

ABSTRACT  
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TITLE OF THE PAPER:

USER REQUIREMENTS FOR SPACE STATION FREEDOM EVOLUTION

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DESCRIPTION: (should clearly present the purpose of your paper and include detailed information on the methods and results of your research)

In planning an evolution strategy for Space Station Freedom, careful consideration must be given to future user requirements. To ensure continuing utility, design enhancements must be largely driven by the needs of the user community. As the Station will in essence be a laboratory in low earth orbit, it will need to evolve in order to keep pace with the research which it hosts throughout its 30 year life. The need for continued access to state-of-the-art technology is one of the principle reasons for evolution.

Evolution is needed for the Station as a whole as well as at the individual experimental facility level. This paper deals principally with the former, although there is very close linkage between the two. Future experiments will in general require greater resources and more sophisticated accommodations.

An example of the linkage between experiment advances and Station evolution can be seen within Life Sciences where a long-term priority is a larger diameter centrifuge, capable of holding larger primates. This is a logical extension of the rodent and small primate experiments which will be performed with the currently planned 2.5 meter centrifuge. Although itself an experimental facility, the new centrifuge would require, a larger diameter host module; a significant enhancement of the Station. Again, within Life Sciences, an increased number of crew members will extend the potential range of human physiology studies and will also increase the statistical reliability of results. Reducing carbon dioxide concentration, towards levels encountered on the earth, will allow more accurate reference to the large body of control data established in terrestrial laboratories. In all of these areas, significant enhancement of the Station and its systems will be necessary.

Microgravity Research requirements would include increased power levels, vibration isolation and also an increase in data downlink rates. "To maintain the pure, microgravity levels in an enlarged station, or achieve lower levels, vibration isolation may be required. Also, continuous drag compensation system could reduce the quasi-steady element of the microgravity environment and obviate the need for reboost.

In addition to discipline-specific capabilities, there will probably be several generic requirements such as a free-flyer servicing facility. Evolution will also be required for the ground segment to reduce latency and enhance telescience capabilities.