SOCIOLOGY AND SPACE DEVELOPMENT

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I. Overview of Sociology and Space Development

Sociology organizes knowledge to identify and analyze more of the hidden potential in human behavioral systems. The tests of sociological concepts are in behavior, i.e., does the concept work in real life? Systems of sociological concepts can be broken into three basic categories: social systems, or systems of ways of doing things; cultural systems, or systems of meaning (e.g., language, values, beliefs, ideas); and personality systems, or systems of need dispositions (internalized cultural and social systems). Using each of these systems, sociologists attempt to identify patterns of relationships between events and the systems, as well as among sets of systems and events. Sociologists thus examine the consequences of behaviors resulting from social, cultural, and personality systems and from interactions among those systems. Sociologists also seek ways to encourage desired consequences. Because sociology constitutes a way of organizing knowledge about human behavioral systems, the discipline applies to any type of human activity.

The study of human behavioral systems encompasses almost every aspect of space development in the near and far term. Presently, sociological issues include astronaut survival and safety and mission effectiveness. As the presence of humans in space expands in scope and duration, the quality of life in space as well as on Earth becomes pertinent.

Moreover, the unique environments of spacecraft and early space missions, the limited crew sizes, and

the constrained Earth-space communication flows may enable sociologists to identify fundamental social processes to a degree not previously possible. In space, external influences are minimized, and information about behavior systems and their consequences is increased, but not beyond a manageable scope. Perhaps space development will be to the study of behavioral systems what the linear accelerator was to physics, enhancing the significance and development of human behavioral systems as a science.

With the move to space, humanity also has an unprecedented opportunity to maximize behavioral systems that significantly improve the quality of life. Never before has humanity sought to develop such an unbounded frontier with the aid of knowledge about arranging behavioral systems synergistically‹trying to insure that what is good for the individual is good for the group and vice versa. Consequently, space development represents an unprecedented new start‹a vast opportunity for fresh beginnings.

The overriding questions for behavioral systems studies become: What problems do we confront? What do we know? What don't we know? What do we want to accomplish? How do we accomplish our goals while at the same time preserving the integrity and interests of space crews?

In pursuing the answers to these questions, an important starting point is data from Soviet long-duration spaceflights, undersea expeditions, Antarctic research stations, submarine missions, and relevant simulations. Another important issue is the use of behavioral systems in the space program as a training tool versus use as a selection/elimination tool. For example, the Soviets have employed behavioral systems scientists to train cosmonauts to function at peak capacity under high stress. Such an approach is contrary to the current American practice of using behavioral testing as a criterion for including or excluding candidates for the space program. Soviet work in this area is thus unique and significant.

II. Technology-Based Instruction Modules

The sociological systems and issues discussed above can be applied to a variety of space technologies. Brief descriptions below review the sociological implications of Spacelab, the Space Shuttle, space applications and utilization, and permanent occupancy of near-Earth space.

A. Spacelab

With the advent of larger and more diverse crews living and working in space, human behavioral patterns become critical to mission success. Extremely complex schedules require careful orchestration of many variables for the smooth functioning of daily activities in orbit and on the ground.

(1) Cultural systems. Soviet experiences in the Salyut 6 space stations demonstrate that communication flows are a function of understanding many languages, notably the critical "spacecraft-ese" derived from the native language. However, fluency in that technical language, experimental languages, and Russian has not come easily to recent international crews. Furthermore, in an extreme emergency, rapid communication is essential, leaving little or no time for crew members to translate. Misunderstandings

have arisen from linguistic variances, as well as from culturally-derived values and beliefs. Since Spacelab expects to host international crews, this becomes an important area for study. Even when crew members speak the same language, there is not always a common understanding of intent. For example, facial gestures also are an important source of meaning and means of communication. However, as fluids collect in the upper body during spaceflight, the face becomes somewhat "bloated," interfering with facial gesture communication. The person is saying one thing, but facial gestures do not correspond with the intended meaning, thus creating stress and misunderstanding, as the Soviets have noted. Communication of meanings over electronic media is also a unique realm and the only link to Earth for the crews. Misunderstandings can occur easily, even using two-way video links (let alone computers or radios). Because accurate and clear communication flow is essential, consideration of cultural systems becomes important. Additionally, the meaning of participation in the mission itself is also significant, especially as flights become more routine.

(2) Social systems. The coordination of systems for operating in space is fundamental to mission success. The core of most missions includes factors such as authority systems, decisionmaking responsibilities, scheduling flexibility, work flows, leisure and personal activities, and mission management systems. Work in the Spacelab Mission Development (SMD) III simulation illustrated difficulties that have occurred and the impact upon the mission (1). Skylab experiences point to the importance of scheduling flexibility as well as interfacing between leisure and personal activities. Soviet experiences underline similar points. Moreover, the introduction of mission specialists, payload specialists, and scientists into Shuttle missions brings a new dimension to missions regarding expectations about how jobs are to be done as well as how decisions are to be made.

(3) Personality systems. The Soviets make significant efforts to ensure the personal compatibility of flight crews as well as to relieve psychological and interpersonal stress. The Soviets also have instituted a vigorous socio-psychological training program to facilitate cosmonaut self-confidence, independent judgment, and resistance to emotional stress in isolated and confined conditions. The Soviets also operate an in-flight socio-psychological program designed to identify and relieve increased stress levels. In spite of these precautions, the Soviets have encountered problems of hostility among members of the prime crew as well as between the crew and the ground control staff. Experiences with work crews in isolated research stations at the Antarctic and elsewhere document similar difficulties. However, to date the American space program has employed only limited psychological interviewing, testing, and screening to determine flight suitability of candidate astronauts. There have been some incidents on American spaceflights that indicate potential sources of interpersonal stress, and such problems assume increasing importance as mission crew personnel become more diversified and missions become longer. Furthermore, Spacelab's sexually mixed crews require study of need dispositions relative to sex role expectations, especially in high-stress or emergency conditions.

B. Space Shuttle

U.S. experience during the SMD III Management Study identified many mission development problem areas.

(1) Cultural systems. The study found that personnel often had different interpretations of mission directives and experiment parameters. Specifically, payload specialists have unique orientations and special backgrounds that must be interfaced with NASA management systems, lest the significance of space research and activities be seen from the perspective of academic or industrial career requirements, which can be inconsistent with NASA objectives.

(2) Social systems. The SMD III study demonstrated important problems of management coordination between space centers and payload or mission specialists. To date, NASA has shown extensive management expertise, but Shuttle missions will pose new management problems; for example, once numerous missions are planned simultaneously, with participation stretching around the world, management of behavioral systems will grow in complexity, requiring especially fine tuning.

C. Space Applications and Utilization

Remote sensing, information, and communication satellites can have a major impact on societies in the United States as well as in developing countries. Adequate application of human behavioral systems may prove a decisive factor in effective utilization of such technologies.

(1) Cultural systems. Many developing countries find new or alternative technologies to be mixed blessings. At times such technologies radically disrupt ongoing cultural systems, yet provide no new systems of meanings in their place. At other times, developing countries decide that current values and ways of thinking are inconsistent with newly-introduced technologies. Some people perceive‹ correctly or incorrectly‹that the new technologies constitute a threat to old ways, and, consequently, such people resist the introduction of the technologies. A thorough understanding of the impacts of new technologies upon the cultural systems of advanced and developing nations is essential if the new technologies are to be integrated into societies and prove valuable.

(2) Social systems. Since new or alternative technologies often are developed in the West rather than evolved within developing countries, such technologies usually are introduced on top of social systems that are not necessarily compatible with the new capabilities. Again, this type of progress can be disruptive to the population, the success of the technology, or both. People need to know how to use the technologies to their advantage, as well as develop the skills necessary to work in technology-based business and industry. Expectations about factors such as work habits, scheduling, and decisionmaking are integral to the success of new technologies and must be delicately interwoven with the ongoing social systems. The technologies themselves can be useful in pursuing this objective: for example, information and communication satellites are an important means of educating local populations, as the ATS 6 communications satellite demonstrated in India (2). Satellite communications also can provide new channels for interaction among the business, industrial, and scientific communities, for example, by providing capabilities to conduct conferences, acquire timely market information, and exchange research and other data. In short, it is not sufficient to simply introduce new or alternative technologies; interfaces with local social and cultural systems must be forged if technologies are to be optimized.

(3) Personality systems. The need dispositions of many people in the developing world are different from those of people in the West; i.e., people in developing countries often have different desires and respond to different goals, all of which are an intrinsic part of their emotional make-up. Successful introduction of new or alternative technologies‹such as remote sensing and communication or information satellites‹must be assessed with this concept firmly in mind.

D. Permanent Occupancy of Near-Earth Space

Much of the research and analysis relevant to Spacelab applies to human occupancy of permanent space stations in low-Earth orbit and geosynchronous orbit. However, in permanent space stations, crew size will increase, as will time in orbit. Moreover, crews probably will be more mixed in professional background and training. Soviet experience in Salyut demonstrates that the longer the orbital stay, the more crucial human behavioral systems factors become. Furthermore, research conducted on workers in submarines, Antarctic research stations, undersea laboratories, pipeline crews in Alaska, and simulations confirms the potential disruptive power of interpersonal stress factors, which might ultimately pose a threat to mission safety and success. In addition to limiting factors noted for Spacelab, the environment and behavioral systems interfaces become important for longer-term space stations. For example, the flow of interpersonal relationships is influenced by the layout of the physical environment. Plans and areas for privacy, leisure, work activities, and personal maintenance all relate to the level of stress experienced by the crew. The nature of the physical layout itself is important: flexibility in fixtures and variety in the visual surroundings should be emphasized. Earth-to-space communications also assume increased importance in long-term occupation of space; people in remote stations may find that frequent interactions with Earth-bound friends, relatives, and associates are necessary to maintain their self-images during extended space duty.

Military uses of space, such as the introduction of space-based laser or particle beam weapons, may have a major impact on the way people think and relate to the world. If the threat of nuclear war is removed to space, what will the impact be? Furthermore, how would such a development affect international relationships, relations with developing countries, and other international links? Finally, crews manning space military units would be subject to pressures quite distinct from those affecting crews in civilian bases: For example, what measures would be required to preserve the crew's ability to function in such an environment?

E. Large-Scale Space Operations

In the long term, projects such as expeditions to outer planets or permanent human settlement of the Moon pose many human behavioral systems issues. For example when people moved from Europe to the New World and then on to the far West, the people and their cultures changed. Attitudes, values, and ways of living underwent significant alteration, and societies evolved with many members who could not be happy or comfortable in their old homes. The same phenomenon will affect those who opt to settle the planets. Moreover, such pioneers will develop immunological, cultural, and social divergences. In the past, however, pioneers sought new frontiers with new options, but brought little scientific

knowledge about new ways of arranging behavioral systems. Consequently, new values and methods of operation evolved, but randomly. However, now it should be possible to apply behavioral systems approaches to the design of lunar and space communities, seeking to optimize the synergy between the individual and the group. Unlike specters of 1984, current research concludes that behavioral systems changes must be voluntary if they are to be successful. Behavioral systems cannot make someone self-confident, but they can afford opportunity for growth and for smooth-flowing patterns of interaction.

Appendix Two provides details on a course taught at California State University, Northridge.

Footnotes

1. The Spacelab Mission Development (SMD) III study employed a simulation in which Shuttle crews, ground control staff, and the principal investigators worked together on Spacelab experiments. A number of potential problems in coordination were detected.

2. The ATS 6 was an experimental communications satellite designed in part to bring educational television programming to parts of rural India.

Appendix Two

Sociology

Teaching Strategies, Select Bibliography, and Course Description and Syllabus

B.J. Bluth Sociology Department California State University, Northridge

I. Teaching Strategies

Teaching experience from two courses is reviewed briefly below.

(A) Update on Space Program. Since 1978, the Update on Space Program has been conducted each summer at California State University, Northridge. This program has three elements‹speakers, a semester project, and readings (each discussed below). Additional materials on the program are included in the course description and syllabus.

(1) Speakers. Many people do not really believe that our society will move into space to live and work during their lifetimes, let alone in the near future; space development often appears to be a spectacular fantasy. To provide an understanding of real possibilities, options, and time frames, various speakers actually working on space projects are invited to brief the program participants. Each speaker assumes a position of responsibility in the program and presents material to an audience of intelligent novices. Speaker topics include technology, hardware, military applications, research, social and psychological issues, energy, benefits of space operations, communications and information satellites, remote sensing

satellites, space stations, lunar habitation and mining, space and the evolution of the species, asteroidal mining, and education and public participation .

(2) Semester project. Each graded participant writes a term paper on some aspect of space from the point of view of human behavior systems. Topics have encompassed areas such as: stress vs. isolation in space stations; mixed crews; selection procedures used in the U.S. space program; work team effectiveness in space; leisure in lunar colonies; designing a recreation program for space colonists; education in space; changes in consciousness in space; minimizing role conflict; search for the ideal work structure; the community as a paradigm for space colonies; isolation and confinement considerations for space; satellite solar power stations and public concern; expanding our limits; shifts in legal requirements for space; the Moon Treaty; effects of crowding in residential areas; social and psychological evolution in space colonies; political allegiances and space colonies; and a program for educating today's children about space. Students with minimal social sciences background receive basic sociology references and guidance in other potentially worthwhile areas.

(3) Readings. All students receive extensive reading lists that correspond to speaker presentations and add items relevant to the social sciences.

(B) Astronautical Sociology. Astronautical sociology is a graduate class that assumes some familiarity with the potential of space development. However, the course does start with a slide presentation on options, possibilities, and problems encountered in the behavioral systems to date. The course employs the seminar format, with discussion centered on readings and related research in the socio-psychological aspects of long-duration spaceflights. Also, the faculty extensively familiarizes students with research materials on space and briefs students on means of obtaining Soviet materials. Student assignments include searches of STAR and IAA, NASA classification systems, and other government and industry document systems.

II. Select Bibliography

General Sociology Texts

Jacob Bronowski. "Science and Human Values." Harper & Row, 1956. Neil J. Smelser. "Sociology." Prentice-Hall, 1981.

Astronautical Sociology

B.J. Bluth. "Alternative Social Structures in a Vacuum." In: Richard van Patten, Paul Siegler, and E.V. B. Sterns (eds). "The Industrialization of Space: Advances in the Astronautical Sciences." San Diego: Univelt, Inc. Vol. 36, II, 1978.

B.J. Bluth. "Consciousness Alteration in Space." In: G. O'Neill (ed). "Space Manufacturing 3." American Institute of Aeronautics and Astronautics, 1980.

B.J. **Bluth**. "Constructing Space Communities, A Critical Look at the Paradigms." In: R. Johnson, et. al. (eds). "The Future of the U.S. Space Program, Advances in the Astronautical Sciences." San Diego: Univelt, Inc. Vol. 38, 1979.

B.J. **Bluth**. "Social and Psychological Problems of Extended Space Missions." In: "Global Technology 2000." American Institute of Aeronautics and Astronautics, 1980.

B.J. **Bluth**. "Sociological Aspects of Permanent Manned Occupancy of Space." AIAA Student Journal. Fall 1981, pp. 11-15, 48.

B.J. **Bluth**. "Soviet Space Stress." Science 81. Vol. II, No. 7, September 1981, pp. 32-35.

B.J. **Bluth** and S.R. McNeal. "Influential Factors of Negative Effects in the Isolated and Confined Environment." Proceedings of the Fifth Princeton/AlAA/SSI Conference on Space Manufacturing.

B.J. **Bluth** and S.R. McNeal. "Update on Space: Volume I." National Behavior Systems, 1981.

S. Cheston and D. Winter. "The Human Factors in Outer Space Production." American Association for the Advancement of Science, 1980.

O.G. Gazenko, V.I. Myasnikov, K.K. Ioseliani, O.P. Kozerenko, and F.N. Uskov. "Important Problems of Space Psychology: As Evidenced by the Salyut 6-Soyuz Manned Missions." Paper presented at the XXVII International Congress of Space Medicine, 1979.

Robert Helmreich, John Wilhem, Trieve A. Tanner, Joan E. Sieber, and Susan Burgenbauch. "A Critical Review of Ames Life Science Participation in Spacelab Mission Development Test III: The SMD Management Study." NASA TM 78494. June 1978.

Nick A. Kanas and William E. Fedderson. "Behavioral, Psychiatric, and Sociological Problems of Long-Duration Space Missions." NASA TM 58067, October 1971.

J.A. Rummel, et. al. "Spacelab Mission Development Test III (SMD III) Final Report: Scientific Experiments." Vol. I, JSC-13950.

Sherman P. Vinograd. "Studies of Social Group Dynamics Under Isolated Conditions." NASA CR-2496, December 1974.

III. Syllabus

California State University, Northridge

Course: Update on Space
Instructor: B.J. Bluth

The 1979 Update on Space was an educational experience offered as a sociology course through California State University, Northridge. Students, paraprofessionals, and professionals were invited to participate in a multifaceted program designed to provide the most up-to-date information of space-related activity in several different disciplines.

The major facets of the program included:

Speaker presentations An agenda of knowledgeable people actively involved in space-related activity presented up-to-date information in their areas of expertise. A list of speakers and the titles of their presentations are included.

Field Trips
TRW facilities
Jet Propulsion Laboratory
Rockwell Space Shuttle Mock-Up

Luncheon Program
Seven to twelve class participants accompanied each speaker to lunch for an informal exchange of information and ideas. Students paid for their own lunch and contributed towards the cost of the speakers' lunches.

Participant Feedback
Following completion of the course, extensive participant feedback was solicited by survey.

Schedule and Topics

Week #1
Introduction
Tom Logsdon, Rockwell International. "The Science Fact of Science Fiction."
George Butler, Director, Advanced Space Concepts, McDonnell Douglas Astronautics. "Manned Space Platforms‹Past, Present, and Future."
Dr. Richard Johnson, Chief. Biosystems Division, NASA, Ames Research Center. "Design Considerations for Space Habitats . "
Gary' Hudson, President, The Foundation. "The Commercial Use of Space."

Week #2
Bob Hammel, Manager, Space Processing Applications, TRW. "Materials Processing in Space."

Trip to TRW facilities.

Dr. **B.J.** Bluth. "Authority Conflict and Astronaut Stress."

Richard A. Colla, President, Rico-Lion, Ltd. "Television and Space Realities."

Week #3

Trip to Jet Propulsion Laboratory: Voyager Fly-By of Jupiter.

Curtis Graves, NASA, Chief of Education and Community Affairs. "Educational Resources and Problems."

Dr. Peter Vajk, Science Applications, Inc. Author of "Doomsday Has Been Cancelled" and SAI "White Paper on Alternative Financing for SPS."

Jerry Hanley, Manager, Solar Power Satellite Project, Rockwell International. "Solar Power Satellites."

Dr. Rein Turn, Process Design, TRW. "Computers in Space and the Future."

Week #4

Captain Stan Rosen, USAF, Spacecraft Manager of the Defense Satellite Communications System Program Office.

Dr. Joe Angelo, Los Alamos Scientific Laboratory. "The Role of Man in Space: Payload Specialists and Non-Career Astronauts."

Trip to Rockwell International Shuttle Mock-Up. Presentation by John Dunstan, Instrumentation Systems, Rockwell. "The Landsat Program."

Dr. Kirk Stone,* Research Professor, Department of Geography, University of Georgia. "Selection of Settlers for Outer Space Colonizing."

Day open for trip to Apollo Exhibit at Museum of Science and Industry.

Week #5

Dr. Robert Helmreich, Professor and Chairman, Graduate Program in Social Psychology, University of Texas, Austin. "Psycho/Social Aspects of Habitats."

Sandy Shokocious, Biochemist and co-author of Life Extension. "Extending Life and Intelligence in the Future."

Howard Nellor, Hardword Project Manager, Tracking Data Relay Satellite System, TRW and Colleen Feldman. "Industry and Government in Space Programs."

Dr. Sally Ride, NASA, Astronaut Candidate. "Women in Space."

Durk Pearson, TRW. "Inertial Confinement Fusion Propulsion."

Week #6

Dr. Stephen Cheston, Professor and Associate Dean of the Graduate School, Georgetown University. "Space Social Science: An Emerging Discipline."

Al Kazanowski, Senior Member of the Technical Staff, Advanced Programs Department, Space Division, Rockwell International. "The Russian Space Program."

Dave Reed, Member of the Technical Staff, Advanced Programs Department, Space Division, Rockwell International. "The Starraker."

Maxwell W. Hunter II, Assistant to the Vice President of Research and Development for Strategic Affairs, Lockheed Missiles & Space Co. "Laser Propulsion Concepts."

Dr. Krafft Ehricke. President, Space Global, Inc. "The Extraterrestrial Imperative."
*Dr. Stone was unable to attend and S.R. McNeal of Loyola University presented a briefing on the public response to the Chicago Spacewatch Program.

Readings [all required readings noted with *]

Week #1
*O'Neill. "The High Frontier." Or Heppenheimer. "Space Colonies."
Should be read early as they constitute the necessary background for the whole course.
Bova. "Analog Science Fact Reader."
Stine. "Science Fiction is Too Conservative."
Logsdon. "The Rush to the Stars."
*NASA. "Why Men Explore."
*Salkeld. "Space Colonization Now." (xerox reader)
NASA. "Skylab, Our First Space Station."
"Worlds Beyond." Input 8.1.
Johnson. "Space Settlements: A Design Study."
*"Private Space Shuttle." (reader)
"Worlds Beyond." Sequences 9, 10, 11.
Stine. "The Third Industrial Revolution."

Week #2
*"Space Humanization Series" (SHS). Von Puttkamer. "The New Age..."
"Space Shuttle."
NASA. "Apollo-Soyuz Pamphlets 7 & 8" (on Biology and Tech nology in 0-g).
*NASA Facts. "The Space Shuttle."
*SHS. Sieber."Well-Being..."
"Worlds Beyond." Sequences 2, 3, 4.
Brand. "Space Colonies." Schweikart, pp. 110-113.
Brand. "Space Colonies." Berry, pp. 82-85 and selections from pp. 33-69.

Week #3
*NASA Facts. "The Voyager Mission."
*SHS. Logsdon. "The Policy Process..."
Bronowski. "Science and Human Values."
Vajk. "Doomsday Has Been Cancelled."
"Worlds Beyond." Sequences 6 & 7.
Brand. "Space Colonies." Schweikart, pp. 74-81.

Week #4
*"The New Military Race..." (reader)
*SHS. Michaud. "The Anti-Satellite..."

*"Astronaut Selection and Training." (NASA handout)
"Worlds Beyond." Sequence 9.
*SHS. Salmon. "Power Over..."

Week #5
*Helmreich. "Psychological Considerations..." (reader)
*Prieser. "Habitability Considerations..." (reader)
Rosenfeld. "Prolongevity."
*Stine. "Govt. & Industry..." (reader)
*SHS. Chafer. "Space Policy..."
*Review: SHS. Sieber. "Privacy..."
Review: "Astronaut Selection..."
Brand. "Space Colonies." Schweikart, pp. 138-45.
"Worlds Beyond." Sequences 15 & 16.

Week #6
*SHS. Cheston. "Space Social Science Suggested Paths..."
*SHS. Chafer. "Space Policy..."
Review: "New Military Race..." (reader)
Review: SHS. Michaud.
Brand. "Space Colonies," pp. 12-21.
*Ehricke. "The Extraterrestrial Imperative." (reader)

Very little work has been done on the sociological implications of the move into space. Students taking the course for credit are asked to write a term paper on some aspect of the sociological dimension, using proper library research methods and term paper format and covering at a minimum fifteen pages. The paper will be due the last day of class.

The subject matter of the paper should be seen from a perspective taken from the social sciences, sociology in particular; however, the topic should be one that is of particular interest to you. Interest has been shown in this course, and some of the papers may be published in complete or summary form in various journals or books, depending on their quality and general interest.

Since the backgrounds of the students taking the course vary considerably, that will be taken into consideration in the evaluation of the papers. Please give a brief indication of your academic status in the beginning of your paper.

In the event you are at a loss for a topic, one technique might be to take an introductory sociology textbook and ask how humanity's move into space might be a source of change or difficulty. For example, you could look into the chapter on poverty, consider the suggested origins and causes of poverty, and then ask if this set of conditions would apply in space settlements, and, hence, if we could expect to have poverty in the habitats humans build in space. Some further examples of potential project

areas are:

1. Identify some of the elements of culture and social systems that are built up as adaptations to the physical environment of planet Earth, such as time, space, land use, water, etc. and consider the ways such values and norms might be changed by moving into completed artificial habitats in space. What would be the significance or potential impact?

2. Language is a vital social invention that acts as a glue for society. How much do you think the language of space settlers will become unique to them, and what effect could that have on the communication and interaction with Earth? (This would require that you examine the dynamics of language development and use, etc.)

3. Examine the sociological literature on the causes of one of the following and project the various possibilities for their development or lack of development in space settlements. Suggest some procedures that might be used in trying to prevent the development of the following in space settlements: Crime, Delinquency, Suicide, Anomie, Prejudice, Addiction, Poverty, War, etc.

4. The "Significant Other" and "Reference Groups" are important sociological concepts. How might these processes of socialization be affected by the move to space and what might be some of the consequences?

5. Stratification is an important sociological concept for understanding the divisions that arise in societies and the distribution of wealth, power, and mobility. Consider the origins and functions of stratification and project the ways stratification might develop in space settlements and the impact of such developments.

6. Many modern institutions have been subjected to tremendous pressures in modern technological society. Choose one of the following and consider the ways that institution might change in space settlements as well as the importance of such changes:
Marriage Family
Education Religion
Politics Bureaucracy
Military Work
Leisure News Media

7. There are serious proposals for international space settlements. What problems and possibilities do you see in such a situation?

8. A number of our speakers indicate,that humans will experience a radical change of consciousness when they move into space‹an evolution in consciousness will take place. Do an in-depth analysis of this idea from the perspective of social science.

9. Rosabeth Kanter has developed a stringent set of commitment mechanisms for the development of community in her book, "Commitment and Community." At the same time, some of our speakers are suggesting that the trend for development of the quality of life in space should follow the ideas of Abraham Maslow for self-actualization. Do you recommend such a course for the planners of space settlements?

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