

DEFINING THE CRITICAL PATH: SUMMARY OF A DISCUSSION

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Abstract

A formal discussion was held among Conference attendees to learn if there was any consensus on how to most effectively direct our efforts toward the settlement of space. After opening remarks by an invited panel, in which the roles of government, business, and small organizations or individuals were considered, a wide-ranging exploration of personal views on many space-development matters ensued. From this we conclude that there is no consensus, but that there is direction that may be used to advantage.

Initial Considerations

Over the first two evenings of the Conference, most of the attendees chose to participate in a total of three and a half hours of discussion centered on the question of how we should proceed to open the High Frontier. The initial half-hour was comprised of statements on the "state-of-the-problem" by each of the session's two co-chairmen, Dr. David Webb and Morris

Hornik, and three invited panelists, Jim Muncy, Alex Gimarc, and Dr. Lee Valentine. The three panelists were chosen because of their different perspectives, and were asked to look at "scale of effort" problems, *i.e.* at aspects of the fundamental approaches open to us, such as: What can we expect of governmental space programs? Of commercial space enterprises, large or small? Of tiny non-profit organizations, or even individuals? After Morris Hornik introduced the session, he provided a statement of intent and the outline shown in Figure 1.

In his presentation, Jim Muncy suggested that the ongoing collapse of the governmental program was actually a watershed positive development, in that it forces us out of the illusion that someone else will achieve our dream for us. Alex Gimarc argued that breaking the world-wide governmental monopoly on access to and operations in space, largely through de-regulation, would allow a multitude of new commercial enterprises to tackle money-making space projects, resulting in the opportunities we

have hoped for. Lee Valentine pointed out that historically, whether looking at the development of the first aircraft, or early liquid-fueled rockets, or the mass-driver, the most important work was accomplished by a few individuals for startlingly little money, in contrast to the large sums spent by parallel or follow-on government projects that did not succeed at going much beyond the work of the enthusiasts -- usually not even doing as well. As final opening speaker, David Webb contrasted the apparent success of environmentalists in implementing their objectives, with the seeming failure of those in the space movement to make their goals part of a national agenda.

At this point, a moderated floor discussion commenced. Quite a number of divergent views surfaced during the three hours divided between the first two evenings of the conference. The only fundamental agreement among those in the room was that space is very important to the future of humanity. It is also safe to conclude that there are many interesting and possibly useful things we could be doing about space, and most of these things have their champions. The first night, discussion wandered over many areas connected with space development, but basically outlined the general status of efforts to move people into space. On the second night, identifying a workable approach to opening the High Frontier dominated the discussion. Influence on

Government or NASA policy was not dwelt upon, nor what large commercial bodies could accomplish. The emphasis was on making choices and accomplishing something. The following conclusions are drawn from both evenings.

General Concerns

The participants considered the roles various organizations have played, and should play. There was a call to decide what, specifically, we who wish to settle the High Frontier want from government. Views ranged from the need for government to correct its previous errors, to fully privatizing space development. The most direct governmental involvement encouraged was for the public sector to become an "anchor tenant" of space industries, much in the way that air mail contracts helped promote the nascent air lines. It was stated that we must avoid expanding the bureaucracy as much as possible. There was a strong belief that members of Congress, like most citizens, think of space projects as (at best) necessarily meaning NASA, and (at worst) only in terms of the jobs sustained.

NASA was not discussed at great length the first night, and hardly mentioned at all the second. Personal feelings ranged from rating NASA a waste of billions of dollars, to NASA's being "the only game in town" and better than the alternative of

nothing going on in space, so worthy of support if for no other reason. It was pointed out that NASA's goals are not similar to ours, and the very fact that it is a government agency and therefore not concerned with profit makes it not relevant to settling thousands of people in space. Many years of watching the federal space program go in ways contrary to the direction that space enthusiasts would wish it to, has resulted in advocates being tired of fighting for or against NASA programs.

The only part of the government other than Congress and NASA mentioned as possibly having an impact on moving large numbers of people into space was the Department of Energy. It was hoped that DoE could be made to understand that space is not just a NASA and scientific community preserve, but an area of endeavor which could be used to solve problems specifically part of its charter. This would help end NASA's monopoly, and (hopefully) spread interest in large-scale development of space to private industry.

Attitudes toward the business world's status and role in developing the High Frontier were, as always, varied. It was accepted that a strong economic drive is important to moving large numbers of people into space, for changing space from the realm of government to the realm of individuals. This acknowledgement falls far short of identifying such a driver; any return on investment in space, as things

currently stand, is difficult to find. Drawing a comparison to the development of the aircraft industry, it wasn't until companies took an active role in promoting planes that the business "took off" commercially. Private concerns are not involved in space development because there is no profit to be made. Most explanations for this situation were based on lack of appropriate government support, or on the need to bring down the cost of launch. There was a brief digression into whether we are unable to meet the demand for access to space because launch is too expensive, or if the cost of launch is high because there is so little demand for access to space. No useful conclusions resulted.

Some future sources of revenue from space were suggested, such as tourism, materials processing, energy, "Coast Guard" services, civil space patrol, entertainment, and one-way migration, but it was stated that the responsibility for reducing the cost of launch was beyond the scope of this evening session. Suggestions for near-term incentives for the utilization of space, like greater commercial benefit from spin-offs, or joint stock companies to finance development, were proposed as something we could do to move us into space. A final significant point was made, namely that the image of those who support space settlement, as seen by those who have money to invest, conveys lack of focus and lack of realism.

Personal Viewpoints

Concerning individual involvement in space, there was a sense that the time for talking has passed -- that there is a need to accomplish something. We have in a sense stagnated. The great, dramatic accomplishments in space occurred many years ago, and nothing since has captured the imagination of the public or appealed to those who have the money to finance the breakout into space. Many expressed frustration that so much time has passed without accomplishing our goal. David Webb's comparison between the space and environmental movements was discussed further. Of course, analogies can be carried too far. As with comparisons to the settling of the New World or the building of the transcontinental railroad in the U.S., there are significant differences. In the drive to settle space, there is no "bad guy" or visible malevolent influence that is intentionally preventing our progress. The New World was not nearly so hostile an environment as the Moon or space in general, nor is there the strong and obvious economic drive to settle space that there was to connect the U.S. East Coast with California.

Approaches favored by the participants could be categorized as either direct or oblique (as in Figure 1). Advocates of both agreed that time, money, and effort have been spent without result. Supporters of the direct approach stated that we need to

have a clear, concrete goal; that we set a path, then simply do the work. Greatly affecting phrases were "Demo or Die!" and "The Moon in four years, with you or without you!" and especially "Pick one thing and do it!" Many maintained that all we really need is one big advance that would establish an economic driver, and all the work that has been done will fall into use -- and we will move into space. Others centered on one or more space development needs: identifying projects or research that best further our goals; focus on specific, visible results (if only to use for education); dispelling the image of space as always a vision, a daydream not addressing the current world's needs, not backed by hard research.

Along this last line, there were those who strongly believed that, because most of the technical challenges are not serious barriers, the important thing is to educate and influence the public, or specific members of the public, or the government, or Congress; that the main difficulty is marketing. In this view, the problem is that the moment in which all people grasped space as the definite future in which they might take part has passed -- that a kind of universal enthusiasm, born with Mercury, died with Apollo. There is a new generation that feels disconnected from the space program, and imagines nothing in space for them. Many participants declared that educating those who assume space to be irrelevant is vital. The issues then become: which groups

should be targeted, in what order; what types of information would elicit active support; and finally, how should information be disseminated to specific groups, be they children, members of Congress, or the public in general?

Those who favor a more oblique approach maintained that it is best to seize any current opportunity to demonstrate technology likely to be useful in space development, whether or not the actual demonstration itself applies to space, or establishes anything new. They believe that pursuing indirect objectives is the most realistic way to make progress toward our long-term goal of building the means for humanity to spread itself throughout the solar system. There was also a small consensus-centered faction, which wanted to unify the members of the "space movement" to show a solid front, saying that we should survey "space movement" members about what needs to be done, making our choices based on tabulated opinions.

What of the Future?

The Space Studies Institute, its general success, and its purpose were discussed. SSI was perceived as having been successful in the projects it has pursued in the past, although some regret was expressed that the mass driver and mass catcher were not pursued further. All agreed that SSI was appropriately

small. The perceived role of SSI in the future was as varied as the opinions of the participants on the direction that should be taken to settle the High Frontier. For some, SSI's role in the future is to continue creating opportunities for others by proving theories and technology. For others, its mission is to keep the dream alive and to keep the possibility of the achievement of the vision in the public eye. It was also suggested that the economic models that SSI generated be re-examined to see if perhaps some clues to how we should move in the future could be found. It was hoped that SSI could help those who are not technically oriented to bring the technological aspect of space to others via kits and such.

When the session wound down, it was quite clear that no general consensus had been achieved. The completely appropriate closing comment was by Jim Muncy, reminding us that these Conferences exist so that we may report progress over the preceding two years, and be informed, even inspired, to go off and make more progress to be reported back at the next Conference two years later. Therefore, each of us should leave this session and pursue that aspect of critical activity that we are excited about and able to undertake; we don't need consensus, just the common interest we already have.

What conclusions can be drawn from this range of discussion? First, there is no agreement on a Critical Path, or

even on the need for such a Path. Second, this probably doesn't matter at all, as long as individuals and the organizations they comprise continue to do the work they judge most important. Third, this does provide useful guidance for the Space Studies Institute. It appears that there are two major research-related activities we must pursue. SSI should act as a clearinghouse for

projects, persons and ideas engaged in this work, to facilitate and accelerate their efforts. SSI must also select and promote an evolving scenario for space development, selecting and executing work that advances that scenario. If we have in fact learned what, at the most fundamental level, we set out to learn, then the session was a success.

Figure 1

- I. Scope of enterprise: Framing the issues
 - A. "Hard" considerations -- summarize actual concerns
 - 1. Technology
 - 2. Economics
 - 3. Safety
 - B. "Soft" considerations -- summarize perceived problems
 - 1. Public Opinion
 - 2. U.S. Politics
 - 3. International Relations
 - C. Scale of efforts needed to address hard and soft issues
 - 1. Governmental (and international)
 - 2. Corporate (and multi-national)
 - 3. Non-profit (and volunteer, etc.)
- II. Strategic choices: What is to be done?
 - A. Direct approach -- specifically address the issues, e.g.
 - 1. SPS constructability
 - 2. SPS financibility
 - 3. SPS biological effects
 - B. Oblique approach -- address related problems, e.g.
 - 1. Power for space platforms
 - 2. Terrestrial power beaming
 - 3. Power for space propulsion
 - C. Long-term approach -- educate for the future, e.g.
 - 1. Articles and media activity
 - 2. Lobbying and testimony
 - 3. Curricular material, prizes