

# The European Research Council

## ERC information session

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*Platform Wiskunde Nederland, Centrum Wiskunde & Informatica*



**European Research Council**

Established by the European Commission

# Agenda

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1. ERC programme
2. Data on Dutch projects
3. ERC evaluation process

# The ERC: funding from and for researchers

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## Scientific freedom

- Bottom-up frontier research in all fields of science and humanities (no predetermined subjects)
- Support to the individual scientist (no consortia)
- Scientific excellence is the sole criterion (societal/economic impact not necessary)

## Scientific governance

- Independence: Scientific Council with 22 members with full authority over strategy
- Community engagement: international peer-review (Evaluation Panels and Remote Reviewers)
- ERC Executive Agency employs Officers with research background for admin roles

# The PE1 Team

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2/3 speak Dutch  
(Vlaams)

3/3 love math



# ERC grant schemes

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## **Starting Grant**

2-7 years after PhD

Up to € 1.5 Mio for 5 years



## **Consolidator Grant**

7-12 years after PhD

Up to € 2 Mio for 5 years



## **Advanced Grant**

Significant track-record in the last 10 years

Up to € 2.5 Mio for 5 years



## **Synergy Grant**

2 – 4 Principal Investigators

1 PI can be based outside EU/Associated Countries

Up to € 10.0 Mio for 6 years



## **Proof-of-Concept**

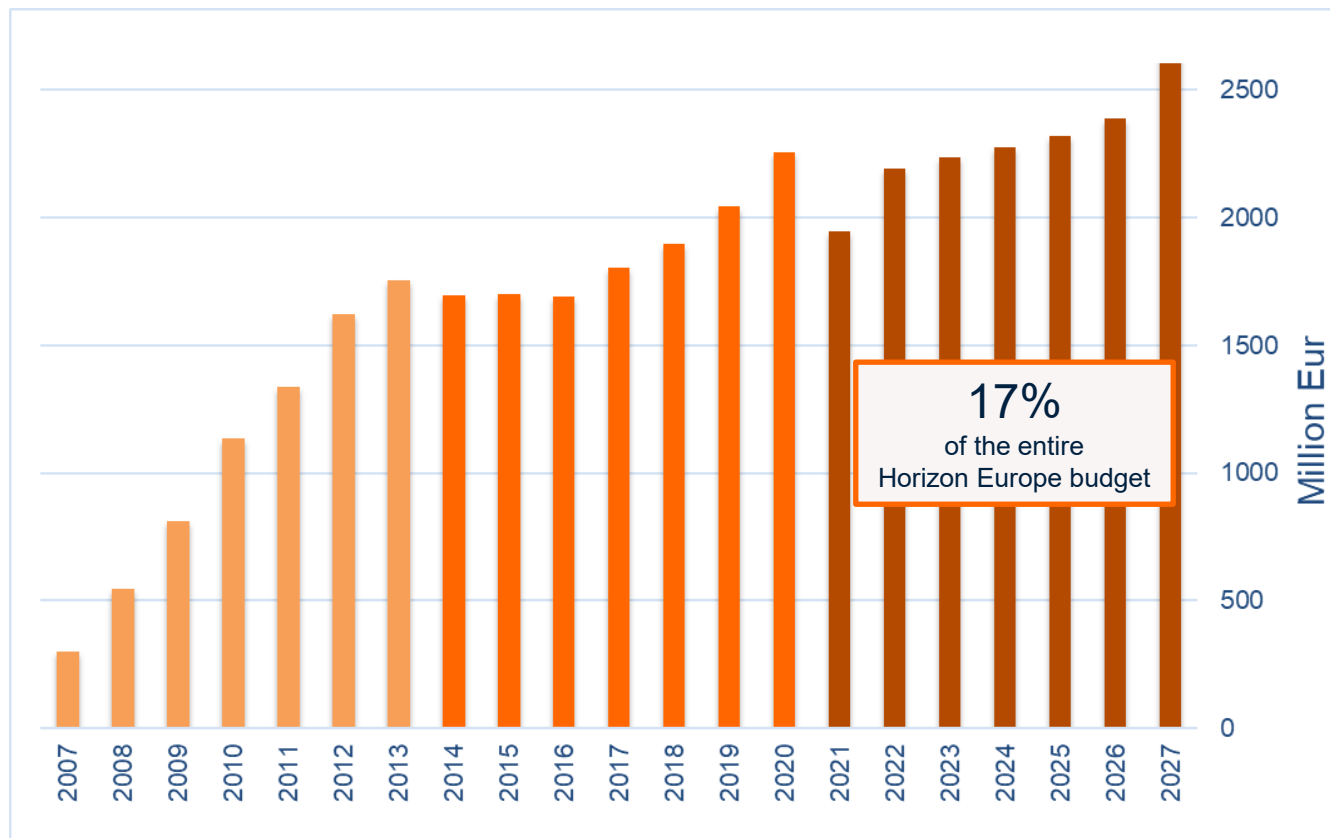
For ERC grant holders

Bridging gap between research - earliest stage of marketable innovation

Lump sum €150,000



# ERC budget 2007 – 2027: EUR 36.5 billion



# ERC in figures



Over **13,000**  
top researchers funded since  
the ERC creation in 2007



Over **90,000**  
researchers and other professionals  
employed in ERC research teams



Over **2,400**  
patents and other IPR applications  
generated by ERC funding



Over **400**  
start-ups identified as founded  
or co-founded by ERC grantees



Over **220,000**  
articles from ERC projects published  
in scientific journals

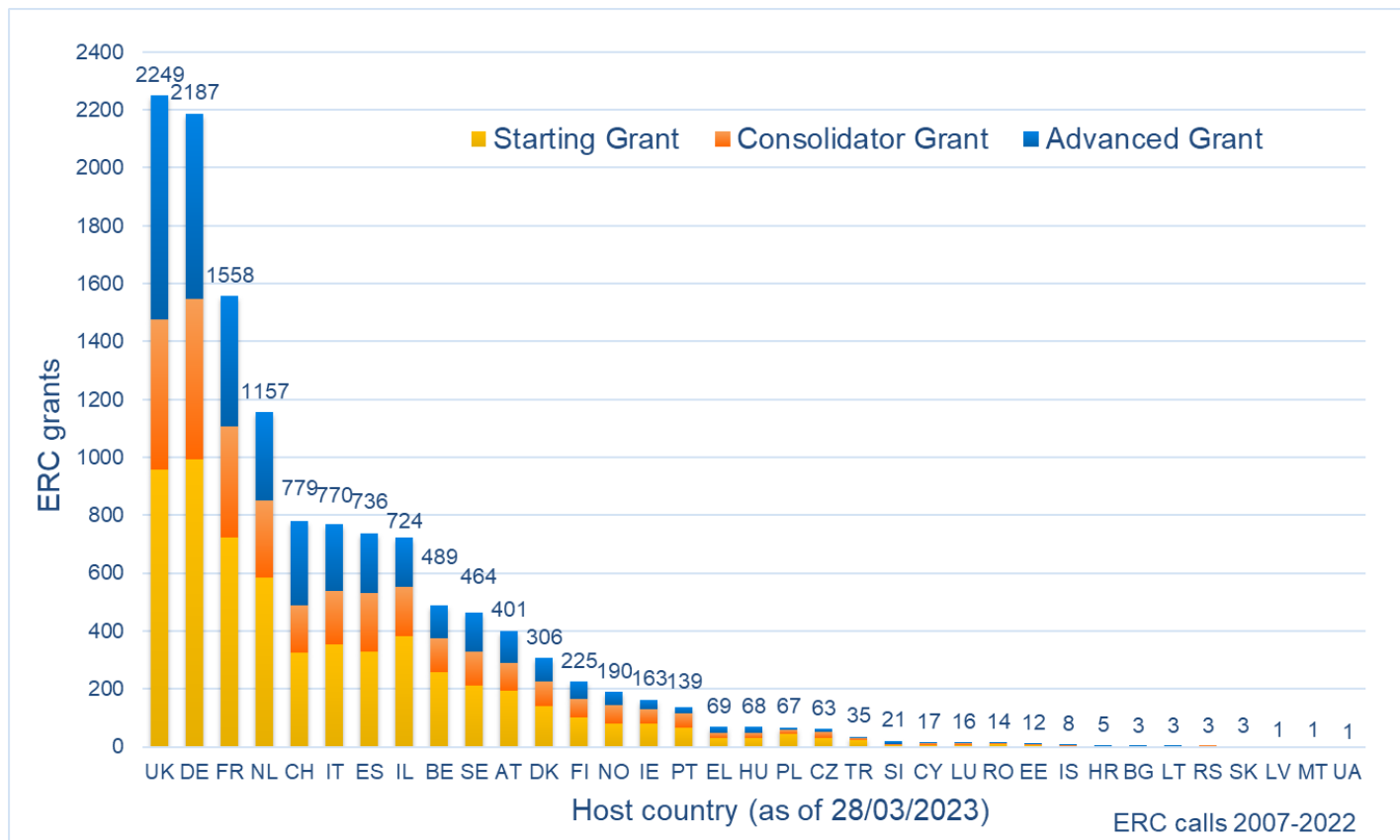
## Fields Medals 2022

- Hugo Duminil-Copin: StG 2017
- James Maynard: StG 2019
- Maryna Viazovska: former Panel Member
- June Huh



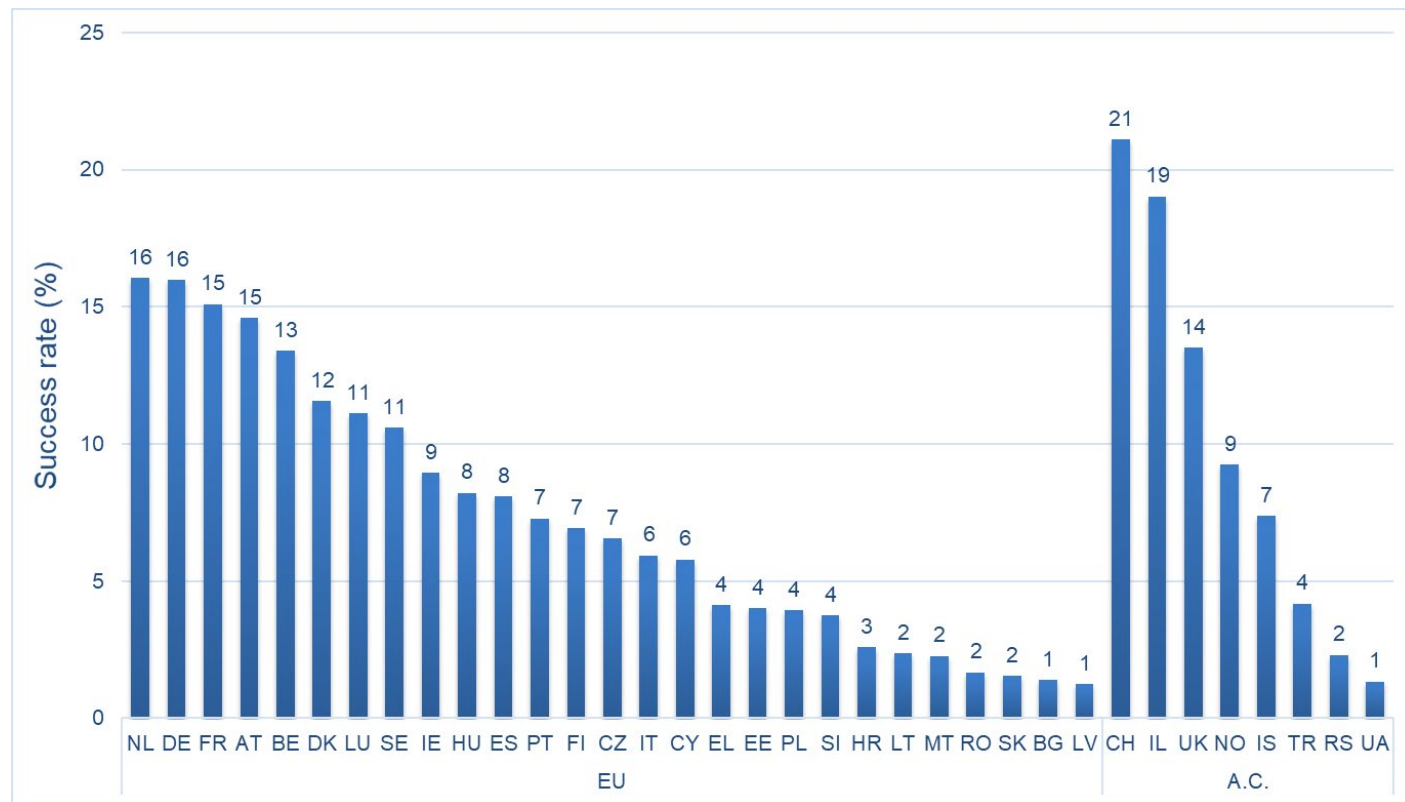
**14** Nobel Prizes, **6** Fields Medals, **11** Wolf Prizes  
and other prizes awarded to ERC grantees

# ERC-funded projects by country of Host Institution





# Success rate by country of Host Institution



Success rate (2007-2022)

# NL PE1 grantees

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Call	PI	Project Title	HI
ERC-2022-COG	MARTIJN KOOL	SURFACES ON FOURFOLDS	UNIVERSITEIT UTRECHT
ERC-2022-STG	STÉPHANIE VAN DER PAS	HIGH-DIMENSIONAL NONPARAMETRIC BAYESIAN CAUSAL INFERENCE	STICHTING VUMC
ERC-2022-STG	JAN VONK	GEODESICS AND GEOMETRIC-ARITHMETIC INTERSECTIONS	UNIVERSITEIT LEIDEN
ERC-2020-STG	GIJS HEUTS	CHROMATIC HOMOTOPY THEORY OF SPACES	UNIVERSITEIT UTRECHT
ERC-2019-COG	LENNY TAELEMAN	ZETA FUNCTIONS AND FOURIER-MUKAI TRANSFORMS	UNIVERSITEIT VAN AMSTERDAM

# Latest news – COG 2023 grantees



PI	Project Title	HI Country
Anselm Johannes SCHMIDT-HIEBER	From A to B: Generalizing the mathematics of artificial neural networks (ANNs) to biological neural networks (BNNs)	NL
Jason MILLER	Analysis in Random Planar Fractals	UK
Filip RINDLER	Concentration Phenomena in Nonlinear PDEs and Elasto-plasticity Theory	UK
Justin SALEZ	Elucidating the cutoff phenomenon	FR
Andrea SEPPI	Geometry and analysis for $(G,X)$ -structures and their deformation spaces	FR
Alberto MASPERO	Generating Unstable Dynamics in dispersive Hamiltonian fluids	IT
Evgeny SHINDER	Motivic invariants and birational geometry of simple normal crossing degenerations	DE
Michael FEISCHL	New Frontiers in Optimal Adaptivity	AT
Eleonora DI NEZZA	SinGular Monge-Ampère equations	FR
Xavier ROS-OTON	Stable solutions and nonstandard diffusions: PDE questions arising in Mathematical Physics	ES



# Evaluation panel structure

## Life Sciences

- LS1 Molecules of Life: Biological Mechanisms, Structures and Functions
- LS2 Integrative Biology: From Genes and Genomes to Systems
- LS3 Cell Biology, Development, Stem Cells and Regeneration
- LS4 Physiology in Health, Disease and Ageing
- LS5 Neuroscience and Disorders of the Nervous System
- LS6 Immunity, Infection and Immunotherapy
- LS7 Prevention, Diagnosis and Treatment of Human Diseases
- LS8 B
- LS9 B

**PE1 scope:** All areas of mathematics, pure and applied, plus mathematical foundations of computer science, mathematical physics and statistics

## Physical Sciences & Engineering

- **PE1 Mathematics**
- PE2 Fundamental Constituents of Matter
- PE3 Condensed Matter Physics
- PE4 Physical and Analytical Chemical Sciences
- PE5 Synthetic Chemistry and Materials
- PE6 Computer Science and Informatics
- PE7 Systems and Communication Engineering
- PE8 Products and Processes Engineering
- PE9 Universe Sciences
- PE10 Earth System Science
- PE11 Materials Engineering

## Social Sciences and Humanities

- SH1 Individuals, Markets and Organisations
- SH2 Institutions, Governance and Legal Systems
- SH3 The Social World and Its Interactions
- SH7 Human Mobility, Environment, and Space
- SH8 Studies of Cultures and Arts



# PE1 Mathematics descriptors

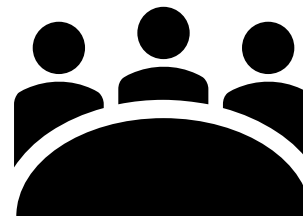
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PE1_1	Logic and foundations	PE1_12	Mathematical physics
PE1_2	Algebra	PE1_13	Probability
PE1_3	Number theory	PE1_14	Mathematical statistics
PE1_4	Algebraic and complex geometry	PE1_15	Generic statistical methodology and modelling
PE1_5	Lie groups, Lie algebras	PE1_16	Discrete mathematics and combinatorics
PE1_6	Geometry and global analysis	PE1_17	Mathematical aspects of computer science
PE1_7	Topology	PE1_18	Numerical analysis
PE1_8	Analysis	PE1_19	Scientific computing and data processing
PE1_9	Operator algebras and functional analysis	PE1_20	Control theory, optimisation and operational research
PE1_10	ODE and dynamical systems	PE1_21	Application of mathematics in sciences
PE1_11	Theoretical aspects of partial differential equations	PE1_22	Application of mathematics in industry and society

# Evaluation panel composition

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- Nomination: responsibility of the Scientific Council
- Well before submission deadline
- Typically 14 – 16 Panel Members
- Aim: maximize expertise coverage
- Constraints to ensure diversity
- Panel Members from other calls and years can support if needed



# Excellence

is the sole evaluation criterion

### Excellence of the Research Project

- Ground-breaking nature
- Ambition
- Feasibility of the research project

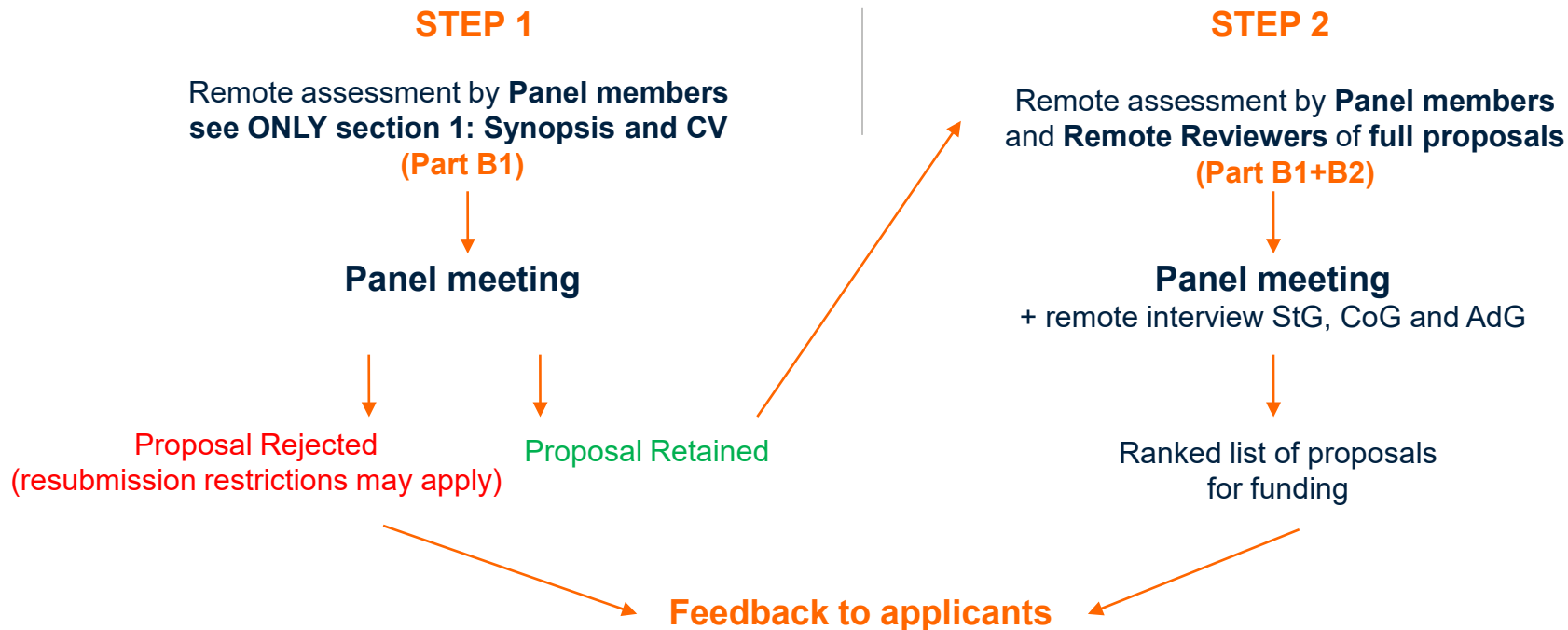
### Excellence of the Principal Investigator

- Intellectual capacity
- Creativity
- Commitment

with a focus on the extent to which the PI has the required scientific expertise and capacity to successfully execute the project

# Evaluation process

For individuals calls: a single submission but a two-step evaluation



*Difference for Synergy Grants: three steps and interview in person*



# Examples of applied mathematics beyond PE1

**Panel: StG 2021 PE7**

**Title:** Higher-Order Hodge Laplacians for Processing of multi-way Signals

**Panel: CoG 2020 PE8**

**Title:** Mathematical and Numerical Modelling of Process-Structure Interaction in Fractured Geothermal Systems

**Panel: StG 2021 PE11**

**Title:** Beyond Representative Volume Elements for Random Heterogeneous Materials

**Panel: AdG 2016 PE6**

**Title:** Large-Scale Formal Proof for the Working Mathematician

**Panel: AdG 2021 PE1**

**Title:** Stochastic dynamics of sINgle cells: Growth, Emergence and Resistance

**Panel: PoC 2022 (from a CoG PE1)**

**Title:** Advanced Reduced order modellinG: Online computational web server for complex parametric Systems

**Panel: SyG 2019**

**Title:** Stochastic Transport in Upper Ocean Dynamics

# ...where is the boundary?

## Panel: CoG 2021 PE2

**Title:** Loop Corrections from the Theory of Motives

**Descriptor:** PE1\_12 Mathematical physics

## Panel: AdG 2018 PE3

**Title:** Non-Markovian Memory-Based Modelling of Near- and Far-From-Equilibrium Dynamical Systems

**Descriptor:** PE1\_19 Scientific computing and data processing

## Panel: StG 2021 SH4

**Title:** A New Bayesian Foundation for Psychometric Network Modelling

**Descriptor:** PE1\_19 Scientific computing and data processing

## Panel: StG 2020 LS7

**Title:** Directed networks as a novel approach for improving the management of cardiac arrhythmias

**Descriptor:** PE1\_21 Application of mathematics in sciences



# Where can you find more information?

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## Videos - ERC Classes

- What to consider before applying
- How to fill in the application
- The interview
- How the evaluation works

## ERC Research Information System (ERIS)

- App for exploration and visualization of ERC projects and their outputs

# Thank You!

More information: [erc.europa.eu](https://erc.europa.eu)



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