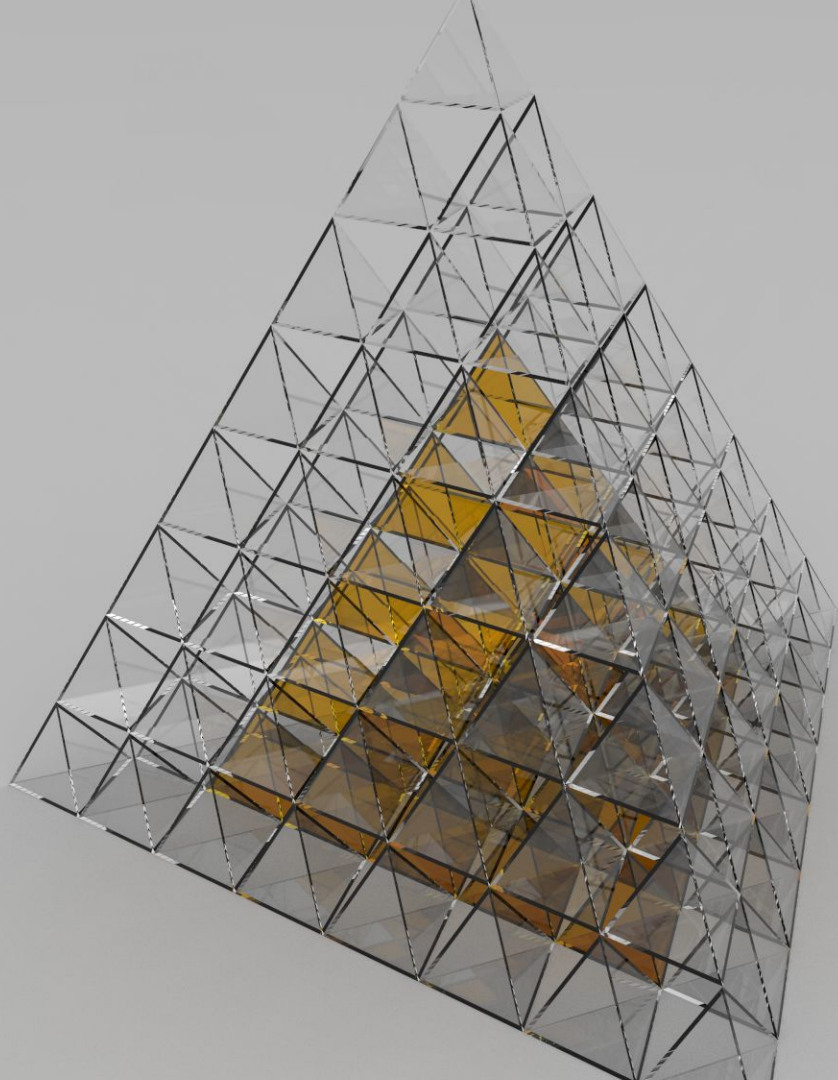


TASK 03 presentation

LOVE TRIANGLES

(Ilkka, Emilia, Helena)



Tetractys

A mathematical
sculpture highlighting
geometrical properties
behind triangles and
tetrahedrons

Statement

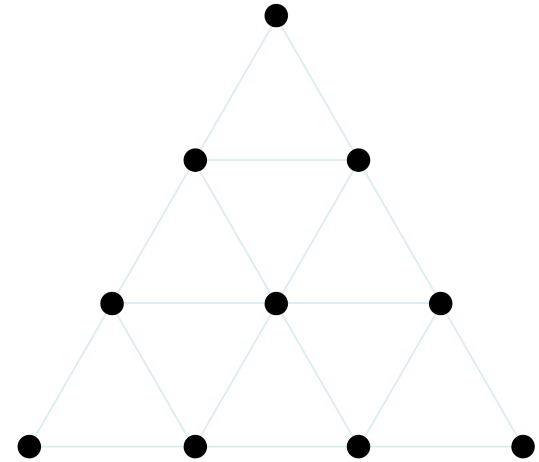
- Tetractys is the sacred symbol of Pythagoreans and it conceals a lot of symbolism

Numbers added up to 10: unity of divine order

Four elements: EARTH, AIR, FIRE, WATER

Organization of space:

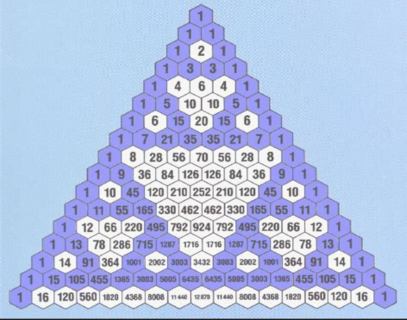
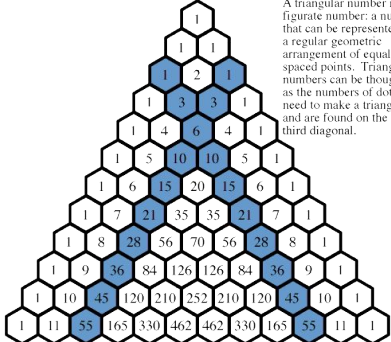
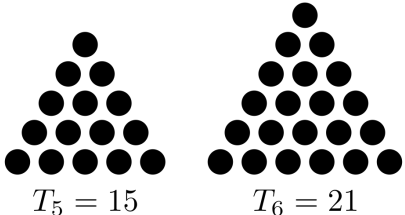
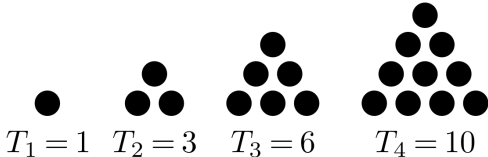
- 1st row -> 0D (point)
- 2nd row -> 1D (line)
- 3rd row -> 2D (triangle)
- 4th row -> 3D (tetrahedron)



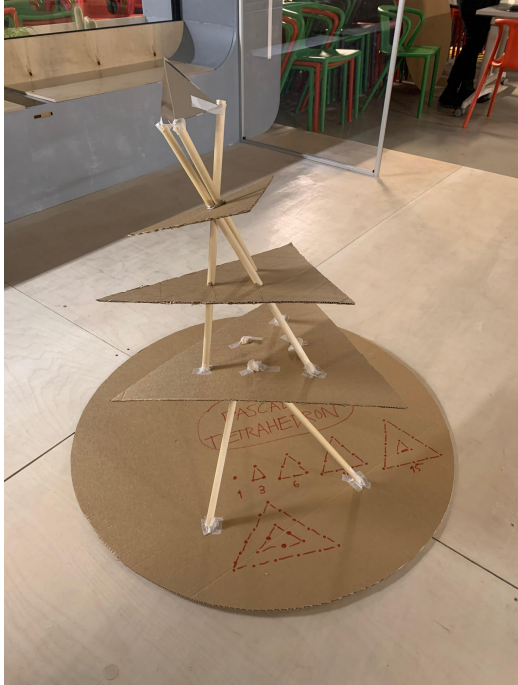
Tetractys symbol

Statement

- Starting point: triangular numbers, Pascal's triangle

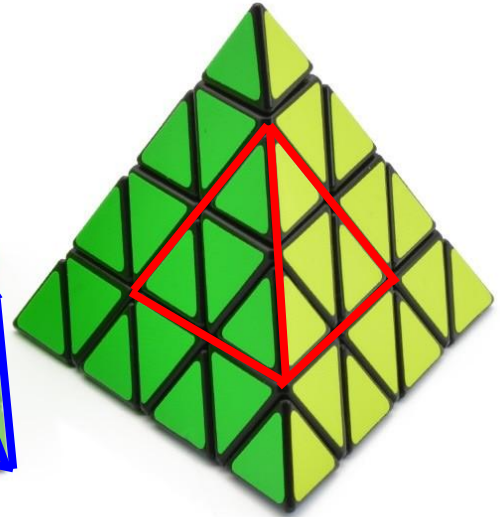
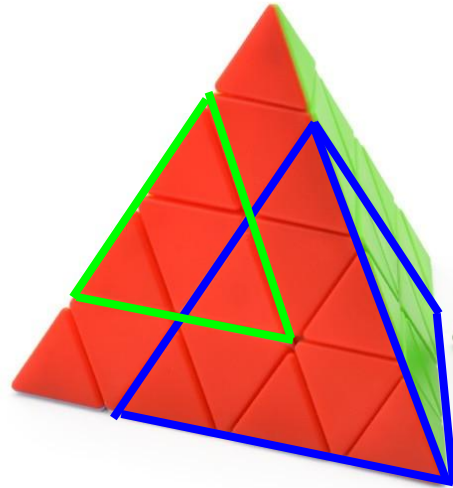
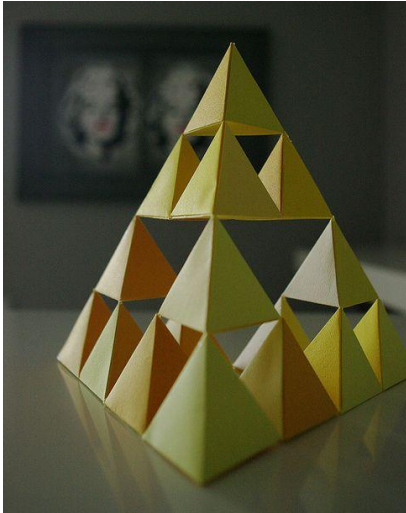


When stacked, a new tetrahedron starts in the center point every 3th level



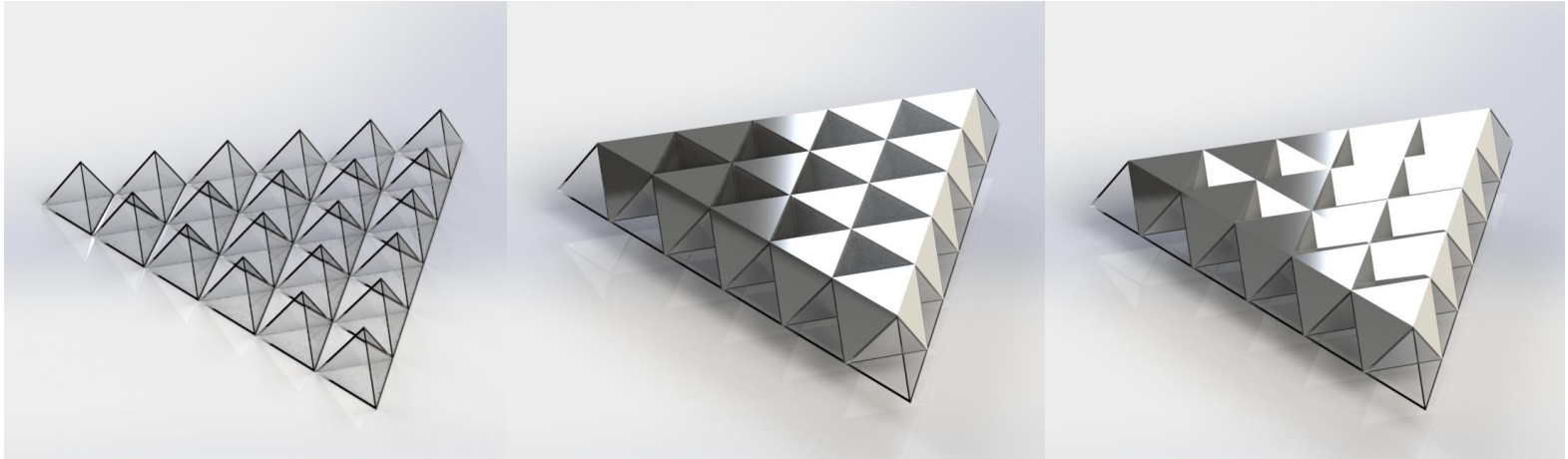
Statement

- Stacking of tetrahedrons offers fractal-like possibilities, also highlighting different sized tetrahedrons with different colours is possible



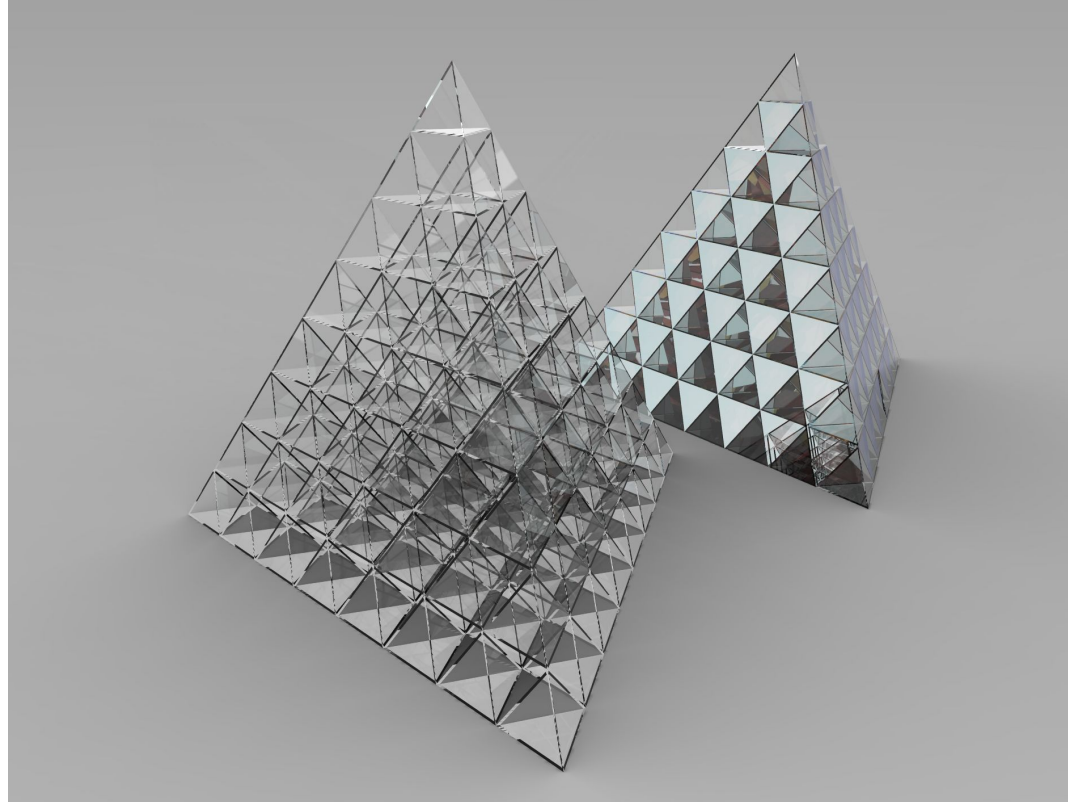
Statement

- Tetrahedrons are NOT space-filling
- Interesting (and surprising) finding: space can be filled with tetrahedrons + octahedrons!



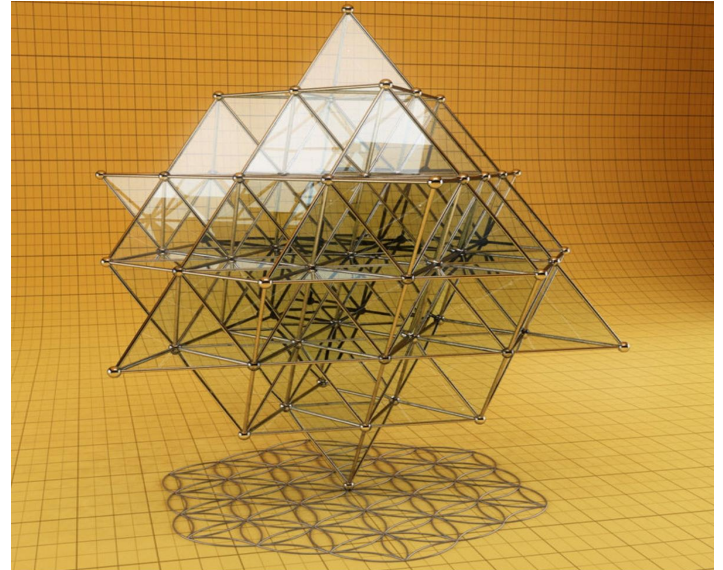
Implementation ideas

- Using clear acrylic sheets as well as reflecting surface finishes



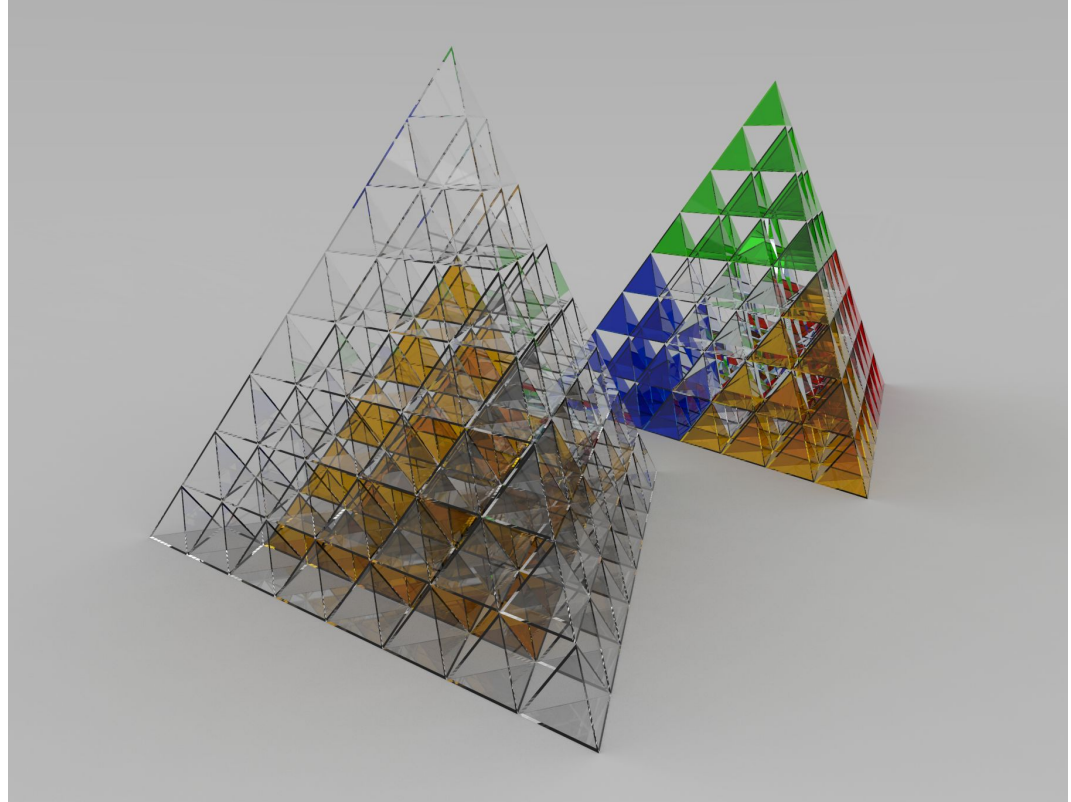
Implementation ideas

- Using shadows and reflections to bring out new pictures and forms
- Arranging the tetrahedrons in such a way, that it affects from what angle it is being watched like the tree of life below.



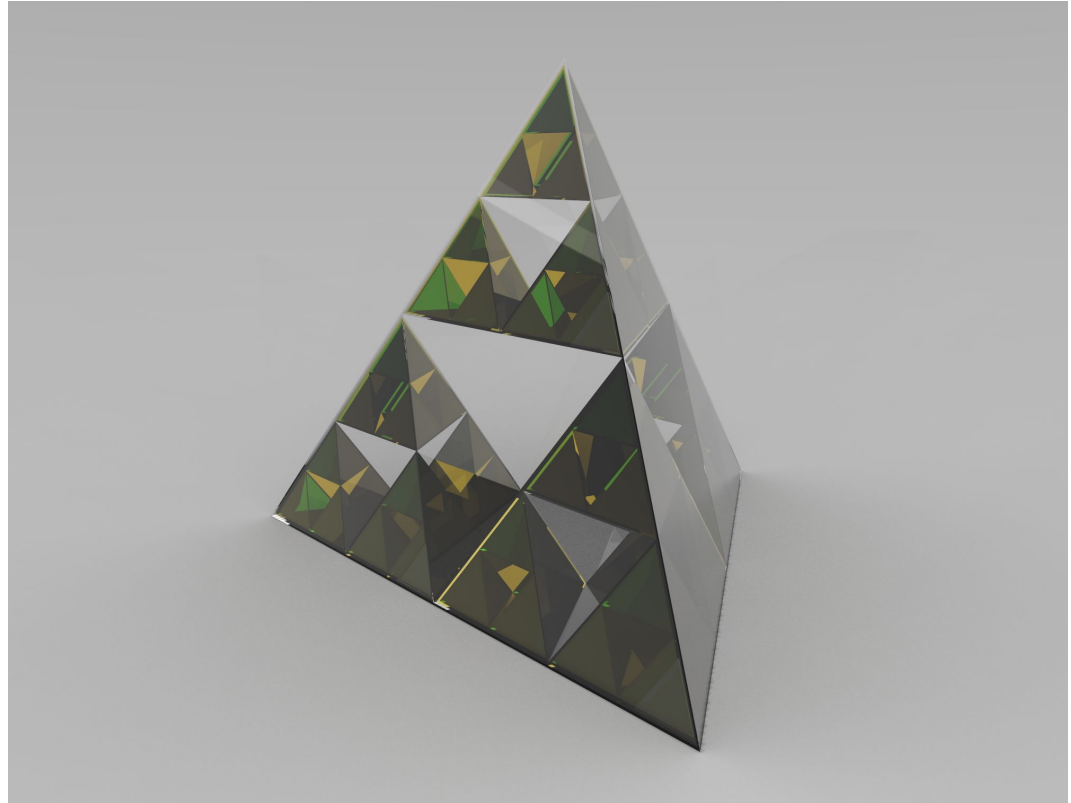
Implementation ideas

- Different properties can be highlighted with colours and reflective surfaces



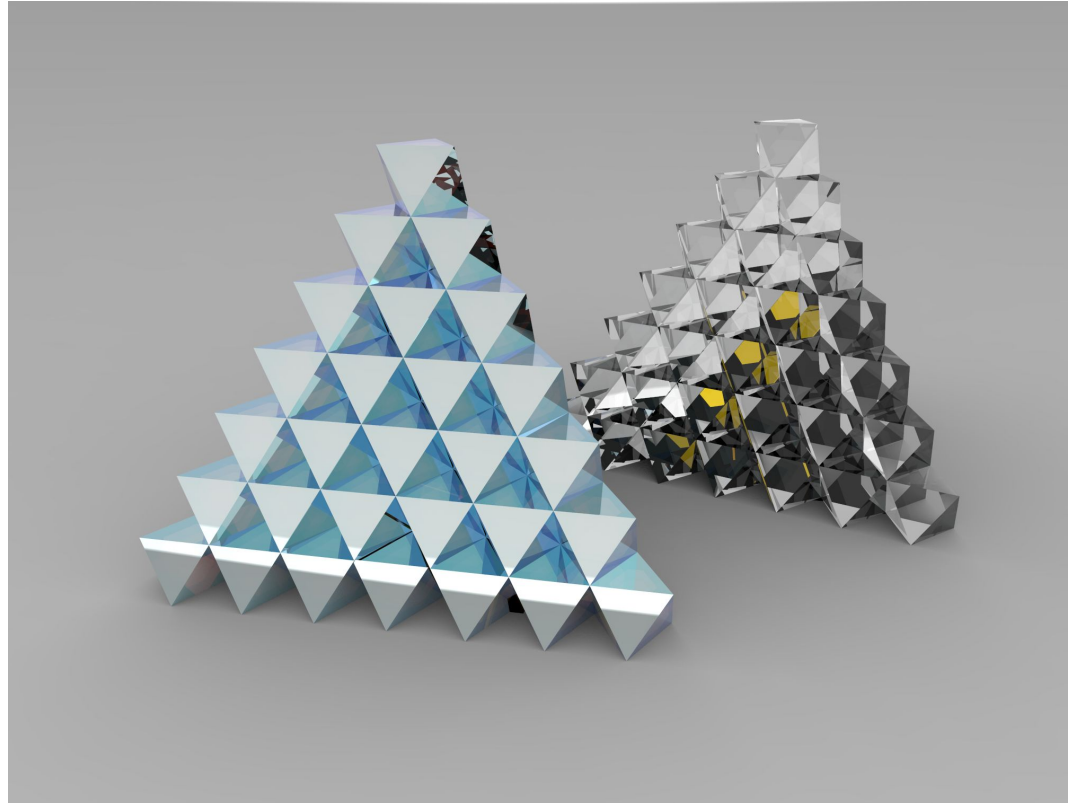
Implementation ideas

- Smaller tetrahedrons can be encapsulated in a shell of a bigger tetrahedron
- This fractal-like approach would also help supporting the structure



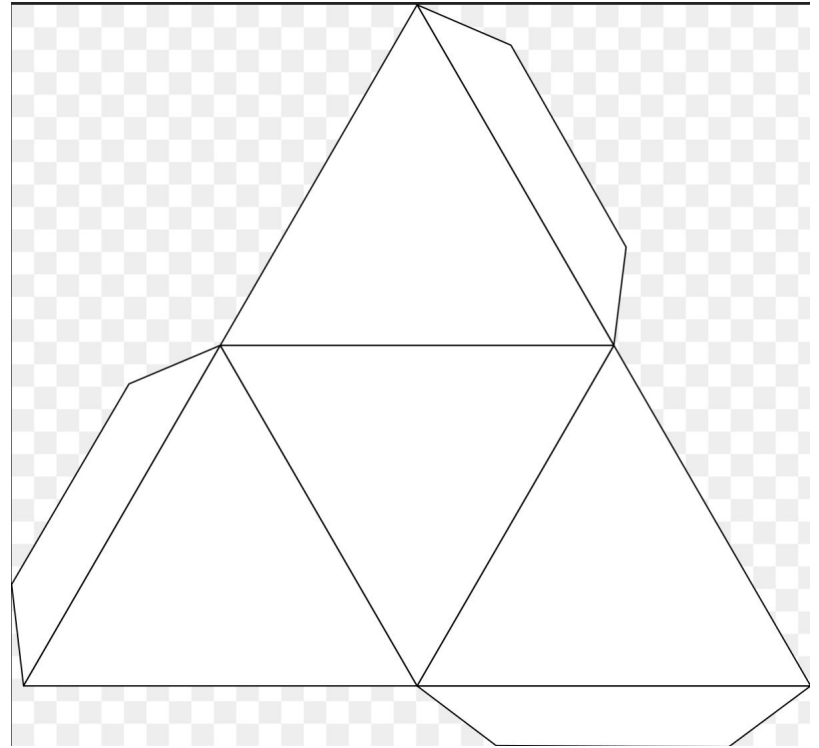
Implementation ideas

- Using only octahedrons instead of tetrahedrons (since they contain all the tetrahedron “data” in the negative space anyway!)



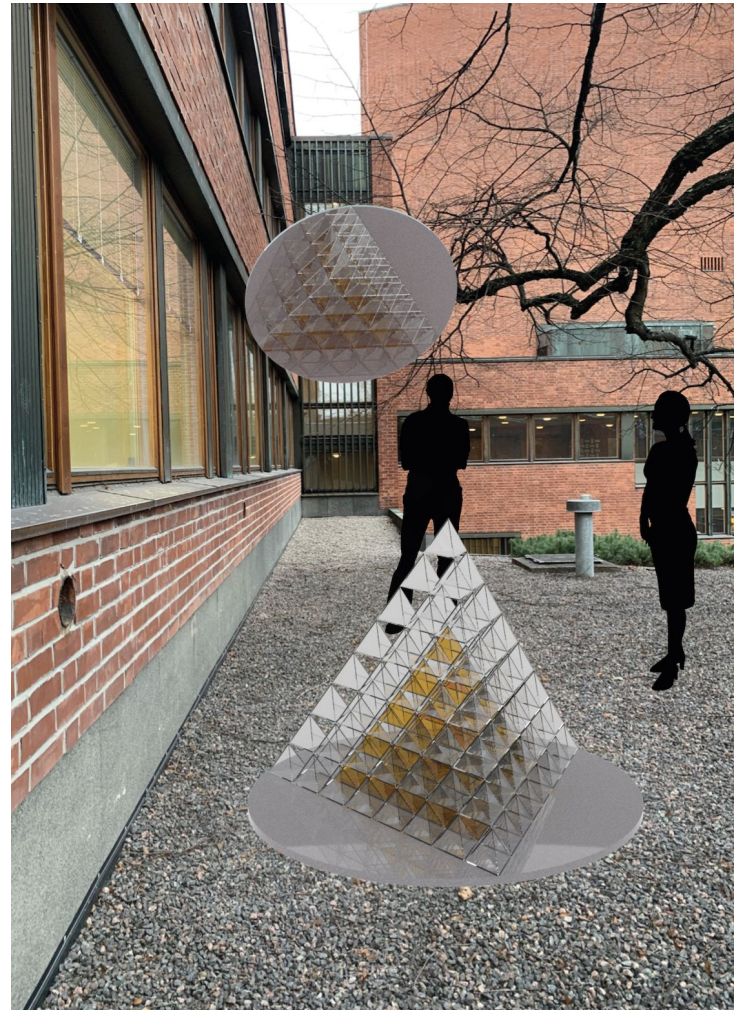
Implementation ideas

- An option to use as a template for bending the plastic tetrahedron. It is possible to bend up to 90 degrees while being still cold.
- For heat bending a hot air gun can be used or flaming, but only from the joint shortly in order to avoid bubbles from forming. The sheet will shrink up to 3% after cooling down.
- Angles can be done by using simple wood boards connected with a screwed joint and forcing the plastic bend with it,



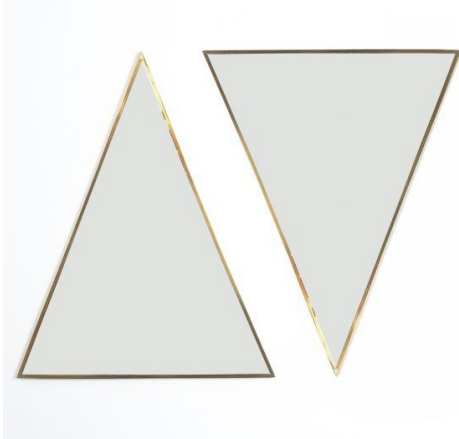
Implementation

- Either on the ground or slightly elevated (0.5 m or so)
- 1-1.5 m platform would correspond to tetrahedron edge
- Small unit size depends on the number of levels

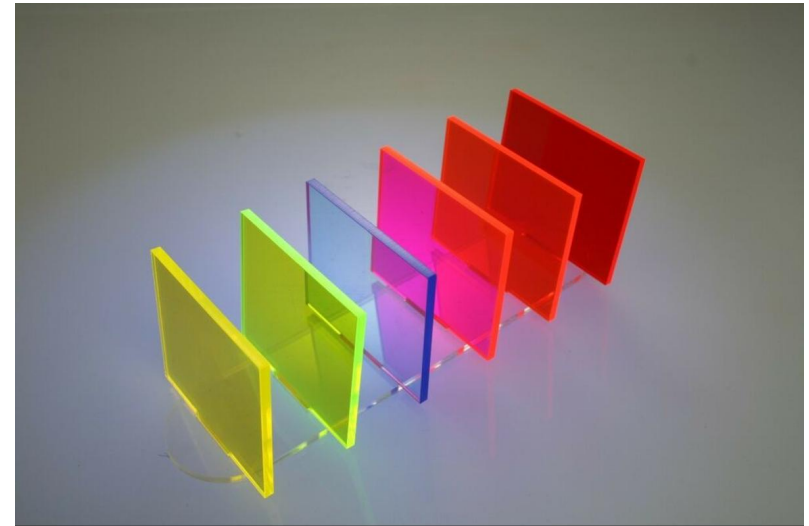


Materials

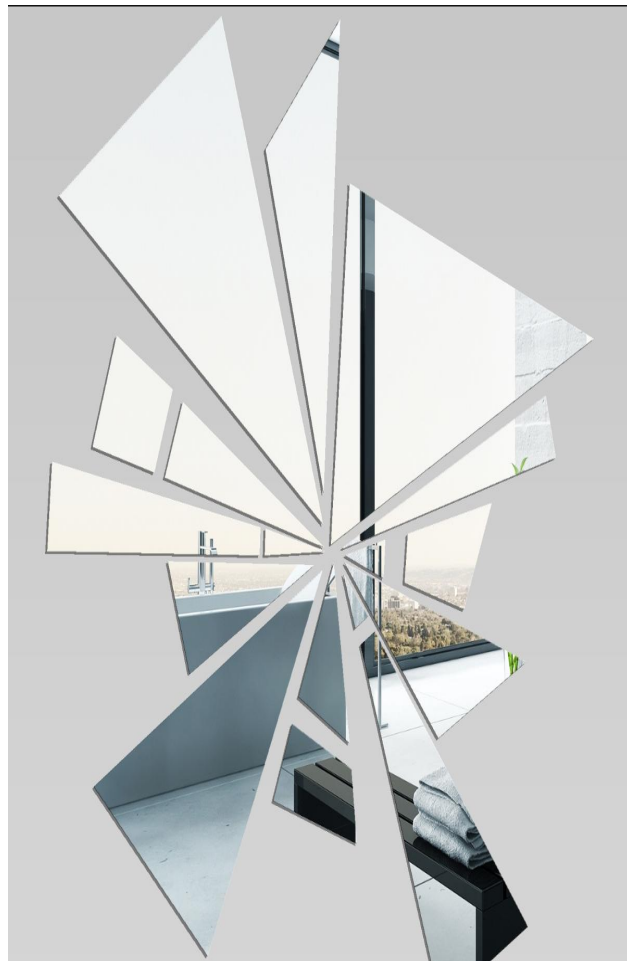
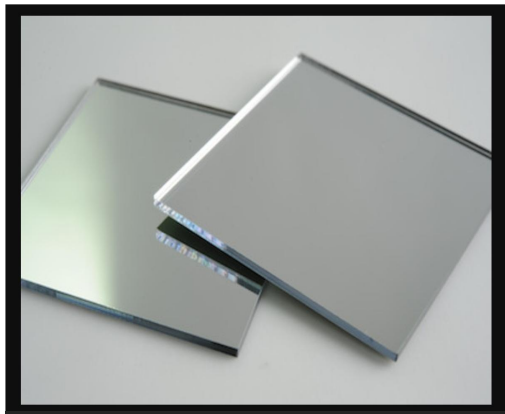
- Acrylic sheets or other plastic sheets like PC polycarbonate sheets (unbreakable and fit for outside use)
- From muovikilpi oy, Muovipuoti.fi, Vink oy, 2M etc.
- Mirrors



Self-fluorescent polyacrylic sheets - 50% lighter than PA and unbreakable



Mirror-like acrylic



Coloured acrylic



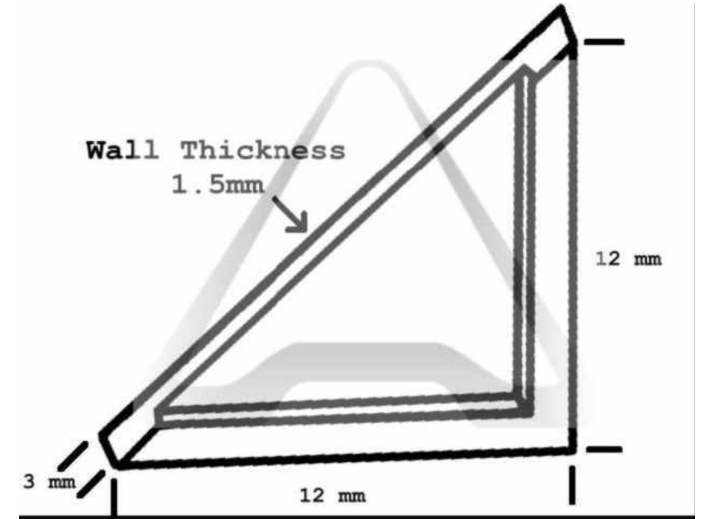
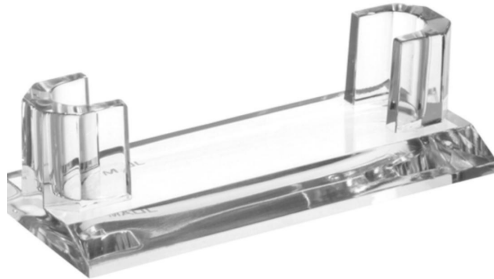
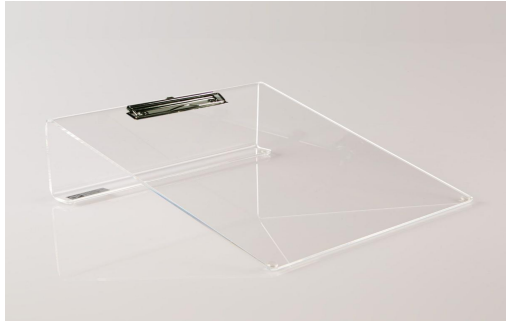
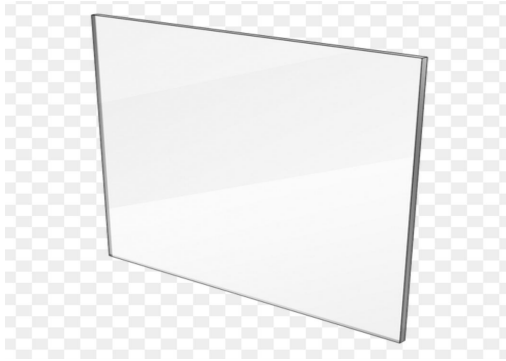
- Golden and blue transparent acrylic

PC



- Polycarbonate
- <https://omnexus.specialchem.com/selection-guide/polycarbonate-pc-plastic>

Acrylic sheets



Material demand

- Colored tetrahedrons 56 pieces:
 $2,56284616\text{m}^2=2,56\text{m}^2=2562846\text{mm}^2$
- Transparent tetrahedrons 64 pieces:
 $2,92896704\text{m}^2=2,93\text{m}^2=2928967\text{mm}^2$
- Octahedrons 84 pieces: $7,7\text{m}^2=7688533\text{mm}^2$
- The transparent protective shell 130cm/edge:
 $2,9\text{m}^2=2927165\text{mm}^2$

Rough cost estimation

- Price estimations and materials:

The protection shell is sensible to build from polycarbonate PC, because it fits for outside presentation and is durable and does not break into pieces like glass and polyacryl.

The prices for transparent PC varies from 19,50€/m² to 343,2€/m² so it is not about the same which product do we use in this presentation to build it. Also the width has a huge effect on it. The shell could easily be much thinner material if it is durable.

1mm transparent PC is 19,50/m² LEXAN 104457 by Muovipuoti. They sell it in 2050x1250mm pieces and the prices increase with the width.

1mm: 19,50€/m² 2050x1250 LEXAN 104457 product number

1,5mm: 29,10€/m² 2050x1250

2mm: 40,20 €/m² 2050x1250

3mm: 60,10€/m² 3050x2050

4mm: 80,40 €/m² 3050x2050

Materials and costs

- Protective transparent PC shell for the outer tetrahedron would be 2,9m² and it's price would be 56,55 €-233,16€ for 1-4mm width. The ALV is 0% in these prices.
- Perspex Fluorescent colour transparent sheets are 87,70€/m² and 3mm width. It's colours are orange, green, blue, red and yellow. Product numbers 129111-129116 and 196189 2T51 for 2030x3050mm sheets. These sheets are handy as they are self-luminating like neon yellow vests for street workers and can not be easily missed even outside. The materials are also fit for outside use and they have UV protection and those are durable between -20C and 80C. Those can be bend easily and use the most common tools in plastic working.
- It is also possible to use coloured folios over transparent PC or PA sheets from 2M company.
- Mirror like surface is pretty expensive if done from unbreakable PMMA. 2mm is 66,50€/m² and 3mm is 92,60€/m²
- The sheet size is 2050x3050mm ACRIMIR SILVER 10 HOPEA 371595 product number. by VINK FINLAND
- That would be 7,7m²x92,60€/m²=713,02€, which is NOT feasible unless we pretty much replace everything else by them alone with the outside protective shell as the whole budget was about 1000€.
- We did consider that option too leaving the tetrahedrons empty.

Challenges and conclusions

- Attaching the acrylic sheets neatly
- Structural durability, unbreakability
- Movability,
- Weather resistance, UV-durability
- Shrinking after cooling down 3%
- Costs and coloring/mirroring effect
- Weight
- Fluorescent PA is more expensive, but it is 50% lighter and unbreakable unlike regular PA.
- Folio sheeting could become cheaper while considering colors and other effects in the end.