

MatRIC Strategy 2016

Following discussions with MatRIC's International Advisory Board at the end of 2015 it is clear that during 2016 we must focus more on the impact MatRIC is having within UiA. This is to be achieved without negative consequences on the effective developments that MatRIC has achieved so far. This document is based on a notion of continuing to build on national and international achievements and emphasizing actions locally within UiA. The strategy for 2016 assumes MatRIC's goals and workplans set out in the proposal documents (e.g. Project Description) and should be read in the context of these.

MatRIC's objectives for 2016

Objective	Benefit to UiA	Indicators of success
Through networking university level mathematics teachers, coordinating research into innovation in teaching and learning, developing resources and dissemination, MatRIC will lead innovation, research and excellence (cf Project Description) in mathematics education in Norwegian universities and university colleges.	UiA benefits from 'owning' this national centre of excellence. UiA mathematics teachers benefit from the knowledge flow within the networks created by MatRIC. Does UiA's leadership believe that MatRIC brings <i>substantive</i> value to the university's national and international profile; that is, apart from the kudos of having one of only four SFUs?	Participation in MatRIC's national events. Collaboration with UHR in video production. Feature in NOKUTs SFU magazine.
To be a local stimulant and resource (change agent) for excellence in mathematics teaching at UiA	MatRIC was awarded the SFU status on the basis of evidence of excellence in mathematics teaching. Is excellence maintained? Is there any sign of improvement (that might be attributed to MatRIC)? What difference is MatRIC making? What is the substantive difference made by MatRIC to the university's educational provision?	MatRIC Drop in How to study lectures Mathematics teachers' lunches – promoting a discussion focusing on teaching. More variation in teaching? Improved resources? Improved student outcomes?
To be a local stimulant and resource (change agent) for raising the quality of teaching and learning across UiA.	MatRIC is UiAs only SFU – it should be a beacon and a pathfinder. Mathematics at UiA has this national "quality stamp" (SFU) – what are the conditions that enabled the MatRIC proposal to succeed? Mathematics is faced with many challenges – taught across both campuses, at least three departments within the faculty, and at least three 'faculties' involved. Many study as a service subject (lack motivation, weak background, very large groups). More students study mathematics than any other subject in the university.	What should be the relation between PULS and MatRIC. How can MatRIC work with other groups, departments and faculties in order to develop recognized excellence in teaching and learning? How does MatRIC fit with UiA's strategy and priorities with regards to professional and academic fields? PULS is an executive change agent. MatRIC should illuminate excellence – and the path to excellence. MatRIC is an exemplar change agent.
To be a node linking the Norwegian university mathematics teaching community with leading international groups.	Develop UiAs international links. UiA is presented as a Norwegian Centre of Excellence internationally – enhancing UiA's profile/image. There are benefits to be gained by	Links with: MEC Loughborough UK KHDM – Hannover & Paderborn Germany INDRUM and ITN group (France, Spain, Germany, Denmark)

	interacting with international leaders and communities.	Brno University of Technology (and two other Czech universities) San Diego State University Arizona State University Mathematical Sciences Research Institute (Berkeley USA)
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This 2016 strategy is based on the following preliminary claims and corresponding data

1. There are indicators that MatRIC is making an impact nationally and internationally.

For example:

- Attendance at MatRIC events – during 2015 these have taken place in Kristiansand, Grimstad, Bergen (HiB), Trondheim (NTNU), Tromsø (UiT). They have attracted participants from all the universities and many university colleges. The feedback elicited by post-event evaluations has been very positive. (A detailed analysis of participation has not been made).
- At the request of UHR MatRIC has been leading a university level mathematics video production group, the videos have been produced at the Grimstad studios and are being published on the MatRIC web site.
- Internationally, as Director of MatRIC (SG) is being invited to participate in major international groups focusing on researching undergraduate mathematics education – Invitation only conferences and workshops, H2020-ITN proposal.

2. There is evidence of MatRIC's actions within the mathematics teaching and learning community at UiA.

For example:

- The development of MatRIC Drop in, support centre providing mathematics help for all students.
- Mathematics lunches.
- MatRIC open lectures.

3. However, there are some significant areas in which, so far, it is possible that MatRIC has not made much impact:

- Within the Department of Mathematical Sciences.
- Within the Faculty of Engineering and Science.
- Within the University as a whole.

- 3a. Some questions that might be asked to expose evidence of impact are listed in box 1.

4. In 2016 MatRIC will consolidate the national and international developments – and develop actions that make an effective contribution to the development of teaching and learning across the university. MatRIC is a *change agent* rather than a *repository* of expertise that might be called on for 'help'. It is a lamp to illuminate good practice where it exists, and a directory for locating expertise and experience in teaching and learning mathematics. It is a network of university level mathematics teachers and a conduit for sharing ideas about practice. It is a resource and stimulant for innovation in teaching and learning mathematics. MatRIC will be a catalyst for improvement and excellence.

What impact is MatRIC making within the Department of Mathematics?

- Since MatRIC was established – has excellence in mathematics teaching been maintained?
- Has MatRIC contributed to any changes (for the better)?
- Is MatRIC seen as a valuable resource?

Same questions as above but change 'Department of Mathematics' to Faculty of Engineering and Science?

- Does MatRIC contribute towards excellence in teaching mathematics?
- Does MatRIC contribute towards excellence in learning mathematics?
- How does MatRIC involve students in MatRICs activities?
- How does MatRIC promote students' participation in teaching and learning?
- How does/could MatRIC contribute to programme design and evaluation?

How visible is MatRIC across the university?

- How does MatRIC contribute to the excellence of education at UiA?

Box 1. Questions that may be posed to expose MatRIC's impact on the Department, Faculty and University.

Implementation plan for 2016

As noted in the introduction, this strategy for 2016 is a response to discussions with members of the IAB that took place towards the end of 2015. Appended at the end of this document are some notes made following those meetings (IAB in Trondheim, subsequent discussion with Duncan Lawson in Hannover. One issue arising from these discussions is that MatRICs leaders and coordinators should take a critical look at all that has been done and consumed our resources (financial, human, time) over the last two years and reach some decisions about what might be discontinued, what needs to be preserved, what needs to be developed, etc. We will do this.

1. Consolidation of MatRIC's national and international actions:

- A reduced external/national programme of events (in comparison with 2015) – probably one seminar, one or two shorter workshops/colloquia and the annual conference.
- Continue to develop the web pages www.matric.no, this is the place where MatRIC is 'visible'.
- Continue to support and develop MatRIC Drop in.
- Continue to develop MatRIC TV based on the existing UHR/MatRIC production group.
- Continue to develop the international network through conferences, visits etc.

2. Priority areas for development (noted in discussions with IAB, NOKUT and others)

- Teacher education
- Student involvement
- Impact within the Department of Mathematical Sciences
- University-wide influence.

Teacher education

Teachers call on a wide knowledge base, for example about curriculum, educational systems, school practices, developmental psychology, pupil and classroom management – and content knowledge and pedagogical content knowledge.

MatRIC's concern is primarily with the development of teacher education students' mathematical knowledge – is their knowledge of mathematics fit for purpose? And to a lesser degree their pedagogical content knowledge for teaching mathematics – can they present and communicate mathematics in a meaningful way.

We will explore ways of working with teacher education students to help them develop mathematical content knowledge and pedagogical content knowledge of mathematics. We will seek to develop ways in which they can assess their own mathematical knowledge as 'fit for purpose' (using computer aided assessment approaches – cf. MatRIC Network coordinated by Morten Brekke), and develop advanced/competent students as 'peer mentors' for those needing support to improve their competence. MatRIC will support the 'peer mentors' development of mathematics pedagogic support skills.

Student involvement

Students are centrally involved as learners. They are also involved regularly in the process of course evaluation. MatRIC will explore the development of student support groups. These groups will be invited to discuss and expose the challenges they and their peers face, and what additional resource might be provided to improve performance, and reduce failure and drop out. Advanced students will be invited to develop the learning resources sought. This action could be taken with engineering students on the Grimstad campus or Economics students in Kristiansand – or both. Could students in Grimstad work with Morten Brekke in the development of SOWISO CAA that could create quizzes for the teacher education students at Kristiansand?

Impact within the Department of Mathematical Sciences.

Effort will be taken to convince colleagues that they benefit from having MatRIC within their department. Rather than asking what MatRIC can do to help them, we will focus on asking what they can do to help MatRIC. We will work through Department meetings and the now established, MatRIC funded, mathematical lunches. The aim will be to demonstrate how MatRIC is resourcing an agenda for development. One approach could be peer observation of teaching. Another could be the enlisting of students to prepare learning support materials.

University-wide influence

If mathematics can achieve the SFU status, so can every subject discipline or professional field. It is MatRIC's challenge to demonstrate that it is worth having a SFU – more needs to be done to inform about what MatRIC has done, is doing, with the resources and profile – nationally and internationally. MatRIC can also support in the process of developing and preparing proposals for gaining SFU status. MatRIC has to demonstrate and disseminate within the university examples and evidences of good practice that have been stimulated by the award of SFU. MatRIC is not in competition with PULS, but MatRIC could be used to demonstrate that national recognition of excellence is within reach of all.

From discussion in IAB 27 November 2015 and with Duncan Lawson on 2 December 2015.12.10

Need to consider Coherence across MatRIC's activities: Lots of activities, important to consolidate. Take a strategic look at all the activities and make sure we do the right things.

Looking forward to the mid-term evaluation ...

Is mathematics education (teaching and learning mathematics) at UiA (still) excellent?

To be awarded the SFU it was necessary to provide evidence of excellence in education in mathematics at UiA. In the mid-term evaluation it will be necessary to demonstrate, with evidence, that mathematics education at UiA is still excellent or better. As things stand at the moment the criteria for excellence, and

measures of excellence are undefined – or there is no common agreement. Therefore it is necessary to give some thought to how MatRIC/UiA will demonstrate that mathematics education remains excellent.

It will be necessary to describe developments against a base line. What is the base line? Look at the evidence used in the MatRIC proposal. For evidence of developments we could look to indicators such as pass rate, study barometer etc.

What does success (for MatRIC/UiA) look like? Mathematics is taught as a ‘service subject’ – are students motivated to study and do they enjoy studying mathematics?

Someone (a UiA colleague) at the site visit in September 2013 declared that the success of MatRIC would be seen in better pass rates, better grade profiles and reduced drop out. This could be used in evaluation as ‘our’ interpretation of excellence and a commitment.

Evidence of continued excellence ties in with ‘impact’. It will be necessary to demonstrate that MatRIC is making a difference – to students’ learning experiences, to teaching, possibly curriculum and programme development, in addition to external impact.

[SG comment: the discontinuation of the mathematics with finance programme is bound to count against us]

Have ideas come in from the outside and changed things? Has practice changed? Is practice likely to change? Are ‘we’ listening? What difference is MatRIC making for those not directly involved? Consider: the evaluation panel will want to talk with colleagues who are not directly involved with MatRIC, what are they likely to say?

Involvement: Students and colleagues should be more involved.

[SG comment: the Drop in, and possibly mathematics lunches are the two main efforts we are making that could ‘speak to’ or influence colleagues. Do we need to put more effort into these? What else can we do?]

The group that undertook the mid-term evaluation of ProTed were provided with relevant extracts from the ‘Study Barometer’. We need to consider this carefully, analyse the results for UiA and explain them. The evaluation panel will want to talk with students.

What is the evidence that mathematics education at UiA is moving towards international frontiers?

MatRIC will be required to produce a self-evaluation document [SG: maybe we can get a copy of ProTed’s self-evaluation].

Sustainability should be planned for already now. What will happen when the MatRIC funding ends, what will continue? The mid-term evaluation will enquire about sustainability – what happens if MatRIC does not get funding after 2018, or 2023? It is not good to say, ‘well the Centre discontinues’ – what will be left, what actions will remain, how will research and development in university level mathematics teaching be sustained?

The Management Board will be asked about how the Board contributes to MatRIC’s strategy. It will be necessary to demonstrate that the Board is more than a ‘rubber stamp’ of monitoring and approval of MatRIC leaders’ decisions and actions. Receiving and discussing the Leader report is important, but Board meetings need to do more than this.

What is the Management Board's strategy for exit? Does UiA want to maintain the MatRIC brand? DL: it is unlikely that the university leadership will make a commitment but they could express an opinion. – How does the senior management see MatRIC as a source for enhancement [SG: 'a change agent'].

[SG comment, there needs to be a commitment from UiA to sustain elements of MatRIC's work, but it is not reasonable to expect the level of financial support from UiA. Somehow MatRIC's activities need to be rooted in sustainable activities – and within department and faculty strategies].

The Rector's view is very important (in the mid-term evaluation) and could be decisive in whether a second period of funding is granted. The question posed to the Rector could be: "What does the SFU do to raising teaching and learning on the agenda of the university?" What are the key institutional agendas? How might MatRIC contribute to taking the university's teaching and learning agenda forward? How might MatRIC do this? [SG: I have no doubt that Frank would provide enthusiastic answers to these questions, but it would be nice to support the answers with substantive evidence.]

The Annual conference – discussion on how to improve it. Keywords: Have a theme for the conference, make a committee for the conference with persons from different institutions. Include more opportunity for discussion, more practitioners telling about good practice, perhaps produce a booklet of best practice.