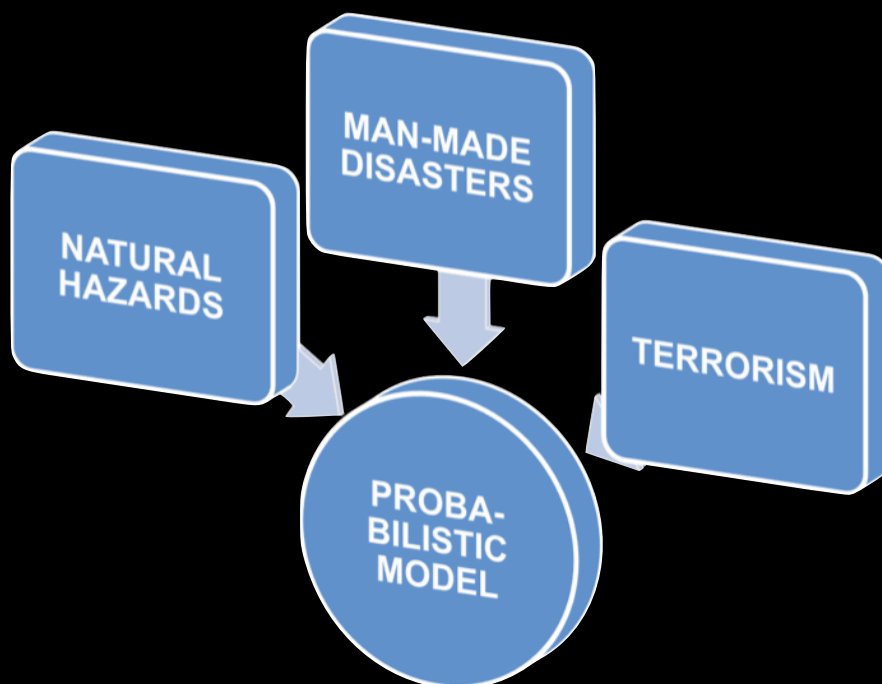


Dipl.-Geogr. Konstantin Greger

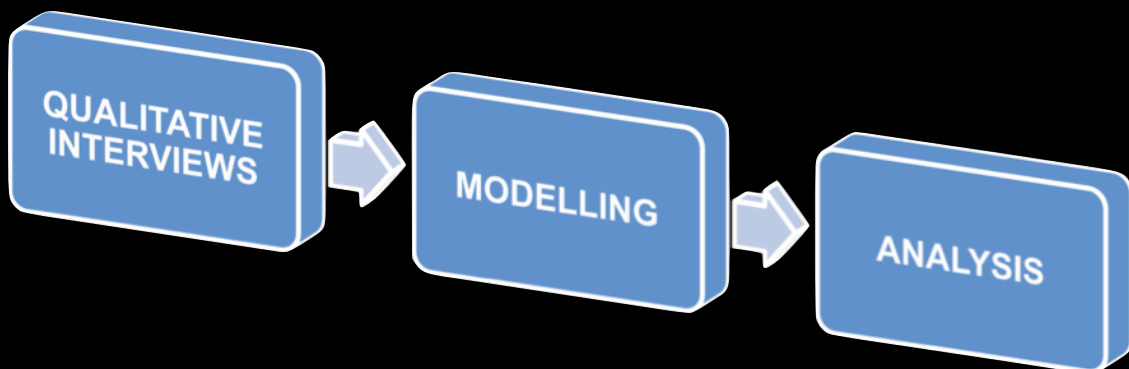
SPATIAL MODELING AND ANALYSIS OF MAN-MADE LARGE- SCALE EVENTS USING GIS



STARTING POINT

- ① Man-made large-scale loss events can be put in a spatial context.
- ② Factors determine the spatial distribution of these anthropogenic incidents.
- ③ Their existence and significance can be quantified using geostatistical methods.

HYPOTHESES



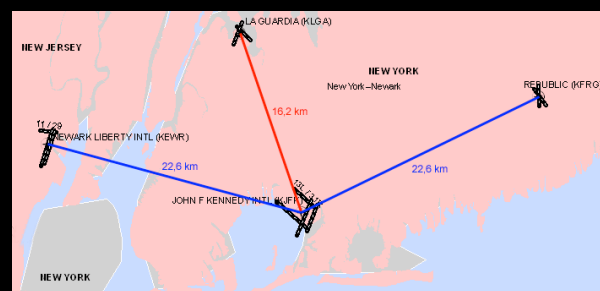
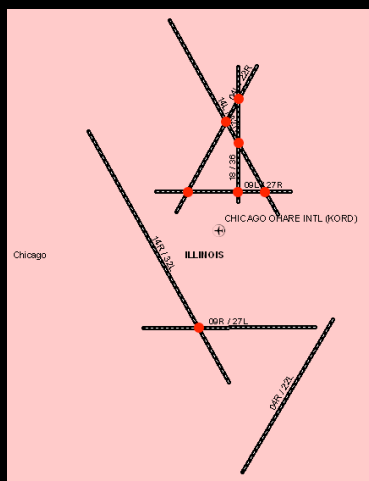
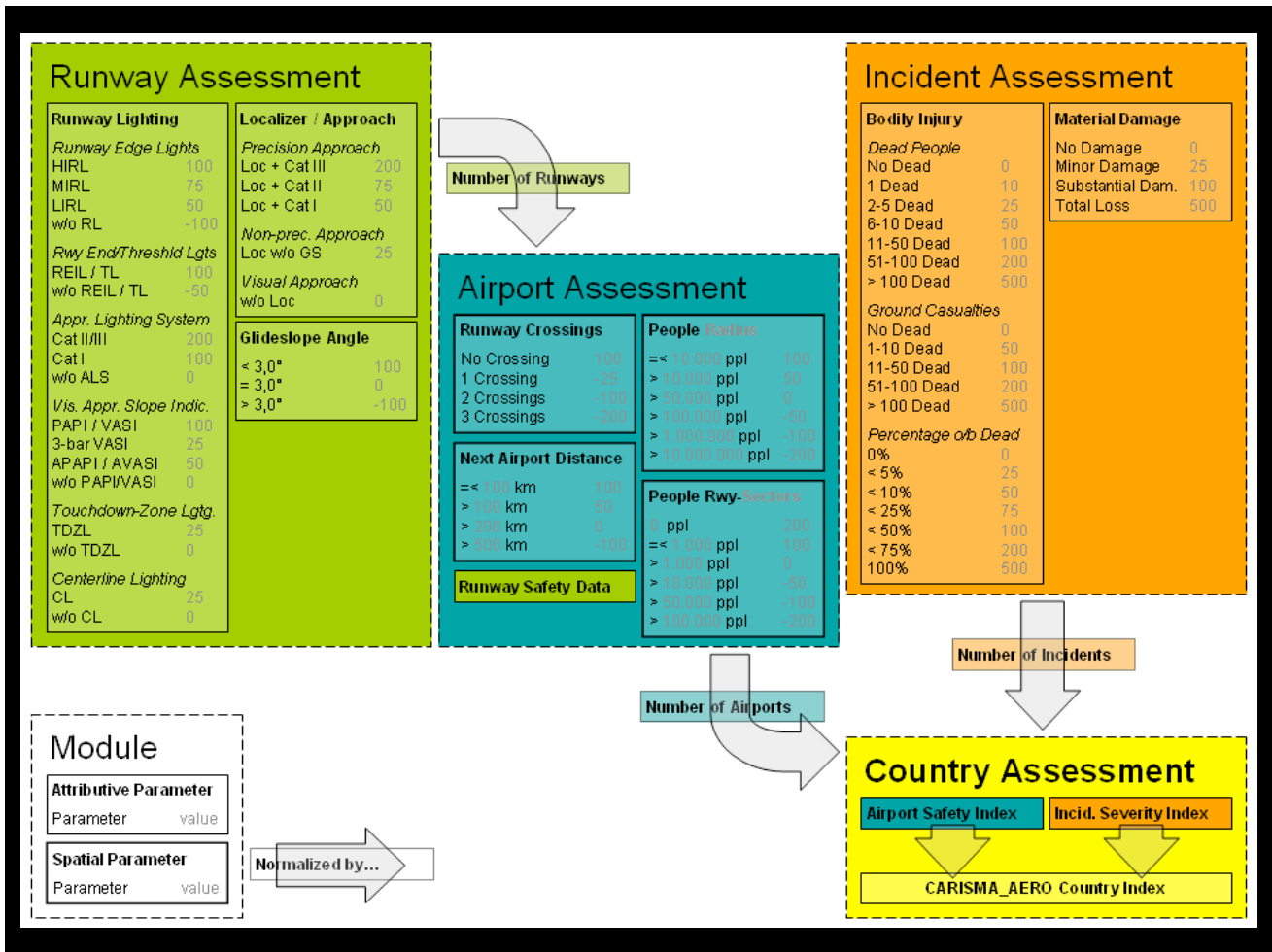
RESEARCH PROCESS

- ▶ Location is no reference for risk exposure.
 - ▶ Surroundings are of greater interest.
 - ▶ Factors facilitate occurrence of incidents.
 - ▶ These can be mapped onto the country.
 - ▶ Probabilistic model not considered useful.
- **Changed goal for usage of data model**

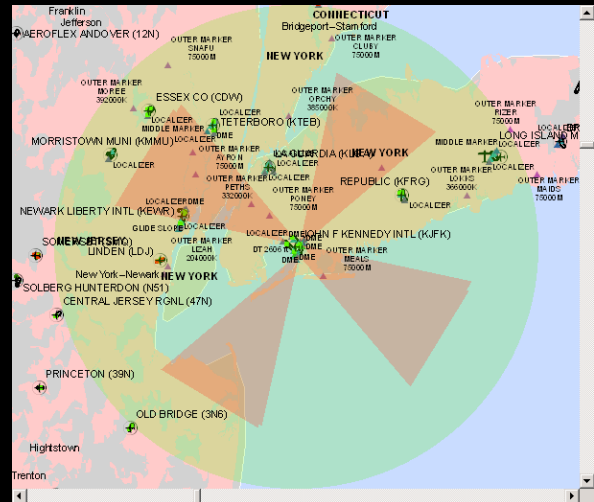
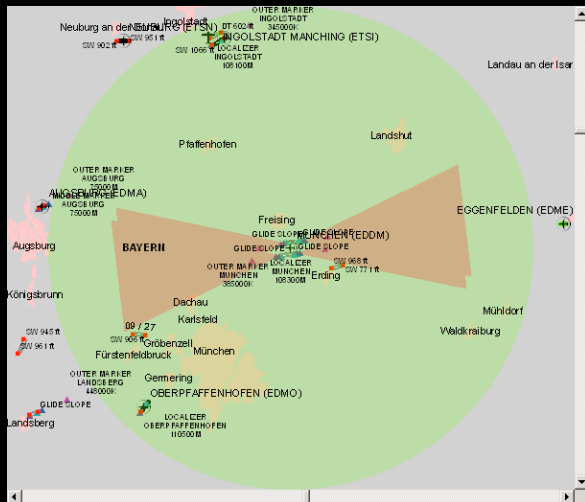
QUALITATIVE INTERVIEWS

- ↓ Decision to focus on aircraft incidents (except when in flight).
 - ↓ Identify influential real-world objects.
 - ↓ Evaluation of data about critical infrastructure and historical incident data.
- **Correlation between these two dimensions could prove hypothesis.**

MODELING



SPATIAL ANALYSIS



SPATIAL ANALYSIS

STATISTICAL CROSS-CORRELATION

- Pearson product moment correlation coefficient r

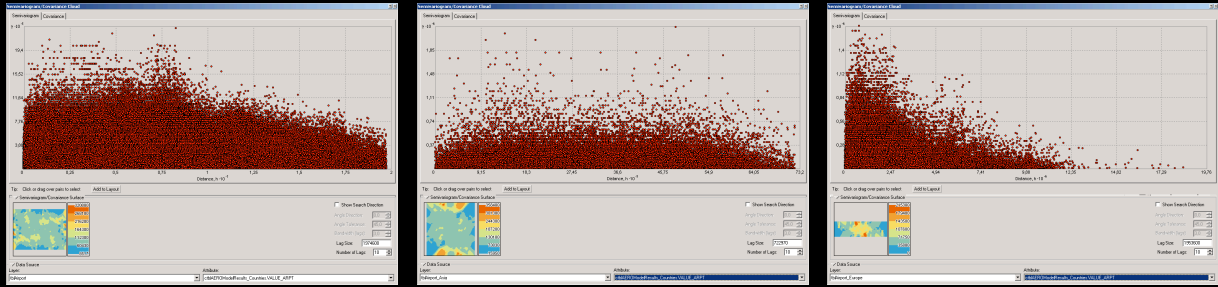
SPATIAL AUTO-CORRELATION

- Semivariogram
- Moran's I

DESCRIPTIVE STATISTICS

- Minimum
- Maximum
- Mean

STATISTICAL ANALYSIS



SEMIVARIOGRAMS

	Africa	Asia	Australia	Europe	N-Amer.	S-Amer.	Total
Count	256	365	75	581	1984	182	3443
Min	-500	-600	-350	-533	-640	-500	-640
Max	975	1500	950	1300	1000	1087	1500
Mean	15.92	261.57	303	300.6	221.62	142.98	220.44
Median	0	300	250	325	250	125	250
Skewness	0.515	0.072	-0.051	-0.061	-0.262	0.295	-0.034
Std. Dev.	311.59	325.89	323.99	330.29	256.32	142.98	293.43

DESCRIPTIVE STATISTICS

- ▶ Starting point: lack of probabilistic model.
- ▶ Interviews: knowledge-base more useful.
- ▶ Central hypothesis could not be proved.
- ▶ Descriptive statistics showed correlation.

SUMMARY

- ▶ Wrong factors
- ▶ Too few factors
- ▶ Wrong weighting
- ▶ Missing calibration
- ▶ Incomplete data
- ▶ Erroneous data

REASONS FOR FAILURE