Using Secondary Objectives to Guide the Development of Lunar Industry

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Secondary Objectives

- A common part of space programs
  - or any mega-project

- Space Station
  - Stimulating international co-operation

- Secondary objectives shape the final result
  - Configuration, orbital inclination, support infrastructure

- If secondary objectives shape a project's result...

Using Secondary Objectives as a Project Guide

- Could this be worked backwards for business?
  - Identify a result we need to achieve
  - Identify an objective we would like to achieve
  - Use that objective to achieve the desired result

- Government may shape industry by imposing inefficiencies

- In addition to legislating rules of behaviour

- Legislating an objective for an industry
  - Leaving business to find the best way to overcome it
  - A “Directed Inefficiency”

Example of Directed Inefficiency: Emission Controls

- Pollution reduction in automobiles
  - Emission standards declared by Government
  - Businesses were directed to meet them

- The result?
  - Catalytic converters / cleaner fuels / better engines

- Business is told which inefficiency to overcome
  - Not how to overcome it

- Solutions are left to market forces for resolution
  - Objective quickly resolved
  - Emission standards were met within years

The Inefficiency Remains in Place, but...

- Business stands to gain from finding better solutions
  - Reduced cost = higher profit
  - Most effective / least expensive solutions prevail
  - Available solutions and technology get better

- Over time, an ideal solution emerges on its own merits

- Government social objectives achieved
  - Without the need for micro-managing oversight

- Using the abilities of the private sector
  - To resolve social / regulatory objectives

Objective I'd Like to See: People in Space

- Socially beneficial but financially ineffective

- In extreme environments
  - Robots are effective and getting better
  - Only need the infrastructure required to get the job done
    - e.g communication satellites vs. space station

- People are needed now for robot support
  - Many unknowns to resolve: Radiation, regolith, dust

- On the Moon, people are a cost
  - Robots produce revenue, humans supervise
  - Market forces will seek to reduce that cost
  - Humans may be eliminated from lunar business

Where Can Improvements Be Expected?

- Technology will improve when used commercially
  - People will gain financially from reduced cost

- For human habitation and transport technologies
  - If human beings are a cost to reduce...
  - Is there a profit motive for improvement?
  - The incentive is to remove people

- Could we invent a profit motive for human presence?

- Could a human presence be a secondary objective?

Establishing Claims for Resources

- On Earth, claims involve
  - Physical surveying, claim markers
  - Registration, territory definition
  - An outline of the business

- There is also a transfer of risk from grantor
  - Presence of a resource not always certain

- Finding the resource is expensive
  - Attempting to detect marketable quantities
  - Made easier with modern technology
    - But initial geology is still often an educated guess

As a Result of the Discovery Process

- The business discovers the resource (or not)
  - They have also demonstrated significant effort

- If a business is going to expend that effort...
  - They're likely to use the information gained

- An authority granting the claim is assured that the resources found will be used

- A concern for targets of economic stimulation
  - Such as the Moon
  - Want infrastructure at resource site
  - Resources left alone might as well not exist

Is There a Transfer of Risk in Space?

- Remote sensing can detect resources
  - Resource mass and location are often the draw
  - Not necessarily the purity or concentration
    - Little doubt of economic viability

- Surveying can be done remotely
  - Areas of permanent shadow identified
    - Earth equivalent for precious metals?

- Precedents for claims via robotic telepresence
  - For claim marker: Landing of a NEAR-type craft
  - Or a swarm of “nano-landers”
  - Spending a few million dollars to secure tens of billions

Does This Demonstrate Intent / Ability to Use?

- Has the claimant expended significant effort?

- Want to avoid:
  - Land grabs
  - Gadflies
  - Businesses with insufficient resources
  - Everything a 'gold rush' could face

- A result to achieve:
  - Regulation of the lunar claims process

- Could be accomplished through legislation
  - Limit the pool of claimants

Identify Objective to Achieve Result

- On Earth, the claims process is open
  - In space, want to leave the field open to competition

- The environment in space is different
  - In some ways easier to stake profitable claims

- This ease creates new problems

- To resolve those problems:
  - Could a threshold of difficulty be established in space?

Adding an Inefficiency to Space Claims

- Why not add a human component?

  - A lunar claimant would need to:
    - Deliver human surveyors to the territory being claimed;
    - Stake claim markers at each defining kilometer;
    - Return with a physical sample from each staked location.

- Would indicate ability to use resources
  - At a minimum, claimant had ability to reach resources

- Demonstrates intent of use
  - Willingness of planning, effort and expense for claim

Demonstrates Intent of Use

- It takes resources to send a person to the Moon
  - Just a fraction of that required for full development
  - Only those who intend full use would bother

- Creates an inefficiency to benefit business
  - A hurdle is put in place
  - Claims will only be made by serious claimants

- Streamlines the claims management process
  - Only legitimate claims with reasonable expectation of being pursued would be filed

- Rate of claim would be regulated by technology restrictions

Regulate Claims and Develop Human Spaceflight

- The 'space authority' is stating requirements for claim
  - Not stating how it is to be accomplished

- Businesses face a new cost:
  - Delivering human surveyors to the lunar surface
  - Human beings an essential component
    - Business will seek to reduce that cost

- Implementation is not restricted
  - Invention, innovation, cost reduction can be employed
  - Over time, reducing cost and complexity

- As with emission reduction in automobiles
  - Human spaceflight can be made a part of commerce

Conclusion

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- Secondary objectives have been a part of space programs

- Project results are influenced by secondary objectives

- Working backwards:
  - We can produce desired results by creating secondary objectives

- Human spaceflight
  - Mandatory human participation in claims
  - Using market forces to improve technology
  - While resolving issues of claim regulation