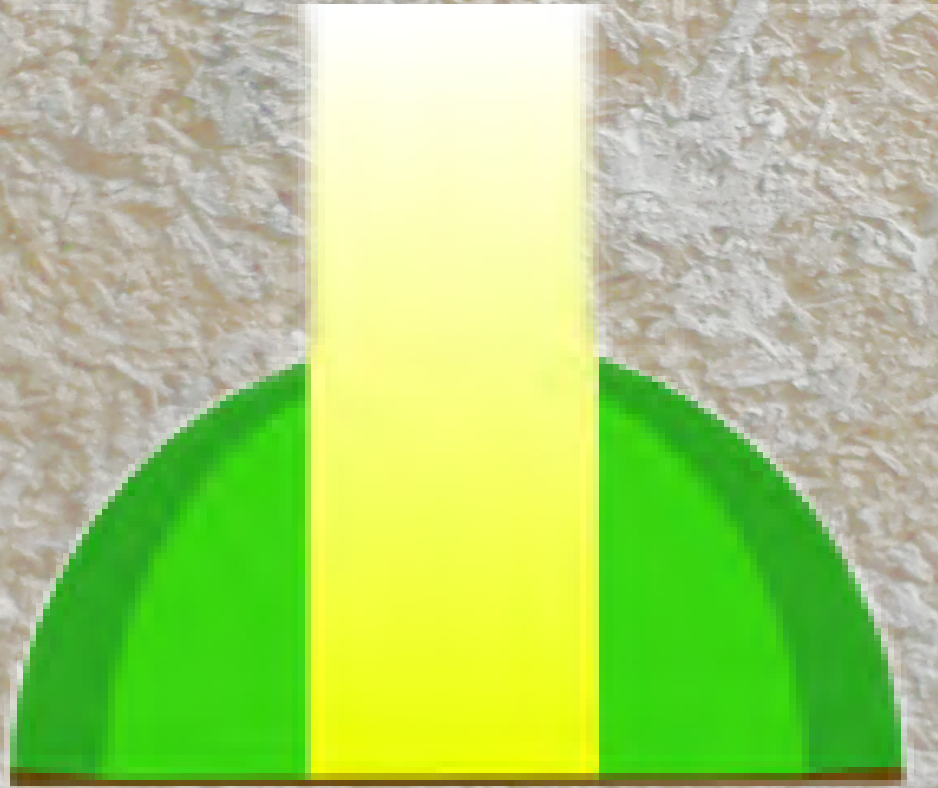


# HempCreate: the art of hemp based Geopolymer extrusion.



λ Thank you for inviting me to this Geopolymer camp.

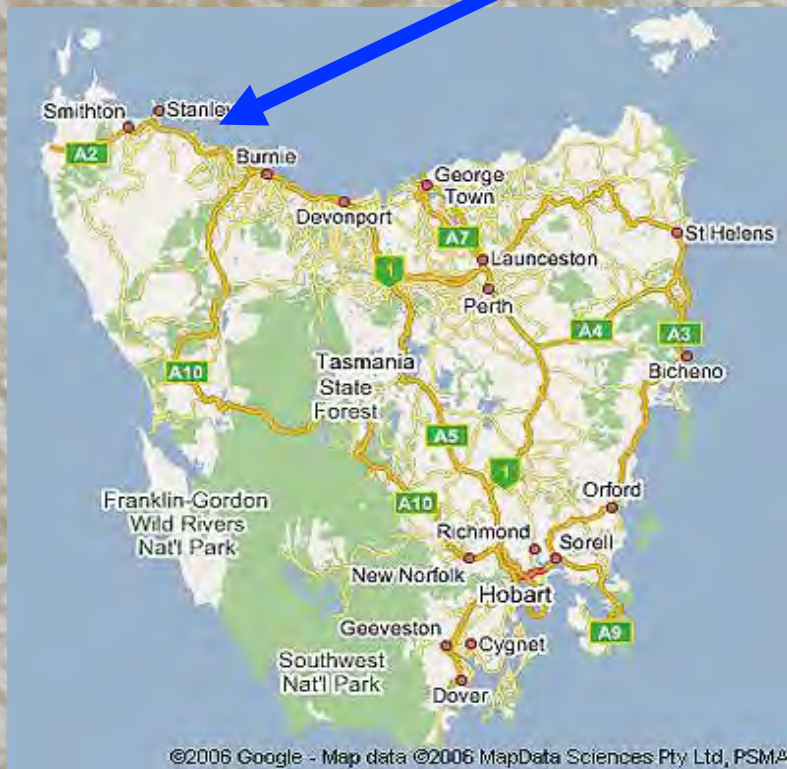
λ David Andresen

λ Geopolymer Camp 9 July, 2014 Saint-Quentin France IUT University

# Geopolymer Hempcrete

λ Bonjour,

λ Project is in Rocky Cape, Tasmania, Australia



λ I am Norwegian born, in Stavanger

λ I am therefore, a Norwegian becoming a Taswegian

# The spiritual aspect

I say “thank you” to all minds, **immortal minds**, who are helping me with this project

λ What is creativity?

λ **purpose**

λ **passion and persistence**

λ **faith in self**

λ **in the service of humanity.**

λ Every human being is born with **creative potential.**

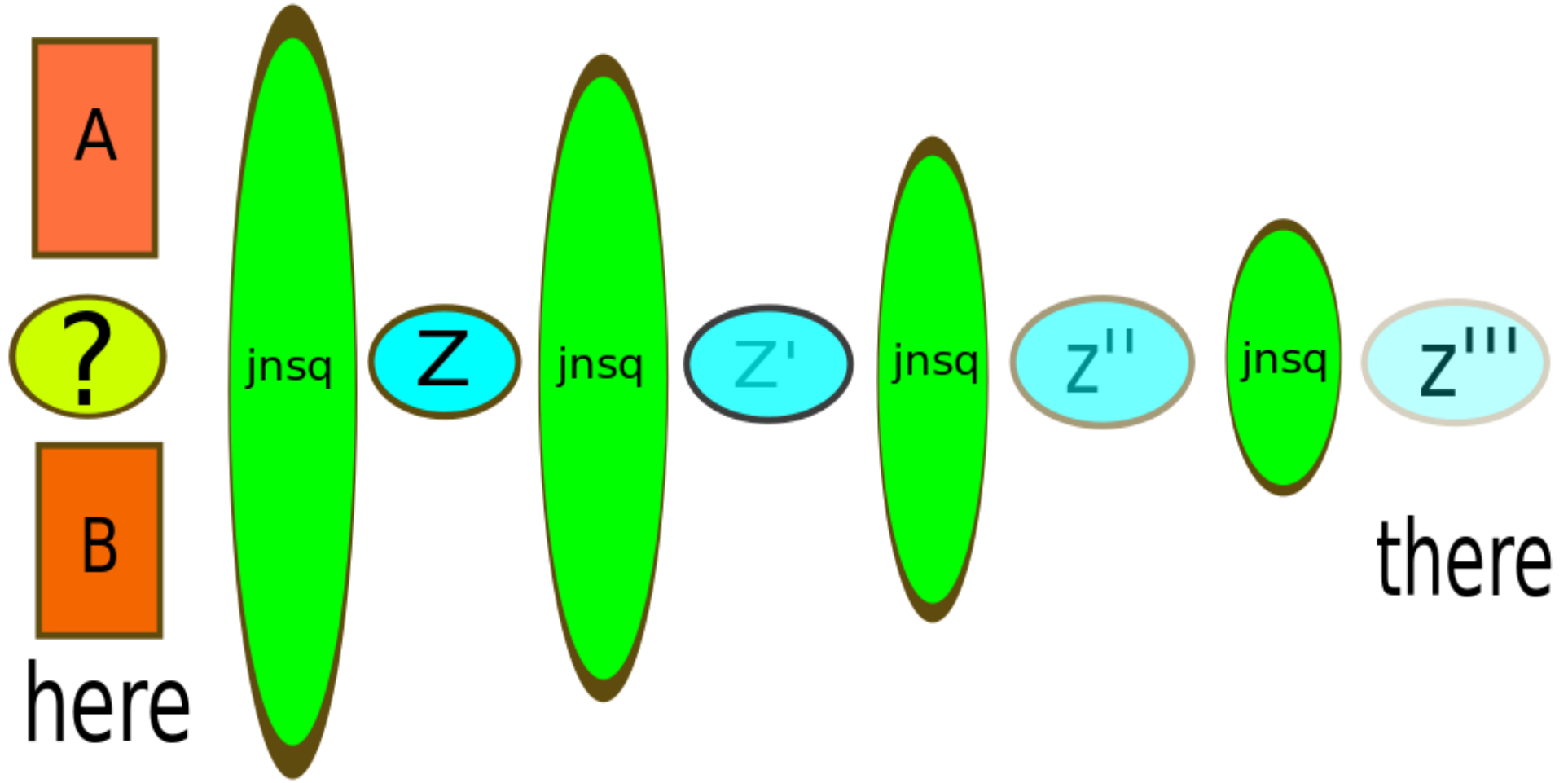
λ Understanding how **to be creative** is important.

To create anything one must begin with something.

Nothing can **not** be modified.

When the hand does the **mind sees.**

# Jakob's ladder?



A + B + jnsq (nature, science, the minds of others) makes Z  
jnsq = je ne sais quoi = I do not know what

# The material aspect

## Extrude [print] buildings

λ Geopolymer Hempcrete appears to have **desirable properties** for creating building such as;

λ Catenary vault, Dome and Curved walls

√ Necessary to;

√ understand **Geopolymer chemistry**

√ discover a suitable Geopolymer **Hempcrete** mix

√ apply principles of **Bau-biologie**.

√ design the machines that **combine, convey, control,**

√ **compact, and cure** the Geopolymer Hempcrete mix.

√ **Automate** these portable machines.

# Industrial hemp



But first to grow and process hemp cane hurd or skiv.

# Mix ingredients

A usable mix design has been discovered.

## Ash:

$\text{SiO}_2=65.5\%$        $\text{CaO}=2.3\%$   
 $\text{Al}_2\text{O}_3=22.7\%$      $\text{MgO}=0.5\%$   
 $\text{Fe}_2\text{O}_3=2.7\%$       $\text{Na}_2\text{O}=0.68$

## Slag:

Silica < 35%,  
Alumina < 13%  
Calcium Oxide < 40%  
Gypsum  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}=15\%$

## SS-sol:

$\text{Na}_2\text{O} \rightarrow 8.6\%$   
 $\text{SiO}_2 \rightarrow 27\%$

Hemp hurd: 2.5–5.0 mm

Water



# Mix design

- λ 100g flyash
- λ 136g activator
- λ 100g slag
- λ Additional
- λ 63g activator
- λ 1litre hemp
- λ 50-100g water



λ Activator 56g SS-sol + 23g NaOH + 57g H<sub>2</sub>O



# Compaction (1litre compacts to 0.6 litre)



This mix design can be **extruded**.

# Compression test



This mix design has a compressive strength of 6MPa.

# Flame test



This mix design will not support combustion.

# Durability test

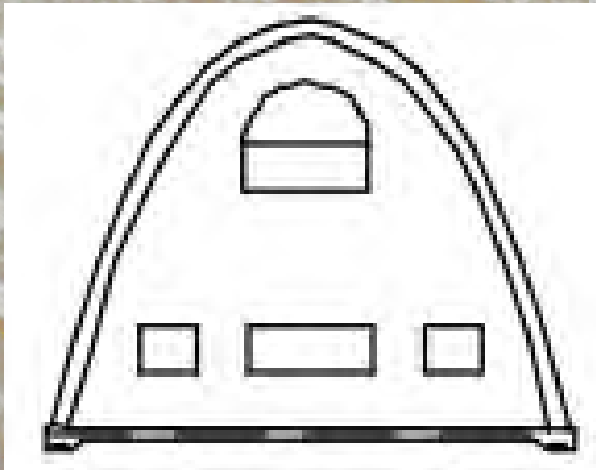


This mix design is durable.

# Buildings

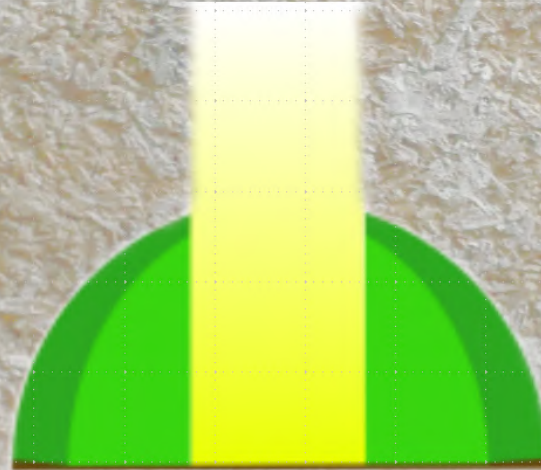
Thermal envelopes and hygroscopic walls.

Catenary vault



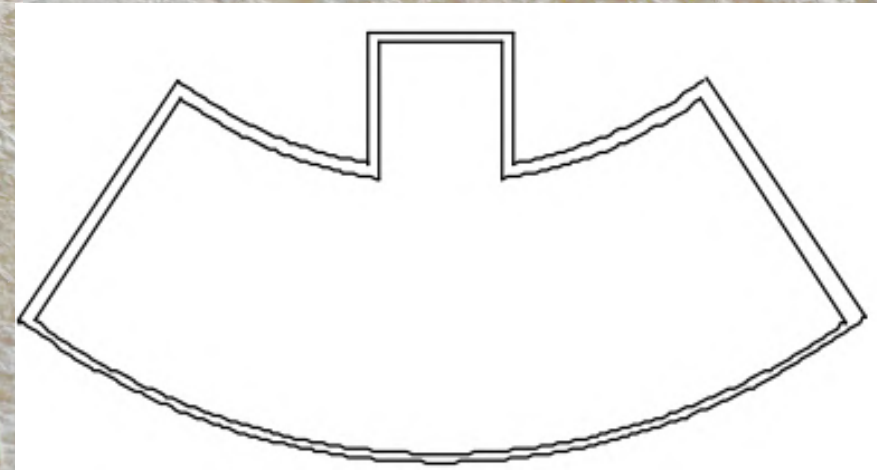
Garage

Dome



Shed

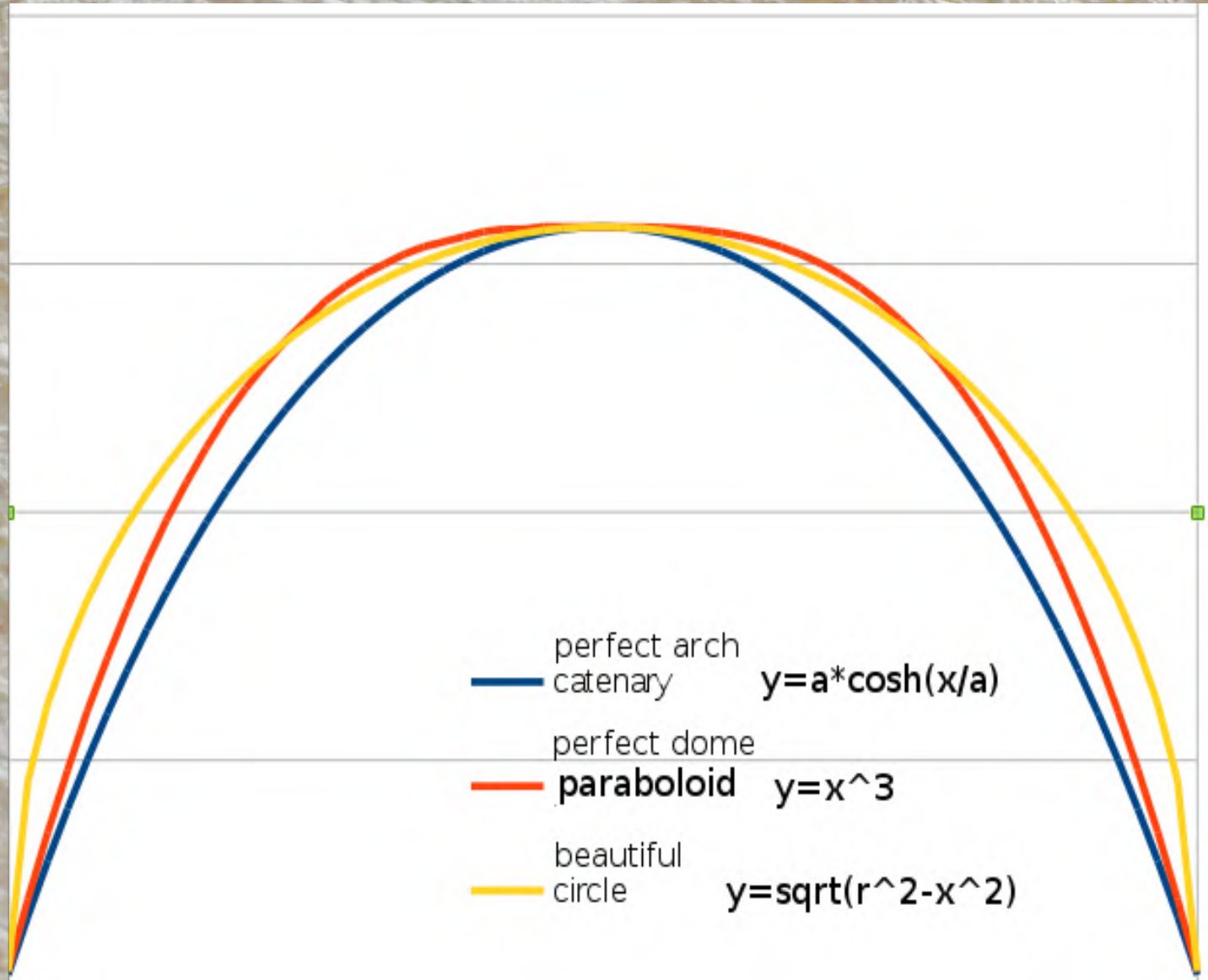
Curved walls



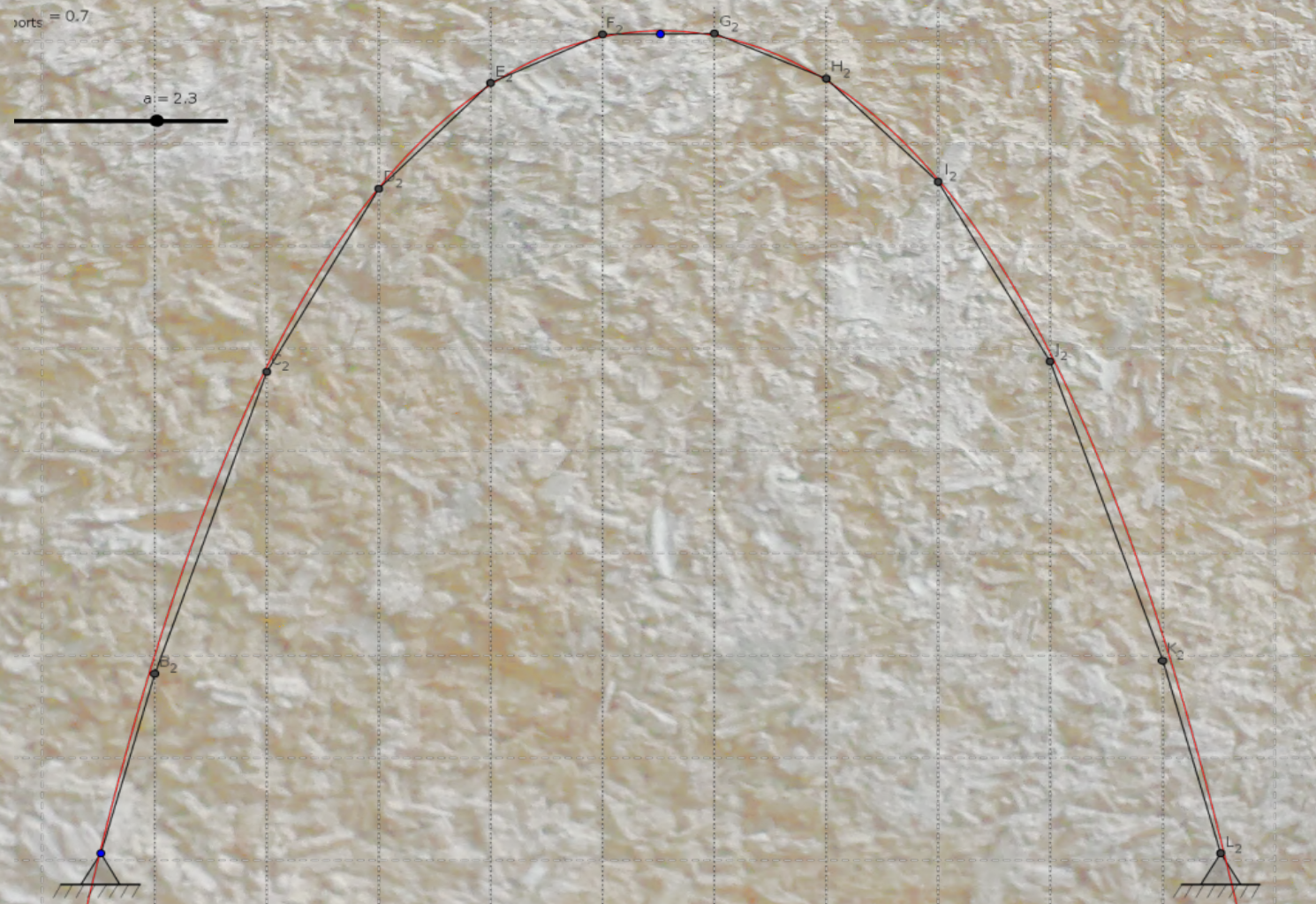
Dwelling

GeoGebra: an open source funicular design program.

# Design formulae



# Design with Geogebra



GeoGebra catenary design [black line]

$y = a * \cosh(x/a)$  catenary [red line]

# Papercrete dome



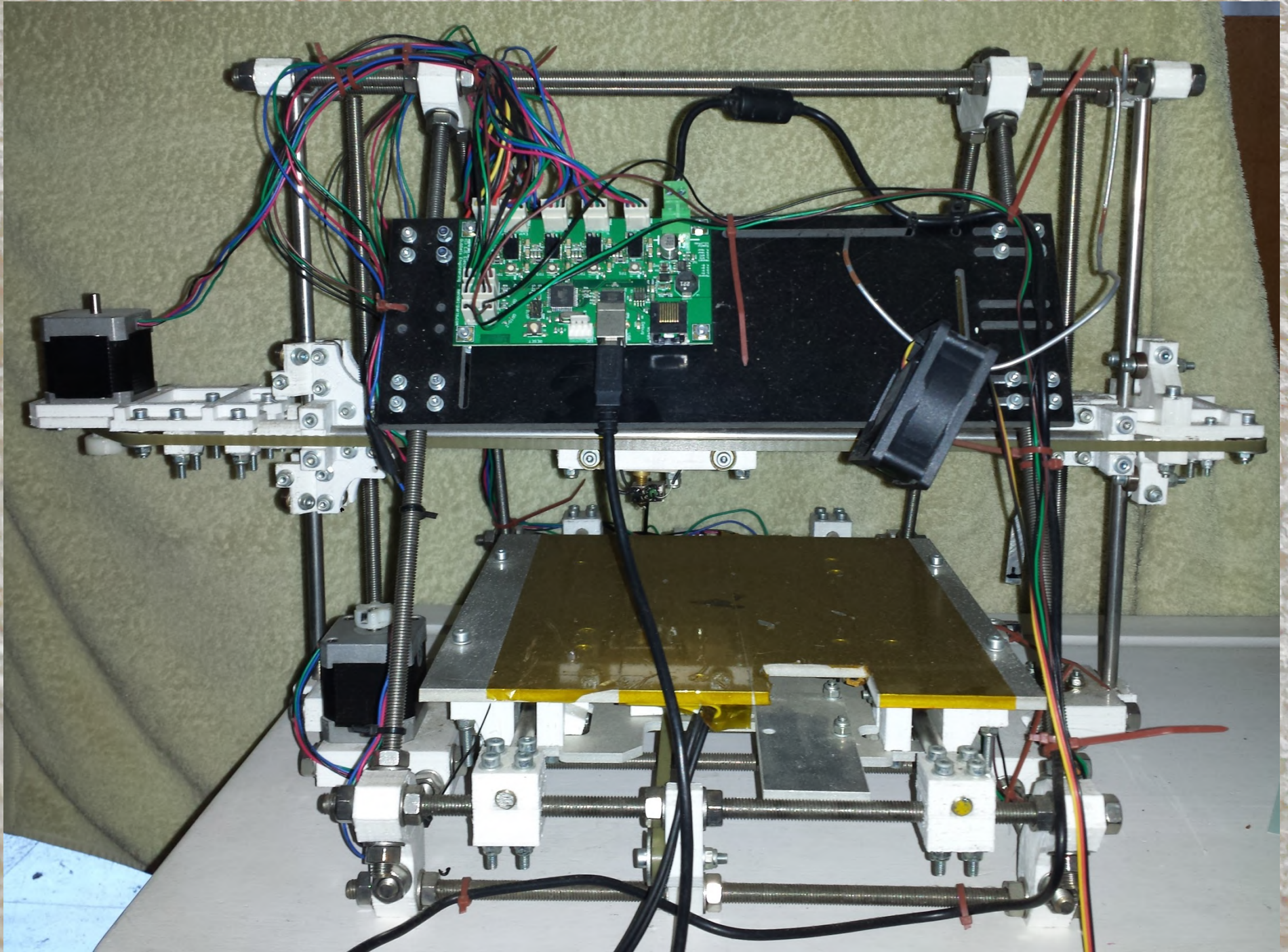
λ Papercrete dome extruded in Sydney, Australia



# Magnesium oxide hempcrete

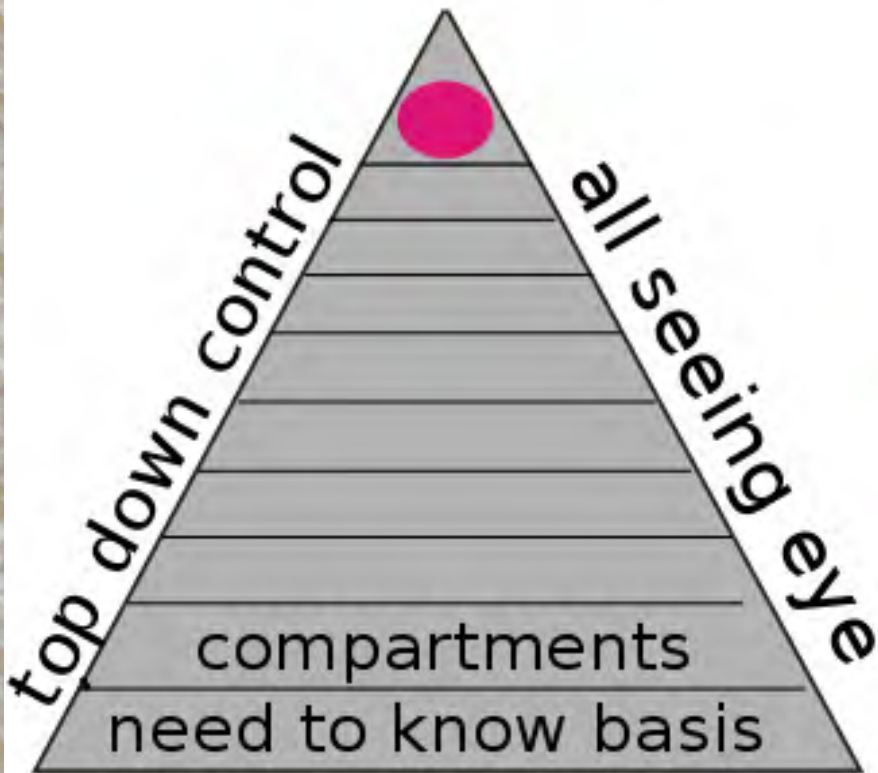


# Reprap Mendel: open source 3D printer

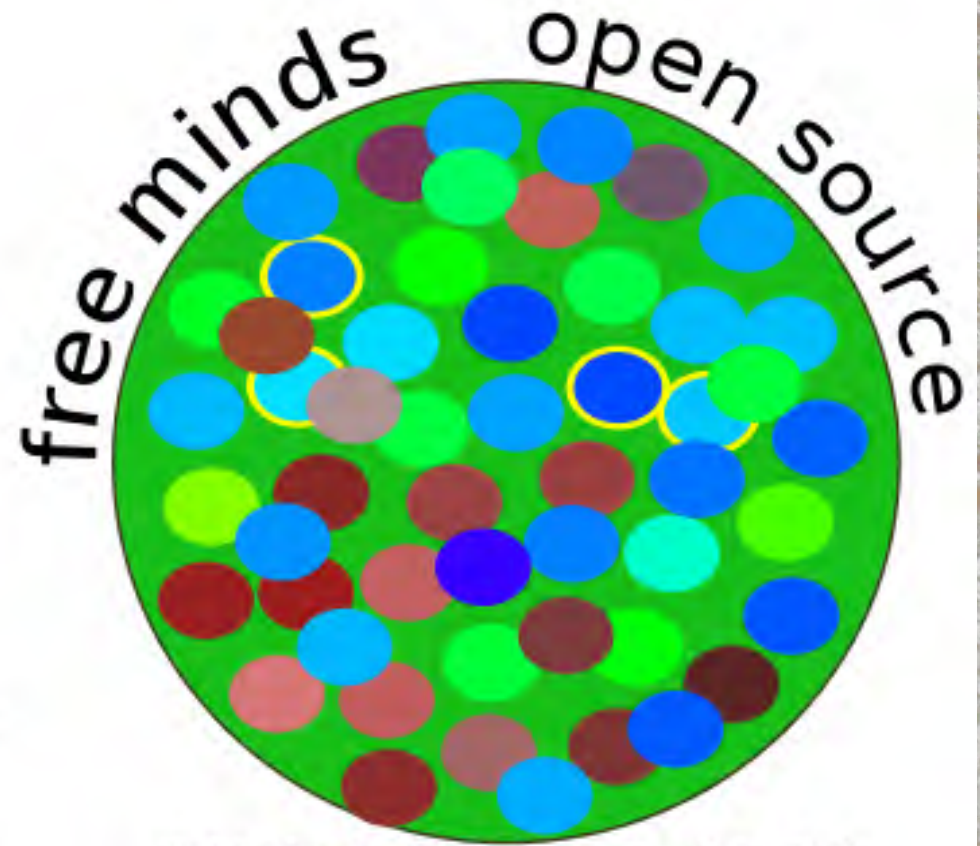


# OpenSource OfCourse

- λ The new paradigm - can coexist with psychopathy
- λ Information belongs to everyone - natural law



**OLD PARADIGM**



**NEW PARADIGM**

**Pyramid is strong, sphere is stronger**

# Ancient mysteries

According to Socrates:

“Ye! heed these words, you who wish to probe the depths of nature.

If you do not find within yourself that which you seek, neither will you find it outside.

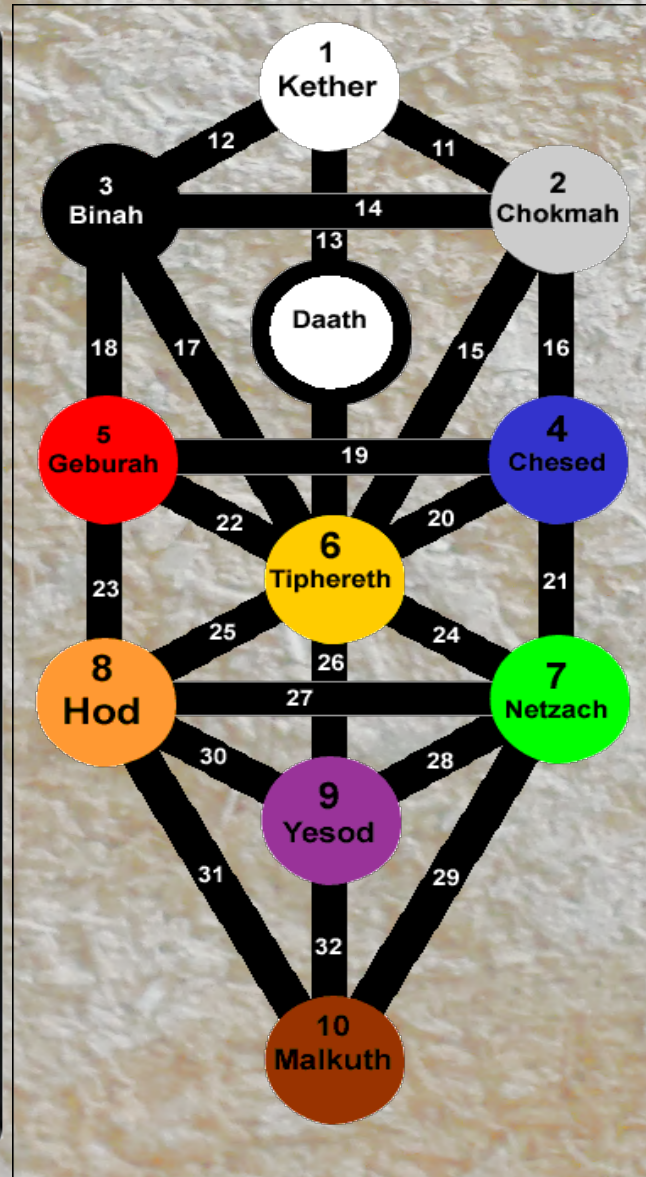
If you ignore the wonders of your own house, how do you expect to find other wonders.

In you is hidden the treasure of treasures, to know thyself, and you will know the universe and the Gods.

# Tarot cards



# Qabala



# Tracing board



# Consciousness

λ **Knowledge**

**[not omission]**

λ **Understanding**

**[not belief]**

λ **Action**

**[not ego]**

λ **“To know and not to do, is not to know”**

λ **Wang Yangming (1472-1529)**

It is the only thing from which the Philosopher's Stone can be prepared, and without it, no noble metal can be created.

**What is it?**



For more information:  
<http://torusdome.com>  
<http://2bcreative.org>  
Email: [david@hayday.biz](mailto:david@hayday.biz)