

**Present:** Kalevi Ekman (Aalto University), Sijbrand De Jong (Nijmegen), Thierry Lagrange (CERN, Chair), Joachim Mnich (DESY), Ezri Tarazi (Technion); Hans Boe, Oday Darwich, Markus Nordberg, Saku Makinen, Chrysoula Manoli, Claudia Marcelloni, Silje Maurset, Romain Muller, Santeri Palomaki, Pablo Garcia Tello, Harri Toivonen, Laetitia Veyrat.

**Excused:** Julian Birkinshaw (LBS), Matteo Cavalli-Sforza (IFAE), Marzio Nessi, Tuuli Utriainen.

**Meeting agenda:** <https://indico.cern.ch/category/11552/>.

## **DAY 1**

**Th. Lagrange** welcomed everyone to the 3<sup>rd</sup> ISAB(-G) meeting and presented the goals and overall schedule for the meeting (Appendix 1)<sup>1</sup>. He noted the huge progress made at IdeaSquare (IS) since the last review; the implementation of the recommendations ISAB made; and provided a summary of the acute challenges IS is now facing. The most dramatic development since last year is that IS no longer gets a budget from CERN. Although the CERN management has made it clear that it by no means wishes to shut it down, IS will need to, in the current moment of crisis, strongly align itself with [ATTRACT](#) and other forms of new funding from the outside. Th. Lagrange noted that this needs in parallel to take into account the unique role of IS at CERN as linking its research to societal challenges (sustainable development goals or [SDGs](#), whenever suitable. Despite the strong efforts made, IS still is perceived as somewhat “isolated” from the core of CERN, which ISAB-G already noted last year, and had recommended, among other things, IS to strengthen its ties with the Knowledge Transfer (KT) group. Th. Lagrange said he was himself very pleased of the progress already made in that direction, and that further efforts are being made, for example launching the “pre-incubator” concept. He concluded by noting that IS needs constantly to innovate itself to remain at the top of the game. Now is the moment for IS to re-think itself, not only for testing new concepts for ATTRACT, but also within and outside CERN.

**M. Nordberg** presented an update on [GRADE](#) projects<sup>2</sup>, as well the proposal for a new project (CBI), resulting from SIMPLE that ended in 2019 (Appendix 2). He noted that two of the current projects had received funding from ATTRACT<sup>3</sup>, and that five ATTRACT-funded projects are either hosted or supported by IdeaSquare<sup>4</sup>. M. Nordberg also summarized the general lessons learned so far.

In the questions that followed, ISAB-G asked why SIMPLE or AUGMENT did not continue as ATTRACT-funded projects. M. Nordberg explained that AUGMENT had submitted a proposal

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<sup>1</sup> All the material have been uploaded on the Indico-agenda page, including the minutes and recommendations made from the previous meeting, endorsed by the ISAB-G in April, 2019.

<sup>2</sup> M. Nordberg conveyed the greetings and regrets from M. Nessi who could not attend this meeting due to his travels. Although the [Neutrino Platform](#) is physically strongly rooted at IS, it has its own separate [reporting line](#). It is therefore not included in this presentation.

<sup>3</sup> These include : LaGemPix, Gemteq, MonPicoAD.

<sup>4</sup> These include: SWAP, SMART, POSICS, MonPicoAD, SALT.

but that unfortunately the selection committee – nothing to do with IS – had not selected it for funding. Concerning SIMPLE, University of Geneva had submitted a SiPM-related application to ATTRACT and it got funded (POSICS). However, the more CBI-oriented (student) partners of SIMPLE did not submit to ATTRACT, due to internal developments at CERN. Despite this, the universities involved in CBI expressed in 2019 their desire to continue as a focused CBI-project in GRADE, which was presented to the Research Board in September 2019, which in turn is waiting for the endorsement from ISAB-G (Appendix 3<sup>5</sup>).

ISAB-G expressed its support to the proposed CBI-project within the GRADE MoU framework.

Following their recommendations from the previous year to re-group funded ATTRACT projects within IS and the GRADE MoU framework, M. Nordberg explained that there are 19 ATTRACT-funded projects where CERN is a partner, and that he had requested such a regrouping within the GRADE MoU framework. However, the CERN legal service had not agreed to this, supported by the CERN management, referring to IP rules under H2020 which differ from those used for approved CERN experiments. ISAB-G was left puzzled by this, noting that there are several EU-funded projects which are embedded within the CERN experiments without posing any potential IP conflicts.

**P. Tello** gave an overview of the current status of ATTRACT, and its connections with activities at IdeaSquare (Appendix 4). He explained that IS will play a crucial role in Phase 2 where the selected projects from Phase 1 will be scaled up to higher levels of TRL<sup>6</sup>, embedding CBI-like student projects within. IS will be hosting workshops and scholars related to the socio-economic study of ATTRACT that the EC wants the Consortium to deliver. IS will be able offer a global reach for students also outside Europe, due to its intergovernmental status. In the next framework program, Horizon Europe, ATTRACT is expected to be able to repeat these two stages. P. Tello also provided an update on how IS is experimenting new teaching methods beyond Design Thinking, supporting CERN's EU-strategies and proposing complementary ways to engage the public in science e.g. at Science Gateway and later on in ATTRACT.

ISAB-G expressed its concern that while it understands IS needs urgently to turn to funding from other sources like ATTRACT Phase 2, it risks then to move away from what has made it meaningful in the CERN context, i.e. fostering early-stage, still fragile R&D ideas with societal connections. That is, the very things it has demonstrated to do successfully for ATTRACT Phase 1. ISAB-G also noted that IS has proven its case also by *importing* new technologies to CERN, like the Neutrino Platform in innovations related to cryostat technologies. P. Tello and M. Nordberg acknowledged this, underlying that IS will continue in that role, and that if discussions with the EC proceed in the desired direction, IS could soon start to help in fostering new scientific collaborations for a new Phase 1 in Horizon Europe, under the EIC framework<sup>7</sup>.

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<sup>5</sup> See Research Board Minutes CERN-DG-RB-2019-491, [page 3](#).

<sup>6</sup> The aim is to raise the [TRL](#) to about 5 by the end of Phase 2.

<sup>7</sup> These plans are not, however, included in the presentation.

**S. Palomaki** provided an update on CBI-like student activities at IS (Appendix 5). He noted that 2019 had been a record-breaking year in student activities and that 2020 is a transition year in terms of re-focusing the CBI-programme for ATTRACT.

ISAB-G asked about the role of the Delft (HSP) programme w.r.t. CBI to which S. Palomaki replied they most likely will join it, and that all CBI partners will meet at IS later in the year to discuss the future of the CBI in the light of ATTRACT and other updates.

P. Tello then continued with updates on new student teaching techniques and methodologies prototyped and tested at IS beyond Design Thinking (Appendix 6). He reported that these programmes are growing in demand among different Member State organizations and are perceived as unique. He also commented on the new program with ESADE targeting at business executives, as a new source of income.

**H. Boe** presented an update on activities using or relying the technical facilities at IS and shared the related statistics (Appendix 7). He also summarized the gained learnings from these activities.

In the discussion that followed, ISAB-G asked about his proposed investment in a laser-cutter. H. Boe explained it would significantly speed up the student prototyping work and that it offered much wider production possibilities w.r.t using the current 3D-printers. Usable laser-cutters range in price from 5kEUR to 30 kEUR and H. ISAB-G asked whether access to such laser-cutters elsewhere at CERN (e.g. at EN) had been explored and what the cost would be w.r.t external services. Moreover, ISAB-G asked what safety requirements or implications obtaining or using such a device would imply. H. Boe replied – supported by information from Th. Lagrange - that EN has a heavy-duty laser-cutter for metals worth ca 400 kCHF. The lower-end cutters IS has in mind belong to Safety Class 1, i.e. similar to the 3D printers currently used there. Although ISAB-G does not suggest that IS should become a consolidated center for advanced printers at CERN – as the current large number of workshops at CERN already deploy them – ISAB-G nevertheless recommended IS to update the list of tools available at CERN to determine what machinery to use at IS (and possibly then charge for?) and what to rely on elsewhere at CERN, when needed. ISAB-G supported the idea of purchasing a laser-cutter in the price range presented by H. Boe, provided that IS would not obtain the same service level and access elsewhere.

ISAB-G warmly welcomed the proposed FPGA-related workshops at IS and encouraged to continue in that direction, considering that industry is keen to hire programmers who have experience using them.

O. Darwich shared first thoughts on a “IS Think Tank” concept (Appendix 8) that would engage both internal and external actors to create new, topical technology-driven communities at IS. These could result in new R&D initiatives under GRADE, or launch new industrial collaboration (possibly start-ups) or new EU-funded projects. As an example, he quoted a recent [Hackathon](#) at IS around Quantum Technologies.

The ISAB-G asked why the topic of Quantum had been selected as there is a lot of competition in that domain right now, and what the connection with CERN is. O. Darwich

replied that CERN people are already involved in developing algorithms for faster particle identification and simulations. The industry (e.g. IBM) is providing CERN researchers access to their quantum hardware. CERN has a natural role to play as an integrator of multidisciplinary approaches and as early-adaptor of these technologies. The next step could be going into quantum sensors.

ISAB-G also inquired what in this value proposition was unique to IS and CERN. This triggered a lively discussion around using “uniqueness” as *the* yard stick. It was noted that being really bad at something could be unique too – obviously not desired – or just driving a process to create value could be unique, yet without producing any meaningful measurement points. It was remarked that uniqueness alone may not be valuable; for example, remaining unique forever may suggest no-one wants to copy it because it is not perceived as useful. It might thus be better to strive for “non-uniqueness” and instead, be a leader, first to test out things and encourage others then to copy, and then re-invent oneself and then start the cycle again.

It was argued that IS combines three things which makes it unique in terms of a methodology: basic R&D collaboration, user-centric approach to solve SDG challenges using cross-disciplinary students, and its exploratory approach to understand innovation processes.

The ISAB-G recommended that IS should (also) consider hot topics in niche areas like energy efficiency or mobility (e.g. autonomous vehicles) which are better connected to the core of CERN and where direct competition is less fierce.

**C. Marcelloni** and M. Nordberg then presented first ideas of how IS could contribute to interactive experiences engaging visitors at Science Gateway (Appendix 9). This would be achieved by focusing on experimentation and research on human-machine interaction. This could also involve the Arts@CERN-program by testing first prototypes through the CERN alliance with the Barcelona City Council.

ISAB-G acknowledged that such an engineering-driven approach could indeed provide a complementary offering for Science Gateway and that it should be clearly anchored at CERN. It could, perhaps, also be linked to events like internal “Open Days” aimed at engaging the CERN personnel.

**S. Makinen** gave a brief update on the progress of [CIJ](#), the plans to increase the number of submissions and encourage more articles on experimental innovation (Appendix 10)<sup>8</sup>. He invited all participants to the afternoon session on Day Two to delve deeper into the above challenges.

ISAB-G asked whether CIJ was facing competition and what makes it special among other online journals. S. Makinen acknowledged that the competition is fierce but that CIJ is special in the sense that it operates in the niche area of experimental innovation and it invites shorter submissions than journals in general.

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<sup>8</sup> CIJ is provided as an in-kind contribution by TAU to GRADE, at an annual person effort of 0.3 FTE.

ISAB-G felt that CIJ is providing an important contribution to the goals of IS in shedding light to the unanswered question of how (good) ideas pop up and how best to feed them further up in the innovation chain.

**S. Maurset** presented an update on KT activities at IS in 2019 and plans for 2020 (Appendix 11). As new activities at IS, KT is launching a BIC screening week and is updating the CESP programme. The aim is to start a new “pre-incubator” which offers coaching and support for potential entrepreneurs and start-ups in terms of structuring their ideas, to prototype and to validate concepts.

ISAB-G commented that it had perceived IS more as a “Germinator” - pollinating seeds of entrepreneurship among participants to create an ecosystem and the right conditions - rather than as a business incubator or an accelerator to boost business growth. S. Maurset acknowledged that the idea was indeed the former, to find the right people who want to do it, rather than offering funding support. ISAB-G also asked how this would be coupled to the different activities at CERN to lower the threshold to develop an idea into a concept, including upcoming ATTRACT Phase 2. S. Maurset replied that CESP and the BIC week has been developed having this in mind, with possibly connections also to CBI. The CERN Alumni could also be part of it.

M. Nordberg then presented the resources allocations and future projections at IS (Appendix 12). He described 2020 as a transition year while shifting activities towards external funding, as there is no longer a budget available from CERN. A five-year Strategic Plan will be presented to ISAB in early 2021.

M. Nordberg reminded that the annual operating cost of IS is (on average) 400 kCHF and that in 2019, a transition started to support ATTRACT, generating a carry-over in the budget allocation to 2020 from CERN. Together with obtaining external funding from organizing business executive modules with ESADE, 2020 activities can be funded, albeit at a strict minimum level<sup>9</sup>.

ISAB-G responded by considering IS as a “must to have” rather than a “nice to have” or a “just a fad”, believing CERN needs something like IS. Instead, the value provided by IS is concrete and real, the building is there, the people and projects are there. ISAB-G pondered at length how to sustain it without external funding pressures diluting its originality and its link to CERN.

ISAB-G recommended that IS would start to look for wealthy individuals e.g. on a 100-km radius to collect large donations. This could, for example, include the proposed extension of IS as proposed already two years ago; to attract exclusively selected investors to get immersed in “Deep-Tech” at CERN; perhaps to develop IS as a prototyping center with

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<sup>9</sup> Similar to action taken in 2019, the replacements of the AV-system at IS – which was originally recuperated free of cost from deserted equipment used during the 2013 Open Days – has been put on hold, as workshop tools, printers and kitchen replacements (the two dish washers are long overdue their original life span, like the coffee machine). The floor of IS requires patching, as fixing of water leaks on the roof. The CBI student program support personnel has also been reduced by 30%.

advanced manufacturing tools? For example in Israel, this has turned out to work well as a funding model for universities and R&D labs. Naturally, complementarity should be maintained w.r.t other funding programs at CERN, like the CERN & Society and the Science Gateway. ISAB-G welcomed the proposed initiative(s) to attract and charge for e.g. business executives to spend time at IS.

Th. Lagrange concluded the day by thanking all for the excellent presentations and the constructive and helpful interactions by all ISAB-G members. He summarized that 2020 will be an important transition year for IS and that it needs now to improve both internal and external communications and should no longer remain “below the radar”. This, however, will make IS then more visible and subject to scrutiny in terms of admin and safety rules, also in the context of SG, etc. that it will then need to solve as matters arise.

## **DAY 2**

**Th. Lagrange** opened the internal session of the ISAB-G and invited its members to make any comments, observations on remarks related to the presentations and material made available to ISAB-G. He asked members of ISAB-G to look at the direction IS is proposing to move during 2020, and at the critical objectives for 2020.

Discussion started around the fundamental usefulness of a place like IS and what signal the CERN management is sending by allocating no budget for it. Quoting Aalto Design Factory as an example, it’s original life span was only for one year, which then got extended annually several times, until it was recognized by the University management as strategic, sustainable and something not to get rid of. Using the [DFGN network](#) as another example, there still remain “low-hanging fruit” to offer to research organizations, companies and universities. Someone just needs to be first and show the way. The fact that 23 universities send 280 students to IS for 20 weeks each year at their own expense tells *something*. It would be useful to hear *why* they do this: because of influence of CERN? IS alone? Some other reason? Could the CBI program continue the same way somewhere else than at IS? ISAB-G considered that strong evidence has been presented that CERN would indeed need something like the IS, and that it would be strange if funding needed to switch only to ATTRACT. Naturally, there would be some limit to the level of feasible interactions between CERN researchers and visiting students and that one obviously needs to be selective. Given that IS is aiming at a moving target in time – for example, being also a prototype for ATTRACT - ISAB-G suggested IS to reformulate its mission and state its priorities.

ISAB-G considered that IS has been wise to position itself to the early stage of the innovation chain, yet making links to “being useful for society”. That is, it operates at the “Fuzzy Front End” of the spectrum, tracing from basic research – like the GRADE projects - opposed to developing products for the supermarket; and entrepreneurship being then somewhere in-between.

ISAB-G discussed at some length the connection between IS, entrepreneurship-driven activities as proposed by KT, and ATTRACT. ISAB-G felt IS offers yet unharnessed opportunities in transforming early (random collection of) ideas into a more entrepreneurial approach, permitting rapid product-concept testing and spotting early-stage failures before

larger investments are required. Seen from this perspective, ISAB-G found the presented new entrepreneurship-initiatives by KT most encouraging. At the same time, ISAB-G expressed its concern that due to its funding constraints, IS appears to be moving away from fostering ideas popping up, to supporting projects in ATTRACT Phase 2 scaling up towards the market. ISAB-G felt that IS is playing an important role in experimenting and studying the process of how and why great ideas emerge and develop, referring e.g. to the research being documented in the CIJ.

ISAB-G expressed its wish to see IS to continue its role in helping to shape raw ideas into more structured “entrepreneurial” form and preparing them to benefit from platforms like ATTRACT. In this way, IS would effectively combine its special positioning (early-stage, “grey area”), its hands-on approach (“the visionaries just do it”) and its quest to understand how early-stage innovation processes work (i.e. the methodologies and processes developed in CBI, the research carried out in IS and elsewhere, and published e.g. in CIJ).

ISAB-G noted that although it expects IS to significantly contribute to the fostering of entrepreneurial activities at CERN which, in turn, could result in new innovations and eventual start-ups, it also reminded that this process is not deterministic and cannot be pre-planned ex-ante. Instead, what often tends to happen is that something completely unforeseen emerges, an idea pops up and it starts growing and it survives and does not get killed like ideas normally do. So entrepreneurship is like a “bug” that a place like IS can effectively “spread” and make grow. This is why ISAB-G sees IS as the “Germinator”. Then, when the ideas start to take clearer shape, more traditional structures can take over. ISAB-G would recommend that IS does not try to compete in this latter domain. ISAB-G recommended that entrepreneurship should therefore become a part of the daily life of IS but not the mission of IS itself.

ISAB-G would consider it as a dangerous strategy for IS to rely solemnly on ATTRACT, because if there is no ATTRACT, then there is no IS, either. ISAB-G felt that during the past five years, IS has become a visible brand of CERN. ISAB-G considered that CERN had in IS a showcase to “Deep-Tech” or “Design-Tech”, something so fantastic and amazing that a lot of universities would just love to have one. CERN has a huge asset in hosting large number of young students and post-docs. It needs these people. It could optimize and better interface with this “contact service” and better understand the elements of the process of adapting and developing new technologies for both its own needs as well as for societal purposes. As CERN is no longer able to provide an operating budget for IS, ISAB-G strongly recommends IS to seriously consider seeking for external donations. IS is in operation, it is there, it has proven its usefulness, it has an impressive track record. ISAB-G would consider such an offering of great interest to one or a couple of selected, wealthy individuals.

At the same time, ISAB-G recommends IS to increase awareness within CERN that IS is an important and integral part of CERN. For example, cross-connecting departments through common info-sharing events hosted at IS; annual “Open Days ”; organizing one-day events with topics of common interest e.g. AI/Machine Learning; topical events where personnel signs up to contribute and give presentations (“un-conferences”); inviting the different Committees (CC, FC, SPC, etc.) and target people (e.g. ILOs, corporate CEOs, VIPs) to IS; marketing and developing the prototyping capabilities at IS; organizing more training at IS

for the young people (like FPGAs); linking IS to Science Gateway (as IS is already planning to do); invite the students from different CERN-programmes to IS to participate in its programs and use its facilities for inventing new things; invite CERN Alumni to give technical presentations. IS should also make a list of specific show cases of events or projects at IS which have resulted in acknowledged advances for CERN to demonstrate that IS contributes also towards addressing CERN's problems.

Concerning events at IS organized by external instances (e.g. PORT, UN, UniGen), ISAB-G recommended that IS should improve its PR-efforts around them to bring more visibility for IS. ISAB-G supports the idea of tailor-made offerings for industry management (e.g. ESADE business exec program, IMD visits) to softly gauge with sponsoring.

ISAB-G noted that the presentations this time did not provide examples of technologies or ideas *imported* from the outside to the CERN community. Next time, ISAB-G would like to hear about them, if any.

Finally, ISAB-G took a self-critical look at its own competences available for the benefit of IS. It felt that it would benefit from additional expertise in the domain of investor/business advice. ISAB-G also observed a gender imbalance in its composition and asked Th. Lagrange to raise this question with the CERN management.

Th. Lagrange thanked all ISAB-G members for their active and helpful interaction and constructive feedback. He said he will compile a list of recommendations based on the received input and share it for comments and further elaboration by March. He then moved to close the official part of the ISAB-G deliberations.

Following the lunch, **S. Makinen** chaired the mini-workshop on developing CIJ. As he had noticed in his summary talk the previous day, one of the actions is to engage stronger IdeaSquare projects and ATTRACT in CIJ. He reminded that although the volume of submissions is good, wider – and more recognized – citation requires more submissions. One relatively simple way to do this is to encourage the student teams, supported by their mentors, to submit articles about their innovation processes and experiences. The scope of the current workshop was therefore to address the following two related questions:

1. How and what kind of support can we provide for students in submitting articles to CIJ?
2. How to motivate mentors to support students to submit articles to CIJ?

The participants were split into two groups, one addressing a question each.

Group #1 identified up to five support or incentive actions to be taken into account, emphasizing the importance of support from the beginning for the student assignments and not only at the end (Appendix 13).

Group #2 identified six arguments to motivate the mentors to help the students (Appendix 14). The Group felt that helping the student would offer them “low hanging research material fruit” for publishing, although it was understood that publishing is not necessarily a compelling argument for all teaching staff.

S. Makinen thanked all participants for the helpful input and contributions and promised to return back with editorial guidelines aimed at both students and their mentors.

**M. Nordberg** then made final concluding remarks on behalf of Th. Lagrange, thanking all, and inviting IS personnel to provide any possible additional material or clarifications requested by ISAB-G to be uploaded on Indico without further delay in order for ISAB-G members can formalize their recommendations and observations. He reminded that the minutes of the meeting as well as the recommendations of ISAB-G, will be made available to everybody by March, as input for the internal IS Strategy Day scheduled for May 26th.