Infrastructure to Support a Cislunar Economy

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NASA Kennedy Space Center
Swamp Works
Granular Mechanics and Regolith Operations (GMRO) Laboratory
Rob Mueller, Nathan Gelino, Brad Buckles.
Infrastructure stokes economies by enhancing private industry's ability to *produce and exchange goods and services*.

Historically US infrastructure investments and *public/private partnerships* have enabled the economy we have today:

- Roads
- Bridges
- Rail
- Sanitation
- Power Generation and Transmission
- Postal System
- Waterways
- Air Ports
- Internet
- Financial Systems
- Telephones

Government investments and *public/private partnerships* can enable a healthy Cislunar economy by providing the space analog to the infrastructure expenditures.
Alaska: Seward’s Folly

1867: Alaska Sale to USA by Russia

Price: $7.2 Million (1867$)
~$643 Million (2019$)

Estimated Value today:
~$2.5 Trillion (could be double this)

Return on Investment:

<table>
<thead>
<tr>
<th>Investment Gain</th>
<th>$2,499,357,000,000.00</th>
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<tbody>
<tr>
<td>ROI</td>
<td>388,702.49%</td>
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<tr>
<td>Annualized ROI</td>
<td>5.57%</td>
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<tr>
<td>Investment Length</td>
<td>152.46 years</td>
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</tbody>
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https://www.washingtonpost.com/business/economy/to-solve-our-debt-problems-lets-sell-alaska/2012/12/14/1c63c1d6-4352-11e2-9648-a2c323a991d6_story.html?noredirect=on&utm_term=.98d825c1e27f

https://www.loc.gov/teachers/classroommaterials/lessons/alaska-purchase/
The key is to invest in the highest payback areas

What should the Government provide vs. Private industry?

Public vs Private infrastructure:

Swamp Works suggests Government leadership areas to be:

- A legal framework for ownership and operating in Cislunar space (Governments)
- Mining and resource definition standards and legal terminology (e.g. CIM)
- Mapping of resources and associated science (e.g. USGS)
- Navigation aids to locate systems with high accuracy (e.g. GPS)
- Communication infrastructure to enable reliable and high data rate transmission of signals (e.g. Laser communications)
- Power generation and distribution (e.g. Nuclear power)
- Standard interfaces to facilitate transfer of commodities (e.g. docking standard)
- Award Public/Private Partnership contracts to industry for potential lunar surface infrastructure such as launch/landing pads, roads, radiation shelters, material storage, and transportation systems