



# FREE “LIBRE” ENGINEERING SOFTWARE (AND A FEW EXTRAS)

- ❑ This presentation was originally given at EA. The information contained herein does not reflect EA's goals or technologies.
- ❑ Free software comes with no warranty
  - ▶ But there are companies that do support it!
- ❑ The presentation is built as a catalog, this means
  - ▶ It is filled with links! Every image that you see has a link!
  - ▶ It is structured so that you can search for what you want
    - There is toooooo much information, so focus on what is important to you
  - ▶ It is meant to be used as a reference, don't try to learn it at all
  - ▶ The selected software only represents a small portion of all the alternatives that are available

- ❑ The logos and trademarks belong to each project and/or company.
  
- ❑ **I am NOT an expert.** The information presented here may be incorrect.
  - ▶ I am not responsible for the consequences of the use of the software.
  - ▶ The selected programs do not represent the totality of available solutions.

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(Share the knowledge!)

- ❑ Course objectives
  - ▶ **Know what libre software means/is**
  - ▶ See what is available
  - ▶ **Let the world know and use more libre free software**
- ❑ Ask questions!
- ❑ Index
  - ▶ Introduction to libre/free software
  - ▶ Mechanical software
  - ▶ Electrical software
  - ▶ Other software
  - ▶ Software for every day use

# What is libre/free software?

- ❑ Software, since the 80s, has slowly become a walled garden
  
- ❑ [Richard Stallman](#) starts the [GNU](#) project to give a completely open and libre solution in [1983](#)
  
- ❑ Today there are plenty of well-known libre projects
  - ▶ [Android](#), [VLC](#), [7-Zip](#), [Moodle](#), [Zlib](#), [SQLite](#)...
  - ▶ [Firefox](#), [Chromium](#), [WebKit](#) (Safari)
  - ▶ [Linux](#) (the internet is based on Linux)
  - ▶ [OpenSSL](#) (encryption to connect to our banks, web...)
  - ▶ And a lot more, which we will see now

- ❑ Also known as Open Source Software (OSS)
  - ▶ I prefer not to use this term
  
- ❑ Definition as given by the FSF (Free Software Foundation)
  - ▶ There are four conditions
    - It can be **used for any purpose**
      - **This includes commercial use!**
    - It can be **studied and modified**, source code availability is a requirement
    - It can be **shared and distributed without restrictions**
    - **Changes** to the software **can also be shared and distributed**
  
- ❑ There are many licenses that fulfill the requirements above, however, each in their own way and they may not be compatible

- ❑ As users, libre software offers
  - ▶ Lower costs (normally 100% free\*\*\*)
  - ▶ A community to interact with
  - ▶ Great software and **exceptional learning tools**
  - ▶ Development focused on the users
  
- ❑ As engineers
  - ▶ We can see the insides, the design and what/how it does
  - ▶ No limitations! Run your programs in 100s of CPUs
  - ▶ Develop our own solutions
    - Libre software is **very** widely used in research!
  - ▶ Noticeably lower costs
  - ▶ Passionate and expert communities in a lot of cases



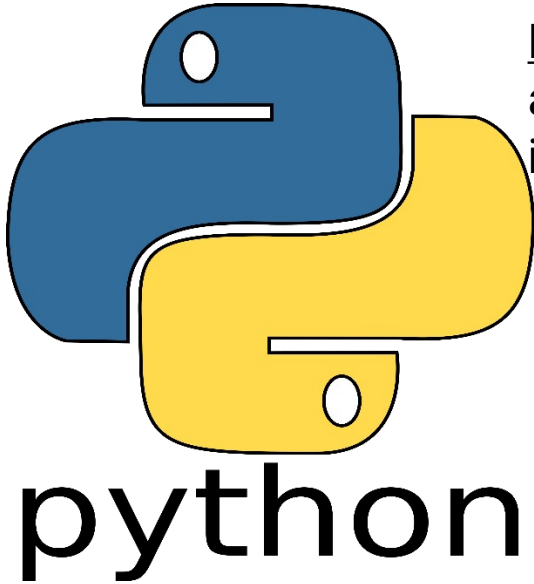
## □ Common forms of development

- ▶ Public institutions (payed with taxes)
  - [Public money, public code, FSFE FOSDEM 2023 presentación](#)
- ▶ Passion projects
- ▶ Industry backed projects (see Linux, OpenSSL)
- ▶ Community developed projects
  - Community contributions (knowledge, time, help, money...)

## □ New forms of development

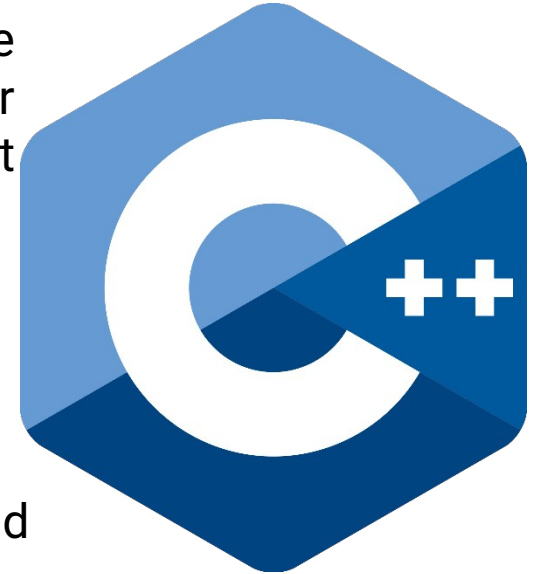
- ▶ Corporations that open their own tools
- ▶ Corporations that work on libre software
  - **Customer support, documentations, courses, custom development**
  - *Private ancillary solutions*

# Technical libre software for general applications



Python is widely used as a scripting and interfacing language

C++ is probably the most common for core development



R, statistics and data analysis



Julia is like Python but for the XXI century

Fortran, old but powerful





Ada: programming language perfect for embedded systems up to whole systems

SPARK: subset of Ada that is verifiable using formal methods

Ada/SPARK is widely used in safety-critical systems:

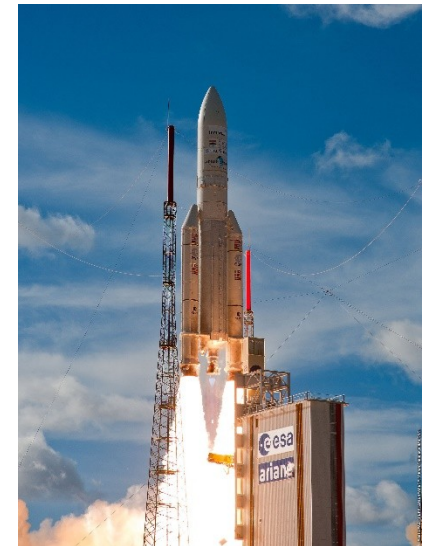
- Eurocontrol (2.3MLOC)
- [TER/Paris Metro](#)
- [Eurofighter](#)
- [Airbus/Boeing](#)
- [Cyberseguridad](#)
- [Petroquímica](#)



Rosetta

100% Ada

Ariane 5

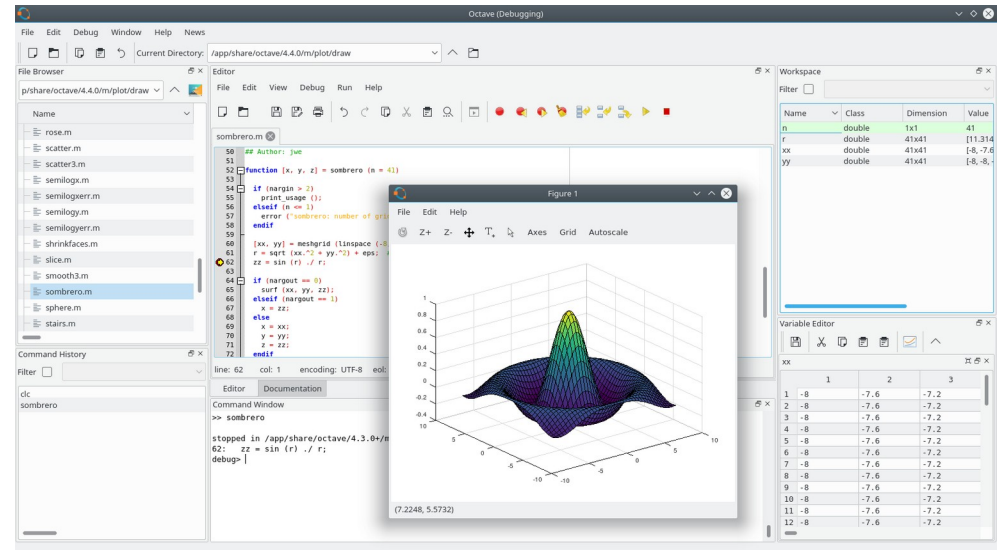
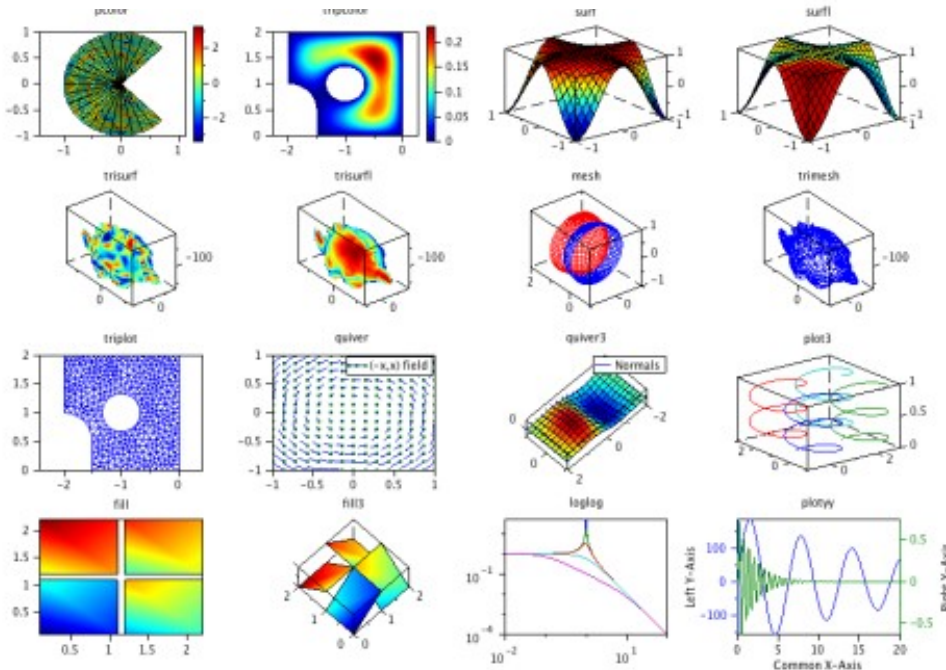
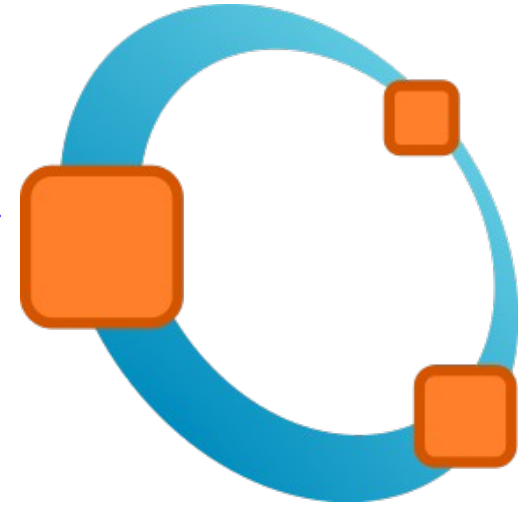


Alternative to Matlab



GNU Octave

The syntax is mostly compatible with Matlab's





wxMaxima

Sympy



Alternative to Wolfram,  
Matlab (symbolic)

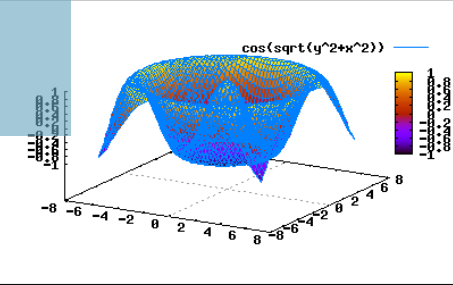
CAS allows us to work  
directly over the  
variables, not in a  
numerical manner

wxMaxima 0.7.1 [ unsaved ]

File Edit Maxima Equations Algebra Calculus Simplify Plotting Numeric Help

```
(%i1) is(6+9=42);
(%o1) false

(%i2) wxplot3d(cos(sqrt(x^2+y^2)), [x,-2*%pi,2*%pi], [y,-2*%pi,2*%pi],
[grid,50,50],
[gnuplot_pm3d,true]);
Output file "/home/omegatron/maxout.png".

(%o2) 

(%i3) matrix([x^2+x,y^2+y,z^2+z],[x^2,y^2,z^2],[x^2+y,y^2+z,z^2+x]);
(%o3) 
$$\begin{bmatrix} x^2 + x & y^2 + y & z^2 + z \\ x^2 & y^2 & z^2 \\ y + x^2 & z + y^2 & z^2 + x \end{bmatrix}$$


(%i4) 'integrate(x/(1+x^3),x)=integrate(x/(1+x^3),x);
(%o4) 
$$\int \frac{x}{x^3 + 1} dx = \frac{\log(x^2 - x + 1)}{6} + \frac{\operatorname{atan}\left(\frac{2x - 1}{\sqrt{3}}\right)}{\sqrt{3}} - \frac{\log(x + 1)}{3}$$


(%i5)
INPUT:
Simplify Simplify (r) Factor Expand Simplify (tr) Expand (tr) Reduce (tr) Rectform Sum... Product...
Solve... Solve ODE... Diff... Integrate... Limit... Series... Substitute... Map... Plot 2D... Plot 3D...
Ready for user input
```



Coliop4 - transportation-tupel-data.cmpl

Problem Output Solution

```
%data : plants set, centers set[1], routes set[2] , c[routes] , s[plants] , d[centers]
%display nonZeros

variables:
    x[routes]: real[0..];
objectives:
    costs: sum{ [i,j] in routes : c[i,j]*x[i,j] } ->min;
constraints:
    supplies {i in plants : sum{j in routes *} x[i,j]} = s[i];
    demands {j in centers: sum{i in routes *} x[i,j]} <= d[j];
```

transportation-tupel-data.cmpl  
transportation-tupel-data.cdat

---

Problem transportation-tupel-data.cmpl  
 Nr. of variables 8  
 Nr. of constraints 7  
 Objective name costs  
 Solver name CBC  
 Display variables nonzero variables (all)  
 Display constraints nonzero constraints (all)

---

Objective status optimal  
 Objective value 36500 (min!)

Variables Name	Type	Activity	Lower bound	Upper bound	Marginal
x[1,1]	C	2500	0	Infinity	0
x[1,2]	C	2500	0	Infinity	0
x[2,2]	C	1500	0	Infinity	0
x[2,3]	C	2000	0	Infinity	0
x[2,4]	C	2500	0	Infinity	0
x[3,1]	C	2500	0	Infinity	0

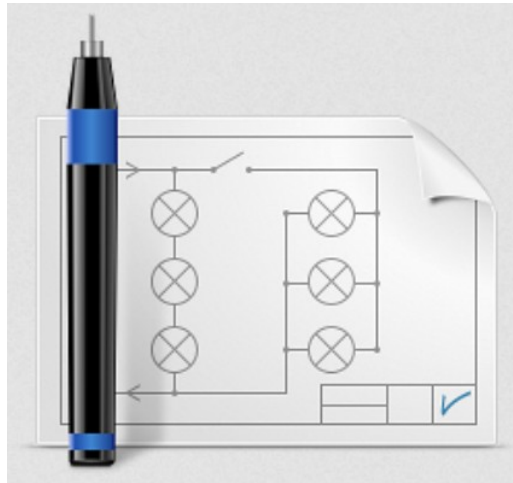
---

Constraints Name	Type	Activity	Lower bound	Upper bound	Marginal
supplies[1]	E	5000	5000	5000	3
supplies[2]	E	6000	6000	6000	6
supplies[3]	E	2500	2500	2500	2
demands[1]	L	5000	-Infinity	6000	0
demands[2]	L	4000	-Infinity	4000	-1
demands[3]	L	2000	-Infinity	2000	-4
demands[4]	L	2500	-Infinity	2500	-3

Alternative to ILOG  
CPLEX, Gurobi, AMPL,  
etc

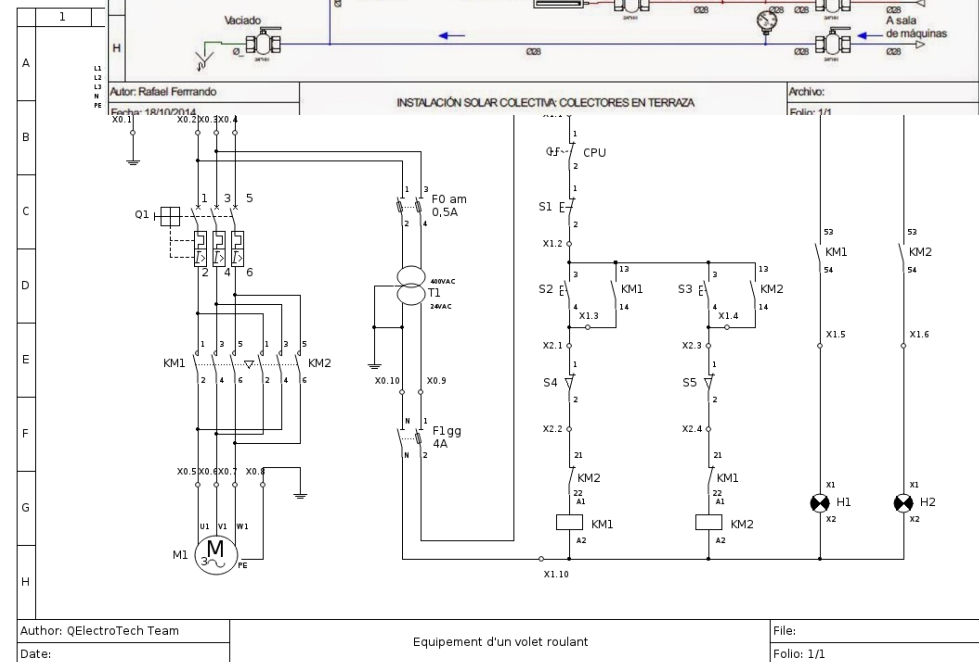
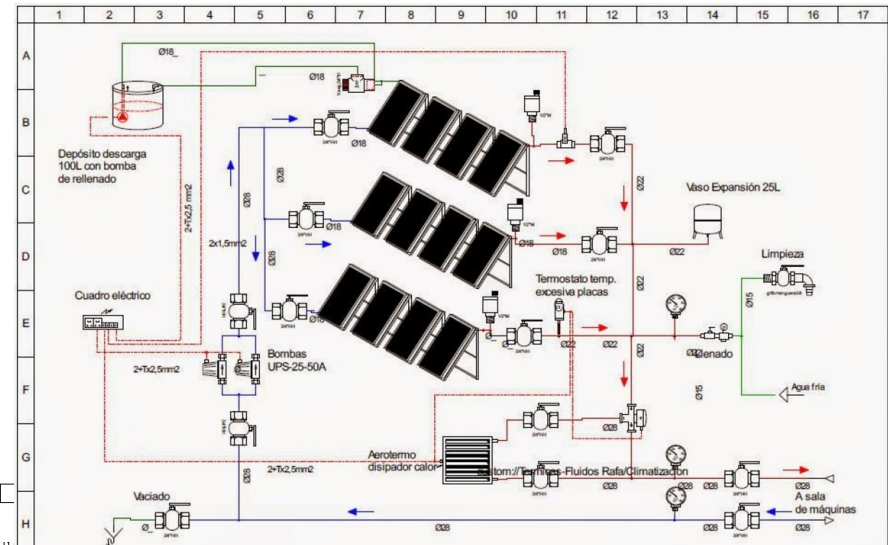
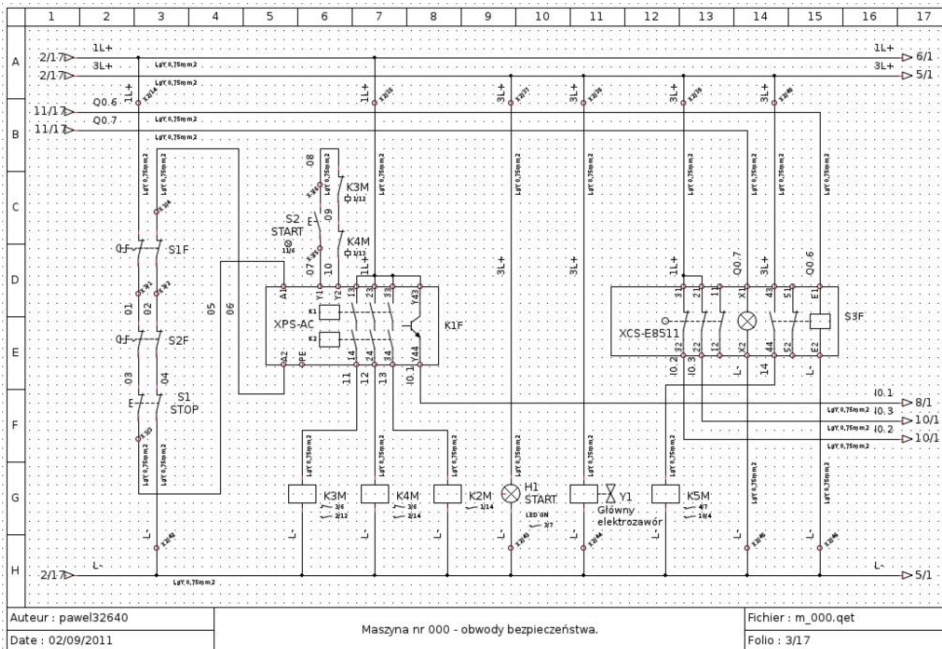
Array of tools for  
optimization problems  
of the MINLP kind



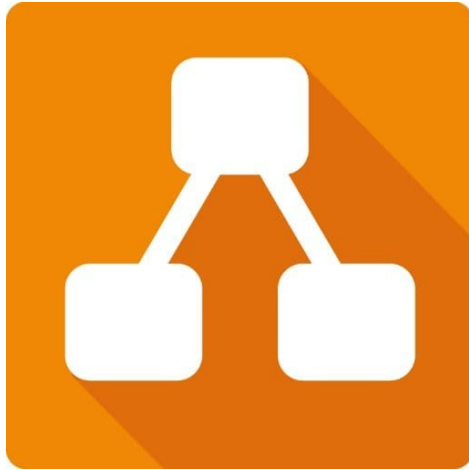


## QElectroTech

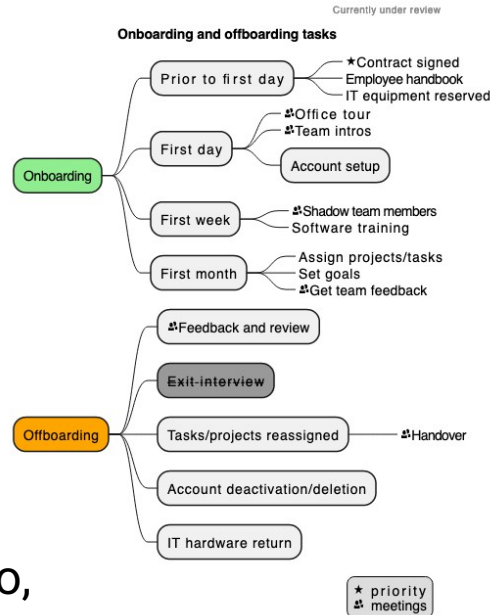
Hydraulic, electrical, electronic, control, etc, diagrams  
Follows IEC 60617



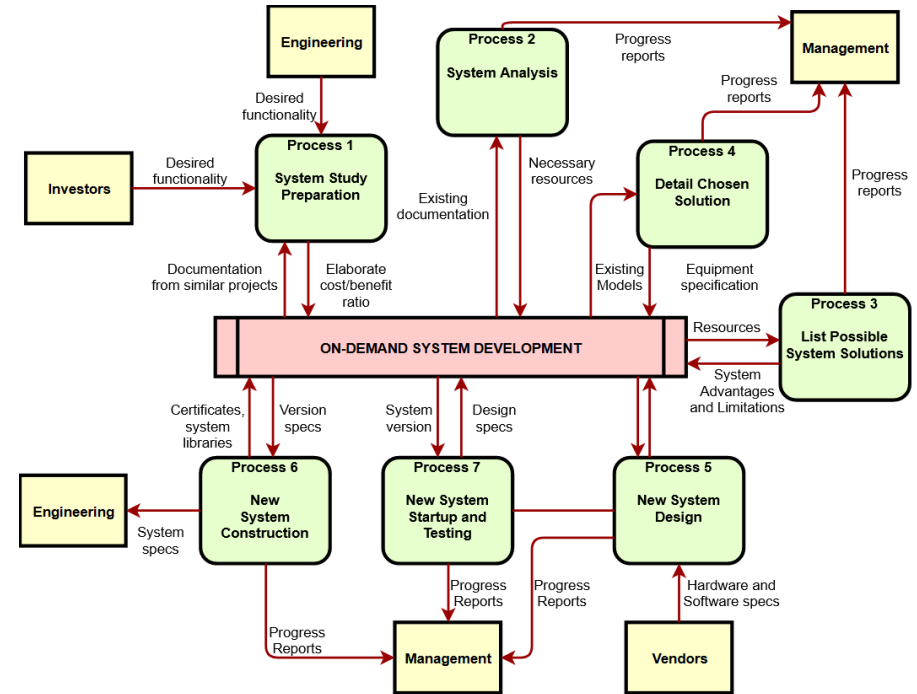
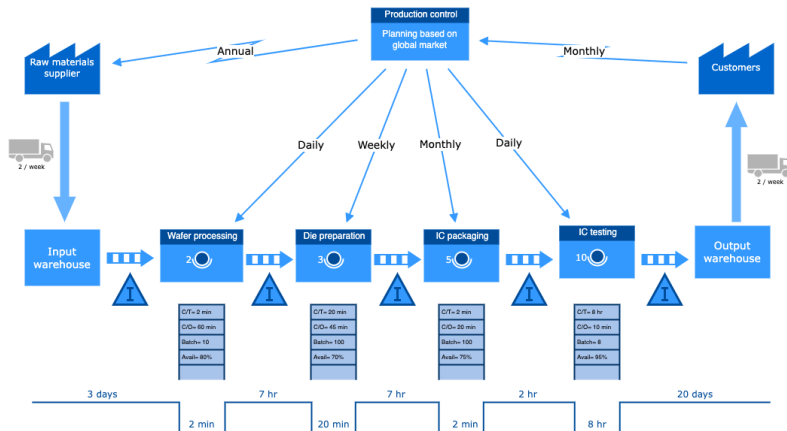




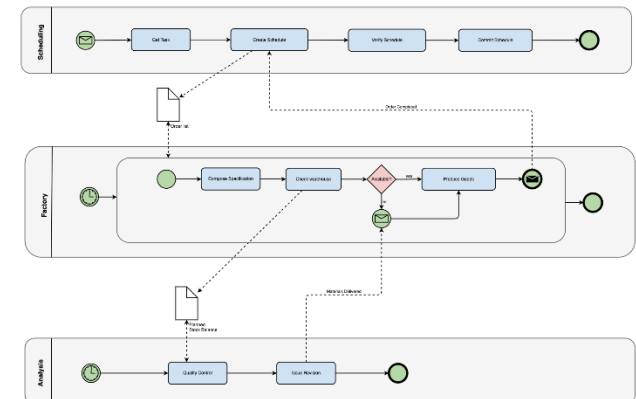
## Diagrams



## Alternative to MS Visio, Lucidchart



Very useful for synoptic diagrams (P&IDs, flow diagrams...)



# M<sup>++</sup> Mutation

Multicomponent Thermodynamic And Transport properties for IONized gases in C++

Libraries for ionization and  
molecular interactions  
(reactions)



**Reaktoro**  
for Python and C++



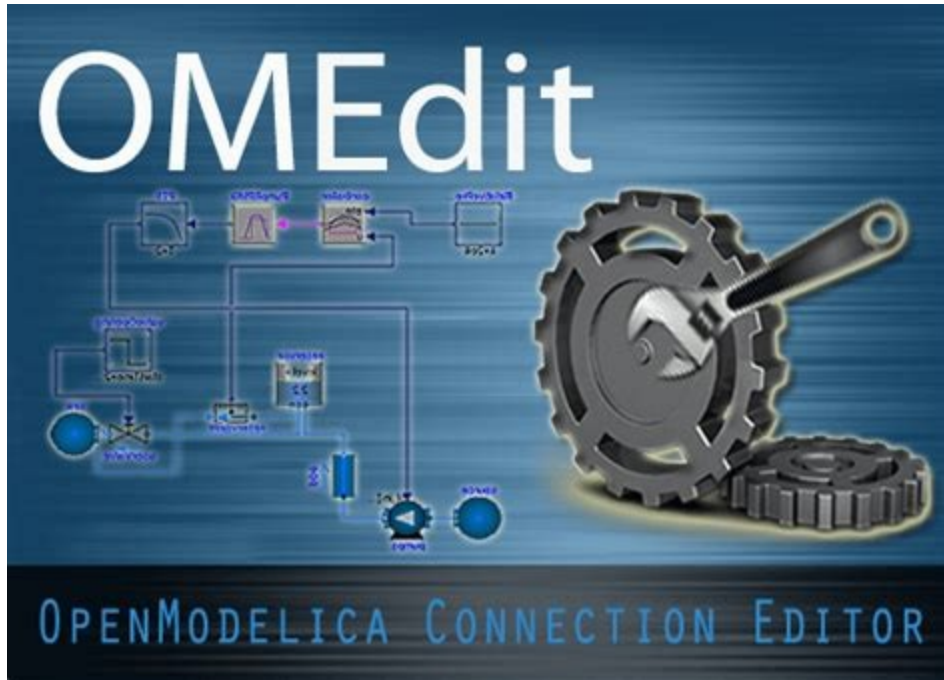
# Cantera

Alternative to CHEMKIN.  
Combustion, kinetic  
chemistry modeling

# CoolProp



Alternative to REFPROP. It has tons of interfaces,  
very useful as a calculator



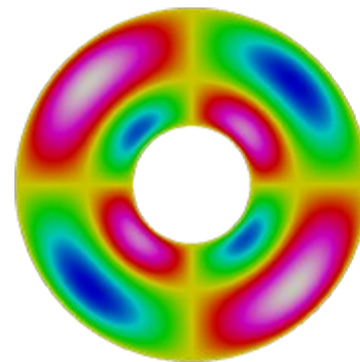
Alternative to Dymola, SimulationX, Wolfram System Modeler, Simulink...

It is already used by the industry:  
[BOSH, ABB, DHI, Molten Salt Solar Power...](#)

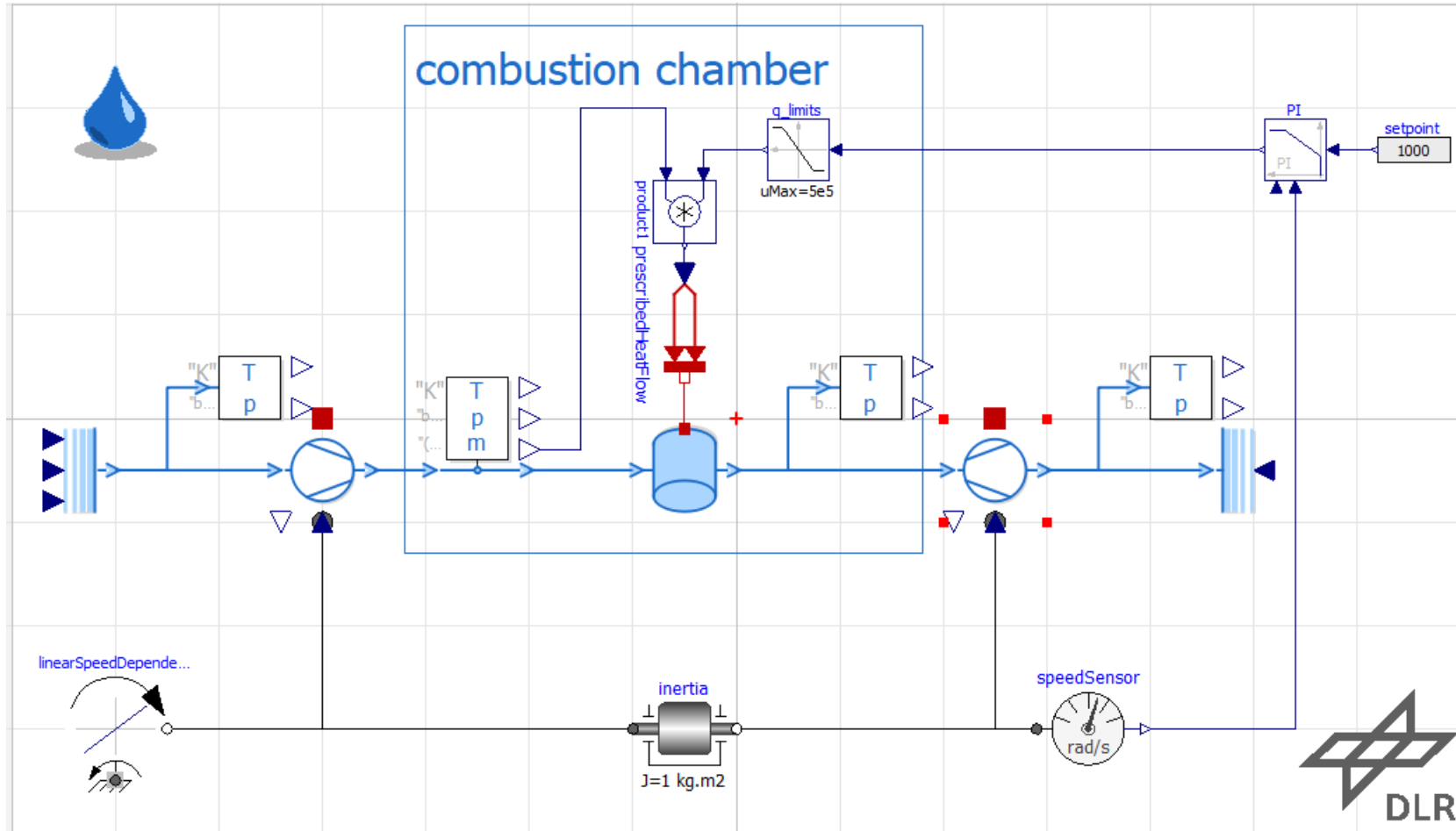
Based on the standardized language Modelica

Alternative to COMSOL, ~ANSYS

Multiphysics simulation using finite elements or particles

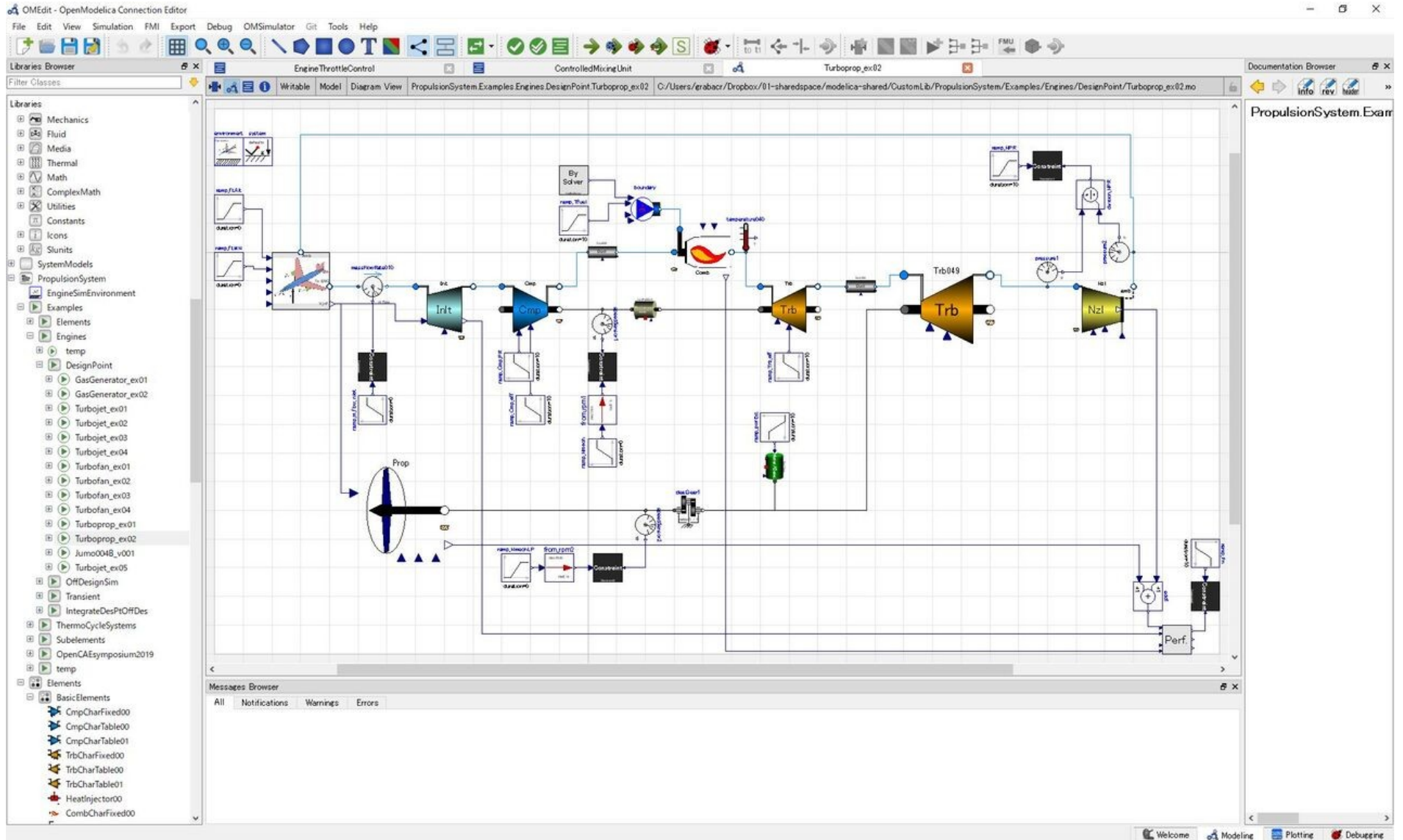


# Elmer



Simulation of fluid, mechanical, electrical, chemical, control systems. Very very capable.

Picture: simple example of a compressor-gas turbine.



OMEdit - OpenModelica Connection Editor

File Edit View Simulation FMI Export Debug OMSimulator Git Tools Help

Libraries Browser

EngineThrottleControl ControlledMixingUnit Turboprop\_ex02

Filter Classes

Libraries

- Mechanics
- Fluid
- Media
- Thermal
- Math
- ComplexMath
- Utilities
- Constants
- Icons
- Slurints
- SystemModels
- PropulsionSystem
  - EngineSimEnvironment
    - Examples
      - Elements
      - Engines
        - temp
        - DesignPoint
          - GasGenerator\_ex01
          - GasGenerator\_ex02
          - Turbojet\_ex01
          - Turbojet\_ex02
          - Turbojet\_ex03
          - Turbojet\_ex04
          - Turbofan\_ex01
          - Turbofan\_ex02
          - Turbofan\_ex03
          - Turbofan\_ex04
          - Turboprop\_ex01
          - Turboprop\_ex02
          - Jumo0048\_v001
          - Turbojet\_ex05
        - OHDesignSim
        - Transient
        - IntegrateDesPtoOHDes
        - ThermoCycleSystems
        - Subelements
        - OpenCAESymposium2019
        - temp
        - Elements
          - BasicElements
            - CmpCharFixed00
            - CmpCharTable00
            - CmpCharTable01
            - TrbCharFixed00
            - TrbCharTable00
            - TrbCharTable01
            - HeatInjector00
            - CombCharFixed00

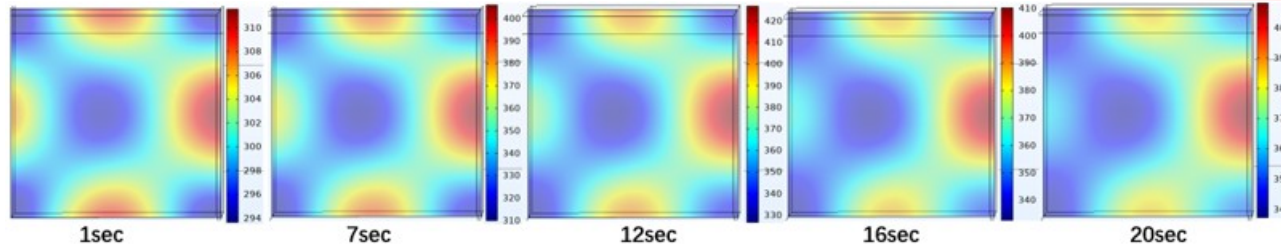
Documentation Browser

PropulsionSystem.Exam

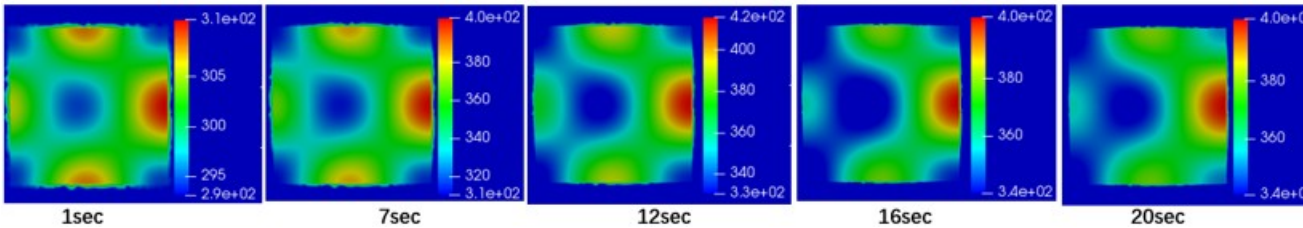
Messages Browser

All Notifications Warnings Errors

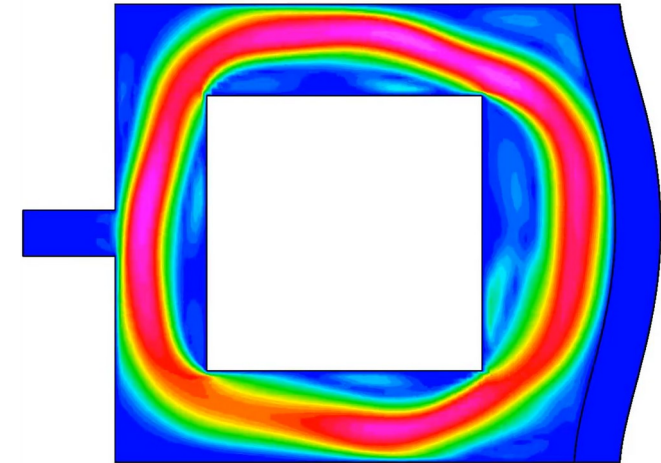
Welcome Modeling Plotting Debugging



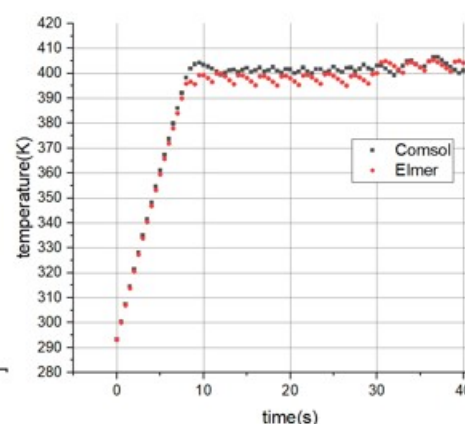
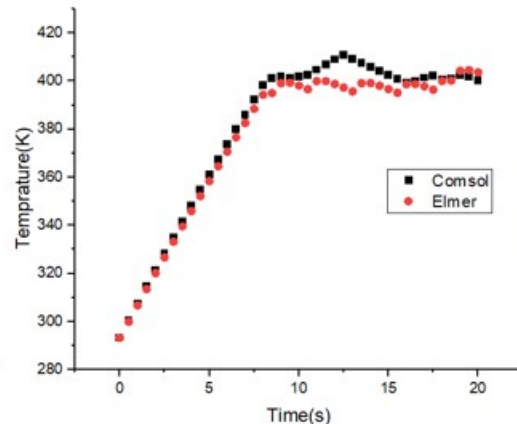
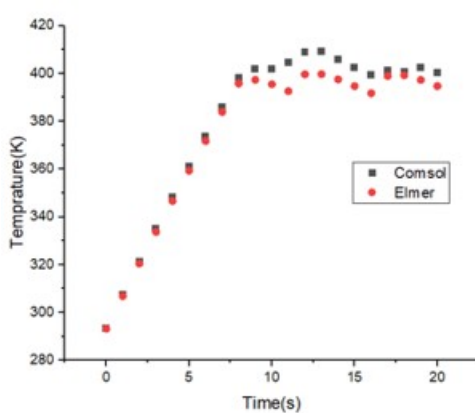
COMSOL



ElmerFEM



Coupled FSI:  
Flexible membrane



time step (0,1,20)

(0,0.5,20)

(0,0.5,40)

Heat-up of a potato in a microwave with explicit control of the radiation... Gyrotron of a sterellator?

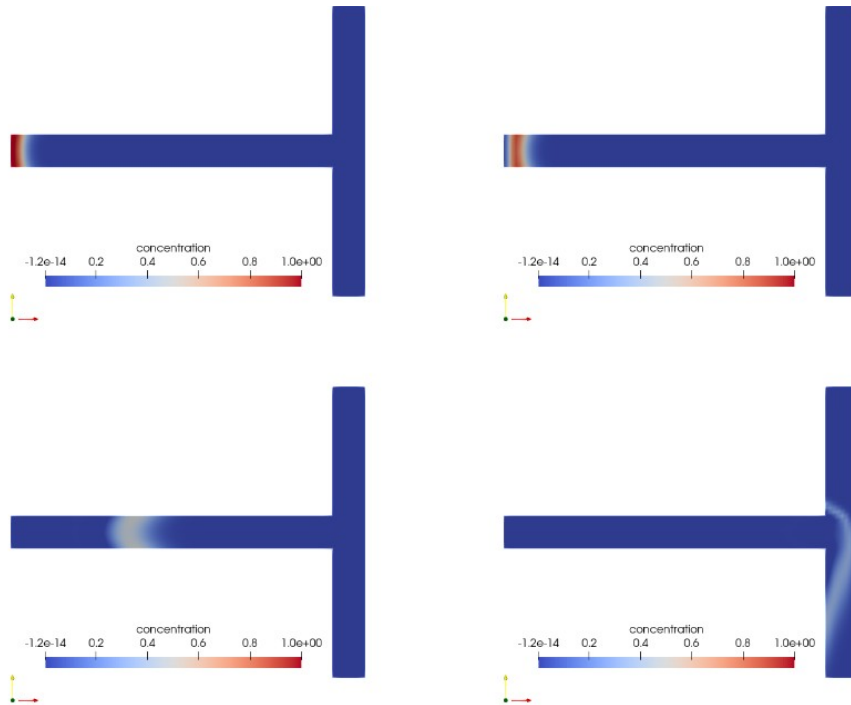


Figure 29.3: Concentration at time: 0, 2, 15, and 45 ticks

## Electro-osmosis

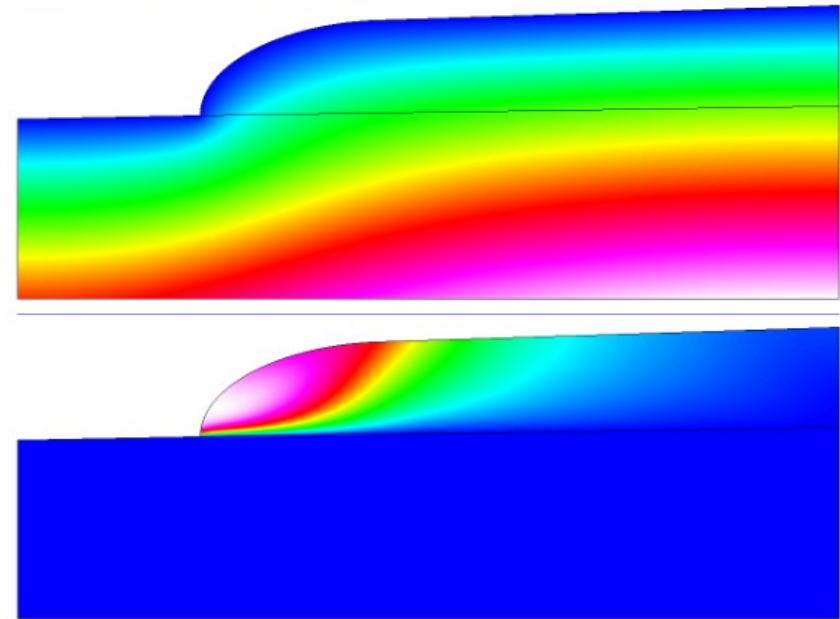


Figure 27.3: Temperature (upper figure) and velocity (lower figure) distributions of the toy glacier sitting on a bedrock.

## Glacier over a rock. Thermo-mechanics

There is acoustics, electromagnetism, thermal radiation,  
mesh adaptation, DEM...



Generic and manual simulation systems. Interesting for specific applications.

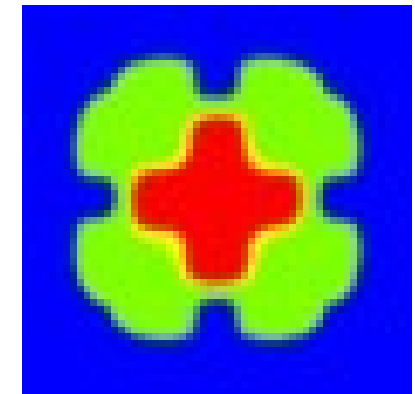


FEniCSx

There is no proprietary equivalent

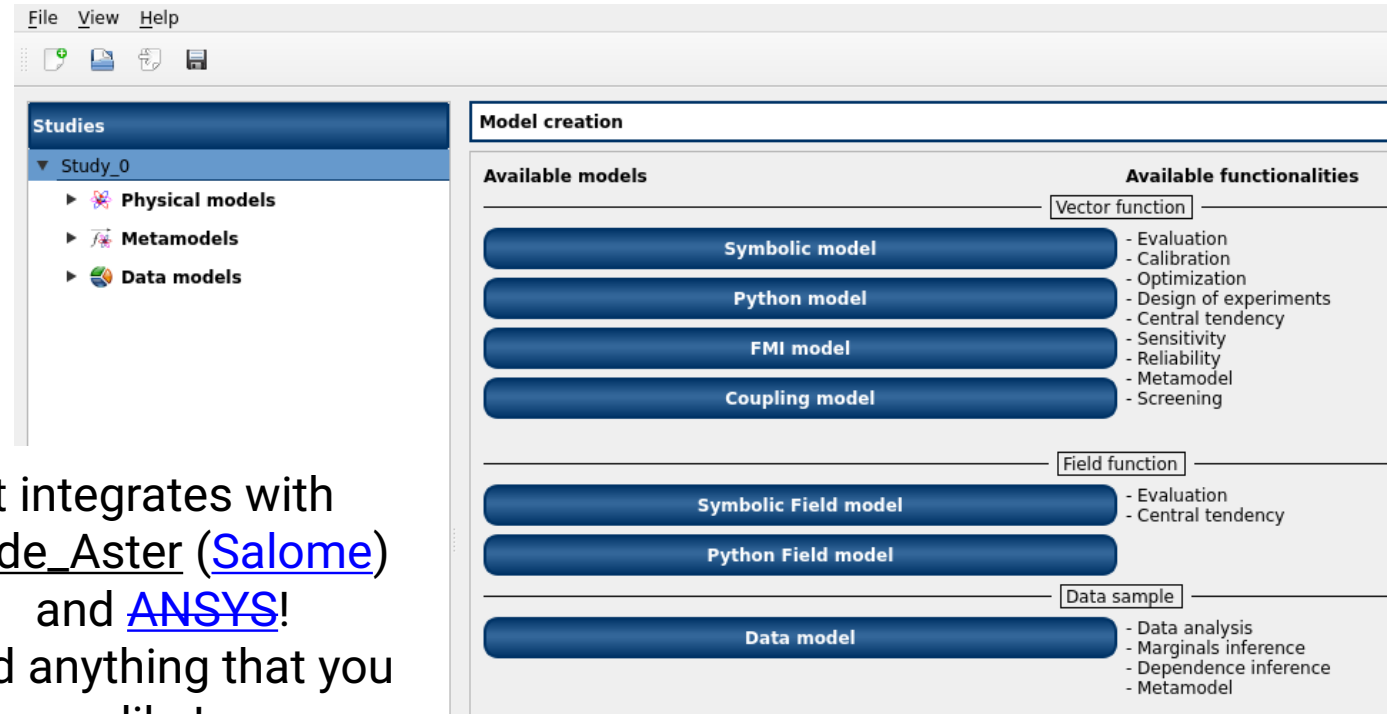


# FREEFEM



deal.II

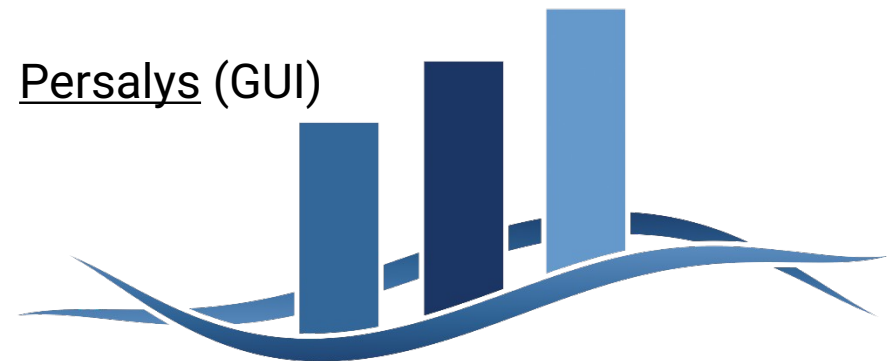
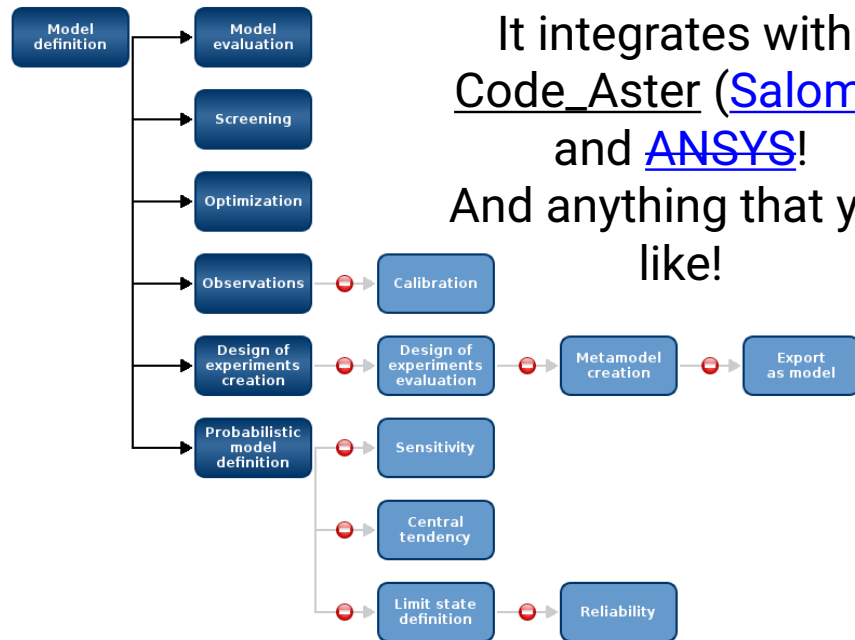


The screenshot shows the OpenTURNS GUI. On the left, a tree view under 'Studies' shows 'Study\_0' with sub-items: 'Physical models', 'Metamodels', and 'Data models'. The main panel is titled 'Model creation' and lists available models and functionalities:

Available models	Available functionalities
Symbolic model	<ul style="list-style-type: none"> <li>- Evaluation</li> <li>- Calibration</li> <li>- Optimization</li> <li>- Design of experiments</li> <li>- Central tendency</li> </ul>
Python model	<ul style="list-style-type: none"> <li>- Sensitivity</li> <li>- Reliability</li> <li>- Metamodel</li> <li>- Screening</li> </ul>
FMI model	
Coupling model	
Symbolic Field model	<ul style="list-style-type: none"> <li>- Evaluation</li> <li>- Central tendency</li> </ul>
Python Field model	
Data model	<ul style="list-style-type: none"> <li>- Data analysis</li> <li>- Marginals inference</li> <li>- Dependence inference</li> <li>- Metamodel</li> </ul>

It integrates with Code\_Aster (Salome) and ANSYS!  
And anything that you like!





Uncertainty quantification, optimization and data analysis.

It is widely used in the nuclear sector and aerospace. It integrates with quite a few powerful optimization suits

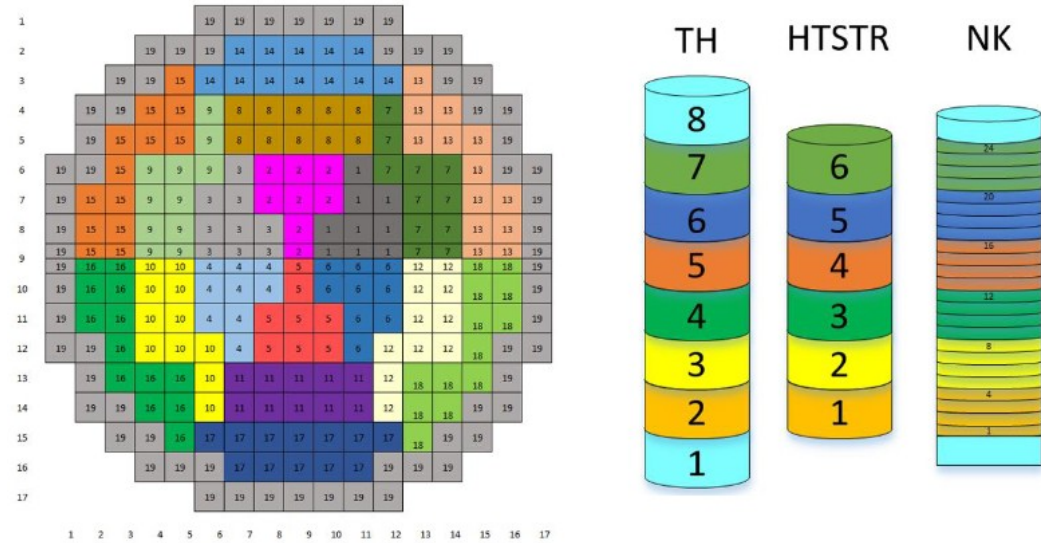


Figure 2 - TRACE TH and HTSTR models, TH-HTSTR-NK mapping

### 3. UNCERTAINTY PROPAGATION METHODOLOGY

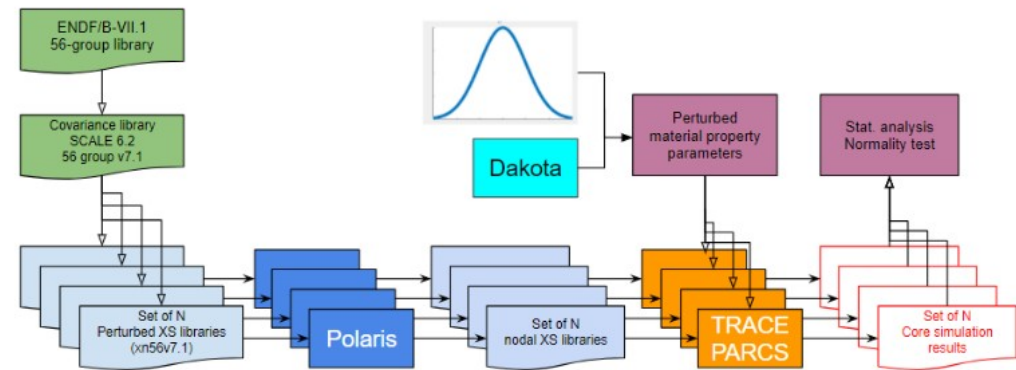


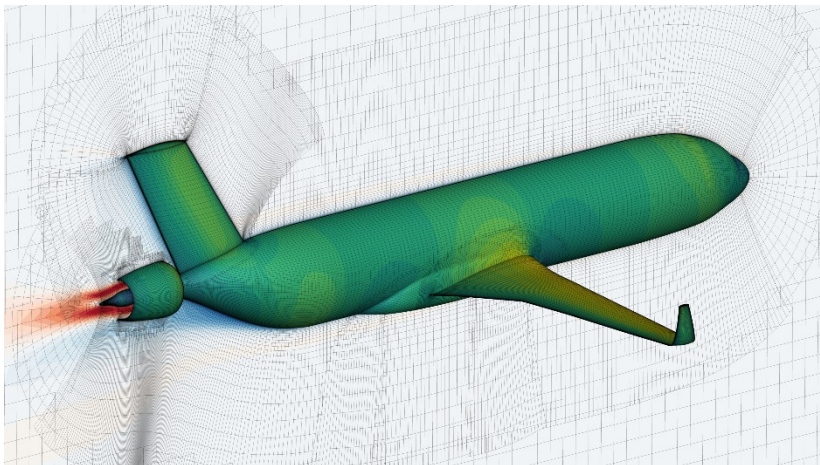
Figure 3 - Uncertainty propagation from nuclear data and material properties



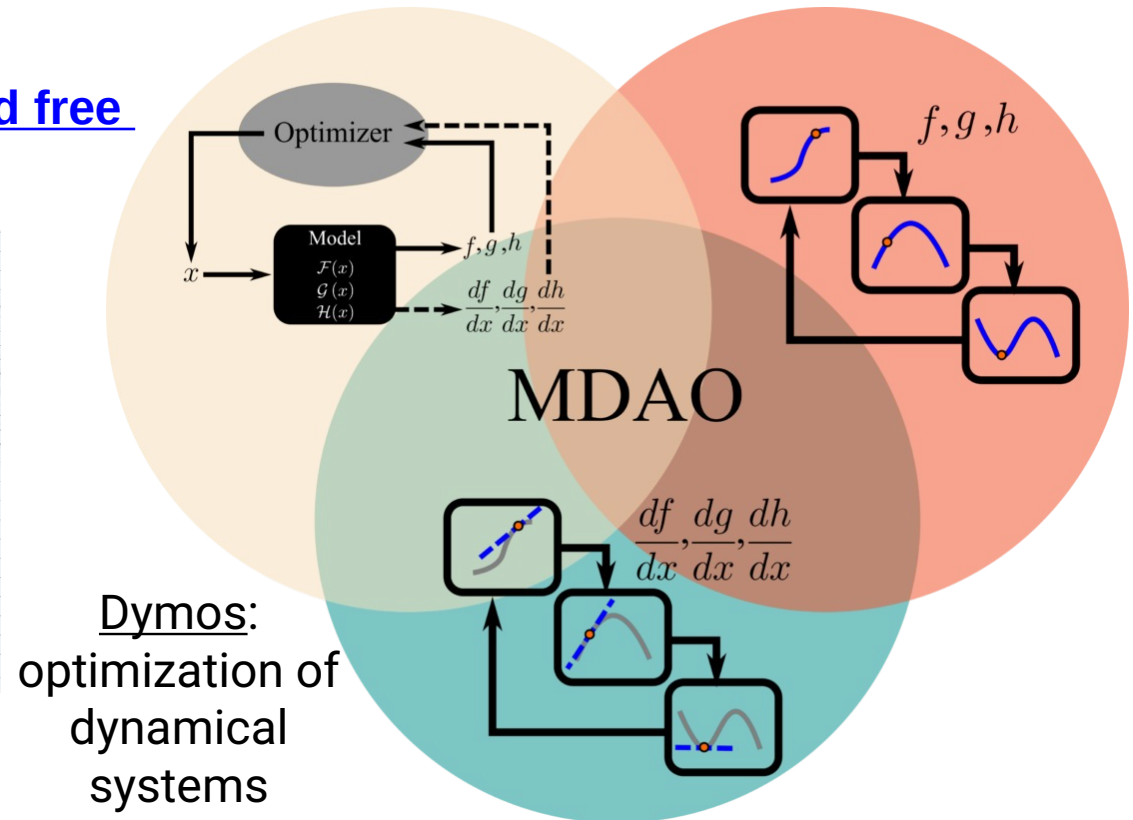
Another possibility (INL). Also used in the nuclear sector: [RELAP5-3D](#), [MELCOR](#), [SCALE](#)...



Exceptional and free learning book!



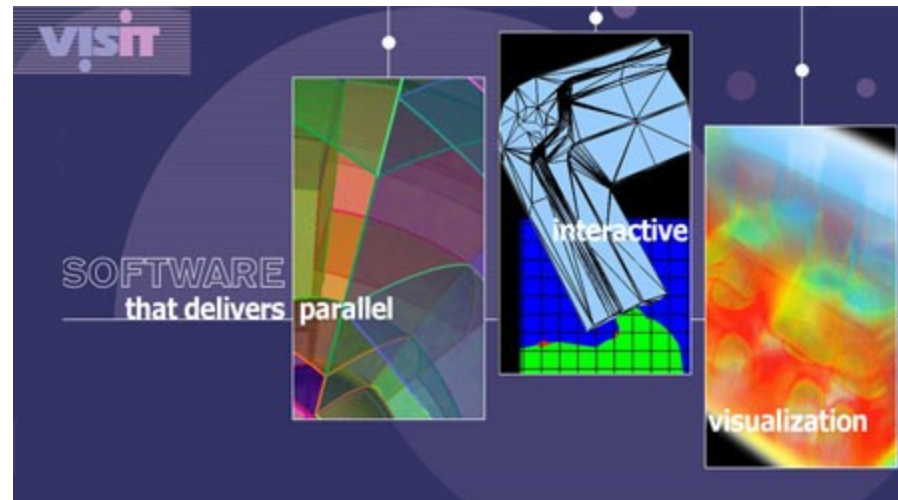
It is widely used in the aerospace sector

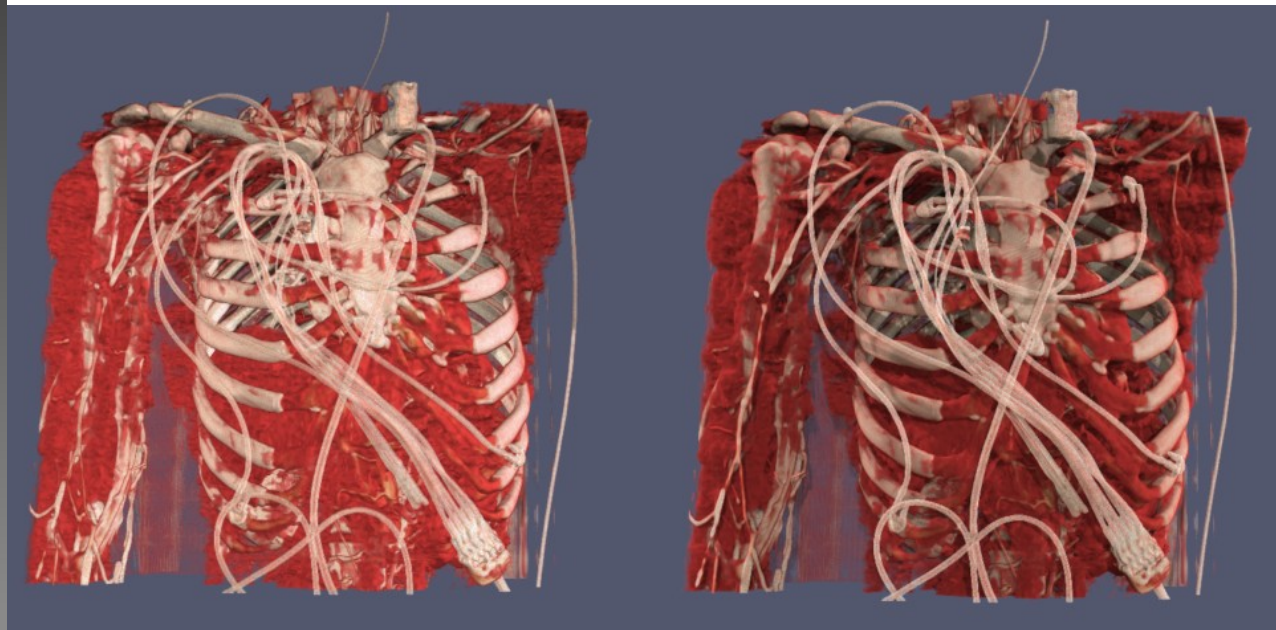
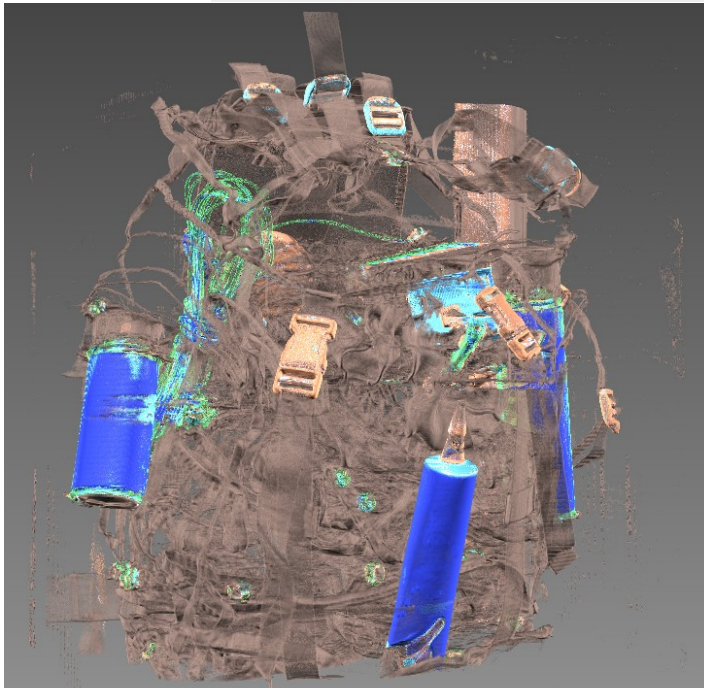
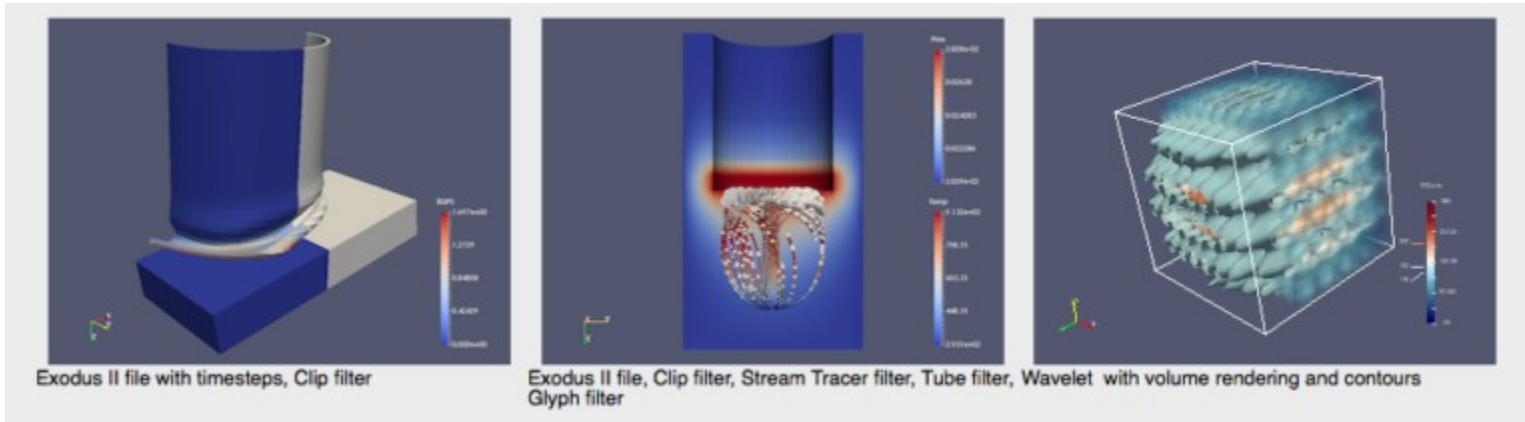




# ParaView

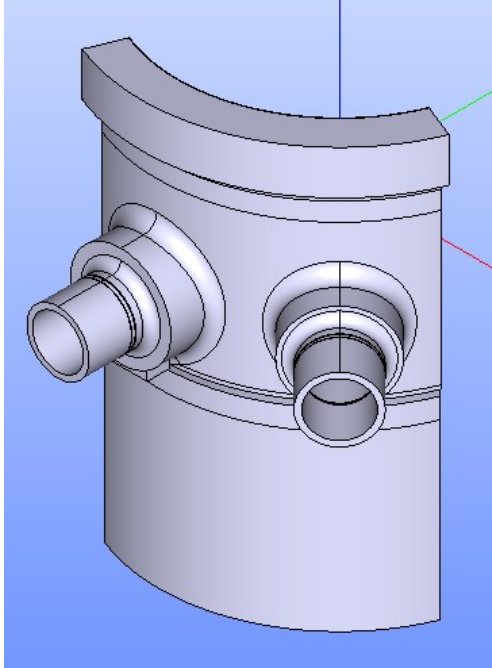
Industrial titans,  
“crème de la crème”



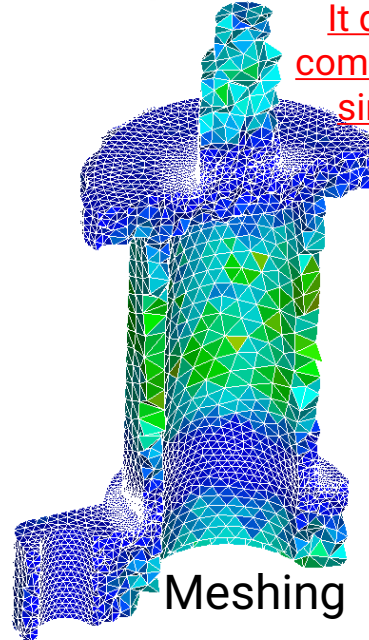
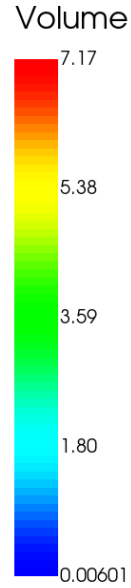


## SALOME

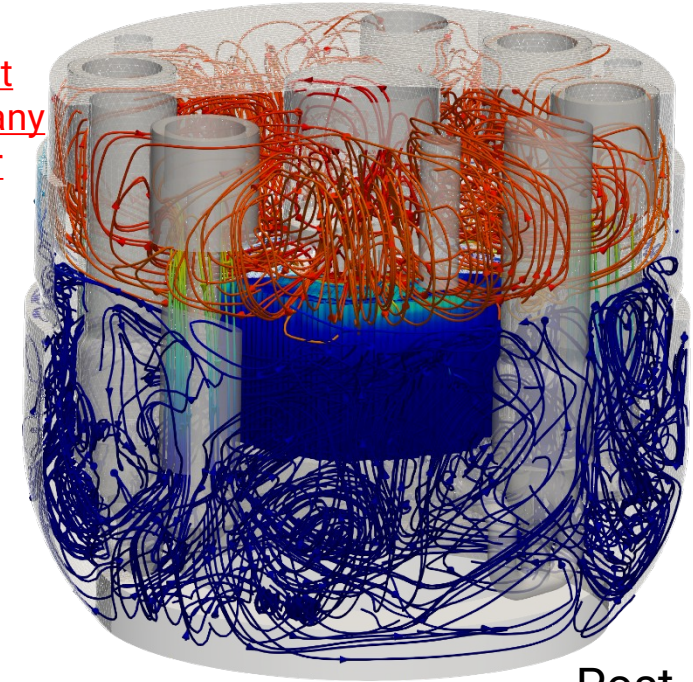
It does not  
come with any  
simulator



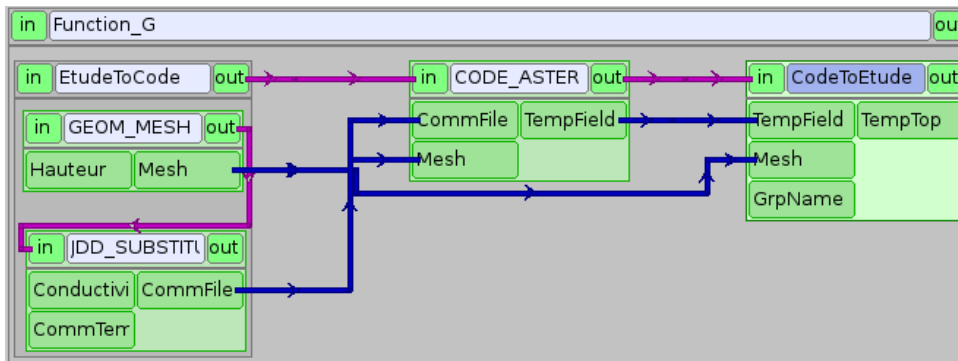
CAD



Meshing

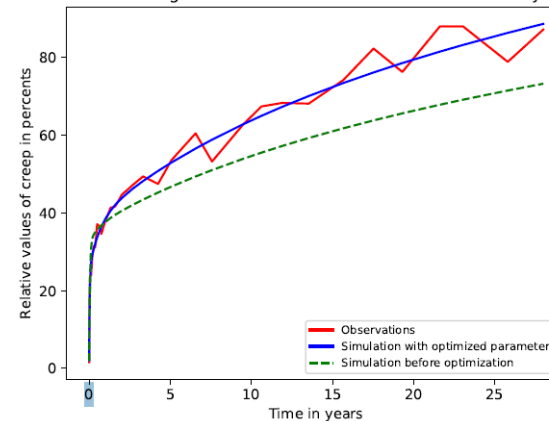


Post-processing



Automation

Simulating law of behavior for concrete on full history



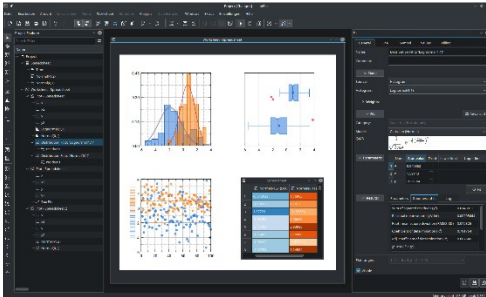
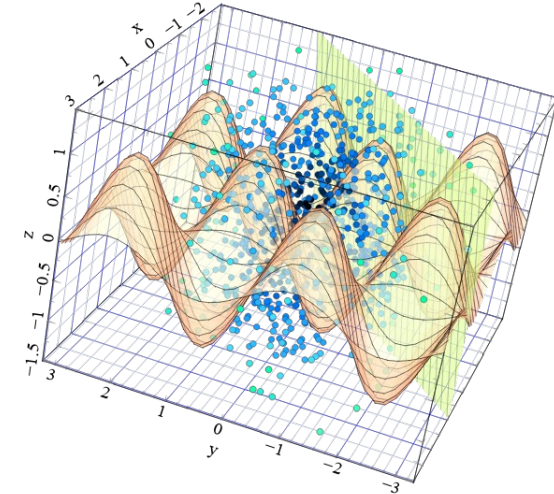
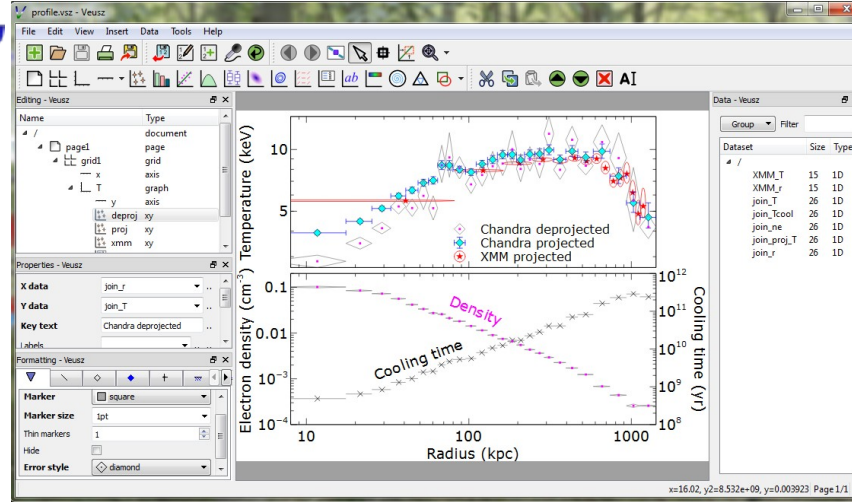
Data ingestion

## Salome users and their modifications





Alternatives to Origin



LabPlot

gnuplot is quite manual but very powerful



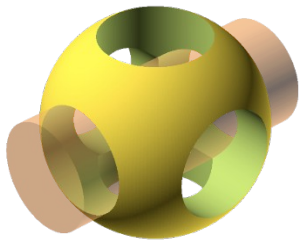
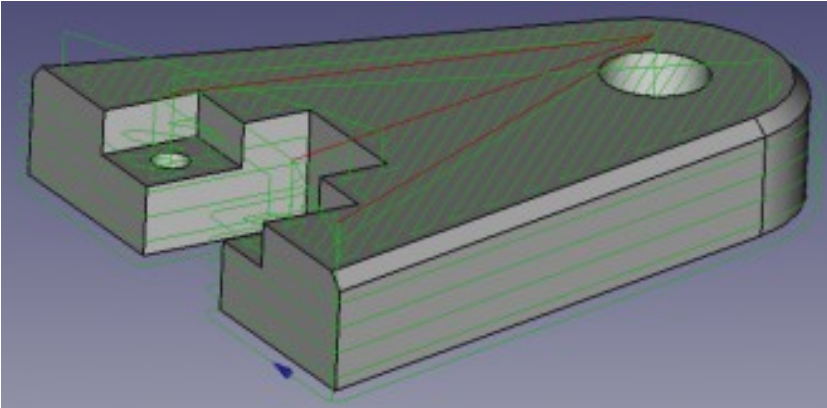
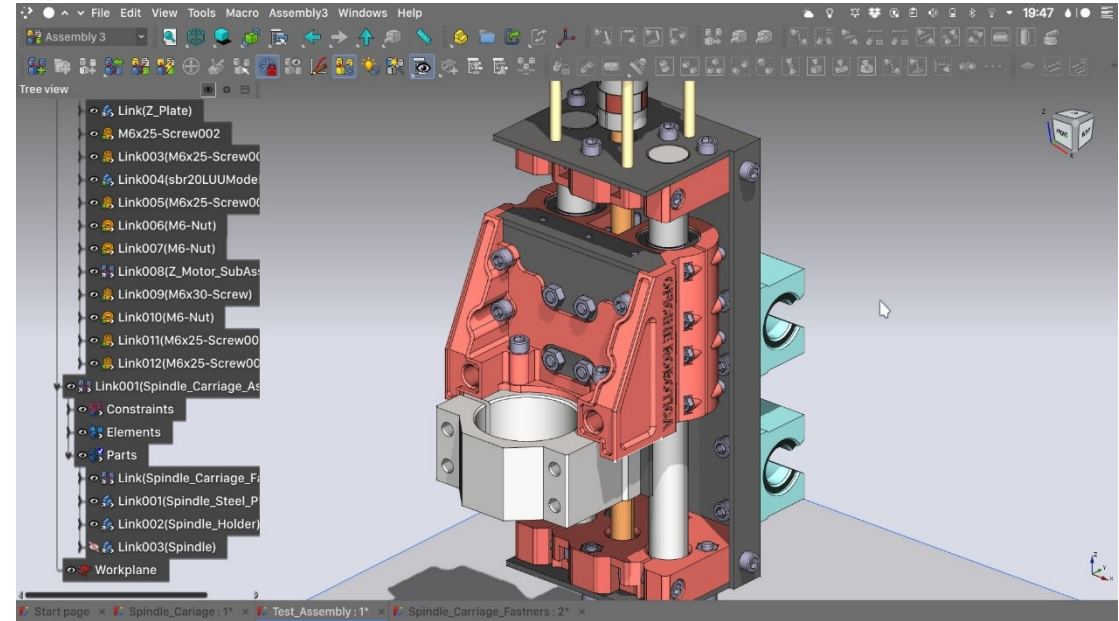
CERN: [ROOT](#)



# Libre software for thermo-hidro-mechanical engineering

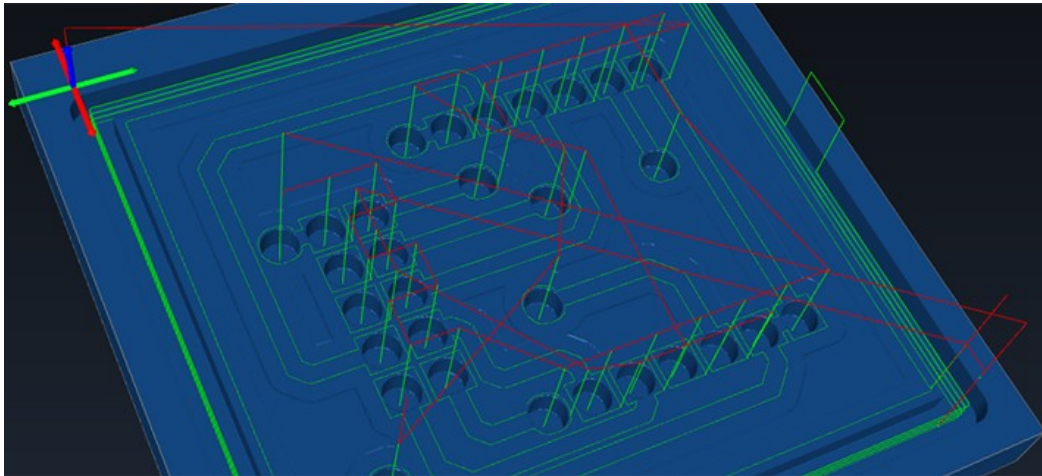
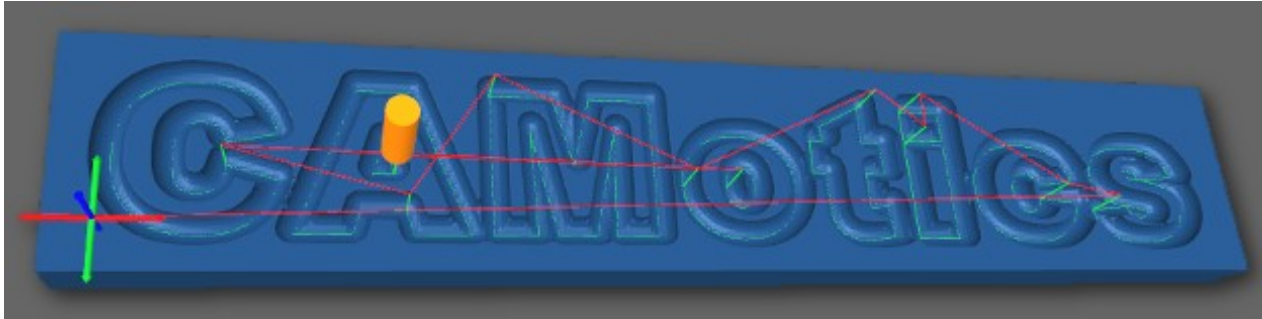


FreeCAD  
Basic alternative  
to Catia,  
SolidWorks, Solid  
Edge, Fusion

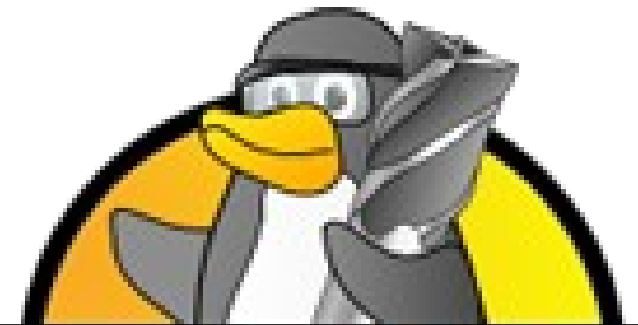


**OpenScad**  
Parametric CAD, programmable.  
Included in FreeCAD





Kiri:Moto



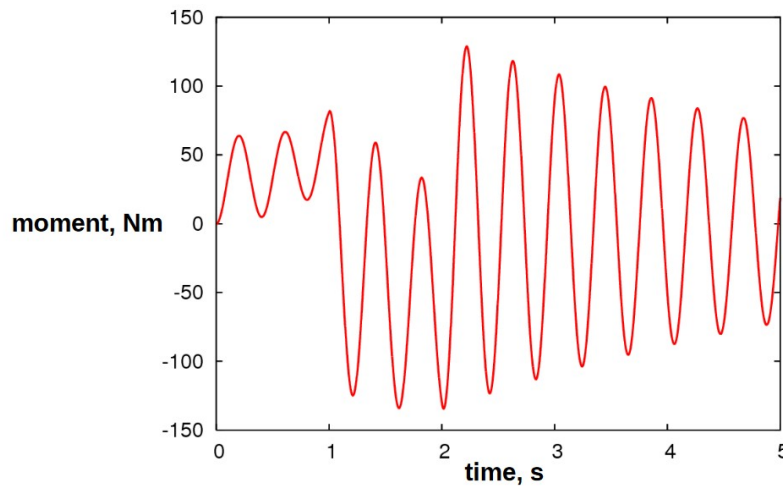
**LinuxCNC**

**ONLY CONTROL, N axis**

Currently (2023), limited to generation  
for 4 or 3+2 axis

# MBDyn

- Internal bending moment close to actuator connection



31

### Example: Hydraulically Actuated Beam

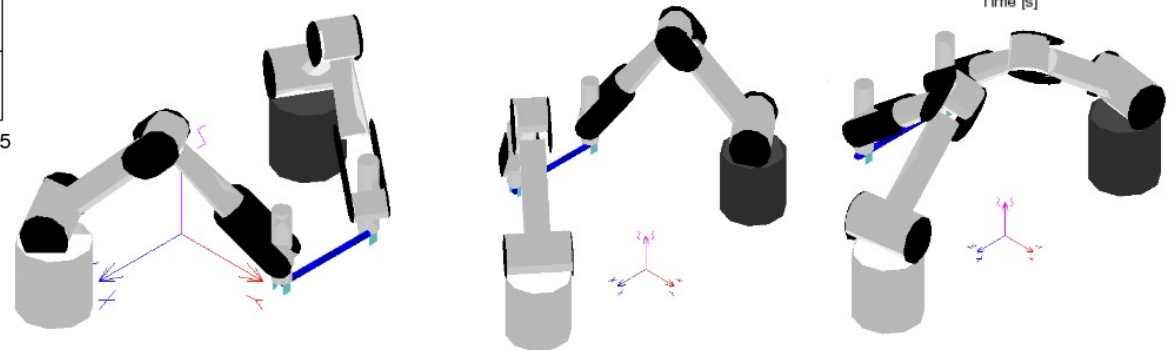
**MBDyn**

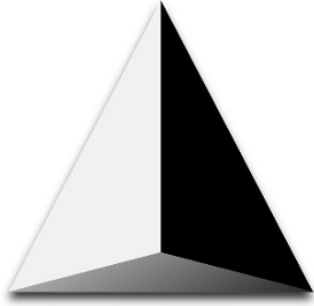
- From: J. Mäkinen, A. Ellman, R. Piché, "Dynamic Simulations of Flexible Hydraulic-Driven Multibody Systems using Finite Strain Beam Theory", 5<sup>th</sup> Scandinavian International Conference on Fluid Power, Linköping, 1997, Sweden

The schematic diagram illustrates a hydraulic actuator system. A revolute hinge is connected to a flexible beam, which is further connected to a rigid body (mass). The beam is also connected to a hydraulic cylinder actuator. The actuator is connected to a prismatic joint, which is connected to a pipe line with an orifice. The pipe line is connected to a source of imposed flow. The diagram is labeled with various components: revolute hinge, Flexible beam, Mass, rigid body, beam, Hydraulic cylinder, actuator, prismatic, Pipe line, imposed flow, orifice, and pipe. The joints are labeled  $C_1$  and  $C_0$ .

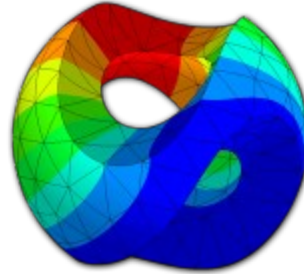
- Input file: <https://www.mbdyn.org/userfiles/documents/examples/actuator>

Pierangelo Masarati – MBDyn Hydraulic Modeling POLITECNICO DI MILANO

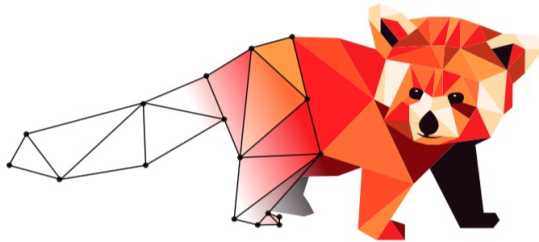




gms h



Netgen/NGSolve



Upgrade  
your meshes

[Mmg Platform](#)

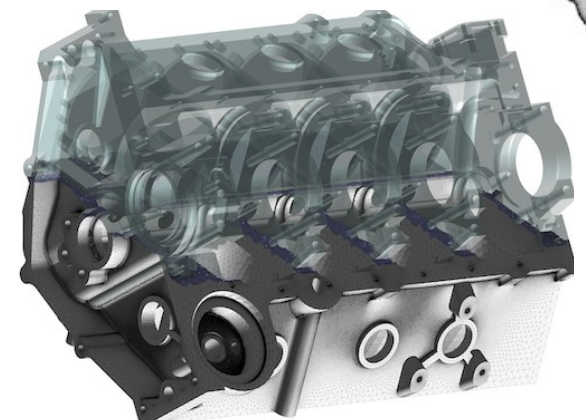
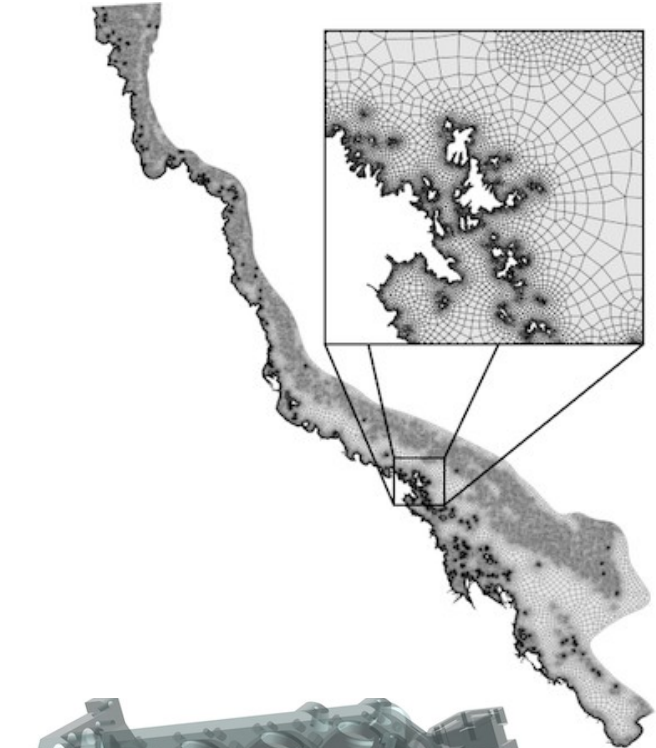
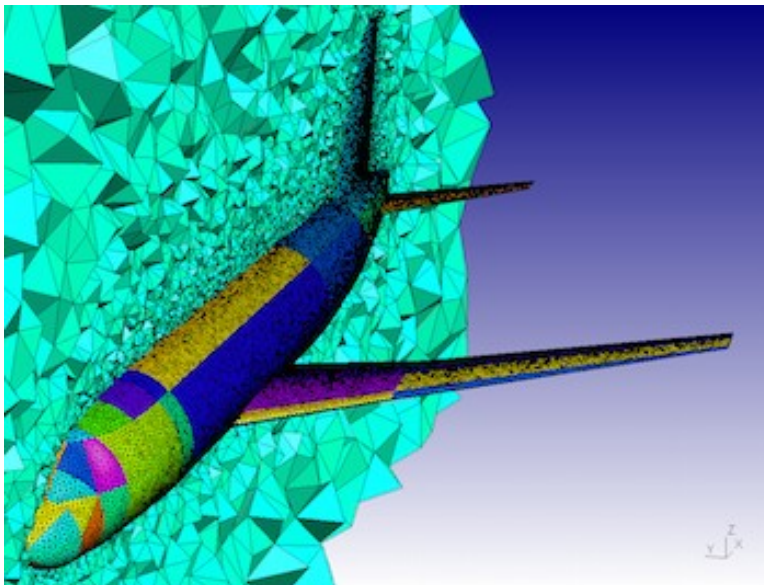
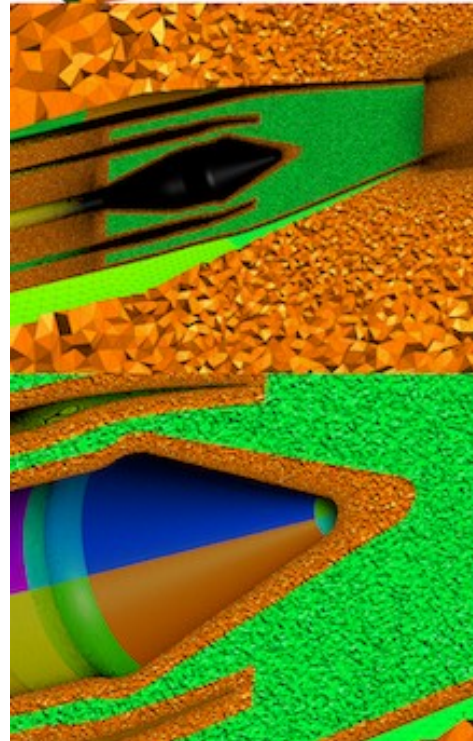
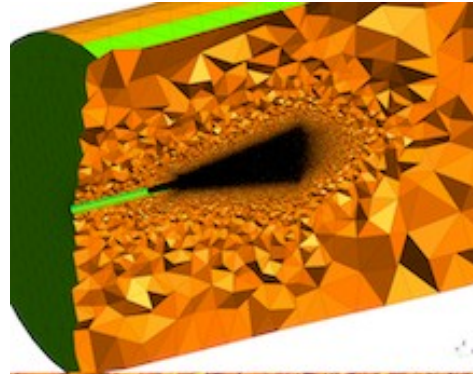
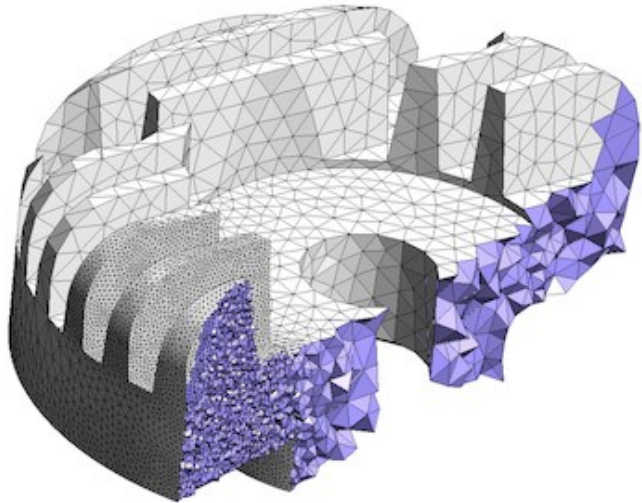


[cfMesh](#)



[MeshLab](#)

Geometry manipulation, great for scans, fixes, analysis...

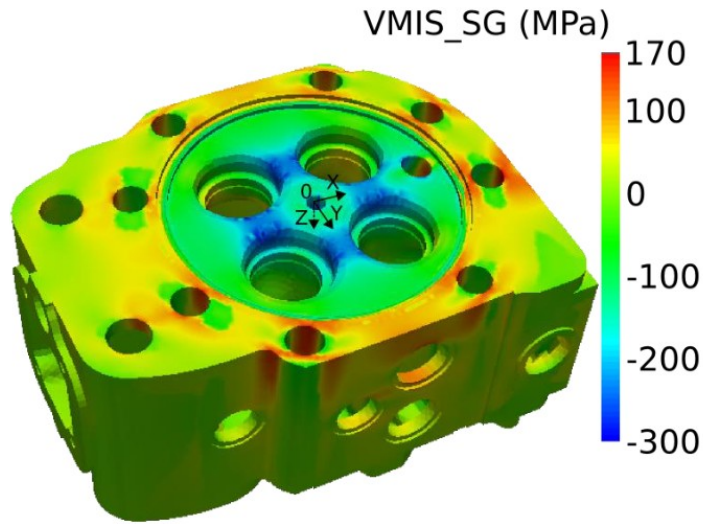




Salome + Code\_Aster

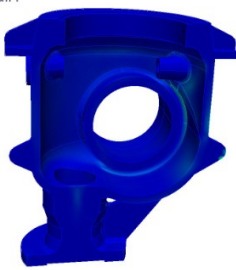
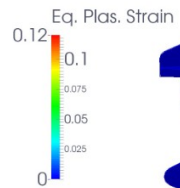
- ❑ Developed by EDF for mechanical and civil studies
  - ▶ Validation of nuclear power plants and their components
  - ▶ Validation of electrical generation structures
  - ▶ Validation of civil structures
  
- ❑ Code\_Aster is very capable
  - ▶ Resource efficient (aimed at supercomputers)
  - ▶ Libre software, anything can be modified
  - ▶ Complete automation (Python)
  - ▶ Advance materials without limits (high complexity use...)
  - ▶ Limitless mechanical models
  - ▶ **A bit difficult to use and quite manual! I will give a course**



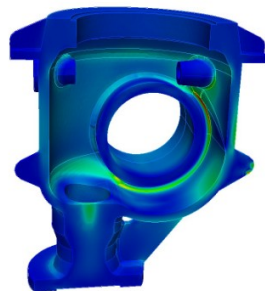


End of start

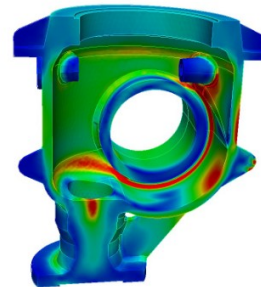
Déformations plastiques équivalentes à 200000h de fluage



Lemaitre



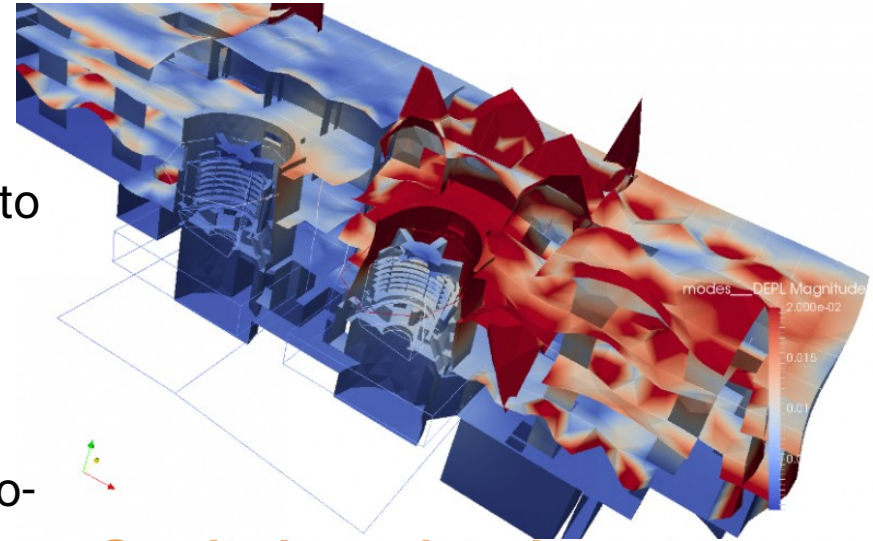
Hayhurst – S2



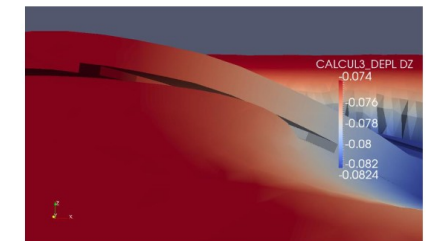
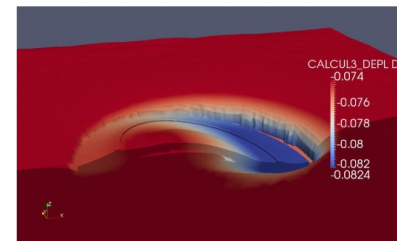
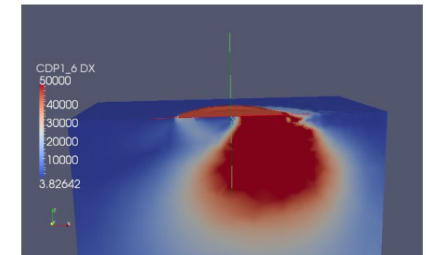
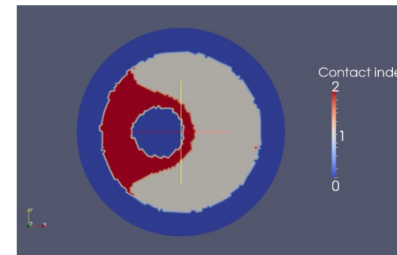
Hayhurst – S1

Alternative to  
Abaqus,  
ANSYS,  
Nastran

Only thermo-  
(hydro)-  
mechanics



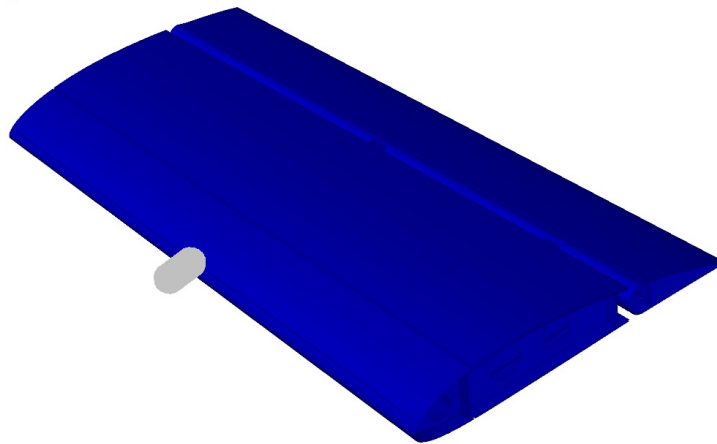
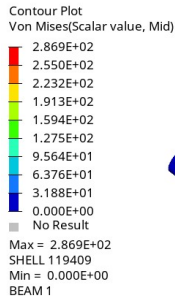
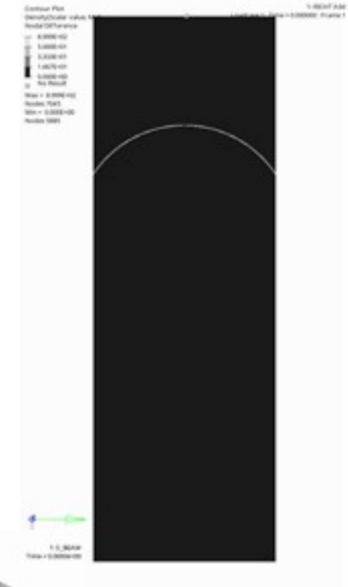
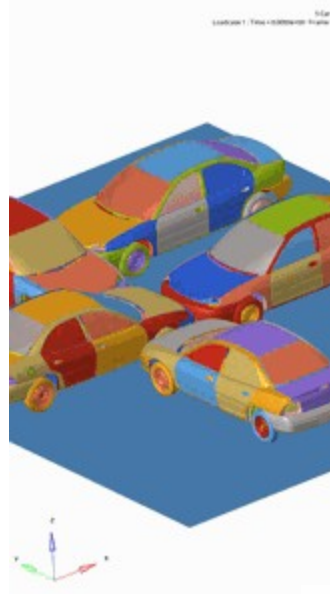
## Gravity base detachment



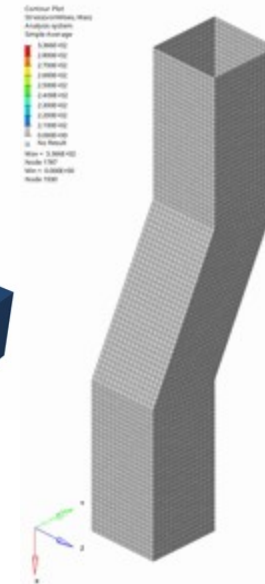
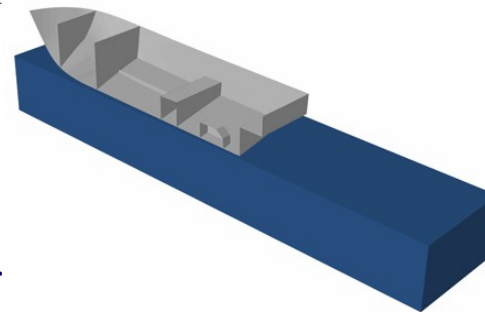
Explicit simulation,  
implicit and  
multiphysics:

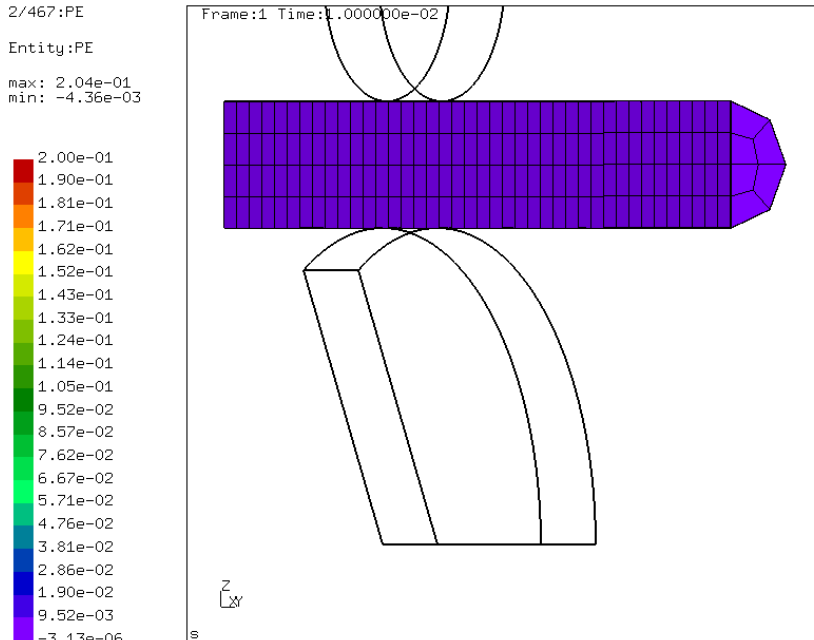
FEM, SPH, CFD

Direct alternative to  
**LS-DYNA** (compatible  
with its input)



1: birr  
Loadcase 1: Time = 0.0000e+

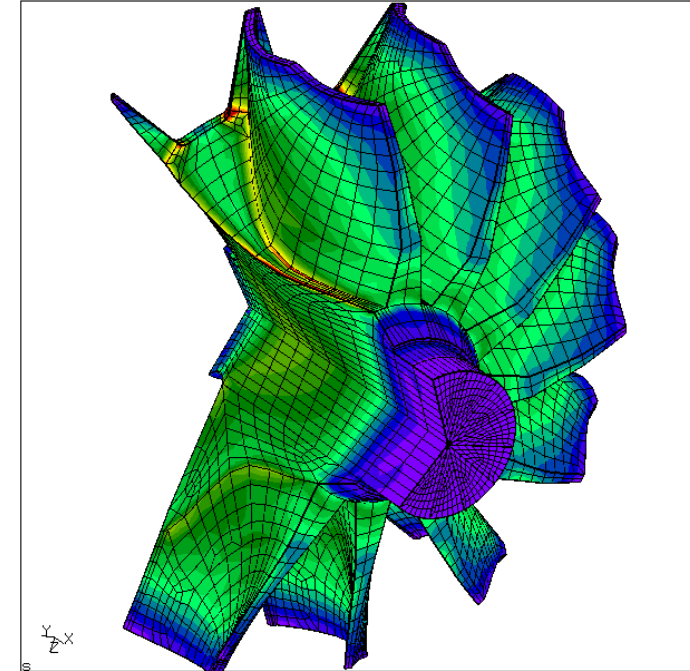
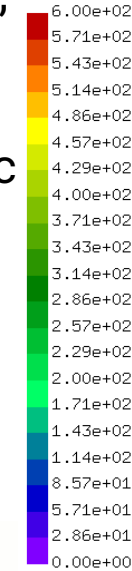




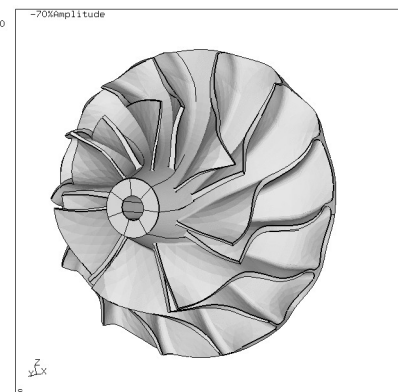
FEM (implicit, explicit) CFD, Laplace-Helmholtz, etc

LC2:STRESS  
Tim:1.000000  
entity:Mises

max: 8.62e+02  
min: 2.32e+00

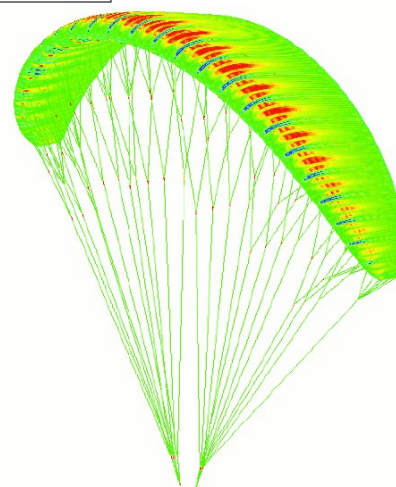
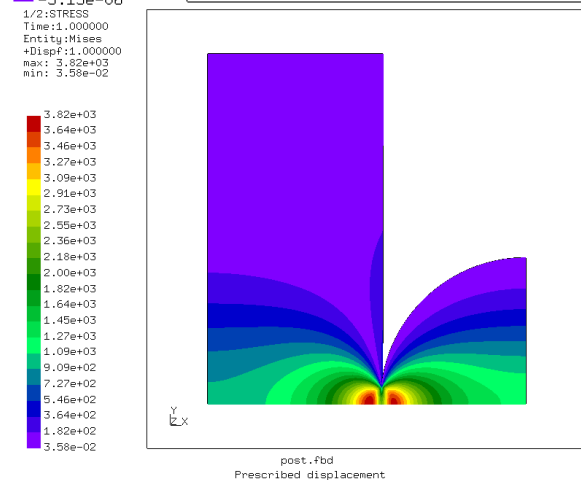


22/58:PDISP  
Time:34567.372380  
Amplitude

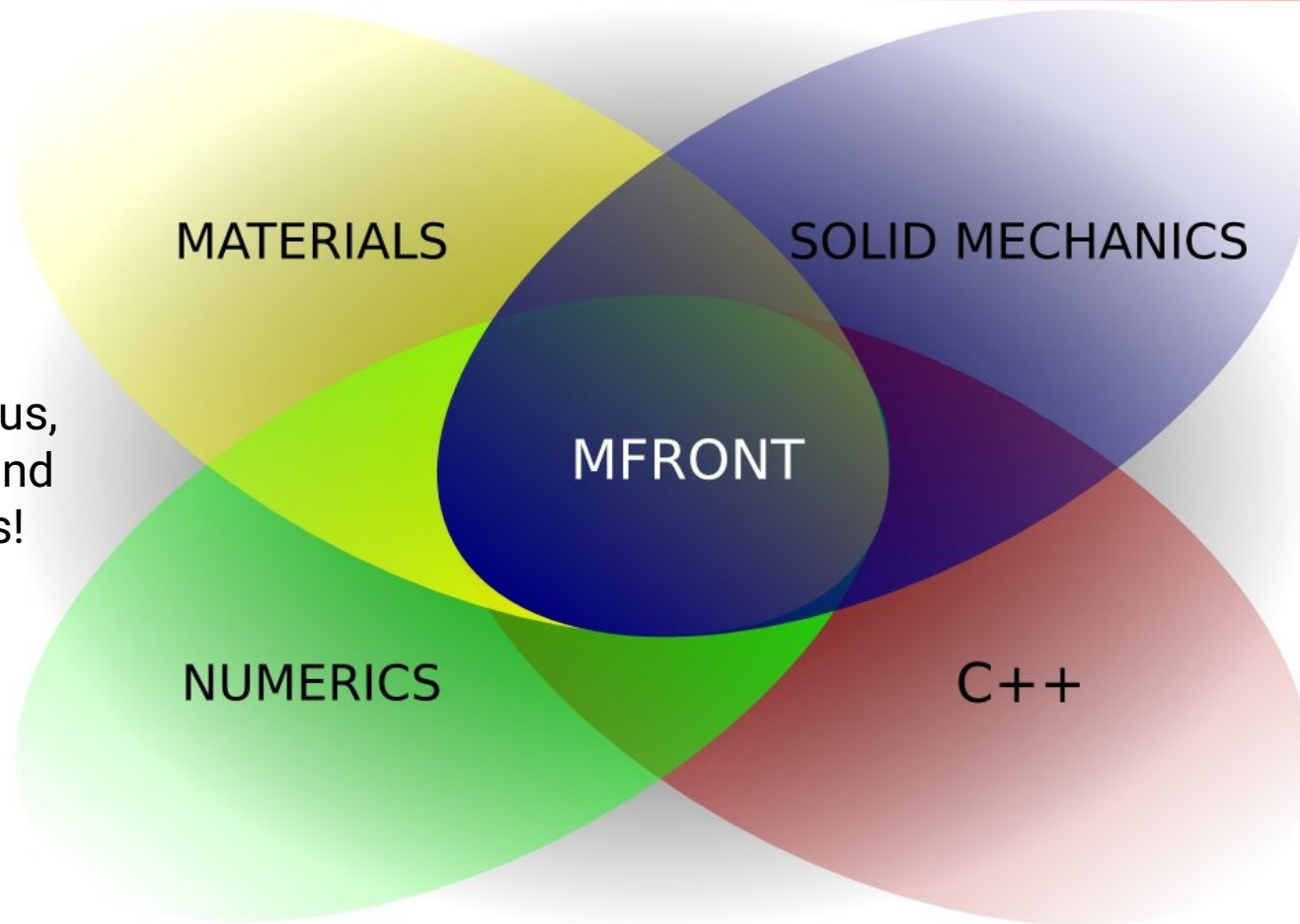


Direct alternative to **ABAQUS**

It tries to be compatible with its input format and functionality



Works for  
ANSYS, Abaqus,  
Code\_Aster and  
many others!



**There is no proprietary equivalent.**  
Allows for the simple and efficient definition of properties  
and material behavior

```
@DSL MaterialLaw;
@Material U02;
@Law YoungModulus_Martin1989;
@Output E;
@Input T, f;
@PhysicalBounds T in [0:*[; // Temperature is positive
@PhysicalBounds f in [0:1.]; // Porosity is positive and Lower than one
@Bounds T in [273.15:2610.15]; // Validity range
@Function {
  E = 2.2693e11 * (1 - 2.5 * f) * (1 - 6.786e-05 * T - 4.23e-08 * T * T);
}
```

## Material properties

```
@DSL IsotropicPlasticMisesFlow; //< domain specific language
@Behaviour Plasticity; //< name of the behaviour
@Parameter H = 22e9; //< hardening slope
@Parameter s0 = 200e6; //< elasticity limit
@FlowRule{ //< flow rule
  f = seq-H*p-s0;
  df_dseq = 1;
  df_dp = -H;
}
```

```
@Brick "StandardElastoViscoPlasticity" {
  // Here the stress potential is given by the Hooke Law. We define:
  // - the elastic properties (Young modulus and Poisson ratio).
  // Here the Young modulus is a function of the temperature.
  // The Poisson ratio is constant.
  // - the thermal expansion coefficient
  // - the reference temperature for the thermal expansion
  stress_potential : "Hooke" {
    young_modulus : "2.e5 - (1.e5*((T - 100.)/960.))**2)",
    poisson_ratio : 0.3,
    thermal_expansion : "1.e-5 + (1.e-5 * ((T - 100.)/960.) ** 4)",
    thermal_expansion_reference_temperature : 0
  },
  // Here we define only one viscoplastic flow defined by the Norton Law,
  // which is based:
  // - the von Mises stress criterion
  // - one isotropic hardening rule based on Voce formalism
  // - one kinematic hardening rule following the Armstrong-Frederick Law
  inelastic_flow : "Norton" {
    criterion : "Mises",
    isotropic_hardening : "Voce" {R0 : 200, Rinf : 100, b : 20},
    kinematic_hardening : "Armstrong-Frederick" {
      C : "1.e6 - 98500 * (T - 100) / 96",
      D : "5000 - 5* (T - 100)"
    },
    K : "(4200. * (T + 20.) - 3. * (T + 20.0)**2)/4900.",
    n : "7. - (T - 100.) / 160.",
    Ksf : 3
  }
};
```

## Mechanical behavior

[TFEL/MFront](#)

[MGIS](#)

Open  FOAM®

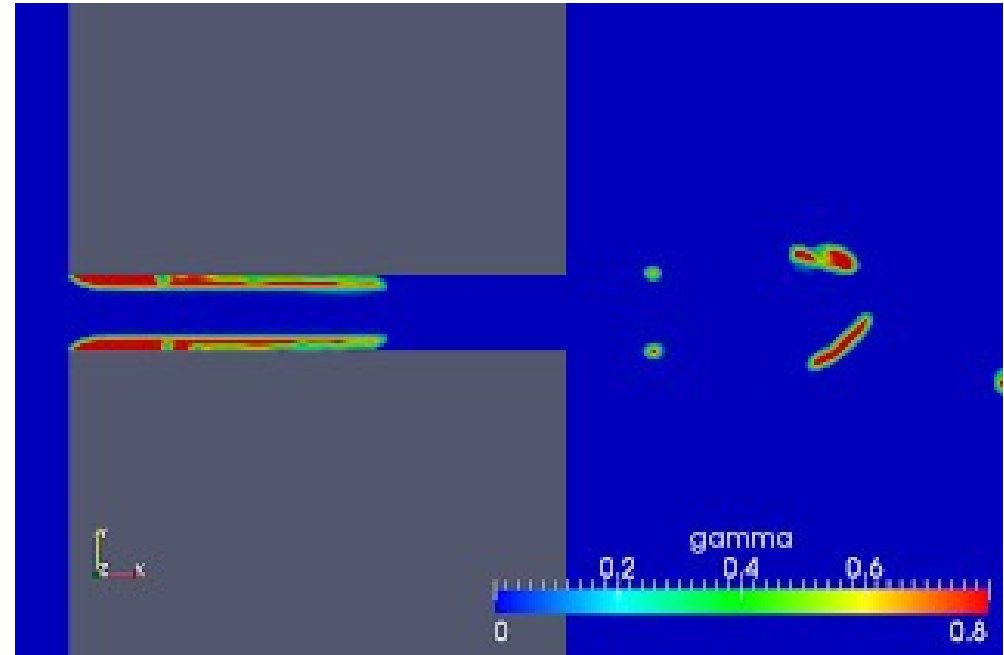
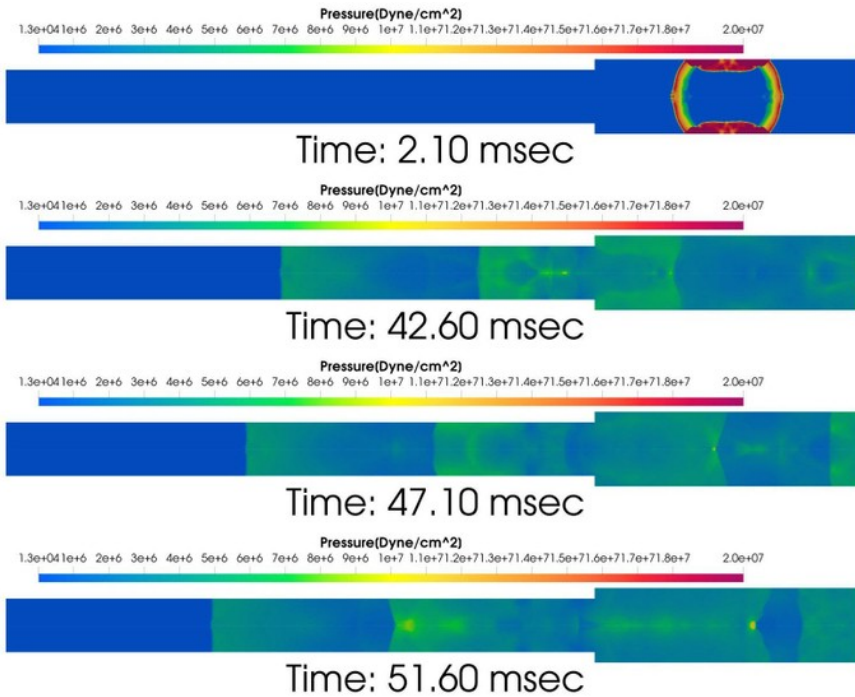


code\_saturne

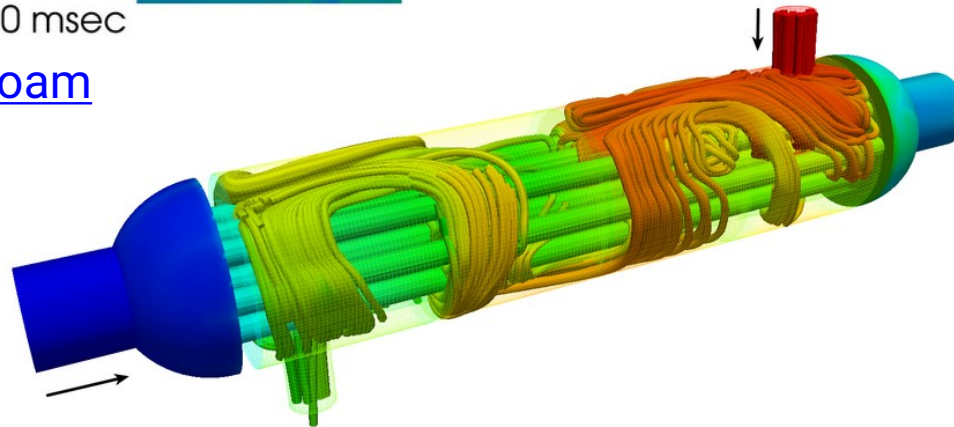


SU2  
code

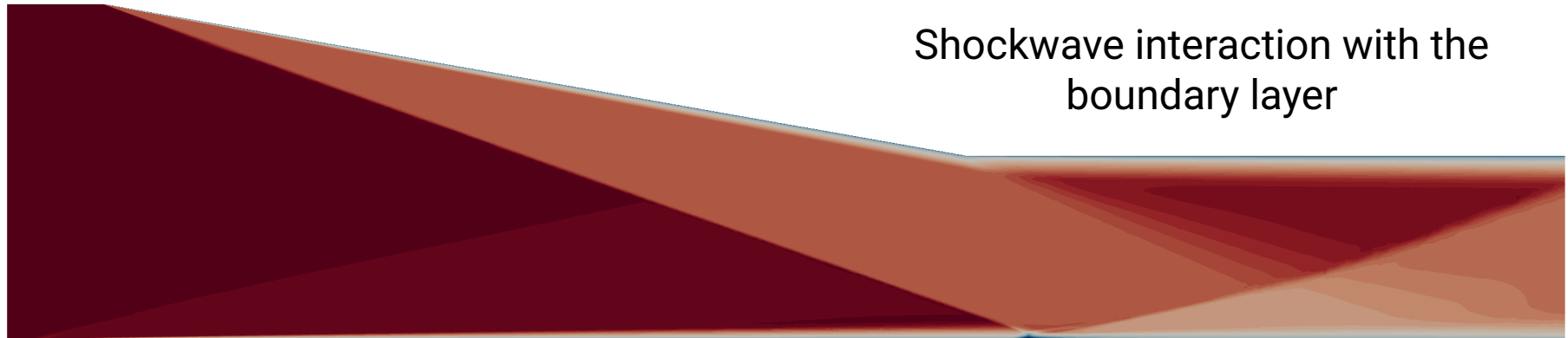




[blastFoam](#)



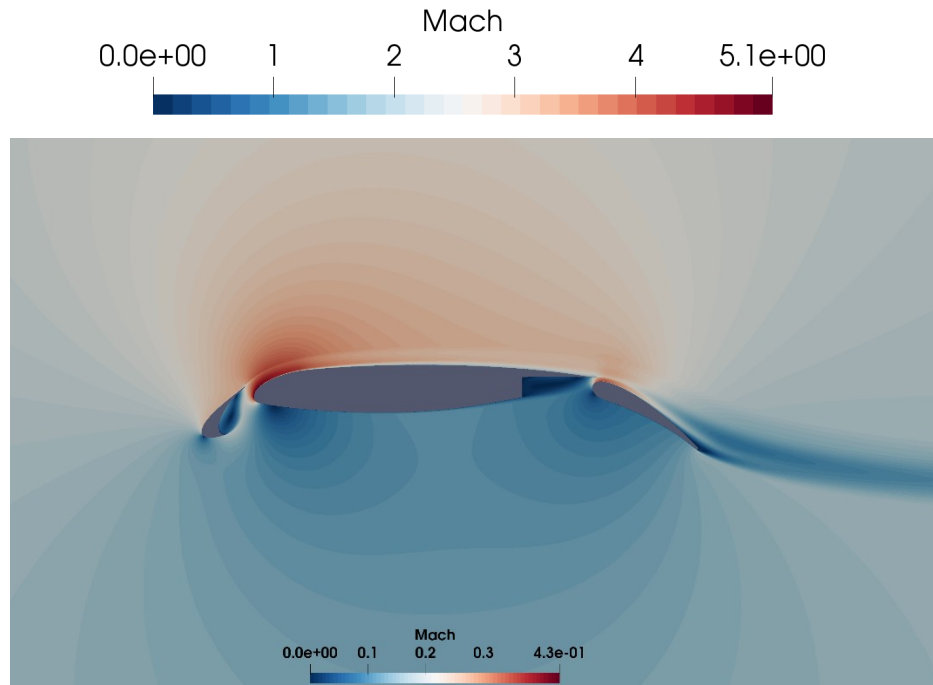
### Shockwave interaction with the boundary layer



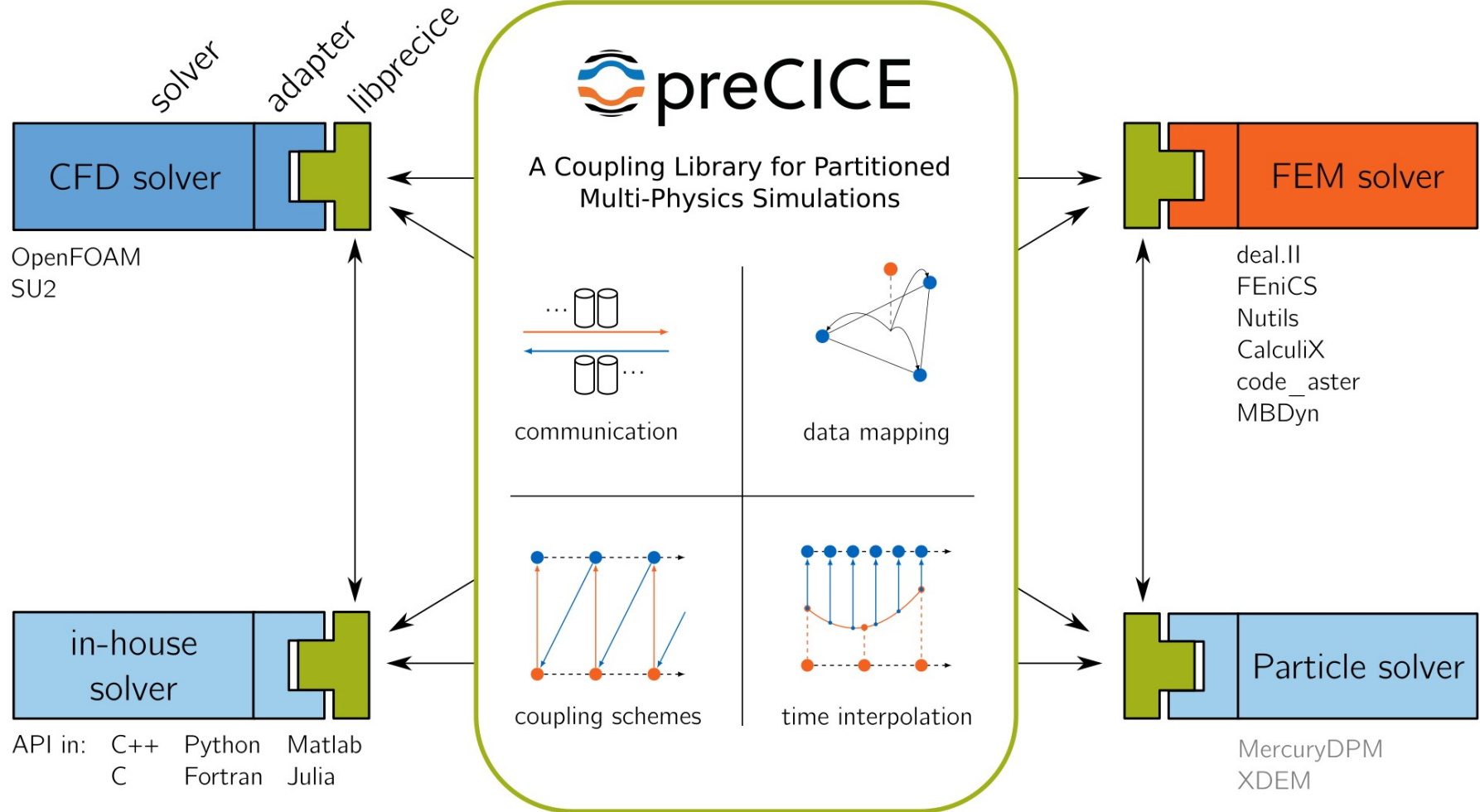
Thermo-chemical models based on

[Mutation++](#)

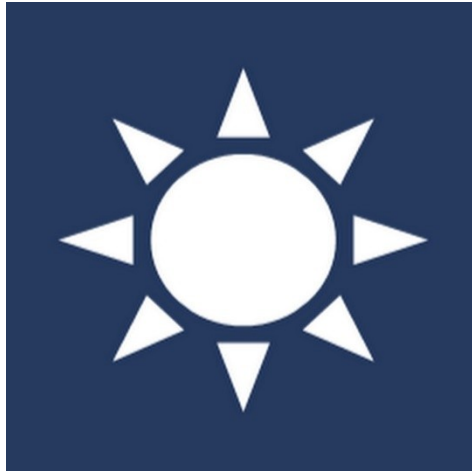
[SU2-NEMO](#)







**There is no proprietary equivalent and probably will never be**



System Advisory Model ([SAM](#)),  
developed by NREL

Techno-economic analysis of  
renewable energies. Very powerful!



[Open  
Sustainable  
Technology](#)



## OpenStudio

Energy calculations for buildings:  
HVAC, radiation, control, economy...

Integrates  
[Radiance](#) and [EnergyPlus](#)

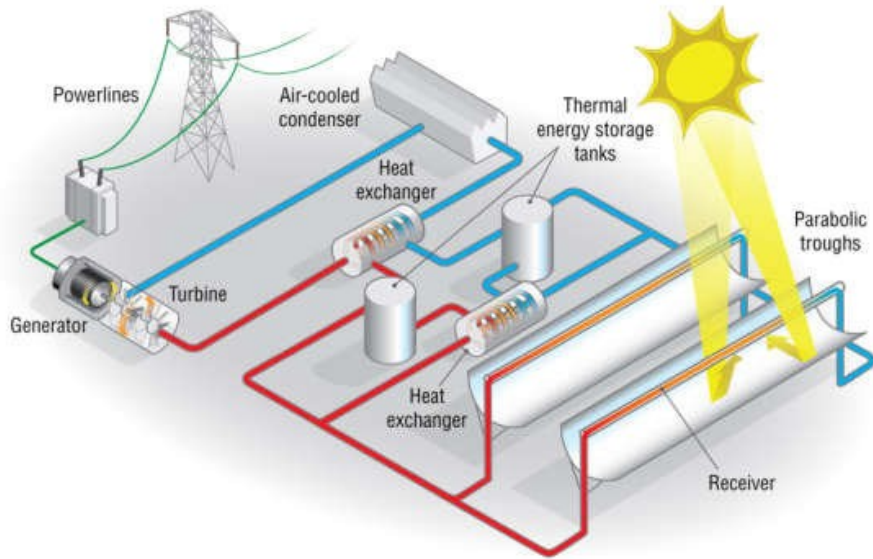


[Ladybug](#) tools. Integrates many  
other systems in a single  
package (CFD, OpenStudio, etc)



## LFENERGY Landscape

Tool selection  
ordered by type and  
objective.  
Very useful



## Simulation and validation of two thermal solar plants

Appendix B – Sample solar tower model of a solar facility for 110 MW rated power and 10 hours of thermal energy storage located in Tonopah.

Here below are the input parameters. Highlighted are the parameters that are internally computed.

<b>Heliofield Field</b> Design point DNI: 950 W/m <sup>2</sup> Solar multiple: 2.4 Receiver thermal power: 711 MWt	<b>Power Cycle</b> Design turbine gross output: 122 MWe Estimated gross to net conversion factor: 0.9 Estimated net output at design (nameplate): 110 MWe Cycle thermal efficiency: 0.412 Cycle thermal power: 206 MWt
<b>Tower and Receiver</b> HTI hot temperature: 566 °C HTI cold temperature: 288 °C	
<b>Thermal Storage</b> Full load hours of storage: 10 hours Solar field hours of storage: 4,166.67 hours	

<b>Heliofield Field</b> Import... Export... Copy Paste Heliofields: 10347	<table border="1"> <thead> <tr> <th>X Position</th> <th>Y Position</th> </tr> </thead> <tbody> <tr><td>1542.25</td><td>672.894</td></tr> <tr><td>739.977</td><td>-825.158</td></tr> <tr><td>819.582</td><td>-791.492</td></tr> <tr><td>-1636.89</td><td>561.94</td></tr> <tr><td>-1591.76</td><td>0.773239</td></tr> <tr><td>1553.18</td><td>348.336</td></tr> <tr><td>1280.13</td><td>-419.432</td></tr> <tr><td>-934.42</td><td>-866.06</td></tr> <tr><td>1501.6</td><td>111.118</td></tr> <tr><td>-561.792</td><td>-991.244</td></tr> <tr><td>-1039.24</td><td>-798.481</td></tr> <tr><td>-370.883</td><td>-980.129</td></tr> </tbody> </table>	X Position	Y Position	1542.25	672.894	739.977	-825.158	819.582	-791.492	-1636.89	561.94	-1591.76	0.773239	1553.18	348.336	1280.13	-419.432	-934.42	-866.06	1501.6	111.118	-561.792	-991.244	-1039.24	-798.481	-370.883	-980.129	
X Position	Y Position																											
1542.25	672.894																											
739.977	-825.158																											
819.582	-791.492																											
-1636.89	561.94																											
-1591.76	0.773239																											
1553.18	348.336																											
1280.13	-419.432																											
-934.42	-866.06																											
1501.6	111.118																											
-561.792	-991.244																											
-1039.24	-798.481																											
-370.883	-980.129																											
<input type="checkbox"/> Generate heliostad layout using tower dimensions Calculate <input type="checkbox"/> Optimize heliostad layout and tower dimensions Calculate	<b>Optimization Settings</b> Initial optimization step size: 0.06 Maximum optimization iterations: 200 Optimization convergence tolerance: 0.001																											

**Performance model output**  
kWh of Electricity

**User inputs**  
Installation and operating costs

**Financial parameters:** debt, taxes and incentives

**Performance Adjustments**

**Result: Project cash flow and metrics**

Year	0	1	2	3	4	5
Energy (kWh)	0	32,417,240	32,951,256	32,993,878	34,933,510	31,773,718
Energy Price (\$/kWh)	0	0.15	0.132	0.133	0.135	0.14
Energy Value (\$)	0	4,862,601.5	4,368,671.5	4,519,860.5	4,935,169	4,458,598.5
Operating Expenses:						
O&M Fixed expense (\$)	0	0	0	0	0	0
O&M Capacity-based expense (\$)	0	299,976.13	307,475.53	315,162.41	323,041.47	331,117.5
O&M Production-based expense (\$)	0	0	0	0	0	0
Insurance expense (\$)	0	0	0	0	0	0
Property tax net assessed value (\$)	0	0	0	0	0	0
Property tax expense (\$)	0	0	0	0	0	0
Net Salvage Value (\$)	0	0	0	0	0	0
Total operating expense (\$)	0	299,976.13	307,475.53	315,162.41	323,041.47	331,117.5
Net Income (\$)	0	4,562,625.37	4,061,196	4,204,698.09	4,612,127.53	4,127,481

## Cost analysis



Develop geometry using one of the available tools.

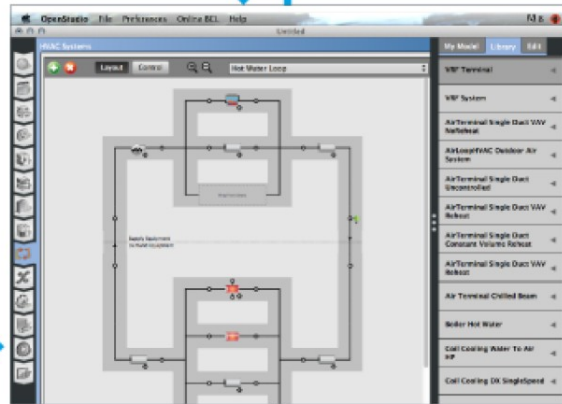
Envelope

Baseline

Additional Inputs



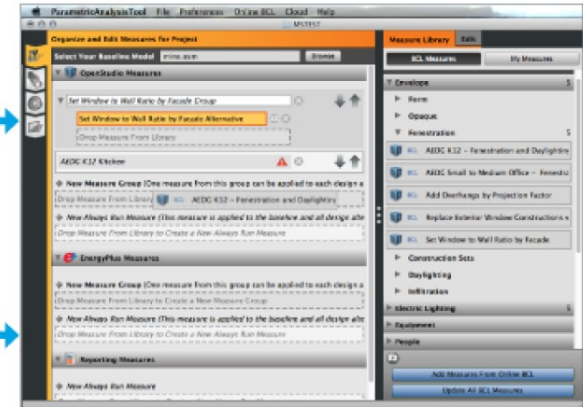
The **Building Component Library (BCL)** provides an online source for standardized model inputs and energy conservation measures.



Edit and create spaces, thermal zones, HVAC systems, schedules, loads, constructions, and more using the **OpenStudio Application**.

Measures

Energy conservation **measures**, reporting measures, and quality control measures are available in the OpenStudio application and in PAT.



**ParametricAnalysisTool (PAT)** enables drag-and-drop energy efficiency measures to alter the baseline model and create design alternatives.

Design Alternative Name	Energy Use Intensity (kBtu/ft <sup>2</sup> -yr)	Peak Electric Demand (kW)	Electricity Consumption (kBtu)	Natural Gas Consumption (kBtu)	District Cooling Consumption (kBtu)	District Heating Consumption (kBtu)
Baseline	38	35,794	33,644	4	278	391
Add Overhangs by Projection Factor Alternative 0.0 Only	4%	0	0%	0%	-4%	15% (1%)
Add Overhangs by Projection Factor Alternative 1.0 Only	4%	0	0%	0%	-4%	15% (1%)
Reduce Night Time Lighting Loads Alternative Only	5%	5,604	11,650	0%	24	20%
Reduce Building Lighting by Percentage Alternative Only	7%	5,902	12,458	0%	22	20%
Use of Everything	18	6,902	14,113	0%	381	20%

**PAT** performs life cycle cost analysis of design alternatives, runs automated quality checks, and packages simulation results for upload to EDAPT.

# Libre software for electronic and electric engineering

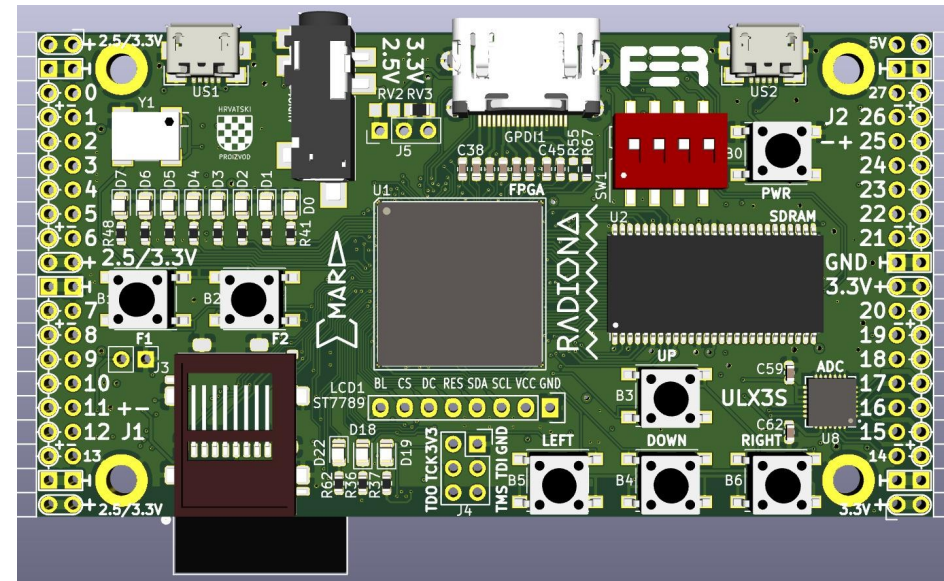
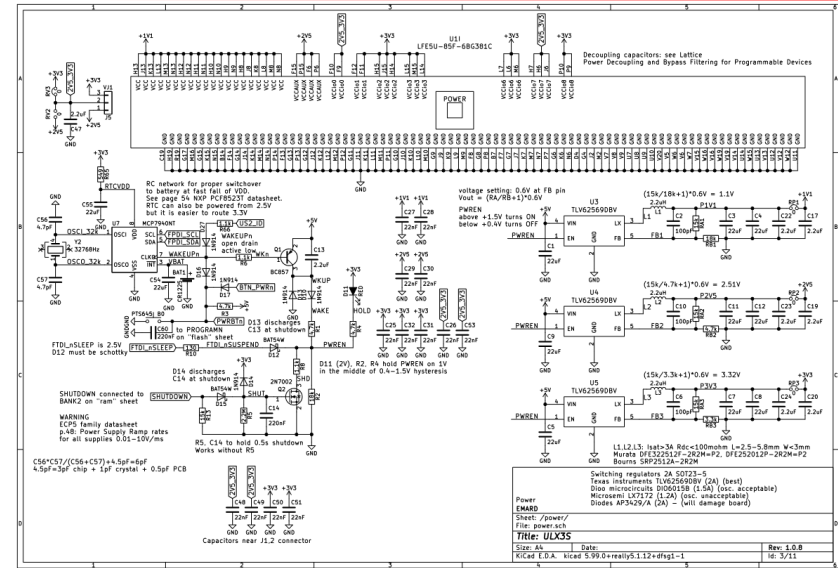


Alternative to Altium Designer, Autodesk EAGLE, Proteus PCB...

Schematic design and PCB. Brings many auxiliary tools

Its commercial use is very common. CERN develops and uses it for its detectors

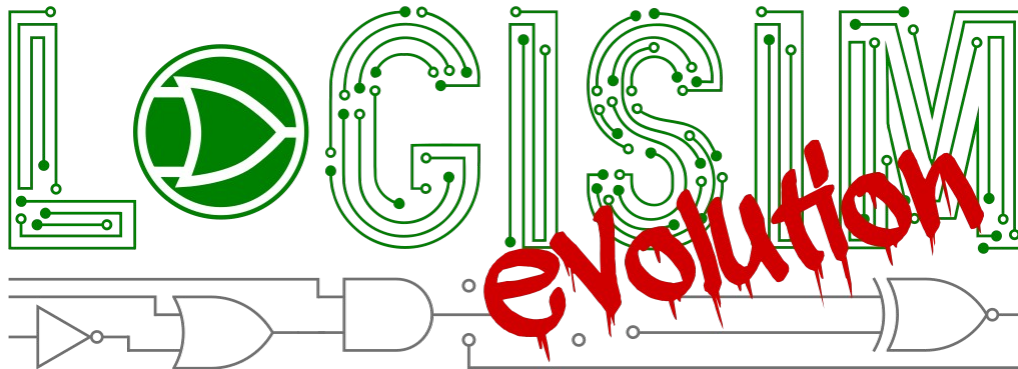
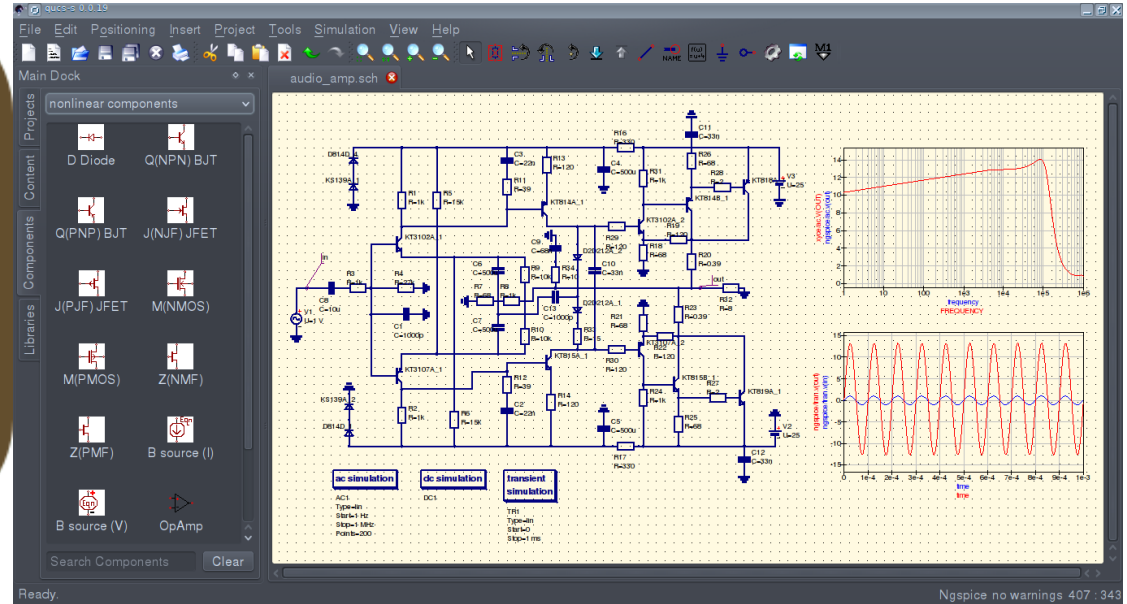
[ULX3S](#)  
completely libre FPGA



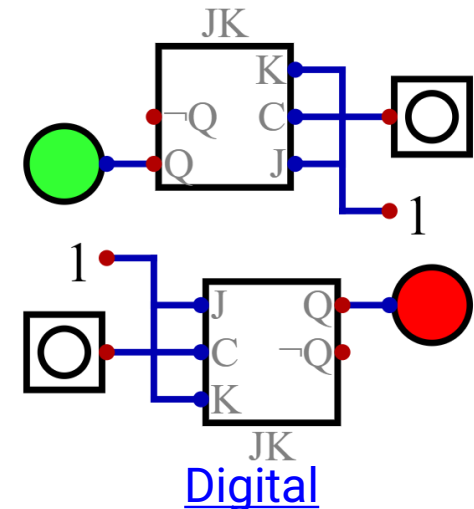


Alternative to  
Altium,  
LTSpice

Analog  
simulation



Simulation of  
digital, logical  
and CPU  
systems





CNC for PCBs

## SPICE simulation

- ▶ [Xyce](#) (HPC)
- ▶ [ngspice](#)

[OpenROAD](#) and  
[OpenLane](#)

PnR for silicon designs

## KLayout

Design of silicon components and traces

```

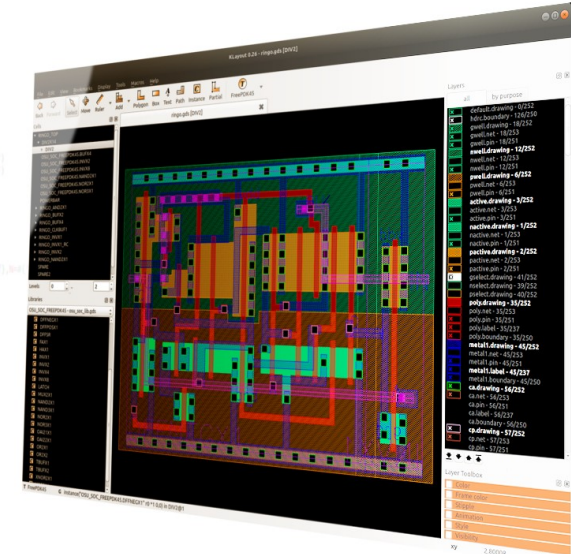
# The KCell declaration for the circle
class StarKCell - KCellDeclarationHelper
include RBA

def initialize
# Important: initialize the super class
super

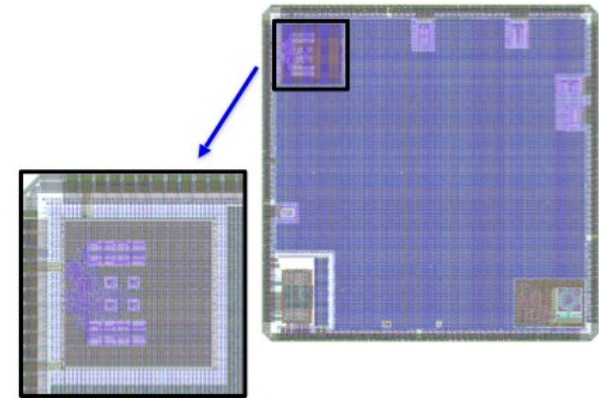
# declare the parameters
param(r1, TypeDouble, "Layer", :default = LayerInfo(0), :is)
param(r2, TypeDouble, "Inner radius", :default = 1, :const = true)
param(r3, TypeDouble, "Outer radius", :default = 3, :const = true)
param(n, TypeInt, "Number of rays", :default = 30)
param(da, TypeInt, "Ray angle", :default = 3, :const = "deg")
end

def display_text_impl
# Provide a description text for the cell
"StarKCell(L=[l to s],R1=[r1 to r1],R2=[r2 to r2],n=[n])"
end

def produce_impl
# This is the main part of the implementation: create the layout
# compute the ray parts and produce the polygons
d = Math::PI * da / 180.0
a = 0.0
n.times do |i|
  dpts = []
  DPoint new(r1 * Math.cos(a + d), r1 * Math.sin(a + d))
  DPoint new(r2 * Math.cos(a + d), r2 * Math.sin(a + d))
  DPoint new(r3 * Math.cos(a + d), r3 * Math.sin(a + d))
  cell.shapes(Layer).insert(DPolygon.new(dpts))
  a += Math::PI * 2 / n
end
end
    
```



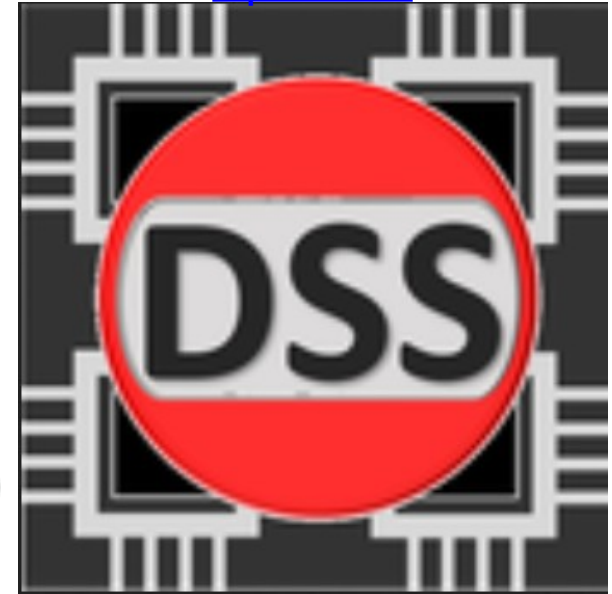
## IEEE SA Open



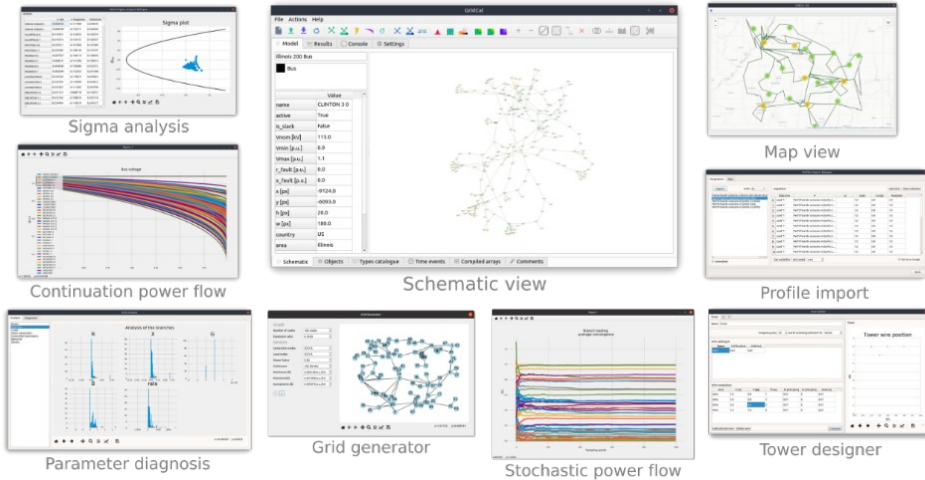
OpenTitan SoC



## OpenDSS



Alternatives to Siemens PSSE, ETAP, et al.



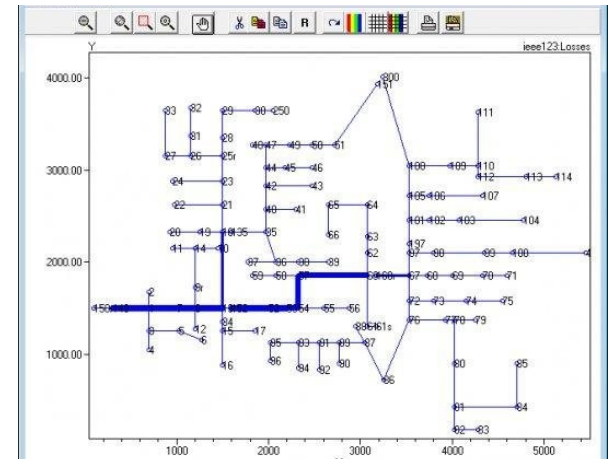
## GridCal



## Matpower



# panda power



The screenshot displays the GNU Radio GUI with a signal processing flow graph. The flow starts with a 'WX GUI Chooser' block, followed by a 'Complex to Mag' block, and then a 'Low Pass Filter' block. The filter parameters are: Decimation: 1, Gain: 1, Sample Rate: 2M, Cutoff Freq: 80k, Transition Width: 80k, Window: Hamming, Beta: 6.76. The output goes to a 'WX GUI Scope Sink' block.

Two analysis windows are open:

- Scope Plot:** Shows a waveform with three channels (Ch1, Ch2, Ch3) over time (180 to 320 us). The Y-axis is 'Counts' ranging from -1.5 to 2.5. The X-axis is 'Time (us)'. The plot shows a complex signal with a clear periodic component.
- Top Block:** Shows a spectrogram of the signal, with a clear horizontal band of energy around 80 kHz, indicating the filter's cutoff frequency.

At the bottom, there are several control sliders for parameters like 'hsync' (300m), 'hdelay' (30), and 'vdelay' (68). A status bar at the bottom left shows system information: 'gnumiscar v0.1.1-10-g3c02250 (0.1.2gk) gnumradio 0.7.4', 'built-in source types: file fcd rtl rtl\_tcp uhf hackrf bladerf rfspace', 'Using device #0 Generic RTL2832U SN: 77771111153705700', 'Found Fitipower FC0013 tuner', 'Exact sample rate is: 2000000.052982 Hz', and 'Using Volk machine: avx\_64\_mmx\_orc'.

## GNU Radio

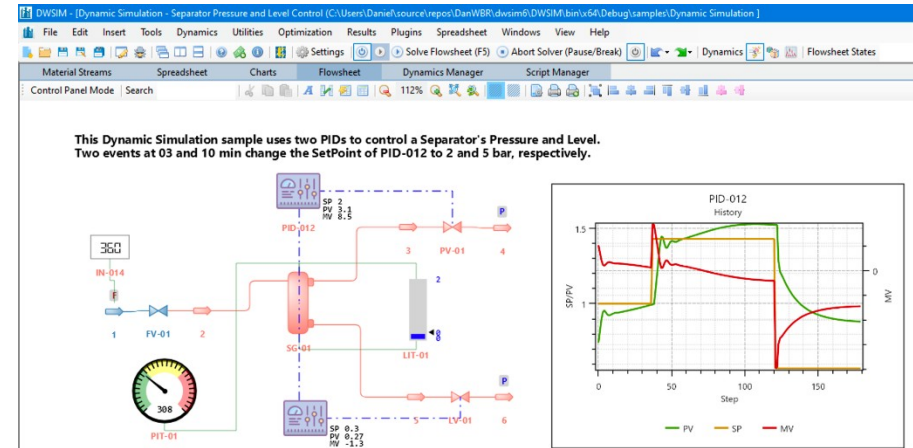
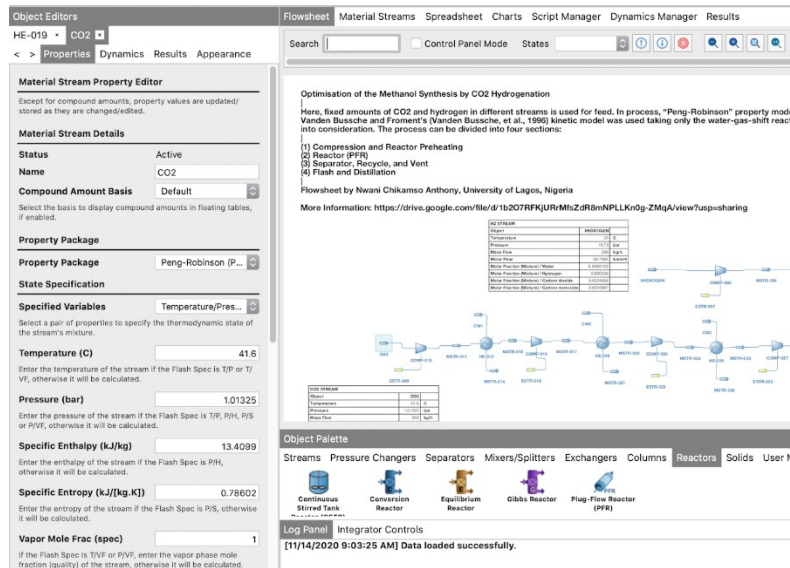
# Libre software for engineering, other fields



# DWSIM

Alternative to CHEMCAD, Aspen Plus.

Real fluid models, controls, parametric sweeps, VB or Python scripting...

**Object Editors**  
HE-019 - CO2

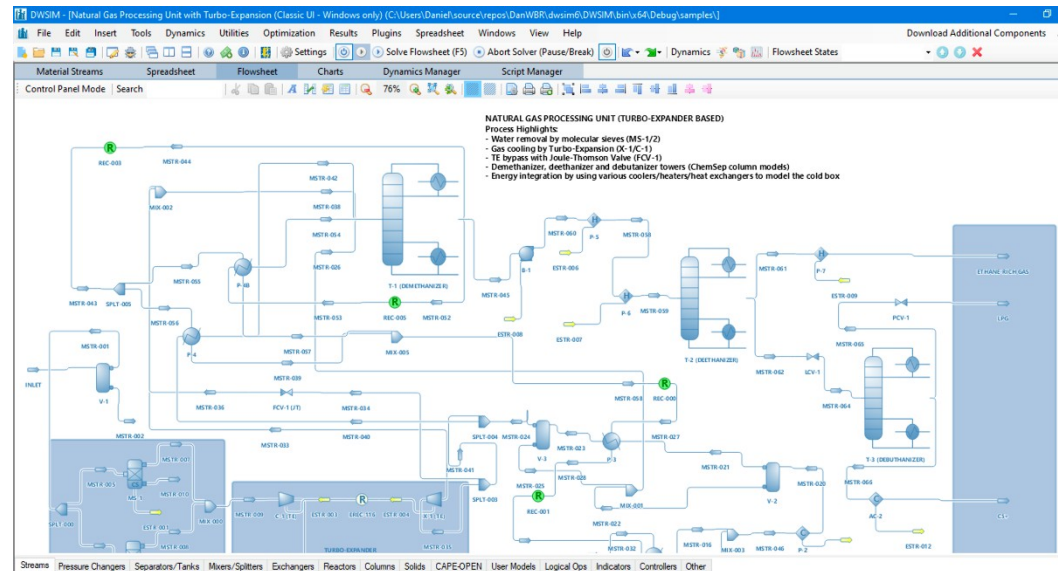
**Material Stream Property Editor**  
Except for compound amounts, property values are updated/stored as they are changed/edited.

**Material Stream Details**  
Status: Active  
Name: CO2  
Compound Amount Basis: Default

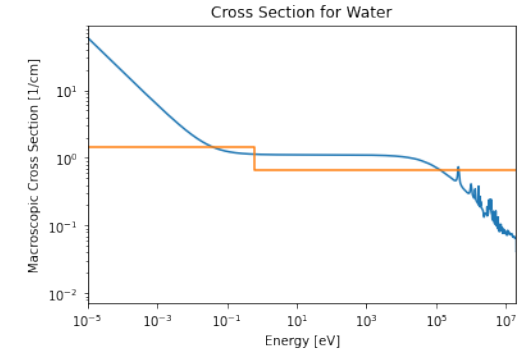
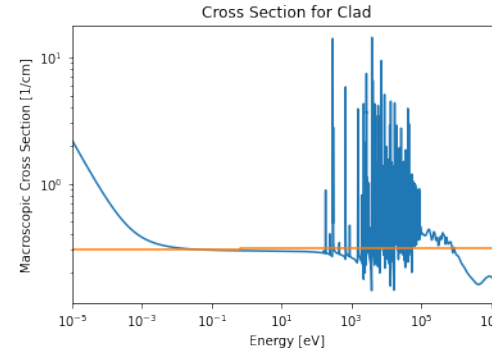
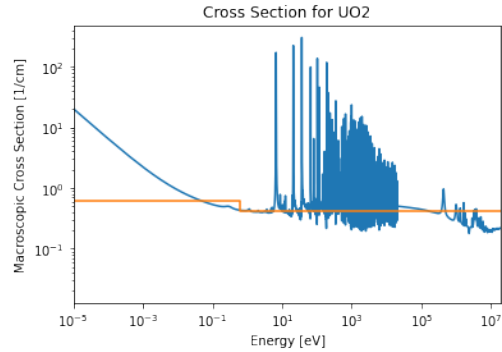
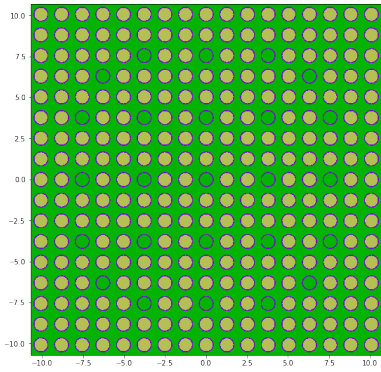
**Property Package**  
Peng-Robinson (P...)

**State Specification**  
Specified Variables: Temperature/Pres...

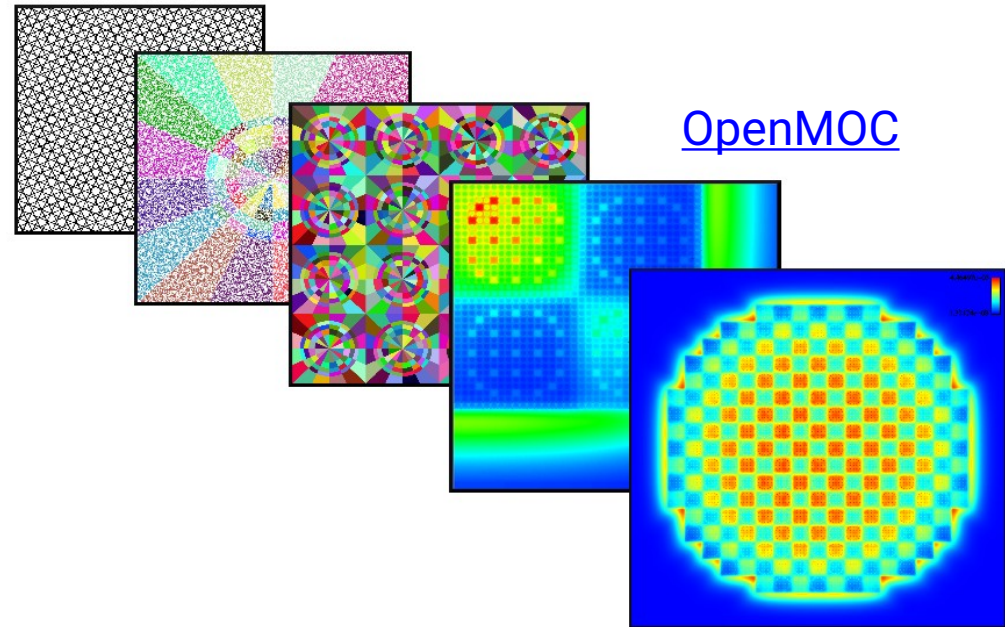
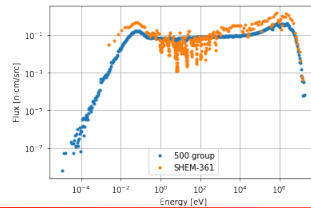
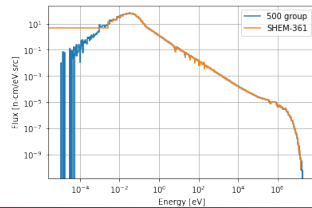
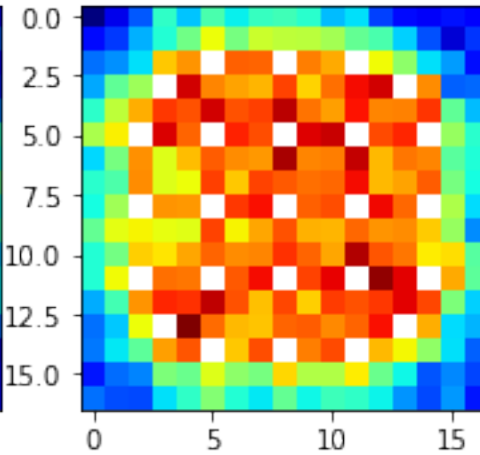
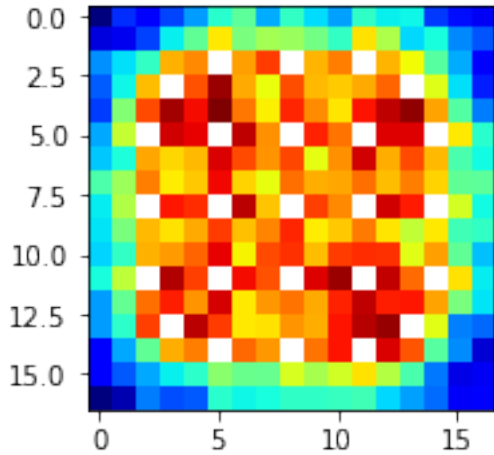
Temperature (C): 41.6  
Pressure (bar): 1.01325  
Specific Enthalpy (kJ/kg): 13.4099  
Specific Entropy (kJ/(kg.K)): 0.78602  
Vapor Mole Frac (spec): 1

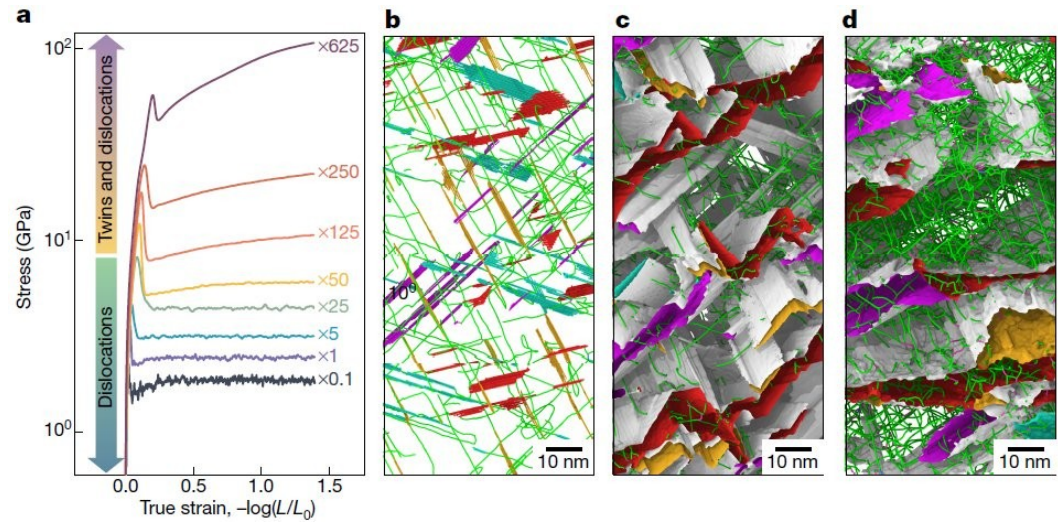
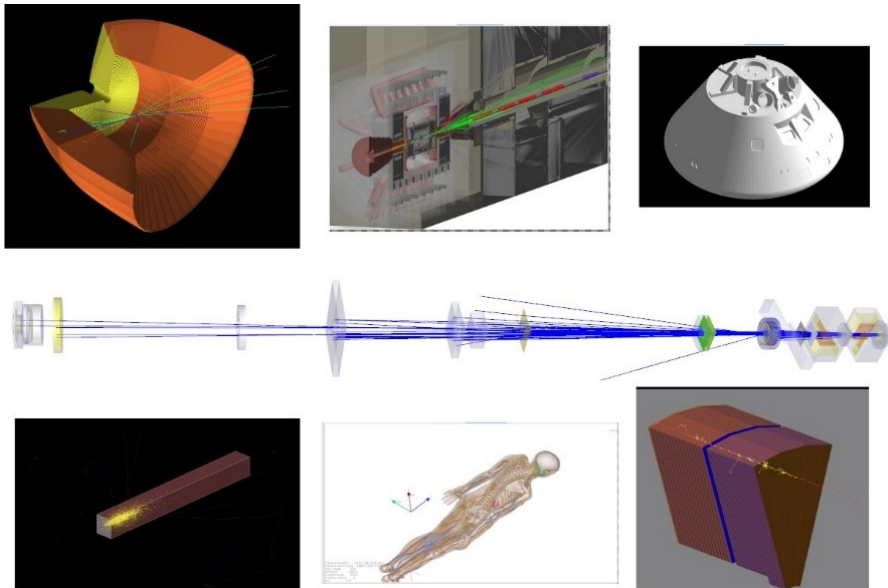
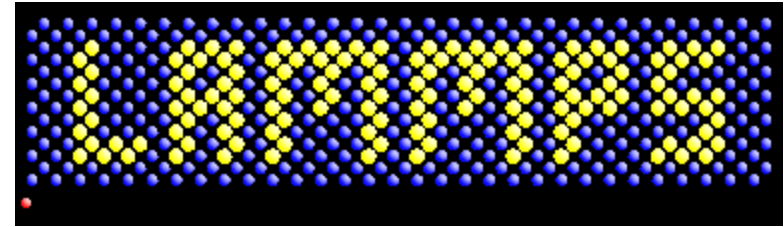


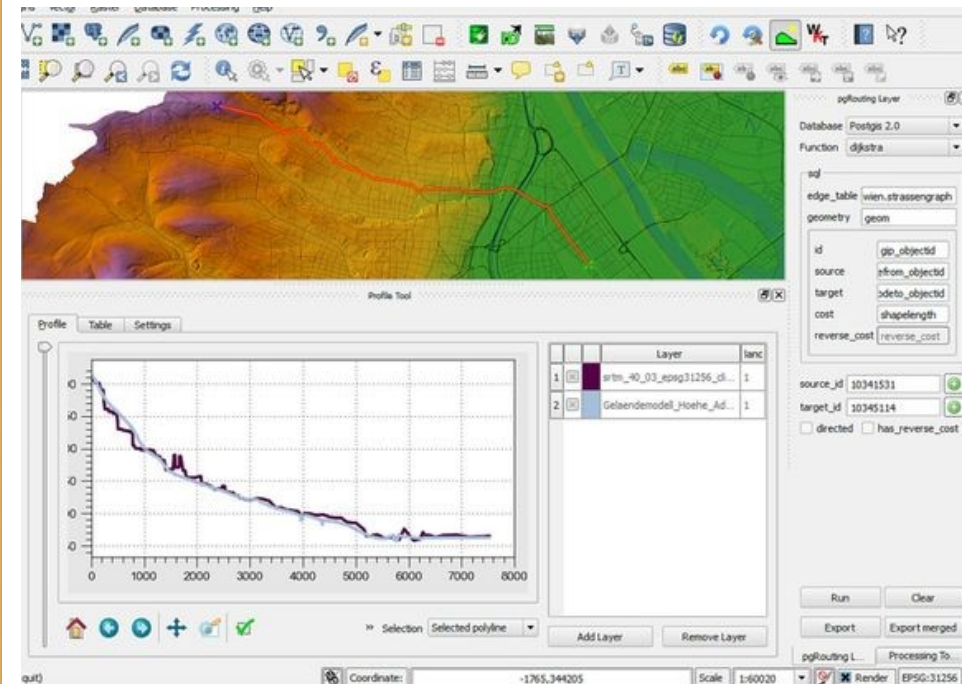
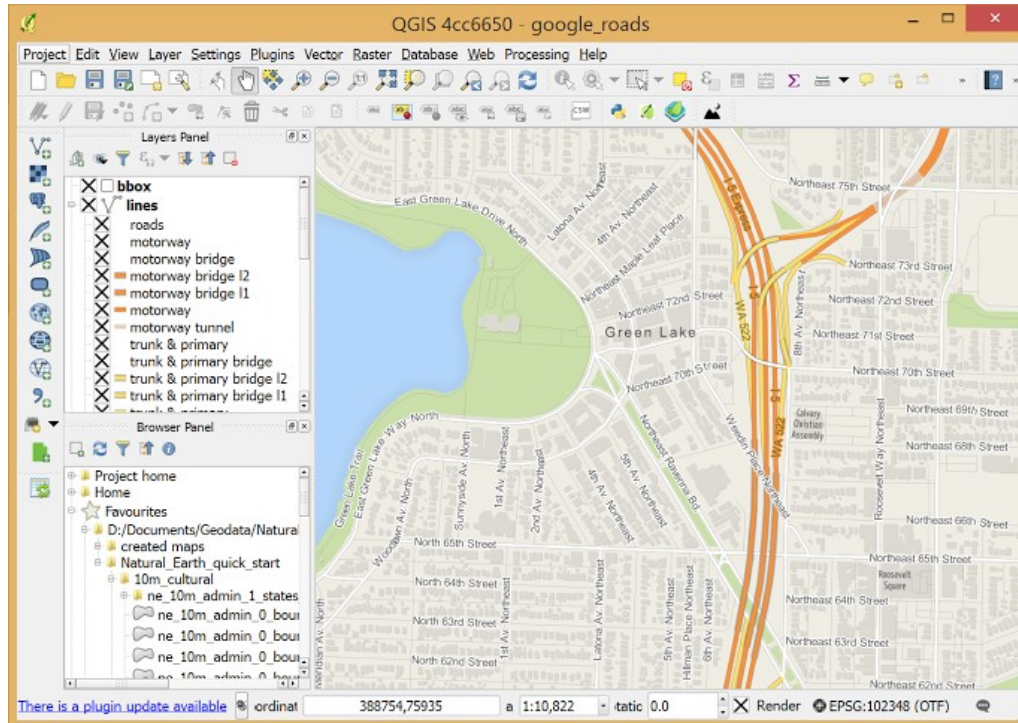
## OpenMC



## Continuous-Energy Fission Rates Multi-Group Fission Rates





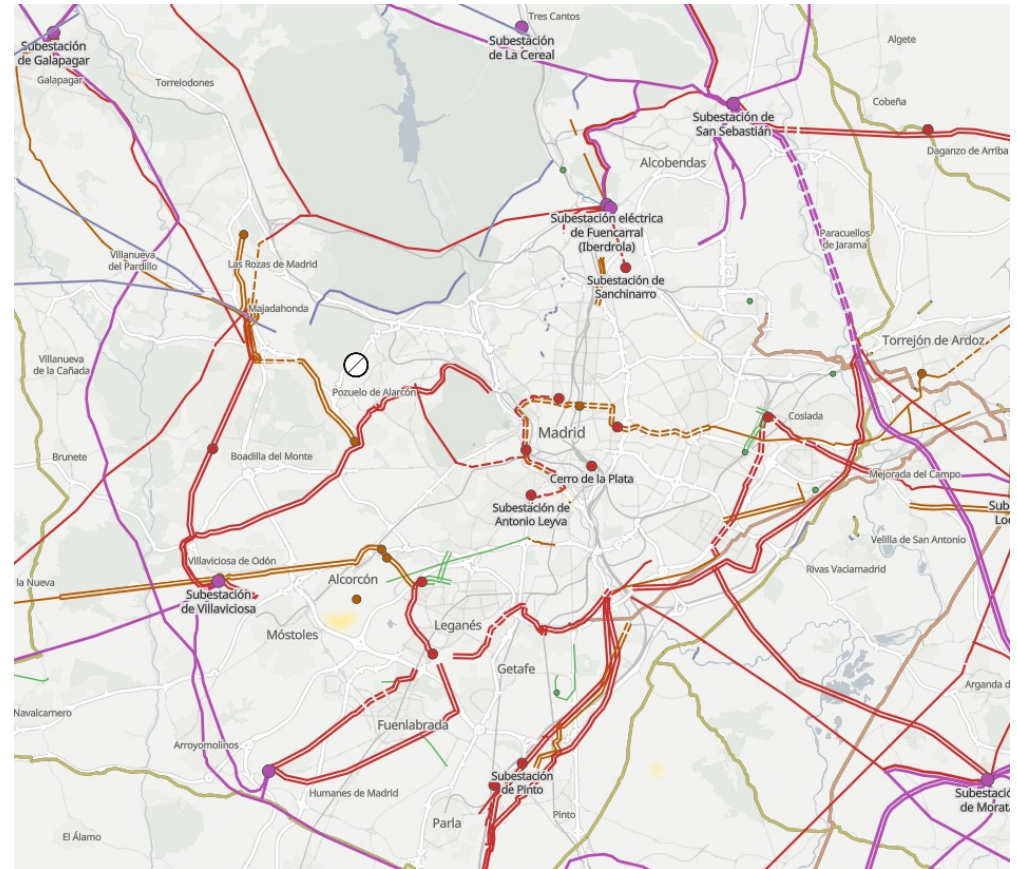




[OpenStreetMap](#)

Alternative to Google Maps

## [Open Infrastructure Map](#) Electric grid, solar, water, gas, oil, telecoms





## ❑ Enterprise Resource Planning (ERPs)

- ▶ Tryton: Spanish/European presence
- ▶ Dolibarr: French/European presence, well-known
- ▶ Odoo: not fully open. Probably the most well-known
- ▶ ERPNext: modern and of rapid development, Indian presence

## ❑ Project organization

- ▶ ProjeQtOr: very competent and complete tool: quality control, tickets, user management, costs, Gantt, time estimates...
- ▶ Taiga: modern organization system (Agile, SCRUM...)
- ▶ FrePPLe: administration of production processes
- ▶ OpenProject: very complete, but not all is open
- ▶ ProjectLibre: simple and traditional

Search

Bookmarks

My Dashboard

Setup

Admin Tools

Users & Groups

### Home

Add widget to your dashboard...

**GLOBAL VIEW**  
93 late  
75.61% late

**AGENDA**  
To do: 4

**PROJECTS**  
Open: 10  
Open tasks: 9

**COMMERCIAL PROPOSALS**  
To accept | refuse: 22  
To bill: 6

**ORDERS**  
Open: 24

**INVOICES**  
Unpaid: 13

**CONTRACTS**  
Services to activate: 0  
Services running: 1

**VENDOR PROPOSALS**  
To accept | refuse: 0  
To close: 0

**PURCHASE ORDERS**  
To accept | refuse: 1  
Awaiting reception: 1

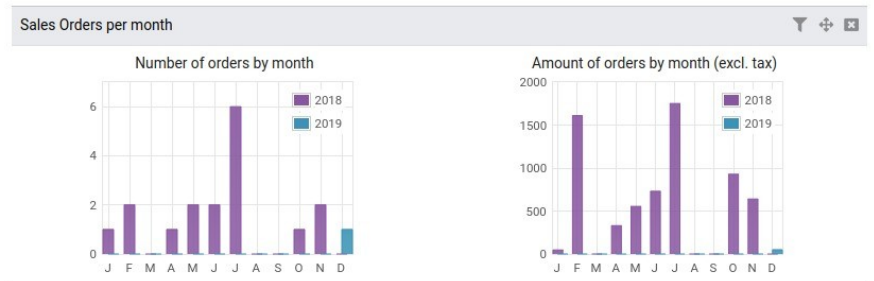
**VENDOR INVOICES**  
To pay: 7

**BANK ACCOUNT**  
To reconcile: 23  
Checks awaiting deposit: 5

**MEMBERS**  
Subscription to receive: 2

**EXPENSE REPORT**  
To pay: 1

**LEAVE**  
To approve: 0

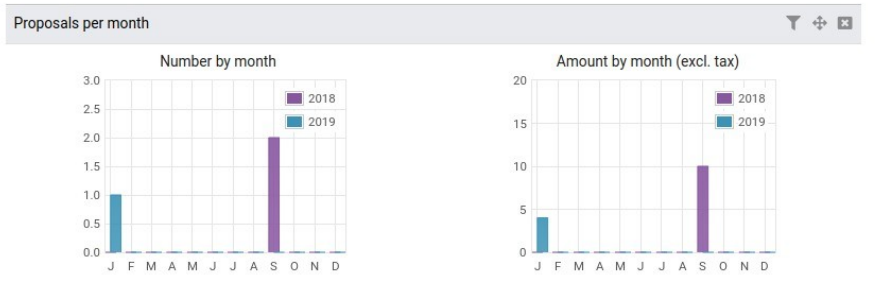


### Database Statistics

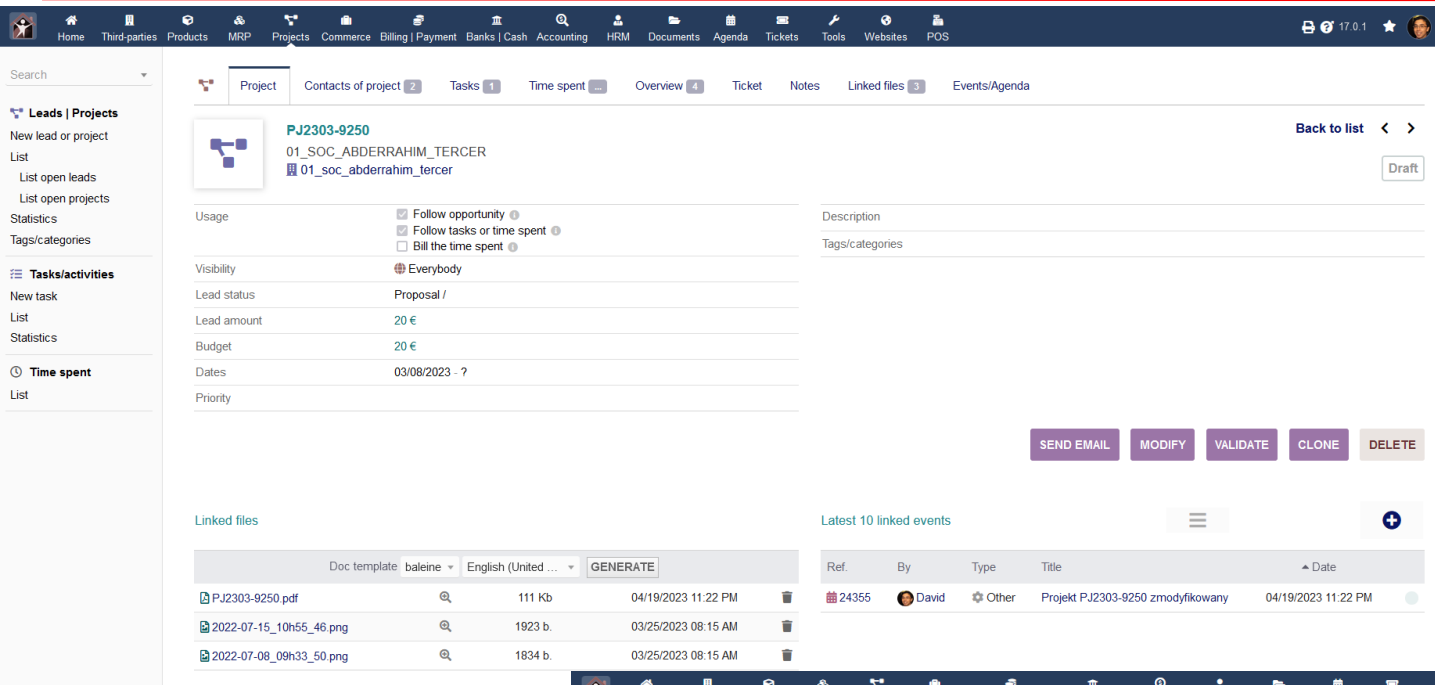
Users: 11	Customers: 15	Prospects: 8	Vendors: 8	Contacts/Addresses: 10
Members: 3	Products: 15	Services: 2	Commercial proposals: 38	Sales Orders: 38
Customer invoices: 39	Contracts: 4	Interventions: 3	Purchase orders: 6	Vendors invoices: 10
Vendor proposal: 3	Projects: 13	Expense reports: 2	Leave: 3	Donations: 3

### Currently open tasks

PROJ1 TK1007-0001 Analyze	-25%	02:30/10:00
PROJ1 TK1007-0002 Specification	-15%	02:00/05:00
PROJ1 TK1007-0003 Development	--/--/--	
PJ1607-0001 TK1607-0004 Project preparation phase A	-0.5%	21:00/200:00
PJ1607-0001 TK1607-0005 Project preparation phase B	+1.27%	11:11/300:00



Latest 5 news from Dolibarr.org News



Project: PJ2303-9250  
 01\_SOC\_ABDERRAHIM\_TER CER  
 01\_soc\_abderrahim\_tercer

Usage:  Follow opportunity,  Follow tasks or time spent,  Bill the time spent

Visibility: Everybody

Lead status: Proposal /

Lead amount: 20 €

Budget: 20 €

Dates: 03/08/2023 - ?

Priority:

Buttons: SEND EMAIL, MODIFY, VALIDATE, CLONE, DELETE

Linked files table:

Doc template	baleine	English (United ...)	GENERATE
PJ2303-9250.pdf	111 Kb	04/19/2023 11:22 PM	
2022-07-15_10h55_46.png	1923 b.	03/25/2023 08:15 AM	
2022-07-08_09h33_50.png	1834 b.	03/25/2023 08:15 AM	

Latest 10 linked events table:

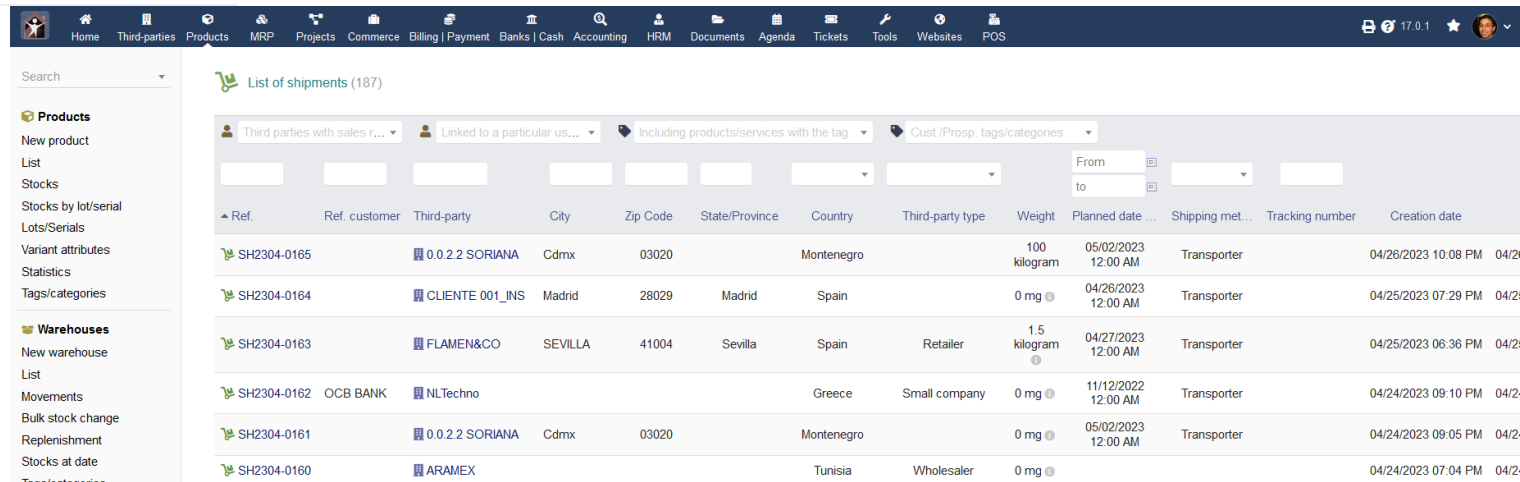
Ref.	By	Type	Title	Date
24355	David	Other	Projekt PJ2303-9250 zmodyfikowany	04/19/2023 11:22 PM

Project, cost, human resources

Many other modules!

You can try the public [Demo](#) version

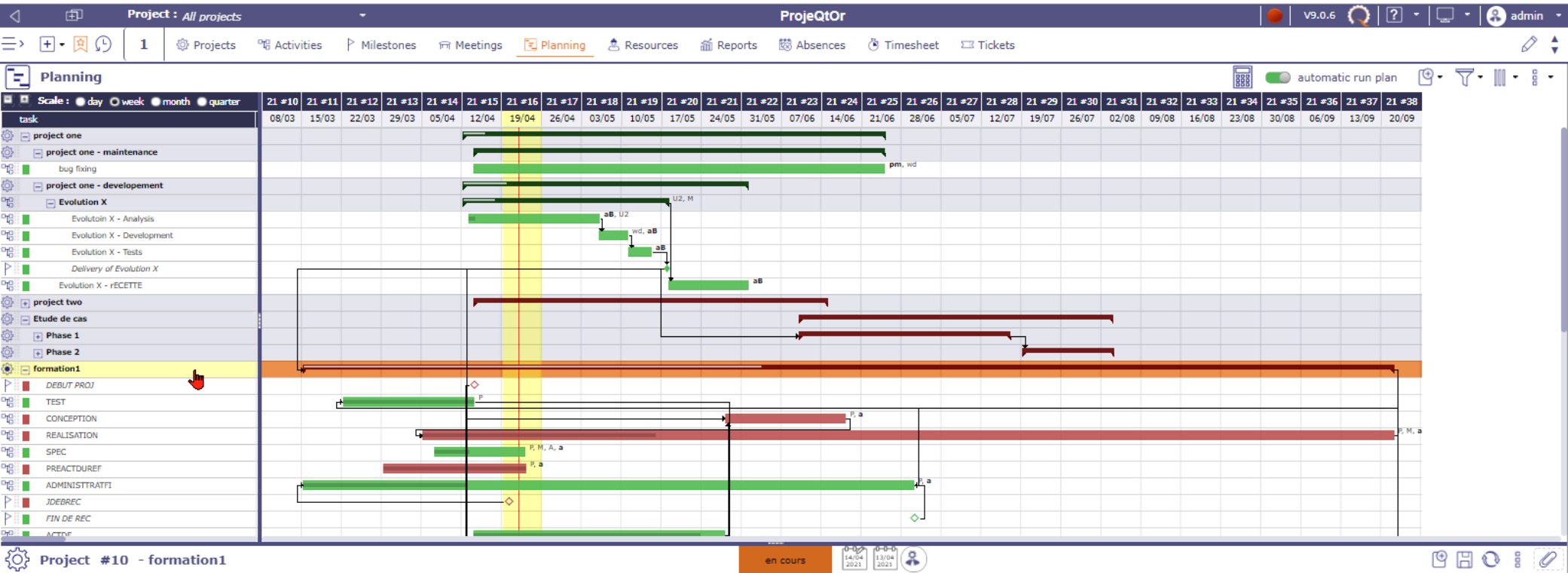
Products, warehouse, envoys, deliveries, suppliers, clients...



List of shipments (187)

Filters: Third parties with sales r..., Linked to a particular us..., Including products/services with the tag, Cust./Prosp. tags/categories

Ref.	Ref. customer	Third-party	City	Zip Code	State/Province	Country	Third-party type	Weight	Planned date ...	Shipping met...	Tracking number	Creation date
SH2304-0165		0.0.2.2 SORIANA	Cdmx	03020		Montenegro		100 kilogram	05/02/2023 12:00 AM	Transporter		04/26/2023 10:08 PM
SH2304-0164		CLIENTE 001_INS	Madrid	28029	Madrid	Spain		0 mg	04/26/2023 12:00 AM	Transporter		04/25/2023 07:29 PM
SH2304-0163		FLAMEN&CO	SEVILLA	41004	Sevilla	Spain	Retailer	1.5 kilogram	04/27/2023 12:00 AM	Transporter		04/25/2023 06:36 PM
SH2304-0162	OCB BANK	NLTechno				Greece	Small company	0 mg	11/12/2022 12:00 AM	Transporter		04/24/2023 09:10 PM
SH2304-0161		0.0.2.2 SORIANA	Cdmx	03020		Montenegro		0 mg	05/02/2023 12:00 AM	Transporter		04/24/2023 09:05 PM
SH2304-0160		ARAMEX				Tunisia	Wholesaler	0 mg				04/24/2023 07:04 PM



**Project #10 - formation1**

en cours

14/04/2021 13/04/2021

▼ Description

id = 10

name

type

organization

▼ Allocations to projects

	id	resource	profile	start date	end date	rate (%)
	37	ADAM	Project Member			100
	38	MARTINE	Project Member			100
	36	PAUL	Project Leader			100
	39	POOL DEV	Project Leader			100
	id	contact	profile	start date	end date	rate (%)

▼ Progress

Dates and durations				
	validated	planned	real	requested
start date	<input type="text" value="06/04/2021"/>	<input type="text" value="15/03/2021"/>	<input type="text" value="15/03/2021"/>	<input type="text" value="04/01/2021"/>
end date	<input type="text" value="09/08/2021"/>	<input type="text" value="21/09/2021"/>	<input type="text"/>	<input type="text" value="30/03/2021"/>
duration	<input type="text" value="87 d"/>	<input type="text" value="133 d"/>	<input type="text"/>	<input type="text" value="62 d"/>

There is a public [Demo](#) version!

Project : All projects | ProjeQtOR | v9.0.6 | admin

1 | Projects | Activities | Milestones | Meetings | Planning | Resources | Reports | Absences | Timesheet | Tickets

### 11 Projects

id	wbs	project name	type	color	project code	client	status	health status	progress	validated end date	planned end	done	closed
6	1	Absences	Administratif			internal	en cours		100 %		23/04/2021	<input type="checkbox"/>	<input type="checkbox"/>
1	2	project one	Forfait		001-001	client one	en cours	surveillé	5 %	24/06/2021	24/06/2021	<input type="checkbox"/>	<input type="checkbox"/>
2	2.1	project one - maintenance	Manual billed		001-001-1	client one	enregistré	sécurisé	0 %	24/06/2021	24/06/2021	<input type="checkbox"/>	<input type="checkbox"/>
3	2.2	project one - development	Manual billed		001-001-2	client one	en cours	en danger	15 %	01/06/2021	31/05/2021	<input type="checkbox"/>	<input type="checkbox"/>

---

### Project #2 - project one - maintenance

enregistré | 13/04/2021 | 06/12/2018 | E

#### Description

id = 2

name

type

organization

category

client

invoice contact

project code

contract code

client code

is sub-project of

sponsor

manager

color

description

#### Allocations to projects

+	id	resource	profile	start date	end date	rate (%)
<input type="button" value="edit"/>	4	analyst A	Project Member			100

*Allocate contacts (requestors) that are not resources  
These contacts can also be users (that will connect)*

+	id	contact	profile	start date	end date	rate (%)
<i>Allocate users that are not resources not contacts</i>						

#### Progress

**Dates and durations**

	validated	planned	real	requested
start date	14/04/2021	14/04/2021		05/03/2012
end date	24/06/2021	24/06/2021		13/11/2015
duration	50 d	50 d		950 d

**Costs and works**

	validated	assigned	real	left	revised
work	100 d	85,2 d	0 d	85,2 d	85,
cost	€	21 544 €	0 €	21 544 €	21 544
expense	€	0 €	0 €	0 €	€
reserve				0 €	
total cost	0 €	21 544 €	0 €	21 544 €	21 544

**Steering**

progress  expected  wbs

Margin

priority

#### Treatment

status

health status

quality level

trend

overall progress

fix planning  do not include in planning calculation

non extendable project  forbid to add or remove items in planning

under construction  the project is not started yet

exclude from global plan  do not see all items on the global planning view

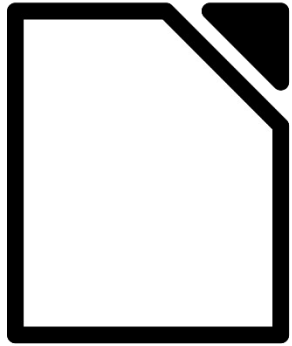
There is a public [Demo](#) version!

- ❑ Editors: [VSCodium](#), [Emacs](#), [NeoVim](#), [QtCreator](#)...
- ❑ Organization (alternatives to Notion): [Logseq](#), [Appflowy](#)
- ❑ Writing: [CryptPad](#), [Standard Notes](#), [Notesnook](#), [Trilium](#)
- ❑ **AI, data analysis:** [TensorFlow](#); [Redash](#), [Superset](#)...

---

- ❑ Version control: [Git](#) ([Gitea](#), [Gitlab](#), [SourceHut](#)), [Fossil](#)
- ❑ Web backends: [Supabase](#), [Appwrite](#), [PocketBase](#), [Hugo](#), [WordPress](#)...
- ❑ DBs: [SQLite](#), [PostgreSQL](#), [MariaDB](#), [FerretDB](#), [CouchDB](#), [Redis](#), [ArangoDB](#), [InfluxDB](#), [TDengine](#), [Milvus](#)...
- ❑ Infraestructure: [Cockpit](#) (VMs), [Podman](#) (containers), [Kubertenes-K3S](#) (services), [CNCF!](#) (summary of everything!)...
- ❑ Monitoring, metrics: [Prometheus](#), [Grafana](#)

# Libre software for daily use and hobbies



Alternatives to  
Microsoft Office!

# LibreOffice

The Document Foundation



Alternative to  
InDesign

Posters,  
magazines,  
flyers...

Scribus

# LATEX

High quality documents



**Figure 281: Context menu in Formula Editor**

**Note**

The Elements window and the context menu contain only the most common commands that are used in formulas. For some seldom-used commands, you must always enter the command using the markup language. For a complete list of commands, see the *Math Guide*.

**Markup language**

Markup language is entered directly into the Formula Editor. For example, typing the markup `5 times 4` into the Formula Editor creates the simple formula  $5 \times 4$ . If you are experienced in using markup language, it can be the quickest way to enter a formula. Table 5 shows some examples of using markup language to enter commands. For a full list of commands that can be used in the Formula Editor, see the *Math Guide*.

**Table 5: Example commands using markup language**

Display	Command	Display	Command
$a = b$	<code>a = b</code>	$\sqrt{a}$	<code>sqrt {a}</code>
$a^2$	<code>a^2</code>	$a_n$	<code>a_n</code>
$\int f(x) dx$	<code>int f(x) dx</code>	$\sum a_n$	<code>sum a_n</code>
$a \leq b$	<code>a &lt;= b</code>	$\infty$	<code>infinity</code>
$a \times b$	<code>a times b</code>	$x \cdot y$	<code>x cdot y</code>

276 | Creating formulas

Scribus 1.5.4.svn - /mnt/.../Mandats/Internes/Journal inter-prisons/Journal Oxygène/N°9 - La Famille/numéro 9 famille v2 - Serge [Scribus1.5].sla\*

Fichier Édition Objet Insérer Page Tableau Extra Affichage Fenêtres Scripter Aide

Normal

Propriétés

X, Y, Z

Ombre Portée

Forme

Groupes

Image

Numéro de page: Automatique

X: 0,000 mm

Y: -15,000 mm

Rotation: 0,0 °

Mise à l'échelle

Mise à l'échelle libre

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Fermer

Fonctions de police

Propriétés du tracé de texte

ÉDITORIAL

## LA FAMILLE

**N**ous avons tous une famille, grande, petite, éloignée, rapprochée, élargie, inconnue... La famille est la cellule de la société. C'est grâce au groupe familial que les individus peuvent se développer, se protéger des bêtes sauvages, aller à la chasse ensemble, élever les enfants... Voilà quelques tâches que l'homme a pu faire parce que des liens familiaux, claniques se sont établis.

Dans les prisons, les thèmes de la famille provoquent beaucoup d'émotions, parfois très fortes, mais aussi, hélas, une tristesse profonde de dues aux absences ou à l'éloignement. S'il est vrai que nous ne choisissons pas notre famille il est aussi vrai que les liens sont très forts et qu'en général nous accompagnons toute la vie. La mère, le père, les frères et sœurs sont des personnes très importantes, sans oublier les oncles et tantes, cousins, cousines, grands-parents, qui font de la famille un refuge, un lieu privilégié où l'on se sent bien.

La famille plus étroite nous évoque très souvent des souvenirs d'enfance, de l'époque où nous étions « tous ensemble » et l'imagination même pas qu'un jour nous allions être séparés. Les anecdotes, les histoires ne manquent pas. Des soirées autour du feu, de grandes festes autour d'une table etc... nous laissent des souvenirs indélébiles que nous portons dans notre cœur pendant longtemps.

Nous pouvons former des groupes « non traditionnels » suite à des voyages, des mariages, des adoptions... qui vont s'ajouter voire remplacer la famille naturelle. Par exemple, des groupes d'amis deviennent au fur et à mesure du temps passé ensemble comme une nouvelle famille, peut-être avec d'autres lois et d'autres habitudes mais qui bien ça fait du savoir que l'on est pas tout à fait seul.

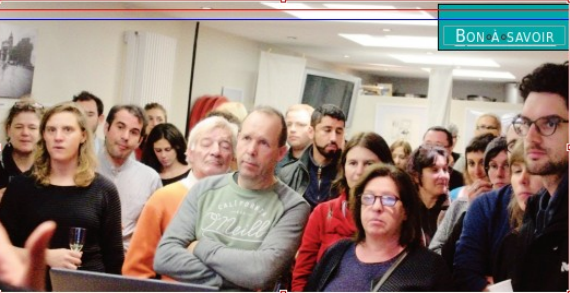
Tous les groupes sont différents et peuvent créer des règles qui sont plus ou moins claires. Il est important pour y faire accepter de comprendre ces dynamiques pour pouvoir faire partie de ces nouvelles familles.

Toutes personnes peut connaître un changement soudain dans sa vie et se retrouver tout à coup sans famille. La reconstruction, c'est un vrai art, qui demande beaucoup de talent et de persévérance. Être humain est socialement, a besoin des contacts pour pouvoir vivre. La solitude, l'isolement et la perte d'interaction avec ses proches sont considérés comme des obstacles à surmonter sur les chemins vers le bonheur et l'épanouissement souhaités par tout être humain.

Dans le présent numéro, vous retrouverez sur les thèmes de la famille une entretiens avec un détenu ayant un projet de maintenir des liens entre parents et enfants, des textes et des dessins de détenu en, ainsi que les contenus des ateliers d'écriture des prisons d'ITire, de Marnette et de Nivelles. La nouvelle rubrique « Focus » présente quant à elle l'ask « Relais enfant-parent » et nos sections « Jeux » et « Recettes » complètement tout.

— CARLO S. GOODY VIDAL

**BON A SAVOIR**



## JOURNÉES NATIONALES DE LA PRISON 2016

Les thèmes de la N°9 de l'ask sera « Le Détenu ? Et la famille ? »

Depuis trois ans, les Journées Nationales de la Prison s'organisent en Belgique. Cet événement est une idée venue de France, à la base la Fédération des associations réflexion-action, prison et justice (FARAPE) l'organise depuis 2002.

Pour l'année 2016 l'ADEPP et d'autres associations qui travaillent dans le milieu carcéral (APRES, CAAP, Groupe INTRO) et la Ligue des droits de l'Homme (LDH) ont organisé une exposition de travaux faits par des détenus et des membres de groupes d'étudiants de secondaire. Avec eux, des travailleurs de la LDH et la CAAP ont aussi proposé des ateliers pour présenter la situation des détenus dans les prisons.

La participation de jeunes a été très active et les réflexions très intéressantes sur les sujets qui ont été abordés. En outre, la LDH a organisé un débat sur le rapport qu'elle a publié sur les conditions et le contexte de travail des personnes incarcérées dans notre pays. Pour les débats à suivre, nous avons eu...

La participation de Mme Mélanie Bertrand pour la CAAP de M. Jean-Luc Bolm à la Direction Générale Établissements Pénitentiaires de M. Nicolas Berchaud, délégué syndical de la CSG services publics de la prison de Forest et Damien Scalise de la LDH et ULB.

Lors des trois journées, il y a eu un événement collectif, nous pensons déjà à la préparation des prochaines JNPN. N'hésitez pas à nous envoyer vos textes, des situations, des collaborations pour enrichir les prochaines journées et surtout pour essayer de faire entendre votre voix en dehors des murs.

— OSCAR CORTES

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OXYGÈNE N°9

OXYGÈNE N°9

75,00%

3 de 36

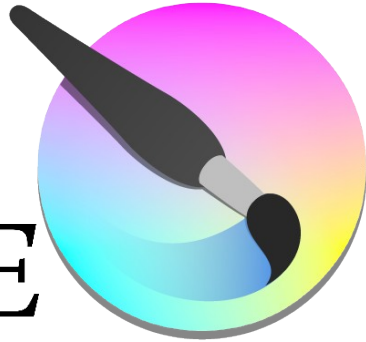
Fond de page

X: 42,939 Y: -5,253 mm 100%



# INKSCAPE

Vector design



# KRITA

Digital painting and drawing



# Darktable

Alternatives to Adobe Photoshop,  
Illustrator, Lightroom, Fresco...

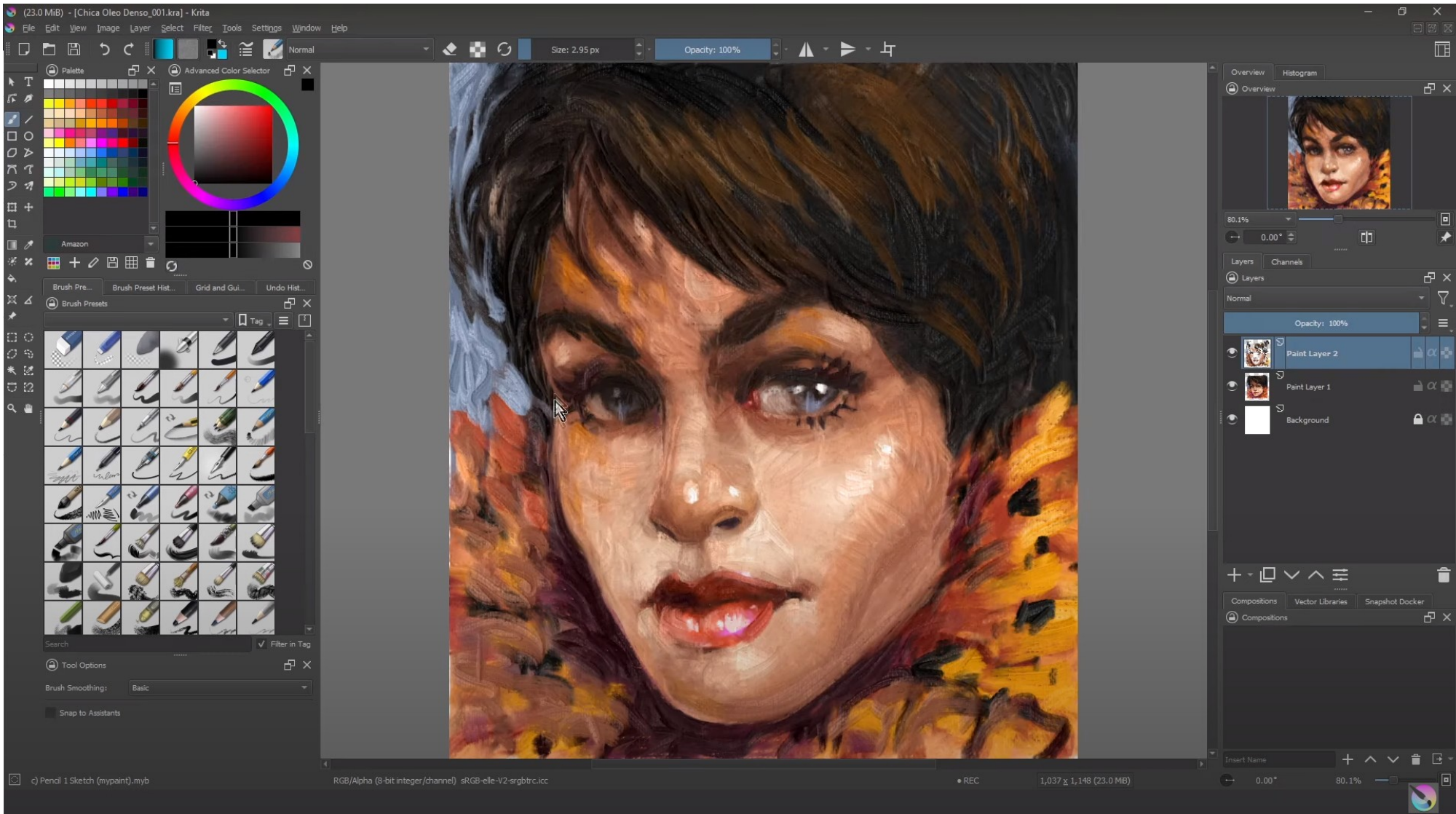


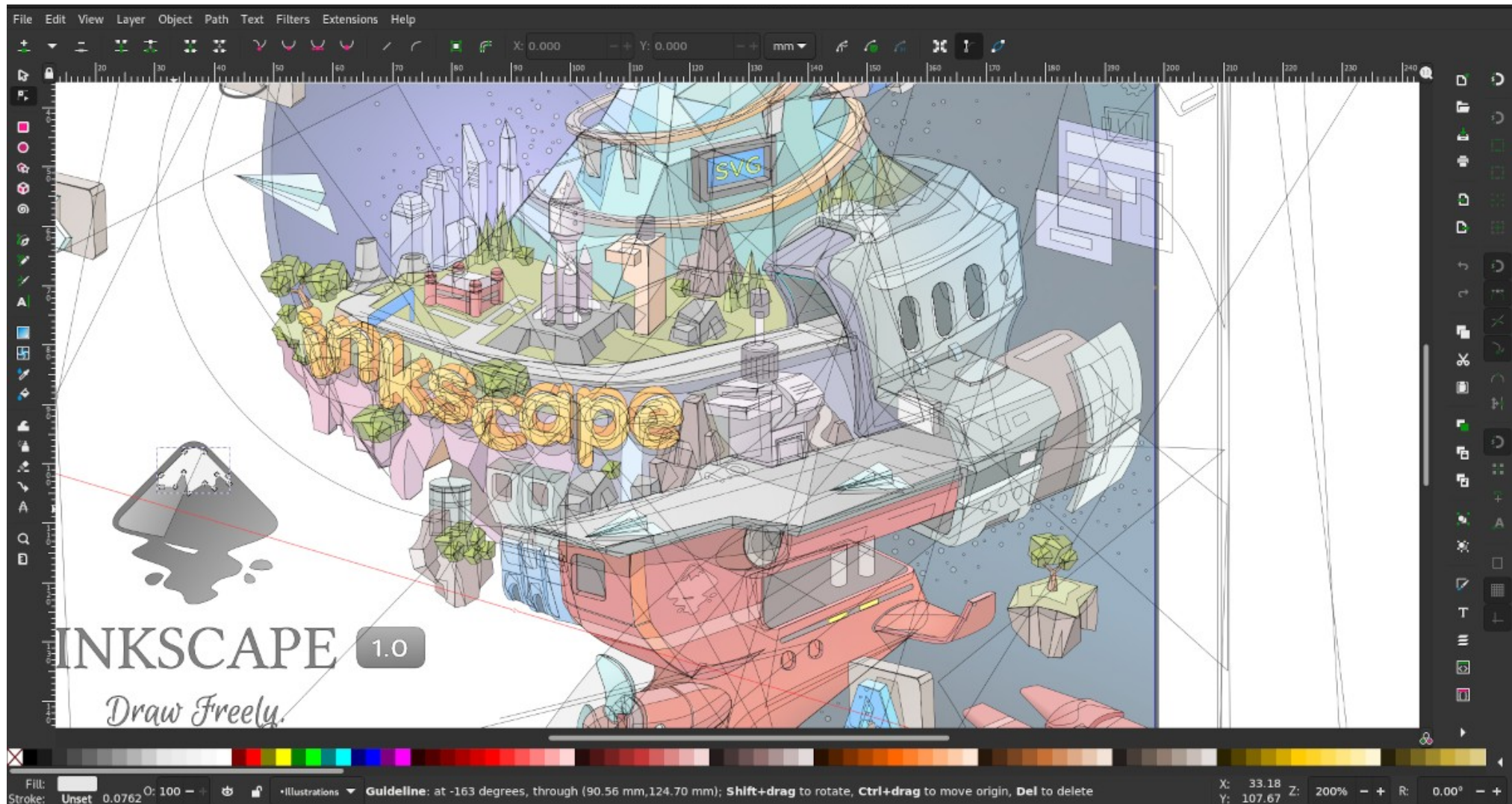
RAW edition  
of images



# *gimp*

Alternative to  
Photoshop







## Audacity®

Swiss army knife for audio editing



Digital Audio Workstation  
(DAW)

Music notation

# musescore

Alternatives to Adobe Audition, FL  
Studio, Ableton, Sibelius...

The screenshot displays the Audacity software interface. At the top, the menu bar includes File, Edit, Select, View, Transport, Tracks, Generate, Effect, Analyze, Tools, Extra, and Help. Below the menu is a toolbar with various icons for playback, editing, and monitoring. The main workspace shows a multi-view of an audio track, including a waveform and a spectrogram. The waveform is labeled 'Multi-view' and shows a blue signal. The spectrogram below it shows frequency content from 0k to 8k Hz. The interface also displays project settings like 'Stereo Mix (Realtek High Definition Audio(S...))' and '2 (Stereo) Recording Chann...'. At the bottom, there are controls for Project Rate (44100 Hz), Snap-To (Off), and Start and End of Selection (00 h 00 m 14.176 s to 00 h 00 m 17.194 s). A large digital display shows '00 h 00 m 14 s'.

The screenshot displays the Ardour software interface during a recording session. At the top, the transport controls show the project is playing at 00:01:27:13. The main workspace features a piano roll for a track named 'Vocal' with a 'SOLO' button, and a waveform view for 'Claps PRT'. Below these are tracks for 'Bass DI', 'Keys L', 'Keys R', 'AC Gtr A...unce-1', 'E Gtr Lead', 'E Gtr L', 'E Gtr R', and 'Gang PRT-L'. A 'Meterbridge' window is open, showing a frequency spectrum for the 'Guitar' track. On the right, the 'Mixer' window shows a 48-track master bus and individual channel strips for 'Bass DI', 'Vocal', 'Claps PRT-L', and 'Keys L'. Each channel strip includes a fader, solo, mute, and lock buttons, along with level meters. The interface is dark-themed with green and orange highlights.



Home Score Publish DevTools

Parts Mixer

0:00:07 2.1 ♩ = 120

Palettes Instruments Properties

BETTER\_Repeats\_Lesson\_C... X

Add Palettes

- ▶ Clefs
- ▶ Key signatures
- ▶ Time signatures
- ▶ Tempo
- ▶ Accidentals
- ▶ Dynamics
- ▶ Articulations
- ▶ Text
- ▶ Lines
- ▶ Repeats & jumps
- ▶ Barlines
- ▶ Layout

Valse  
(Posthumous.)  
F. Chopin. Op. 69., No. 2  
1829

10. *p*

6 *p*

12 *cresc.* *rit.* *dim.*

2

29

35

41

47

Workspace: Default

Concert pitch

Page View

164%

The screenshot displays the MuseScore II software interface. At the top, the menu bar includes File, Edit, View, Add, Format, Tools, Plugins, Help, and Diagnostic. The main toolbar contains various musical notation tools. The left sidebar shows a palette with categories like Clefs, Key signatures, Time signatures, Tempo, Pitch, Accidentals, Dynamics, Articulations, Text, Keyboard, Repeats & jumps, Barlines, and Layout. The central workspace shows a musical score for "Der Abschied" from "Das Lied von der Erde" by Gustav Mahler. The score is in 4/4 time with a tempo of quarter note = 54. The score includes staves for Oboe 1, Contrabassoon, Horn in F 1, Horn in F 2, Tuned Gongs, Harp 1, Harp 2, Violoncellos, and Contrabasses. A blue selection box highlights a specific measure in the Oboe 1 staff. At the bottom, a piano keyboard is visible with keys C1 through C8 labeled. The status bar at the bottom indicates "Range selection: Start measure: 5; Start beat: 1; End measure: 5; End beat: 4.875" and "Workspace: Default Concert pitch Page view 126%".



[Guitarix](#)



[Surge XT](#)

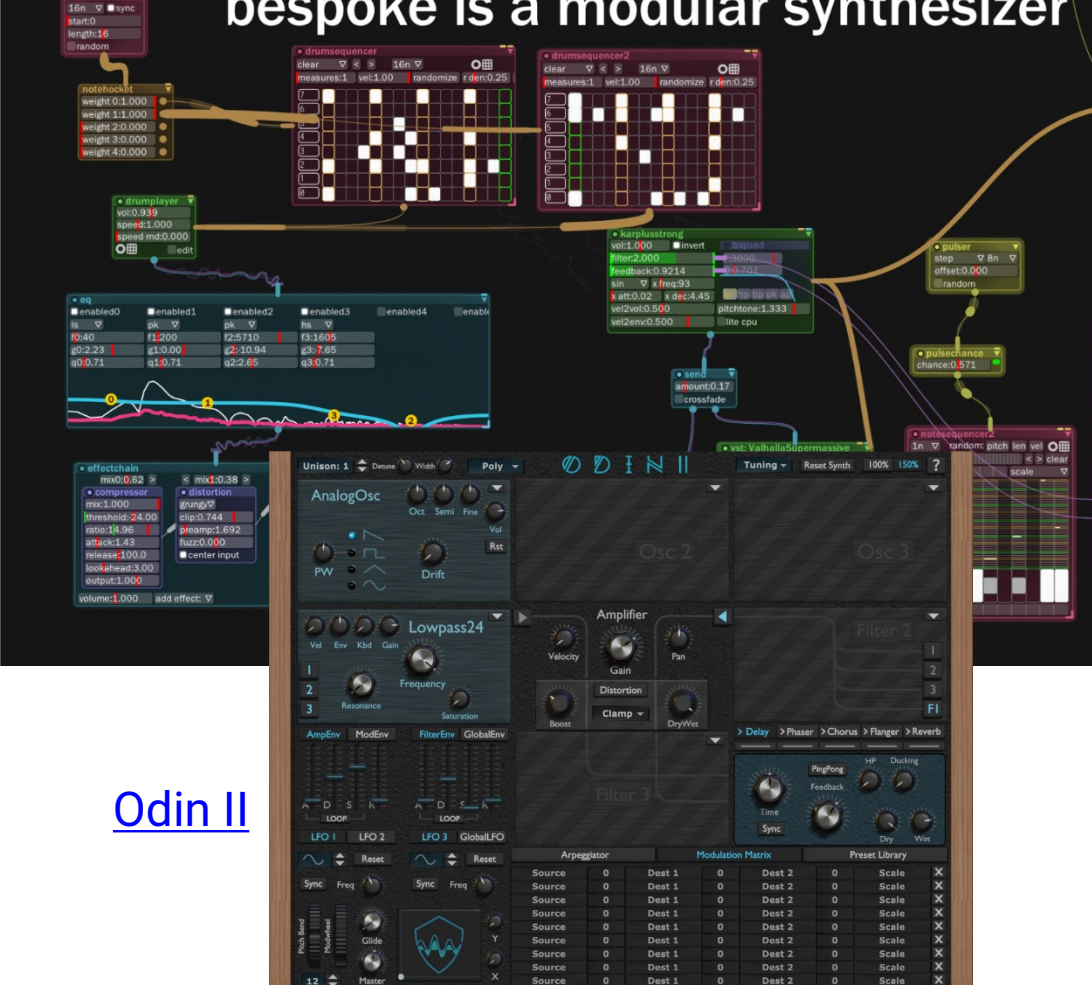


## [VCV Rack 2](#)



bespoke is a modular synthesizer

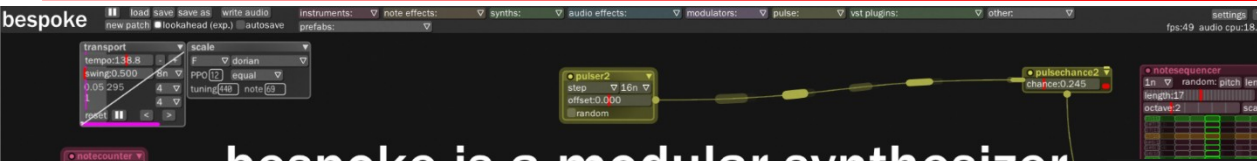
[Helm](#)



[Odin II](#)

And many others!

This is an incredible world!



bespoke is a modular synthesizer

[Helm](#)



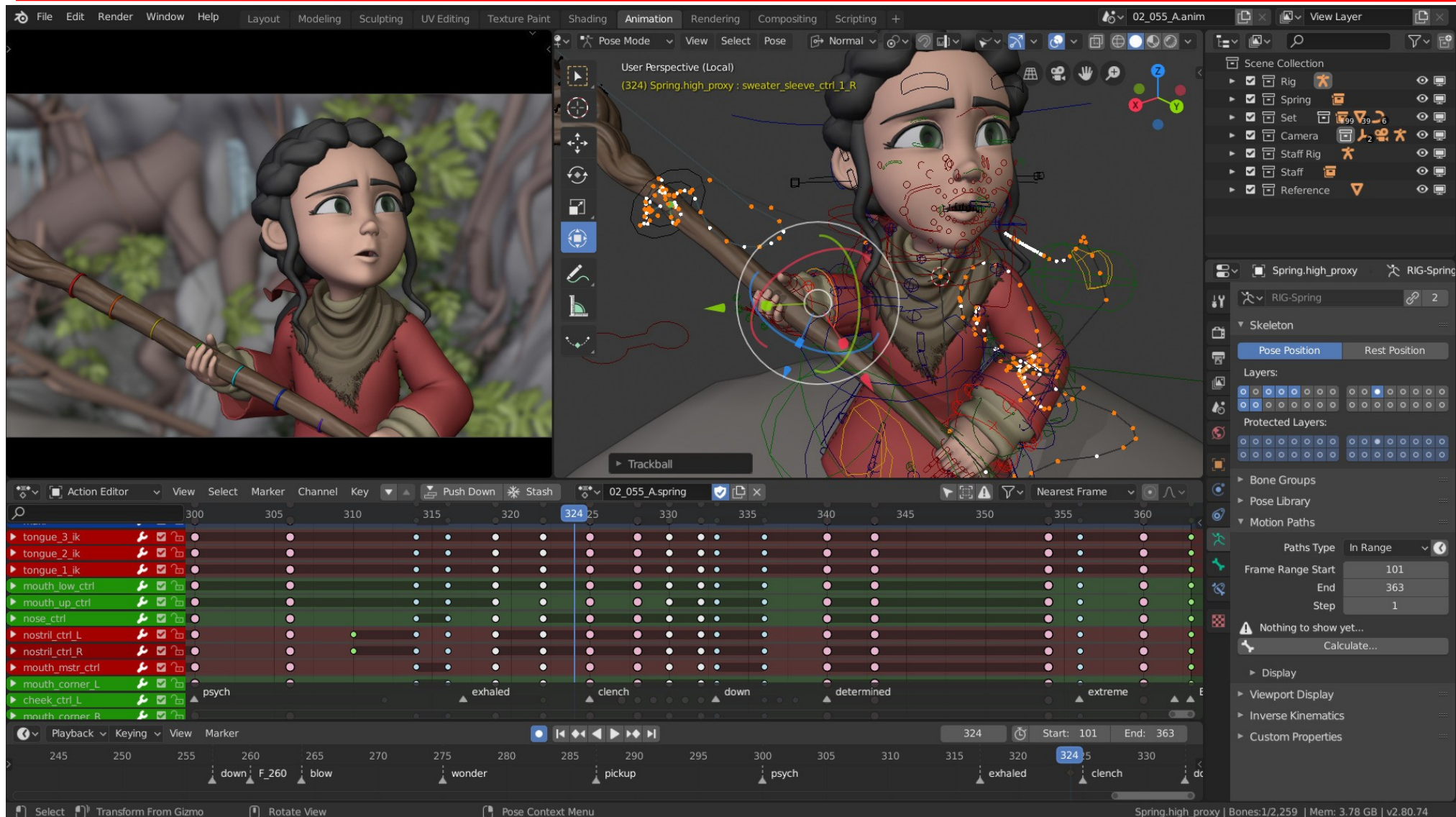
[Odin II](#)



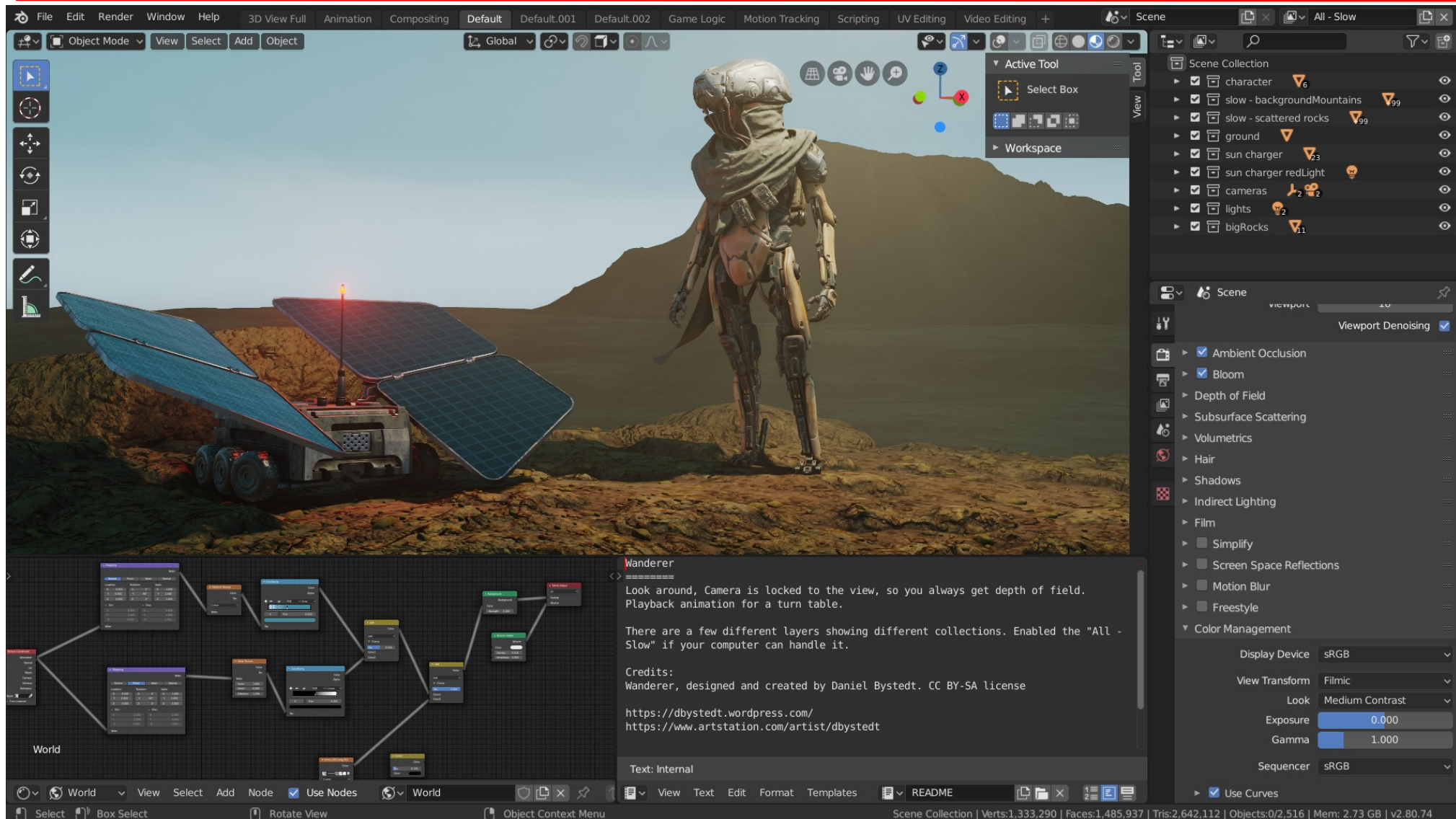
And many others!

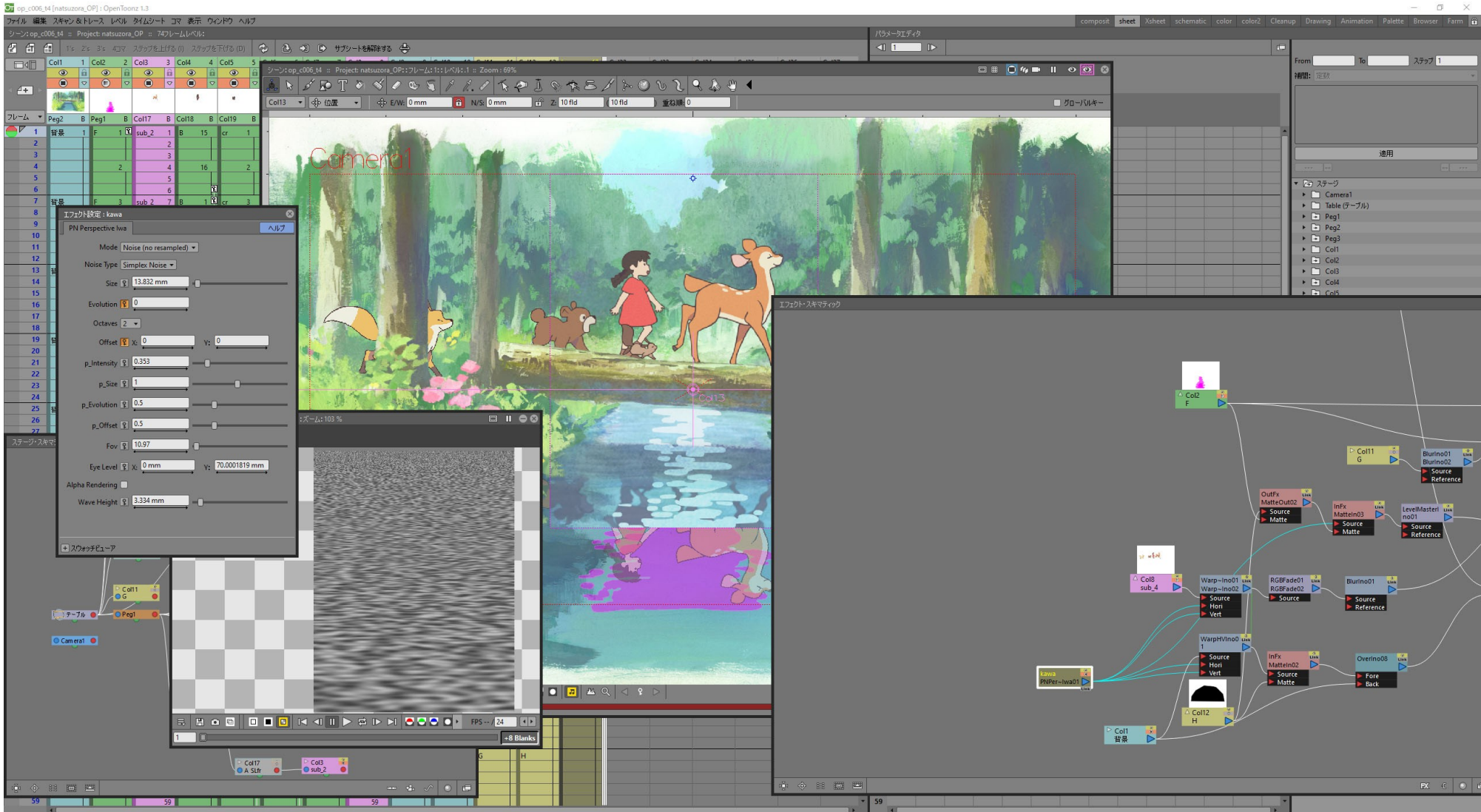
This is an incredible world!









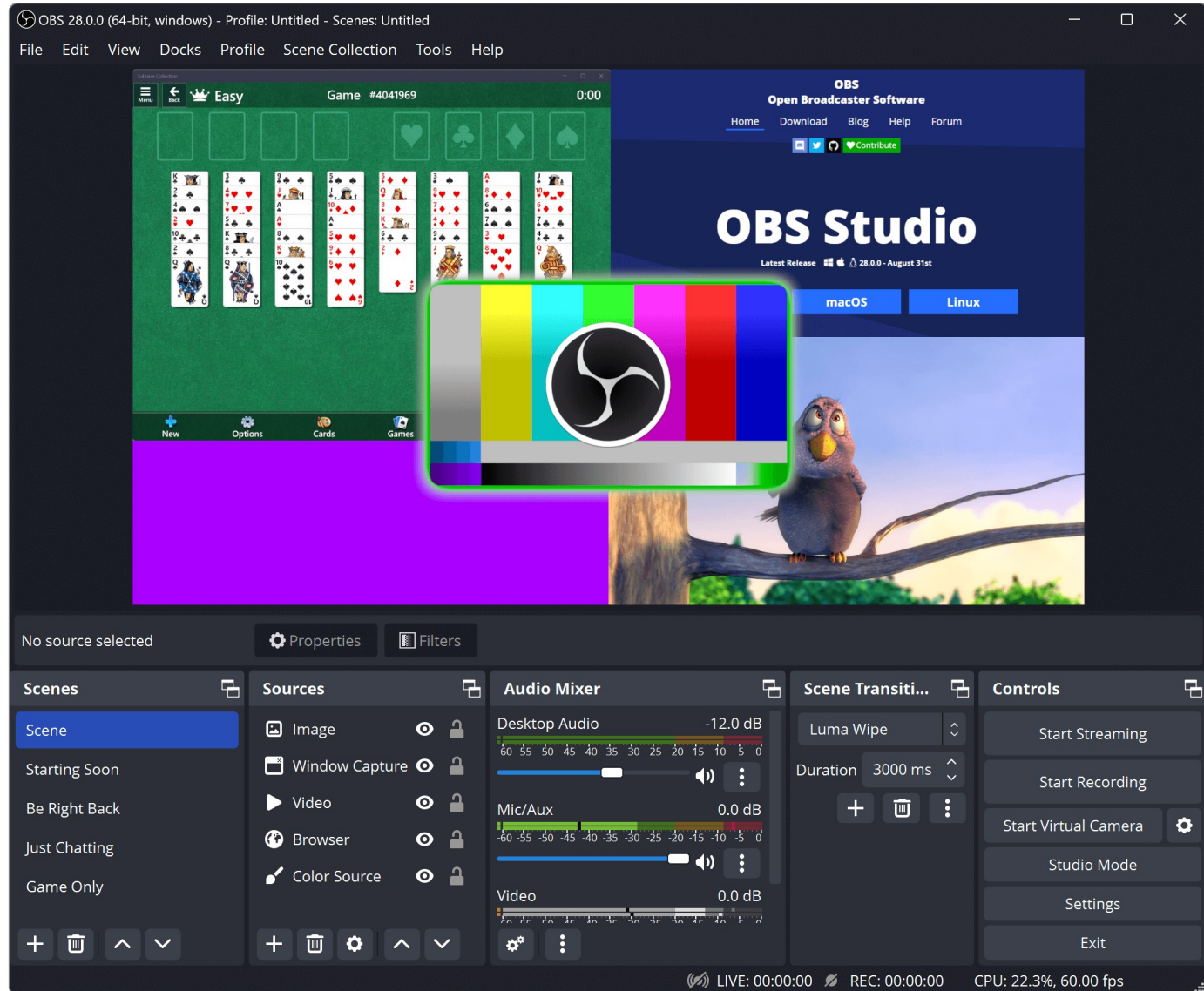




Open Broadcaster Software  
It is widely used by “streamers”. High-quality and flexible

Courses, tutorials?

Videos and live-streaming?





Non-Linear Editors (NLE)



Alternatives to Adobe Premier Pro,  
Vegas Pro, Final Cut...



File Edit View Project Tool Clip Timeline Monitor Settings Help

Logging Editing Audio Effects Color

31\_02\_Valeska\_Ferreira.MP4 effects

Lift/gamma/gain

Linear 00:00:02:07

Lift Gamma Gain

R: 0.113 G: 0.133 B: 0.131 R: 1.133 G: 1.221 B: 0.992 R: 1.347 G: 1.255 B: 1.381

25.00fps 00:00:00:00

25.00fps 00:02:21:03

00:00:00:00 00:00:12:09 00:00:24:19 00:00:37:04 00:00:49:14 00:01:02:00 00:01:14:09 00:01:26:19 00:01:38:04 00:01:51:14 00:02:04:00 00:02:16:09 00:02:28:19 00:02:41:04 00:02:53:14 00:03:06:00 00:03:18:09 00:03:30:19

01\_Dany\_Hey\_Vc\_Ai.MP 00:00:52:20 [2]

01\_Edemir\_Levanta da 00:00:22:12 [1]

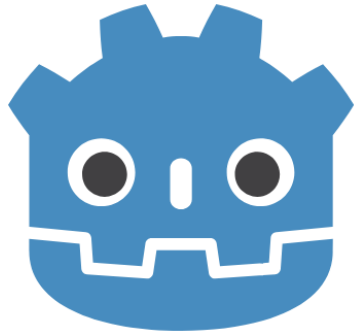
01\_Gravação\_Musica\_C 00:02:00:09 [2]

01\_x2mate.com-Brasil 00:00:21:08 [1]

02\_01\_MST\_Abertura M

Master

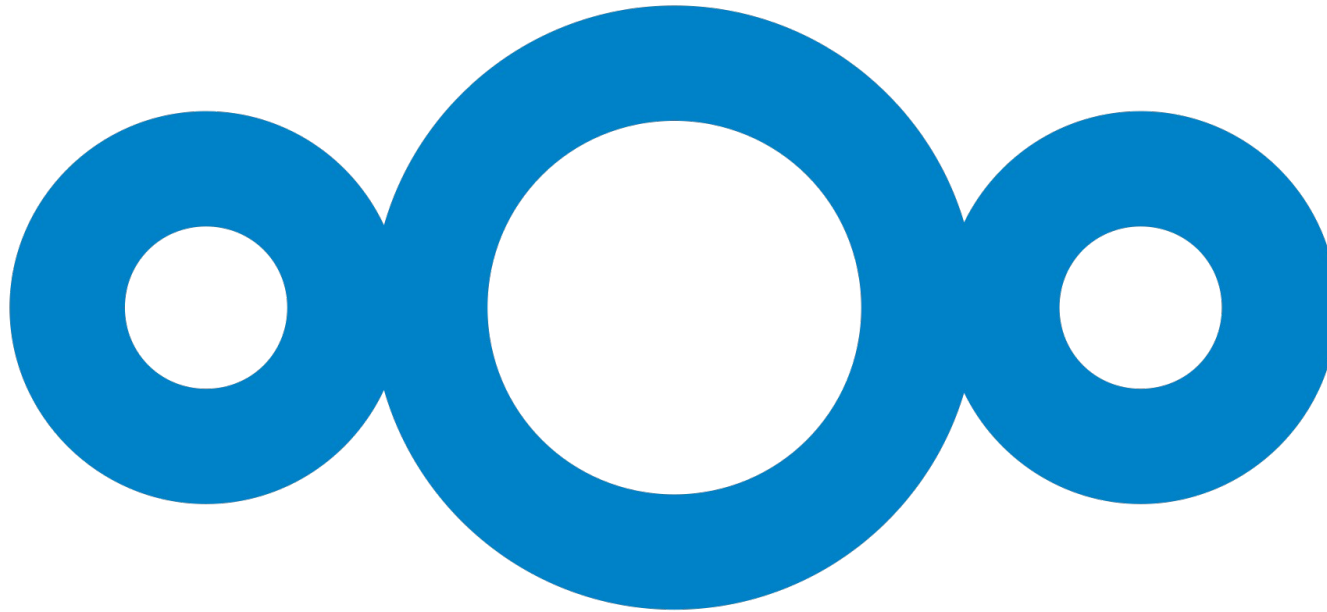
0,00dB



# GODOT

Useful for interactive systems, simulations,  
and VR





# nextcloud

Good alternative to Google Drive y Microsoft.  
It includes most of their services, such as collaborative document editing!





## ERP for hospitals:

- Patient records
  - Personal Health Record (PHR)
- Lab records
- Hospital records
  - Electronic Medical Record (EMR)
  - Hospital Management (HMIS)
  - Health Information System (HIS)

## Used by:

- Argentina
- Cruz Roja México
- Laos
- Cameroon
- Gambia
- [Spain](#)
- Pakistan

[FontForge](#)



Typography design

[Thunderbird](#)



Email client



Finance administrator



[Penpot App](#)

Application and Web design

Even videogames!

[O.A.D](#)



# Moreover, the libre philosophy also applies to...

- ❑ Artistic and document creations
  - ▶ See [Creative Commons](#) (CC) licenses
- ❑ Even fonts have licenses
  - ▶ Arial, Calibre, etc are **NOT** libre. Alternatives: [Kurinto Fonts](#), [Google Fonts](#), [Fontlibrary](#), [Fontesk-OFL](#)
  - ▶ The most common license for libre fonts is [SIL OFL](#)
- ❑ Even video formats
  - ▶ The typical .mp4 (video files), are encoded using H.264 or H.265 technology: They are **NOT** libre
  - ▶ In order to not pay royalties, Google, Netflix, etc have created libre codecs: [VP9](#) y [AV1](#)
- ❑ **Even mobile apps!** See [F-Droid](#)

# Conclusions

- ❑ There are a wealth of solutions
  - ▶ Many have not been covered. Search them!
    - Example: Micro-graphical analysis of crystals? [Fiji](#)
  - ▶ One will always help us, take advantage of it
  
- ❑ Share this information
  - ▶ Family, friends, personal use
  - ▶ **University use:** [Moodle!](#), [Oppia](#), [Canvas](#)
  
- ❑ Go little by little, don't try to change all in one go
  
- ❑ Some problems can only be solved with libre software (flexibility, capacity, costs...)

- ❑ Use a search engine
  - ▶ “open source alternative to XXX”. XXX being proprietary software
  - ▶ “open source YYY”. YYY being a topic (FEM, CFD, drawing...)
- ❑ Analyze the different possibilities
  - ▶ At the user level
    - Does it have what I want? Large community?
    - Good documentation? Good learning resources?
  - ▶ At the company level
    - Is there a company with support behind it? Large community?
    - Does it use similar technologies that we already exploit?
      - Programming language: C++, Python, etc... DBs...
    - Is it updated, modern? This is industry dependent
    - License? MIT vs BSD(2/3) vs Apache v2 vs (L/A)GPL v(2/3)

- ❑ Some programs are very manual and do not bring preconfigured libraries...
  - ▶ Example: Code\_Aster does not bring material, piping, etc; libraries. The GUI is not very helpful to the user...
- ❑ A long and difficult learning curve is generally common
- ❑ The certification of software will cost money
  - ▶ Many are already certified and validated, however, this costs money!
- ❑ In some cases it is a bit difficult to find external support for bug fixes, improvements...

## ❑ Proprietary software:

- ▶ Looks to become a dependency
  - It does not interoperate with external systems, **creates technical debt**
  - Annual subscriptions? **Abuses the dependency**
- ▶ They can change the terms ([CERN license change](#))
- ▶ The changes may not help the users, benefits take preference

## ❑ We have to be honest with libre software

- ▶ Any change will take time and have an associated cost
- ▶ They are different systems and ways of working (not worse!)
- ▶ **The change has to happen from our own initiative**
  - This is not the case we are used to
  - The initial investment is large in everything: investigating, learning, testing...



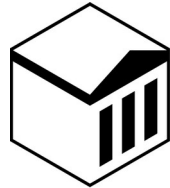
# There are organizations that support libre software in companies



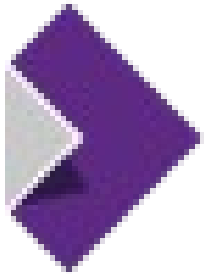
Foundation created to integrate and operate libre software within companies

Good Governance Initiative (GGI)  
[handbook](#)

There are already huge companies which have signed up



Foundation for Public Code



[Collabora](#)

Consultancy in documentation systems and others

# And many others!

European commission  
Joinup Licensing Assistant  
[Find and compare licenses](#)



- ❑ What is libre software?
  - ▶ The four freedoms/rights
- ❑ What does these principles offer society and us?
  - ▶ Flexibility
  - ▶ Learning
  - ▶ Community
- ❑ What solutions are there?
  - ▶ Many, some are very high quality
  - ▶ You have to search them!
- ❑ Proprietary software has some intrinsic issues
- ❑ Libre software is ready for the enterprise/engineering world

# Questions?

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I am available for any questions or discussions  
[foleo@empre.es](mailto:foleo@empre.es)

Personal email  
[irvise@irvise.xyz](mailto:irvise@irvise.xyz)

## ❑ FOSDEM (Free and Open source Software Developers' European Meeting) 2023, Brussels 4 y 5 of February



## □ We could quickly see

### ▶ CoolProp

- Use of PropsSI (Python) interface

```
import CoolProp.CoolProp as CP # HEOS::R32[0.697615]&R125[0.302385]
CP.PropsSI('D','P',68e5,'T',300,"CO2")
Out[21]: 689.1314547444613
CP.PropsSI('D','P',68e5,'T',301,"CO2")
Out[20]: 266.54485685623814
CP.PropsSI('d(D)/d(T)|P','P',68e5,'T',300,"CO2") # Cálculo de derivadas!
Out[19]: -31.962307565403005
```

- There is also an Excel addon!

- ▶ Maxima: example(diff);
- ▶ QUCS-S: audio\_amp, DBM\_mixer
- ▶ DWSIM: LiBr-H<sub>2</sub>O, Amonia-Water, Biodiesel-production
- ▶ Scilab: CACSD – Inverted pendulum; Optim&Sim – nplot  
McKinnon #2 & #1; Simulation – Bike & Flow