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MULTICULTURAL ISSUES IN LAW & ETHICS OF INTERNATIONAL SPACE STATION (ISS) ASTRONAUT-RELATED MEDICAL DECISION-MAKING*

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Abstract

Since the 1967 “Outer Space Treaty” (OST)² introduced the term “Envoy of Mankind”, interpretations of universal policy and its relevance to law and human space flight have been debated. More recently, team representatives of the International Space Station (ISS) Partners have drafted medical standards for integrated astronaut crews. This new kind of multicultural, diplomatic environment furthers human cooperation both on Earth and during space flight. The decision-making processes increasingly bridge disciplines and influence issues of information control. This paper raises questions pertinent to both contemporary space law and ethics. It presents an analysis of links between space law and space medicine, and considers the potential of multilateralism for serving to further develop humanity in Outer Space. It may not be easy for the Partners to reconcile the desire to contribute to successful ISS medical and legal teams, while still maintaining a degree of national autonomy. This paper demonstrates that varied

experiences and cultural perspectives may still strengthen and facilitate astronaut-related medical and legal decision-making toward the implementation of standard policy.

Preface

Policy, law and medicine are becoming increasingly inter-related. The aim of this paper is to invite lawyers, in particular, to consider some issues that require further reflection and analysis. It addresses the potential of multilateral medical decision-makers to further the development of humanity in Outer Space. For the purposes of this paper, the term “Envoys of Mankind” as used in traditional space law means members of integrated crews of the International Space Station (ISS). This research initiative is part of the author’s doctoral project that examines the role of hegemony (i.e. leadership through political domination) in multilateral decision-making and astronaut-related ISS standardization processes.

The paper explores how, in this new diplomatic environment, the use of mediation

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may facilitate increased cohesiveness in multinational astronaut health-related negotiations and practice alongside other astronaut-related professionals.

Introduction

Law and ethics in contemporary society concerning the medical-related aspects of human space activity are influenced by the speed of international team developments in space medicine. These challenges relate less to technical aspects of medicine than to how multicultural decision-making teams can proceed ethically when drafting global standards for application to successful ISS activities. Medical teams must consider their activity in relation to rapid developments made by other ISS astronaut-related decision-making teams concerning law, engineering and management.

Medical standards for astronauts are being drafted by a team of representatives of ISS Partner space agencies³. In itself, this may be perceived as a new type of “quasi” diplomatic environment. Effective, internal negotiation has the potential to strengthen and facilitate the medical policy standardization process. Mediation could help here and also possibly impact the relationship between cooperation and competition between related astronaut decision-making teams.

If ethical rules applied to astronaut space medicine are solely ethical in nature, that is, if they only deal with rights and obligations in a moral sense and cannot be reduced to legally enforceable principles or standards, then they should be rooted in ethical principles that govern society as a whole. How such principles apply to the development of medical standards regarding astronaut selection, training, monitoring during missions and post-mission medical

follow-up, will be viewed alongside specific ethical challenges faced by health professionals in the sensitized environment of a multilateral space endeavor such as ISS.

Global Astronaut Medical Policy-Making: Relevance to Ethics & Law

Medical practice concerning human space flight deals with monitoring and preserving human health, as well as diagnosing and treating human mental, physical and behavioral problems. This area of scientific expertise in theory transcends national borders. Nevertheless, in practice, Russian and American experience in human spaceflight forms the foundation for ISS global medical policy.

The historical, political relationship between nations may then influence human perception and behavior, and complicate medical team cooperation. The influence of the political environment on other astronaut decision-making teams⁴ in turn, also impacts medical team decision-making for ISS. These combined effects may then enhance integration or facilitate fragmentation of both medical teams and national boundaries. In a way, more physicians representing different countries may interact, learn from each other and cooperate. In another way, inequalities and disparity in medical knowledge and experience may be overemphasized. How the evolution of both will coincide (or not), will largely depend on the nature and evolution of cooperation between ISS Partners, as well as individual attitudes concerning working with respective Partners. Hence the role for mediation, to ensure that the “positive aspects” prevail as opposed to negative aspects of political and cultural differences. Religious beliefs aside, what is medically possible tends to be determined by the use (or not) of technology, confidence in the

knowledge, judgment and ability of the care provider, and the care-provider's faith in himself. Yet, when some medical team members are more experienced than others, and if they perceive a blurring of medicine and national policies, this may render problematic a highly interactive, international decision-making process to develop homogeneous crew medical standards for different missions and schedules. Addressing the role of ethics and policy-making would help one to better understand the internal power dynamics of this standardization process for astronaut-related medical issues. Ethics are moral principles or value judgments often translated into rules of acceptable conduct⁵. Both human perception and reference to history (e.g. customs and practices)⁶ would help define acceptable astronaut medical standards and related professional practice under given circumstances.

Take for example, the European approach to developing manned space flight programs. They have less mission experience than the Russians and Americans. Yet, the Europeans have evaluated and compared different cultural approaches and experiences⁷ in order to develop a more global, internal perspective⁸. As a result, Europe may well be in a more informed position in this regard to contribute to effective global cooperation in multilateral space endeavors.

Yet, customs or a code of conduct (soft law) may still be problematic as physicians seek to institutionalize new medical policies. Streamlining training for instance means sacrifices or concessions may be made by those parties with more experience. All astronauts do not train on every kind of equipment in a spacecraft, nor is it necessary to undergo training at every ISS partner

training center for each mission. This would also not be economically viable. Where would law fit in?

Since laws are established by an authoritative body, they are traditionally associated with politics and national territories. They are made applicable to people by legislation, decrees and judicial decisions. Aside from the mandatory affect of these laws on those persons subject to them, there can be an inner, psychological motivation to adhere to those norms that are associated with mutual interest between the concerned parties. The multicultural, pragmatic approach of ISS medical teams is strongly linked to custom. They seek to establish guidelines for achieving maximum harmonization of ISS astronaut training, activity and related medical standards. This is preferred rather than more formal negotiation of rules to be ratified by government at the parliamentary level.

ISS Medical Networks

The physicians and medical support teams involved in ISS have created their own network to facilitate cooperation and joint actions⁹. Improved frequent communication (such as via the Internet) promotes more global dialogue in the intervals between in-person meetings. Negotiations, whether at these meetings or otherwise, are influenced by formal legal regulations associated with information exchange. These guidelines will be invaluable when medical groups consider how best to address global, regional and local issues involving astronauts.

For example, one might consider how ethical issues concerning medical communication could arise. As public-private partnerships¹⁰ evolve, physicians employed by State agencies may be responsible for the health of astronauts engaging in experiments

for private companies. If the patients' health is in danger then the physician may be obliged to make a decision that has implications for both public and private parties involved.

The aim of these physicians is nonetheless, to promote the global respect of ISS astronaut medical policy, and thus, to instill a moral obligation to which users and other parties should adhere. Policies must translate into incentive structures.

It appears that global astronaut policy may have a built-in incentive structure. Since integrated teams will represent the countries that contribute to the drafting of these standard policies, each participating country has an economic, political, professional and human interest in adhering to the global regulations. Yet, there is also a moral obligation which may only be developed through time as faith and trust develop between the parties involved.

For global astronaut medical policy to be effective, it is essential that measures outlined be perceived as being just and fair, as well as understood by individuals whose first language is not English. The involvement of non-politician actors in the development of astronaut medical standards is essential not only for developing better-informed professionals, but also for awareness-building, more effective specialized implementation, more appropriate monitoring of human subjects in extreme environments and encouraged compliance by interdisciplinary experts. To help explain and also to compel thought about how such standards and limits for human experimentation are established, evolving conduct is considered.

Multinational human space flight policy is increasingly important because of ISS. Representatives of Partner States, and

government staff of ISS Partner space agencies from Canada, Europe, Japan, Russia and the United States, have drafted global standards of "legally acceptable" behavioral conduct for astronauts.

More recently, global medical issues and safety are key. ISS medical team policy would be expected to be grounded in common, professional medical issues. It would be affected by differences in perception, ideology and experience of individual medical (and support) team members. These factors impact the evolution of acceptable astronaut standards and also those standards meant for passengers or future space tourists¹¹.

An Internal Approach

Notably, the ISS cooperation has resulted in Memorandums of Understanding (MOU)¹². These MOUs introduce the changing role of multilateral medical boards¹³ as regards space activities. Such bodies are composed of flight surgeons and medical support teams of ISS partner space agencies. Individual physicians with different levels of experience and different cultural perceptions, linguistic and other backgrounds, develop together the evolving ISS astronaut medical and health standards applicable to the new global environment of space activities.

The ISS Multilateral Medical Operations Panel (MMOP) members represent the official Partner States, and as physicians, are key actors in the defining of global astronaut standard medical policy¹⁴. Amongst themselves, these physicians consider the input of respective team members' experience, as well as physiological/psychological and other factors relevant in defining astronaut medical policy standards.

The ethics and law to be considered by the

panel members relate to astronaut medical policy in four crucial areas:

- a) astronaut selection : standardized, use by designated committees in each ISS Partner State;
- b) astronaut training : standardized, partially according to ISS infrastructure functions and directed by States contributing these parts, partially according to experience related to human survival and adaptability in extreme environments;
- c) astronaut monitoring during missions : standardized limits of acceptable activity and subject experimentation; and
- d) post mission medical follow-up: standardized procedures/ tests ; baseline Earth environment.

Consider some hypothetical examples: If an ISS astronaut has appendicitis or heart problems, will the other crewmembers have training in basic medical diagnosis and treatment? In CPR? What level of basic medical training will be required or considered acceptable for and by crew members so that integrated astronaut teams will be considered equipped to deal with possible medical complications during long term missions?

It is also useful to consider technology as an evolving interface for astronaut data acquisition and storage, as well as a diagnostics tool to aid ground-based medical support¹⁵. Such issues may be associated with legal policy, information transfer and control, and may influence relationships between medical decision-making on ground and in space. Evolving standards of astronaut medical care may redefine the meaning of responsibility and liability, (e.g. malpractice and negligence), thus adding a political/legal dimension to the consequences of a tort (injury) committed on an astronaut in-orbit.

Since the transfer of information via technology is partially regulated for reasons of responsibility and liability¹⁶, astronauts as space research subjects may be compared

with technology. Diplomats¹⁷ are meant to bridge gaps between technology and existing policy. Politicians often have the last word on implementing policy, and tend to associate scientific credibility with high quality studies. “High quality” is traditionally associated with random-blinded studies where individual experimental subjects do not know what role they play and are randomly chosen¹⁸

Astronauts are selected after consideration of relatively rigid criteria and tend to only volunteer as experimental subjects in space when they are thoroughly informed of procedures, associated risk and rationale of experiment¹⁹.

In turn, pro-activity in law and policy-making suggests the need for the respective disciplines to identify and study areas where solutions might be considered for astronaut medical scenarios that have yet to occur. For instance, it is important to hypothesize situations involving astronauts that could occur on ISS such that medical policy standards drafted today might remain flexible enough to be applicable to the greatest number of scenarios.

Yet, as space physicians redefine standards and clinical significance of perceived conditions, crucial decisions are not necessarily based solely on research statistics. Instead, physicians increasingly place emphasis on their understanding of basic biology, clinical observations and knowledge of how the human body functions in different environments. It is physician teams (as opposed to politicians) that must determine acceptable astronaut medical policy standards relevant to groups of respective ISS program participants²⁰. Focusing on the boundaries of information sharing and control could contribute to a better understanding of ethical and other

obstacles. It can also help people circumvent conflicts or adapt to disagreements more appropriately.

Legal Issues concerning Physician Teams & Human Space Standard Policy Users

Specific legal issues (e.g. standard of care, liability) would influence the interactions between multicultural physician teams and users of standard medical treatment in space²¹. The negotiation of ISS manned space flight policy, including its ethical implications would also be affected.

Since astronaut crews increasingly integrate individuals of different nationality and culture, the potential for multicultural issues to strengthen medical group decision-making on Earth has been recognized. Such medical exchanges must consider: the compatibility of cohesive team actions with respective national laws about physician-patient confidentiality and privacy concerns with respect to medical information transfer between professionals, as well as information exchanges made between national boundaries. These modern astronaut issues are not overtly covered in space law treaties²².

An exception may be in Article 2 of the Astronaut Rescue And Return Agreement²³ which states that, “States will provide all necessary assistance” to astronauts of another state found in their territory. One could reasonably argue that this obligation to furnish “assistance” includes medical treatment. Thus, on Earth, space law appears to encompass the obligation of medical assistance, which is a component of astronaut (rescue and) protection.

Yet, consider for example, the case of medical assistance furnished to an astronaut on the ISS. Here, the comprehensive regime of cross waivers of liability set forth in the

1988 ISS Intergovernmental Agreements do not waive the right of natural persons to pursue claims of liability for damage such as the death or bodily injury caused by another astronaut²⁴. Thus, it has been suggested²⁵ that diplomatic immunity (protection) should be conferred to astronauts by each Partner State to protect them from personal liability, thereby accomplishing such a waiver in effect.

The Five Space Treaties consider an “Envoy of Mankind” generally as an extension of the State²⁶ without formally recognizing the value of knowledge of Earth-based medical experts. The treaties also mention that humans in space play a role in advancing scientific research. This could benefit humanity and follows the Common Heritage of Mankind Principle²⁷. The key points in these Space Treaties emphasize the power of political decision-makers and the responsibilities of astronauts. Yet, the ISS multilateral agreements in some ways begin to expand and enshrine traditional space law. The participation of knowledgeable medical experts is formally recognized, and thus deemed meaningful and valuable here.

On another “legal” level, physicians make promises via the Hippocratic Oath as witnessed by their respective national medical communities. This can be considered “soft” law because it is a moral or formal professional commitment rather than a legislatively imposed rule with sanctions.

Doing no harm to patients is an understood code of conduct²⁸ on Earth and should likewise, extended by appropriate means (e.g. as international law or domestic law, as part of the legal regime of the State having jurisdiction over the space object and personnel therein”) to medical practice in Outer Space. Disregarding this oath on Earth

by unethical behavior may result in physicians losing their license to practice, and even being exiled from the medical profession by their peers²⁹. Reputation and respect are highly regarded within this profession. Extreme violations to patient rights may constitute criminal acts in addition to civil liability imposed under national law³⁰. These points should be understood in the extreme case of deliberate medical negligence committed in space. Take for instance, the plausible failure of a physician on Earth to communicate knowledge of detected astronaut physical problems to the astronaut in space, the lack of which results in death or the serious illness of or injury to the astronaut.

Communication between Space Physicians & Other Professional Groups

Legal and ethical issues regarding communication between astronaut medical teams with persons/groups who are not astronauts, also merit attention. The ability to maintain a certain necessary autonomy in the medical decision-making process, while contributing to successful space medical teamwork with other space professionals, may not always be as straightforward as one might expect³¹. There may be considerations of both competition and cooperation, as well as the desire to maintain technological or experiential leadership (on personal, national or for other reasons) that complicate the success of medical team efforts.

Take for example, the notion that Russians have more experience in long duration space flight missions but that Americans have the most economic investment in ISS infrastructure³². It is possible that Americans may wish to translate their technological and economic influence into a leadership role in astronaut medical “team”

policy-making. The parameters of acceptable medical team conduct will have to evolve accordingly.

The process of defining global standards for astronaut conduct and “integrated ISS crew” medical issues also compels reflection. Is it possible and even desirable to reconcile the perceived need of increasing international cooperation in human space activities with a simultaneous desire to preserve autonomy and cultural diversity? If so, with what sacrifices and to whom? These are not easy questions to answer when political struggles in the world concerning economic and technological growth, as well varying national interests separate ISS Partner States in other environments. For example, consider parallel sanitary and phyto-sanitary measures and international standard-setting activities in multinational trade agreements. A historical comparative study reveals applications of value judgments³³.

Certain results of astronaut-related decision-making, and the impact of evolving multilateral medical and behavioral standards, on the conduct of integrated ISS crews has yet to be determined in practice. Key questions posed here include how might quasi-predictable circumstances and environments in space effect the conception and execution of standards created for astronauts? Can astronaut-related legal and medical issues serve as effective contemporary control mechanisms for astronaut adaptation and quasi self-governance in space? Basic positions will now be considered via a mediation approach.

Critical Approaches to Communication: Mediation

It is relevant at this point to refer to Greek mythology. Hermes is often referred to as a messenger as well as the god of diplomacy³⁴.

His experiences in languages and with travelers make him appear as a mediator. He often seems to both constitute and work at the boundaries of different worlds, aiming to compel reflection and link what is traditionally separate.

To some, Hermes may also represent an unsettling figure, a rebel against both divine and human order, an advance prospector (in the minds of some people however, transgressor) of boundaries he sets to cross. This could seem intimidating from certain points of view.

In some ways, Hermes as a symbol redefines applications of ethics. Hermes' role is somewhat comparable to a perceived aim of the Helsinki Declaration regarding biomedical research on humans. It outlines how a committee of ordinary people is an appropriate means of discerning what is acceptable ethical conduct for wider use³⁵. Can an individual or small group of specialized individuals be perceived appropriate if acting in a similar role?

When ethical views are enshrined in law, it may be argued that the role of ethics committees can evolve from simply giving advice to becoming institutionalized. Consider the setting of WWII where risky human experimentation that jeopardized human health was advocated and even promoted by the Nazi government³⁶.

If individuals having a role on ethics committees establish fixed positions on changing issues, this could be perceived as a problem. In some cases, administrative roles have evolved to include responsibilities associated with ethics committees. The ISS Crew Code of Conduct (CCOC) for instance, may need to be ratified by some national parliaments. It must be partially based on value judgments of what drafting committees consider appropriate behavior for

international astronaut crews under defined circumstances. The activity of specific ethics committees considers different perspectives of the human presence in space. Addressing examples will help elucidate some of the obstacles to be overcome.

Communication with International Ethics Committees

Actors representing ethics committees outside of internal, medical decision-making power dynamics may have different points of view, and at times, differing political goals (if any) concerning astronauts. The perspective of globally-oriented ethics councils may contribute to the enhancement of ISS cooperation.

'Appropriate' astronaut space law and ethics linked to medical policy may be perceived differently by international committees like the United Nations COMEST³⁷ than by for instance, the ISS MMOP. The COMEST perspectives do not directly impact the drafting and execution of astronaut legal and medical standards for "the most comprehensive scientific technical project ever undertaken"³⁸. Yet, nonetheless, such perspectives impact the evolution of a potentially evolving global astronaut problem³⁹.

Noteworthy is one of the four topics of reflection considered by UNESCO/COMEST: "Manned Flights and Man's Presence in Space". Members of this committee discuss why it may be worthwhile (or not) to send human beings to outer space, why astronauts should organize and share knowledge, and what advances are expected from microgravity research⁴⁰. Although, as noted above, this committee does not contribute directly to global medical policy-making for ISS astronauts, the ethical issues considered by COMEST should

compel reflection elsewhere, including in the ISS astronaut-related committees.⁴¹

Medicine & Philosophy

Inter-relationships exist between medicine and human philosophy⁴². A quasi-blurring of the connection between ISS astronaut crew conduct and space medical issues may influence the role of diplomacy in the ISS environment. Then again, perhaps it is the role of diplomacy that results in the quasi-blurring of this connection? Both possibilities here demonstrate the potential to alter human mindsets⁴³.

To help identify relevant policy connections, one must first ask who are the diplomats in this scenario? Do they seek to bridge the gap between human “astronaut” technology and policy? It appears ISS flight surgeons, medical support teams, and members of multicultural teams involved in space activities are, in their respective professional groups, a new generation of quasi-diplomats. Considering this environment, what are some links that can be made to ethics and law⁴⁴? This implies that ISS flight surgeon teams should be working closer with legal teams in order to develop better astronaut medical policies that consider ethical questions.

Multilateral astronaut health-related decision-making will impact, on a psychosociological level, the selection, training, qualification and continued monitoring of human behavior in outer space. These decisions over time may begin to evidence a customary practice. An analysis of multicultural issues, both in ISS medical teams on Earth and in astronaut crews in space, has the potential to strengthen the standardization process and impact multinational astronaut-related decision-making. A better understanding of links between multicultural issues and medical

implications on astronauts may also improve mission performance and help reduce human risk in extreme space environments.

Laws basically derive from legislation, judicial decisions, and reliance on established precedents. History adds credibility and leads to acceptable legal decision-making. Medicine is based on ever-expanding knowledge and applications of science and technology. It also has connections to study and tradition. In both, however, resolution/consensus is sought and sometimes reached through discussion, mediation or negotiation. Amidst it all, one may ask whether medicine and law are really so different in their fundamental methodologies.

So what do you do in a case like ISS when there is not always an obvious, applicable precedent to astronaut medical policy-making? In this environment, physicians may be frustrated. Their profession and its policies fundamentally address and support the best interest of the patient (the space medical policy user) and increasingly, the integrated astronaut team, and not the politics of the originating cultures.

Aside from any professional (scientific) competition, there is no formal adversarial system for resolution of differences especially when politics and law are put aside. Can one separate medicine as a profession from politics in international cooperation? Non-scientific (e.g. religious or political beliefs) systems put non-medical values ahead of medical knowledge. This may seem to complicate what is otherwise an increasingly closer relationship between medicine and politics.

In terms of developing medical standards for ISS astronauts, there is, thus, cooperation and competition within the medical

profession, between physicians, policy-users (e.g. patients) and affected professional groups. There is also accelerated interaction and information exchange between countries concerning the progress of space activities. Amidst it all, one may ask whether law and medicine are so very different?

Conclusion

In conclusion, medical decision-making with regard to human activities in space can be linked to legal scenarios in terms of confrontation. Integrating a new communication structure that promotes mediation and moral accountability between physicians, space medical policy users and other professionals would be beneficial.

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Amidst increasingly global space medical activities for astronauts and their medical care givers, an ethical consciousness needs to be generated in such a way as to enhance a sense of moral responsibility and accountability between and within all parties concerned. This means between medical teams, governments, medical policy users and society at large. The changing of mindsets will take time. A flexible system that integrates a role for self-determination and different exchanges can only effectively evolve out of global dialogue. The trend toward ISS multilateral fora and decision-making is a positive step.

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Attachment 1:

MEMORANDUM OF UNDERSTANDING
BETWEEN THE NATIONAL
AERONAUTICS AND SPACE
ADMINISTRATION OF THE UNITED
STATES OF AMERICA AND THE
EUROPEAN SPACE AGENCY
CONCERNING COOPERATION ON THE
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Article 11
Space Station Crew

11.1. Each partner has the right to provide personnel to serve as Space Station crew from the time the partner begins to share common system operations

responsibilities. During the period of a three-person crew, NASA and RSA will be allocated 50% of the three crew flight opportunities. The above allocations will be adjusted as allocations to the other partners for crew flight opportunities begin, commensurate with utilization resource allocations specified in Article 8.3.b, while maintaining equal shares for NASA and RSA. Such adjustments will be as agreed in implementing arrangements between NASA and RSA. During Assembly, flight opportunities for NASA and RSA Space Station crew will be satisfied over time and not necessarily on each specific crew rotation cycle; however, in the event of adjustments, each crew complement will have at least one representative from NASA and one from RSA. Following outfitting of the NASA-provided Habitation Module and initial operational verification of the NASA-provided crew rescue vehicle, when the Space Station has a crew of seven, RSA will be allocated three crew flight opportunities. The remaining four crew flight opportunities will be allocated to NASA, ESA, the GOJ and CSA commensurate with utilization resource allocations specified in Article 8.3.b and will be satisfied over time, not necessarily on each specific crew rotation cycle. The SOP will annually or as required by any partner review the implementation of this paragraph and provide its conclusions to the MCB.

11.2. During assembly and verification, a fully trained ESA crew member will participate in the on-orbit assembly and system verification of the ESA-provided European pressurized laboratory and other assigned flight element assembly and system verification tasks planned during that on-orbit period as provided in the verification plan described in Articles 6.1.a.4 and 6.2.a.3. NASA takes note of ESA's request for assignment, subject to applicable crew assignment procedures, of an ESA crew member in connection with the demonstration flight of the European orbital transfer vehicle.

11.3. The MCB has established a Multilateral Crew Operations Panel (MCOP), which will be the primary forum for the top-level coordination and resolution of Space Station crew matters which affect all partners including the processes, standards and criteria for selection, certification, assignment and training of Space Station crew. The MCB will develop an MCOP Charter that defines the specific

responsibilities of this Panel. Any modifications to this Charter will be approved by the MCB. The MCOP will have a rotating chairmanship and all decisions taken will be by consensus. The partners will propose to the MCOP their candidates for Space Station crew based on mission requirements and allocated flight opportunities. If the MCOP determines the candidates meet the Space Station crew standards and criteria, the candidates will be assigned to specific crew complements, subject to approval in accordance with the partners' internal agency procedures. Following assignment to a crew, the entire crew will begin increment-specific training in order to acquire skills necessary to conduct Space Station operations and utilization. One or more specific crew complements can be trained as a team in preparation for a specific crew rotation cycle according to the agreed curriculum and specific mission requirements. The MCOP will determine the readiness of the crew for flight based on the results of a review of the crew's medical condition and the crew's performance during training.

11.4. NASA, ESA and the other partners will establish a Multilateral Medical Policy Board (MMPB) to provide coordination and oversight of crew health issues. NASA and ESA will each provide a single point of contact for medical support who will have full responsibility on behalf of its respective agency to resolve issues related to the development of a common system for medical support. The MMPB will be supported by a Multilateral Space Medicine Board (MSMB) and by a Multilateral Medical Operations Panel (MMOP), established by NASA and ESA with the other partners, which will be the primary working level groups for coordination of crew health matters including clinical care, medical standards, preventative medicine (including operational countermeasures) and environmental monitoring. The MMOP and the MSMB will operate on the principle of consensus. The MMOP will develop medical standards, certification criteria, pre-flight, in-flight, and post-flight medical care requirements, medical hardware responsibilities and operational procedures and recommend them to the MSMB for approval. The MSMB will present its decisions and findings to the MMPB and MCOP, as appropriate, for review and concurrence. NASA and ESA will be responsible for medical certification of their

respective crew members in accordance with agreed standards, and will present the appropriate documentation to the MSMB for approval. The MSMB will have responsibility for final medical certification of crew and for oversight of the implementation of medical operations.

11.5. NASA, ESA and the other partners will establish a Human Research Multilateral Review Board (HRMRB). This Board will have the responsibility for assuring that human research protocols do not endanger the health, safety, and well-being of human research subjects on the Space Station, while ensuring ethical conduct of experiment operations. The HRMRB will review and approve, prior to their implementation, human research protocols for the Space Station proposed by the partners. The HRMRB will operate on the principle of consensus.

11.6. The Space Station crew will operate as one integrated team with one Commander. Consistent with the principle of integrated crew, the entire crew will operate under a single timeline for performance of all operations and utilization activities. The crew Commander will be responsible for the mission program implementation and crew safety assurance aboard the Space Station. Specific details concerning this integrated crew concept will be agreed by the MCOP.

11.7. NASA will be financially responsible for all compensation, medical expenses, subsistence costs on Earth, and training for Space Station crew which it provides. ESA will be financially responsible for all compensation, medical expenses, subsistence costs on Earth, and training for Space Station crew which it provides. NASA and ESA each agree to waive fees for Space Station-related training for the other's Space Station crew. Specifically, ESA will not be charged Space

Station-related training costs for its Space Station crew training at NASA or NASA contractor facilities, and NASA will not be charged Space Station-related training costs for its Space Station crew training in ESA or ESA contractor facilities. This waiver of fees will also apply to any Space Station-related crew training at NASA or NASA contractor facilities or at ESA or ESA contractor facilities for all other partners' Space Station crew. Space Station-related crew training will be defined by the MCOP. Such training includes instruction training materials and equipment, access to all necessary facilities (including travel among NASA and NASA contractor facilities and travel among ESA and ESA contractor facilities) and all costs for activities in the agreed training plan and curriculum that will be used for training following certification of Space Station crew pursuant to Article 11.3. Agreed training for all assigned duties will be required.

11.8. The Space Station Code of Conduct will be developed by the partners and submitted to the MCB for approval. Each partner must have approved the Space Station Code of Conduct before it provides Space Station Crew. The Space Station Code of Conduct will, inter alia: establish a clear chain of command on-orbit; clear relationship between ground and on-orbit management; and management hierarchy; set forth standards for work and activities in space, and, as appropriate, on the ground; establish responsibilities with respect to elements and equipment; set forth disciplinary regulations; establish physical and information security guidelines; and provide the Space Station Commander appropriate authority and responsibility, on behalf of all the partners, to enforce safety procedures and physical and information security procedures and crew rescue procedures for the Space Station.

Endnotes

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² *The Treaty on the Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, signed at Washington, London and Moscow, January 27, 1967. Article V of the Treaty commences: "States Parties to the Treaty shall regard astronauts as envoys of mankind in outer space and shall render them all possible assistance in the event

of accident, distress or emergency landing on the territory of another State party on the high seas."

³ The separate MOUs between NASA and each of the other ISS partners provide for the establishment of a Multilateral Medical Policy Board (MMPB) supported by a Multilateral Space Medicine Board (MSMB) and a Multilateral Medical Operations Panel (MMOP). See e.g., NASA-ESA MOU. Articles 11.3 through 11.8, and especially 11.4. A copy of Article 11, "Space Station Crew" of the NASA-ESA MOU appears as Attachment 1 to this paper.

⁴ For example, legal management for the Crew Code

of Conduct (CCOC), engineering teams for smooth infrastructure interfaces & functioning, and other multicultural management teams for astronaut activity

⁵ See E-H Klug (1992)

⁶ See Human Rights documents such as the European Convention on Human Rights (1999), Canadian (& Regional) Human Rights Reports (1998), UN Commission on Human Rights activity, Japan Country Report on Human Rights Practices (1998), U.S. Department of State Human Rights Reports (1998),

and Human Rights Report Russia (1998). Canada, certain members of the European Space Agency (ESA), Japan, Russia and United States are the ISS Partner States, while the Canadian Space Agency (CSA), ESA, NASDA, Russian Space Agency (RKA), and NASA are their respective "Cooperating Agencies".

⁷ Both internal and external to ESA Member States

⁸ See Riopoll & Peeters (1998) and ESSB Report on U.S.-European Collaboration (1999)

⁹ For example, consider the use of on-line and digital communications, teleconferences, & on-site meetings.

¹⁰ Partner relationships between government and industry give rise to legal issues of responsibility and liability as between the government and its industrial partners.

¹¹ Space passengers and other persons primarily involved in outer space activity for commercial purposes are not referred to in the OST and their status as "envoys of mankind" is debatable under international law. By contrast, Article VIII of the Outer Space Treaty (OST) provides that jurisdiction and control over an object launched into space, including any "personnel thereof", which is on the registry of a State party to the OST shall be retained by the State of registry, i.e., the object and its personnel shall remain subject to the domestic laws of such a State.

¹² MOUs often are not intended to be legally-binding on the parties thereto. One would have to examine the MOU and its relevant *travaux préparatoires* in their historical context to determine the intent of the parties as to whether or not the MOU or parts thereof are in fact legally-binding; Consult A. Aust (2000).

¹³ See 1998-9 versions of ISS MOUs between NASA-RSA, NASA-CSA, NASA-ESA and NASA-JAPAN)

¹⁴ The MMOP also consults with the MMSB, MMPB & the Multilateral Crew Operations Panel (MCOP) concerning the principle of consensus. However, it is beyond the scope of this paper to analyze the levels of ISS medical bureaucracy outlined in ESA-NASA MOU, Article 11.4.

¹⁵ See IAF 2000 paper entitled, "The Future of Space Medicine, author Gerda Horneck, German Aerospace Centre.

¹⁶ See respective formal regulations for information

and technology transfer of respective ISS Partners

¹⁷ Also described as tactful individuals skilled at handling delicate situations

¹⁸ See A. Hoiseth (2000).

¹⁹ Consider John Glenn's second trip into space as an example of this informed volunteerism; see also premise behind the film "Spacecowboys" (2000)

²⁰ In the case of ISS, Article 11.4 of the respective MOUs states that the, "Multilateral Space Medicine Board (MSMB) will have responsibility for *final* medical certification of crew and for oversight of the implementation of medical operations."

²¹ "Medical policy standards users"

²² Except for instance, the broad obligation placed on the territorial government in Article 2 of the Astronaut Rescue and Return Agreement to immediately take all possible steps to rescue the personnel of a spacecraft in need, "and render them all possible assistance". By implication, this would include medical assistance.

²³ *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space*, Signed in Washington, London and Moscow, April 22, 1968.

²⁴ See IGA, Article 16.3

²⁵ See for example, Lafferranderie G. (1987)

²⁶ For example, Article VI of the Outer Space Treaty (OST) – reads in part: "States Parties to the Treaty shall bear international responsibility for national activities in outer space... and for assuring that national activities are carried out in conformity with the provisions set forth in present Treaty." Furthermore, activities in space by non-governmental entities, e.g. commercial or non-profit entities, "shall require authorization and continuing supervision", e.g., a national scheme of licensing and continuing regulatory oversight by the "appropriate State Party to the OST; Article VIII of the OST provides that the State of registry retains jurisdiction and control of the registered space objects and any personnel thereof in outer space

²⁷ The term "Common Heritage of Mankind" was coined by Ambassador Pardo of Malta. He redefined the oceanic common heritage in the 1970s during Law of the Sea negotiations. The idea goes beyond the freedom of the seas to include the resources of the ocean outside the areas of national jurisdiction. This concept is embodied in the now ratified Law of the Sea Convention. The United Nations appointed themselves Trustee for the Common Heritage but limited that trusteeship to the seabed outside a 200 mile exclusive economic zone. The resources of this vast zone were reserved for the coastal states. Does not the Common Heritage have rights and duties within these zones of national jurisdiction? Does the failure of the United Nations to define the nature of jurisdiction and trusteeship outside of the Sea Bed foreclose the existence of such rights, duties,

jurisdictions and trusteeships. Lawyers will advise you that, absent specific words of denial, silence with respect to a legal regime does not necessarily mean that such a regime does not exist. This principle is the very basis for customary and common law. The concern of Law of the Sea negotiators was to control the use of the seabed portion of the global commons and to provide for a sharing of revenues resulting from the exploitation of our "Common Heritage." Control of resource use and sharing of *potential* revenues from the global commons have been the focal points in extensions that have been made of the Common Heritage principle to outer space, to the Moon, and to Antarctica (See Ervin, 1984 and Herber, 1991).

²⁸ See the Hippocratic Oath: I SWEAR by Apollo the physician, and Aesculapius, and Health, and All-heal, and all the gods and goddesses, that, according to my ability and judgment, I will keep this Oath and this stipulation to reckon him who taught me this Art equally dear to me as my parents, to share my substance with him, and relieve his necessities if required; to look upon his offspring in the same footing as my own brothers, and to teach them this art, if they shall wish to learn it, without fee or stipulation; and that by precept, lecture, and every other mode of instruction, I will impart a knowledge of the Art to my own sons, and those of my teachers, and to disciples bound by a stipulation and oath according to the law of medicine, but to none others. I will follow that system of regimen which, according to my ability and judgment, I consider for the benefit of my patients, and abstain from whatever is deleterious and mischievous. I will give no deadly medicine to any one if asked, nor suggest any such counsel; and in like manner I will not give to a woman a pessary to produce abortion. With purity and with holiness I will pass my life and practice my Art. I will not cut persons laboring under the stone, but will leave this to be done by men who are practitioners of this work. Into whatever houses I enter, I will go into them for the benefit of the sick, and will abstain from every voluntary act of mischief and corruption; and, further from the seduction of females or males, of freemen and slaves. Whatever, in connection with my professional practice or not, in connection with it, I see or hear, in the life of men, which ought not to be spoken of abroad, I will not divulge, as reckoning that all such should be kept secret. While I continue to keep this Oath unviolated, may it be granted to me to enjoy life and the practice of the art, respected by all men, in all times! But should I trespass and violate this Oath, may the reverse be my lot!

²⁹ See K.V.Covert (2000); W.N. Covert (2000); Canadian Medical Association (CMA) Meeting Minutes and Statutes.

³⁰ For example, the case of the African psychiatrist

who temporarily worked in New Brunswick, Canada in early 1990s but whose unethical conduct in taking advantage of (sexually abusing) patients led to the revoking of his medical license to practice in Canada and the Canadian authorities seeking to lay charges. Yet, he left the country before being reprimanded by the law and apparently continued to practice in other countries.

³¹ Consider implications here of the U.S. federal law which protects U.S. government medical personal from malpractice suits

³² Note how medical emergencies have been dealt with on Apollo Mission as well as on Mir missions: as they happened, the individuals dealt with them—Consult B. Burroughs (1998); M. Connors (1995); V. Vereshchetin (1989).

³³ See Agricultural trade policy discussed at the 25th FAO Regional Conference For The Near East, Beirut, Lebanon, 20 - 24 March 2000.

³⁴ See Constantinou (1996)

³⁵ It is particularly relevant that the World Medical Association (WMA) is in the process of revising the Declaration of Helsinki, the cornerstone of guidelines for biomedical research involving human participants. In a time of rapid change in the area of research, it is essential to ensure that the Declaration continues to provide adequate protection for patients and appropriate guidance to physicians and other researchers. After consulting national medical associations, patient representative groups, specialists and other interested parties, the WMA has now developed a final proposed revision. This proposal was considered by the 52nd WMA General Assembly in Edinburgh, Scotland, from 3 to 7 October 2000. (<http://www.wma.net/e/helsinki.html>)

³⁶ See e.g., The Nazi Doctors: <http://members.aol.com/poloboy02/nazi1.htm>

³⁷ World Commission on the Ethics of Scientific Knowledge and Technology

³⁸ Logsdon J. (1998)

³⁹ The idea that different levels of State economic and technological strength, different history, different approaches to politics and ideologies, as well as diverse cultural perspectives, can contribute to unhealthy "co-opetition" (i.e., a combination of cooperation and competition—Brandenburg & Nalebuff (1998)) and take the focus away from building mutually beneficial co-operation.

⁴⁰ The Life Science section of online ethics website in conjunction w/COMEST surveys [<http://www.interpharma.ch/themen/biogen/archiv/SciConfFW.html>], restricts ethical perspectives to that of research investigators and does not mention the point of view for research subjects.

⁴¹ See for example, "Online Ethics Centre for Engineering in Science" where COMEST supervises surveys of ethical views concerning interdisciplinary science [<http://www.onlineethics.org/index.html>]

⁴² Boyd et al. (1995)

⁴³ Consider the notion of codes of conduct as a contemporary trend in computer science, chemistry, engineering, biology and physical sciences, in order to regulate limits of acceptable human behavior
[See e.g. : <http://www.onlineethics.org>]

⁴⁴ Consider for instance, the American Association for the Advancement of Science Directorate Science and of Policy Programs, "Dialogue on Science, Ethics & Religion": [<http://www.onlineethics.org>]