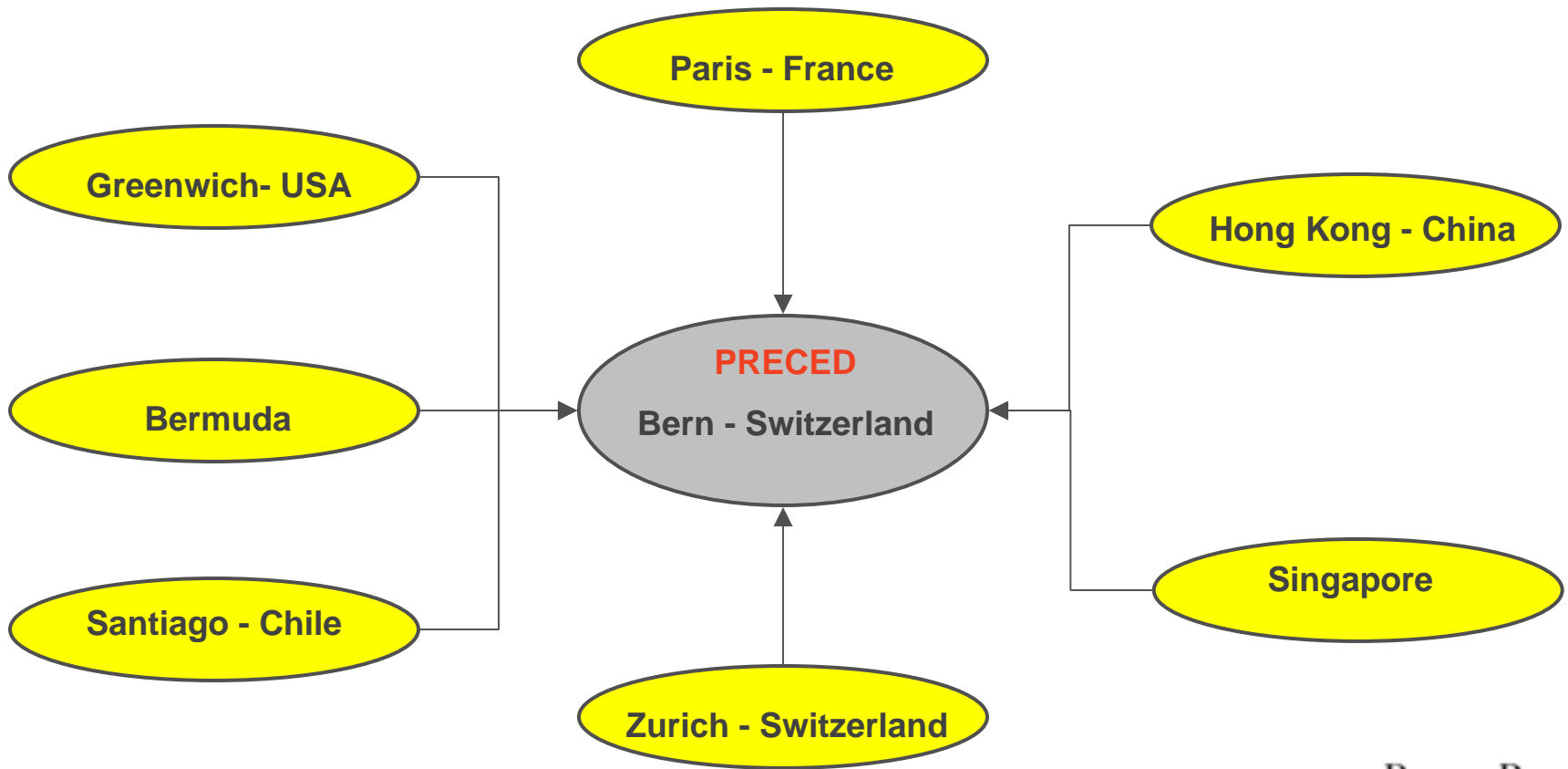


Oracle Unix Server in Bern

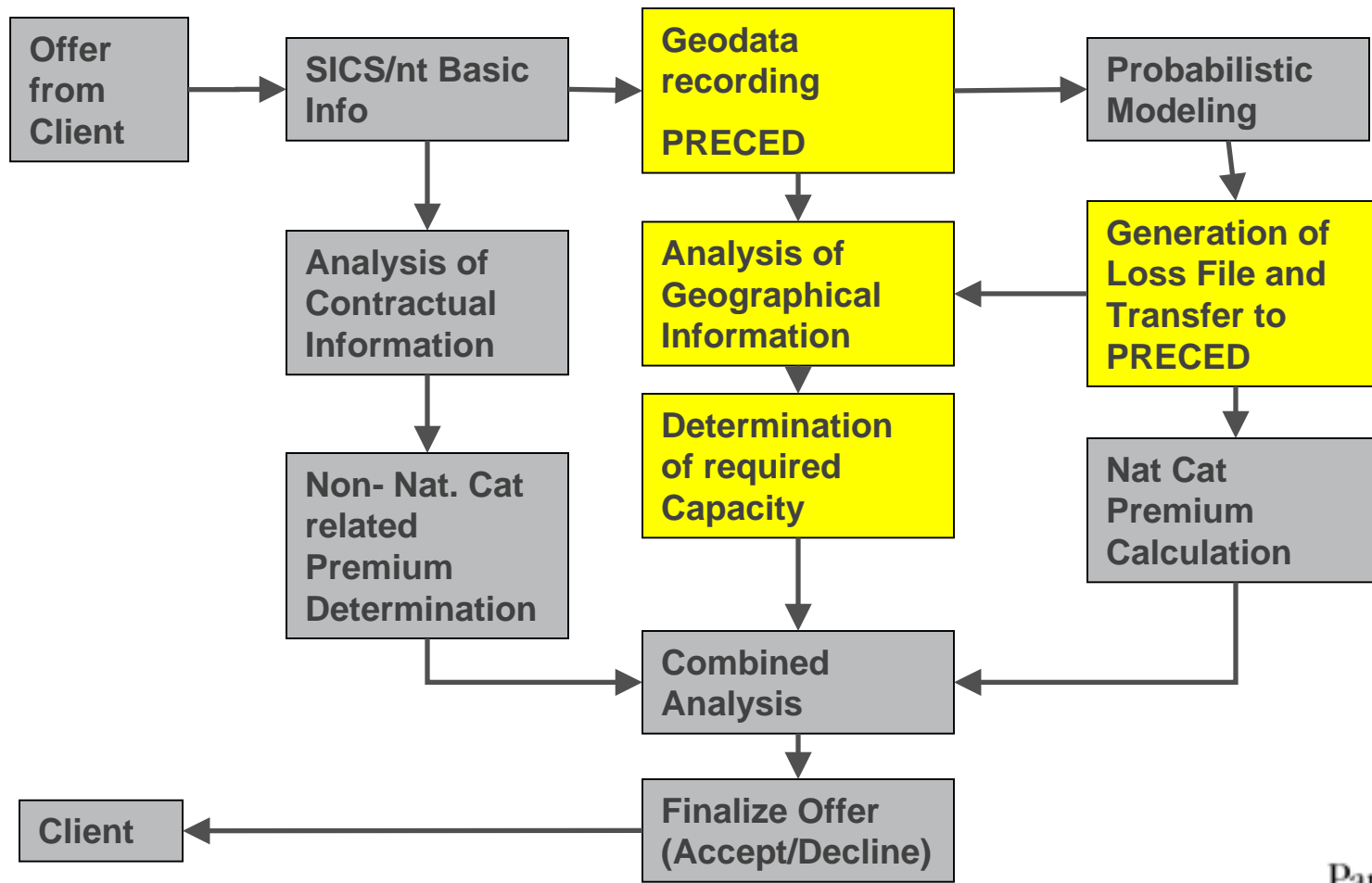
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PRECED – Citrix Network



Underwriting Process



 PRECED Functionality



Exposure Recording & Visualization

a) Treaty Exposure – Aggregated Data (Cresta, Unicede)

Policy Type	Zone	Fee	# Policies	Building	Contract	SIC	#	Total
Proportional	Jul 1	\$5	0	0	0	0	0	\$76,400,000
Proportional	Jul 10	\$5	0	0	0	0	0	\$18,800,000
Proportional	Jul 11	\$5	0	0	0	0	0	\$4,300,000
Proportional	Jul 12	\$5	0	0	0	0	0	\$6,500,000
Proportional	Jul 13	\$5	0	0	0	0	0	\$9,700,000
Proportional	Jul 14	\$5	0	0	0	0	0	\$20,000,000



b) Treaty Exposure – Detailed Data (Policy / Location Level)

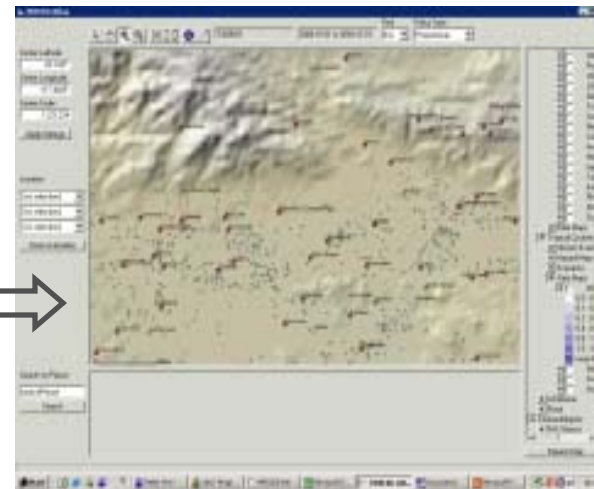
Raw Data



Convert to Partner Re Standard Format



Data Transfer To PRECED



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Exposure Recording & Visualization (2)

c) Facultative Business Exposure

The screenshot displays a software interface for exposure recording and visualization. On the left, a data table lists exposure objects with columns for Place/Zone, Object, OV, and OBI. Two detailed views for 'Houston' are shown, providing specific data for each object.

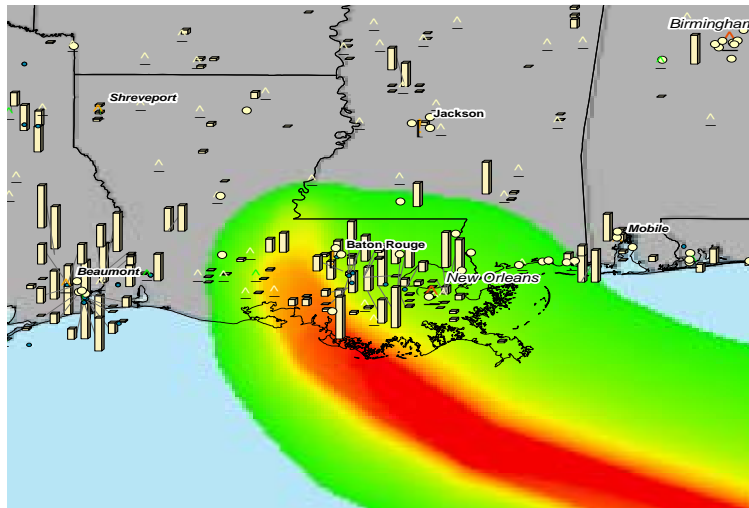
Place/Zone	Object	OV	OBI
Hungerford	HUNGERFORD	74,495	39,534
Huntington I	HUNTINGTON BE	39,828	9,660
Hurley	HURLEY	81,063	0
Idaho Falls	IDAHO FALLS	141,585	0

Two detailed views for 'Houston' are shown:

- Object 1:** Object: HOUSTON, Currency: EUR, Start Date: 2004-01-01, End Date: 2004-12-31, Occupancy Type: Industrial, Place: Houston. OV: 1,967,331, Limit OV/OBI: 5.00, % Ded: -, Ded Amount: -unknown, Construction Type: -, Lat: 29.7718, Lon: -95.4071.
- Object 2:** Object: HOUSTON, Currency: EUR, Start Date: 2004-01-01, End Date: 2004-12-31, Occupancy Type: Industrial, Place: Houston. OV: 737,055, Limit OV/OBI: 5.00, % Ded: -, Ded Amount: -unknown, Construction Type: -, Lat: 29.7718, Lon: -95.4071.

On the right, a map of the United States shows exposure points. A legend for 'FAC Value' includes categories: 0 - 14% of Max, 14 - 29% of Max, 29 - 43% of Max, 43 - 57% of Max, 57 - 71% of Max, 71 - 85% of Max, 85 - 100% of Max, FAC Value / Limit, and FAC Intensity. A yellow arrow points from the 'Houston' data to the map.

Exposure Limitation per Business Unit and Peril Zone



Contract Info		Scenario Loss 100%		Scenario Loss per Share	
Scenario (Amount in EUR)	Peril				
EQ_SC_Japan	EQ	282,458,875		7,304,222	
EQ_SC_Mexico	EQ	17,047,198		426,179	
EQ_SC_Turkey	EQ	14,944,895		373,816	
EQ_SC_Texas, Province of China	EQ	22,625,808		585,842	

Capacity		Effective By		2002-09-12	
Business Unit	Specialty	Utilized Capacity	Scenario Loss our Share	Remaining Capacity	Total Capacity
Scenario	Peril				
EQ_SC_Japan	EQ	41,821,217	7,165,442	21,813,243	78,000,000 USD
EQ_SC_Turkey	EQ	21,238,674	389,818	28,398,808	88,000,000 USD
EQ_SC_Texas, Province of China	EQ	24,764,594	594,295	59,000,411	88,000,000 USD
EQ_SC_Mexico	EQ	16,794,288	418,081	63,790,631	88,000,000 USD

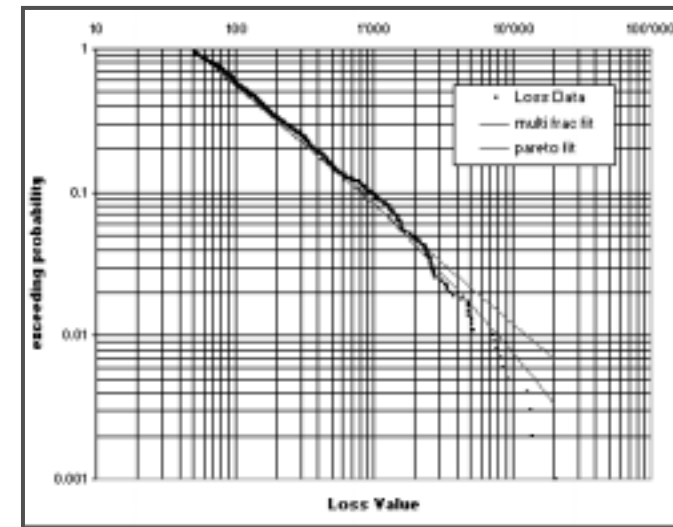
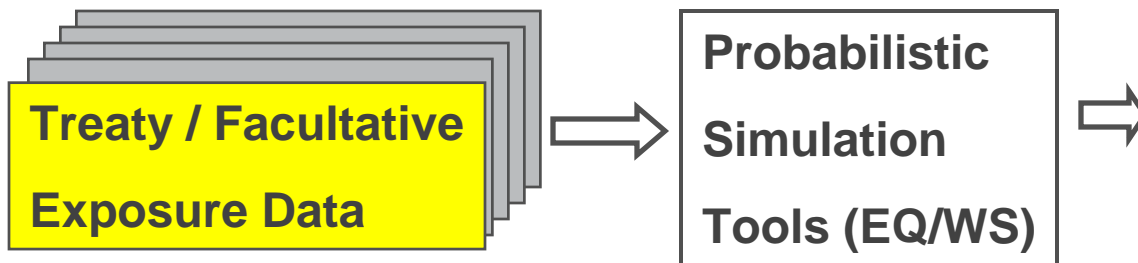


Partner Re allocates to each Business Unit a certain amount of capacity per peril zone. Capacity usage is controlled by using a scenario approach.

Centralized Exposure Control in SICS/nt

Portfolio Analysis

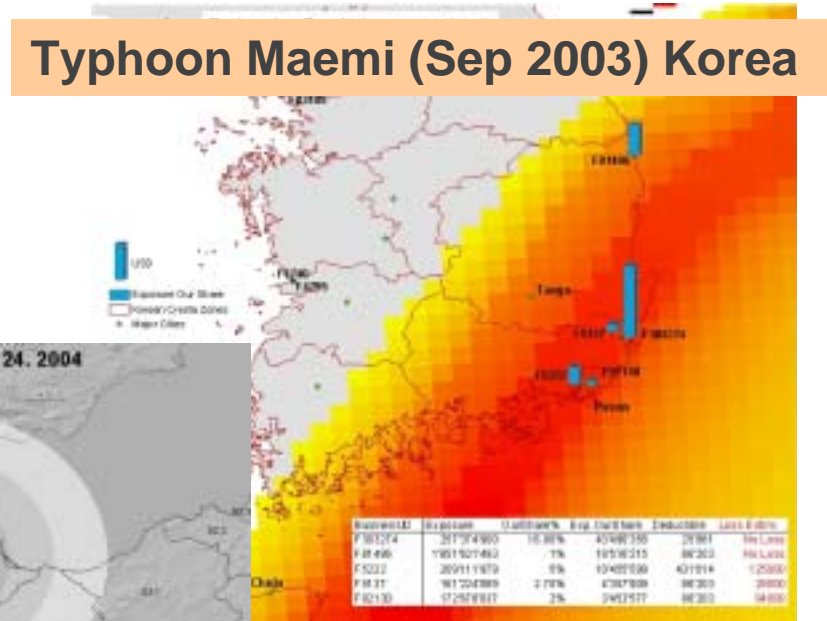
- Determination of capital requirement and allocation to Business Units
- Profitability analysis (ROE – Return on Equity)
- Verification of deterministic scenarios
- Information to be provided to rating agencies (S&P, Moody's..)





Event Loss Estimation

- Fast and reliable post-event information to the Board of Directors and Executive Management
- Accurate and timely information to investors and media



Earthquake Al Hoceima Morocco (Feb 2004)

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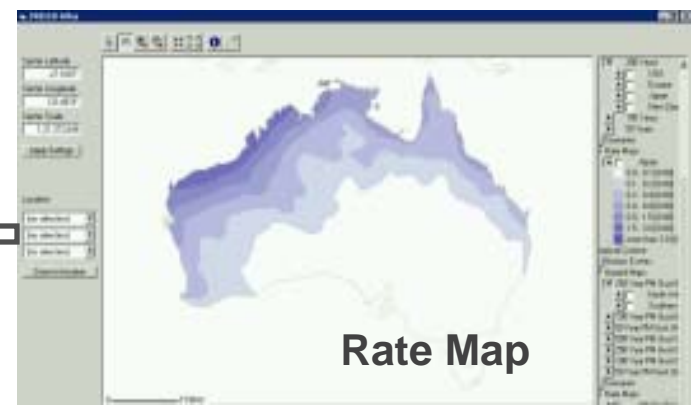




Hazard – and Rate Maps: Geographic Underwriting

Earthquake

Windstorm



Premium
Calculation



PML
Calculation



Conclusions

Partner Re has realized how important GIS Tools are for the insurance and reinsurance industry

PRECED is used by all underwriting units and therefore enables enterprise wide exposure management and offers steering and control opportunities to achieve strategic decisions.

With PRECED

the pricing consistency has been improved

the determination of capital requirement is State of the Art

the catastrophe capacity is utilized more efficiently

the post event loss estimation is faster and more accurate

