

Quality for the Future of Humans in Space¹

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Summary. A proposal for the formal merging of the Quality Sciences with the Space Sciences following the Why, When and How of humanity's next great adventure of living in space.

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Why Go? [2]

Space has unique keys for solving many of the problems we humans face on earth. For one hundred years humans have solved the problems of flight around our planet. The urge to do so was built into our biology and is reflected in our social consciousness. For fifty years that urge combined with our curiosity about the universe has propelled us into space. Now, as the 21st Century begins, we know with certainty that human exploration of, and migration to, Earth's moon and our Solar System must occur.

This is the conviction of transglobal representatives of all disciplines and interests, including, among others, those of scientists, engineers, astronauts, cosmonauts, taikonauts, managers, scholars, biotechnologists, physicists and teachers who have experienced the last fifty years and projected their intelligence into the future. Their conviction comes from the basic conclusion that space resources and environments are the independent variables essential for the improvement of the quality of life for humans on the Earth; and for the ultimate survival of our human race. Earth was the human birthplace. The Solar System, and possibly beyond, holds human destiny.

Space Sciences, technology and experiences make the next major breakout from Earth to space not only feasible but commercially profitable.[3] History and learning on earth have proven two fundamental reasons why now is the time for the serious planning for a space faring civilization off-Earth. Both of these reasons are rooted in the compelling need for species survival:

1. Benefits from space for earth and its people can make positive paradigmatic improvements for Earth's biosphere, energy, health sciences, industries and limited resources. This will have revolutionary societal, political and biosphere impacts.
2. Threats to humanity on Earth from natural causes (earth-based or space-based) or human-produced phenomena (e.g. the negative impacts of population dynamics and industry growth; weapons for mass-killings; hurricanes and climate changes; disease pandemics; gamma-ray bursts; asteroids-Earth collisions; Earth quakes and volcanoes) can be reduced, avoided or completely eliminated by the exploitation of new capabilities that space will generate.

When and How to Go.

In January 2004, President George W. Bush became the first President since John F. Kennedy announced to Congress on 25 May 1961 that U.S. astronauts would go to the Moon by 1970 to formally announce a new vision to "*Return to the moon by 2020, with robotic exploration by 2008, extended human missions as early as 2015*" [4]. The era of human permanence in our Solar System is now being planned.

A fact of history is that WHAT humans do makes evolutionary and revolutionary differences, either positively or negatively for humanity. HOW those things are done is equally important. We have choices to make. Time is not on our side because of biosphere trends and increasing threats. Choices involving less than concerted global effort will contain high risk. The costs will be huge but the potential benefits can change the quality of life for all humans. Our generation can grasp this opportunity to design the future of humans in space that will both capitalize on the positive and negative lessons learned here on Earth over the past centuries. Needed is a new global collaboration to capitalize on those potentials. The task will have complexities that decision makers have not previously faced. It will require new synergetic intellectual interactions between government, industry, universities and global populations.

Given its place in history the United States has a moral responsibility and the capability to lead a global systems approach to the planning and execution of this unprecedented opportunity to bring both short-range and long-range good results to Earth.

The Role of Quality Sciences, Theory and Management

The Legacy. Quality has not been a top priority for humanity over the past 3,000 recorded years. It has occasionally happened randomly through the history of human evolution for different reasons at different places and in different societies around the world. But improvement of the quality of life has been neither universal nor consistent through time.

The Quality Sciences began impacting humanity in the 1950s in Japan by the end of the 20th Century it had produced a quantum leap in the quality of products and services in the developed nations of the world. Dr, Joseph M. Juran, one of the lead pioneers, on his 94th birthday in 1999, commented on the origin and growth of the Quality Sciences in the 20th Century and made the statement “*My belief is that historians in later decades will look back on the 21st century as the Century of Quality*” [5].

The Space Sciences also matured in the 2nd half of the 20th Century. Those two sciences took largely separate and parallel paths as they moved toward the New Third Millennium but they had many interactions as quality was identified as a prime requirement in manned space missions.

We are, in 2006, in an historically unique era. Science and Technology has been the catalyst for quality improvements, but also the creator of destructive forces never available to humans in the past [6].

The Future. There will be a formal marriage of the Quality Sciences with the Space Sciences in the next few years. That will happen of necessity as the impacts of potential failure of human migration to space become fully recognized while the achievements of the Quality Sciences on earth are documented. There can be a good case made for the continual improvement of the human condition, even human survival, being at stake. Without that merger the success of the future of humans in space is in doubt.

Space – Quality Links

Since July 1998 I have been building the “*Quality Classics*” folder in the web site of the Inland Empire ASQ Section 0711, Riverside, California (www.asq711.org). There are now 23 Quality Classic essays. The definition for inclusion on the web site is it must be a concept, model, tool, formula or algorithm that has 50 years or more validated utility in the Quality Sciences. My editing work over the last eighteen months on the book *Beyond Earth: The Future of Humans in Space* has given me insight into the success variables for the next human adventure. Table 1, following summarizes the two lists.

Quality Sciences Fundamentals

1. "[The Pareto Optimum](#),"
2. "[The Shewhart Cycle](#),"
3. "[The Cost of Quality](#),"
4. "[Continuous Improvement](#),"
5. "[Variation](#),"
6. "[Benchmarking](#),"
7. "[Employee Involvement & Empowerment](#)"
8. "[Process](#)"
9. "[Systems](#)"
10. "[The Hawthorne Effect](#)"
11. "[Quality Thinking](#)"
12. "[Quality Policymaking](#)"
13. "[Productivity](#)"
14. "[Surveying for Systems Improvements](#)"
15. "[Cost Benefit Analysis](#)"
16. "[Learning](#)"
17. "[Leadership](#)"
18. "[Cooperation vs Competition](#)"
19. "[Morality](#)"
20. "[Knowledge](#)"
21. "[Management by Objectives](#)"
22. "[Zero Defects](#)"
23. "[Space](#)"

Humans in Space Needs

- A. Purpose, Theory and Mission
- B. Survival
- C. Life Support
- D. Intelligence and Resources
- E. Governance – Code of Ethics
- F. Leadership
- G. Law, Safety and Security
- H. Settlement/Oasis/Society Construction
- I. Program Reliability and Predictability
- J. Biotechnical Support and Evolution
- K. Education, Documentation and Learning
- L. Music and the Arts
- M. Entertainment and Tourism
- N. Business & Commerce
- O. Economic Growth
- P. Exploration Operations
- Q. Spaceports
- R. Science and Technology

Table 1, Quality Fundamentals and Humans in Space Needs

Conclusion and Recommendation

A detailed analysis of the linkages between Quality Fundamentals and Human Needs in Space will be the task of a future “*ASQ Space Quality Division.*” That is the recommendation of this paper.

The Quality Sciences will be an essential success variable in the next great human adventure – the exploration and habitation of space. The American Society for Quality (ASQ) is the logical professional organization to collaborate with global governments, industry and universities to begin in-depth research and analysis to determine how the learning of the Quality Sciences should be applied to the needs of humans as they migrate to form societies and civilizations in space.

[1] A paper presented at the ASQ Quality Management Division Conference, Irvine, California, 3 March 2006.

[2] Themes and concepts in this paper, plus an entire systems approach to the subject of the next major movement to space can be found in Bob Krone, Ph.D., Editor, 2006, *Beyond Earth: The Future of Humans in Space*, CGPublishing, Inc., Apogee Space Press, Burlington, Ontario, Canada.

[3] Commercial profitability was a major focus at the 25th Annual International Space Development Conference in Los Angeles, 4 – 7 May 2006. See the documentation of that conference at www.isdc.nss.org/

[4] www.nasa.gov/missions/solarsystem/bush_vision.html

[5] Scott M. Paton, “A Century of Quality: An Interview with Quality Legend Joseph M. Juran” Quality Digest, February 1999.

[6] See Robert M Krone, “Science and Technology for What” Review of Policy Research, Vol 22, Number 4, July 2005.