Nomenclature of Event Types

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26 March 2012

Introductory notes

We propose a structure that is to be imitated in internal databases of three data centres and hopefully in commonly used standard seismic bulletin exchange formats such as ISF and QuakeML. The standard formats are yet to be reviewed and adjusted by the appropriate bodies, but the proposed nomenclature is designed not to require a change of structure of these formats. We tried to make sure that the proposed database nomenclature could be converted into existing standard formats with no considerable loss of meaning.

Current disarray in the use of event types is caused by many self-conflicting features of real application:

1. Mixing event types and event effects (*such* as felt or damaging) should no longer be encouraged. This issue is to be addressed by introduction of a separate effect block (such as felt, damaging, tsunami, landslides, avalanches, casualties etc). This topic is outside the scope of this document.
2. There is a real need for majority of researchers, especially in the area of seismic hazard, to know if an event was tectonic.
3. Currently used nomenclatures do not allow sufficiently general event types. This causes either misuse of event types or withdrawal of information. To encourage more event type information provided by data reporters, we need to let the nomenclature users to give exactly as much information as they can, want or allowed to provide.

Proposed nomenclature for application in the ISF

Event type is proposed to be a **two-character code** composed of the following:

- character 1: certainty
- character 2: type

A leading character generally indicates the certainty with which the type of the event is asserted and a trailing character indicates the generic or more detailed type of an event.

The **first** (leading) character, the **certainty**, can be one of:

- s = suspected
- k = known
- u = unknown
- n = not reported

The **second** (trailing) character, the **type**, can be one of the 26 characters below. The most general (common) choice will be one of: **e**, **a**, **o** or **u**. If there is a need, users can use progressively more detailed event description instead.

- u = null (to follow the first character being "u" or "n")
- e = earthquake
- a = anthropogenic event or event linked to an anthropogenic activity
    - c = collapse (of underground cavity, mine or building) (see comments)
    - x = explosion
        - f = accidental explosion
        - h = chemical explosion
        - g = controlled explosion
        - j = experimental explosion
        - d = industrial explosion
        - m = mining explosion (quarry blast, road cut, blasting levee)
        - n = nuclear explosion
    - i = induced or triggered event
        - r = rock burst
        - w = reservoir loading
        - k = fluid injection
        - q = fluid extraction
    - p = plane/train/boat crash
- o = other
    - s = atmospheric (sonic boom, sonic blast, acoustic noise, thunder)
    - b = avalanche
    - y = hydroacoustic event
    - z = ice quake
    - l = landslide (rockslide) (see comments)
    - t = meteorite
    - v = volcanic eruption

Essential comments

1. The above bullet-point hierarchy of event types is not part of the standard formats. Nevertheless its presence in this document helps to explain that event type reporters can be as general or as detailed as they so desire.

   For example, "a" is a simple way to separate man-caused events from those occurring naturally. On can go further and use "x" as a less general term for explosion, or even use "n" as a more specific indication of the nuclear explosion. The choice is governed by exact situation where progressively more detailed type may either be not known or not desired/allowed to be identified.

2. Landslide (rockslide) is an actual ground failure that was recorded as oppose to an earthquake that caused a landslide, in which case this information belongs to the effect block. The same applies to cavity, mine or building collapse.

3. The default is decided by each reporter. We nevertheless expect that both characters are filled with character values according to the above description and the second character, by definition, must be "u" if the first character is "u" or "n".

Proposed nomenclature for application in the QuakeML

QuakeML addresses the issue with two attributes: EventTypeCertainty and EventType.

Possible enumeration values for **EventTypeCertainty** (if used) include:

- known
- suspected

Possible enumeration values for the **EventType** (if used) include:

- not reported
- earthquake
- anthropogenic event
  - collapse
    - cavity collapse
    - mine collapse
    - building collapse
  - explosion
    - accidental explosion
    - chemical explosion
    - controlled explosion
    - experimental explosion
    - industrial explosion
    - mining explosion
      - quarry blast
      - road cut
      - blasting levee
    - nuclear explosion
  - induced or triggered event
    - rock burst
    - reservoir loading
    - fluid injection
    - fluid extraction
  - crash
    - plane crash
    - train crash
    - boat crash
- other event
  - atmospheric event
    - sonic boom
    - sonic blast
    - acoustic noise
    - thunder
  - avalanche
    - snow avalanche
    - debris avalanche
  - hydroacoustic event
  - ice quake
  - slide
    - landslide
    - rockslide

- meteorite
- volcanic eruption

Essential comments

The above bullet-point hierarchy of event types is not part of the QuakeML format. Nevertheless, its presence in this document helps to show why the above enumerations are required to make an event type reporting as convenient and practical as possible.