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Datasheet for the decision of 28 March 2023

Case Number: T 1587/18 - 3.5.01

Application Number: 09781198.8

Publication Number: 2318994

IPC: G06Q40/00

Language of the proceedings: EN

Title of invention:
EARTHQUAKE DAMAGE PREDICTION AND PREVENTION SYSTEM AND METHOD THEREOF

Applicant:
Swiss Reinsurance Company Ltd.

Headword:
Earthquake damage prediction/SWISS RE

Relevant legal provisions:
EPC Art. 83

Keyword:
Sufficiency of disclosure - (no)

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Case Number: T 1587/18 - 3.5.01

D E C I S I O N
of Technical Board of Appeal 3.5.01
of 28 March 2023

Appellant: (Applicant)	Swiss Reinsurance Company Ltd. Mythenquai 50/60 8022 Zürich (CH)
Representative:	Leimgruber, Fabian Alfred Rupert ThomannFischer Elisabethenstrasse 30 4010 Basel (CH)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 10 January 2018 refusing European patent application No. 09781198.8 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	W. Chandler
Members:	I. Kürten
	C. Schmidt

Summary of Facts and Submissions

I. The appeal concerns the decision of the examining division to refuse the European patent application No. 09781198.8 for lack of inventive step (Article 56 EPC).

II. In the statement setting out the grounds of appeal, the appellant requested that the decision under appeal be set aside and that the case be remitted to the examining division for further prosecution based on a newly filed set of claims or, alternatively, that a patent be granted based on that set of claims.

III. In a communication pursuant to Rule 100(2) EPC, the Board set out its provisional opinion that various elements of claim 1 appeared to be unclear and to lack basis in the originally filed application. As a result, the Board doubted that the invention, in particular the aspects of the 3-dimensional earth model and its parameterisation, as well as the use of foreshock measurements, was disclosed sufficiently for it to be carried out by a person skilled in the art without undue burden. What was disclosed appeared not to involve an inventive step.

IV. In a reply, the appellant filed three new requests and submitted supporting arguments.

V. The Board arranged for in-person oral proceedings. In the communication accompanying the summons, the Board elaborated that, despite attempts to amend them, the aspect of the 3-dimensional earth model and its parameterisation and the aspect of the foreshocks, added at the beginning of the appeal and still contained in all requests appeared to be fundamentally

unclear and did not enable the skilled person to put the invention into practice. As a result, the Board could not see how they could form the basis of an allowable claim.

VI. In a reply, the appellant filed a new main and two auxiliary requests and provided arguments in favour of the admissibility and allowability of these requests.

VII. Due to a public strike in Germany, the appellant's representative was unable to travel to Munich and the oral proceedings were held via videoconference on the scheduled date of 28 March 2023. During the oral proceedings, the appellant withdrew the auxiliary requests.

VIII. Claim 1 of the appellant's sole request reads:

An earthquake damage prediction and prevention system (1) self-adapting during operation for determining an impact caused by an earthquake to objects associated with different geographical locations (A,B,C,D) generating reliable earthquake impact signaling providing real-time reaction on an occurring earthquake, wherein the system comprises an intensity calculation module (104) with a coordinates processor for generating geometric distances for the geographical locations (A,B,C,D) from a hypocenter (2) of an earthquake given by magnitude, depth and coordinates of the earthquake at the hypocenter (2), and wherein the intensity calculation module (104) comprises an propagation calculation unit for seismic wave propagation through earth generating local intensity values based upon the generated geometric distances and the earthquake magnitude, characterized,

in that the system comprises a plurality of early warning means comprising seismic sensors to measure foreshocks of an earthquake, wherein the early warning means are decentralized located building up a grid of controlled earthquake detection centers, wherein the propagation calculation for generating the local intensity values comprises a stored comprising variable weight parameters parametrizing a 3-dimensional tomographic earth capturing local amplifying effects at least comprising low velocity zones and topography, the foreshock measurements of the earthquake serving as input values and initial start parameters to the propagation calculation unit generating the local intensity values for larger magnitude earthquakes based on smaller magnitude earthquakes, and wherein the geographical locations (A, B, C, D) are determined based on transmitted signals of the early warning means;

in that the system comprises means for storing at least one impact ratio table (151), wherein the impact ratio table (151) comprises a first data structure for storing geographical and/or topographical data coordinates of the determined geographical locations (A,B,C,D), wherein for generating the local intensity values based upon the geometric distances and the earthquake magnitude by the propagation calculation unit, the generated geometric distances are stored assigned to the corresponding geographical locations (A,B,C,D) by means of a second data structure of the impact ratio table (151), and wherein the parameterization is dedicated and specifically adaptable to a specific region or geological structure;

in that the system (1) comprises user interfaces (111) to receive from a plurality of users at least one of

the variable weight parameters and/or at least one impact ratio for different earthquake intensity levels indicative of the impact caused by an earthquake to the object and/or at least one object parameter defining earthquake exposed structures of the, wherein the index calculation module (105) comprises means for adapting the variable weight parameters and/or generated impact ratios and/or object parameter based on those parameters received by the plurality of users;

in that the system (1) comprises an index calculation module (105) to generate the impact index for the geographical locations (A, B, C, D) by determining in each case from the impact ratio table (151) the impact ratio for the local intensity at the respective geographical location (A, B, C, D), and adding up the impact ratios weighted in each case by the a weighting factor assigned to the respective geographical location (A, B, C, D), the weighting factor being indicative in each case of a nominal impact at a geographical location, and the impact index being indicative of a total nominal event impact; and

in that the system comprises alarm means for generating and transmitting an electrical stimulus pulse to activate automated alarm systems on occurring catastrophic events, wherein the activation is bound to a definable threshold value of the system by comparing the impact index to a definable threshold value by means of a trigger function and executing the activation if the impact index exceeds the threshold value.

Reasons for the Decision

1. The invention

1.1 The invention concerns generating an "impact index" indicative of the damage caused by an earthquake to a pre-defined portfolio of objects, such as buildings and bridges, which are spread across different geographical locations (page 1, first paragraph and Figure 3 of the published application). Such indices find application in e.g. insurance loss and risk assessment (page 7, lines 4 to 5).

1.2 The application describes the calculation of the impact index using non-intuitive terms, but it is relatively clear that it is the sum of the product of the objects' values ("weighting factors" - page 9, lines 9 and 10, and Table 1) and the estimated percentage damage they would sustain for a given severity of the earthquake ("impact ratio" - Table 2). The severity of the earthquake at an object's location is calculated from a function of the earthquake's magnitude at its hypocenter 2, the distance of the object from the hypocenter (Figure 4) and a set of parameters (" variable weight parameters" - c1 to c4 in Equation (1)). In the concrete embodiment, this function is the one-dimensional Equation (1) on page 17, but it is referred to as a parameterised "3-dimensional earth model" on page 12, but only in very general terms.

2. Sufficiency of disclosure (Article 83 EPC)

2.1 In the written procedure, the appellant explained that the invention concerned parameterisation of the 3-dimensional model and the use of foreshocks. However,

it was not clear to the Board, either from the claims, the description or the appellant's explanations, how the parameters of the model were affected by the user input or how the foreshock measurements played a role in the calculation of the local intensity values.

2.2 During the oral proceedings the appellant explained that the key point of the invention was that the parameters in the model were based on a regression of user observed values of damage caused by previous earthquakes (the foreshocks). Thus, the foreshocks were not playing the traditional role of predicting an impending major earthquake as described in the opening part of the description at the end of page 3; rather they were used in adapting the parameters of the model to the characteristics of the region. Also, different "users" were performing a variety of activities, including entering initial values, observation values, and possibly carrying out the regression, although the system could have been doing that automatically.

2.3 In detail, the appellant explained that in the invention:

Firstly, a user configures the system by selecting a seismic wave propagation function, such as a 3-dimensional model of the earth's structure. Contrary to the Board's initial understanding the generalisation of Equation (1) to the 3-dimensional model was not part of the invention, as it was conceded to be known.

Secondly, the same or similar user enters default values for the model's parameters, as well as the above-mentioned "impact ratios" for different types of objects, e.g. depending on their building material.

Thirdly, a plurality of users at various locations observe and record:
- the damage (impact ratio) caused by a foreshock, i.e. some arbitrary earthquake, to existing objects (e.g. buildings) and
- information about these objects (such as the material they are made of).
From this information and the previously entered data, the system infers the local intensity of the foreshock that caused the damage at each place of observation. The sets of local intensities, foreshock's magnitude and the distances from the objects' locations to the foreshock's hypocenter, are regressed to adjust the model parameters.

Lastly, the propagation function with the adapted parameters can be used to predict the intensities of future earthquakes at the locations of all the objects in the portfolio, and thus the overall damage.

2.4 This explanation finally clears up many of the Board's doubts, expressed in its communications, about what the invention actually does. However, although it is eminently plausible, the Board judges that it is not disclosed in the application.

Firstly, although not a definitive legal proof, the fundamental idea of using observed data sets to determine the model's parameters did not occur to any of the members of the Board, despite reading the application at the beginning of the appeal and after both of the appellant's replies.

Moreover, the Board is unable to derive it using the accepted legal standards from the application. The only

pertinent passage in the description is on page 13, second paragraph, according to which:

> " *... the index calculation module 105 comprises means for adapting the variable weight parameters and/or generated impact ratios and/or object parameter based on those received by the plurality of users.*"

The passage does not indicate any criteria for adapting any of the parameters, let alone that object parameters and impact ratios observed during foreshocks are used to infer the foreshock's local intensities at the objects' locations, or that the inferred local intensities, along with the foreshock's magnitude and the distances from the objects' locations to the foreshock's hypocenter, are used to adapt the model parameters (i.e. the variable weight parameters).

2.5 The appellant argued that the skilled person reading the application as a whole would have understood how to adjust the variable weight parameters.

The Board disagrees because the application does not comprise any embodiments describing the parameters' adaptation. The language used in the above-mentioned passage on page 13 is too broad and the repeated use of "and/or" conjunctions creates ambiguity, making it impossible for the skilled person to determine what is being adapted and how this adaptation is carried out, or by whom.

2.6 The appellant also referred to the paragraph on page 17, lines 12 to 17, according to which the user inputs impact ratios which are stored in an impact ratio table in association with earthquake intensity levels.

The Board, however, notes that this passage corresponds to the second step of the method outlined above. The subsequent paragraphs clarify that the stored impact ratios are used for calculating the damage caused by an earthquake by employing a model with predefined parameters, which corresponds to the last step of the method. The stored impact ratios are not used to infer a foreshock's local intensities from observations and to adjust the model parameters, as outlined in the third step above.

2.7 In view of the above, the Board concludes that the application fails to disclose the adaptation of the model parameters with sufficient clarity and completeness to enable the skilled person to carry it out. Given that this adaptation is an essential aspect of the invention, the Board judges that the application does not meet the requirements of Article 83 EPC.

3. Since the appellant's sole request is not allowable, the appeal has to be dismissed.

The Board notes that, in principle, under Article 13(2) RPBA, the admittance of all the appellant's requests, which were filed after the notification of the summons to oral proceedings, was subject to the Board's discretion. If none of the requests had been admitted, the result would have been a rather formal refusal for having no claims on file. In the present case, however, the Board preferred to deal with the main substantive issue that had been discussed throughout the appeal and which applies to all requests that had been filed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

T. Buschek W. Chandler

Decision electronically authenticated