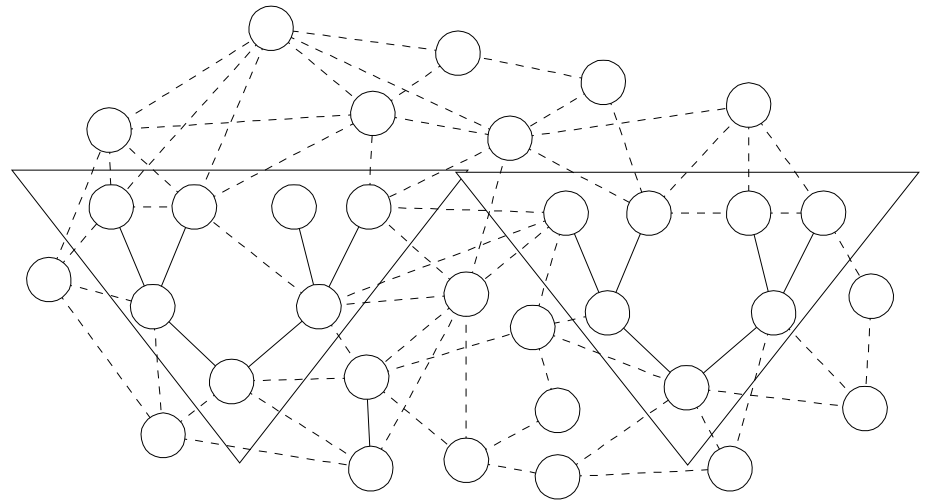


A Review of Licensing and Collaborative Development

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



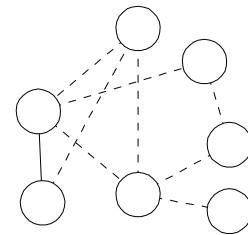
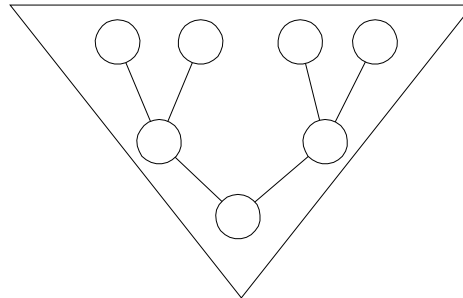
Paul D. Fernhout

Cynthia F. Kurtz

Kurtz-Fernhout Software

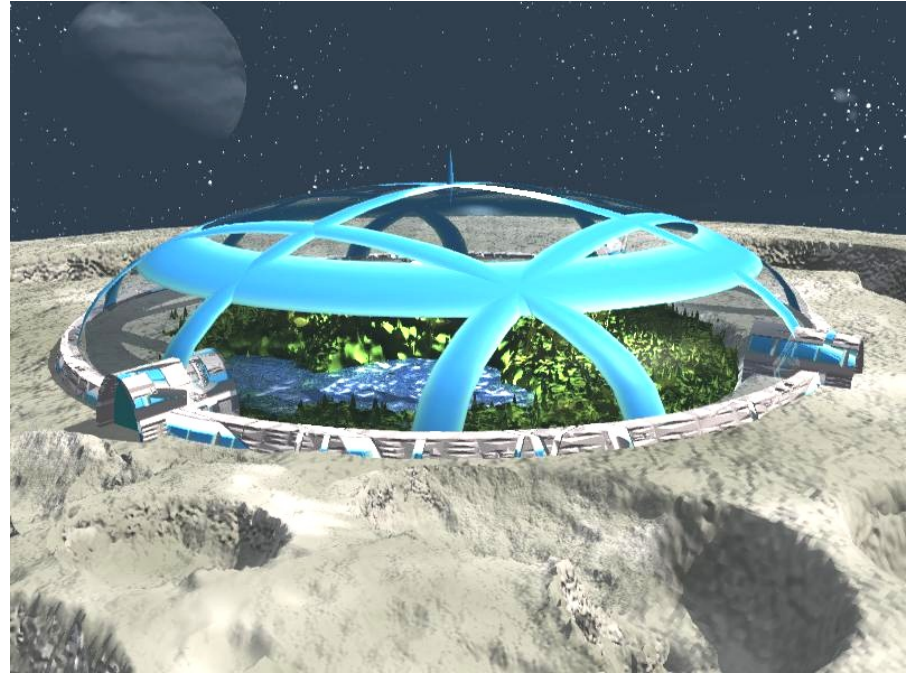
Chappaqua, NY

<http://www.kurtz-fernhout.com>



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

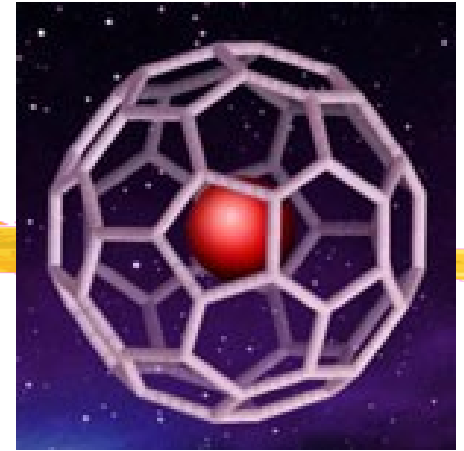


Photo Credit: NASA

- 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.

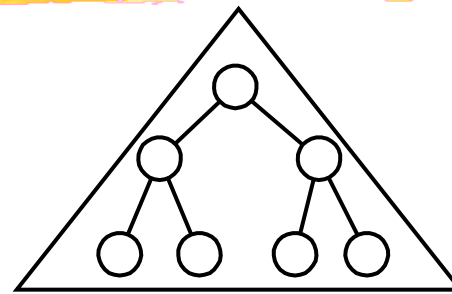
Open Tools and Standards



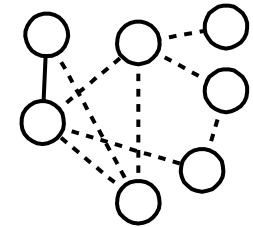
- Exponential growth of technology since 1970s removes technological limits to collaboration
- Extensible tools support a wide variety of purposes
- Examples: Squeak, DrScheme, Python + Tk
- Non-proprietary standards allow evolution of project artifacts over time
- Examples: XML, SGML, HTML, ASCII text

Models of IP Production

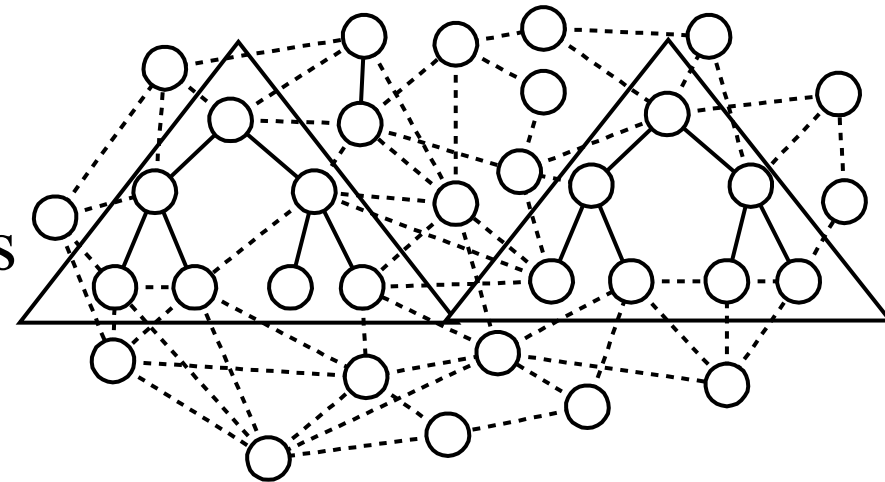
- Individual -- One person reading, processing internally, and producing isolated work
- Centralized -- Multiple people continually refining centrally owned artifact design
- Collective -- Variety of owners granting limited licenses for each part of a large technical artifact



Hierarchy



Meshwork

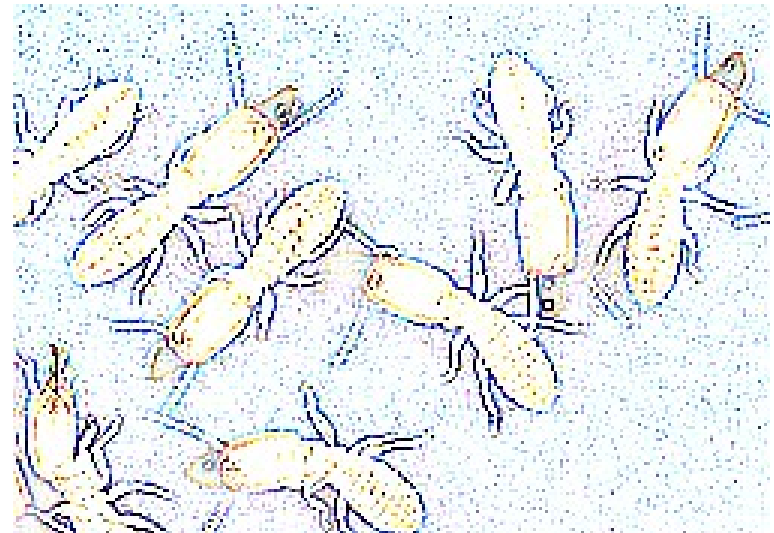


Hierarchies and meshworks combined

(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