Revision of the Mars Exploration Program Analysis Group (MEPAG) Goals Document

In 2000, the Mars Exploration Program Analysis Group (MEPAG) was asked by NASA to work with the science community to establish consensus priorities for the future scientific exploration of Mars. Those discussions and analyses resulted in a report entitled Scientific Goals, Objectives, Investigations, and Priorities, which is informally referred to as the "Goals Document." The initial report proved to be very useful for guiding program implementation decisions. It also is clear that the report requires regular updating in light of dramatic new results from Mars and evolving high-level strategic direction from NASA. For this reason, MEPAG periodically revises the Goals Document as a statement of community consensus positions (**http://mepag.jpl.nasa.gov/reports/index.html**).

The MEPAG Goals Document is organized into a four-tiered hierarchy: *Goals*, *Objectives*, *Investigations*, and (where applicable) *Measurements*. The Goals have a very long-range character and are organized around major sectors of scientific knowledge: Life (Goal I), Climate (Goal II), Geology (Goal III), and Preparation for Human Exploration (Goal IV). Because developing an understanding of Mars as a system requires making progress toward meeting all four Goals, MEPAG has not attempted to prioritize the Goals, but rather represents them equally. The four Goals each include 2-3 Objectives that embody the strategies and milestones needed to achieve them. Objectives are presented in priority order. A series of Investigations that collectively would achieve each Objective is also identified and each is prioritized.

The Goals Document is presented as a statement of community consensus positions and it is MEPAG's intent that the descriptions of scientific Objectives and Investigations serve simply as example targets for future instrument development and measurements. As measurement capabilities and techniques evolve, detailed requirements should be defined by Principal Investigators, Science Definition Teams, and Payload Science Integration Groups for program missions and by the Principal Investigator and Science Teams. These requirements can then contribute to forward program planning. Some types of Mars-related scientific research take place without flying spacecraft to Mars. Most notably, these include meteorite studies, telescopic observations, theoretical models, and fundamental research of diverse character. The Goals Document does not consider these sectors of research in its hierarchy, or in its prioritization system.

The revision process of the 2006 Goals Document seeks input from the community regarding the suitability of present Objectives and Investigations and their relative priorities. As shown in the attached diagrams, formal opportunities to provide input include: (1) discussions with members of the Goals Committee at this meeting; (2) responses to a short survey and any comments regarding the revised Goals Document (to be available on the MEPAG website from late August to late September, 2007); and (3) the February, 2008 MEPAG meeting. Note that because of ongoing analyses currently undertaken by the Mars Architecture Program, revision of Goal IV (Preparation for Human Exploration) will be deferred to later in 2008.

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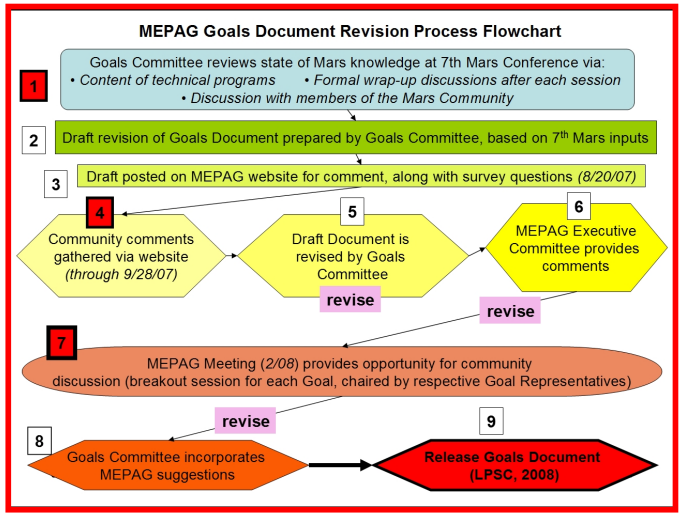
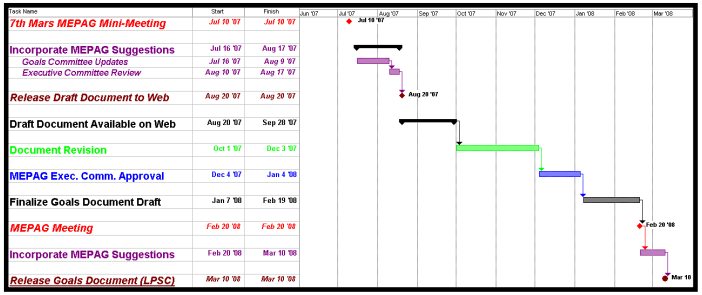
Process



Schedule



2006 Goals Document Summary

Objectives Investigations

Goal I: Determine if Life Ever Arose on Mars

A. Past/present Habitability
1. Water distribution
2. Hydrology
3. Phases containing C,H,O,N,P,S
4. Sources of energy

B. Carbon Cycling
1. Organic carbon distribution
2. Inorganic carbon distribution
3. Links between C,H,O,N,P,S
4. Oxidation chemistry

C. Past/present Life
1. Complex organics
2. Chemical/isotopic signatures
3. Morphology of mineral signatures
4. Temporal chemical changes requiring life

Goal II: Understanding the Processes and History of Climate on Mars

A. Atmosphere and climate processes
1. Lower/upper atmospheric climate
2. Search for Microclimates
3. Distribution of photochemical species

B. Surface/atmosphere record
1. Isotopic/noble/trace gas compositions
2. Escape rates
3. Isotopic/noble/trace gas evolution
4. Physical/chemical records of past climates
5. Recorded climates preserved in polar regions

C. Spacecraft safety
1. Boundary layer thermodynamics
2. Lower atmosphere (< 80 km) behavior
3. Middle atmosphere (80-200 km) behavior
4. Upper atmosphere (> 200 km) behavior

Goal III: Determine the Evolution of the Surface and Interior of Mars

A. Geologic evolution of surface
1. Water distribution
2. Sedimentary geology
3. Geochronology
4. Igneous processes
5. Surface-atmosphere interactions
6. Surface composition/mineralogy
7. Tectonics
8. Hydrothermal processes
9. Regolith evolution
10. Crustal magnetization
11. Impacts

B. Interior dynamics/structure
1. Structure/dynamics
2. Magnetic field
3. Thermo-chemical evolution
4. Phobos/Deimos

Goal IV: Prepare for Human Exploration

A. Sufficient Mars info for human mission
1. Particulates
2. Lower atmosphere dynamics for EDL/TAO (?)
3. In situ biohazards
4. In situ Water resources
5. Dust toxicity
6. Atmospheric electricity
7. Organic sustainability on martian surface
8. Ionizing radiation environment
9. Regolith cohesion/trafficability
10. Dust storm meteorology

B. Technology demonstrations
1. Aerocapture
2. In situ resource utilization demonstrations
3. Precise landings
4. Navigation/communication systems
5. Material degradation
6. Atmospheric electricity
7. Autonomous approach navigation