MINISTRY OF EDUCATION, RESEARCH, DEVELOPMENT AND YOUTH OF THE SLOVAK REPUBLIC

VER 2026

Periodic Assessment of Research, Development, Artistic and Other Creative Activities VER 2026

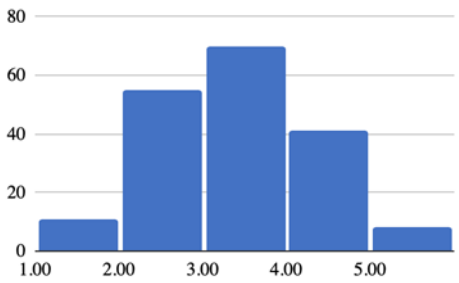
Final Report of the Mathematics Sub-panel

Summary

This report provides an area-level assessment of the quality of science and research in Mathematics, including social impact cases and the overall creative environment, based on the evidence submitted for VER2026. The intention is to comment on the quality profile of the research area, identify recurrent strengths and weaknesses, and provide recommendations that can be acted upon by submitting institutions and by the system.

Overall quality of research outputs. The sub-panel assessed 185 research outputs with a single final consensus rating per output, on a 1–5 scale where 1 = world-leading, 2 = internationally excellent, 3 = internationally recognised, 4 = nationally recognised, and 5 = below the standard of nationally recognised work. The distribution of final ratings is:

- 1: 11 outputs (5.95%)
- 2: 55 outputs (29.73%)
- 3: 70 outputs (37.84%)
- 4: 41 outputs (22.16%)
- 5: 8 outputs (4.32%)



The overall mean final score is 2.892, which indicates that the portfolio is dominated by outputs at internationally excellent and internationally recognised quality (levels 2–3), with

a smaller but visible share of world-leading work (level 1), and a minority of outputs that are primarily nationally recognised or below that standard (levels 4–5). The principal opportunity for improvement is to increase the share of outputs at levels 1–2 through more selective portfolio composition and clearer international positioning, while reducing the inclusion of outputs that do not exceed the nationally recognised threshold.

Social impact and creative environment. Social impact cases and creative environment narratives show a generally adequate level of maturity, but with recurring needs for greater clarity and stronger evidence, particularly where claims extend beyond local or anecdotal effects. In the creative environment dimension, collaboration strategy and its demonstrable contribution emerge as a common area for improvement, alongside more explicit links between strategic profiling, staffing, and sustainability.

General considerations. Across the evaluation, the sub-panel observed a solid tradition of technically strong mathematical work supported by dedicated groups and individuals, often with deep expertise in well-established areas. This provides a stable core of competence and continuity within the Slovak mathematical community. The most urgent improvement lever concerns international positioning and strategic focus. A larger share of research activity would benefit from stronger engagement with the international research frontier, clearer articulation of the broader significance of problems studied, and greater participation in emerging or rapidly developing areas of mathematics and its applications. Strengthening international collaboration networks, improving selectivity in research outputs, and aligning institutional strategies with areas where global visibility and funding opportunities are growing would likely have a significant positive impact.

1. Quality of science and research outputs

The final consensus ratings of 185 research outputs display a strong concentration in the middle bands: 67.6% of outputs are rated 2–3, while 26.5% are rated 4–5, and 6.0% are rated 1. In the sub-panel's view, this indicates a research ecosystem with a substantial "core" of credible, technically sound mathematics, but where world-leading contributions are comparatively sparse and where a significant minority of outputs would benefit from stronger international positioning, clearer novelty claims, or higher selectivity at submission stage.

The distribution also suggests that differences across institutions are driven not only by absolute research strength, but often by portfolio composition: in some cases, excellent work coexists with outputs that appear incremental or primarily local in reach. A more disciplined selection strategy would likely improve the representativeness of institutional profiles.

What characterises the strongest outputs (scores 1–2)

Across the submissions, outputs rated 1–2 most often show clear novelty and a conceptual step forward, with a main theorem, result, or method that advances a well-defined research line, resolves a meaningful open problem, or introduces a technique with transfer potential. They combine technical depth with disciplined exposition, so that the rigorous argument is presented in a way that is legible to the intended community. They situate the work relative to the international state of the art, with explicit benchmarking and clear engagement with closely related literature. Finally, they tend to be coherent with the institution's research profiling, clustering around identifiable groups or longer-term trajectories rather than appearing as isolated peaks.

In terms of subject areas, the strongest outputs frequently appeared in fields where Slovak groups maintain active international collaborations and where research questions are

clearly connected to broader developments in mathematics or related disciplines. These include areas of mathematical physics, selected parts of analysis, and data-driven or modelling-oriented mathematics. In these cases, the work was typically embedded in an identifiable international research conversation and addressed questions of clear relevance to the development of the field.

Recurring weaknesses in lower-rated outputs (scores 4–5)

Outputs rated 4–5 are typically incremental, with limited conceptual advance or a scope that remains narrow relative to the existing literature. Several outputs address highly specialized technical questions whose interest appears largely internal to the specific framework considered. They are often weakly positioned, with an insufficient articulation of why the problem matters, unclear comparison to related work, or limited engagement with the international research conversation. The results are often relatively straightforward once the setup is introduced, and the contribution can appear closer to a technical exercise than to a development that advances the field. In several cases, dissemination choices and presentation reduce visibility and reach, so the output reads more like routine production than frontier research. A further recurring issue is ambiguity about the mathematical contribution, especially for interdisciplinary items where mathematics is present but not central or not made explicit.

Some weaker outputs also appear to remain largely within highly specialized niches or traditional lines of work without clearly connecting to current developments in neighbouring areas of mathematics or to emerging interdisciplinary directions. In a number of cases, results were presented in isolation from the broader conceptual or methodological context of the field, which reduced the perceived significance of the contribution even when the technical work itself was correct.

Recommendations on research-output strategy

Institutions should treat the 25-output cap as an opportunity to present their strongest profile, ensuring that the full portfolio is consistently positioned at international standards; where the submission approaches the maximum, selectivity should still be used to avoid including outputs that dilute the overall quality signal. Outputs should be positioned explicitly in the narrative, with brief context that states the novelty, benchmarks against international standards, and explains why the contribution matters within its subfield. Portfolios should also be coherent, aligned with a small number of strategic research themes where the institution can plausibly compete internationally, rather than spanning many unrelated lines. At system level, brief guidance should encourage coherence and selectivity, and discourage mixing genuinely top-level outputs with weakly positioned ones when the goal is to communicate a clear institutional research profile. Institutions should ensure that each selected item represents a clear and identifiable intellectual contribution, rather than routine extensions.

Institutions may also wish to encourage publication strategies that consolidate related incremental results into more substantial contributions that clearly articulate the broader significance of the work. Stronger engagement with international collaborations and with emerging thematic areas in mathematics and its applications would likely enhance both visibility and competitiveness in international funding schemes.

2. Social impact cases

The sub-panel assessed 9 social impact cases using the four required dimensions (1 = strongest; 5 = weakest). The overall mean score (average of the four digits per case, then averaged across cases) is 2.56. Dimension means (in prescribed order) are [2.56, 2.56, 2.44, 2.67] for: (1) application potential, (2) degree of impact, (3) link underpinning→impact, (4)

quality of evidence. Overall, narratives and causal links are often plausible (dimension 3 is strongest on average), while evidence quality is the main limiting factor (dimension 4 weakest).

Practical recommendations

A practical approach is to build the evidence pack first, using independent letters, policy or industry documents, and usage or adoption metrics, and only then write the narrative around it. Each key claim should be supported by independent corroboration, ideally a third-party confirmation tied to a specific, dated outcome. Cases should include simple quantification where feasible, such as reach, adoption, duration, or before-and-after indicators. The causal chain should be made explicit, from underpinning research to mechanism, adoption, and outcomes, with evidence attached to each step.

In addition, institutions may benefit from identifying potential impact pathways earlier in the research cycle and maintaining systematic records of engagement activities, partnerships, and downstream applications. Even where impacts remain primarily regional, clearer documentation of the mechanisms through which research influenced practice, policy, or technology would significantly strengthen the credibility of the impact narratives.

3. Creative environment

The sub-panel assessed 8 creative environment statements across four dimensions. The overall mean is 2.63, with dimension means [2.63, 2.75, 2.50, 2.63] for: (1) strategic direction/profiling, (2) staffing conditions, (3) collaborations and contribution, (4) overall sustainability. The most common weakness is staffing/pipeline clarity; collaborations are often present but under-documented in terms of concrete outputs and added value.

Practical recommendations

Creative environment narratives should focus on a small number of priorities, each with a clear two to three year milestone plan, responsible groups, and target communities. They should include a staffing and pipeline map that explains how permanent staff, postdocs, and PhD students fit together, together with recruitment priorities, succession planning, and how workload balance is managed. For each major collaboration, institutions should report concrete outputs such as joint papers, grants, mobility, co-supervision, events, or tools, and they should state explicitly what the collaboration enables that could not be achieved alone. Submissions should also add a short sustainability dashboard with a few performance indicators, key risks, and mitigation actions. Finally, the creative environment narrative should be aligned with the submitted output portfolio, explaining why the environment produces the strongest outputs and how it will sustain that performance.

Particular attention should be given to demonstrating how international collaboration contributes to research development and career progression for early-career researchers. Clear mechanisms for integrating PhD students and postdoctoral researchers into international networks, joint projects, and collaborative publications would strengthen both the research environment and the long-term sustainability of the system.

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