

## **SUPPORT SYSTEM FOR DECISIONS USEFUL IN INSURANCES AREA**

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**ABSTRACT:** *The purpose of the study is represented by the identification of the actual methods and the assessment of the future methods of evaluation and underwriting of the risks in the sector of the insurances, for identifying the ways of increase of the performances on this domain. The intended objectives are, as follows: the identification of some analytical methods of qualitative analysis and of the quantification of the risks on the domain of the insurances of goods; the accuracy of the risk-situation evaluation; the improvement of the times for analysing the risk and the elaboration of the decision; the fundamental support for subscribing online for insurances, the elaboration of an application destined to establish the character as possible or impossible to be insured of an objective, and also the offer of some recommendations with improving character for the objectives exposed to some risk situations at the limit of the threshold of insuring possibility.*

**KEY WORDS:** *decisions, decisional processes, risk and uncertainty, insurable risks, support system for decision, decision assistance, insurance, finance*

### **1. THE PROJECTING OF THE “RISK ANALYSER” SYSTEM**

The need of information is felt at all levels. The contents and the dynamics of the activities which are specific for the insurance companies reflect an acute need of information regarding the financial state of the society, the reliance on the approved budget and the degree of implementation of the development strategy. Without an informational system and of evidence well established, may appear sincofes and problems within the activity, which can be known only based on an analysis and by studying in time of the information. On the insurance domain it can be identified an evidence system used by the insurance societies, which comprises: *the informational financial-countable system and the operative informational system.*

The phases that are crossed when developing an informational system include: *the preliminary study* within it is delimited the comprising area, the establishment of

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the objectives, the feasibility study. The result of this phase is represented by the system vision, which comprises a synthetic description which it is specified what the system will suppose, who is going to use it, why it is used, what facilities have to be assured and what kind of restrictions has to be responded; the elaboration is the phase when the data are collected and when there are specified the functional and unfunctional requirements of the future system; the construction supposes the phase of obtaining of the system including the analysis, the projecting, programming and the testing; the transition ensures the introduction into exploitation of the system at the user.

The four phases of structuring the cycle of development correspond to the managerial perspective upon the process, when the attention is focused on the financial, strategic and personal aspects, etc. The functional requirements of the system which we've developed are caught under the form of the use cases. The result of this activity is, therefore, a model of the cases of utilization, in which, next to the description of these cases and of the implied actors, there are also other elements, such as: the specification of the eventual unfunctional requirements and of the prototypes of the interfaces with the users. The main steps overpassed in defining the requirements of the developed system are: the identification of the actors; the identification of the utilization cases; the description of the utilization cases; the defining of the model of the utilization cases.

**The identification of the actors** supposed, in this context, the determination of any element which interacts with the system, but is not a part of it.

The actors may be human persons, different equipment or peripheric devices as the sensors, or even another computer. An actor can find himself in the position of introducing data in the system, of extracting from this one, or both. It must be kept the aspect that in all the cases the initiative of the interaction belongs exclusively to the actor and not to the system.

For being able to identify as completely possible the actors who are to use the system, we have searched answers at the following questions: Who is interested in the system? Who supplies the data of the system? Who's the beneficiary of the system's functionality?; Who's going to manage and ensure the maintenance of the system? Does the system use external resources? Is it necessary the interaction with other functioning informatical systems?

Concerning the actors who interact with an informatical system on the domain of the insurances, these are numerous as there have been developed integrated systems which bring together data supplied by all the departments of an insurance society (sales department, damages department, financial - accounting department, judicial department, etc). The access to these data is, of course, limited depending on the position occupied by the actor within each department. Resuming the application „RISK ANALYSER”, which has as object in a first phase the introduction of the insurance policy, the evaluation of the risks and the establishment of some conditions of overtaking in insurance, and the second phase the refining of the introduced policies by different criteria, it may be identified three types of actors: *the underwriters of the insurance policies, the data operators and the administrator of the data base.*

**The identification of the utilization cases** supposes the retrieval of all possibilities of dialogue between an actor and the system, by which the first is the

beneficiary of one of the functionalities assured by the second. The identification of the cases of utilization is done in correlation with the actors found during the previous step, and every actor has to have at least a corresponding case of utilization. Few questions of the following kind may contribute to the establishment of the utilization cases: What's the main task of each actor? Which are the cases of utilization that assure the update of the system data? ; Which are the actors who may introduce, modify or delete data from the system?; Do the identified utilization cases answer all the functional requirements? One of the most met difficult of this phase has consisted in finding an adequate of granularity, as sometimes it is reached at an excessive level of detailing, by equalization of the cases of utilization with the functions of the system, which is wrong. Concerning the decision making for the comprising of a case of utilization we've started from the idea that this one is a part of major, complete functionality, from the beginning to the end of it.

**The description of the cases of utilization** is materialized in obtaining of as much as possible details, for each of the case of utilization. In this description we've presented all possible variants of enchaining of the events in the respective case of utilization. The event signifies what the system does as an answer any of the actions of the actor. It is necessary, in consequence, to be precised when and how begins and ends the case of utilization, what interactions take place during its deploy, which are the data that must be supplied by the user, what's the main sequence of the events, which are the alternative or the exceptional sequences, those forming in a word *screenplays of the deployment of the case of utilization*. As a result of the effected analysis, we've determined all the cases of utilization which correspond to the application:

**A. Authorization of the user:**

**Case of utilization:** *The authorization of the users with respect to the access of the data base;*

**Purpose:** *To avoid the access at the data base of the unauthorized persons;*

**Initial Point:** *The Identification based on User and Password;*

**Final point:** *The access authorization;*

**Process description:** *the user may access the data base only after passing and authorization protocol*

*After introducing the user name and password, the system will establish either the access at the data base, either it will ask for a new authorization, in case of introducing of some data which the system does not recognise.*

**The measurable result:** *The authorization of accessing the data base.*

**B. Introduction of the goods insurance policy:**

**Utilization case:** *Introduction of the goods insurance policy;*

**Purpose:** *The evaluation of the insuring possibility and the storage in the data base of the insurance policies;*

**Initial Point:** *The request of the overtaking in insurance;*

**Final Point:** *The creation of the policy and then the evaluation, saving/ printing or abandon (cancelation);*

**Process description:** *The request of concluding an insurance, by a potential client, adressed to an insurance company representative. After collecting all necessary data (filling in a quetionaire – inquiry and performing the risk inspection) it passes to the*

loading of the data in the program In case in which the client cannot be found in the client - name list of the application, it will proceed to its introduction. After introducing the technical aspects (description of the assured, policy type, assured time, assured amounts, risk degree, etc) it will pass to the automatic evaluation of the risk, by the application, which will recommend to the insurance company representative the next steps to be followed (overtaking under insurance, overtaking under insurance in certain conditions, rejection of the insurance). The next stage will consist either in storing and printing of the policy if the insuring conditions are accomplished, either in rejecting the insurance request, if the risk exposure is higher than the acceptability threshold.

**The measurable result:** The underwritten policy.

### C. The retrieval of the policy in the data base:

**Utilization case:** The Retrieval of the policy in the data base;

**Purpose:** The Interogion of the data base upon certain criteria;

**Initial point:** Introduction of the filtration conditions;

**Final point:** Retrieval and view and / or printing of the policies;

**Process description:** Any person who has access to the application, may require to the data base its interogation and to display the results of this action. There are different conditions of filtering: on the name of the assured client, policy number, the agency where it was underwritten, underwriter, contractor. At the moment of the display of a positivie interogation result, the application will generate a cursor that will display this matter. The user may view the retrieved policy and may eventually reprint it.

**Measurable result:** The policy is retrieved, viewed and / or reprinted.

**The finishing of the model of the utilization cases** is the step which has included the recoveries and the corrections as required, referring to the actors and the utilization cases intially defined, as a following of the filling in and of the profound study of the obtained information after passing the previous steps. Knowig that the actors are exterior to the system and that the utilization cases are a part of it, it can be assigned at this moment the border which limits the system.

The utilization cases that appear in this application are:

**The authorization of the access of the users** to the data base, access performed based on the User and Password, figure 1:

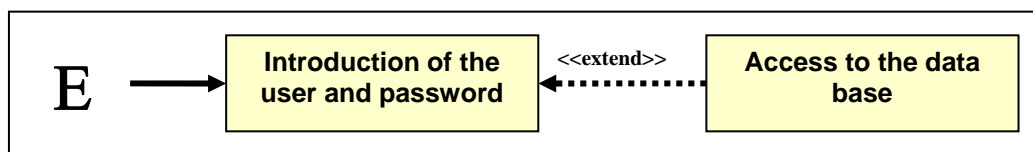


Figure 1. Case of utilization: The Authorizing the access of the users

**Introduction of the insurance policy and** assessment for overtaking as assured figure 2:

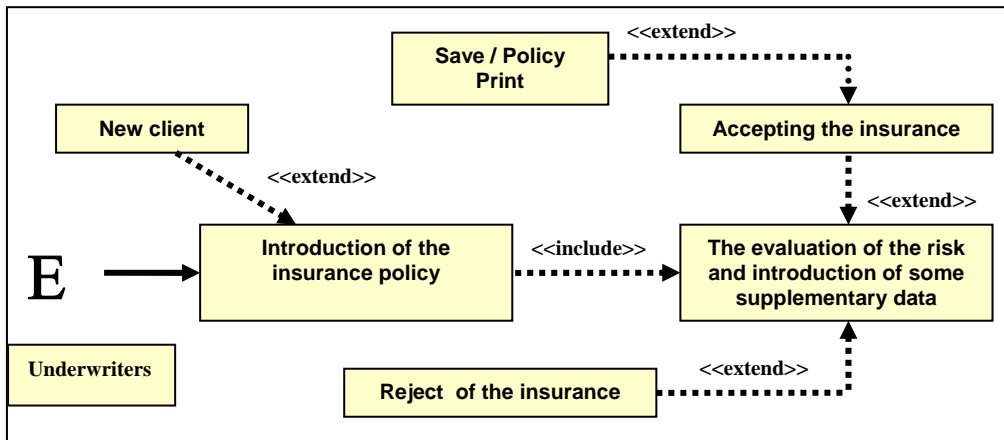


Figure 2. The Utilization case: Introduction of new policies in the data base

*The retrieval of an insurance policy* in the data base on certain criteria (fig.3):

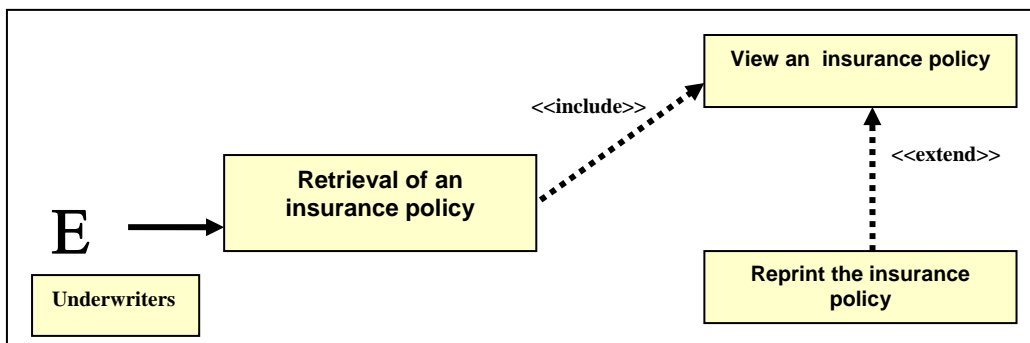


Figure. 3 The Utilization case: The Filtering of the policies on certain criteria

For obtaining a functional model we've considered as necessary the passing of the following steps : *the identification of the objects and of the classes, generation of the accomplishments of the utilization cases; the identification of the associations and of the aggregations, the identifications of the classes attributes, the identification of the inheritance relationships, finishing of the analysis model.*

**The Identification of the objects and of the classes:** The classes of objects identified on this level belong to the three stereotypes previously determined: *entity, of presentation and of control*. The identification of the presentation classes reflects concepts or elements that are inherent to the domain of the problem. The description of the utilization cases has represented a precious source of information and suggestions with this regard, as the discussions with the users, too. *The identification of the presentation and control classes* has as a start point, the following sentence: every case of utilization has to have at least a control class and at least a presentation class for each actor it interacts with. The diagrams of classes are statistical diagrams. In picture

4 we've presented the diagram of the classes that are components of the developed system.

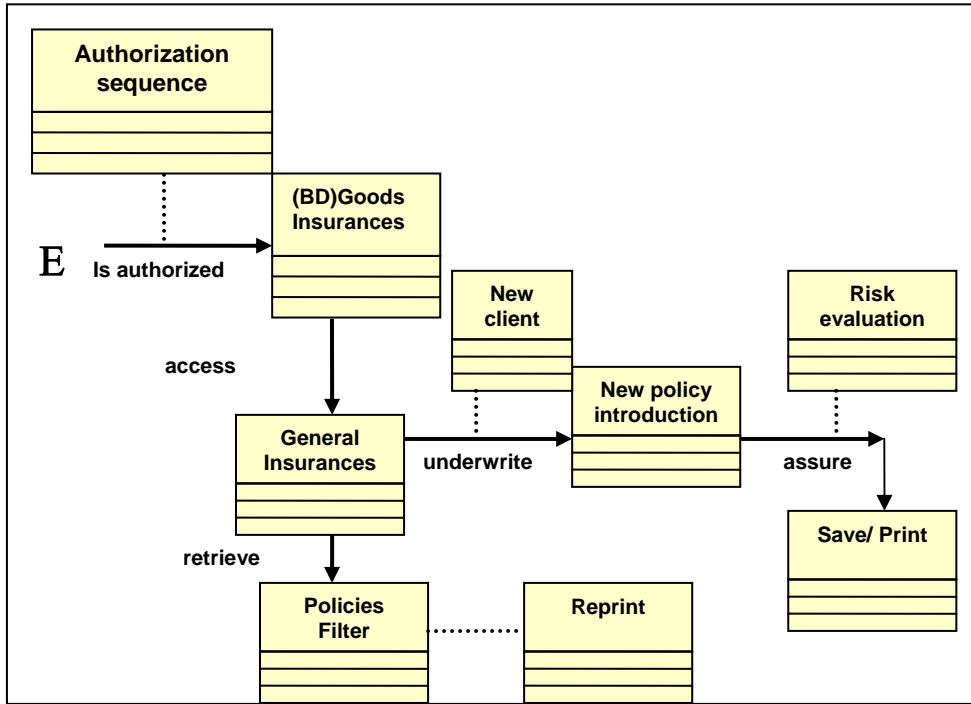


Figure 4. The Diagram of the classes of the system „RISK ANALYSER”

The classes of projecting represent the solution of implementation of the analysis classes. For their identifying and defining we've taken in account the following general orientation: to the presentation classes from the analysis correspond the interface classes with the users, necessary to their accomplishment; to the entity classes correspond the gestion classes, the persistence classes, and in some cases, classes of representation of the associations, the control classes will not have, as a general rule, an equivalent in the projecting classes, their responsibilities being distributed to the other projecting classes, according to the described behavior of the diagrams of sequences and of collaboration.

**The Generation of the accomplishment of the utilization cases:** An accomplishment or an instance-procedure of a utilization case assigns its functioning according to one of the identified flows of events. The functioning is described by indicating the classes of objects participating and of their way of interaction from the beginning to the end of the accomplishment of the respective case of utilization. We have represented this interaction by the sequence and collaboration diagrams. It is unlikely that all these elements to be possible to be established since the very beginning. As in the case of the previous steps, it follows a correlation of them, with possible revisions and corrections, performed within the analysis model. With this

respect, we have considered that it is more efficient to show the diagrams of activity for each case, sacrificing the sequence and collaboration diagrams.

The activity diagram for the case of utilization A “The Authorization of the access of the users” is revealed in figure 5:

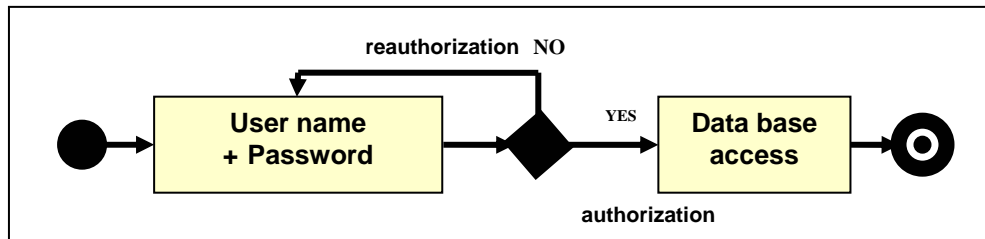


Figure 5. The diagram of activity for „The Authorization of the access of the users”

The diagram of activity for the case of utilization “Introduction of new policies in the data base” is shown in the figure 6.

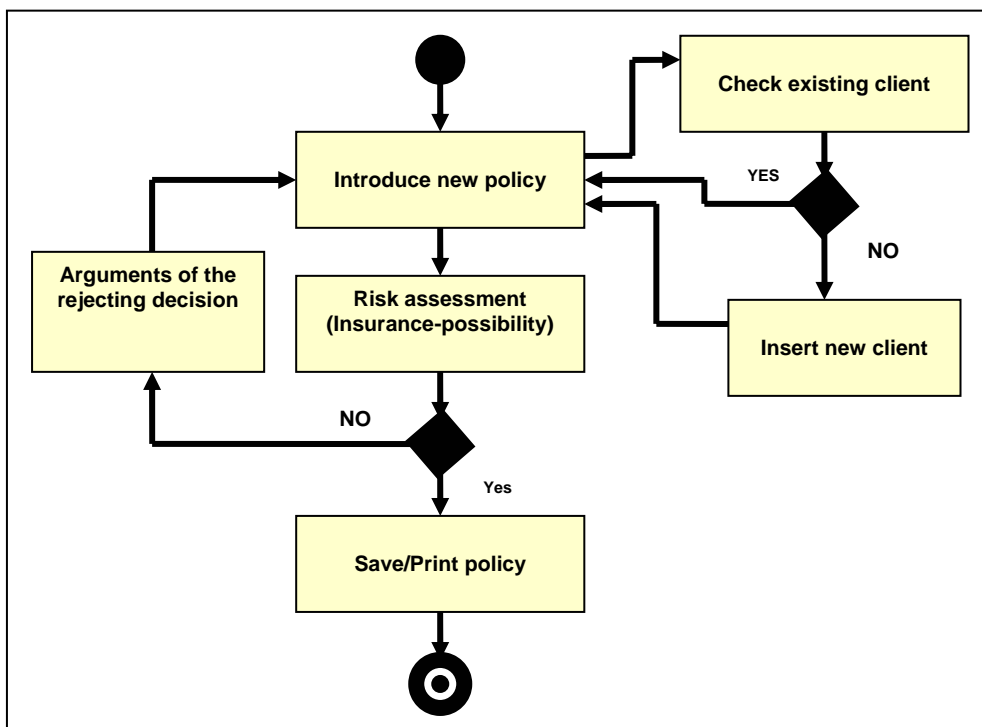


Figure 6. The Diagram of activity for „Introducing new policies”

The diagram of de activity for the case of utilization „Filter of the policies on certain criteria” is shown in the picture 7.

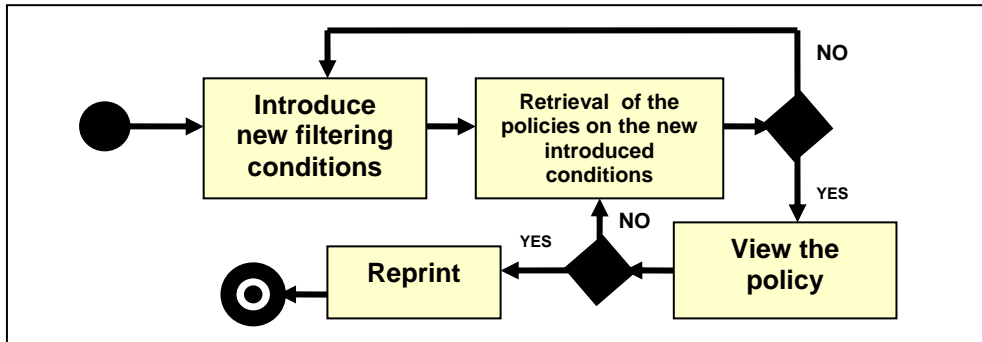


Figure 7. The diagram of activity for the „Policies filter”

**The finishing of the analysis model.** This supposed the review and, if necessary, the modifying of the initial solutions. The classes of objects together with all other elements defined up to now have been considered as “candidates”, this step establishing the ones that became definitive. In the logical projecting phase I would turn the attention from the presentation of what it is there and what’s the intention to the description of what will be the meaning or the signification of the new system and how it will function. The way of perception of the system shall offer by showing all inputs, outputs, and also the interfaces and the dialogues. These were built baed on what it was identified in the previous steps, but taking in account the requirements identified during the deployment of the activities from the logical projecting stage. **The logical projecting** is working by the means of three steps: *the projecting of the forms/formats and of the reports*, by whose means the users will have the image of the inputs and outputs of the new system; *the projecting of the interfaces and of the dialogues*, for revealing the way of communication of the user with the system; *the logical projecting of the data base*, by which it is described the standard structure of the data base of the system. It is to be mentioned the fact that, these three subphases shouldn’t be developed sequentially, as they are interdependent one of each other.

**The projecting of the forms/formats and.** A form/format is a printed element, with head and other pre-printed components, as with blank forms for filling in the data. During the process of projecting of the forms and reports it was necessary to be found answers for the questions: Who’s the beneficiary of the form or report?; What has to be in the contents of the form or report?; When is it required to obtain the outputs?; Where to be sent the form or the report?; How is it going to be used the respective outputs? How many persons are going to use or see them? With reference to the built application, there is a base with different formats for introducing the data (the filter for the retrieval of the insurance policies in the data base, the format for introducing the insurance policies together with the format of the risk assessment factors), and also reports generated automatically by the system for displaying the conditions of insurance or the causes of the insurance rejection or the view and printing of the insurance policies, these being presented visually in the chapter (section) V.

**The projection (design) of the interfaces and the dialogues.** I consider that a judicious projecting or design of the interfaces and dialogues should lead to finding out the answers to the used questions for supporting the activity of projecting of the forms



and reports. Similar with the interface, the dialogue disposes by an own subsystem of functioning. The main feature of the performant systems regarding the dialogues is the diversity of the forms of introducing of the data and of extracting the results. A modality of presentation of the sequence of the dialogues is that one which calls the diagram technique. The structure of the diagram of calling the menus, in the case of the created application, is shown in the figure 8.

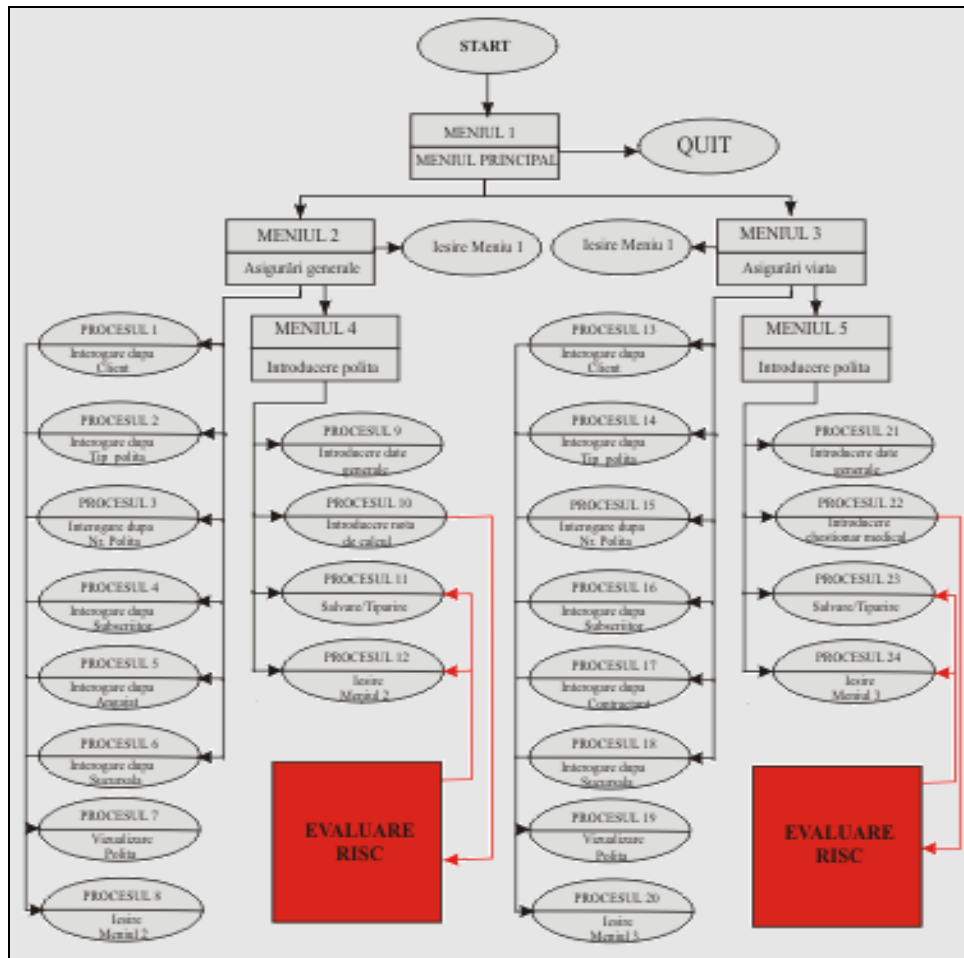


Figure 8. The structure of the diagram of calling the menus for the „RISK ANALYSER”

**The logical projecting of the data base.** The logical modelling of the data with their help of a special notation, which corresponds to an organization way of these by the system of gestion of the data base, in the present case being one based on relationships. The logical modelling process of the data developed in paralell with the other activities of the logical projecting: the projection of the forms, reports, interface and of the dialogues. This modelling is performed ont only based on the diagrams entity - relationship, but also based on the upmaking sketch of the forms and reports. In the

same stage I performed the elementary data analysis from the inputs and outputs of the system for detaching the existing connections between them. In the process of the logical projecting we've passed four essential steps : *the accomplishment of a logical data model* from the perspective of the user (forms and reports) regarding the application; the fusion of all perspectives of the users in a logical consolidated model of the data, this step being called *the integration of the perspectives, the transformation of concept model of the data* (entity-relationship), performed without taking in account the user's perspective, in a set of relationships; the comparison of the consolidated logical model of the data with the transformed model of the entity- relationship and the accomplishment, by the integration of the perspectives, of a final logical model of the application data. During the process of analysis of the requirements of a system, may be identified and described the points of view of a group of users. The number of the perspectives of the users may often be of a rank of hundreds or tens, each of them intending certain elementary data from the base. For the application „RISK ANALYSER” we considered as being necessary a data base which should contain 11 tables, as shown in the figure 9, which include the entire information specific to the general insurance policies. Here, the data are going to be loaded exclusively after awarding the right of underwriting the policy by the application and its saving in the data base.

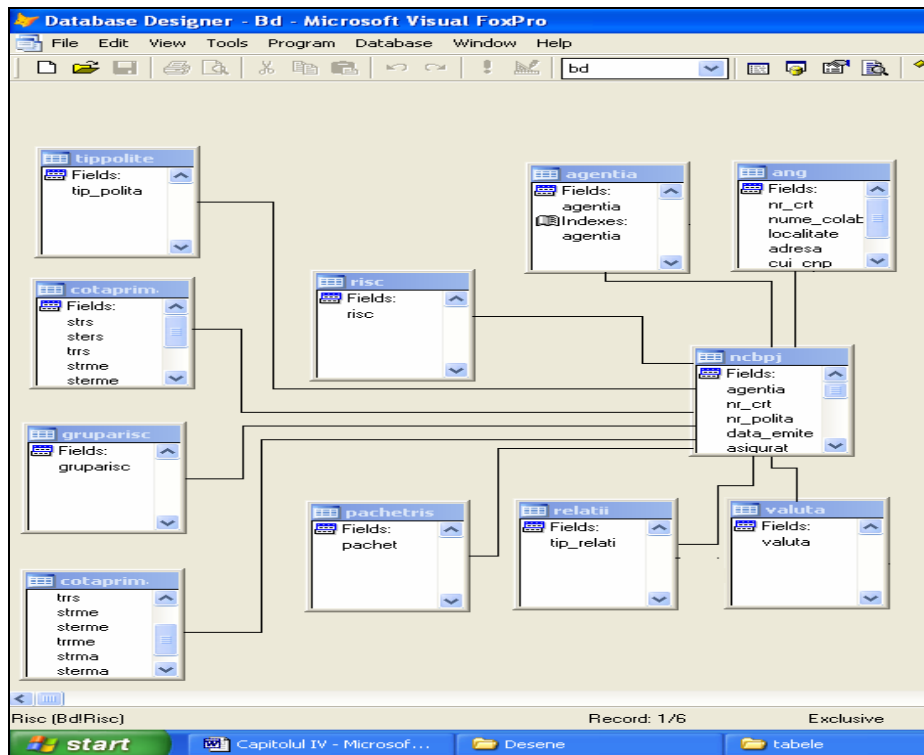


Figure 9. The data base of the system *RISK ANALYSER*

## 2. CONCLUSIONS

The projecting and accomplishment procedure for an informatical system designed for the assistance of the decision in the insurance activity, has the role of persuading for sure that, generally the introduction of the informatical technologies in the management of the organizației and, especially, the interactive assistance of the decisions supposes a detailed knowledge and a laborious effort of modelling of all processes which intervene within the activity of underwriting of the risks within the insurance companies. The substantiation of the decisions implies the *information and knowledge*, the decision making process registering an increase of the complexity. By this work I've tried to reveal the way in which the opportunities and the challenges of making a decision use the resources and the capacities of the organization, being stressed especially, the technology of the information. I described also detailed the aspects concerning the processing of the knowledge and problems of the decision making and the way in which the informatical systems intervene for offering a solution.

Such an informatical system, specialized for the assessment of the risks on the domain of the insurances, has to represent a powerful instrument, which allows to the users to control the decision-making process and to have the capacity to offer information, not only concerning the of inacceptance of the insurance, but also of the potential modalities of solving such problems. Knowing that this domain, the insurance domain, offers places of work for which the payment out is made directly proportional with the brought revenues, under this impulse it is possible to perform superficial or even subjective analyses of risks, only having the wish of maximizing the own earnings. The developed application has as one of the major objectives the elimination of the subjectivism of the evaluation of the risks and the underwriting of the policies exclusively based on objective principles.

Another sphere of action of the application „*RISK ANALYSER*” refers at the fact that in Romania, at this moment, there is an extremely alert rhythm on the direction of the stability of the employees in the insurance companies. Due to this fact, almost permanently there are employees with quite reduced oldness, who are in the stage of accumulation of the knowledge. The underwriting of the risks, especially in case of the insurances of goods for judicial entities and life insurances, will be done after a previous training of about two or three months, under a very careful monitoring. This application does not eliminate the part of theoretical training of the employee, but offers a practical support allowing that the activity of underwriting to begin on the first days of work.

Following the principle of the good faith or on the principle of realibility of the assured (a usual thing at the contracting of the life insurances), with the help of of this application may be put the base of the underwriting online of such types of policies, going till the list printing of the policy at the terminal of the assured and online payment performance of the insurance premium, a thing already practised by the most of the banking societies. After that, are to be performed the risks inspections at the assured place, by the representatives of the insurance company, for comparing the declarations of the assured with the reality and are to be made

eventual corrections of the insurance premium, going up to the cancelation of the contract, if the declarations given by the assured are quite inexact. From the perspective of the evolution to the society based on knowledge, I consider that soon, the stage of performing the inspections of risks on site will be skipped, the policies being concluded based on the data of the future electronical data base owned by the service of municipal planning (urbanism) within the local public administrations.

At this moment the perspective of the complete underwriting online, has become a reality. The support systems of decision-making have to be the main vehicle of the decision-makers with the purpose to keep the rhythm with the exponential increase of dimension, with the complexity and the speed at which the business has to be led. A support system for decision-making must be an integral component of the decision –making, which extends the ability of the decision-maker to process rapidly the information and to approach the complex problems, consuming time, reducing the time affected by this process. At the same time the fiability of the decision-making system will be improved encouraging the process of exploration and learning, creating a strategical and competitive advantage for the organization.

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