

**Working Group D (FACILITIES)  
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This document is intended to capture the essence of discussions on the day. Suggestions were wide-ranging and some do not lend themselves to easy categorization. Organization of this document attempts to group things according to major themes.

## **1. The International High Plateau Station**

Although national polar programs have many advantages in terms of leveraging resources from government and industry bodies, it was noted that the exclusive population of national bases also generates significant disadvantages and complications. They are often set up in an environment where political motives are competitive rather than collegial. When they become the vehicle for national prestige, the ethos of rapid and fluid international collaboration which is the lifeblood of the most successful modern scientific endeavors becomes difficult to support.

This motivated the idea of some form of international station which would have some form of relatively open-door policy to national membership from a wide range of countries. This follows the trend of international astronomical observatories such as the Gemini partnership or the European Southern Observatory. Much of the same logic applies, with immediate and profound advantages gained by sharing infrastructure and creating a crucible for cross-fertilization with scientists from many nations working together. This is surely a recipe for the construction and maintenance of healthy international collaborations.

Such an International High Plateau Station would have strong resonance with the spirit of the Antarctic Treaty itself. Perhaps most importantly of all, it would provide a vehicle for smaller countries (such as Indonesia or Denmark) with Antarctic aspirations to share the otherwise prohibitive costs of running an entire program alone. The democratization of access to the Antarctic would surely yield long term benefits with a far wider national demographic to draw upon for new ideas in the exploration of the scientific potential of working there.

It is not clear if such a station would be sited completely separately from existing infrastructure, or whether there could be a case for leveraging from existing supply and communications lines.

Such an initiative already has a precedent in the ARENA program, albeit operating with a European rather than an International theatre. A further advantage of such an organizational structure is the security of commitment provided by international treaty level co-operative agreements: surely a lesson from space missions and major observatories we would do well to emulate.

## **2. What are the major enabling technologies needed for the next steps?**

In no particular order of importance, enabling technologies required for new generation initiatives to take form on the ice were discussed.

- PLATO already forms an excellent model for providing much of the requirements for science from the High Plateau.

- Ground Layer Adaptive Optics (Inexpensive and likely to become far more common at mid-latitude observatories in coming years).
- Stable tower designs (and foundations that do not sink or differentially shift).
- Mitigating the effects of high relative humidity (but low absolute humidity).
- High bandwidth communications back to home institutions
- Versatile devices and computing platforms which are robust and operate with low power demands (e.g. efficient Cryo-coolers)

### **3. Are there simple strategies to adopt to help facilitate better collaborative links?**

- Again, PLATO sets an excellent precedent here in providing a “standard platform”.
- Do we need a data standard/format/definitions for site testing data metrics?
- Push for portable science verification instruments which can be shared between sites.
- Possible to define standard hardware interfaces?

### **4. Example science domains for major new initiatives.**

For the present, this is a very partial listing intended to be a starting point for further fleshing out of areas for growth of scientific capacity.

- High energy/particle astrophysics (already mature)
- CMB Astronomy (already mature)
- Balloon-Borne Platforms (mature)
- Meteor Sample Programs (mature)
- THz Astronomy
  - single dish
  - interferometry
- IR Astronomy
  - Wide-Field Imaging
  - Continuous cadence observing for variable/transitory phenomena
- Visible Light AO
  - Hubble will be de-orbited someday (?) and the demand for visible-light wide-field, high angular resolution imaging will suddenly be thrust upon ground based observatories. It is doubtful if any of the available flavors of AO at mid-latitude observatories will deliver sufficiently in this regard.
- Solar Astronomy
  - continuous cadence observing
- Optical Interferometry
  - Several architectures possible: Astrometric/Nulling/Imaging/Closure Phase
  - Each has quite distinct science reach and distinct advantage from the Antarctic.