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Datasheet for the decision of 4 July 2023

Case Number: T 1468/17 - 3.5.01

Application Number: 05746866.2

Publication Number: 1894159

IPC: G06Q40/00

Language of the proceedings: EN

Title of invention:
COMPUTER SYSTEM AND METHOD FOR DETERMINING AN EARTHQUAKE DAMAGE INDEX

Applicant:
Swiss Reinsurance Company Ltd.

Headword:
Determining an earthquake damage index/SWISS RE

Relevant legal provisions:
EPC Art. 56
RPBA 2020 Art. 13

Keyword:
Inventive step - determining earthquake damage using attenuation function (no - not technical)

Decisions cited:
T 2079/10

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Case Number: T 1468/17 - 3.5.01

D E C I S I O N
of Technical Board of Appeal 3.5.01
of 4 July 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 13 February 2017 refusing European patent application No. 05746866.2 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	W. Chandler
Members:	N. Glaser
	C. Schmidt

Summary of Facts and Submissions

I. This is an appeal against the examining division's decision to refuse European patent application No. 05 746 866.2 for lack of inventive step (Article 56 EPC), because claims 1 to 9 of the main request were a straight-forward implementation of a business method on a notorious (networked) computer system.

II. The appellant requested in the statement setting out the grounds of appeal, dated 13 June 2017, that the decision under appeal be set aside and that a patent be granted on the basis of request "Anhang A", comprising claims 1 to 10, filed together with the statement setting out the grounds of appeal. Claim 1 to 10 corresponded to the refused auxiliary request.

III. The Board notified the appellant in a first communication about its provisional opinion that the subject-matter of claims 1 to 10 was not inventive. The Board referred to the following documents :

D1: R.M.W. Musson, Intensity-based seismic risk assessment, Soil Dynamics and Earthquake Engineering December, 2000, pp. 353-360;

D2: JPH 11211839, Patent Abstracts of Japan, 6 August 1999

IV. In response, the appellant presented arguments in favor of inventive step and submitted a new main request (Anhang A) to replace the request on file.

V. The Board summoned for oral proceedings on 28 and 29 March 2023 which were intended to be jointly held with

the oral proceedings in case T 1587/18. The Board maintained its provisional opinion.

VI. In response, on 27 February 2023, the appellant presented arguments in favor of inventive step and submitted a further amended main request (Anhang A), as well as a first auxiliary request (Anhang B) and a second auxiliary request (Anhang C).

VII. The appellant informed the Board in a letter dated 22 March 2023 that it waived the right to oral proceedings and requested a decision according to the state of the file.

VIII. The Board cancelled the oral proceedings.

IX. Claim 1 of the main request (Anhang A) submitted on 27 February 2023 reads as follows:

"*1. A computer system (1) for determining a damage index measure indicative of the damage caused by an earthquake (2) to a portfolio of defined objects (6) associated with a defined geographical area (3), wherein the damage index quantitatively indicates the damage caused by the earthquake (2) to the portfolio of the defined objects (6) located in the defined geographical area (3) based on physically measured parameters of the earthquake (2) the system (1) comprising:*

a database (15) for storing local portfolio replacement value indices (5) assigned to grid coordinates (7) of the geographical area (3) geographically localized by a longitude and latitude value, the local portfolio replacement value index (5) being determined by aggregating portfolio replacement values of individual

objects (6) of the portfolio associated with a grid coordinate (7) and the portfolio replacement values being defined by abstract values of the individual objects (6), wherein the portfolio replacement values are assigned to a grid coordinate (7) based on the proximity of their associated portfolio object to a grid coordinate (7);

the database (15) for storing local seismological attenuation parameters and correction parameters for local subsoil conditions assigned to the respective grid coordinates (7) of the geographical area (3);

*means [*sic*] an earthquake data module (103) for receiving and storing location, depth and magnitude data associated with the earthquake (2) from seismological measurement stations;*

means for calculating a local damage index (5) for each grid coordinate (7) having a local portfolio replacement value index (5) assigned to it, by selecting for the respective grid coordinate (7) local seismological attenuation parameters and a correction parameter for local subsoil conditions from the database (15), by calculating a distance of the respective grid coordinate (7) from the location of the earthquake (2), by calculating for the respective grid coordinate (7) a local shaking intensity value index, applying an attenuation function to the distance and depth and magnitude data using the local seismological attenuation parameters and the correction parameter for local subsoil conditions, by determining for the respective grid coordinate (7) a local seismological vulnerability value by a vulnerability function assigned to the geographic area (3) returning a vulnerability value for a given grid coordinate (7) and

given magnitude of the earthquake (2), by calculating for the respective grid coordinate (7) a local mean damage degree index from the local shaking intensity value index and the local seismological vulnerability value, and by calculating the local damage index (5) from the local mean damage degree index and the local portfolio replacement value index (5); and

means for calculating the damage index by aggregating the local damage indices (5) for the grid coordinates (7)."

X. Claim 1 of the first auxiliary request is based on claim 1 of the main request with the following additional features:

"*a grid (4) definable associated with the geographical area (3) by selecting the geographical area (3), wherein parameters defining the geographical area (3) and the grid (4) are stored in a database (15), and wherein the grid (3) as grid elements with different spacing*" as the first feature of the claim;

"*... , wherein a simulation function is executed by an application module (105) for further processing of the damage index, the simulation function defining different sets of earthquake data for hypothetical earthquakes (2) affecting the geographical area (3), wherein for each set, the damage index assigned to the earthquake data is stored by the simulation function, and damages are forecasted for different earthquakes (2) by the simulation function, and wherein locations of planned objects (6) are selected by the simulation function with regards to minimum earthquake damage.*" at the end of the claim.

XI. Claim 1 of the second auxiliary request is based on claim 1 of the main request with the following additional features:

"*a grid (4) definable associated with the geographical area (3) by selecting the geographical area (3), wherein parameters defining the geographical area (3) and the grid (4) are stored in a database (15), and wherein the grid (3) as grid elements with different spacing*" as the first feature of the claim;

"*... , wherein the damage index is compared to a defined threshold value by a trigger function triggering activation of an alarm function or displaying alarm indicators, and/or transmitting alarm messages.*" at the end of the claim.

Reasons for the Decision

1. Background of the invention

1.1 The invention concerns determining a damage index indicative of the damage caused by an earthquake to a portfolio of objects, such as building, bridges, highways, power lines, etc., which are located in a defined geographical area, page 1, lines 5 to 10. The damage indexes can be used for urban planning and for setting up earthquake insurance funds for insuring a portfolio of objects, see page 14, lines 3 to 4 and 13 to 15.

1.2 The background to the invention on pages 1 and 2 sets out that conventionally, a damage index is defined on a measured magnitude of the earthquake. This damage index is said to correlate poorly with the true damage caused to the objects of the portfolio and the geographical

distribution of objects. Physical parameters other than the magnitude can be used, such as "earthquake shaking intensity", which is a measure of ground acceleration or velocity. However, this requires a dense net of seismograph stations which is not available in the majority of countries.

1.3 The objective of the invention is to determine a damage index which corresponds better to the true damage caused to a portfolio of objects associated within a geographical area without the need for a dense network of seismological measurement stations.

1.4 Looking at Figure 4 and claim 1, the invention achieves this objective essentially by using a seismological attenuation function to calculate a "local shaking intensity" of the earthquake at grid coordinates 7 of a selected geographical region 3, based on the distance of the grid coordinate from the earthquake 2, the earthquake's magnitude as well as attenuation parameters, see equation on page 12, line 22. A "local damage index" is then determined for each grid coordinate based on its "local shaking intensity" and "local portfolio replacement values" 5 assigned to it. These are abstract or monetary values of portfolio objects which are located within a defined geographical segment of a grid coordinate, see page 9, lines 1 to 26. The "local damage indexes" are aggregated to form the overall "damage index".

2. Main request - Article 56 EPC

2.1 Claims 1 to 10 correspond in essence to the claims of the refused auxiliary request.

2.2 The examining division considered that the assessment of earthquake risks and damage was essentially based on scientific or mathematical methods, which were non-technical, and the association of monetary or economic values to objects was merely a commercial activity. No technical problem could be derived other than the automation of the non-technical mathematical and business method on a general purpose networked computer system, and this was not inventive (Article 56 EPC).

2.3 The appellant contested the isolated identification of the technical features of claim 1 and argued that the claim was more than a mere automation of a known mathematical method on a computer. The measurement of a technically reproducible, detectable measured variable (here: damage index measure) had technical character and should be taken into account in the inventive step analysis.

The technical problem of the invention was derived from the observation that a dense distributed network of measuring stations was not available in the majority of countries. The technical problem of the invention could be formulated as "providing technical means for measuring a damage index without being able to use its dense distributed network of seismological measuring stations".

Known business methods of risk transfer usually determined a probability of occurrence for an earthquake with a certain strength on the basis of historical data and events. The mathematical procedures for earthquake wave propagation were complex, computationally intensive and time-consuming. The invention went in a different direction which was neither mathematical nor business-oriented, but was based on technical conside-

rations for an efficient automation within a digital environment.

The invention in summary splits the geographical area in a grid with assignable measurement parameters (index measure), defined a discontinuous attenuation function, which had measurable support points in the individual grid cells of the grid, and calibrated the grid or grid cells using grid-based correction factors. All these steps were based on technical considerations and could be derived neither from the mathematical method nor from the business method of risk transfer based on historical data.

2.4 The Board cannot see the need for any technical considerations for the insurance expert, who is considered to be the relevant (notional) business person, when he wants to determine the damage to a portfolio of objects which are located in a defined geographical area according to the present invention. This expert knows not only the seismological data and parameters, but also that the extent of the earthquake shaking intensity varies over a geographical region according to mathematical functions from academic research on seismology.

The mathematical expertise of the insurance expert indicates that local damage values can be determined from location, depth and magnitude data of an earth quake based on, among others, the distance of an object from the location of the earthquake, and the given seismological models (local seismological attenuation parameters, correction parameters, a vulnerability function). Typical attenuation functions, known by seismologists, see page 12 of the application, employ the distance between an object and an earthquake which

is calculated from the latitude and longitude of the earthquake and the object in question, in other words from two grid positions.

2.5 The invention relies on the determination of a damage index from physical seismological data using seismological models, which the Board interprets as mathematical models, and does not reside in the improvement of the measurement technique itself, as in T 2079/10 (*Steuerung von zellulär aufgebauten Alarmsystemen/SWISSRE*), reasons 4.2 and 4.3, or in a different measurement of data, as argued by the appellant. The invention represents a possibly new, but mathematical modelling concept with the purpose of determining a damage index for a non-technical purpose, for example, for the definition of an insurance portfolio of insured objects, see page 14, lines 1 to 28, of the application. However, the use of seismological data does not imply technical considerations when a new mathematical model is developed.

2.6 When designing this approach the insurance expert does not require an interaction with the (technically) skilled person in the art, only an awareness of the different models employed for the modelling of earthquakes. Apart from being non-technical, these were also known in the art, for example, D1, page 353, right column, last paragraph, to page 355, left column, second paragraph, and Section 2, and D2 disclose the idea of predicting damage indices. The Board sees no need for the (notional) business person to have any technical knowledge for this part of the design.

2.7 Moreover, the Board cannot see any difficulties for the person skilled in the art of data processing to imple-

ment the mathematical concept of the present invention on a conventional networked computer system. The mathematical modelling concept leads the skilled person to seek the appropriate provider of seismological data and use the appropriate seismological models.

2.8 The appellant argued that the use of a "grid" for splitting up a certain geographical region was based on technical considerations in order to automate the system. This step would not result from the abstract, mathematical modelling. It allowed a discretisation of the seismologic waves and was a technically new and efficient way to predict local damage indices with a computer.

2.9 The Board does not agree. The purpose of a "grid" is to aggregate portfolio replacement values of different objects, see page 9, lines 1 to 24, of the application, based on the proximity of the objects to a grid coordinate. The portfolio replacement values define an abstract or monetary value of a portfolio object.

2.10 The Board understands, e.g. from Figure 3, a "grid" to serve merely as a grouping of portfolio objects 6 with associated replacement values 5. The grid coordinate 7 represents the position of that group for the purpose of calculating the impact of the earthquake on that group of objects. In the Board's view, grouping portfolio objects together and assigning them a single positon would arise during the non-technical mathematically modelling phase of the invention. Furthermore, the "discretisation" is not introduced by a "grid", but by fact that the seismological model, see page 12, line 15, to page 13, line 3, of the application, relies on discrete coordinate values to determine the impact of

an earthquake based on the distance of the earthquake to an object.

2.11 Even if the "grid" were not part of the underlying mathematical model, but part of the implementation, the Board considers the use of appropriate coordinates in grids, based on latitude and longitude values, as obvious matters of routine design when implementing such models.

2.12 The subject-matter of claim 1 does therefore not involve an inventive step over a notorious (networked) computer system (Article 56 EPC).

3. Auxiliary requests

3.1 Auxiliary requests 1 and 2 were filed after notification of the summons to oral proceedings. Article 13 RPBA 2020 applies to the question of whether to admit these requests into the appeal proceedings.

3.2 According to Article 13(2) RPBA 2020, any amendment to a party's appeal case made after notification of a summons to oral proceedings must, in principle, not be taken into account if they raise new issues. They may be taken into account based on the Board's discretion.

3.3 The differences between claim 1 of the main request and these two auxiliary requests are identified under points X and XI above. *Inter alia* - Claim 1 of auxiliary request 1 introduces the feature of "a simulation function" and claim 1 of auxiliary request 2 introduces the feature of an "alarm function", whereby both features were taken from the description.

3.4 The appellant did not provide any reasons for these amendments nor did it explain why these amendments were only made at appeal stage.

3.5 These amendments shift the scope of the invention to subject-matter which has not been considered by the examining division. Any such attempt to amend the application could and should have been made during the examination proceedings. Filing the auxiliary requests only in appeal proceedings therefore contravenes the nature of the appeal proceedings, which focuses on the review of the decision taken by the department of first instance.

3.6 The Board therefore decides not to admit these requests into the procedure.

4. Since none of the appellant's requests is allowable, it follows that the appeal has to be dismissed.

5. This decision can be taken in writing since the appellant withdrew its request for oral proceedings and asked for a decision according to the state of the file.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

T. Buschek W. Chandler

Decision electronically authenticated