Abstract for Submission to the DARPA 100 Year Starship Public Symposium

Interstellar Sweat Equity

Dr. Marc M. Cohen, Arch.D
Marc M. Cohen Architect, PC
4260 Terman Drive #104,
Palo Alto, CA 94306-3864
(650) 218-8119
marc@astrotecture.com
100YSS Project Committee Chair
International Space Development
Authority Corporation (ISDAC)

Declan J. O'Donnell
Law Office of Declan Joseph O'Donnell, Esq.
777 Fifth Ave.
Castle Rock, Colorado, 80104
(303) 688-1193 Office Phone
isdac.usis@gmail.com
President, United Societies in Space
President, ISDAC

Robert E. Becker
System Engineer
156 Coast Road, Larne,
County **Antrim**,
Northern Ireland, UK BT40 2LF
roberte.becker@prodigy.net

Categories:

Economic, Legal, and Social
Biology and Space Medicine
Habitats and Environmental Science

We suggest that we combine elements of these three categories into a panel "On Board the Multigenerational Starship"

Format: Presentation of a Paper and a Panel

There will be many papers that do not fit neatly into the initial categories. The ***On Board the Multigenerational Starship*** panel will help to accommodate them. Governance of the Starship will emerge as a central issue.

So, you have just launched aboard the Starship, headed to an exoplanet light years from Earth. You will spend the rest of your natural life on this journey in the expectation and hope that your grandchildren will arrive safely, land, and build a new settlement.

On a spaceship that can essentially fly and operate itself, what *will* the crewmembers do for their generations in transit? Certainly, they will train and train again to practice the skills they will need upon arrival at a new world. However, this vicarious practice will neither suffice to prepare the future pioneers for their destiny at a new star nor will it provide them with the satisfaction in their own work that comprises the apex of the Maslow Pyramid of Human Needs and Motivations shown in FIGURE 1.

In order to hone the crewmembers' inventive and technical skills, to challenge them and to prepare them for pioneering, the crew would build and expand the interstellar ship in transit. This transtellar "sweat equity" would provide meaningful and useful activity to the new generations of crewmembers. The crewmembers would build all the components of new segments of the vessel from raw materials – including atmosphere – stored on board. The construction of new pressure shell modules would be one option, but they would also reconstruct or fill–in existing pressurized volumes. The crew would build new life support system components and develop new agricultural modules in anticipation of their future needs. Upon

arrival at the new star or planet, the crew would be able to apply these robustly developed skills and self–sufficient spirit to their new home.

The strategy of interstellar sweat equity implies that the creators of the spacecraft must design it for this gradual expansion, providing tools, supplies, and materials. The crew will need the ability to create and test their own new tools and inventions to improve upon the training and practices that the Starship creators provide them.

The question of sweat equity raises a set of social, economic, and governance issues. Equity implies a share -- a unit of ownership – in the collective or corporate enterprise. That works fine for people who are able and willing to work as described. But what should be the policy for people who are unable or unmotivated (e.g., the disabled, the elderly, the clinically depressed, or mothers with young children, etc.)? Do they hold an equal share? Is their equity somehow adjusted or reduced? How can the sweat equity strategy succeed in creating a society that is not divided among "haves" and "have-nots."

Cohen, Marc M.; Brody, Adam R. (1991 April). Human Factors Issues for Interstellar Spacecraft. In, *Proceedings of the 28th Space Congress* (p. 1·19-1·29). Cocoa Beach, Florida, USA, 23-26 April 1991: Canaveral Council of Technical Societies. **PDF**

Cohen, Marc M.; Houk, Paul C. (2010 September). Framework for a Crew Productivity Figure of Merit for Human Exploration (AIAA 2010-8846). AIAA Space 2010 Conference & Exposition, Anaheim, California, USA, 30 August - 2 September 2010. Reston, Virginia, USA: American Institute of Aeronautics and Astronautics. **PDF**

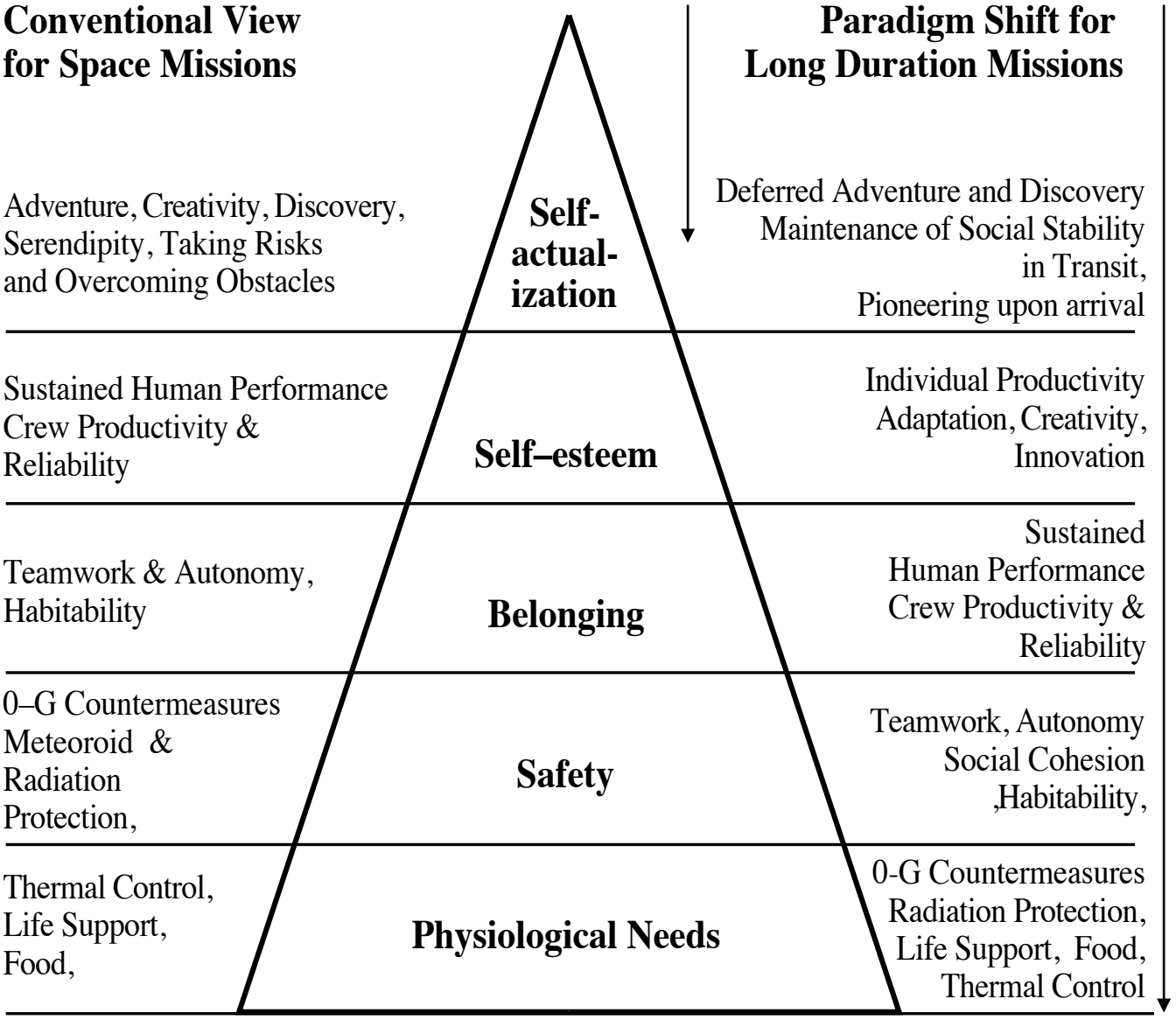

FIGURE 1. Paradign Shift in Maslow's Model of the Hierarchy of Human Needs, showing the effect of generational extended duration spaceflight.