TASK 5.4: *INTEGRATION &APPLICATION* PROGRESS & ACHIEVEMENTS

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Contributing partners: All

PHIMECA
Solutions for robust engineering

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T5.4 – Technical work achieved

- Integration of new modules
  - Analytical Tensile Curve
    - Evaluate the stress-strain curve using
      - A temperature-depending elastic law
      - A hardening model
  - Experimental Tensile Curve
    - Load experimental stress-strain data and make it compatible with Charpy ot CT calculation
  - Charpy
    - Predict a Charpy energy based on a finite element plastic calculation and a local approach to fracture models
  - Fit Analytical Tensile Curve
    - Provide the coefficient of the Analytical Tensile Curve identified from experimental data

T5.4 – Technical work achieved

- Integration of Initeac module (Statistical modeling of IASCC)
  - Presentation of Initeac module with 12 test cases.
  - Integration the UserGuide into the presentation.
- Integration of Mibf
  - The Microstructurally Informed Brittle Fracture (MIBF) model takes into account the microstructure of the RPV steel.

T5.4 – Technical work achieved

- UserGroup meeting
  - Collective exercise
    - The new presentation was presented
    - Several case studies from the presentation were presented and tested
  - on June 19th 2017 in EDF
  - on June 22th 2018 in EDF
  - on June 28th 2019 in Madrid

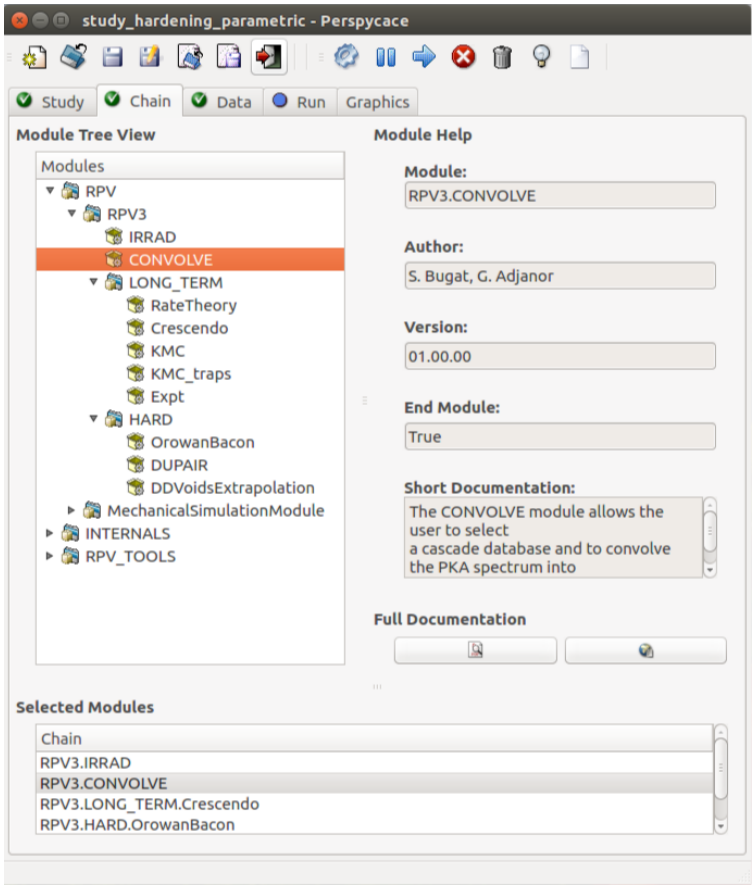
- Soteria Training school on 3-7 September in Valencia
  - Collective exercise
    - The new presentation was presented
    - Several case studies from the presentation were presented and tested

T5.4 – Technical work achieved

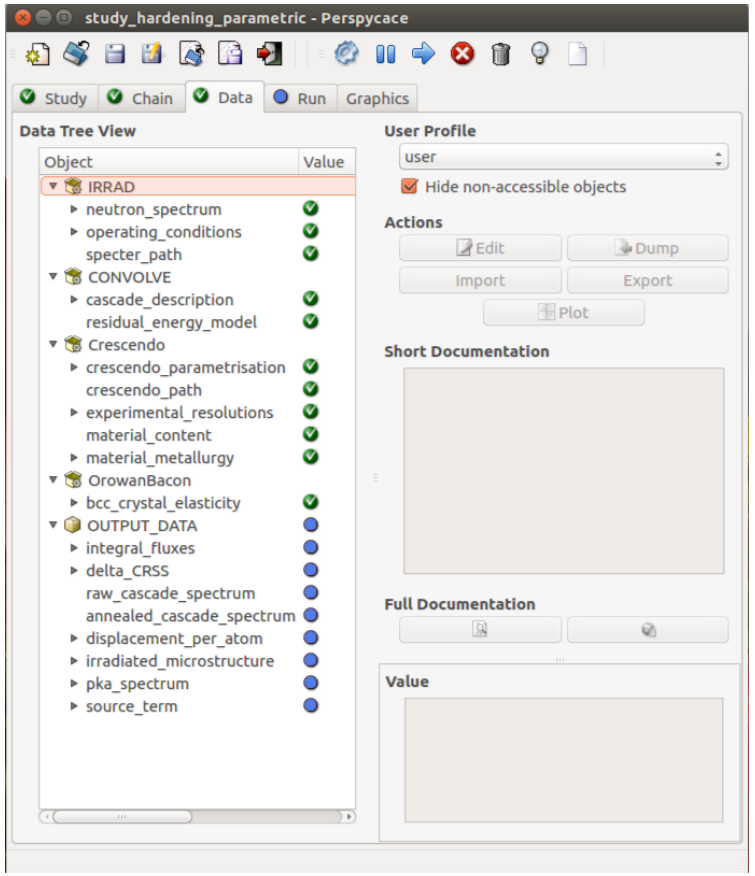
- **Construction of the Graphical User interface to realize parametric Soteria studies :**
  - Design of experiment → Operational
  - 3 post-treatments → Operational
    - A table of input and output variable
    - A table with the minimum and maximum values of each input and output
    - A scatter plot showing the relationship between inputs and outputs
  - We were inspired by graphical user interface of **OpenTurns**
    - Phimeca and EDF developed a graphical user interface (GUI) of **OpenTURNS**. This interface is integrated into SALOME-MECA
    - **OpenTURNS** is a C++ library open source to treat uncertainties. It is co-developed by EADS IW, EDF R&D and PHIMECA Engineering.

Soteria hardening study

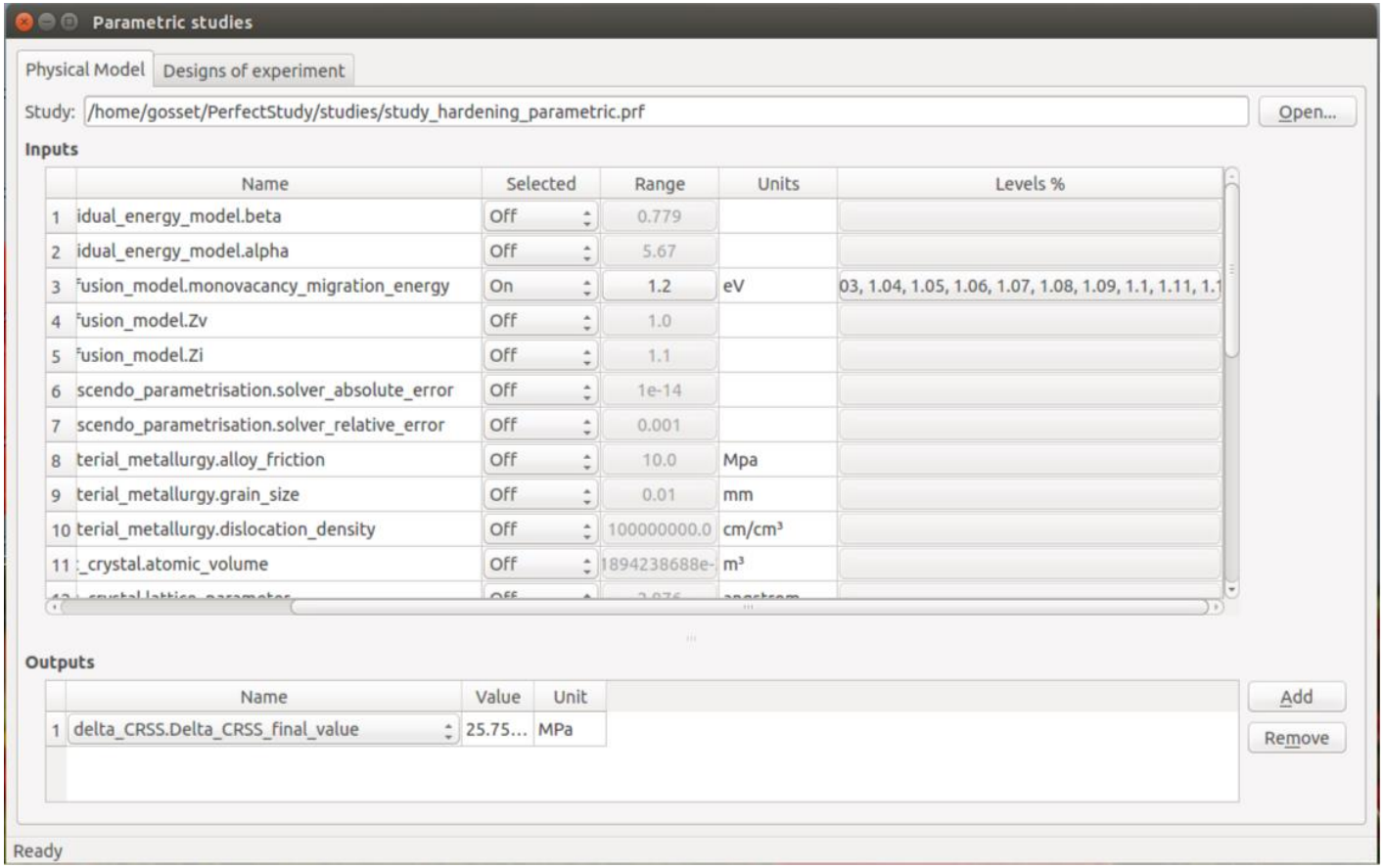
CHAIN



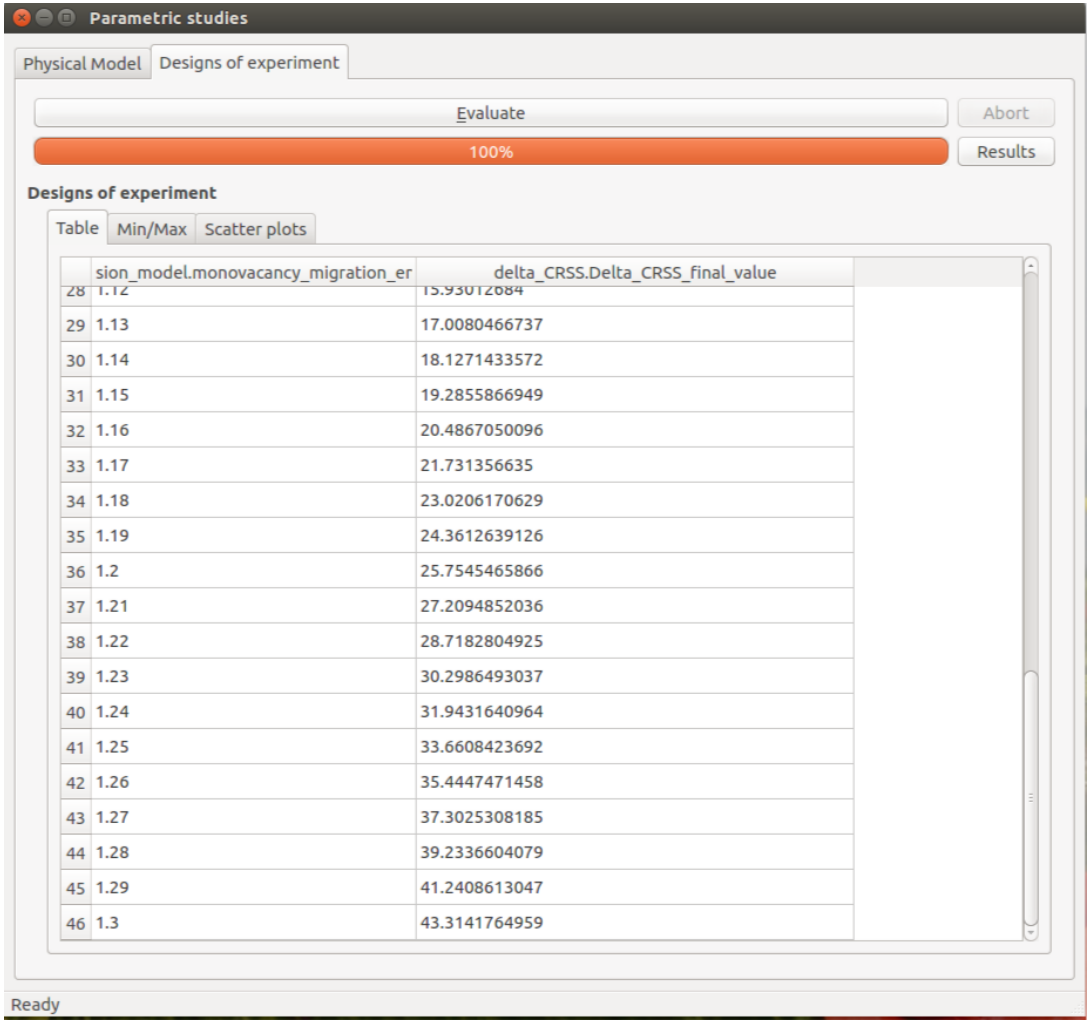
DATA



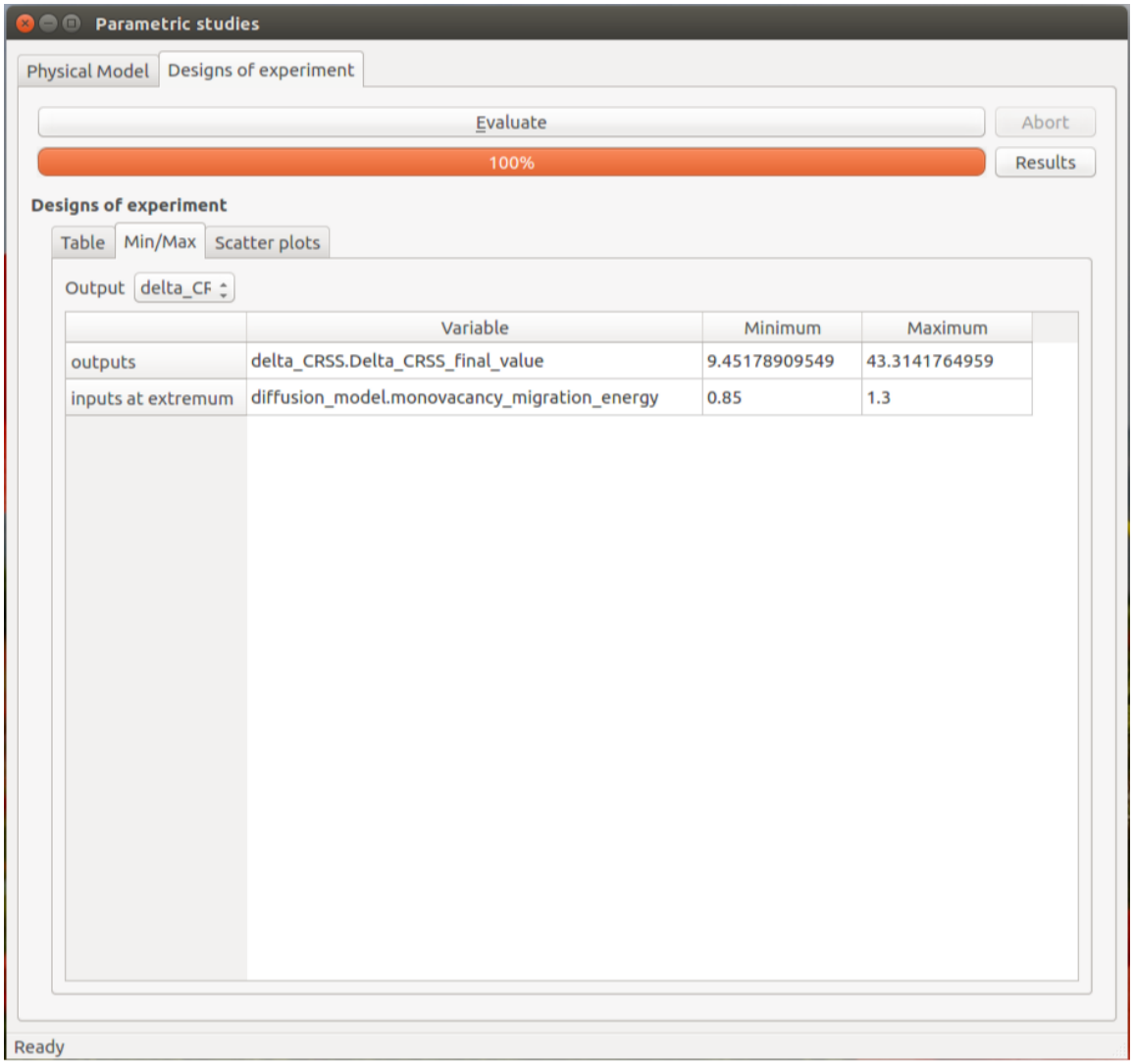
Parametric hardening study



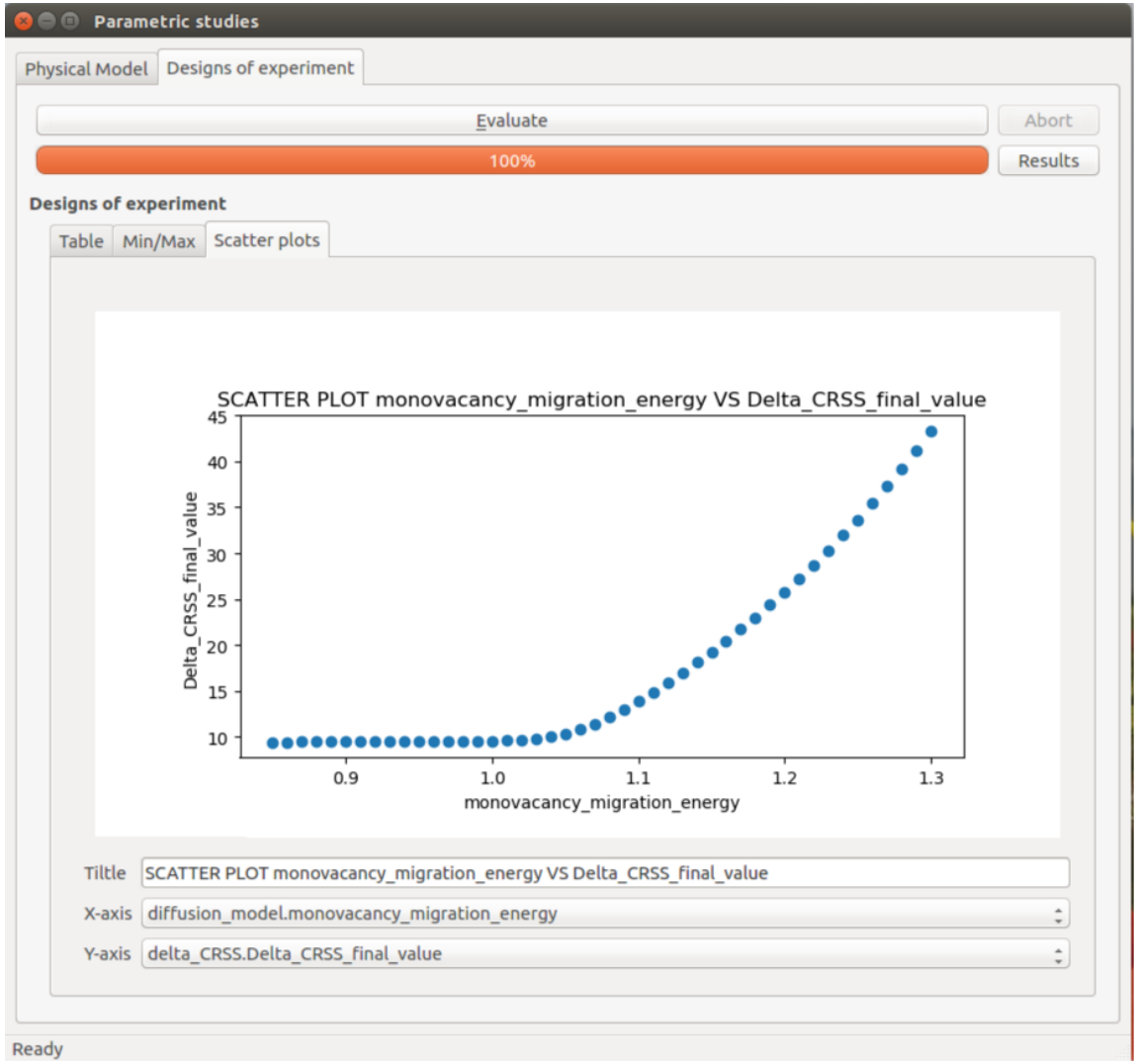
A table of input and output variables



A table with min and max value of each input and output



A scatter plot between input and output



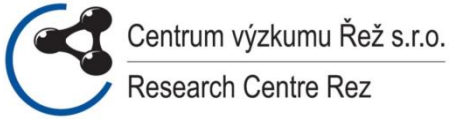
Technical work achieved

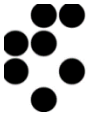
- Dissemination of the platform
  - **New version of the platform with Salome-Meca 2018**
    - **For linux**
      - The document "Installation instructions for the Soteria Platform" on the web-site of SOTERIA
    - **For windows**
      - By using a virtualBox
    - **SciMotors platform (EDF)**
      - Remote connection to a machine containing the Soteria Platforms

Future work

- **ENTENTE : EUROPEAN DATABASE FOR MULTISCALE MODELLING OF RADIATION DAMAGE**
  - Implementing MFront into the platform
  - Performing quantitative sensitivity studies of the model based on variance analysis
  - Maintenance of the platform
- **BOLTS : Lifetime prediction of baffle-former bolt cracking**
  - Implementing MFront into the platform
  - Performing quantitative sensitivity studies of the model based on variance analysis
  - Integration of Amitex (CEA)
  - Integration of new modules

The SOTERIA Consortium





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