IMPLEMENTATION OF A LUNAR INFORMATION SYSTEM AND GEODATABASE MODEL. J. Schulz, S. van Gasselt and G. Neukum, Institute of Geosciences, Freie Universitaet Berlin, Germany.

Background and Motivation. In the context of recent missions to Earth's moon new data obtained by planetary remote sensing instruments will become available to the public in the near future for scientific analysis as well as for future exploration planning purposes [1]. Such mission endeavors are accompanied by agency-funded projects in order to make lunar spacecraft data that has been obtained in the last 40 years available to the general public. These projects involve the Lunar Orbiter Digitizing Project led by the USGS Astrogeology Research program [2] or the Digital Lunar Orbiter Photographic Atlas [3] and ongoing efforts by NASA Johnson Space Center and partners (ASU and LPI) to make the Apollo 15-17 Metric as well as Panoramic Camera data available to the public and interested researchers through the Apollo Image Archive [4]. For the scientific approach of data viewing, querying and basic analyses, the USGS Astrogeology Branch has been playing a major role in the planetary community by providing not only pre-processed data for download but also by employing a web-based GIS (the USGS Planetary GIS Web Server PIGWAD) to which one can connect either directly via web browser or via WCS/WMS services [5]. Although state-of-the art technology has been employed for providing web-based information systems, all such systems lack the possibility of adding, analyzing, modelling and as re-organizing data. Although these issues are beyond the aim of such systems, such possibilities are of utmost importance for performing in-depth scientific analyses. Terrestrial GIS technology is predominantly used for data organization, data revision, data modelling and data analysis in all sorts of scientific and public branches and it forms a well-established platform for planning purposes. Consequently, such possibilities can easily be transferred to other planning requirements, such as planetary landing site selection, planning of orbital imaging, or for data organization by means of large-scaled database systems. The basis for such goals is the consistent and coherent storage of data within a proper geospatial context. In this way, a lunar IS, comprising of data from past lunar missions and providing a platform for incorporating new mission data, will be a valuable source of information for organizing data, planning of adequate landing sites for automated and manned missions, planning of areas suitable for the constructions of lunar bases, identification of resource potentials, and - most importantly - assessing possible hazards and economic risks.

Data Basis and Implementation. In the context outlined above we have been working on an implementation of a lunar IS within the commercial ArcGIS framework by ESRI by building a consistent geodatabase of lunar mission data and setting up a file management infrastructure for performing analyses making use of different data types and a variety of scales, i.e. global scales for orbiting spacecraft to local scales for manned missions and experiments during the Apollo program. The implementation procedure is aiming at acquiring and referencing data obtained from various sources (USGS, Planetary Data System, Planetary Science Archive, mission/agency sources). This step involves consistency checks and - if possible and necessary - referencing data making use of the Unified Lunar Control Network 2005 [6]. By doing this we transfer data from a simple geographic coordinate system to properly projected data. During the implementation we focus on consolidating datasets in sequence and by scale so that global datasets are treated first.

A major work package deals with consolidating and homogenizing the 1:5M geologic maps made in the early 1970s. Six map sets covering the lunar globe have been digitized by USGS and were converted to shapefiles or feature datasets within a personal geodatabase. While data are topologically clean, a consistent global map could not be derived yet due to geologic boundary offsets and different map-unit identifications by different mappers. With the help of high-resolution geologic map scans provided by LPI at a map scale of 1:1M, these inconsistencies have been cleaned in most overlapping areas. The global map has been transformed to fit to the Unified Lunar Control Network 2005. Unit boundaries and labelling are currently updated to form a homogeneous map basis for global studies and analysis. All items have been transferred to a file database and will be incorporated into the lunar global datasbase model as a feature dataset with proper relations. At the workshop we will present the current status of the global database model prototype and the recent work of the global geologic map implementation.

References. [1] NASA – Expl. Systems Mission Directorate, http://www.nasa.gov/exploration/home; [2] USGS Lunar Orbiter Digitizing Project, http://astrogeology.usgs.gov/Projects/LunarOrbiterDigitization; [3] Digital Lunar Orbiter Photographic Atlas, http://www.lpi.usra.edu/ resources/lunar_orbiter; [4] Apollo Image Archive, http://apollo.sese.asu.edu/; [5] PIGWAD, http://webgis.wr.usgs.gov/; [6] B. A. Archinal et al. (2006) *U.S. Geological Survey*, Open-File Report 2006-1367.