Exchange of Experience Session II on Sustainability:

PRACE/ F. Berberich (e-infrastructures)

The sustainability of the funding of the Research Infrastructure (RI) depends on its nature. Large scale facilities like CERN, ESRF, ILL, FAIR or XFEL with huge initial construction costs are different from a decentralized RI like the Partnership for Advanced Computing in Europe (PRACE). The investment for a single High Performance Computing (HPC) system ranges from € 40 Mio to € 60 Mio. PRACE deploys currently six HPC systems in the four Hosting Member states (France, Germany, Italy and Spain). In addition to the initial investment, the operation costs have to be considered as well. Each Hosting Member committed to contribute in kind the Total Cost of Ownership (TCO) of € 100 Mio. during the initial five years. The investment is complemented by over € 100 Mio from the PRACE members and the EC support to enable and accelerate the implementation and development of the PRACE RI. Due to the fast development in the field of HPC, the lifetime of a system is limited to a period from three to five years. Periodic renewal of the HPC systems is crucial to maintain the European competitiveness at a comparable level of US, Japan or China. As a result of the continuous renewal of the systems, PRACE is in terms of funding needs comparable to other large scale facilities. PRACE is already in the implementation phase since 2010 and is working to achieve a continuous sustainability beyond 2015 through a funding which combines contributions from the Members and funds from the EC.

1. How to achieve financial sustainability and move towards implementation?

INFRAFRONTIER/ M. Raess (Biological and Medical Sciences)

Moving towards financial sustainability and implementation requires the involvement of the potential funders early on. In INFRAFRONTIER, we established the 'INFRAFRONTIER Inter-Ministry Working Group' in October 2010. This working group contains representatives of the responsible national ministries and large funding bodies. Since the establishment of the group, these representatives have met twice a year to discuss the implementation steps and strategy. Between these focal meetings, the implementation documents of the INFRAFRONTIER Legal Entity have been updated, commented on and circulated in the group.

This was particularly important in our situation, since we will establish a German private limited company first and an ERIC later. The GmbH will be founded by research organisations, but the members of the ERIC will be Member States and Intergovernmental Organisations. The Inter-Ministry Working Group ensures that the future members of the ERIC are already involved and steering the process at this first (GmbH) stage and that the shareholders of the private limited company have full backup by their ministries. This should help smoothen the transition between GmbH and ERIC.

European XFEL/ M. Altarelli/Claudia Burger (Physics)

- Unique characteristics of the planned facility, extending the potential relevance of scientific breakthroughs beyond basic science to technologies of essential importance for Europe, help to get financial pledges
- Strong support by the scientific communities
- Strong lead partner to prepare the project and host the project team
- International cooperation from the beginning
- Define a (reduced) start-up version

PRACE/ F. Berberich (e-infrastructures)

Since the PRACE RI is funded through national investments and contributions, the national governments had to commit to the provision of in kind and cash contributions for the initial period. The first Scientific Case that was produced in 2006 convinced the governments to make the required initial investments. In order to secure the funding for the next phase, two criteria have to be met: firstly, PRACE has to demonstrate to the governments and the EC that it achieved its goals and secondly, it has to demonstrate that the demand from Science and Industry still exists. To demonstrate the latter, an updated Scientific Case for HPC in Europe 2012-2020 was produced that captures the current and future needs of the scientific communities and proofs the importance of HPC for the society maintaining its high priority on the political agenda.

SKA/ P. Vogel (Physical Sciences and Engineering)

SKA entered the pre-construction phase via a LoI signed by 9 FA's and Ministries (very small fixed contribution for preparing the legal entity) and few months later followed by a Members Agreement and the establishment of a UK company into the pre-construction phase (2012-2015). SKA successfully moved to that next phase by building trust and comfort by starting with limited commitments of Full Members for an agreed pre-construction period; a minimum required number of members for starting (5) was agreed, a fixed cash members' contribution and estimated (national) in-kind contributions to WPC's. Also important success factors (besides a strong science case and coordinated scientific support for the project)) were: a sense of urgency and proven project progress (results).

With further focus on the pre-construction phase of SKA, sustainability was about reaching a level of confidence that resources to deliver the Project Execution Plan (PEP) were available at funding agencies, ministries and research institutes involved. The PEP was the main deliverable of the Preparatory Phase of SKA (the FP7 PrepSKA project) and formed the basis of the Business Plan of the legal entity that was established by December 2011 (UK company). A minimum number of 5 founding Members was defined as the threshold for the "go" for establishing a legal entity to enter the Pre-construction phase of the SKA. The expected number was to have at least 7 Founding Members, and another 2 to 4 to join later. January 2013 the SKA Organisation has 10 Full Members and 1 Associate Member. The minimum cash contribution to become a Full Member of the SKA Organisation was fixed for the 4 years of pre-construction at a flat rate of M€ 1 in total plus voluntary cash and estimated commitments for in-kind contributions via Work Package Consortia. The contributions (cash & in-kind) is registered in the company's register.

2. What criteria did you use to define your project as "financially sustainable"?

3. What is the level of sustainability needed to start implementation (focus on infrastructures with modular implementation strategies)?

INFRAFRONTIER/ M. Raess (Biological and Medical Sciences)

INFRAFRONTIER is a distributed research infrastructure with national infrastructure in 12 European countries (+observers). Several of these national nodes have been co-operating since several years already; other nodes have joined during the preparatory phase of INFRAFRONTIER. National INFRAFRONTIER partners have secured 136 Mio € for construction, upgrading and operating their national research infrastructure and INFRAFRONTIER is prioritised on several national roadmaps.

Financial sustainability for the European coordination unit (the INFRAFRONTIER legal entity) is closely linked to financial sustainability on the national level. All of the potential six founding members of the legal entity have secured national or institutional funds to build and operate their national

infrastructure. Other countries are still working towards securing these funds, which is not always easy in the current financial situation in Europe. These countries can join the legal entity later (and they are still part of the INFRAFRONTIER effort due to related projects such as InfraCoMP and Infrafrontier I3).

European XFEL/ M. Altarelli/Claudia Burger (Physics)

It is not clear to us what this question means. "Financially sustainable" means to me that

1. there is a project which is scientifically worthwhile in its start-up configuration, and
2. with a realistic construction budget; then,
3. when there are sufficient commitments from contracting parties to cover the construction budget, I would consider the project financially sustainable (especially when there is a contingency or "risk budget")

PRACE/ F. Berberich (e-infrastructures)

Answer to question 2: Due to the short lifetime of the HPC systems, the initial financial sustainability was defined as sufficient commitment for procurement and user support of HPC systems in order to cover the needs of European scientists. For the initial period the criteria were contractual binding commitments from the Hosting Members and the commitment from all Members to pay annual contributions in cash.

Answer to question 3: The national investment in leadership systems allocated to PRACE as 'in-kind' contributions had to be aligned with the national procurement strategies for HPC. The PRACE RI started with one HPC system (the first 1 PetaFlop/s system in Europe) in operation. It was foreseen to increase the number of the HPC systems at the highest performance level to six systems, which are available today. The increased capacity corresponds to the demands of the users and offers different architectures to cover different types of applications. This investment spiral was used also to have at any time up to date systems available in Europe. The first system was already replaced by a more powerful system of six PetaFlop/s and other systems are being upgraded.

SKA/ P. Vogel (Physical Sciences and Engineering)

Answer to question 2: The Business Plan set the financial level that people could sign up to. The differentiating between cash and in-kind contribution ensured that
a) there's enough cash to run a central project office for coordination
b) enough in-kind contribution to be confident that there's confidence that the technical requirements as set by the PEP could be delivered.

Answer to question 3: The phased approach of the SKA project: PrepSKA – Pre-construction Phase - SKA1 - SKA2. Need a certain level of commitments to be able to construct (for SKA1). Process for developing a Funding model for SKA1 has started now. (If time, I may briefly summarize where we are in this process).To deliver, will need an agreed business case for all partners to use in their national approval systems, and a construction phase governance to be developed. Discussions on the funding model for SKA1 have started, few principles agreed by SKA Board, some working assumptions and a process in place for further work by a Funding Task Force, work is ongoing. Expected to become more clear by end 2013 (in the mid of the pre-construction phase).

4. How does your financial model look like?
5. What combination of funding do you rely on?

INFRAFRONTIER/ M. Raess (Biological and Medical Sciences)
As a distributed research infrastructure, there is no uniform financial model for the national nodes. Funding sources include dedicated research infrastructure grants (FR, FI), dedicated national and institutional funding (e.g. DE), structural funds for building new infrastructure (CZ, GR), and combinations of these funding sources. The budget of the INFRAFRONTIER Legal Entity is relatively lean and covered by membership fees. National funding is flanked by European FP7 funds (InfraCoMP, Infrafrontier I3, BioMedBridges, EMTRAIN) to carry out specific activities in the remits of INFRAFRONTIER.

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The PRACE RI (PRACE aisbl) is funded through two types of contributions, contributions in kind and in cash. On the one hand, the Hosting Members contribute in kind making available the HPC systems to PRACE. On the other hand, all the Members contribute with a yearly Membership fee to the functioning and activities of PRACE as an international non for profit association registered in Belgium. In addition PRACE is supported in parallel by a series of implementation phase projects in the 7th framework programme (RI-261557, RI-283493 and RI-312763).

European XFEL/ M. Altarelli/Claudia Burger (Physics)
Answer to question 4: Establishing a non-profit limited liability company to construct, operate and develop the facility on the basis of an intergovernmental convention

- Financial contributions by the shareholders (mostly research institutions, appointed by the contracting parties = the governments)
- Contributions in cash and in-kind (≈50 % IKC)
- For the operation phase: repartition of operating costs among the shareholders according to shares and use of the facility by the scientific communities of the contracting parties
- Open model: new shareholders welcome

Answer to question 5:
100 % publicly funded by the shareholders (+possibly by scientific >associates)
Small EU funding of the preparation phase, support to specific research
projects of our staff from EU and/or national funds involved

SKA/ P. Vogel (Physical Sciences and Engineering)
~33% Cash contributions (fixed minimum level for 4 years cash contribution is required, plus additional cash contributions by hosts (HQ & selected sites), and ~66% in-kind contributions by Participating Organisations via self organising Work Package Consortia (institutes, industry) to execute the Project Execution Plan. The current funding commitments for the pre-construction phase is 23, 4 M€ cash for the SKA Office and €87.8 M€ in-kind to run the national work programs.

SKA/ P. Vogel (Physical Sciences and Engineering)
Concluding remark PV: Interesting to see what is (or has been) driving the process, how to use the 'momentum' in the project and have a realistic sense of what can be reached with a substantial part of potential members, within an agreed project timeline (go/no go decisions), and accept a certain level of uncertainty in the overall resourcing (definition of sustainability?). Be attractive to new partners to join along the road (inclusiveness). I would like to stress the importance of the EC-money for projects like SKA (FP7 PrepSKA, GO-SKA) and hopefully new opportunities are offered in Horizon2020.