Mars Breakout Group Report  
PSS Meeting, April 19, 2011

Breakout group participants:
PSS - D. Des Marais, J. Bell, J. Grant, R. Greeley, J. Johnson, D. Sumner.
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* General impressions of DS recommendations
* Specific DS recommendations that carry cost implications
  Highest priority items
* Flagship descope process
  Schedule, minimum science floor, costing process
  AO issues
General impressions of DS recommendations
Part 1

* Positive overall opinion of DS report and recommendations: Remarkable synthesis of science priorities, balance across solar system and across mission lines, budget constraints, and misc. other issues

* Regarding prioritization during budget challenges, endorse sequence: SR&T > Discovery > New Frontiers > Flagships

* Strongly endorse efforts at international collaboration. Support effort to accommodate science goals and objectives of both NASA and ESA in the joint Mars program.

* Mars 2018 designated Flagship #1 is excellent. Mars Sample Return (MSR) is the NEXT KEY STEP in an ongoing highly productive program. It delivers carefully selected samples to state-of-the-art laboratories on Earth. MSR informs future exploration to understand Mars as a planetary system and a potential habitat for life.
General impressions of DS recommendations

Part 2

* Some Mars community concern exists that MSR might dominate the 2020-2030 decade and that Mars is not included in New Frontiers queues. There are many interesting science targets at Mars. The community consensus is still that sample return at this time is needed to make a major step forward in our understanding of Mars.

* Applaud retaining Mars within scope of an augmented Discovery program.

* Strong support for stabilizing/augmenting SR&T/RA budget. It provides critical support for interpreting voluminous mission data acquired by past and ongoing missions. It also supports new investigators and future missions.
Specific DS recommendations, Part 1

* Caching system is the key NASA stake in 2018 rover. System includes arm with peer review-selected characterization instruments, sample acquisition and transfer hardware, cache container, and hardware to ensure preservation.

* The NASA caching system and the ESA subsurface drill are both essential to address highest priority science objectives for both agencies. PSS supports integration of ESA and NASA science goals into a single rover to enable a scientifically exciting and viable mission to Mars in 2018. Instruments necessary to meet NASA’s science goals should be selected through a competitive peer review process.

* Strongly endorse TGO mission: International collaboration to investigate diverse trace gases, temperature, atmospheric dynamics, and potentially-related surface processes and features.
Specific DS recommendations, Part 2

* Endorse early planning to ensure adequate funding for extended missions that are critical for planning future missions (e.g., Odyssey, MRO) and that continue to provide great science value for the cost (most, if not all, of the others). If the science of the mission is viable, as determined by senior review, extending missions represents an excellent investment in science.

* Endorse focused technology development programs. Stable, focused program is critical for all of solar system exploration. One key example: Sample return technology benefits multiple missions in Flagship and New Frontiers queues. SR technology strengthens key final step that consummates the sequence: Flybys-Orbiters-Landers-Rovers-Sample Return, as it will be applied to multiple solar system objects. Focused SR technology development hastens the time when significant missions will occur, even if a particular SR mission is delayed or cancelled. A focused technology development strategy strengthens the justification for sustaining the technology budget.
Flagship Descope Process, Part 1

* MEPAG SAGs help guide prioritization of mission goals and objectives during descopes: e.g., ND-SAG, MRR-SAG, E2E-SAG.

* In any descoped mission, the systems required for NASA caching science and the ESA subsurface drill science are essential to address the highest priority objectives for both agencies and communities.

* Endorse Joint Science Working group effort to define Level 1, etc. requirements for meeting key mission goals and objectives, e.g., The “carefully-selected samples” caching objective imposes requirements for mission duration, mobility, arm/container caching system, site accessibility (latitude, altitude), site diversity, number and mass of samples, “sample suites,” and documenting context of selected sample. MEPAG’s E2E-SAG report will articulate these requirements.
Flagship Descope Process, Part 2

* Descope by slipping launch from 2018 to 2020 is technically feasible. But, if it is necessary, it must be decided early in order to minimize costs of postponement.

* Costing process: “Decadal Survey Process” (external costing exercise) should be employed to cost 2018 rover mission after its Level 1 requirements are defined (September 2011) but before the FY14 budget process begins (April 2012). Costing process should continue to be applied to all solar system missions. (schedule on last slide)

* Endorse initiatives for $^{238}$Pu, required for 2018 rover RHUs: Includes production restart and approval process for ESA and NASA.

* Should issue a draft AO for arm and mast instruments (Conduct competitive selection for parts of payload to be added to single 2018 rover).

* Instrument AO should be released simultaneously in U.S. and in Europe (TGO is a successful prior example of this process).
* Irrespective of whether or not the rover MSR mission is viable in 2018, technology development for sample return is of critical importance and should continue. Sample return consummates the portfolio of planetary science approaches: fly-by, orbiter, lander, rover, and sample return. It is a high priority for the Mars community, and investments are essential in order to make sample return fiscally and technically feasible.
Schedule

May 2011  ESA Program Board (PB-HME)
June 2011  MEPAG mtg., Lisbon
Fall 2011  2018 rover defined (Level 1 req, etc.)
Fall 2011  Begin 2018 costing study
Fall 2011  Pre-Ministerial Meeting
Feb. 2012  FY13 budget announced
Mar. 2012  MEPAG meeting
April 2012  Costing 2018 rover finished
April 2012  FY14 budget work begins
2013  ESA Ministerial 2018 decision