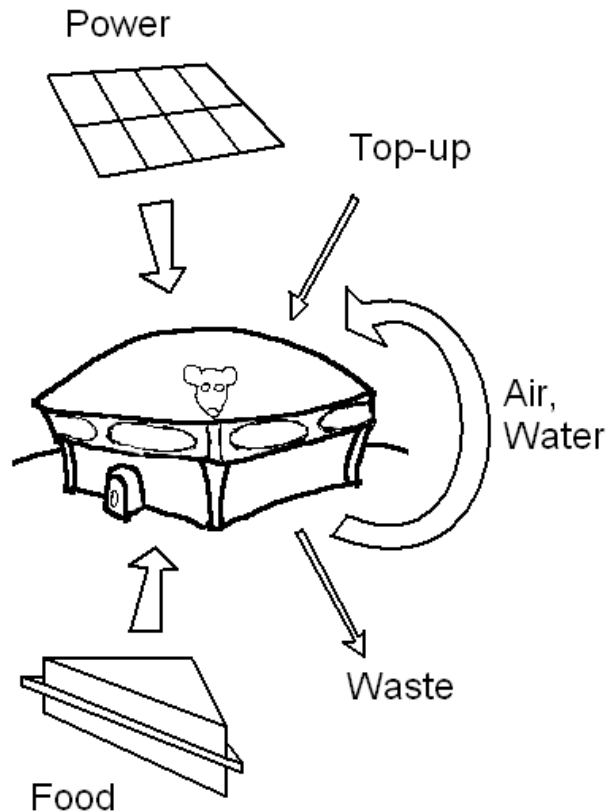


Space Colonies

by Deuce =^.^=.

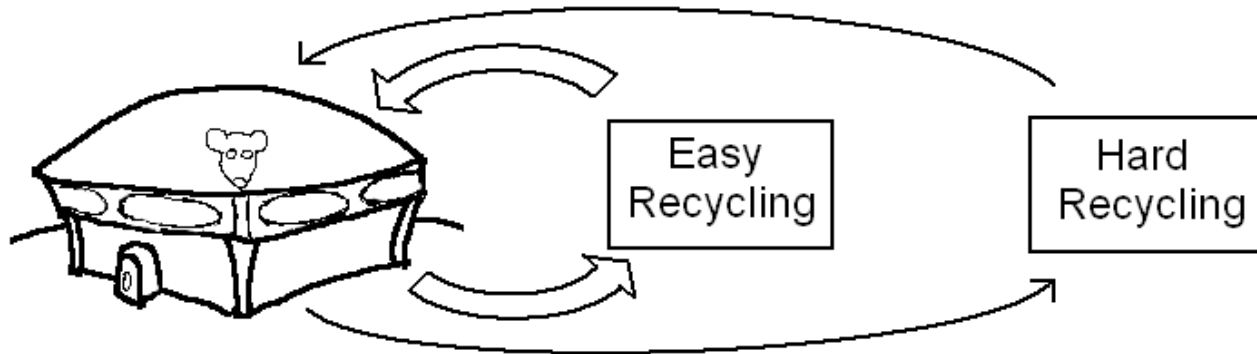
(art by Verace Xenirvana -
VeraceX@gmail.com)

Things We Need To Live



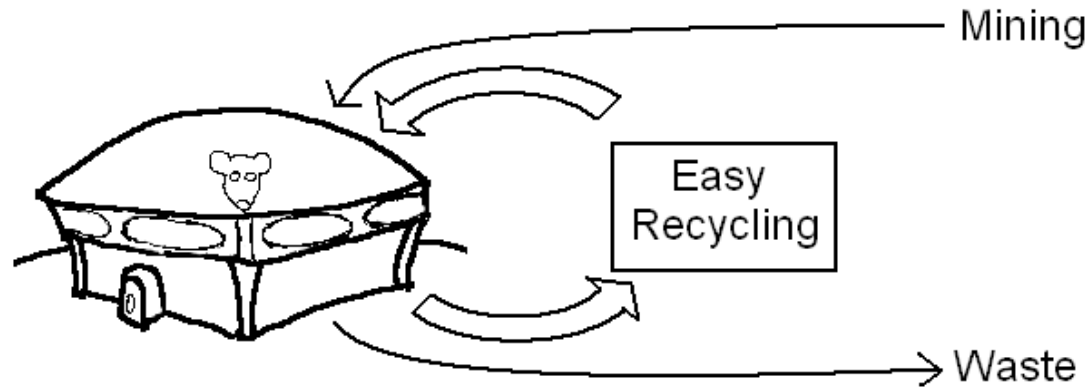
- Four things needed: Food, Water, Air, Power.
 - Power is plentiful, even in the outer system.
 - Air and water can be mechanically recycled or mined.
- Food must be shipped in or grown!
 - Growing takes a lot of space, but a colony has this.

Recycling: Closed Loop



- Colony is a closed system! Nothing truly lost.
- Elements end up in “easy to recycle” or “hard to recycle” forms.
- Goal is to recycle enough to keep re-supply trips reasonable.

Recycling: Open Loop



- Colony doesn't have to be a closed system!
- Alternative to recycling hard stuff: Resupply from environment.
 - Mining is much cheaper than shipping!

Planetary Resources

- Need all of these to have a colony:
 - Volatiles (CHON)
 - Need for living things, plastics.
 - Inner system lacks these!
 - Rock/Metal
 - Need for structure, machinery.
 - Icy bodies lack these.
 - Gravity low enough to launch from.
 - Escape velocity < 3 km/s.
 - Gravity high enough to trap volatiles and allow healthy development.
 - Gravity at least 0.1 g.

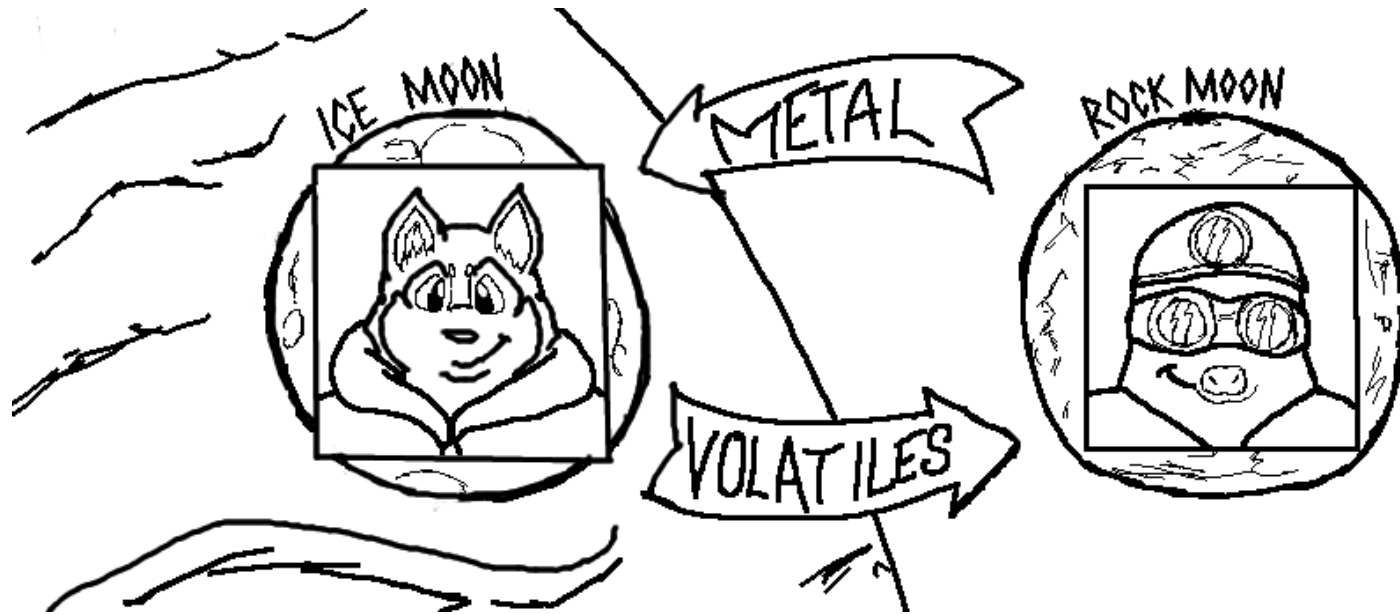
Location, Location, Location!

- **Earth's moon:**
 - No volatiles.
- **Mercury/Venus/Mars:**
 - Escape velocity too high.
- **Jovian moons, Titan, maybe Triton:**
 - Hard to access metals. Otherwise great!
- **Other moons, Pluto:**
 - Surface gravity too low. Otherwise okay.
- **Asteroids, Comets, Space Stations:**
 - Lack volatiles (asteroids), metals (comets), or both (space stations). No gravity (leaked matter is lost).

Interplanetary Trade

- Virtually nonexistent!
 - Anything heavy is prohibitively expensive to ship.
 - Even if mining or manufacturing locally is very hard, still cheaper and easier to do that.
- Loophole: tiny things and data are ok.
 - Tiny things that are hard to make: microprocessors, medicines

Interplanetary Trade

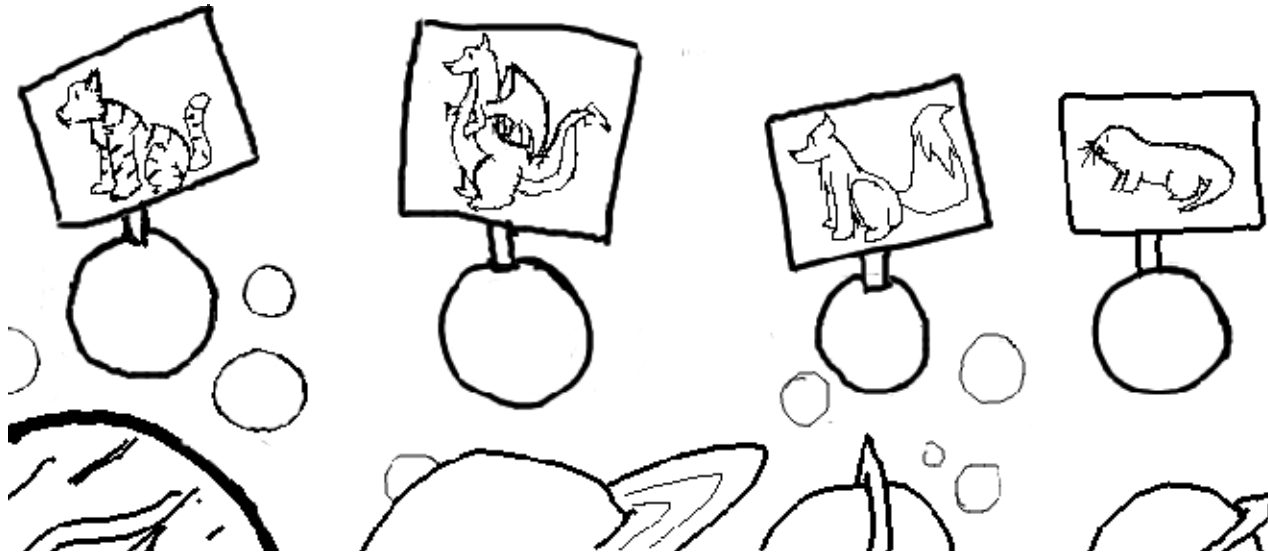


- Loophole: trade between Jovian moons.
 - Low delta-v, short transit times, orbit transfers can use electric drives.
 - Mass driver can ship things from airless suppliers.

Space Prospecting and Industry

- Market for space products isn't Earth!
 - Earth is a giant ball of rock and metal covered with volatiles. It has all the resources it could ever need.
- Market is places Earth can't supply.
 - Space mining supplies space projects!
- Market has to be close to the supplier.
 - Space stations are built near the material source.
 - Trade within a moon system is possible.

Looking Forward



- Outlook is good!
 - Many decent places to colonize (even if none are perfect).
 - Multi-world federations around gas giants are possible.