

The ISAB was presented the activities of GRADE and IdeaSquare (IS) on February 22-23, 2019. It made the following observations and recommendations below. Our responses added in green:

1. IS and GRADE provide CERN a new and unique platform for small groups to work together on next-generation instrumentation R&D challenges, with the potential for societal impact. ISAB considers that the GRADE projects are all scientifically sound and technically demanding;
2. Of the current GRADE projects, ISAB found the TT-PET and the MRI (at ISOLDE) most promising. Considering the importance that CERN attaches to its work on Medical Physics, should it not find a way to support project like the MRI as part of its R&D in this field? Maybe after asking experts to evaluate its potential, after the ERC funding period is completed;

TT-PET is extended to EoY 2020 and discussions are underway with IdeaSquare (IS) how it could help beyond. Related activities are currently funded through the ATTRACT-Phase 1 funded project "MonPicoAD". Its progress will be reviewed in June and then its plans will be updated. Concerning MRI-ISOLDE, it does not have a formal MoU signed as part of GRADE (instead, it is part of the ISOLDE program) and unfortunately it was not selected by ATTRACT. The project was re-submitted in September for a FET-Open, outcome to be known soon. In the meantime, a number of experiments were carried out last summer over at ISOLDE and they are now in the process of finishing the data analysis and writing up the first papers for these preliminary experiments.

3. ISAB considers that of the presented updates, AUGMENT has the highest potential for immediate use in broader range of applications and could even already move to incubator stage. Although ISAB understands the project has been on hold since 2017 waiting for new fresh financing, it nevertheless would encourage the partners to consider commercializing possibilities with e.g. the help of the CERN KT Group; Unfortunately, AUGMENT was not selected by ATTRACT. IS had several discussions with the team to try to find ways to keep it going, including (renewed) offers to seek EU-funding, but no pragmatic solution could be found, and it was thus terminated.
4. ISAB understands that all current GRADE project partners have applied to ATTRACT. If funded, this might be a good opportunity to restructure the projects, even if the initial funding levels are small. There might be opportunities for them to also liaise with other funded ATTRACT projects at CERN or elsewhere; IS proposed to the CERN management to integrate the CERN/IS related ATTRACT-project under GRADE, but the Legal Service did not support that idea, referring to different IP-rules.
5. ISAB would have liked to hear more about the longer term IS strategy of how GRADE initiatives intend to move on to the next stage(s) and how e.g. the Knowledge Transfer Group can be part of those efforts; Indeed, this was not clearly explained: the purpose of R&D initiatives in GRADE is to serve *very early-stage phases of emerging small collaborations*, where new institutes can join in one by one (and not like in establishing a pre-determined structure with larger number of institutes known ex-ante, like e.g. in the LHC). The GRADE projects

would thus have a limited life-time, up to four years, within which it would be decided if/how enough critical mass can be established to move on to a 2<sup>nd</sup> stage, like e.g. formal [R&D projects](#) using beam-time, or to be funded by ATTRACT. The latter route appears to have been relatively successful so far. The KT Group is already actively involved in Phase 1 projects linked to CERN, and in those of them selected to Phase 2, formally part of. KT Group has so far not been directly involved in either TT-PET or MRI-ISOLDE but may well be in the future, depending how they will evolve.

6. The annual budget presented (400 kCHF per year) is considered by ISAB as adequate for the present level of activities (150 registered events at IS in 2018; including a Fellow and two Project Associates for running the student activities and workshops; building operation costs, including running three labs). However, it is not clear to ISAB whether the rapid, seemingly organic increase of activities since 2017 is sustainable within the available resources. Therefore, IS is encouraged to examine whether the activities have already reached saturation level and if so, what activities should be reduced, dropped and which to be kept or increased. In view of possible saturation of the system, it may be important to set up a strategy to determine which new GRADE projects could be accepted;

This examination and prioritising of activities started following the ISAB-G meeting last year, and this work is actively under way, to be completed by EoY 2020. The expenditures in 2019 were cut down to the bare minimum as it emerged there would be no budget allocation for IS from CERN for 2020. In parallel, ATTRACT-Phase 1 related support activities have been moved to the ATTRACT budget which has liberated some resources to manage IS through 2020 on a minimum level.

Concerning new GRADE projects, the only one proposed at the moment is CBI, which results from CBI-like student interactions administrated through SIMPLE. Discussions are taking place with UniGen on further development work and testing of the SiPM, as IS provides important lab space for them. For the time being, the work continues without any formal GRADE MoU in place. General guidelines for accepting new GRADE R&D projects is attached to the distributed material.

7. Given the increasing Neutrino platform, ATTRACT and connected CBI activities, there appears to be a pressing need to extend the IS building using the plan made and proposed back in 2017. It would be very helpful if this extension could find the necessary additional financial resources (800 kCHF was quoted but not elaborated upon);

No progress on this. CERN does not have the resources available, so we are exploring external funding linked to plans to bring in investors closer to IS (and ATTRACT) activities. Not expected to happen before 2023.

8. ISAB considers that the opportunities offered by IS would merit reaching wider attention inside CERN, as it thinks that IS and the support it offers is not so well known and acknowledged at CERN. Based on experience gained e.g. at Aalto of how quickly organization memory tends to fade, perhaps IS should organize an annual "open" day to share its offerings and engage the younger generation to participate in IS activities (additional resources!);

Such an "Open day" is planned later in this year, with the intention to make it an annual event.

9. It would be useful to include IS & ATTRACT as a case example in the current discussions at the European Strategy Group related to technology transfer,

education and outreach. If IS can provide some additional information, ISAB could assist in passing it on the relevant group(s);

This has happened, thanks to the support from ISAB-G and ATTRACT committee members. We are currently waiting for the ESG Report to be published to learn more.

10. ISAB would encourage IS to interact with the people behind Science Gateway project to explore whether IS could be part of any common activities there;

This has happened, although without much progress. IPT made a proposal for some space at SG but that could not be supported. IPT will make a new proposal to the CERN management during the Spring, focusing on using IS space instead for the general public.

11. ISAB welcomes the IdeaSquare Journal of Experiment Innovation (CIJ) as an on-line platform to report and share the experiences gained in the different innovation (education) processes at IS and elsewhere (this is a Tampere University in-kind contribution to IS). ISAB encourages CIJ to include also stakeholder engagement analysis to select the right participants across different sectors and to shed light on the way experimental innovation-related education programs should be carried out w.r.t more classical ones.

Recommendation has been taken on board and e.g. CBI students and teachers are now been encouraged to submit contributions focusing on the experimental nature of their innovation learning process. IS has drafted guidelines for these types of articles. First articles from students have now been published.

For the next review in early 2020, ISAB would like in particular to hear more about the following points:

- What were the top three priorities set for IS in 2019 and what will they be for 2020? In 2019, the three highest priorities were: provide support for ATTRACT Phase 1; test new experimental innovation methodologies in CBI-like environment and bring CIJ closer to these activities; test offerings for external income where the uniqueness of IS is recognized (e.g. exec mgmt courses, expert-hacks).
- What is the “sales pitch” of IS and GRADE to the intended target groups? How to measure the deliverables and what its impact is? Not yet developed, pending for updated strategy plan 2021-2025. A dedicated workshop on “Pitch Visionary” planned for mid-year. Plan to measure deliverables using aspects such as: quality of; volume of; geography of; (social) media noting of.
- What are the (innovation-related) lessons learned from the GRADE projects at IS so far? What has worked, what has not? What is the strategy for accepting to host projects as part of GRADE? These have been distributed in the attached material and during the presentations.
- Implications of IS activities for e.g. (Maxi) ATTRACT? What is the (revised) rationale behind the (selected?) IS activities? What is unique to IS (and what not)? To be elaborated further in early 2021. Indications provided in the attached material and during the presentations.
- What is the vision of IS and ATTRACT for the next 5 years and 10 years, both for R&D and education? How is that strategic for CERN? How to quantify and measure it? It would appear that focusing on ATTRACT will best serve all the aspects mentioned above. To be elaborated further in early 2021.

- Could (should) IS be used to launch (new) R&D platforms also outside the scope of detectors? For example, related to accelerators?  
It could, but given the identified boundary conditions, it seems unlikely IS is able to stretch itself beyond its current scope. To be discussed with ISAB-G!
- How much and what type of resources are the external IS partners bringing in?  
Some rough estimates provided in the distributed material. A workshop is planned for late-2020 to obtain a better picture.
- What new insights are the articles in CIJ offering to the future directions of IS educational activities and for (Maxi) ATTRACT?  
Presented in the meeting and referred to above.

ISAB would also appreciate receiving ad-interim progress updates by email, to facilitate the preparations for the next review. The Progress Report 2017-2018 was distributed in the Summer.