Moon Village Architecture Working Group

2020-2021 MV Architecture Studies

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Global Mission History / Timeline (10 January 2020)

Not all Missions / Cubesats / Payloads Shown

Expanding Humanity to the Moon: Architectural Considerations

John C. Mankins
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Moon Village Reference Architecture Case Study
Conceptual Framework

Scenarios

Scenario ALPHA

Scenario BETA

Scenario GAMMA

Architectural Elements

MV Architecture
Building Blocks
Framework (1)
It is Impossible to *Know* the Future…

The MVA has defined a set of Moon Village Scenarios

**Alpha:**
Government / Human Space Flight-driven

**Beta:**
Government / Science-driven

**Gamma:**
Private Venture-driven

And the potential of the Moon is emerging rapidly…
MV Architectural Element...

Earth-Based: AE-EB_X.0
Mission & Market: AE-MM_X.0
Orbital System: AE-OS_X.0
Surface System: AE-SS_X.0
Transport System: AE-TS_X.0

Comm & Networks
Logistics / Interfaces
MV Architecture Case Studies
Building Blocks

Utilities
• Communications & Networks
• Power Generation & Energy Systems
• Position Location and Navigation
• Imaging & Operational Sensing
• Computing and Data Management

Transport & Logistics
• Space Transport Systems (incl. Surface-2-Surface)
  ✓ Space Transport Vehicles (Expendable, Reusable, etc.)
  ✓ Landing Systems & Vehicle Support Systems
  ✓ Advanced Launch Concepts
• Surface Transport (Crew, Cargo, Materials)

Operations
• Dust Mitigation
• Construction
• Physical Waste Processing & Recycling
• Manufacturing

Resources
• Resources Exploration & Characterization
• Mining Systems & Resources Extraction
• Resources Processing & Handling

Habitation / Self-sustaining ‘Biospheres’
• Habitable Volume (Pressure Vessel, Air, Water, Lighting, Thermal Management, etc.)
• Radiation Protection
• Agricultural Systems
• Biological Waste Processing & Recycling

Human Operations & Health
• EVA Systems
  ✓ Airlocks
  ✓ EVA Suits
  ✓ Personal Mobility Systems
  ✓ EVA Maintenance Systems
• Medical Care Systems (Urgent Care, Immunology, Surgical Care, etc.)
• Lunar-Gravity Mitigation

Robotic Systems (Surrogates / Augmentation)
• Robotic Systems - Interior
• Robotic Systems – Interior / Exterior
• Robotic Systems – Exterior / Remote

Science Missions / Payloads
• Science of the Moon (geophysics)
• Science from the Moon (Astrophysics)
• Science on the Moon (Laboratories Sciences)