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BIRD AVOIDANCE MODEL (BAM) EUROPE

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Abstract

Present day methods used to prevent birdstrikes en route are limited to military aviation and depend mainly on the interpretation of radar images. These so-called BIRDTAMS (Bird Notices to Airmen) already exist since the Sixties in a limited number of West European Air Forces, but show very poor potential for expansion and refinement, because radar observations are not species specific. They cannot meet civil requirements with respect to risk analysis. Further, other existing methods do reflect the current or historical avian threat to aircraft, but are incapable of predicting changes in this threat.

In Europe, air traffic shows a remarkable growth and a threefold increase is expected over the next 15 years. Therefore, it is very important to obtain a dynamic real-time GIS-based model, which can predict changes in the times and altitudes of potential hazardous avian flight, based upon the physical and dynamical processes that drive this flight.

An additional reason for establishing a European BAM besides the improvement of flight safety is the legal aspect. The Bird Protection Directive and the Fauna-Flora-Habitat Directive of the European Community prohibit low-level flying above bird sanctuaries to avoid disturbances. Actual information of these restricted areas is absolutely necessary to pilots.

The European BAM aims at promoting a common European policy to the large problem of bird-aircraft collisions. This could provide the first step towards an international cooperation.

The initiative to start with the development of a European Bird Avoidance Model (BAM) has come from the RNLAF in cooperation with the University of Amsterdam (UvA) and SOVON (Bird census work Netherlands). A proposal for a European project will be submitted to the European Community this fall. A number of European partners in the field of research are invited to participate in this project.

Key Words: Mathematical model, Preflight planning, Warning system, Avoidance, Low-level

European collaboration

Bird-aircraft collisions cause considerable damage to aircraft and may also cause human fatalities. Costs due to birdstrikes encountered by the worldwide aviation fleet are estimated at over three billion US dollars per year. The frequency of birdstrikes has risen significantly as air traffic has increased during the past several decades, and the resultant damage has become more serious as faster aircraft have been developed. In Europe, air traffic shows a remarkable growth and a threefold increase is expected over the next 15 years.

Flights are cross border activities and thus pan-European. Therefore, any system to avoid bird-aircraft collisions should be based on common European policies. A limited number of West European Air Forces use BIRDTAMS (Bird Notices to Airmen) to prevent birdstrikes en route, but this method is limited to military aviation and depends mainly on the interpretation of radar images. Present day methods only reflect current or historical avian threat to aircraft, and are incapable of predicting changes in this threat. To allow for the development of a new predictive real-time bird avoidance system, European institutes will need to join their expertise. An additional reason for European collaboration, besides the improvement of flight safety is the legal aspect of conservation of Europe's natural resources. The Bird Protection Directive and the Fauna-Flora-Habitat Directive of the European Community prohibit low-level flying above bird sanctuaries to avoid disturbances.

The proposed BAM-Europe project aims at promoting a European policy and regulations towards the problem of bird-aircraft collisions by (1) collecting data

on a standardized basis, (2) development of a standard approach, (3) contibute to a better awareness of risks from birdstrikes, and (4) refinement of best practices.

The initiative to start with the development of a European Bird Avoidance Model (BAM) has come from the RNLAF in cooperation with the University of Amsterdam (UvA) and SOVON (Bird census work Netherlands), only after the initiation of the BAM-Netherlands, which is currently in its pioneer stage.For the European BAM it will be necessary to cooperate with partners outside the Netherlands.

The European Union has adopted the Fifth Framework Programme on 22nd December 1998, which defines the Community activities in the field of research, technological development and demonstration (RTD) for the period 1998-2002. The Fifth Framework consists of seven specific programmes of which we respond to the thematic programme “Competitive and Sustainable Growth”. Competitiveness and sustainability are the keys to the long-term future of the Union’s economy: creation and wealth and jobs, enhancement of the quality of life, and preservation of the environment and its natural resource base. Research activities are clearly crucial in generating a more competitive technological base for European industry and in fostering the transition to a sustainable world, which will involve both a transformation of working practices and an optimised use of resources. The thematic programme GROWTH consists of four key-actions of which we respond to “Intermodality and Sustainable Mobility” aiming at RTD objective “Infrastructures and interfaces with transport means” part “Safety”. Relevant “Safety” research objectives are: (1) research should provide the foundation for harmonised pan-European safety regulations, (2) the development of methodologies for a systematic safety approach and risk analysis in transport requires first of all common methodologies and tools for hazard and risk analysis, and (3) methods and tools for implementation and enforcement of safety regulations and strategies need to be developed. The European Commission requires the involvement of users in their projects, which is also our aim especially by involving the civil aviation sector.

A proposal for a European project will be submitted to the European Community this fall. Research will have to be carried out by a consortium of European institutes. A number of European partners in the field of research are invited to participate in this project.

BAM Europe

The EU-project BAM-Europe should show results within three years from its start, and therefore to allow for the construction of a working model at short term, it is necessary to assess to what scale variables can be reduced, without losing relevant information for a valid model.

It is our aim to develop a predictive dynamic model of bird distributions in the air. The dynamic BAM will be based on mathematical modelling of processes identified as governing avian abundance, distribution and flight patterns. In Europe, data on bird distribution and numbers on the ground level are available in varying degrees of detail. However, ground level data need to be extended to obtain a denser network throughout Europe. New knowledge and data have to be generated on bird flight behaviour (i.e. altitude) and on movement patterns within and between seasons, and furthermore the influence of meteorology and geography on these variables needs to be studied. The model will provide information on hazardous bird activity, in the form of an interactive GIS application, which should be attunable to the end-users (flight planners).

The project will consist of six main modules (Figure 1): (2) what species will be included in the model and studied, (3) input of existing data, i.e. bird densities on the ground, (4) knowledge synthesis of i.e. bird distributions in relation to weather, (5) new data generation, i.e. altitudinal data of bird flight, (6) determination of critical/ threshold values for the model to function as a hazard warning system, and (7) what conditions are applicable to the model. Besides the six main modules, there are five sub-modules: the project needs management and coordination (1), the end-users (10) will be involved in the development and implementation of the model through an advisory group, a website (8)will be part of the project, the continuation of the project needs to be optimized (9), and dissemination plans need to be developed (11).

At the European level, the project will promote the standardized inventory of (changes in) 2D and derived 3D bird distribution, which is an essential basis for compatible early warning systems. The project will contribute to a better awareness of risks from birdstrikes, and more specific to incentives to incorporate BAM output in regular flight procedures. The project is also meant to promote the collection of birdstrike data in Europe. The results of the project will facilitate flight control, such as to avoid Important Bird Areas (IBA) and flying birds. The European approach will also support the participation of the most prominent institutes that are involved in the various aspects of the problem. As such, the project is a major effort to mobilize the available expertise in order to tackle the increasing problem of bird-aircraft collisions.

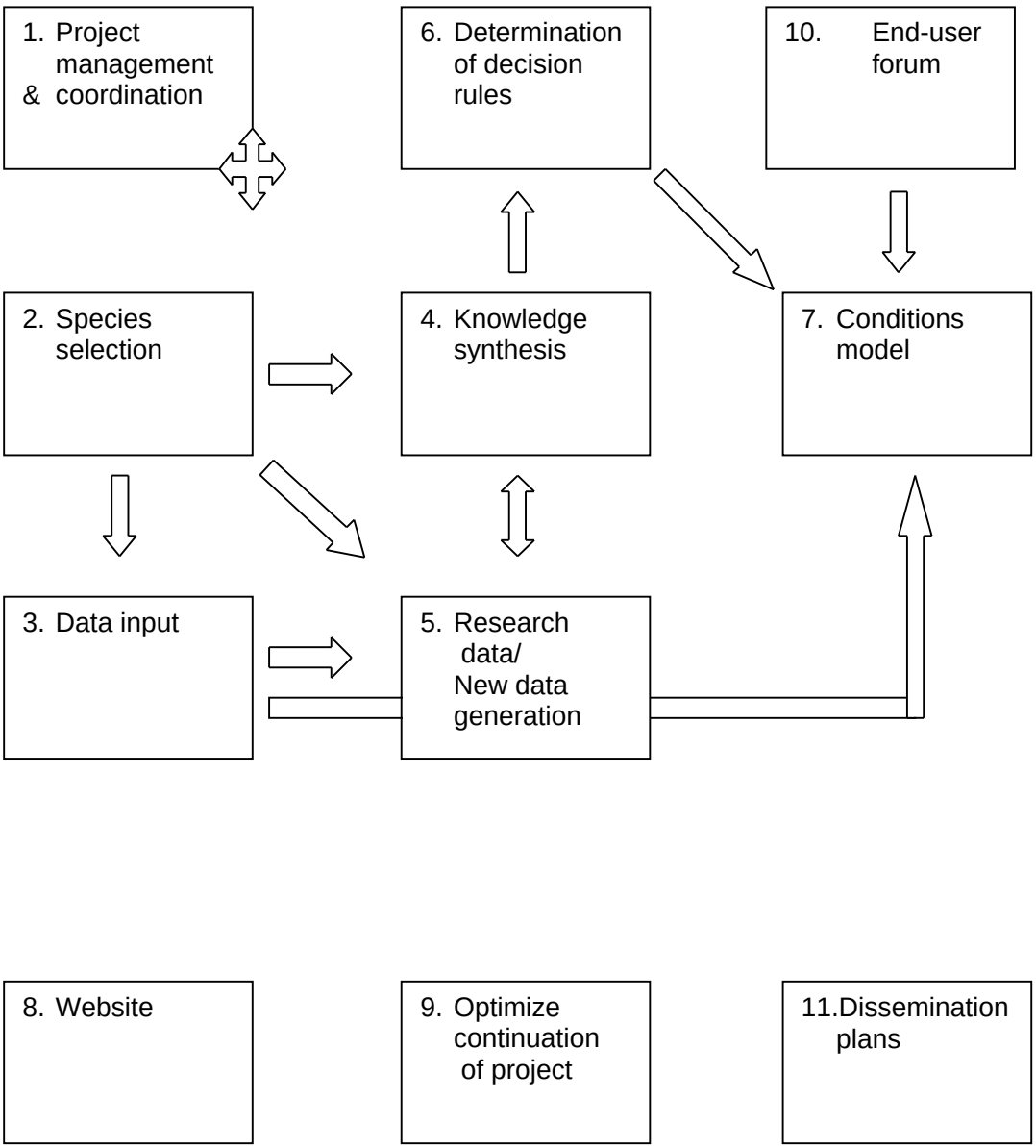

Figure 1. Schematic overview of project modules and sub-modules.

Conclusion

We suppose that the European collaboration to develop a European BAM provides a first step towards an international cooperation, especially with the USA and Canada.
Although not all European activities concerning BAM-Europe are involved as a contract partner, it is our aim to involve the concerned scientific community and other users.
If there are suggestions they are welcome.