

Report of the Scientific Advisory Committee to the National IOR Centre of Norway

Based on Meeting of 22nd October 2020

Basis of the Report

All members of the SAC met virtually with representatives from the National IOR Centre, including the Centre Director, task and theme leaders on the afternoon of 22nd October 2020. The meeting had been postponed from April 2020 due to the corona virus pandemic. The panel were provided with the annual report (2019), the 2020-21 work plan, the Biannual Project reports to June 2020 and slide packs from presentations made to the Board and the Technical Committee, before the meeting. Due to the virtual nature of the meeting we were not able to meet with the PhD students and postdocs as in previous years. The pandemic also meant there was no IOR Norway meeting this year. A webinar was held 2 days before the SAC but this involved 4 speakers from outside the IOR Centre.

Overall Comments

As in previous years, the SAC were impressed by the wide range of high quality research that is being performed, targeted at improving oil recovery. This was particularly noteworthy given the impact of the pandemic, which has resulted in delays of ~ 2 months to most laboratory-based projects. Following our comments in 2019 there has been a significant increase in the number of publications in peer-reviewed journals, although the number of conference presentations has been somewhat limited by the pandemic. Industrial engagement continues to be excellent, through area specific workshops (such as the IORSim workshop) and via the technical advisory committee. We were particularly interested in the research looking at the environmental footprint of IOR and the application of polymer gels to heal fractures.

We were impressed by how many of the ideas and advances developed with the IOR Centre are now being applied in other fields. You should celebrate this through a separate report that is presented annually to the SAC and which focuses specifically on the scientific contributions of the preceding year and the planned scientific contributions for the following year. This will reduce the amount of reading that the SAC has to do whilst enabling you to better express your advances and contributions to the university. Some of this information can already be found in the IOR Centre's annual report and other documentation provided, but not all. The report would include a list of scientific advances, all papers published in the preceding year (under separate headings of journal and conference papers, additional grants won in other areas that leveraged ongoing work or past results, citations or adoption of your findings by other research groups and so forth. We recommended that you write this report in our previous 2 reports.

We were interested to hear the plans to create an IOR Academy following on from the IOR Centre, however were not convinced that this is viable. It may have the support of the companies (who need engineers and scientists trained in IOR) but is unlikely to attract a sufficient number of students, as internationally the number of students wanting to undertake taught degrees or a PhD in petroleum engineering continues to fall. We note that the new computational geoscience degree offered by the University of Stavanger has been very successful in attracting students and recommend that IOR Centre be more visionary and wide ranging in their plans for the next Centre or Academy, perhaps based on ideas in this new course.

Overall, the Centre should continue its short-term focus on performing excellent fundamental research whilst delivering high quality applied research that addresses the needs of its industrial partners. The medium-term goal should obviously be planning for the next phase,

after the funding for the IOR centre finishes whilst looking to the future and the transition to zero-carbon energy sources.

Recommendations

Carried over from our 2018 report:

- Provide a document describing the scientific highlights of each year – e.g., what are the top 10 scientific advances made by Centre researchers? Ideally these advances should be already published or about to be published in peer-reviewed scientific journals. It would be helpful to find a way to quantify the impact. For instance, the development of open-source software in several projects is impressive; is there a way to quantify how widely the software is used by others? There should be more efforts devoted into developing open-source reservoir simulators for enhancing the impact of the IOR centre.

Carried over from 2019:

- Ensure that there is a balance between applied research (supporting challenges identified by industry) and more fundamental research (that may result in new ways of improving oil recovery). Make sure that you articulate the potential benefits of this research and share the results of these more blue-skies projects with industry alongside the projects addressing their priorities.

Further recommendations

- The SAC encourages the IOR Centre to identify a wider, more visionary concept for the next Centre (such as, e.g., “Energy” or “Computational Geoscience”) in order to continue to attract potential students and research funding. As the impact of carbon emissions upon the global climate becomes more and more apparent, the number of students wanting to undertake a PhD in petroleum related research will continue to fall. At the same time all the independent oil companies are repositioning themselves as energy companies with zero carbon emission targets. While the SAC acknowledges that the IOR Centre has recognised this challenge to some extent, the measures envisioned are not considered sufficiently courageous. In particular, the pursuit of an “NIOR academy” provides an overall framing which does not leave enough room for visionary, future, zero carbon concepts. The research partners in, as well as the industrial sponsors of, the IOR Centre, with their enormous knowledge accumulated in geosciences and mass computation, should be ready to take the lead in identifying viable routes to a sustainable energy transition, where this knowledge will soon be badly needed. The SAC believes the IOR Centre’s industrial partners will welcome creative ideas in this direction. Researchers within the IOR Centre are particularly well placed to apply their expertise in subsurface science and engineering to energy sources ‘beyond petroleum’.
- Ensure that the functionality in the chemistry and physics add-ons to Eclipse are also available embedded within OPM
- Clarify why larger scale core flood experiments are needed to upscale polymer flooding to the field.

Summary

The committee recognises the wide scope and impressive achievements of the IOR Centre’s existing research programme, combining both fundamental and applied research in the laboratory and computationally. As noted previously the Centre is clearly more than the sum of its parts. The team now need to develop a vision for the future that is wider than improving oil recovery in order to engage young people, to maintain both industrial and public support and ensure the long term growth of centre and the energy sector in Norway.

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