A Review of Licensing and Collaborative Development

With special attention to the design of self-replicating space habitat systems

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Space Settlement Visions

- Different directions
- Common infrastructure
- A trillion Bernal spheres
- A terraformed Mars
- A living Moon
- Solar power satellites and L5 O’Neill habitats
- Near-term on-Earth technological spin-offs

Picture courtesy of Alexis Flamand
Design Science

• Buckminster Fuller’s larger view

• Supporting human and other life throughout the cosmos in style

• Villages, cities, desert, ocean, Moon, L5, asteroids, Mars, rings of Saturn

• Tools, knowledgeable people, resources, freely accessible digital library

• Technical artifacts: how-to instructions, CAD files, interdependencies, analysis tools, simulations
Space Enthusiasts

- Indirect (non-technical) contribution
  - Dues-paying members -- Mars Society, SSI
  - Lobbyists -- ProSpace “March Storm”
  - Investors -- SpaceDev, SpaceHab
  - Torch-bearers -- teachers, sci-fi authors

- Direct (technical) contribution
  - Enthusiastic engineering
  - Paleontology and astronomy as examples
The Open Source Inspiration

• Linux, Apache, Sendmail, GCC, Python, Squeak, Tek, Emacs, DrScheme, Slashdot, Everything2, DMOZ, SETI-at-home, EOE

• SourceForge has over 153,000 registered developers and 19,000 open source projects.

• How many space enthusiasts are closely cooperating on detailed designs?

• What could the space settlement community do with numbers like those on SourceForge?
Spare Time Adds Up

Using home PCs connected to the internet,
300,000 people
spending 4 hours per week
for 10 years
at an avoided cost of $300,000 per person-year
can create a $90 billion design

... such as for a self-replicating seed factory to send to the Moon, Mars or the asteroids that requires only $1 billion to launch.
Open Tools and Standards

• Exponential growth of technology since 1970s removes technological limits to collaboration

• Extensible tools support a wide variety of purposes

• Examples: Squeak, DrScheme, Python + Tk

• Non-proprietary standards allow evolution of project artifacts over time

• Examples: XML, SGML, HTML, ASCII text
Models of IP Production

- **Individual** -- One person reading, processing internally, and producing isolated work
- **Centralized** -- Multiple people continually refining centrally owned artifact design
- **Collective** -- Variety of owners granting limited licenses for each part of a large technical artifact

(Concept from Manuel De Landa’s *1000 Years of Non-Linear History*)
The Termite Model

• Termites build piles by themselves
• An arch forms by two piles falling on each other
• Other termites get excited
• A tunnel is built
• Tunnels link up
• Giant mounds form

Derived from USDA Photo
Intellectual Property Issues

• Types: copyrights, patents, trademarks, trade secrets

• Distinguish code, content and collection

• Choose appropriate licenses
  - copying
  - derived works
  - viral licenses
  - liability

• See also http://www.centerforthepublicdomain.org
Open Source Cases

• GNU/FSF -- clear license, due diligence  :)  
• Linux -- modular APIs  :)  
• Apache -- clear purpose in mind  :)  
• Squeak -- monolithic, unclear status  :(  
• Bootstrap -- liability for contributors  :(  
• Python -- founder’s employer changed license  :(  
Space Settlement Groups

• General vision -- contributors own IP
  NASA, newsgroups

• Specific vision -- proprietary IP model
  Non-profits -- SSI, Mars Society, LUF
  For-profits -- SpaceDev, SpaceHab, LunaCorp
  Primarily individual -- PERMANENT
  Mixes -- Artemis Society
Living Universe Foundation

• Good example of collaborative web site
• LufWiki copyright notice gives no license for derivative works or redistribution:

“Copyright © 1996-2000 by the Living Universe Foundation and the contributing authors. All material on this website are property of the Living Universe Foundation and their authors.” -- from http://www.luf.org

• GNU Free Documentation License proposal for entire Wiki by LUF member in July 2000
• Committed volunteers (and lots of hard work) are not enough -- IP licenses make a big difference
Suggestions for Promoting Collaboration

• Clear license for each modular contribution
• Signed originality or permission-to-use statements
• Coordinated repository of permissions and audit trail of changes to collaborative works
• Collaboration tools to support licensing needs
• Advance decisions on at least one acceptable license
• Community awareness of these issues and education of new members on these issues