



Questions & Answers Part 3

Please type your questions in the Question Box. We will try our best to get to all your questions. If we don't, feel free to email Charles Huyck (ckh@imagecatinc.com), Paul Amyx (pra@imagecatinc.com), Marina Mendoza (mtm@imagecatinc.com) or Michael Eguchi (mte@imagecatinc.com).

Question 1: Are engineering reviews mandatory?

Answer 1: When developing an exposure database, engineering review is required to responsibly characterize risk. Onsite engineering reviews are mandatory for some decisions in the US, for due diligence.

Question 2: Michael Eguchi mentioned rolling up a portfolio a few times (if I heard him correctly), what information would be aggregated, and in which process would this aggregated data feed into?

Answer 2: It depends on the application. If you are looking at response to a single event, it's simply a matter of adding all the loss numbers for individual properties. If the application is insurance, it means running the properties through an event set, applying deductibles, and then beginning the aggregation process.

Question 3: How can we apply this metadata to study sea level change?

Answer 3: The flow charts were created as examples for tracking and developing a building exposure, which could be used for understanding the number of buildings and people that are vulnerable to sea-level rise. The flowcharts can be augmented and built upon by individual users to help them structure their study and/or create the steps for answering the study's questions.

The metadata structure can be used for documenting the data sources, bibliography, lineage, and processing steps of the sea level data analysis. This is especially important for users to understand the specific data sources (elevation resolution, datums), SSP/RCP scenario and climate model used in the study. For example, the users can develop a community database from building footprint and building attributes. From there, they can assign the first-floor elevation and can begin to assess



Transforming Earth Observation (EO) Data into Building Infrastructure Data Sets for Disaster Risk Modeling

October 3, 5, and 10, 2023

the likelihood of loss given annual nuisance flooding, storm surge, and expected sea-level rise.

Question 4: Is there bias in the various location risks too?

Answer 4: If location risks means hazards, yes. There is uncertainty about many natural hazards, and science is constantly updating assessments of risk, particularly considering climate change. If location risks means site specific risks, also yes. There can be many biases in site specific risk. The classic example is undervaluation in tax assessor data, but also may be there when a proxy is used for rigorous assessment (such as assuming vulnerability from year built).

Question 5: Is risk modeling incorporated into many official city plans worldwide?

Answer 5: Sovereign nations, states, and cities at risk internationally are beginning to model risks to understand the impacts of climate change, and is being encouraged by the Sendai framework and SDGs, and accordingly the UN, the World Bank, and others. Of course, uptake varies substantially, and sharing knowledge is critical. That's why these types of training opportunities are so important. Much, much more needs to be done. Policy is lagging. Cities are not making the hard decisions necessary to implement changes based on risk, especially evolving risk.

Question 6: There should be a beneficial metric for life?

Answer 6: This is done, but it is quite controversial. Life safety absolutely is a factor.

Question 7: Is it the susceptibility analysis that you did for calculating building exposure?

Answer 7: Construction type classifications of the general residential building stock was available through the Population and Housing Census. We reviewed these material types and construction classes in parallel with the relevant building code and ground imagery (google streetview and mapillary)/online ground photos to assess and assign vulnerabilities to each unique building type. A review of a Preliminary Damage Assessment (Hurricane Irma) was also reviewed to assess regional construction practices and common deficiencies prevalent in regards to hurricane wind.

Question 8: For the case study of Antigua and Barbuda, how did you calculate the replacement costs for the different types of buildings?



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October 3, 5, and 10, 2023

Answer 8: Creation of unique development patterns and their associated mapping schemes allowed us to both identify unique structural types/building materials, building footprint sizes and number of stories. Through discussion with local experts, we assigned an average replacement cost per square meter for each model building type and aggregated the results up.

Question 9: In assessing the vulnerability, why will you use vulnerability scoring over index based approaches like the Social Vulnerability Index and Adaptive Capacity Index?

Answer 9: There are different approaches that can be taken to assess vulnerability. This is one of them that we developed based on the recommendations from the UNFCCC, frameworks applicable in the Caribbean, and the California Climate Adaptation guide that we found useful (links are in the slides). The UNFCCC guidelines are not prescriptive, if you take a look, they offer many examples on ways to assess vulnerabilities and define adaptation actions. An important aspect, though, is that based on the definition of vulnerability, we need to look not only at adaptive capacity but also at potential impacts. The scoring system was useful in this case to rank vulnerabilities, which was something requested specifically by the Department of Environment of Antigua and Barbuda.

Question 10: Are there any figures for various impacts (r.e., code black [mass casualties]) clean up?

Answer 10: There are models for bomb impact looking at things like human threats. Basically, impact given radius from the device. This is not work that we do, but the same types of databases are used- just different vulnerability assignments. Cost of cleanup is similar to other debris challenges, such as hurricanes, unless radiation is an issue. Others have looked at HAZUS and modified the damage functions to account for blast.

Question 11: How long did it take to develop the exposure dataset in the Antigua and Barbuda case, and what was the size of the island studied?

Answer 11: I believe we put it together over a period of 6 months, and they are quite small islands (a few hundred square km²). Generally, putting together a detailed Level 5 dataset for Antigua, we ran into many of the same issues that we would have for looking at a much wider or more populated area- such as New York City or Los



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Angeles County. Because coastal issues were key, we wanted to be able to drill down to that higher level of resolution. Barbuda was a far greater challenge than Antigua, because of the lack of data and the relatively recent hurricane damage.