Revised PlanetS KTT Strategy:

1. Summary of previous experience

In preparation of the original proposal, PlanetS decided to build the NCCR around scientific activities, on the one hand, and structuring measures, on the other hand. These structuring measures had to address basic requests like KTT, academic exchange, equal opportunities, public outreach etc., as well as to prepare the path toward a future national planet centre. The Technology Platform (TP) of PlanetS is one of these structuring measures. It addresses most of the KTT aspects, but not all of them. Academic information exchange, for instance, is under the responsibility of the Academic Platform, while transfer of information to the wide public falls under the responsibility of the Communication and Outreach Platform. Although this separation does not exactly match the one proposed originally by SNF, we received positive feedback from both SNF and the external panel. We intend therefore keep this splitting of tasks and responsibilities also for the second phase.

The TP had to address knowledge and technology transfer between public and private sector, and vice-versa. Opposite to other domains e.g. like telecommunication, chemistry, biology, medicine, material science and applied technologies in general, astronomy does not present a priori very strong possibilities of *direct* knowledge and technology transfer to industry. The reason is mainly that astronomy makes use of (cutting edge) technology, but is not a priori developing it. Swiss astronomy (ground and space-based) has been very successful in building specialized instrumentation, collaborating with industry and triggering the development of new components, however, this had and has to occur always with the main scientific objective in mind. Furthermore, the astronomer does neither necessarily have the competence nor the 'mandate' to develop patentable or commercial ideas and products. This has been 'brutally' recalled to us by the SNF and the external panel during the first site visit: "*The time of top scientists should be devoted to research projects rather than tech transfer*." Therefore, we decided early in the NCCR to contact experts from industry and universities and ask them how to address the KTT mandate given to us by SNF. On the basis of these advices we defined and implemented our strategy that is summarized in the respective 'Technology Platform Strategic Paper', Issue 1.

The Technology Platform strategy paper has been discussed and reviewed during the 2015 General Assembly of PlanetS and by the PlanetS Executive Board. Useful comments have been integrated. At the beginning of the past reporting year we have finalised and released the strategy paper. This strategy paper and the TP activities have been presented and discussed during the 2015 Site Visit and comments have been received from the Evaluation Panel and SNF. It was generally recognised that 'technology developments' in astronomy are *very specific and thus very difficult for this community*. The panel experts asked themselves *whether a systematic approach to tech transfer is feasible at all*. On the other hand it was recognised that remarkable results had already been achieved in spite of these difficulties (.

The first three years of our activity have been quite successful: We can report on the creation of a spin-off company of the University of Bern (Ionight), the development and patenting of a super-stable light source (use for Cheops and TESS satellites characterization and calibration) and seed funding of specific technology project (Thermal Ionisation Source, miniaturized Laser Mass Spectrometer, Laser Frequency Comb for astronomy). PlanetS is furthermore member of SwissCompanyMaker, an event for the training of young teams and promotion of a commercial idea. Finally, the TP has established contacts with SwiTT and other swiss-wide KTT organization and organized training for PlanetS members in other to raise awareness for KTT aspects and establish connections and collaborations.

In spite of this positive feed-back, and as suggested by our initial team of experts from industry and universities, we mandated an external expert (Dr. Giovanni Russiniello, ETH engineer, PhD in Astronomy, 10 years of experience as Key Account Manager of Kudelski UK) to assess the potential of KTT between Swiss Astronomy, on one side, and Swiss Industry, Laboratories and technical institutes, on the other side. Also, we asked GR to review our strategic paper in the light of the outcomes of his assessment. As a result of his work, four main conclusions where drawn by GR:

1. **Raising awareness of the importance of technology transfer:** PlanetS should launch an initiative across all their Research groups to raise the awareness of technology transfer. The objective is to outline the innovation process from the lab to product launch so that scientists are prepared and/or possibly enticed to transfer technology should any opportunity arise. This would also give them a first taste of the enterprise environment and make them aware of the possible legal and commercial pitfalls.
2. **Valuing transferrable skills for knowledge transfer:** For several reasons explained in this report, transferring technology developments to the industry is a massive challenge for NCCR PlanetS. On the other hand, however, the PlanetS projects have also been developing tremendous competencies and expertise that are valuable to industries. It is therefore recommended that PlanetS also consider knowledge transfer in addition to technology transfer. This could consist in partnering with companies where scientists (postdocs) would be seconded into partner's organisations free of charge on projects requiring transferrable skills acquired at PlanetS. As an example, members of projects 5 and 6 might work for companies active in Finance, fintech or Big Data in the context of a collaboration project whilst still being employed by PlanetS. Team members with instrumentation engineering expertise might look for partnership projects with companies such as Micos that do employ highly-specialised profiles in the domain for example. This is the knowledge transfer model widely deployed by other NCCRs.
3. **Developing an industry network by using partners:** As we've seen before, the innovation and TT network in Switzerland is vast and based on personal contacts. In order to build their network it is recommended that PlanetS start working with partners that are already well connected and that are active in putting together events with industry players. The following entities are suggested to be the first port of call for PlanetS:
    a. The Swiss Space Center
    b. Heptech
    c. The Geneva Creativity Center
    d. The TT offices Unitec, Unitectra and ETH-Transfer may also contribute.
4. **Developing an industry network directly:** Nothing is more valuable for scientists than gaining a direct exposure to the industry and developing their own network, as this may also help in a future transition to the private sector. Contacts with companies are key success factors with regards to knowledge and technology transfer. It is then also strongly recommended that PlanetS launch a new initiative aimed at building and maintaining direct relationships with relevant Swiss industries. A common practice is the organisation of social events with partner companies, alumni or former colleagues. On this occasion, the attendees (scientists and invited companies' representatives) are given the opportunity to present their activities and current projects. This obviously takes time as the network grows slowly only over time.

5. **Coordination:** All activities mentioned here above demand not only coordination across all PlanetS groups and sites, but also regular follow-ups. To be effective, it is necessary that an individual is assigned to these organisational tasks (workload estimated to be *not less* than 20% FTE.)

For the next phase of PlanetS we will try to consider these recommendation by improving existing activities and introduce new activities whenever needed.

2. NCCR adapted strategy for the second phase

It shall be recalled that the present strategy paper aims at describing two main areas of intervention requested by the KTT-strategy of SNSF to the NCCRs. The two areas are:

1) Technology transfer between private and public sector
    - Collaborations
    - Seed funding for R&D projects
    - Seed funding for Start-Up and Spin-Off creation
    - Industry grants and CTI projects
2) Knowledge transfer between private and public sector
    - Collaborations
    - Events and workshops
    - Expositions
    - Portals and data bases
    - Services

The TP shall be understood as a general service to any Institute of PlanetS and involve Technical Universities and Industry. It shall be a structure that 'enables' and provides 'seeds' for important activities such R&D, creation of spin-offs, exchange of information.

Based on the report by the external expert and the comments received from the external panels we will refocus the objectives and the activities of the Technology Platform (TP) on four specific and concrete areas:

- ***Seed funding*** Continue and strengthen seed-funding for new ideas, strengthen the link with industry and foster project in industry
- ***Networking*** Strengthen contact with existing KTT organisations (SwiTT, UniTec, UniTectra, etc.)
- ***Training*** Propose training for PlanetS collaborators through KTT organisations (workshops, forums, meetings, competitions, etc.)
- ***Participating*** Be and become member of KTT initiatives that already exist (SwissCompanyMaker, LTA, etc.) while avoiding 're-inventing the wheel'

Furthermore, we will aim at slowly building up *access* to **common infrastructures**, which could be mutualized partially or totally and made accessible to PlanetS members within the collaboration and to industrial partners in exchange of a fair participation to the effective costs. (See final point of our action plan.)

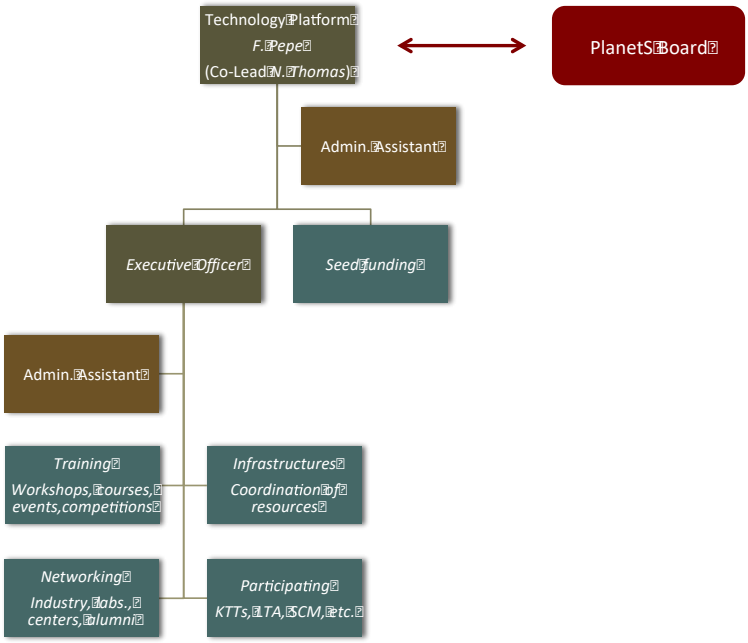
Organization

1. A TP Director and the deputy are appointed by the PlanetS Board for the duration of the (approved) NCCR period of 4 years and are automatically re-conducted. They form together the *Directorate*. The NCCR Board can decide to change the composition of the Directorate at any moment. The TP director and the deputy can resign at any moment

but remain operational until a successor will have been appointed by the PlanetS Board. This transition period is limited to a maximum of 2 months.

2. The TP Director is formally responsible for the achievement of the general goals on long term (duration of PlanetS) and the execution of the specific tasks on the short term (year).
3. The TP Director has decision authority over all decisions taken within the rules defined in the present document. Decisions must however be taken unanimously with the Deputy Director. In case of conflict between the director and the Deputy Director, the latter may request that the decision is submitted to the PlanetS Board for approval.
4. Operational responsibility will be delegated by the Directorate to the Executive Officer. The Executive Officer will be hired at a level of 40-60% for the whole duration of the project.
5. The Executive Officer will be responsible for the implementation of the strategy defined by the Directorate and approved by the PlanetS Board.
6. Changes of goals, organization and rules can be proposed by the Director, the Deputy and Members of the PlanetS Board. They must be approved by the PlanetS Board and the present document must be updated accordingly to become applicable.
7. The selection projects and assignment of seed funding is under the direct responsibility of the Directorate.
8. The Directorate and the Executive Officer will benefit from administrative support from their host institutes. The hosting institutes commit to provide at least a 5-10% of an administrative assistant each.

Figure 1: Organigramme of the Technology Platform



Use of funding

The TP is allocated a budget on a 4-year basis and is supposed to be similar to the first NCCR period. The yearly budget is reviewed and approved by the PlanetS Board at the beginning of each administrative PlanetS year. Following budget structure is foreseen:

1. An Executive Officer (high-level engineer with significant industry experience) is hired at a 40-60% level for the full duration with possible extension to the next phases.
2. 400'000 CHF (100'000 CHF per year) will be allocated by competitive calls for R&D projects and seed funding. This part of the budget will absorb possible 20% of the TP budget by the SNF and benefit from potential 20% increase, since it is considered to be the TP-activity that is most modular but presents also the highest added value.
3. A 10-20% administrative assistant position for the full duration is foreseen in support of the Directorate and the Executive Officer.
4. Funding for travel, coordination of infrastructures and administrative tasks.
5. 'Miscellaneous' funding is allocated for participation of PlanetS members to various KTT and training activities, workshops, membership and partnership of PlanetS with/in various KTT-related organizations

Seed funding for R&D projects

Proposals for R&D activities and seed funding related to PlanetS can be submitted at any time to the TP. Following basis rules and procedures will be applied:

1. The proposal must have a connection with at least one Project of PlanetS, in the sense that a possible benefit for the Project can be identified in advance.
2. The proposal must foresee collaboration, partnership or sub-contract with non-PlanetS partner(s) possibly from industry or technical universities or specialized centres. Potential for KTT must be demonstrated.
3. The proposal can be submitted by anybody, in particular also third parties from from industry or technical universities or specialized centres, as long as they are supported by at least one PlanetS Project leader.
4. The Directorate applies rules for the proposal submission and selection, which have been approved by the PlanetS Board. The rules must have been published on the TP web site within the PlanetS web site beforehand.
5. The Directorate selects successful proposals, which request funding not exceeding 10'000 CHF.
6. In the case of proposals requesting funding exceeding 10'000 CHF, the directorate will select a short list of proposal compliant with the goals of the TP and submit it to the PlanetS Board. The PlanetS board will decide whether to allocate funding and to which project considering the recommendations by the Directorate.

3. New action plan

After consultation with external experts, the following new high-priority tasks have been identified in the two main areas of intervention:

1. Promote R&D activities and new ideas, which may lead to knowledge and technology transfer through seed funding. The TP aims at funding an average of 2 successful proposals per year.
2. Offer training, workshops, participation to events, etc. to PlanetS members in order to raise the awareness of the importance and the opportunities of knowledge and technology transfers. These activities will be offered through existing KTT entities such like SwiTT, UniTec, UniTectra, etc. and their respective portfolios. Participation and Membership in SwissCompanyMaker will be continued.

3. Organize 1-2 topical workshops on specific technology areas or KTT aspects upon proposal of PlanetS members or Partners. Call for workshop ideas will be launched twice a year.
4. Improve networking with industry, specialized centres (e.g. Space Center), technical universities, associations, other NCCRs, etc. Various ideas for achieving this goal have been proposed by our external experts (database, alumni, personal contacts). A more detailed plan shall be proposed and implemented by the future Executive Officer. We aim at participating or creating an events on the example of QStarter.
5. Building up coordination of common PlanetS infrastructures. The goal is to identify resources within PlanetS (databases, archives, workshops, labs and instruments, assembly halls, testing facilities, etc.), which could be mutualized partially or totally. The contribution by each PlanetS Partner would be regarded as an 'in-kind' contribution to the common infrastructure of the future Swiss Institute for Planetary Sciences (SIPS) and would give right to a corresponding 'share' of SIPS. This structure would also allow, on the one hand, to offer to non-PlanetS and companies in exchange of a fair participation to the effective costs, but also, on the other hand, to 'cash' or 'in-kind' contribution to the center by external partners and private companies. Furthermore, partnership with existing infrastructures, such as LTA (Laboratoire de Technologie Avancées) and similar, will be considered. The goal of the second phase of the NCCR would be to ramp-up the implementation of this idea toward the end of the final PlanetS NCCR funding period.