

Proposal Evaluation Form



EUROPEAN COMMISSION

Horizon 2020 - Research and Innovation Framework Programme

Evaluation Summary Report

Call: H2020-MSCA-IF-2014_ST
Funding scheme: Standard EF
Proposal number: 659920
Proposal acronym: ReACT
Duration (months): 24
Proposal title: A Realizability Approach to Complexity Theory
Activity: MAT

N.	Proposer name	Country	Total Cost	%	Grant Requested	%
1	KOBENHAVNS UNIVERSITET	DK	212,195	100.00%	212,195	100.00%
Total:			212,195		212,195	

Abstract:

Complexity theory concerns fundamental questions on the mathematics of computer science about the amount of resources needed to run programs or solve problems. The ReACT project will build on recent work in realizability models for linear logic to provide new characterizations of existing complexity classes. The end goal is to enable researchers to attack long-standing open problems in complexity theory by using mathematical techniques, tools and invariants from operators algebras and dynamical systems.

The "complexity-through-realizability" techniques developed by the ReACT project will provide a unified framework for studying many computational paradigms and their associated computational complexity theory grounded on well-studied mathematical concepts. This will allow for comparison of complexity classes defined from different computational paradigms (e.g. sequential and quantum computation), as well as establish a theory of complexity for computational paradigms lacking such (e.g. concurrent processes).

The "complexity-through-realizability" approach stems from established logical-based approaches of complexity theory and inherits their strengths. It furthermore improves crucially over them as it builds upon state-of-the-art theoretical results on realizability models for linear logic using well-studied mathematical concepts from operators algebras and dynamical systems. As a consequence, it opens the way to the use against the open problems of the discipline the many techniques, tools and invariants that were developed in these mathematical disciplines.

The ReACT project has two objectives. The first objective aims at establishing this new approach to complexity as an emerging and promising field of study which generalizes and extends previous techniques. The second objective is to investigate investigating how the mathematical methods and techniques derived from of our approach can be used to attack long-standing open problems in complexity theory.

Evaluation Summary Report

Evaluation Result

Total score: 91.20% (Threshold: 70.0/100.00)

Form information

SCORING

Scores must be in the range 0-5.

Interpretation of the score:

- 0– The proposal fails to address the criterion** or cannot be assessed due to missing or incomplete information.
- 1– Poor.** The criterion is inadequately addressed, or there are serious inherent weaknesses.
- 2– Fair.** The proposal broadly addresses the criterion, but there are significant weaknesses.
- 3– Good.** The proposal addresses the criterion well, but a number of shortcomings are present.
- 4– Very good.** The proposal addresses the criterion very well, but a small number of shortcomings are present.
- 5– Excellent.** The proposal successfully addresses all relevant aspects of the criterion. Any shortcomings are minor.

* mandatory fields

Criterion 1 - Excellence

Score: **4.70** (Threshold: 0.00/5.00 , Weight: 50.00%)

Quality, innovative aspects and credibility of the research (including inter/multidisciplinary aspects)

Clarity and quality of transfer of knowledge/training for the development of researcher in light of the research objectives

Quality of the supervision and the hosting arrangements

Capacity of the researcher to reach or re-enforce a position of professional maturity in research

STRENGTHS:

* The proposed research is a conceptually sophisticated approach to complexity, is of very good quality, and is original, innovative and timely, and the four research goals set out are well chosen.

* The motivation and novelty of the complexity-through-realizability approach are clearly related to each other, and the work is credibly presented as bringing both conceptual and technical rewards to an area in need of new ideas.

* The ToK content is clearly described in the proposal, and is a particularly strong and novel part of the proposal, involving diversity of

conceptual background and seniority, and an interesting ToK infrastructure.

* The presence of existing complementary work in the host institution, and the injection of original ideas from the Girard school, promises a particularly interesting and fruitful synergy.

* The quality of supervision, as described in the proposal, is very good, and the hosting arrangements are adequate, with at least two research groups of the department contributing to the quality of the hosting arrangements, and there being ER contact enabled with several active research groups and another European project.

* The capacity of the applicant to reach a position of professional maturity is well documented in the proposal.

* The track record in both research and in organisation of meetings is very good, with achievements good relative to the length of the researcher's career, supporting the assumption that he will benefit from the fellowship.

WEAKNESSES:

* Specificity of methodology is lacking in places, sometimes being largely based on as yet unpublished results of the researcher.

* The research objectives require more details.

Overall comments

Not provided

Criterion 2 - Impact

Score: **4.50** (Threshold: 0.00/5.00 , Weight: 30.00%)

Enhancing research- and innovation-related human resources, skills, and working conditions to realise the potential of individuals and to provide new career perspectives

Effectiveness of the proposed measures for communication and results dissemination

STRENGTHS:

* The project will enhance considerably the applicant's skills and potential to obtain a habilitation.

* The acquisition of transferable skills is envisaged, with good opportunities for obtaining teaching and research advising experience.

* The project will provide new career perspectives for the applicant, though the attention to this in the proposal is patchy.

* The proposal describes a number of potential contacts with other research leaders, and with research students, bringing useful experience and longer-term contacts.

* The fellowship will enhance the researcher's abilities to plan and execute a major research project in a conducive environment.

* Proposed measures for dissemination through standard scientific means is adequate and very well described in the proposal, with a listing of appropriate target journals and workshops/conferences.

* Specific interesting plans for outreach and public engagement, though these require more detail.

WEAKNESSES:

* The specific contribution of the research development to the career benefits is not sufficiently focused on.

* Outreach events are not adequately described, and there is a lack of a clear strategy for communicating the theoretical results to non-specialists.

Overall comments

Not provided

Criterion 3: Implementation

Score: **4.30** (Threshold: 0.00/5.00 , Weight: 20.00%)

Overall coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources

Appropriateness of the management structures and procedures, including quality management and risk management

Appropriateness of the institutional environment (infrastructure)

Competences, experience and complementarity of the participating organisations and institutional commitment

STRENGTHS:

* The work plan is effective and credible, structured via specific tasks and appropriately detailed work packages, with a natural coherence lent by the scientific focus of the project.

* The evaluation of risks, and measures to respond to these risks, are discussed in some detail, and carry conviction.

* Management structure and procedures are very well described, with arrangements based on the weekly meeting between ER and supervisor, appropriate for such a theoretically based project.

* The host's infrastructure is very good, and at a practical level, the administrative support offered by this experienced institution is all it should be.

* There is a clear and productive complementarity between the ER and the host institution.

* There are opportunities for training in administrative, organisational and teaching matters.

WEAKNESSES:

* The role of the supervisor and other researchers, is not sufficiently discussed in the allocation of tasks.

* More details of the milestones are required and the allocation of resources to tasks is insufficiently justified.

* The mechanisms for quality control are described in insufficient detail.

Overall comments

Not provided

Operational Capacity

Status: **Operational Capacity: Yes**

Not provided

Remarks