

Building the World's First, Replicable, Open Source, Off-Grid, Global Village



*Marcin Jakubowski, Ph.D.
Open Source Ecology*

3.28.09

Presented at the Oekonux 4 Conference
Manchester, UK



We Propose the Global Village Construction Set

- Productive tools for a new civilization and economy
 - Old civilization has failed, needs re-engineering
- Infrastructure that you all use, directly or indirectly
 - Obvious items essential to a productive economy
- Particular implementations selected by a **metric score**
 - Economic importance, robustness, localization, ecology, and replicability
 - *Liberatory, productive, local, post-industrial, limited but sufficient set*
 - Product Selection Metric in OSE Proposal of 2008
 - If you have substitutions, score them and let us know

Here are Things That You Use Directly or Indirectly



Car



Tractor



Combine



Dairy



Orchard



Sawmill



CNC Multimachine



Induction Furnace



Pyrolysis Oil



Solar Power Generator



3D Printer, Micromill



Steam Engine



MIG Welder

- Set doesn't produce microcircuits and metal

Infrastructure Set Sufficient for Creating Advanced Civilization

opensourceecology@gmail.com - 3.20.09

Housing and Construction



Local Food Systems



Implements



Mobility



Solar Energy



Personal Fabrication

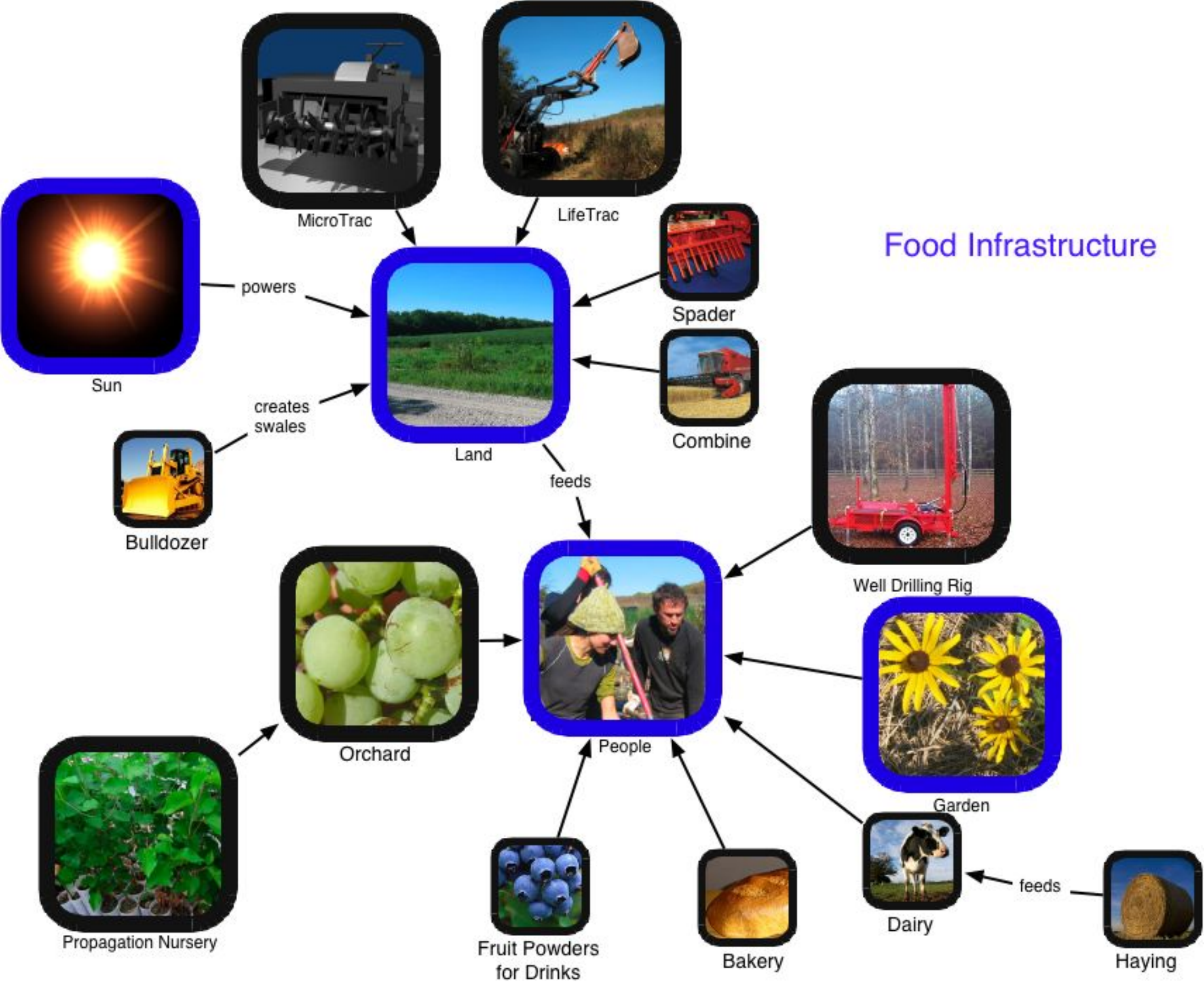
So, You Want to Build a Village?

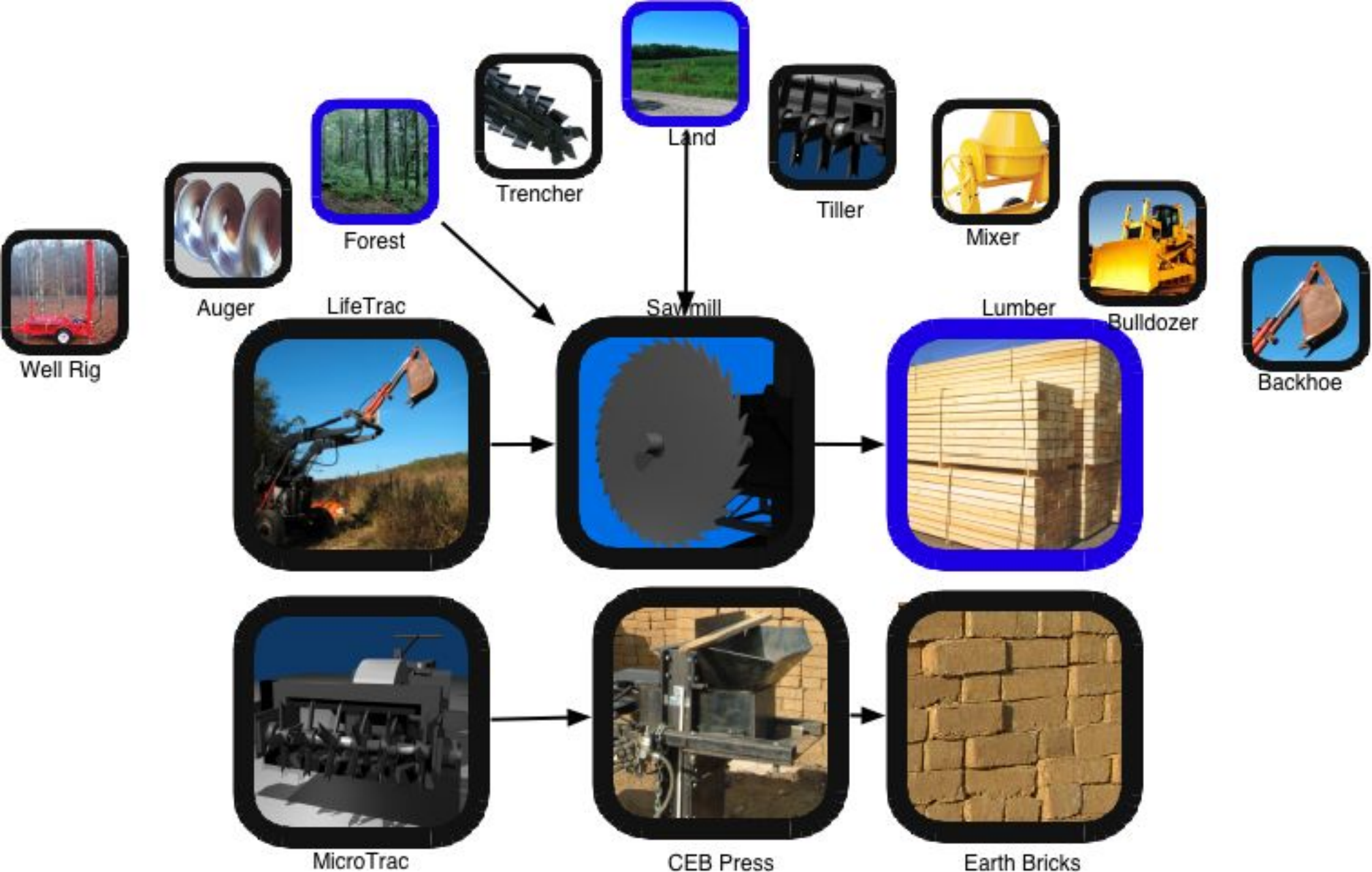


- Here is the construction set
 - It's a 41 piece set
- Why?
 - Because *you* can

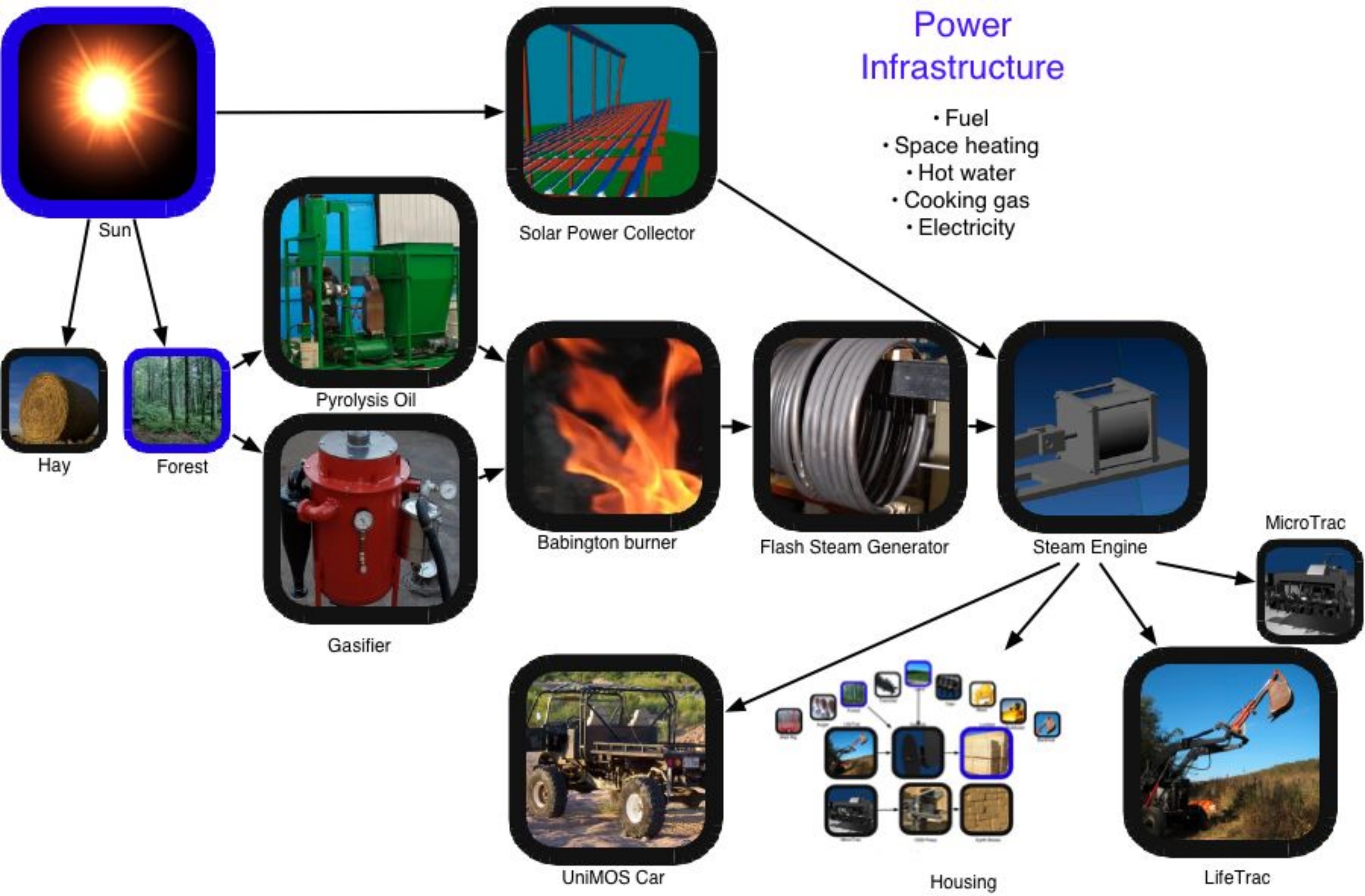
You Might Want to Start by Building a Whole Economy

- Agriculture
- Housing
- Energy
- Fuel
- Transportation
- Technology





Housing Infrastructure



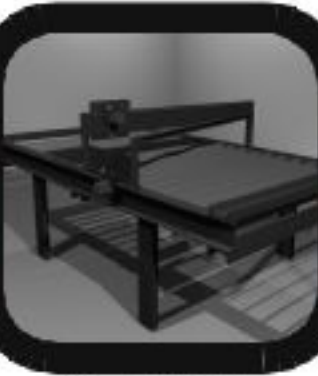
Fabrication Doable in Your Garage or Village



MultiMachine



HydraRaptor



Torch Table



MIG Welder



Plasma Cutter



Induction Furnace



Casting



Hot Rolling



Cold Rolling



Forging

- Multimachine - CNC milling, drilling, lathing
- HydraRaptor - RepRap 3D printer in plastic plus microdrill and micromill for circuits
- HydraTable - torch, plasma cutter, and router CNC table, plus other heads
- Induction furnace - flexible melter for metal, also for case hardening, extrusion
- Metal processing: casting, hot rolling, cold rolling, forging

GVCS Has Several Unique Features



- Self-replicability via Fab (and Ag)
 - closing of the industrial divide
 - *recasting* a new civilization

- Extreme modularity: example of Hydraulic Motor and Power Cube
 - Nonstandard system optimization: hydraulic motor, steam engine
 - GVCS is 100% Solar Powered, 100% locally producible
- Design for Disassembly = LifeTime Design

We are Engaged Actively in Building the Construction Set

- Tractor, CEB, tiller, backhoe prototypes and field testing - done
- Sample building - done



- Active agriculture:



- On the drawing board: Sawmill, MicroTrac, Multimachine, Torch Table



Torch Table

Sawmill

MicroTrac

Lathe

Building Action

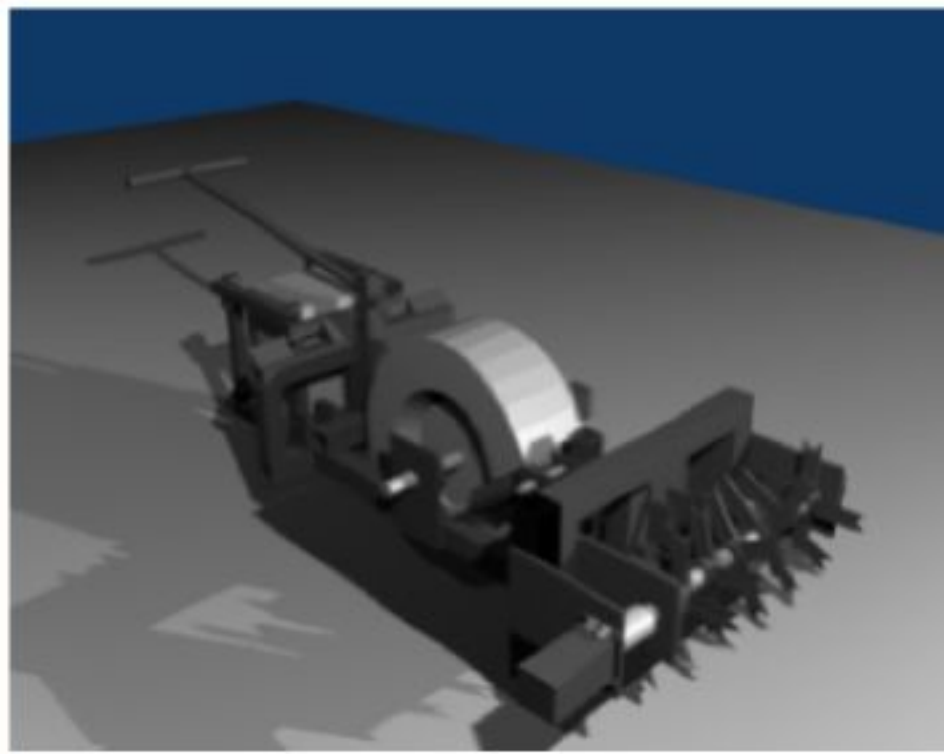
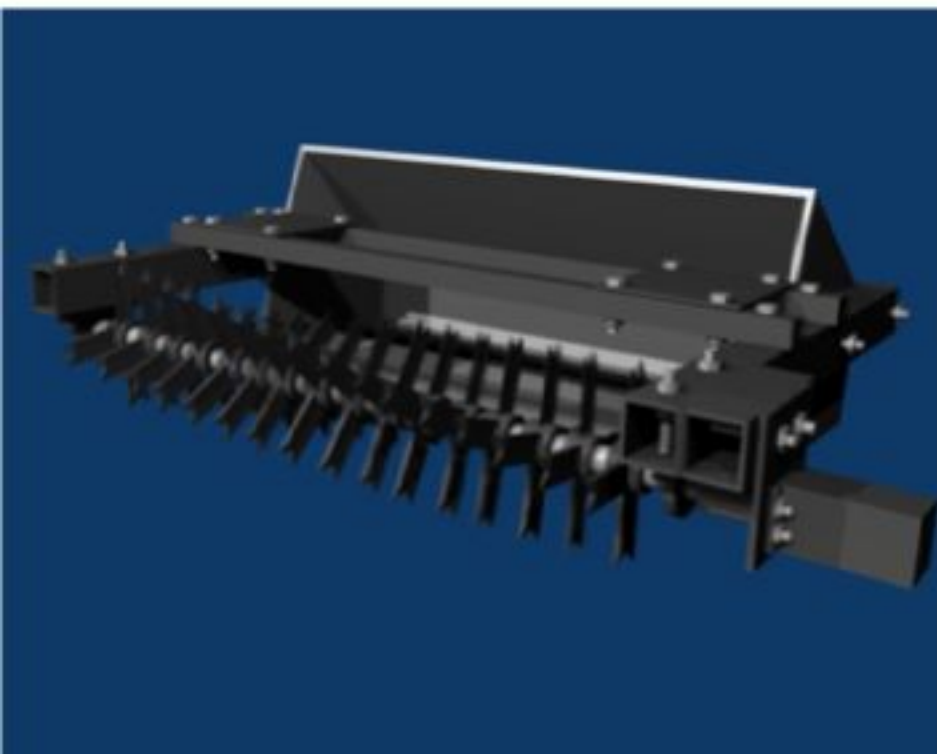


Other Action at Factor e Farm



Our Next Challenge: Product

- CEB Press production is our first full Product Cycle up to Product Release
- Needs Soil Pulverizer for soil preparation and MicroTrac for power



At Cost Production is a Default Open Source Economic Model

- We're testing economics of *At Cost Production*
 - Workshop paid for by crowds
 - We give back by producing *at cost* - materials and labor
 - Mainstreamable - because of cost effectiveness
 - Transformative - P2P called this the '*most important social experiment in the world*'
- One of few growing enterprises in Depression

CEB Press is First Test Case and Entire Set is Sufficient to Create an Economy

- Set focuses on *tools of production*
- Set is a money system
- Currency is backed by transparent documentation of productive capacity



Economic Analysis Without GVCS for a 30 Person Community

- 100% self-sufficient agriculture base requires \$3k/person
 - table found at Perennial Agriculture*
 - *under Title=... , on the OSE Wiki
- Propagation/plantout of edible landscape takes one half human year if appropriate equipment is available - total of \$50k at \$50/hour
 - found at Edible Landscape Creation Economics
- Building construction takes one half year with optimized equipment, 4 people, for \$200k at \$50/hr
 - greenhouse and cluster village is included
 - based on Factor e Farm experience with CEB
- Value of equipment required - \$250k
 - found on LifeTrac Economic Analysis
- Off-grid electricity - \$3k/person, conservative
 - \$10/W installed costs for PV
- Fab Lab - \$150k value
 - found at OS Fab Lab Economic Analysis

ITEM	DAYS REQUIRED
nursery propagation	30
chicken house and fencing	5
rabbit hutch	2
goat fencing	7
100 trees planted per day	30
4 raised beds per day	75
digging a well	14
swaling and ponds	15
1000 sq foot greenhouse	30
lumber milling w/ 2 people	30
brick pressing w/2 people	30
building w/4 people	90
TOTAL	358

-> About \$830k required for startup, plus land costs

Economic Analysis with GVCS for a 30 Person Community

- Immersion training for 2 years at Factor e Farm, \$10k/year tuition
 - Tuition and materials may be reimbursed by apprentice production
- Agriculture base, self-propagated during study
- Plantout occurs in a matter of 2 weeks per person
- DIY Building construction takes 90 days including lumber/brick preparation, with optimized equipment
- Heavy equipment Produced at \$5k total cost, Fab Lab at \$1k
 - Assumes induction furnace and full fab lab at Factor e Farm
 - Melting 50k lb of steel takes 3 weeks, 10 cents/lb scrap cost
 - Equipment produced as part of apprenticeship
- Time for completion of a Village infrastructure is under 1 year per person
 - See *30 Person Village Startup with GVCS* on wiki

-> Replication of Global Village Can happen entirely based on sweat equity

Land is the Most Important Issue

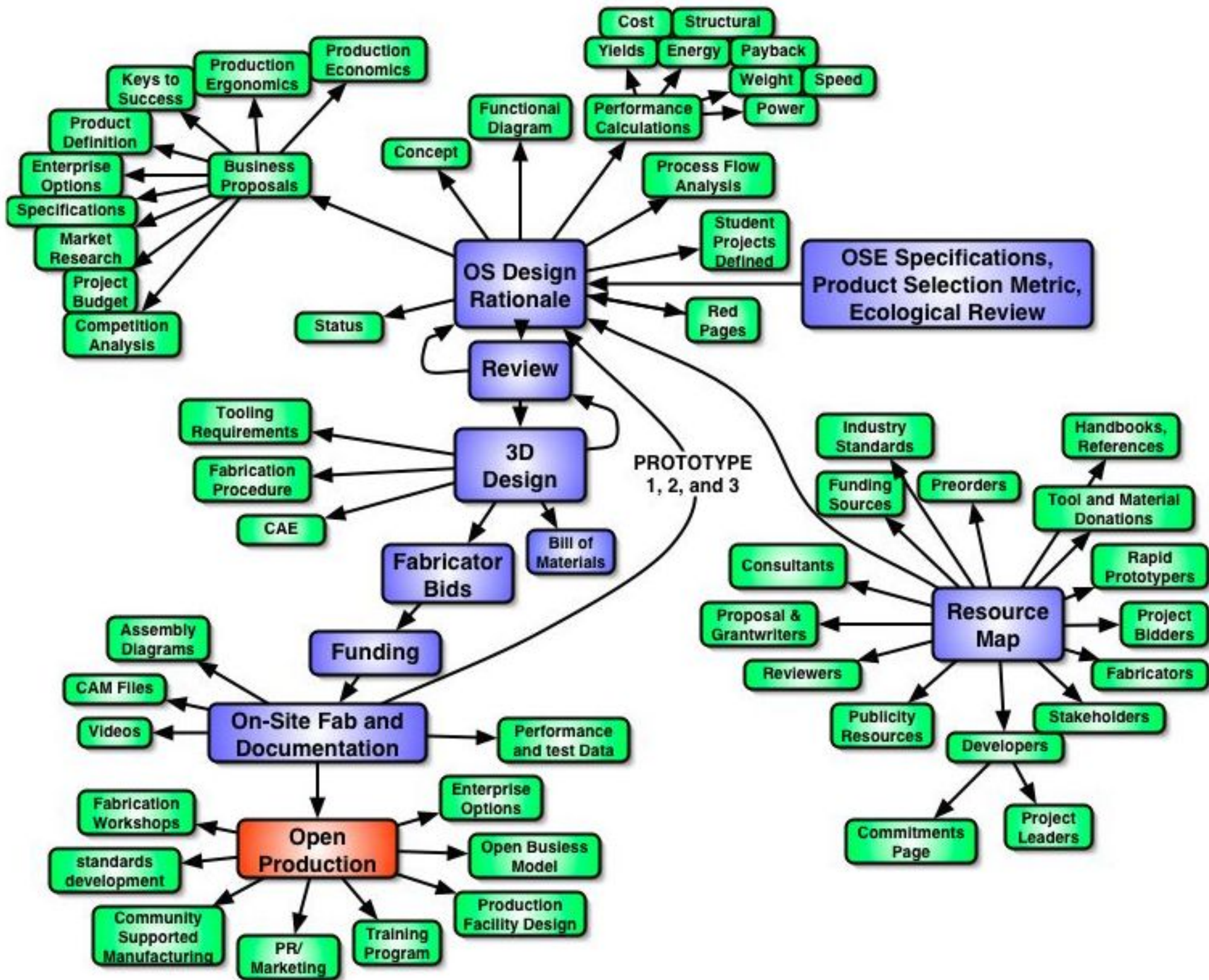
- Economic power allows easy long term, lease-to-own arrangements
- Collaboration with others based on sustainability interests is a good idea
- Acquiring new land with friends is a good idea
- Applications to unsettled land and regeneration of 'developed' land
- Stabilization of population is a spinoff from regenerative land use
- OSE principles call for preserving land for all future generations in NGOs and private trusts with '*structural governance*'

GVCS Is a Social Technology, not Hardware Technology

- Technology is all 'out there', it's about creating access
- Present strategy:
 - Open Source Design Rationale
 - Review/Bid
 - Fund
 - Deploy and document
- No one has cracked the collaborative hardware development nut yet
- Bids are a good strategy (such as in Open Music), but careful analysis is required to come up with bid

Open Source Design Rationale (OSDR) is Defined Iterated, Technological Development Cycle

(for specific Instances of Product Ecologies, Products, and Components)



OSDR Standards Aim at Quality Content

- OSE Specifications for guiding design principles
- Red Pages for development support
- Full explanation of relevant details
- Diagrams/descriptions can be extended to 3D design
- 3D Design annotated with BOM
- BOM spreadsheet available
- Fabrication procedure is outlined
- Resource map lists developers, reviewers, fabricators, consultants, etc.
- Funding via open proposal writing, via OSDR content
- Status should be transparent by viewing OSDR content

GVCS Is Transformative on Many Fronts

- *At-cost* production
- Closing the industrial divide
- Local fuels, local unjobs, local economy option
- GVCS completed is an economy, a bank, a currency
- Buying out at the bottom, being part of solution, not problems

Summary

- GVCS indicates promise of unprecedented quality of life
 - lifestyle engineering program
- Next major step is going into production, completing full product cycle
 - CEB press
- Encouraging technical results show that technology is easier than social technology:
 - collaboration platform
 - attention span
 - 90% problem
 - skilled Dream Team 30
- We need to explain our work more clearly and engage investors more effectively

<http://openfarmtech.org>