

17th Call for proposals for interdisciplinary Seed Fund Projects – thematic call: AI, Simulation, and Data Science: Data-driven Methods for Real-world Challenges

Background

The **Exploratory Research Space @ RWTH Aachen (ERS)** is the central instrument of RWTH to foster interdisciplinary research and to develop emerging fields with the potential to shape the University's research profile. ERS comprises activities which give a leeway for creativity to both senior and junior researchers and which foster interdisciplinary exchange and discussion. One activity is the funding of **Seed Fund Projects**. The typical duration of a Seed Fund Project is 6 to 12 months.

1. Description of the research field

Artificial Intelligence (AI), Simulation, and Data Science have been rapidly transforming the research landscape over the last decades. However, methods in AI, Simulation, and Data Science have been developed largely in different communities. With this call, we seek research proposals that explicitly combine methods from AI, Simulation, and Data Science in order to establish novel connections between these fields and explore untapped synergies.

In light of the ever-increasing availability of data and computational resources in virtually any application area today, the three fields -- especially when taken together -- have significant potential. However, the adoption of data-driven approaches in many domains has been hampered by the lack of suitable methods that respect application-specific requirements. For instance, in medical applications, we need methods that are able to deal with data that are sparse and have high-levels of uncertainty, yet require systems to perform in a reliable and safe manner. Practical applications often require a combination of human and machine intelligence, i.e., automated learning is used not to replace, but to strengthen our human capacity for learning, reasoning, decision making, and problem solving. Similarly, in areas such as robotics or automated driving, issues surrounding the robustness of algorithms are pivotal. Combining AI with high-fidelity and domain-specific physics-based simulations to test for worst-case scenarios could provide a way out of this dilemma, and provide high-quality datasets for training at the same time. In turn, AI and data science can help improve simulation precision or reduce computational effort by developing hybrid simulators that leverage prior domain knowledge and data.

2. Type and aim of projects:

This project call has been initiated jointly by the RWTH AI Center, JARA-CSD, and ICT Profile Area and shall help to explore, develop, and integrate the research landscape of these strategic topics at RWTH. We thus ask for proposals addressing the development of novel methods combining at least two of the following areas with the vision to address real-world challenges:

- (i) Artificial Intelligence (machine learning, automated reasoning and decision-making, deep learning, data/text/process mining, etc.)
- (ii) Simulation (discrete-event simulation, system dynamics, continuous simulation, and hybrid simulation, etc.), and
- (iii) Data Science (data management, statistics, data analytics, distributed computing, business intelligence, etc.).

Proposals should aim to address fundamental challenges of an application domain, which could include uncertainty, reliability, security, safety, dynamics, robustness, and other domain-specific requirements arising in real-world applications.

The activities should be original, creative and can be of high risk. They must not already be addressed by national or international public funding programs.

Projects can also be submitted as **International Research Space@RWTH Aachen (IRS)** proposals. This entails additional funding for collaboration with international partners, who are expected to contribute to the project through matching funds (except in case of capacity building proposals). IRS proposals should elaborate the specific added value of the international cooperation.

3. Selection and evaluation criteria:

The projects will be selected and evaluated by an evaluation group. The selection process may involve external experts.

The selection criteria for submitted proposals will be

- Originality (new, creative, explorative),
- Interdisciplinarity (participation of researchers from different faculties and disciplines with strongly differing research topics),
- Subsidiarity (funding through other sources is not yet possible),
- Team structure (senior and/or high-potential young researchers),
- Potential impact on the research strategy and structure of RWTH Aachen,
- Adequateness of research approach,
- Adequateness of research data management plan.

Specifically for IRS:

- Coherent implementation of internationalization in line with [RWTH internationalization strategy](#),
- Adequate matching funds from the partner (except for projects on capacity building),
- Added scientific value of the international cooperation.

Major evaluation criteria after project completion will be the quality of obtained research results and the future perspectives of the research topic as described in a final report which has to be provided 18 months after project closure:

- A promising proposed third-party funded follow-up project (DFG, BMBF, EU, ...),
- Publications in peer reviewed journals,
- Granted patents or promising patent applications.

4. Funding

The budget for a Seed Fund Project is provided by the Excellence Strategy of the German Federal and State Governments and makes allowances to the allocation model aiming for 30 % share of females. The total budget for all new Seed Fund projects is at most 300.000 €. At least 200.000 € of the funding must be spent in 2021, the rest afterwards. This will require two separate accounts. Funds from 2021 cannot be transferred into 2022.

Eligible costs are: Staff expenses including student assistants, travel and subsistence costs, support for workshops and conferences, consumables and equipment.

5. General conditions

Research Partners: typically 2-3 researchers from different faculties and disciplines. For faculty 1 only, also a group of applicants from different departments is eligible. We encourage the participation of young scientists (junior professor, group leader, research fellow, etc.) who are scientifically independent and are leading a research group.

The researchers should not be part of the same institute.

Joint Proposals with partners from Forschungszentrum Jülich (FZJ) are welcome. The research topics and the expertise of the FZJ partners must be different from those of the RWTH partners and they have to complement each other. The expenses of the partners from FZJ will not be covered by ERS funding.

Each research team (professor with his/her group) can participate in a maximum of 3 Seed Fund Project Proposals.

Progress evaluation: final report

6. Proposal structure and content

Length of proposal: 10 pages **max.**, type size: Arial 11, line spacing: 1.5

- Project partners and principal investigators
- Summary
- Current State-of-the-Art
- Relevant preliminary work of the applicants
- Goals and approach (methodology)
- Working plan
- Financial plan
- Expected long term impact (targeted third party funding, implementation of new scientific infrastructure, new significantly visible, interdisciplinary competences, action plan to achieve these strategic goals)
- Research data management plan
- References

Language: English or German

Please note: Proposals that do not comply with the formal criteria will be excluded from the reviewing process.

7. Deadline for submission: June 15, 2021

8. Project start: October 2021

9. Project duration: 6 to 12 months

10. Please apply at: <http://portal.ers.rwth-aachen.de>

Call: Seed Fund 2021 – AI, Simulation, and Data Science: Data-driven Methods for Real-world Challenges

For additional information on the selection process, please refer to our website:

<http://www.rwth-aachen.de/ers>

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