



MatRIC Centre for Research,
Innovation and Coordination
of Mathematics Teaching

Action plan for a second phase of Centre funding 2019-2023.

(Note: Figures are included in the appendix)

Abbreviations

Many of the abbreviations used in this action plan are acronyms of Norwegian titles, the English titles are listed below and often bear little if any relationship to the acronym.

CoP	Community of Practice
CPT	Community of Practice Theory
HE	Higher Education
HEI	Higher Education Institution
INDRUM	International Network for Didactics Research in University Mathematics
KD	Ministry of Education
KHDM	Centre for Higher Mathematics Education (Universities of Hannover, Kassel & Paderborn).
M	Mathematician, mathematics researcher
ME	Mathematics Education
MER	Mathematics Education Researchers
MNT	equivalent of STEM, Science, Technology, Engineering and Mathematics.
MT	Mathematics Teacher
NFR	Research Council of Norway
NMR	Norwegian Mathematics Council
NOKUT	Norwegian Agency for Quality Assurance in Education
NSMO	National Centre for Mathematics Education
NTNU	Norwegian University of Science and Technology
PIC-math	Preparation for Industrial Careers in Mathematics
PULS	Centre for Educational Development (UiA)
RAISE	Researching, Advancing and Inspiring Student Engagement - Network
R&D	Research and Development
RUME	Special Interest Group of the MAA on Research in Undergraduate Mathematics Education
SFU	Centre for Excellence in Education
ISISP	International Summer Institute on Students as Partners in Learning and Teaching
STA	Student Teaching Assistant
UHR	Norwegian Association of Higher Education Institutions
UD	Norwegian Directorate for Education and Training
UiA	University of Agder

1. Introduction

This action plan is the outcome of meetings involving a comprehensive range of stakeholder representatives at institutional, national and international levels. Discussions have focused on the challenges and suggestions articulated in the “SFU Interim Evaluation, Report following site visit.” The plan builds on MatRIC’s achievements gained over the initial three and a half years of activity. This document sets out to communicate: MatRIC’s vision; focus and connectedness in MatRIC’s goals and strategy; security of leadership; and MatRIC’s strategic role within the University of Agder (UiA), national and international educational contexts.

2. MatRIC’s Vision

Students’ experiences of learning mathematics are central in MatRIC’s vision. Figure 1 (see appendix) illustrates MatRIC’s focus. Performance in mathematics in higher education continues to be a cause of national concern. Securing durable improvements in educational provision is a multi-layered task including the teaching and the contexts and systems in which learning is intended. Thus, MatRIC has a role in challenging teachers and supporting change in teaching, curriculum implementations and structures. However, such change takes time, and in the present MatRIC is aware of the on-going needs of students, we therefore have a concurrent role to demonstrate how the difficulties students experience today can be ameliorated through learning support. This dual role, amelioration in the present and challenge to change for a better future is worked into a single theoretically coherent vision. MatRIC is a resource, a change agent, a competence broker, a provocateur for action, and a provider of evidence based knowledge.

MatRIC’s vision is therefore: *Students enjoying transformed and improved learning experiences of mathematics in higher education.*

The characterisation ‘*transformed and improved learning experiences*’ entails:

- Students as partners in teaching, learning and assessment.
- Research and development based (informed and enriched) education.
- Appropriate and timely learning support, and opportunities for constructive feedback about performance and the development of mathematical competencies.
- Teaching that ignites interest and enthusiasm for mathematics.
- Teaching that exposes the relevance and value of the mathematics learned in whatever discipline it is studied thereby motivating engagement in learning.
- Varied approaches to teaching, learning and assessment and accommodation to learners’ individual needs and learning styles.
- Effective use of technology and other resources for learning and teaching.
- Courses integrated within the programmes of study to which they contribute.
- Courses designed to accommodate variation amongst learners, such as the prior knowledge they bring to their studies.
- Structures that enable efficient and effective learning opportunities.

MatRIC is committed to working towards this vision within UiA with Norwegian mathematics teachers (MTs) and higher education institutions (HEIs), and with international partners.

As a change agent, MatRIC faces challenges in addition to those outlined above. MatRIC has adopted a national role to spread and develop excellence in mathematics teaching across Norwegian HEIs. MatRIC has gained recognition for its national contribution during Phase 1 and will use its position in Phase 2 to influence policy and practice at institutional, programme and course levels. MatRIC’s national actions will motivate, encourage and facilitate collaboration amongst the HE mathematics teaching and MER communities, and bind these into an authoritative and respected body of recognised expertise in mathematics education. MatRIC can call upon experience of mathematics teaching development at school level, but because of the added complexity of mathematics education at higher education it is not a simple matter of transferring knowledge from one arena (school level) to another arena (higher education). MatRIC is at the cutting edge of knowledge creation in the field, and within Norway MatRIC is opening up and leading a new field of inquiry: mathematics teaching development at higher education.

3. Operationalisation

MatRIC is operationalised within community of practice theory (CPT) in which the operative terms are: *enterprise, engagement, repertoire, participation, belonging and identity*. To accommodate the developmental purpose of MatRIC, CPT is expanded to include individual's agency to change practice, and here the operant terms are *critical alignment* and *systematic inquiry (research)*. MatRIC enters an arena comprising three intersecting practices: students' practice, teachers' practice and mathematics education researchers' (MERs) practice. MatRIC acts as a broker between these three practices. MatRIC's vision entails on the one hand supporting students to move along a trajectory from being peripheral participants (as receivers) to full active contributing participants and agents in their HE, and on the other hand, MatRIC is an agent of change and transformation, uniting the separate practices by promoting students as co-creators of knowledge and co-producers of education, and innovative R&D based education.

The intended outcomes expected to arise from MatRIC's actions will be measured in terms of: (1) students' satisfaction and self-reports of their engagement with the educational and knowledge creation processes; (2) teachers' participation in MatRIC actions (events, small research grants, teaching development trials, innovative teaching) and networks, and changing their practice as a result of engaging with MatRIC; (3) production, dissemination and influence of reports arising from research and development activity promoted and facilitated by MatRIC; in CPT terms these will constitute a *reification* of MatRIC as broker and agent of change.

3.1. MatRIC's Objectives as broker and agent.

Sustained and meaningful transformation of students' learning experiences requires working with students directly, working with teachers, HEI leaders and policy makers, and engaging in research that informs, enriches and explores the learning-teaching dyad. Working towards MatRIC's stated vision therefore entails **three primary objectives** (see Figure 3): (1) Improvement of students' learning experiences; (2) Improvement of teaching; (3) Development and application of research into learning and teaching mathematics at university. Because of the complexity of HE mathematics education it is useful to identify **three secondary objectives** that relate to *participation* and *partnership*: (a) didactical development of student teaching assistants (STAs); (b) development of students as partners in learning, teaching and assessment; (c) development of active learning approaches and developing innovative approaches for teaching and assessment. Teaching and learning do not take place in a vacuum; the nested context of courses, programmes, institutions and national frameworks for mathematics education introduce affordances, constraints and goals for teaching mathematics. Substantial and sustainable transformation of teaching and learning entails changes within the context of teaching and learning. At this level, MatRIC can influence policy and practice; thus, in Phase 2, MatRIC will have **two tertiary objectives** (i) to influence course content and structure and (ii) to influence programme design and implementation. Figure 4 illustrates how these eight objectives are interconnected.

These eight objectives exist in a dynamic, organic and mutually interacting complex to facilitate participation in learning, teaching and research, and to effect changes within the practice of teaching and learning mathematics in HE. Actions directed towards one objective may have some impact on students' learning; substantial and sustained impact entails cultural development as the outcome of changes in all objectives. Unfortunately, the sequential (and simplistic) presentation of objectives and actions below does not fully capture the complexity of educational development undertaken by MatRIC.

4. Actions directed at MatRIC's objectives

Within this section attention is focused particularly on MatRIC's contribution to mathematics education. MatRIC has a more general impact locally within UiA, nationally and internationally. Especially within UiA MatRIC is one of several instruments of change applied to achieve UiA's strategy. MatRIC's more general contributions are considered in Section 5, 'Arenas of influence'.

4.1. Primary Objective 1: Transforming students learning experiences.

The intention is that students enjoy mathematics and are motivated to engage with the challenges of mathematics. They should feel themselves supported throughout their studies without lowering the cognitive demand to the extent that it interferes with their learning. The intention is that all students feel fully engaged as active learners and partners in learning, teaching and assessment.

Many students struggle with mathematics. In those programmes in which mathematics is learned as a 'service subject', for many students, performance in mathematics lies at the root of disappointing grades, failure, poor progression, and drop-out. There are many reasons underlying students' unhappy experiences with learning mathematics at university; these reasons do not occur singularly in discrete circumstances but as a complex dynamic that impacts on students' psychological, emotional, and social lives.

Students arrive at university unprepared for studying at this level. Many lack the required prior knowledge, many have not developed appropriate study skills, many have not developed the necessary competencies for independent mathematical thinking. The immediate impact can be to create an emotional burden that resists taking advantage of all the learning opportunities presented. In CPT terms, students need to be supported through an inward trajectory of participation to become full participants in their HE.

MatRIC's actions directed at students' learning to address issues of participation

4.1.1 MatRIC TV. *Goal:* to support students' transition from school to HE mathematics.

Intended outcome: Students better prepared to engage with HE mathematics content.

4.1.2 Drop-in support. *Goal:* to provide one-one tutorial support for students struggling with mathematics.

Intended outcomes: Students feel more secure when challenged by mathematics and are ready to engage with challenges because of the existence of learning support.

4.1.3 Open lecture. *Goal:* to present a 'popular' and accessible image of mathematics and studying mathematics.

Intended outcome: Students more motivated to engage with mathematics.

4.1.4 Mathematics study skills course. *Goals:* to motivate students' engagement in mathematics and to develop the study and thinking skills needed when studying university mathematics.

Intended outcome: Students as more effective and efficient learners of mathematics.

Practically, Target for these actions are UiA students, especially 1st year. The challenge is in making the actions known and getting students to engage. The above actions are advertised on screens in places where students gather, flyers, and announcements in classes will be used. Boxes for depositing compulsory assignments located in the Drop-in draw students to the location, 'coffee & cake' open days, and further efforts to engage with the student body and attract them to make use of the resources provided are used. MatRIC student interns (see 4.1.6 & 4.5.1) are contributing with developing on-line mathematics skills inventories, teaching and learning resources, and evaluation surveys. Actions are financed by UiA funding.

MatRIC's actions directed at involving students to improve educational provision

4.1.5 Student Teaching Assistant (STA) development. *Goal:* to improve the didactical and pedagogical competencies of mathematics STAs.

Intended outcomes: Students experience higher levels of satisfaction, enjoyment and personal achievement in their mathematics studies.

4.1.6. Student internships. *Goal:* To develop resources that will stimulate change in teaching and learning.

Intended outcomes: Resources that are of value in R&D based, innovative, active learning approaches.

Practically, STAs recruited from high performing advanced undergraduate and masters students through e-mail distributed by Examinations Office (confidentiality restricts sharing information and MatRIC making direct contact). Actions (see 4.5) carried out by UiA staff – MTs, MERs, PULS staff. Financed by UiA funding.

The evaluation of this objective will be through students' self-reports aligned with 'Studiebarometeret' administered by NOKUT. MatRIC, supported, by interns, is devising on-line instruments that can be incorporated into routine student evaluations of their courses to reach into the micro level that provides

insights into students' experiences in individual courses. The assumption is that students supported and engaged as outlined above will enjoy higher performance, improved progression and be at less risk of failure and drop-out. MatRIC can seek funds from NFR to undertake the large-scale study that could test this assumption, but evaluation at this level is beyond the resources available to MatRIC.

Further actions to improve students' teaching and learning focus more directly on the secondary objectives; the intentions are to promote students as partners in learning, active learning approaches, innovation in teaching, and R&D based education. These are set out below (sections 4.4-6).

4.2 Primary Objective 2: Transforming mathematics teaching.

The overall intention of this objective is to build up the community of practice in mathematics education that MatRIC is energising in Phase 1. MatRIC's will continue to facilitate further exchange of experience, expertise and good practice between mathematics teachers within Norwegian HEIs, and connect these with international exemplars of best practice in teaching and learning mathematics. Specific objectives in the development of practice are the inclusion of research and development within regular teaching, and the comprehensive inclusion of students as partners in the educational process. MatRIC's actions contribute to UiA's strategy to give credit for teaching quality. MatRIC will support with competence, experience and resources the teachers seeking recognition for teaching quality.

4.2.1. Innovation networks (national & international). *Goal:* To develop a Norwegian expert group and facilitate exchange of ideas, resources and experiences of good, innovative, R&D based practice.

Intended outcome: A sustainable critical mass of networked HE MTs that stands as a pool of expertise in innovative mathematics teaching.

4.2.2. Programme networks. *Goal:* To develop Norwegian expert groups and facilitate exchange of programme specific innovation and good practice in mathematics teaching.

Intended outcome: A sustainable critical mass of networked HE MTs that is competent to contribute authoritatively to the development of courses, programmes and curriculums.

4.2.3. Mathematics teaching Induction course. *Goals:* To improve the quality of teaching of recently appointed HE mathematics teachers, to stimulate interest and inquiry in teaching HE mathematics, to raise the status of teaching HE mathematics, to contribute to community building as new participants join the enterprise of HE mathematics teaching.

Intended outcomes: MTs with basic didactical competencies that will support continued professional development, a prototype for subject specific didactical provision for HE teachers that will contribute to the Norwegian effort to give accreditation for good teaching in HE.

4.2.4. Mathematics lunches. *Goal:* to facilitate a discourse about teaching and learning mathematics.

Intended outcome: MTs meeting regularly to discuss issues about teaching and learning mathematics.

Practically, Actions 4.2.1-4.2.3 target all Norwegian HE mathematics teachers. Networks are facilitated and nourished by workshops, seminars conferences etc. The challenge to broaden participation is shared by MatRIC's dissemination media, Ambassadors and local coordinators (see below Section 4.7). Another challenge is to establish programme networks, this will be achieved through targeted events with international leaders and recruitment to serve on programme specific expert panels (see 4.3.5). Actions will be financed jointly from UiA and SFU funding; 4.2.4 from UiA funding.

The evaluation of this objective will be through basic metrics of participation and reach into institutions, faculties and departments. Also sought will be case studies from teachers such as were used to illustrate the self-evaluation document. Within UiA, it is possible to connect students' course evaluations with teaching innovation. Although desirable, systematic observation of teaching by researchers, operationalisation of practices and the correlation of practice with students' learning would be extremely expensive to implement and well beyond the resources of MatRIC.

4.3 Primary Objective 3: Research

4.3.1. Research seminars and workshops. *Goals.* To support the MatRIC research group at UiA including one post-doctoral and 6 PhD fellows, to support, encourage and develop a Norwegian community of

researchers of university mathematics education.

Intended outcomes: (a) Literature reviews that inform other MatRIC objectives and actions; (b) high quality research, reported in international journals, conferences and research monographs contributing to knowledge about teaching and learning mathematics at HE; (c) evidence for 'MatRIC white papers' (see 4.3.5); A nationally connected community of researchers that is well-connected to the international network of researchers of university mathematics education (INDRUM, RUME, sigma, KHDM).

4.3.2. Small R&D grants. *Goal:* To stimulate MTs to engage in R&D projects that focus on MatRIC's vision within their own teaching.

Intended outcomes: Reports with empirical evidence from innovative teaching, R&D based teaching, active learning, etc. Systematic reflective inquiry into practice becomes a norm for HE MTs.

4.3.3. International engagement and networking. *Goals:* To lift Norwegian research in university ME to international levels of excellence, to contribute to the creation of knowledge internationally.

Intended outcomes: Scientific papers and reports in international journals and conferences. International exchange of researchers.

4.3.4. Systematic inquiry into MatRIC's actions. *Goals:* To ensure innovation promoted by MatRIC is research based, informed by scientific evidence and systematically evaluated.

Intended outcomes: Evidence based reports exposing students' learning experiences and outcomes from innovative teaching and learning as well as MTs regular practices.

4.3.5. White papers. *Goals:* to inform and influence policy and practice especially relating to the provision of mathematics as a service subject in Norwegian HEIs.

Intended outcomes: Evidence based reports from recognised expert groups of national repute.

Practically, 4.3.1 is led by MatRIC's research coordinator, who also acts as scientific adviser for 4.3.2-4.3.4. A small working group will be established to plan the implementation of 4.3.5. The target group for support is the whole community of Norwegian HE mathematics teachers, MERs focusing on university mathematics teaching, and students. Actions will be financed jointly by UiA and SFU funding.

The evaluation of this objective will be based on the production, quality and quantity of published reports. MatRIC's dissemination of research, opinion, and argument based on authoritative, informed and respected expert groups of practitioners (Ms, MTs, MERs & students) that MatRIC establishes and facilitates will influence educational leaders to reflect critically on the issues that make transition to HE and students' effective learning problematic.

4.4. Secondary Objective (a) didactical development of student teaching assistants (STAs);

4.4.1. Summer training camp. *Goals:* To develop STA's competencies in mathematics didactics, to build the team of STAs that will strengthen their resolve to provide high quality teaching and learning support.

Intended outcomes: Students experiencing teaching and learning approaches of consistently high quality.

4.4.2. Regular mentoring of STAs. *Goals:* To strengthen STA's competencies through on-going support, to engage teachers effectively in those parts of course provision devolved to STAs.

Intended outcomes: Teachers recognition of the value of STA's contribution, teachers responsive to experiences of STA's meetings with students, students experiencing teaching and learning approaches of consistently high quality.

Practically, recruitment of STAs and implementation of actions is outlined briefly in sections 4.1.5 & 4.1.6. Actions will be financed from UiA funding.

The evaluation of this objective will be through STA's reports and the course evaluations that students regularly provide. This will feature in the enhanced evaluation described above (4.1.5, 4.1.6).

4.5. Secondary Objective (b) development of students as partners in learning, teaching and assessment;

4.5.1. Internships. *Goal:* To demonstrate the potential of students as contributors to their education.

Intended outcomes: Teachers are more aware of students as producers of knowledge and resources, students experience greater involvement in their studies.

4.5.2. Student teaching assistants. *Goal:* To strengthen educational partnership between teachers and STAs.

Intended outcomes: Teacher's increasing awareness of the value and effectiveness of student peer mentoring and increasing readiness to explore other areas in which students may share in teaching, learning and assessment more generally.

4.5.3. Engaging with and learning from external networks. *Goal:* to connect with and learn from international experience.

Intended outcome: MTs participating in international groups such as RAISE and ISISP.

Practically, 4.5.1 - following successful experience at UiA, and the example of the **sigma** network in the UK MatRIC can initiate a national competition to fund a small number of internships in other Norwegian HEIs, these internships would need to be focused on MatRIC's vision. 4.5.2 (see 4.1.6). 4.5.3 leading and encouraging participation in the international events and inviting leaders from RAISE and ISISP to present at MatRIC events will be used to mobilise action. Actions will be financed jointly from UiA and SFU funding.

The evaluation of this objective will be based on separate evaluations of the three disparate actions above. Internships will be evaluated by exploring interns' experiences, and teachers' reactions. STAs will be evaluated as for secondary objective (a). Engagement in external networks will be evaluated by basic metrics of participation, and also on evidence of changes in practice and discourse about teaching, learning and assessment. A good outcome from this action would be several pilot studies in which teachers undertake carefully controlled experiments with students as partners in learning, teaching and assessment.

4.6. Secondary Objective (c) development of active learning approaches, developing innovative approaches for teaching and assessment.

4.6.1. MatRIC R&D grants. *Goal:* To encourage MTs to engage in innovative teaching approaches.

Intended outcome: Partnerships between MTs, MERs and students working on teaching and learning development

4.6.2. Participation in MatRIC innovation networks. *Goal:* To support MTs and student groups on an inward trajectory of participation in MatRIC's CoP focused on transforming and improving students' learning experiences.

Intended outcome: Sharing and replication of innovative teaching between MTs and across HEIs.

Practically, opportunities to participate in these actions are announced through MatRIC's channels of communication, by MatRIC Ambassadors, and local coordinators (see 4.7). MatRIC's Research Coordinator has scientific oversight of the R&D grants, network coordinators will oversee events and actions. Actions financed from SFU funding.

The evaluation will be based on the number of pilot projects developing active learning approaches and the reports arising from these, demand for MatRIC support and participation in MatRIC networks.

4.7. Tertiary Objective (i) to influence course structure and content

MatRIC has an important role in promoting greater variety in teaching and learning, and through MatRIC networks, pointing to experience and competence that can be shared.

4.7.1. White papers (see 4.3.5 above)

4.7.2. Ambassadors. *Goal:* To extend MatRIC's reach and communicate MatRIC's vision, agenda and opportunities for engagement and for MatRIC to learn about innovative practices in other HEIs

Intended outcomes: Presentation of MatRIC within every Norwegian HEI mathematics provider within a 2,5-year period. Increased participation in MatRIC's activity.

4.7.3. Local coordinators. *Goal:* To have a known and relatively stable contact person within each local HE community of MTs.

Intended outcome: Improved communication of MatRIC's activity and increased participation in MatRIC's actions. Improved dissemination of MatRIC's products (reports, and learning resources).

Practically, 4.7.1 will be dependent on setting up expert groups. Ambassadors' visits will be initiated either by requests from the Ambassador or MatRIC leader, or invitation from an HEI – the possibility of such visits will be advertised. Local coordinators will be recruited through existing contacts, events and ambassador visits. Financed from SFU funding.

The evaluation of this objective will be based on evidence of the use and influence of the white papers in discussions about course structure and content. Invitations to MatRIC to contribute to national discussions about policy and curriculum. Also, Ambassadors' success to reach HE Ms and MTs throughout Norway, the attraction of an ever widening and varied participation in MatRIC's actions, the existence of a comprehensive network of local coordinators.

4.8. Tertiary Objective (ii) to influence programme design and implementation.

Research evidence points to the beneficial effects of smaller classes, with mathematics effectively integrated within programmes of study, taught by mathematics specialists, with applications of mathematics to the user programme. This requires partnership between mathematics teachers and academics from the 'host' discipline. Smaller classes improve teacher accessibility, enable better, faster assessment and feedback, active learning approaches, and better opportunities to tailor courses to individual student's needs. However, it is also recognised that there are very strong economic arguments in addition to deeply embedded cultural mathematical practices seeking to preserve the status quo. MatRIC's view will be promoted by sharing examples of better practice in which the improved quality of student performance outweighs the economic argument and reinforces the educational argument.

4.8.1. White papers (see above)

4.8.2. Ambassadors (see above)

4.8.3. Local coordinators (see above)

Practically, MatRIC needs to grab attention of policy makers and leaders. Communication skills will be emphasised when seeking a co-Director (see Section 6). UiA's communication department will assist.

The evaluation of this objective will be similar to 4.7 above.

NB - Not included in the complex of objectives focused on learning, teaching and researching set out above, but nevertheless a crucial objective within MatRIC's operation:

Dissemination – see Self-Evaluation and Annual Report to NOKUT for 2016 (reproduced in the appendix).

5. Relations and arenas of influence

5.1. Local: UiA

MatRIC's actions, intended to transform mathematics education at UiA and nationally, are entirely consistent with UiA's strategy. The areas of MatRIC's objectives and the intersection with the focuses of UiA's strategy are illustrated in figure 2. UiA will strengthen MatRIC's role within the university by using MatRIC's actions as models and prototypes for the broader developments sought within UiA. For example, the support structures and developmental approaches for students (Drop-in, resource development such as MatRIC TV, STA development) are a proving ground providing experience for the proposed teaching and learning development centre. UiA will use MatRIC's actions intended to develop active learning approaches, students as partners in teaching and learning, and R&D based education as models of good practice to drive institutional developments. MatRIC's actions focused towards the transformation of teaching, such as the use of small R&D grants, MatRIC's induction teaching course and focus on innovation in teaching and learning provide mathematics teachers with evidence for seeking accreditation of high quality teaching. UiA will ensure that all teachers are cognizant of the advantages experienced by MTs and offer similar opportunities to teachers in other disciplines. The development of mathematical modelling projects based on the US, PIC Math project will be used by UiA to demonstrate how student experiences within local industries and enterprises can be used to advantage within students' studies as pursued in UiA's strategic focus 'Social involvement and innovation'. MatRIC's international network is presented within the institution as a practical example of UiA's strategic focus 'global mind set'.

5.2. National

The students' transformed learning experiences will arise through transformed participation in the practice of HE mathematics, and transformation of the practice. MatRIC's actions set out to achieve both transformations; students' participation at UiA, and teaching and learning practices within MatRIC's networks provide examples within MatRIC events and publications. MatRIC's intention to be a national agent for the transformation of HE mathematics education can be achieved in concert with other national bodies such as UHR, NMR and collaborating partners NSMO and NTNU. Actions set out above entail participation at a national level and seek to influence policy and practice at a national level (e.g. innovation and programme networks, teaching induction course, research and 'white papers'). Practically this will involve MatRIC Ambassadors, local coordinators, network coordinators and expert groups to promote MatRIC's actions and products, because the actions and products are of high quality and of value as instruments of change sought within an institution. Experience of mathematics teaching development indicates that 'projects' such as MatRIC are more likely to have an effect as an instrument of change fitting another institution's established agenda, rather than as a change agent per se.

5.3. International

MatRIC has developed an international network mainly with the intention of introducing expertise, experience, knowledge and competence to Norwegian HE MTs. MatRIC has also supported an outward flow of knowledge and expertise through international conferences, collaborative projects with institutions in the Czech Republic, and other presentations on 'foreign soil'. MatRIC and the Norwegian HE ME community continue to have much to gain from the inward flow of knowledge, especially as noted in Section 4.5 the development of students as partners in learning. In Phase 2 the intention is to contribute to a greater outward flow of knowledge through international collaborations (e.g. H2020 Erasmus+ and Innovative training networks).

6. Leadership

Changes to MatRIC's Management Board are proposed, to take effect as soon as agreement is given by the Board. The intention is to include a wider representation from UiA as host institution. Changes proposed are to extend student representation to include a member from UiA's Student Association, the Director of UiA's Educational Development and Learning Centre, and the Dean of Teacher Education. Proposals to expand the International Advisory Board to include leaders of two major Norwegian stakeholder organisations will be implemented when the second phase of funding is announced.

Present network coordinators will collaborate and take on a more active operational role, with less dependence on MatRIC's Director. A Co-Director will be appointed to share responsibilities with the present Director and to provide greater management resilience. The appointee will bring complementary competencies with a key responsibility being the development and implementation of a new communications strategy. MatRIC coordinators aligned to educational programmes (economics, engineering, natural sciences, health science, etc) will be sought, from other HEIs as well as UiA.

7. Sustainability

To ensure sustained growth MatRIC will: be relevant to HE MT's practice; organise events and actions that interest HE MTs and attract participation; be experienced as an active partner in the quest for excellent mathematics education. To achieve this, MatRIC will listen to the ME community, learn and adapt as necessary. MatRIC's vision for Phase 2 will be sustained through the development of momentum of a critical mass of HE mathematics teachers who are networked and collaborating in innovation that leads to transformed teaching and learning. Changes that MatRIC promotes and supports across Norway, particularly in terms of course and curriculum design, will demonstrate their effectiveness in improving the student learning experience and thus will become embedded in the fabric of mathematics learning in HE. MatRIC will seek to embed national events within the biennial MNT conference organised by UHR. Local actions in student support, teaching and learning development, and international networking will be sustained through the university's strategy. By the end of Phase 2, MatRIC will have established its place within UiA and become so crucial to the on-going implementation of its strategy Learning and Education for the Future that UiA will ensure that MatRIC activity continues.