

## Call for Proposals

## Extreme Events: Modeling, Analysis, and Prediction

## Deadlines

**Pre-Proposals (obligatory):**  
December 1, 2009

**Applications (invited):**  
July 1, 2010

## Contact

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## 1. Objectives

In 2003 the funding initiative **New Conceptual Approaches to Modeling and Simulation of Complex Systems** was established. It aims at mathematical modeling and computer simulations advancing a better understanding of complex systems. Equally, a strengthening of cooperation among theory, modeling, and simulation is intended. The initiative addresses suitably qualified theoreticians from all scientific disciplines.

Here, complexity is attributed to systems which consist of a large number of elements and which cannot be adequately described by studying their constituents. Characteristic features of such systems are the competition between autonomy and integration of the constituting elements, emergent phenomena across different hierarchical levels, and adaptation in response to the environment. In this context, the funding initiative aims at concepts which are systematically improvable and can be applied to broad classes of problems. The Foundation anticipates that joint concepts of experts employing complementary methods in theory, modeling, and simulation are particularly promising.

**Research projects** with interdisciplinary and/or comprehensive methodological characteristics are funded after prior topical calls, currently focusing on extreme events as described below. Please note that the former calls on 'Computer simulation of molecular and cellular bio-systems as well as complex soft matter' and 'Complex networks as a phenomenon across disciplines' are closed. Young postdoctoral researchers may apply annually for a Fellowship 'Computational Sciences' (see Information 82c). These fellowships are independent of the topical calls and may still refer to any discontinued topic. Furthermore, sabbaticals with teaching substitutions (in Germany only) and projects on the mathematical fundamentals of complexity (see Information 82) as well as workshops and summer schools according to the Symposia Initiative (see Information 1) are supported, too.

## 2. Topic of the Call

The new call **Extreme Events: Modeling, Analysis, and Prediction** aims at projects by a group of researchers, who deal with the modeling of extremes in complex systems. The object of investigation may be any extreme event in natural, technical, or socio-economic systems – e.g. earthquakes, landslides,

avalanches, tsunamis, flooding, tropical storms, extreme precipitation, material failure, stock market crash or the sudden regime shifts of ecosystems, to name but a few.

The research projects may address

- new methodological approaches for computer simulations and for the multivariate data analysis of extreme events;
- concepts which improve the fundamental understanding of extremes and their consequences in complex systems and which contribute to the identification of any precursors of extreme events;
- improved numerical schemes for the calculation of probabilistic predictions and
- data-based analysis of the occurrence probability (risk) of extreme events.

The above mentioned research desiderata are exemplary and do not predefine the only possible issues. Other urgent scientific questions on the modeling, the analysis and the prediction of extreme events are welcome, too. Stochastic modeling approaches as well as an integration of extremes in deterministic models are possible. In any case, the chosen methodological approach has to tackle a precise scientific question, and the modeling should relate to real data. Pure data analysis without any clear methodological innovation or practical relevance does not meet the requirements. The support of extensive experimental work is beyond the focus of this funding initiative. However, if no literature data are available, the determination of data for validation will be considered.

Conceiving a precise scientific question, choosing a relevant case study, and assembling an – ideally interdisciplinary – team are the tasks of the potential applicants. **Joint projects** by problem-oriented und methodological disciplines are particularly welcome. Likewise, concepts combining methodological know-how from various fields of research are desirable. Single investigator applications will not be funded.

### 3. Funding opportunities

Applications for cooperative research projects by several groups are feasible. Initially, they can span a maximum **duration** of three years. For successful projects there is an optional one-time continuation with a new peer-review process (for another three years maximum). The research projects can be supported through personnel, supplies, and travel **costs**. Travel and subsistence costs for project-related temporary exchange of personnel among the contributing teams (up to one year) or for external guest researchers might be included. The Foundation expects that non-scientific personnel and computing equipment is provided by the participating institutes.

Young postdoctoral researchers associated with the research team may apply for their own salary. Within international collaborations a grant for the benefit of a foreign partner is possible. Please note that the necessity for the

international cooperation has to be substantiated by the obligatory German partner, whose institute is required to coordinate the project.

The Foundation explicitly encourages the debate of the research results with stakeholders – also from outside academia. Hence, **dissemination workshops** in the framework of supported projects are funded as well. The necessary preparation, event and travel costs may be included in an application from the outset or else can be applied for during the course of a project.

Furthermore, the Foundation is supporting **public understanding of science** within its funded projects. Various mediums and formats of interaction are conceivable. When applying under this scheme please specify the target group and address the sustainability of your public relations activity. Funds for enhanced public relations efforts may be included in the original project application or else submitted later on as a separate small application.

## 4. Application

### Application Form

Please use the respective application form from the Download Center of the Volkswagen Foundation's Homepage ([www.volkswagenstiftung.de/service/downloadcenter](http://www.volkswagenstiftung.de/service/downloadcenter)) and send your application including all enclosures as a paper document with original signature as well as electronically (separate pdf-files) to the Foundation's office.

All proposals are subject to a two-stage review process. In the first step, short **project outlines** (max. 5 pages pre-proposals) can be submitted. The deadline for pre-proposals is December 1, 2009. All pre-proposals will be reviewed by the Foundation and international experts. The applicants of the selected pre-proposals will then be invited to submit a full application. If required, hints by the reviewers on certain aspects to be clarified or enhanced are communicated. The invited applications (12 pages maximum) are due by July 1, 2010. The review of full applications includes a **personal presentation** of your project in front of an interdisciplinary and international expert panel in the autumn of 2010 at the Foundation's office in Hanover, Germany.

Since the peer-review is international, pre-proposals and applications are only accepted **in English**. The pre-proposals and the full applications are required in electronic and printed form with identical content. They should provide the following information as detailed in the application form:

- summary, addresses and budget (filled-in application form);
- **joint pre-proposal** (or subsequently application) **by the research team** on objectives and justification, expected results with respect to the international state of the art, methods, work plan and time schedule, cooperation aspects, references;
- curriculum vitae of each applicant with publication list since 2005;
- written statements of other project partners, if applicable.

The Volkswagen Foundation does not process applications which are pending with another funding institution, neither in the identical nor in a similar form. The Foundation can award grants to scientific institutions only. Applicants outside of universities and well-known publicly-maintained research institutions are asked to provide details on the legal status, statutes, trustees

and boards, charitable/non-profit status, budgeting and auditing of the institution to be funded.