Self-sufficient resource-pooling system for risk sharing of airspace risks related to natural disaster events

Field of the Invention

The present invention relates to a self-sufficient resource-pooling system for risk sharing of a variable number of risk exposed aircraft fleets related to airspace risks. Especially, it concerns systems and appropriate signal generation of automated, self-sufficient resource-pooling systems, wherein by means of the resource-pooling system flight interruption risks for of a variable number of aircraft fleets and/or aircraft operators is sharable by providing a self-sufficient risk protection for a risk exposure of the aircraft fleets and/or aircraft operators.

Background of the Invention

Starting in the early twenties century, the importance of air-transportation has drastically increased. Incentivized by the globalization of the markets in the last twenty years, the quantity of goods and people transported via aircraft has further increased enormously worldwide. However, also the pressure for cheap increased, resulting in a dumping of prices and finally to the collapse of major airlines and aircraft operators at the beginning of the 21th century. Nowadays, the price margins in air-transportation are extremely low, which forces the aircraft operators to a tight structure with only small financial buffer in case of business interruption. In general after 10 days without generating revenue in the sense of pooled returns due to performed operation, most of the major airlines would face the serious risk to be forced to stop operation or rather to be out of business. Thus there is a genuine interest in obtaining coverage to such risk exposure of operation interruption. Economically, to be capable of sustaining longer periods of business interruption can also have the advantage of providing more securities for rating agencies or involved third parties.

An example for this demand is revealed by the newest aircraft history. The volcano activities in Iceland 2010 and the subsequent closure of airspace led to an estimate loss of $1.7bn for the airline industry. During the period of April 15th and April

21st almost the entire European airspace was closed resulting in cancellation of all flights in, to and from Europe. In the aftermath the airlines seek risk transfer by means of insurance technology or state compensation or other means to cover such unforeseeable events and ensure operation of the aircraft fleets. In the state of the art, there is no non damage coverage system available as the covers are technically difficult to design due to inter alia (i) no standards for critical ash concentrations or good measurement systems exist, and (ii) the desire for broader risk transfer and coverage, not just limited to volcanic ash. The related technology should also be able to cover risk events as 1) strikes, riots etc., 2) war, hijacking, terror (for example as per AVN48), 3) pandemic-based risks. The technology should provide the conditions that the operation of aircraft fleets in the airline industry as well as airports, which have struggled heavily during the last years due to flights that were cancelled, and thus not being able to provide any source of revenues for this time, can be technically stabilized. In the case of cancelled flights, despite the fact that variable costs can be saved, the portion of fixed costs and extra costs for aircraft/crew and operations rescheduling still remain. In addition airlines operating to and from Europe have to compensate passengers for their cancelled trips. The origin of these cancellations is either influenced by weather or the airline/airport and also Air Traffic Control (ATC). In the state of the art systems, there is no automated system or any sort of damage and operation cover providing relief in case flights are cancelled without a physical damage. Due to this fact aircraft fleet operators as well as airport operators are demanding a sort of damage covering system for cancelled flights.

Further in the state of the art, US2010/036545 A1 discloses an avionic system based on an earth station for automatically eliminating operating malfunctions occurring in airplanes. The avionic system and the airplanes are connected via an interface. If, by transferred parameters of sensors of the airplanes to the avionic system, an operating malfunction is detected on an airplane, the activation of a dedicated malfunction device is triggered by the avionic system to automatically eliminate the malfunction. WO00/07126 A1 discloses an avionic data system used with aircrafts, wherein each aircraft has a communications unit located in the aircraft. Data are transmissible via a cellular infrastructure from the aircraft to the avionic data system after the aircraft has landed. WO02/08057 A1 shows system providing monitoring and data feedback to aircrafts regarding the state of that aircraft. Information is provided by sensors located on the aircraft about the status of the aircraft and equipment. The

system provides feedback information to the aircraft based on the information received during monitoring. Further, EP1426870 A2 shows a wireless aircraft data system, where an aircraft computer communicates with a plurality of aircraft systems. A ground-based computer system provides wireless remote real-time access to the aircraft systems via the wireless aircraft data system. Finally, DE19856231 A1 discloses another avionic system providing data access via satellites by means of bidirectionally transmitting data. The paths of the satellites and their arrangement is designed such that bidirectional transmission channels can be provided among airborne airplanes and ground-based operating centers.

Technical objects of the invention

It is an object of this invention to provide self-sufficient operable system and the technical means and method thereof for emergency interception preventing imminent grounding or damages of aircraft fleets following natural disaster events or terroristic activities. It is a further object of the present invention to provide a resource-pooling system and an appropriately method for the automated transfer of risk exposure associated to the aircraft fleets. The system shall provide a stable operation to threats to the survival of the system, as well as to threats undermining the operation of the system and/or limit its ability to meet the set objectives. It should be capable of

implementing appropriate and effective risk management features, and broadly adopt the necessary technical approach. It is yet a further object of the present invention to provide a system, which enhances through its stable operating risk management structure the system's credibility and lowered risk by improved operations and increased sustainability, which allows the systems to be operated at low risk.

Summary of the Invention

According to the present invention, these objects are achieved particularly through the features of the independent claims. In addition, further advantageous embodiments follow from the dependent claims and the description.

According to the present invention, the above-mentioned objects are particularly achieved in that for risk sharing of a variable number of risk exposed aircraft fleets by means of a self-sufficient system related to airspace risks, resources of the risk exposed aircraft fleets are pooled by means of the system and a self-sufficient risk protection for the risk exposed aircraft fleets is provided by means of the system preventing imminent grounding or losses as a consequence of a natural disaster events, wherein risk exposed aircraft fleets are connected to the system by means of a plurality of payment-receiving modules, and wherein payments from the risk exposed aircraft fleets are received and stored by means of the plurality of payment-receiving modules for the pooling of the risks and resources of the risk exposed aircraft fleets, in that transmitted fight plan parameters of the pooled risk exposed aircraft fleets are received by means of capturing means, wherein by means of a filter module the transmitted fight plan parameters are filtered for airport indicators indicating flown to airports by the corresponding pooled risk exposed aircraft fleet, and wherein by means of the filtered airport indicators detected airports are stored to a table element of a selectable trigger-table assigned to an aircraft fleet identifier of the corresponding pooled risk exposed aircraft fleet, in that a trigger module dynamically triggers on an airport data flow pathway of ground stations situated at said flown to airports of the fight plans, wherein in case of a triggering of an occurrence of an airport closing of one of the airports comprised in the selectable trigger-table, operational parameters of the triggered airport comprising at least time interval parameters of the airport closing are

stored assigned to the corresponding table element of the selectable trigger-table based on the triggered airport indicator, in that each triggered occurrence of an airport closing of one of the airports of the selectable trigger-table, the operational parameters of the corresponding table element are matched with natural disaster event data comprised in a predefined searchable table of natural disaster events in order to determine a possible relation of the airport closing to an occurrence of a natural disaster event comprised in the searchable table of natural disaster events by means of the core engine, in that in case that said relation is established by the core engine, a corresponding trigger-flag is set by means of the core engine to the assigned risk exposed aircraft fleets of the airport indicator of the triggered airport closing, and a parametric transfer of payments is assigned to this corresponding trigger-flag, wherein a loss associated with the triggered airport closing is distinctly covered by the system based on the respective trigger-flag and based on the received and stored payment parameters from the pooled risk exposed aircraft fleets by the parametric transfer from the system to the corresponding risk exposed aircraft fleets. The invention has, inter alia, the advantage that the system provides the technical means to provide an self-sufficient risk protection for risk sharing of a variable number of risk exposed aircraft fleets, wherein the risk is related to the occurrence of natural disaster event as for example volcanic eruption or terroristic attacks. The system further has the advantage that it is able to provide the technical means for risk pooling and loss coverage of events, which technically are difficult to capture. For example, there exist no standards for critical ash concentrations or even good measurement systems. Even the system has the advantage that it is not limited to measurements and triggering of the occurrence of volcanic ash, but allows to pool a much broader spectrum of risks. Further, in general after 10 days, airlines would face the serious risk to be out of business without generating revenue. It is one of the advantages of the system that it provides this coverage and improves their ability to sustain longer periods of business interruption. The system allows capturing all kind of risks as e.g. risk based on atmospheric conditions (example: volcanic ash), and/or meteorological conditions (example: flood, earthquake, storm, wind, rain), and/or seismic conditions (example: earthquake). However, also rare risk events can be captured as riots, strikes, war, pandemic events and instrument/equipment failures (e.g. GPS outage) without having the system operation adapted. The system also provides the technical means to allow a transparent, parametric risk cover. For example the coverage is provided pro rata related to the number of cancelled flights. E.g. a possible formula could be the number

of cancelled flights / number of scheduled flights for the period in which airspace is closed times the limit. This allows an easy measure of the effectively occurred loss. By linking to any possible event, stored in the searchable table, it allows to safely trigger the closure of airspace by a third party authority or the closure of an airport by the operator in conjunction with an annual aggregate of 5-10 days linked to any one event or any other condition. This allows a flexible architecture of the system, which is not provided by any system of the state of the art. Typically, such resource-pooling systems for risk transfer of risk exposed components need special adapted means to geographic or regional particularities. The present system has the advantage that is does not show any of such limitations or adaption need, but can be operated worldwide since it couples the risk and the loss directly.

In an embodiment variant, an additional filter module of said core engine dynamically increments a time-based stack with the transmitted time interval parameters based on the selectable trigger-table and activates the assignment of the parametric transfer of payments to the corresponding trigger-flag by means of the filter module if a threshold, triggered on the incremented stack value, is reached. Said threshold, triggered on the incremented stack value, can e.g. be set to bigger-equal 5 and smaller-equal 10 days. Further, the ground stations can be linked via a communication network to the core engine, and the trigger module can dynamically trigger on the airport data flow pathway of ground stations via said communication network. Said assignment of the parametric transfer of payments to the corresponding trigger-flag can e.g. only be activated, if said transmission comprises a definable minimum number of airport identifications assigned to airport closings thus creating an implicit geographic spread of the closed airports of the flight plan. As a further variant, said assignment of the parametric transfer of payments to the corresponding trigger-flag can e.g. automated be activated by means of the system for a dynamically scalable loss covering of the aircraft fleet with an definable upper coverage limit. In an other embodiment variant, said upper coverage limit can e.g. be set to smaller-equal US$ 100 million. It is also possible that risk related aircraft fleet data can be processed by means of an assembly module and the likelihood for said risk exposure of an aircraft fleet can be provided based on the risk related aircraft fleet data, wherein the aircraft fleets are connected to the resource-pooling system by means of the plurality of payment receiving modules configured to receive and store payments from the pooled aircraft fleets for the pooling of their risks and wherein the payments are

automated scaled based on the likelihood of said risk exposure of a specific aircraft fleet. These embodiment variants have inter alia the same advantages as the first embodiment variant.

In a further embodiment variant, the filter module of said core engine can e.g. comprise an additional trigger device for triggering if said transmission from the trigger module is induced by an applicable third party, whereas the transmission of the parameters includes said time interval parameter of an airport closing and an airport identification, and wherein if the airport closing is third-party induced the stack is dynamically incremented with the transmitted time interval parameters while otherwise the stack is left unchanged. In other words, the incrementation of the stack (viz. the increase of the stack value) by a time period of an airport closing is only performed, if the signal of the additional trigger devices confirms that the airport closing is caused based e.g. on a third party or third party order of an applicable third party or the like. Third-party induced, i.e. induced by an applicable third party, means that the airport is closed based on intervention of a state authority as for example the official aeronautical authority, police or military intervention. In general, the additional trigger device can e.g. also trigger if the airport closing is not self-induced respectively induced by external effects (e.g. complete closing of the airspace), authorities etc., which are not under the control of the airport operator. Applicable means that the third parties, which are triggered on by means of the trigger device are definable as system variables either as predefined parameters or as parameter, which can be accessed by the system, for example over the network from an appropriate data server on request or periodically. This embodiment variant as inter alia the advantage that the systems becomes stable against possible fraud or arbitrary acts by the airport operator.

Brief Description of the Drawings

The accompanying drawings incorporated in and forming part of the specification illustrate several aspects of the present invention, and together with the description, serve to explain in more detail, by way of example, the principles of the invention. In the drawings:

Figure 1 shows a block diagram illustrating schematically an exemplary configuration of the underlying technical structure for the risk transfer of a system according to the present invention. The reference numeral 1 refers to an system according to the invention, reference numeral 2 to core engine, 3 to a receiver or electronic receiver module, 4 to a trigger module, 5 to an appropriately realized filter module, 6 to a failure deployment device generating an technical output or activation signal, and 7 to an automated activatable loss covering system operated or steered by the system 1 or the core engine 2 of the system 1.

Figure 2 shows a diagram illustrating schematically an aggregate exposure example of a possible closure of US East Coast airspace. 7-day closure of US East Cost Airspace and its 7 major airports will affect 19,2% of planned flights for selected airlines

Figure 3 shows a diagram illustrating schematically an aggregate exposure example of a possible closure of Northwest European airspace. 7-day closure of Northwest European Airspace and its 7 major airports will affect 17,9% of planned flights for selected airlines.

Figure 4 and figure 5 shows a diagram illustrating schematically a sequence of steps. Figure 4 shows an exemplary waiting period of 10 days, i.e. the system triggers on the time interval of 10 days for example after the first closing of an airport. The damage covering output signal can be generated e.g. based on (Number of canceled flights during the period)/(Number of planned flights during the 7/10 days), initiating for example an automated payout. This is that the trigger of the system 1 or rather the filter module 5 activates the automated damage covering system 7 by means of the output signal 61 of the failure deployment device 6. Figure 5 shows exemplary a system, where for example the automated pay-out is initiated if the airport closures are bigger than a trigger threshold value, based on (Number of canceled flights in the closed period >trigger)/(Number of planned flights during the period).

Figure 6 shows a diagram illustrating schematically a time sequence of an event where 19,2% of planned flights were cancelled (of insured airline). The number of cancelled flight can lead to an output signal 61 initiating for example the covering of an automated payout $19,2m out of an absolute covering threshold of $100m limit of

the related system 1. Figure 6 shows where the threshold is triggered due to the proceeding of the catastrophic eruption event.

Figure 7 and Figure 8 show diagrams illustrating schematically exemplary underlying probability estimates. Figure 7 illustrates an estimate for events of airspace closure which are longer than 10 days, i.e. > 10 days, while figure 8 illustrates an estimate for events of airspace closure which are longer than 2 days, i.e. > 2 days. The example of figure 7 is based on the EU-wide closure of 2010 due to volcanic ash clouds of 6 days. Figure 8 is based on the examples of the hurricane affecting New Orleans in 2005 by providing airport closings of 16 days and of the hurricane affecting Ft. Lauderdale also in 2005 providing airport closings of 5 days.

Reference will now be made in detail to the present invention examples, which are illustrated in the accompanying drawings.

Detailed Description of the Preferred Embodiments

In Figure 1, reference numeral 1 refers to an self-sufficient resource-pooling system according to the invention, reference numeral 2 to a core engine, 3 to a receiver module, 4 to a trigger module, 5 to an appropriately realized filter module, 6 to a failure deployment device generating an technical output or activation signal, and 7 to an automated activated damage recovering system operated or steered by the output signal. The system 1 technically prevents imminent grounding of aircraft fleets 81,...,84 as a consequence of natural disaster events, pandemics or terroristic activities by providing loss coverage of aircraft fleets 81,...,84 based on pooled resources and risks. The natural disasters, which can lead to an airport closings can comprise all possible catastrophic events, which are inter alia measurable based on atmospheric conditions (example: volcanic ash), meteorological conditions (example: flood, earthquake, storm, wind, rain), and/or seismic conditions (example: earthquake). However, in specific embodiment variants, the system 1 can also be assigned to riots, strikes, war, pandemic events and instrument/equipment failures (e.g. GPS outage). Figure 2 shows schematically an aggregate exposure example of a possible closure of US East Coast airspace. 7-day closure of US East Cost Airspace and its 7 major airports

will affect 19,2% of planned flights for selected airlines. The following table 1 illustrates the affected airports and closings.

	Lufthansa (DLH)	British Airways (BAW)	Air France (AFR)	United Airlines UAL	American (AMR)	Continental Airlines (COA)	Delta Airlines (DAL)	Total Airport
Sample Weekly Departures	168	203	161	1.232	2.359	2.093	7.588	13.804
Sample Weekly Flights	336	406	322	2.436	4.606	4.067	14.609	26.782
Exposure Weekly	38.365	10.921	23.805	7.751	21.780	15.254	21.687	139.562
Share	9%	3,7%	1,4%	31,4%	21,1%	26,7%	67,4%	19,2%

(Table 1)

Further, figure 3 schematically shows an aggregate exposure example of a possible closure of Northwest European airspace. 7-day closure of Northwest European Airspace and its 7 major airports will affect 17,9% of planned flights for selected airlines. The following table 2 illustrates the affected airports and closings.

	Lufthansa (DLH)	British Airways (BAW)	Air France (AFR)	United Airlines UAL	American (AMR)	Continental Airlines (COA)	Delta Airlines (DAL)	Total Airport
Sample Weekly Departures	3.507	3.395	5.397	98	168	84	224	12.873
Sample Weekly Flights	6.895	6.580	10.416	196	336	168	448	25.039
Exposure Weekly	38.365	10.921	23.805	7.751	21.780	15.254	21.687	139.562
Share	18,0%	60,3%	43,8%	2,5%	1,5%	1,1%	2,1%	17,9%

(Table 2)

The system 1 comprises capturing means to receive transmitted fight plan parameters 102, 202 of the pooled risk exposed aircraft fleets 81,...,84. The fight plan parameters 102, 202 should at least comprise airport (91,...,94) indicators and parameters allowing determining frequency of approaching and/or landing and/or departures of aircrafts of a specific aircraft fleet 81,...,84. However, the fight plan parameters are in general a set of measurable factors, that allow determining the operation of a specific aircraft fleet 81,...,84 and determine the planned behavior of its aircrafts, such as the before-mentioned approaching and/or landing and/or

departures indicators of airports, also possibly comprising other flight parameter including ground sampled distance (GSD), longitudinal overlap degree (xp), side overlap degree (q), overfight parameters for specific regions, parameters of Air Traffic Control (ATC) decision support tools including associated parameters for the prediction or planning of four-dimensional (time-related) aircraft trajectories, linked aircraft state data, predicted atmospheric state data and/or any fight intent data and/or parameters related to approach and landing systems or ground control systems.

By means of a filter module, the transmitted fight plan parameters 102, 202 are filtered for airport indicators indicating flown to airports 91,...,94 of the corresponding pooled risk exposed aircraft fleet 81,...,84. Further, the filtered and detected airport 91,...,94 are stored to a table element 101, 201 of a selectable trigger-table 103, 203 assigned to an aircraft fleet identifier of a corresponding pooled risk exposed aircraft fleet by means of the filtered airport indicators 1012, 2012. Further, also frequency or overflight parameter can preferably be filtered and stored to the corresponding table element 101, 201. In a variant, the system 1 can comprises a selectable trigger-table 103/203 for each pooled aircraft fleet 81,...,84, which is assigned to the flight plan 102, 202 of the aircraft fleet 81,...,84. The selectable hash table 103/203 comprises table elements 101/201. Each table element 101/201 comprises operational parameters of an airport 91,...,94. The airports 91,...,94 covered by the table elements 101, 201 are airports 91,...,94, which are flown to according the fight plan 102/202 of the aircraft fleet 81,...,84 by the aircrafts of the aircraft fleet 81,...,84.

For the present system 1, at each of said flown to airports 91,...,94 of the fight plan 102/202 at least one ground station 911,...,914 is situated. The ground stations 911,...,914 are linked via a communication network 50/51 to a core engine 2 of the system 1. The ground stations 911,...,914 may be part of an aviation system part for example of a technical system of an operator of an aircraft fleet 81,...,84, such as of an airline or air cargo/air freight transport company, but also of a manufacturer of aircraft, such as Airbus or Boeing etc., or flight monitoring services of a flight system of the airports 91,...,94. The aircrafts of the aircraft fleet 81,...,84 may comprise, for example, aircrafts for cargo transport and/ or passenger transport and/or air ships, such as zeppelins, or even shuttles or other flight means for space travel. The aircraft fleet

81,...,84 can likewise comprise motorized and non-motorized flight means, in particular gliders, power gliders, hang gliders and the like.

The system 1 comprises a trigger module 4, which dynamically triggers on an airport data flow pathway of ground stations 911,...,914 situated at said flown to airports 91,...,94 based on the stored airport indicators of the trigger-table 103,203. In case of a triggering of an occurrence of an airport closing of one of the airports 91,...,94 comprised in the selectable trigger-table 103, 203, operational parameters of the triggered airport 91,...94 comprising at least time interval parameters 1011, 2011 of the airport closing are stored assigned to the corresponding table element 101, 201 of the related airport indicator 1012, 2012. The ground stations 911,...,914 can e.g. be linked via a communication network 50,51 to the core engine 2, wherein the trigger module 4 is dynamically triggering on the airport data flow pathway of ground stations 911,...,914 via said communication network 50,51. For each triggered occurrence of an airport closing of one of the airports 91,...,94 assigned to a table element 101, 201 of the selectable trigger-table 103, 203, the assigned operational parameters of the airport closing are matched with natural disaster event data comprised in a predefined searchable table of natural disaster events in order to relate the airport closing to an occurrence of a natural disaster event comprised in the searchable table of natural disaster events by means of the core engine 2.

The predefined searchable table of natural disaster events comprises table elements for each of the predefined risk transferred to the resource-pooling system 1. In particular, these risks comprise parameters, defining the natural disaster events, as for example volcanic eruptions or earthquakes etc., which risks for an occurrence is transferred to the resource pooling system 1. The resource pooling system 1 further comprises means for dynamically detect occurrences of such natural disaster events and set appropriate indicator flags in the table element of the corresponding risk together with storing related natural disaster event data and/or measuring parameters indicating at least time of occurrence and/or affected region of the natural disaster event. The means for dynamically detect occurrences of such natural disaster event can e.g. comprise interfaces to access appropriate early warning systems and/or airspace measuring and observation systems or the system 1 can even be directly connected or linked to appropriate sensors or measuring devices allowing the detection of the occurrence of such natural disaster events.

In that in case that said relation can be established between the airport closing and the occurrence of a detected natural disaster event by the core engine 2, a corresponding trigger-flag is set by means of the core engine 2 to the assigned risk exposed aircraft fleets 81,...,84 of the airport indicator 1012, 2012 of the triggered airport closing. Based on the trigger-flags, the resource-pooling system assigns a parametric transfer of payments to this corresponding trigger-flag, wherein a loss associated with the triggered airport closing is distinctly covered by the system 1 based on the respective trigger-flag and based on the received and stored payment parameters from the pooled risk exposed aircraft fleets 81,...,84 by the parametric transfer from the resource-pooling system 1 to the corresponding risk exposed aircraft fleets 81,...,84.

As an embodiment variant, a receiver 3 or receiver unit 3 of said core engine 2 receives, via a communication network interface 31, a transmission from the trigger module 4. Said transmission includes at least parameters regarding a time interval parameter 1011/2011 of an airport closing and an airport identification 1012/2012. The time interval parameters 1011/2011 are saved to the operational parameter of the appropriate table element 101/201 based on the airport identification 1012/2012. The "appropriate" table element 101/201 is the table element, which includes the saved parameters of this airport 91,...,94 referenced by the airport identification 1012/2012. The transmission may also include further parameters. For example, the parameters may also include log parameters of aircrafts at the moments situated at a specific airport 91,...,94, for example, measured value parameters of the flight management system (FMS) and/or of the inertial navigation system (INS) and/or of the fly-by-wire sensors and/or flight monitoring devices of the aircrafts, thereby automatically detecting or verifying airport closings. The transmission can comprise an unidirectional or bidirectional end-to-end data and/or multimedia stream based transmissions for example via an packet-switched communication network as e.g. an IP network or via circuit-switched communication network using an appropriate protocol. Said communication network interface 31 of the receiver 3 can be realized by one or more different physical network interfaces or layers, which can support several different network standards. By way of example, this physical layer of the communication network interface 31 of the receiver 31 may comprise contactless interfaces for WLAN (Wireless Local Area Network), Bluetooth, GSM (Global System for Mobile Communication), GPRS (Generalized Packet Radio Service), USSD (Unstructured

Supplementary Services Data), EDGE (Enhanced Data Rates for GSM Evolution) or UMTS (Universal Mobile Telecommunications System) etc. However, these may also be physical network interfaces for Ethernet, Token Ring or another Wired LAN (Local Area Network). The reference symbols 50/51 can comprise accordingly various communication networks, for example a Wireless LAN (based on IEEE 802.1x), a Bluetooth network, a Wired LAN (Ethernet or Token Ring), or else a mobile radio network (GSM, UMTS, etc.) or a PSTN network. As mentioned, the physical network layer of the communication network interface 31 may be not only packet-switched interfaces, as are used by network protocols directly, but also circuit-switched interfaces, which can be used by means of protocols such as PPP (Point to Point Protocol), SLIP (Serial Line Internet Protocol) or GPRS (Generalized Packet Radio Service) for data transfer.

In addition, the receiver 3 or the communication network interface 31, as well as the ground stations 911,...,914 or appropriate processing units of the aircraft fleets 81,...,84 or aircraft fleet operators, which are connected via the communication network interface 31 of the receiver unit 3 to the core engine 2, can comprises an identification module. Concerning the receiver 3, this identification module may be implemented in hardware or at least partially in software and may be connected to the receiver 3 by means of a contact-based or contactless communication network interface 31, or may be integrated in the receiver 3. The same is true for the other mentioned communication network interfaces, as the network communication interfaces connecting related aviation systems or processing units of the aircraft fleets 81,...,84 or aircraft fleet operators. In particular, the identification module may be in the form of a SIM card, as are known from the GSM standard. This identification module can contain, inter alia, the authentication data, which are relevant for authenticating the related device in the network 50/51. These authentication data may comprise, in particular, an IMSI (International Mobile Subscriber Identifier) and/or TMSI (Temporary Mobile Subscriber Identifier) and/or LAI (Location Area Identity) etc., which are based on the GSM standard. With the additional implementation of such identification modules, the system 1 can completely be automated including the generation and transmission of output signals 61 by means of a failure deployment device 6 and operation of an automated loss covering system 7.

The resource-pooling system 1 can comprise e.g. an additional filter module 5 of said core engine 2, which dynamically increments a time-based stack with the

transmitted time interval parameters 1011, 2011 based on the selectable trigger-table 103, 203 and activating the assignment of the parametric transfer of payments to the corresponding trigger-flag by means of the filter module 5 if a threshold, triggered on the incremented stack value, is reached. Said threshold, triggered on the incremented stack value, can e.g. be set to bigger-equal 5 and smaller-equal 10 days.

As further embodiment variant, said assignment of the parametric transfer of payments to the corresponding trigger-flag for example can only activated, if said transmission comprises a definable minimum number of airport identifications assigned to airport closings thus creating an implicit geographic spread of the closed airports of the flight plan. It is also imaginable, that said assignment of the parametric transfer of payments to the corresponding trigger-flag is e.g. automated activated by means of the resource-pooling system 1 for a dynamically scalable loss covering of the aircraft fleet 41,...,44 with an definable upper coverage limit. Said upper coverage limit can e.g. be set to smaller-equal US$ 100 million.

Preferably, the risk-pooling system 1 further can be realized to comprise an assembly module to process risk related aircraft fleet data and to provide the likelihood for said risk exposure a pooled aircraft fleet 41,...,44 based on the risk related aircraft fleet data. In this variant, the aircraft fleets 41,...,44 are connected to the resource-pooling system by means of the plurality of payment receiving modules configured to receive and store payments from the pooled aircraft fleets 41,...,44 for the pooling of their risks and wherein the payments are automated scaled based on the likelihood of said risk exposure of a specific aircraft fleet 41,...,44. Finally, the filter module 5 of said core engine 2 can also comprise an additional trigger device for triggering if said transmission from the trigger module 4 is induced by an applicable third party, wherein the transmission of the parameters includes said time interval parameter 1011, 2011 of an airport closing and an airport identification 1012, 2012. If the airport closing is third-party induced, the stack is dynamically incrementable with the transmitted time interval parameters 1011, 2011, while otherwise the stack is not incrementable, i.e. the stack is left unchanged.

Tables 3 to 6 show an example of such a parametric payment transfer initiated by the resource-pooling system and based on the pooled resources and risks.

The tables 3 to 6 have to be read as be covered in on single operational set up of the system 1.

Maximum Payout Amount		15'000'000
Cancelled Departure XS point		400
Payout per cancelled departure		15'000
Exponential Dist Lambda =		0.35
Option 1: 10 Day Franchise + 10 Days		
Overall Expected Loss		101'258
	Assumption: Volcano activity in Iceland lasting more than 7 days one in every 20 years. Probability of wind bring ash cloud to Europe = 12%	
Probability of Event occurring		12%
Planned per day		85
Cancelled per day		73.95
	Volcano Europe - 5 major	
	Payout	**Expected Loss**
0.29531191		
0.503414696		
0.650062251		
0.753403036		
0.826226057		
0.877543572		
0.913706414		
0.939189937		
0.957147873		
0.969802617		
0.978720264	14'355'000	15'362
0.985004423	15'000'000	11'311
0.989432796	15'000'000	7'971
0.992553417	15'000'000	5'617
0.994752482	15'000'000	3'958
0.996302136	15'000'000	2'789

0.997394159	15'000'000	1'966
0.998163695	15'000'000	1'385
0.998705978	15'000'000	976
0.999088118	15'000'000	2'329
Expected Loss		**53'665**

(Table 3)

Exponential Dist Lambda =		0.2
		Assumption: Fire in 100% of years, 1 in 10 closes airport at all. If closed will last longer than 7 days in 20% of cases
Probability of Event occurring		10%
Planned per day		85
Cancelled per day		5
Brush Fire		
	Payout	**Expected Loss**
0.181269247		
0.329679954		
0.451188364		
0.550671036		
0.632120559		
0.698805788		
0.753403036		
0.798103482		
0.834701112		
0.864664717		
0.889196842	970'588	2'381
0.909282047	1'058'824	2'127
0.925726422	1'147'059	1'886
0.939189937	1'235'294	1'663
0.950212932	1'323'529	1'459
0.959237796	1'411'765	1'274
0.96662673	1'500'000	1'108
0.972676278	1'588'235	961
0.977629228	1'676'471	830

0.981684361	1'764'706	3'948
Expected Loss		**17'637**

(Table 4)

Exponential Dist Lambda =		0.29
		Assumption: Volcanic Eruption closing airport 1 in 7 years, 20% of these will last longer than 7 days
Probability of Event occurring		1.4%
Planned per day		85
Cancelled per day		4.7
Volcano Canary		
	Payout	**Expected Loss**
0.251736432		
0.440101633		
0.581048451		
0.686513819		
0.765429712		
0.824479599		
0.868664479		
0.901726414		
0.926465456		
0.94497678		
0.958828129	912'353	1'805
0.969192589	995'294	1'474
0.976947937	1'078'235	1'195
0.982750981	1'161'176	963
0.987093187	1'244'118	772
0.990342302	1'327'059	616
0.992773497	1'410'000	490
0.994592671	1'492'941	388
0.995953893	1'575'882	306
0.996972445	1'658'824	959
Expected Loss		**8'967**

(Table 5)

Exponential Dist Lambda =		0.2
		Assumption: Unknown event causing 7% of flights to be cancelled 14 days happens every 10 years
Probability of Event occurring		10%
Planned per day		85
Cancelled per day		5.95
Other		
	Payout	**Expected Loss**
0.181269247		
0.329679954		
0.451188364		
0.550671036		
0.632120559		
0.698805788		
0.753403036		
0.798103482		
0.834701112		
0.864664717		
0.889196842	1'155'000	2'833
0.909282047	1'260'000	2'531
0.925726422	1'365'000	2'245
0.939189937	1'470'000	1'979
0.950212932	1'575'000	1'736
0.959237796	1'680'000	1'516
0.96662673	1'785'000	1'319
0.972676278	1'890'000	1'143
0.977629228	1'995'000	988
0.981684361	2'100'000	4'698
Expected Loss		**20'989**

(Table 6)

In the above mentioned embodiment variant, for registering the communications network interfaces with an associated identification module for unidirectional or bidirectional unicast or multicast end-to-end data and/or multimedia stream transmissions, the resource-pooling system 1 can e.g. comprise a registering network node with a register unit by using a request to request a data link to one or more of the communication network interfaces from the core engine 2 via the contact-based or contactless communication network interface 31. In principle, point-to-point connection (unicast) is intended to mean all direct connections between two network interfaces from point-to-point. This covers both point-to-point and end-to-end connections. On the example of the system 1, the point-to-point connections can also work without an actual switching intermediate unit. The interfaces can cover communication in the lower network layers (1-3 in the OSI model). End-to-end connections also cover all connections on the higher network layers ((4-7 in the OSI model). In the case of end-to-end communication, an intermediate station can also be used for said transmission according to the invention. In the embodiment variant of a multicast-based transmission, multicast denotes data transmission in groups (multipoint connection). Therefore, an appropriate multicast setting can be used in the system 1 for dedicated transmission between the communication network interface 31 of the receiver 3 and associated aviation systems of the pooled aircraft fleets 81,...,84.

In the embodiment variant where the connected communication network interfaces or the resource-pooling system 1 of the pooled aircraft fleets 81,...,84 respectively the receiver 3 comprise an identification module as e.g. a SIM card for storing an IMSI, the interfaces or the aviation systems of the pooled aircraft fleets 81,...,84 can also comprise means for transmitting the IMSI for example to the registration module of the system 1 on request. The IMSI can so be stored in an appropriate user database of the registration module. To authenticate an identification or identifier, the registration module can use the extensible authentication protocol, for example. In case of GSM-based authentication using a location register, the system 1 can also comprise an appropriate signaling gateway module for complementing the logical IP data channel to form signal and data channels in a GSM network to such a location register. A MAP gateway module can be used to generate the necessary SS7/MAP functions for authenticating the interfaces or rather the transmitted

identification stored at the corresponding identification module. The registration module authenticates the at least one communication network interface using the user database, e.g. of the location register, and the signaling gateway module on the basis of the IMSI of the SIM card. Upon successful authentication is stored in the user database of the registration module, an appropriate entry is stored and/or the data link to the one or more communication network interfaces can be set up e.g. by means of the receiver 3 and/or the core engine 2.

A filter module 5 of said core engine 2 dynamically increments a stack with the transmitted time interval parameters 1011/2011 based on the hash table 103/203, i.e. by getting the parameters from the saved parameters of the hash table 103/203. The filter module 5 activates a failure deployment device 6, if a threshold, triggered on the incremented stack value, is reached. Said threshold, triggered on the incremented stack value, can preferably be set to bigger-equal 5 and smaller-equal 10 days. However, the threshold can also be dynamically adaptable based on measured values of the aircraft fleet 41,...,44 of empirically derived values. In an embodiment variant the starting point of an event, which is also the starting point to increment a new stack, can be triggered can also be based on the first authority issues instruction for the closure of airspace for one specific event. In big events it is very possible that authorities based in different locations are issuing similar instructions based on the same event. The end-point of an event, which also ends the incrementation of a specific stack related to the event, can for example be triggered by the last authority that opens their airspace again. Interim periods, in which airspace is not closed in any one location for this event are not measured.

The system 1 is easy adaptable to further border conditions. For natural catastrophe, such condition may include additional trigger thresholds as e.g. in the case of earthquakes that the quake hast to be over 7 on the Richter Scale and located exactly below or close to an airport. Concerning volcanic eruptions, if the trigger is set to measuring parameter of the eruption, also wind conditions have to be considered. For example, for the Iceland's volcanoes, which are most active in Europe, the winds blow the clouds only 6% of the time towards Europe. Further, in an embodiment variant, the system 1 can also cover special cases as for example the case of long-term closure of airports. Long term closure of airports 91,...,94 instead of closure of airspace can result in transfer-flights or replacement flights (example Munich airport is closed for 6

months and Innsbruck and Salzburg airport are used as a "substitute" airport) and may be excluded or included for a pro rate calculation by setting appropriate operational parameters of the system 1. The closure of airspace may be defined as a local authority issuing the instruction to close airspace. In case of an earthquake or major flooding it is likely that instead of airspace the authorities will close one or more airport 91,...,94, which for the coverage by the system 1 can be supposed to be treated similar. Small airspaces, which fall below a certain size, can for example also be excluded from the definition to avoid triggering the cover by a very small airport/airspace. Any computer program code of the system 1 stored as a computer program product to steer and control said core engine 2 of the system 1, the receiver 3 or electronic receiver module, the trigger module 4, the filter module 5, the failure deployment device 6 generating the output or activation signal, and/or the automated or automatically activatable damage covering system 7 may be realized as a software module programmed in any program language, for example in Java (Java is a registered trademark of Sun Microsystems), and may even comprise even one or more script modules for a conventional spreadsheet application such as Microsoft Excel. In the following paragraphs, described are with reference to Figure 1 may also serve the man skilled in the art to realize the partly or as whole software-based various functions executed by the system 1 when said central processor unit 2 is controlled or steered by the computer program of computer program product. However, the man skilled in the art also understands that all these functions can be realized only hardware-based to achieve related technical advantages as speed, stability and the same.

In the embodiment variant with the failure deployment device 6, in case the failure deployment device 6 is initiated by the filter module 5, the failure deployment device 6 can e.g. generates an output signal 61 to provide interruption cover of the aircraft fleet 41,...,44 for at least a part of said time interval of said airport closing by means of an automated damage covering system 7. The generated output signal 61 can be transmitted via the communication networks 50/51 from the failure deployment device 6 to the damage covering system 7 or directly by a signaling connection. If the automated damage covering system 7 is monetary based, the capacity of the automated damage covering system 7 can be set to any definable value, e.g. a $1 billion cover in total for a 12-month period. The scope of the system can be laid up to 10 policies à $100m to major airlines. However, other scopes are also imaginable. A policy here means from the technical aspect, the corresponding aircraft

fleet 81,...,84 is assigned to the system 1 by creating the appropriate communication connections, database entries, signaling conditions and cover by the damage covering system 7 etc. However, the automated damage covering system 7 must not necessary be monetary based but can comprise other means for the covering as e.g. physical alarm means, or automated activatable technical support means to recover the aircraft fleet 81,...,84 for a possible damage due to the catastrophic event. The system may comprise a dynamic or automated pricing by means of predefined rules, as e.g. the use of a 3% rate on line as WAP with 10 days waiting period, MFP 3% RoL with 7 days excess. The selected aircraft fleets 81,...,84 can be restricted to a specific region, i.e. regionally spread to US, Europe, Asia, or unlimited by region to possible worldwide assignment of aircraft fleets 81,...,84. In an embodiment variant, said output signal can e.g. only be generated, if said transmission comprises a definable minimum number of airport identifications with airport closings. Such a definable minimum number can be created due to an minimum size in the geographic spread of the closed airports of the flight plan. It therefore can serve as a minimum threshold for a minimum of affected airports 91,...,94 of a fight plan 102/202 of an specific aircraft fleet 41,...,44. This minimum threshold value can also be set independent of a specific aircraft fleet 41,...,44, triggering simply on the number of closed aircraft fleet 41,...,44 due to a certain natural disaster events, terroristic activities and/or other catastrophic event. Said output signal can be automated generated by means of the system 1 for a dynamically scalable damage covering of the aircraft fleet 41,...,44 with an definable upper coverage limit. Said upper coverage limit can for example be set to smaller-equal US$ 100 million. The output signal 61 generated by means of the failure deployment device 6 can for example be generated pro rata calculated to the number of cancelled flights or e.g. by the number of cancelled flights / number of scheduled flights for the period in which airspace is closed times the limit. However, the man skilled in the art knows that these are only examples, and that the system 1 can easily be adapted to other operational needs.

In certain embodiment variants, the failure deployment device 6 for automatic failure elimination can also directly be activated by means of a switching device of the ground station 911,...,914 if a airport closing is detected e.g. by means of a sensor. The automated damage covering system 7 and/or the failure deployment devices 6 may comprise in particular in some cases, for example, automated emergency and alarm signal devices with or without monetary-value based

transmission modules. For example, at least in some cases for detecting an airport closing, a dedicated sensor or measuring device can be integrated into the aviation system of the airports 91,...,94 and/or the ground station 911,...,914 and/or landing strip. The failure deployment device 6 may be, for example, checking or alarm devices or systems for direct intervention in the affected aircraft fleets 81,...,84 or at the operator of an aircraft fleet 81,...,84, which is affected on detection of corresponding failures. Of course, a plurality of aircraft fleets 81,...,84 may simultaneously be affected or be covered by means of the system 1.

Further, as an embodiment variant, an automated damage or loss covering system 7 can be realized by means of a resource-pooling system integrated to the system 1. By means of the resource-pooling system, flight interruption risks for of a variable number of aircraft fleets 41,...,44 and/or aircraft operators is sharable, whereas the system 1 provides a self-sufficient risk protection for a risk exposure of the aircraft fleets 41,...,44 and/or aircraft operators by means of the resource-pooling system. The risk-pooling system can for example be technically realized by comprising at least said assembly module to process risk related aircraft fleet data and to provide the likelihood for said risk exposure a pooled aircraft fleet 41,...,44 based on the risk related aircraft fleet data. In this embodiment variant the pooled aircraft fleets 41,...,44 can be connected to the resource-pooling system by means of a plurality of payment receiving modules configured to receive and store payments from the aircraft fleets 41,...,44 for the pooling of their risks and wherein the payments are automated scaled based on the likelihood of said risk exposure of a specific aircraft fleet 41,...,44.

In an embodiment variant, the variable number of pooled aircraft fleets 81,...,84 can be self-adaptable by the system 1 to a range where not-covariant occurring risks covered by the system 1 affect only a relatively small proportion of the totally pooled risk exposure of the aircraft fleets 81,...,84 at a given time. In a variant, the system 1 can for example further comprise a payment receiving module configured to receive and store a principal payment from a third party investor for a financial product linked to the system 1 and a payment module configured to determine a bonus payment for the third party investor and a return interest payment for the investor when the pooled resources of the pooled aircraft fleets 81,...,84 exceed a predefined threshold value due to a low frequency of losses occurred.

The filter module 5 may comprise an integrated oscillator, by means of which oscillator an electrical clock signal having a reference frequency can be generated, the filter module 5 being capable periodically filter the table elements 101/201 of the selectable hash table 103/203 on the basis of the clock signal. So, the stack can be determined dynamically or partly dynamically by means of the filter module 5 on the basis of the detected closings of airports 91,...,94.

Note that the resource-pooling system 1 can easily be realized to be resistant against systematic risk or risk based on moral hazard. If for example a majority of aircraft fleets 81,...,84 and/or airports in a certain region get pooled to an system 1 according to the invention, a total system failure could aggregate losses, which can reduce the self-sufficient operation of system 1. The operation of aircraft fleets 81,...,84 by the airlines is a dense web of scheduling, placing aircraft, personnel and resources, an aircraft fleet 81,...,84 respectively the airline always bears a certain financial impact when flights are cancelled or aircraft have to stay on the ground for various reasons. Therefore, the worst impact for an aircraft fleet is the disruption in it's entire network after a few hours or days of outage, where planes have to be relocated, crews have to exchanged due to over hours or wrong locations and the weekly maintenance has to be rescheduled. Even in case of low utilized flights (low load factors) to cancel a flight out of economic reasons would be reasonable but the resulting disruptions in the network are far greater than the gain of saving a few variable costs. Out of these many reasons, the likelihood of moral hazard, meaning aircraft fleets abusing the system cover to compensate for their own bad business is extremely low. Further systematic risk for the operation of the system 1 can for example be threated as follows: (i) aircraft crashing: Single aircraft crashing does typically not result in many flight cancellations despite the fact that the system can be realized to only cover non-physical events; (ii) aircraft breakdowns: Aircraft breakdowns due to mechanical reasons happen quite frequent. However, for these cases, an aircraft fleet 81,...,84 respectively the airline typically face tremendous operational and reputational problems which could not be solved financially. Therefore, the aircraft fleet operators normally have a higher interest to operate flights than to misuse an assigned system 1 for damage covering; (iii) nuclear risk: Nuclear risks can be excluded by an appropriate setting of the system 1. Additionally, aircraft fleets 81,...,84 would cancel flights in the affected area only for a short term as the impact is very limited to air-transportation; (iv) low demand: Low demand on a certain route would be a possibility of abuse of the system 1. However,

since the aircraft fleet operators need the aircraft on the return leg, the aircraft fleet operators would normally not cancel single flights due to low demand. If routes are replaced by other routs the overall number of scheduled flights does not change; (v) grounding: Local authorities can enforce a grounding of an entire aircraft fleet 81,...,84 due to inherent design failures or faulty maintenance of the aircraft fleet 81,...,84. Since this can be influenced by the aircraft fleet operator and can have a huge effect on the number of cancelled flights, the system can e.g. be designed to exclude such events from the cover; (vi) weather: Cancellation due to weather is the most common reason of cancellation with the highest impact. The aircraft fleet operators or the airports operators cannot influence these cancellations. Therefore, the operation of the system 1 can for example be ensured by setting appropriate condition parameters for the frequency and/or severity of the natural catastrophic event; (vii) strike; Strike by the employees of the aircraft fleet operator or the airports are the second highest risk with a strong impact on the flight schedule. However, due to the operational and reputational issues, the desire to avoid any strike is typically bigger that the incentive to misuse the system 1 by wrongly claiming relief by means of cover by the system 1; (viii) ATC: Cancellations due to ATC happen if the controller induce a quote on flights during a brief period in order to safely coordinate the remaining flights. This also lies outside the control of the aircraft fleet operators or the airport operators, but has normally a minor impact on the number of total cancellations and therefore on the operation of the system 1; (ix) insolvency and war/terror: Insolvency is one of the biggest threats for an aircraft fleet operator, but is completely in it's control. Thus, for the realization of the resource-pooling system 1, the exclusion by setting appropriate border condition parameters can be mandatory. War and terrorism is another threat, which can also be excluded by setting appropriate border condition parameters in the resource-pooling system 1.

Additional fraud prevention can be achieved, in that the filter module 5 of said core engine 2 comprises an additional trigger device triggering if said transmission from the trigger module 4 is induced by an applicable third party, whereas if the airport closing is third-party induced dynamically increments the stack with the transmitted time interval parameters 1011, 2011 and otherwise leaves the stack unchanged, viz. obviates incrementation of the stack. Third-party induced, i.e. induced by an applicable third party, means that the airport is closed based on intervention of a state authority as for example the official aeronautical authority, police or military

intervention. In general, the additional trigger device can e.g. also trigger if the airport closing is not self-induced respectively induced by external effects (e.g. complete closing of the airspace), authorities etc., which are not under the control of the airport operator. Applicable means that the third parties, which are triggered on by means of the trigger device are definable as system variables either as predefined parameters or as parameter, which can be accessed by the system, for example over the network from an appropriate data server on request or periodically. This embodiment variant as inter alia the advantage that the systems becomes stable against possible fraud or arbitrary acts by the airport operator.

CLAIMS

1. Automated, self-sufficient resource-pooling system (1) related to airspace risks for risk sharing of a variable number of risk exposed aircraft fleets (81,...,84) by pooling resources of the risk exposed aircraft fleets (81,...,84) and by providing a self-sufficient risk protection based on the pooled resources for the risk exposed aircraft fleets (81,...,84) by means of the resource-pooling system (1), wherein risk exposed aircraft fleets (81,...,84) are connected to the system (1) by means of a plurality of payment-receiving modules configured to receive and store payments from the risk exposed aircraft fleets (81,...,84) for the pooling of their risks and resources, and wherein an automated transfer of risk exposure associated to the aircraft fleets is provided by the resource-pooling system (1), characterized,

in that the system (1) comprises capturing means to receive transmitted fight plan parameters (102, 202) of the pooled risk exposed aircraft fleets (81,...,84), wherein by means of a filter module the transmitted fight plan parameters (102, 202) are filtered for the detection of airport indicators indicating flown to airports (91,...,94) by the corresponding pooled risk exposed aircraft fleet (81,...,84), and wherein by means of the filtered airport indicators (1012, 2012) detected airports (91,...,94) are stored to a table element (101, 201) of a selectable trigger-table (103, 203) assigned to an aircraft fleet identifier of the corresponding pooled risk exposed aircraft fleet,

in that the system (1) comprises a trigger module (4) dynamically triggering on an airport data flow pathway of ground stations (911,...,914) situated at said flown to airports (91,...,94) based on the stored airport indicators of the trigger-table (103,203), wherein the ground stations (911,...,914) are linked via a communication network (50,51) to the core engine (2), wherein the trigger module (4) is dynamically triggering on the airport data flow pathway of ground stations (911,...,914) via said communication network (50,51), and wherein in case of a triggering of an occurrence of an airport closing of one of the airports (91,...,94) comprised in the selectable trigger-table (103, 203), operational parameters of the triggered airport (91,...94) comprising at least time interval parameters (1011, 2011) of the airport closing are captured and stored assigned to the corresponding table element (101, 201),

in that for each triggered occurrence of an airport closing of one of the airports (91,...,94) assigned to a table element (101, 201) of the selectable trigger-table

(103, 203), the captured operational parameters of the airport closing are matched with natural disaster event data comprised in a predefined searchable table of natural disaster events in order to relate the airport closing to an occurrence of a natural disaster event comprised in the searchable table of natural disaster events by means of the core engine (2), wherein the resource pooling system (1) further comprises means for dynamically detecting occurrences of natural disaster events and set appropriate indicator flags in the table element of the corresponding risk together with storing related natural disaster event data and/or measuring parameters indicating at least time of occurrence and/or affected region of the natural disaster event, and wherein the system (1) is connected to appropriate sensors or measuring devices for the detection of the occurrence of such natural disaster events,

in that in case that a match is established by the core engine (2), a corresponding trigger-flag is set by means of the core engine (2) to the assigned risk exposed aircraft fleets (81,...,84) of the airport indicator (1012, 2012), and a parametric transfer of payments is assigned to this corresponding trigger-flag, wherein said assignment of the parametric transfer of payments to the corresponding trigger-flag is automate activated by means of the system for a dynamically scalable loss covering of the aircraft fleet with an definable upper coverage limit only, if said transmission comprises a definable minimum number of airport identifications assigned to airport closings thus creating an implicit geographic spread of the closed airports of the flight plan, and wherein a loss associated with the triggered airport closing is distinctly covered by the system (1) based on the respective trigger-flag and based on the received and stored payment parameters from the pooled risk exposed aircraft fleets (81,...,84) by the parametric payment transfer from the system (1) to the corresponding risk exposed aircraft fleets (81,...,84) by means of an automated activated damage recovering system (7) operated or steered by a generated output signal of an failure deployment device (6) of the system (1).

2. Self-sufficient system (1) according to claim 1, wherein the predefined searchable table of natural disaster events comprises table elements for each of the predefined risk transferred to the resource-pooling system 1, wherein each risk is related to parameters of a table element, defining the natural disaster events, and wherein the resource pooling system (1) further comprises means for dynamically detect occurrences of such natural disaster events and set appropriate indicator flags in the table element of the corresponding risk together with storing related natural disaster

event data and/or measuring parameters indicating at least time of occurrence and/or affected region of the natural disaster event.

3. Self-sufficient system (1) according to one of the claims 1 or 2, wherein an additional filter module (5) of said core engine (2) dynamically incrementing a time-based stack with the transmitted time interval parameters (1011, 2011) based on the selectable trigger-table (103, 203) and activating the assignment of the parametric transfer of payments to the corresponding trigger-flag by means of the filter module (5) if a threshold, triggered on the incremented stack value, is reached.

4. Self-sufficient system (1) according to claim 3, wherein said threshold, triggered on the incremented stack value, is set to bigger-equal 5 and smaller-equal 10 days.

5. Self-sufficient system (1) according to one of the claims 1 to 4, wherein said assignment of the parametric transfer of payments to the corresponding trigger-flag is automated activated by means of the system (1) for a dynamically scalable loss covering of the aircraft fleet (41,...,44) with an definable upper coverage limit, and wherein the payments are automated scaled based on the likelihood of said risk exposure of a specific aircraft fleet (41,...,44).

6. Self-sufficient system (1) according to one of the claims 1 to 5, wherein the risk-pooling system (1) comprises an assembly module to process risk related aircraft fleet data and to provide the likelihood for said risk exposure a pooled aircraft fleet (41,...,44) based on the risk related aircraft fleet data, wherein the aircraft fleets (41,...,44) are connected to the resource-pooling system by means of the plurality of payment receiving modules configured to receive and store payments from the pooled aircraft fleets (41,...,44) for the pooling of their risks and wherein the payments are automated scaled based on the likelihood of said risk exposure of a specific aircraft fleet (41,...,44).

7. Self-sufficient system (1) according to one of the claims 1 to 6, wherein the filter module (5) of said core engine (2) comprises an additional trigger device for triggering if said transmission from the trigger module (4) is induced by an applicable third party, wherein the transmission of the parameters includes said time interval parameter (1011, 2011) of an airport closing and an airport identification (1012, 2012), and wherein, if the airport closing is third-party induced, the stack is dynamically

incrementable with the transmitted time interval parameters (1011, 2011), while otherwise the stack is not incrementable.

8. A method for risk sharing of a variable number of risk exposed aircraft fleets (81,...,84) by means of an automated self-sufficient system (1) related to airspace risks by pooling resources of the risk exposed aircraft fleets (81,...,84) and by providing a self-sufficient risk protection for the risk exposed aircraft fleets (81,...,84) by means of the system (1) preventing imminent grounding or damages following natural disaster events, wherein risk exposed aircraft fleets (81,...,84) are connected to the system (1) by means of a plurality of payment-receiving modules, and wherein payments from the risk exposed aircraft fleets (81,...,84) are received and stored by means of the plurality of payment-receiving modules for the pooling of the risks and resources of the risk exposed aircraft fleets (81,...,84), and wherein an automated transfer of risk exposure associated to the aircraft fleets is provided by the resource-pooling system (1), characterized,

in that transmitted fight plan parameters (102, 202) of the pooled risk exposed aircraft fleets (81,...,84) are received by means of capturing means, wherein by means of a filter module the transmitted fight plan parameters (102, 202) are filtered for airport indicators indicating flown to airports (91,...,94) by the corresponding pooled risk exposed aircraft fleet (81,...,84), and wherein by means of the filtered airport indicators (1012, 2012) detected airports (91,...,94) are stored to a table element (101, 201) of a selectable trigger-table (103, 203) assigned to an aircraft fleet identifier of the corresponding pooled risk exposed aircraft fleet,

in that a trigger module (4) dynamically triggers on an airport data flow pathway of ground stations (911,...,914) situated at said flown to airports (91,...,94) of the fight plans (102,202), wherein the ground stations (911,...,914) are linked via a communication network (50,51) to the core engine (2), wherein the trigger module (4) dynamically triggers on the airport data flow pathway of ground stations (911,...,914) via said communication network (50,51), and wherein in case of a triggering of an occurrence of an airport closing of one of the airports (91,...,94) comprised in the selectable trigger-table (103, 203), operational parameters of the triggered airport (91,...94) comprising at least time interval parameters (1011, 2011) of the airport closing are stored assigned to the corresponding table element (101, 201) of the selectable trigger-table (103, 203) based on the triggered airport indicator (1012, 2012),

in that each triggered occurrence of an airport closing of one of the airports (91,...,94) of the selectable trigger-table (103, 203), the operational parameters of the corresponding table element (101, 201) are matched with natural disaster event data comprised in a predefined searchable table of natural disaster events in order to determine a possible relation of the airport closing to an occurrence of a natural disaster event comprised in the searchable table of natural disaster events by means of the core engine (2), wherein the resource pooling system (1) further dynamically detects occurrences of natural disaster events and sets appropriate indicator flags in the table element of the corresponding risk together with storing related natural disaster event data and/or measuring parameters indicating at least time of occurrence and/or affected region of the natural disaster event, and wherein the system (1) is connected to appropriate sensors or measuring devices for the detection of the occurrence of such natural disaster events,

in that in case that said relation is established by the core engine (2), a corresponding trigger-flag is set by means of the core engine (2) to the assigned risk exposed aircraft fleets (81,...,84) of the airport indicator (1012, 2012) of the triggered airport closing, and a parametric transfer of payments is assigned to this corresponding trigger-flag, wherein said assignment of the parametric transfer of payments to the corresponding trigger-flag is automate activated by means of the system (1) for a dynamically scalable loss covering of the aircraft fleet with an definable upper coverage limit only, if said transmission comprises a definable minimum number of airport identifications assigned to airport closings thus creating an implicit geographic spread of the closed airports of the flight plan, and wherein a loss associated with the triggered airport closing is distinctly covered by the system (1) based on the respective trigger-flag and based on the received and stored payment parameters from the pooled risk exposed aircraft fleets (81,...,84) by the parametric transfer from the system (1) to the corresponding risk exposed aircraft fleets (81,...,84) by means of an automated activated damage recovering system (7) operated or steered by a generated output signal of an failure deployment device (6) of the system (1).

9 Method according to claim 8, wherein an additional filter module (5) of said core engine (2) dynamically increments a time-based stack with the transmitted time interval parameters (1011, 2011) based on the selectable trigger-table (103, 203) and activates the assignment of the parametric transfer of payments to the

corresponding trigger-flag by means of the filter module (5) if a threshold, triggered on the incremented stack value, is reached.

10. Method according to claim 9, wherein said threshold, triggered on the incremented stack value, is set to bigger-equal 5 and smaller-equal 10 days.

11. Method according to one of the claims 8 to 10, wherein said assignment of the parametric transfer of payments to the corresponding trigger-flag is only activated, if said transmission comprises a definable minimum number of airport identifications assigned to airport closings thus creating an implicit geographic spread of the closed airports of the flight plan.

12. Method according to one of the claims 8 to 11, wherein said assignment of the parametric transfer of payments to the corresponding trigger-flag is automated activated by means of the system (1) for a dynamically scalable loss covering of the aircraft fleet (41,...,44) with an definable upper coverage limit, and wherein the payments are automated scaled based on the likelihood of said risk exposure of a specific aircraft fleet (41,...,44).

13. Method according to one of the claims 8 to 11, wherein risk related aircraft fleet data is processed by means of an assembly module and the likelihood for said risk exposure of an aircraft fleet (41,...,44) is provided based on the risk related aircraft fleet data, wherein the aircraft fleets (41,...,44) are connected to the resource-pooling system by means of the plurality of payment receiving modules configured to receive and store payments from the pooled aircraft fleets (41,...,44) for the pooling of their risks and wherein the payments are automated scaled based on the likelihood of said risk exposure of a specific aircraft fleet (41,...,44).

14. Method according to one of the claims 8 to 12, wherein the filter module (5) of said core engine (2) comprises an additional trigger device for triggering if said transmission from the trigger module (4) is induced by an applicable third party, wherein the transmission of the parameters includes said time interval parameter (1011, 2011) of an airport closing and an airport identification (1012, 2012), and wherein, if the airport closing is third-party induced, the stack is dynamically incremented with the transmitted time interval parameters (1011, 2011), while otherwise the stack is left unchanged.

List of References

1 Self-sufficient resource-pooling system

101, 201 Table elements

1011, 2011 Time interval parameter of an airport closing

1012, 2012 Airport identification

102, 202 Flight plan parameters

103, 203 Selectable trigger-table

2 Core engine

3 Receiver

31 Communication network interface

4 Trigger module

5 Filter module

6 Failure deployment device

61 Output signal

7 Automated damage covering system

50/51 Communication network

81,...,84 Aircraft fleets

91,...,94 Airport

911,...,914 Ground stations