SPIS User Interface
-
Internal charging developments

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Artenum (1)

Objective of CIRSOS

Collaboration of two space environment software

GRAS

Radiation modelling software

SPIS

Charging modelling software

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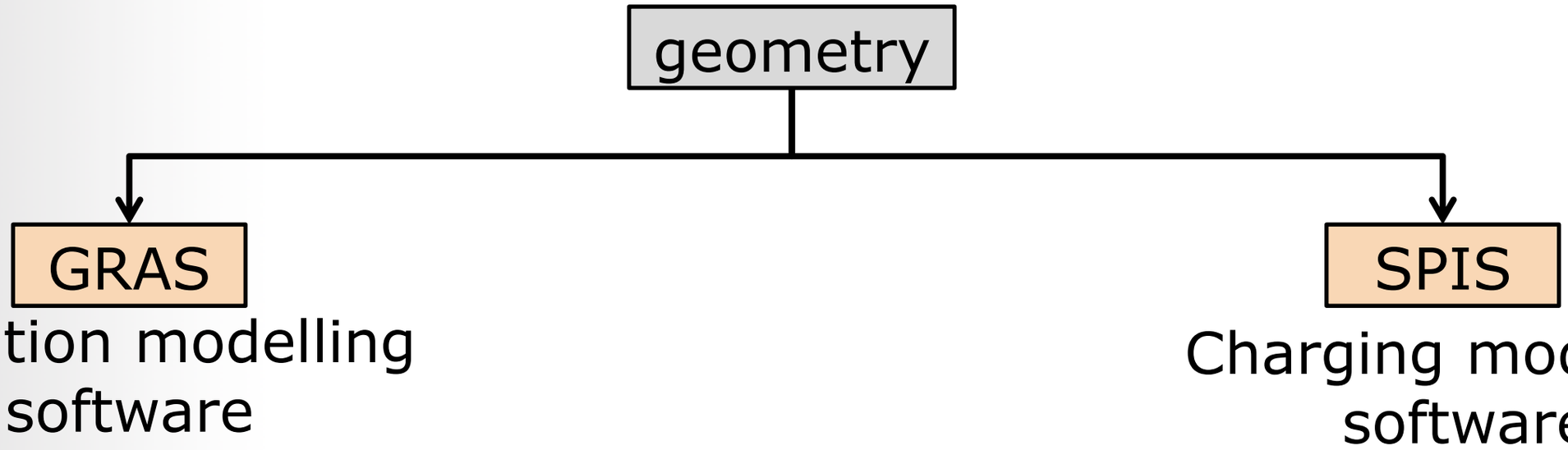
Collaboration of two space environment software



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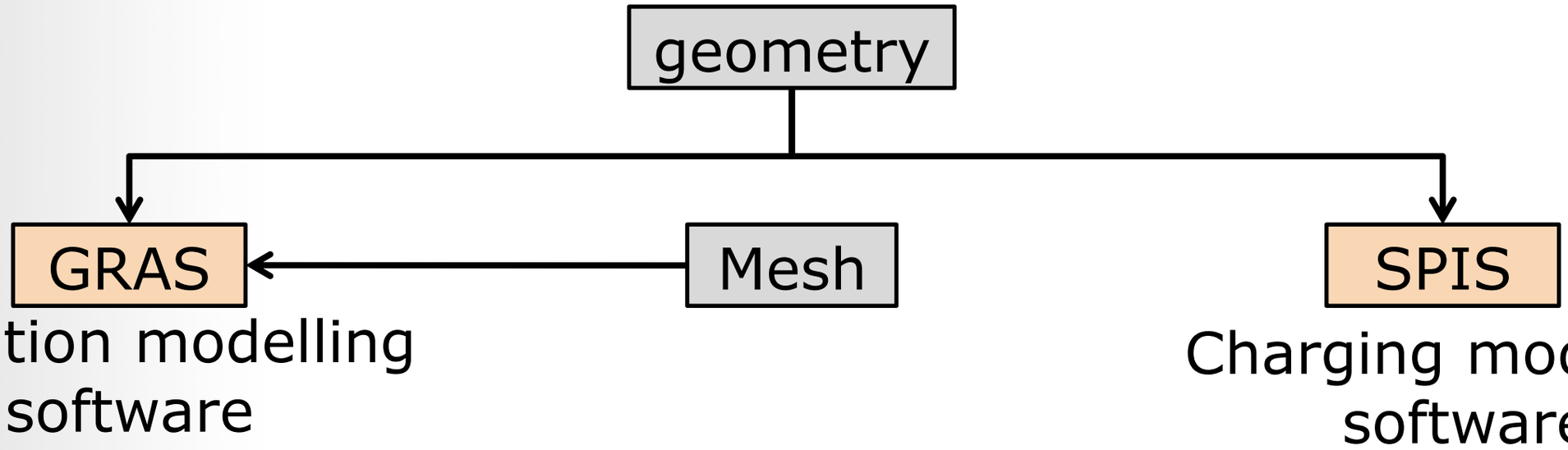

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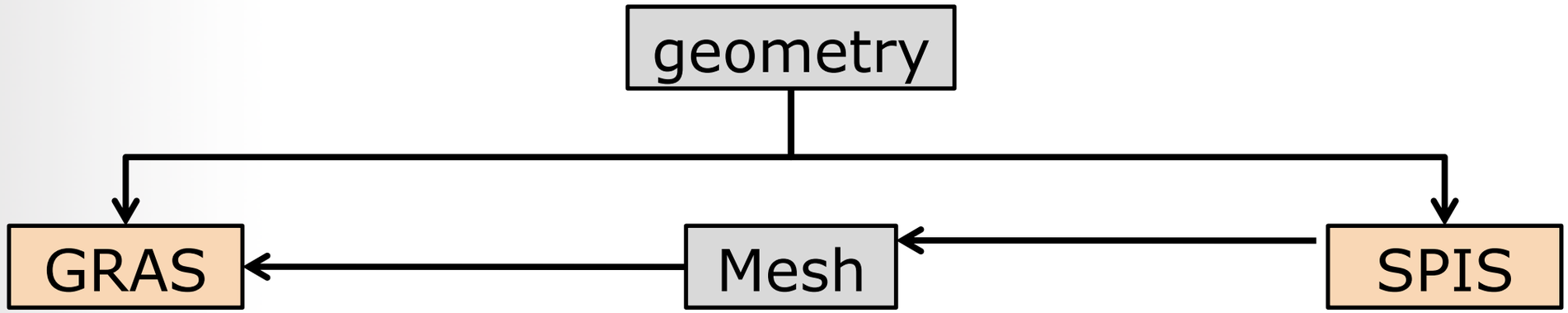

Radiation modelling software

Charging modelling software

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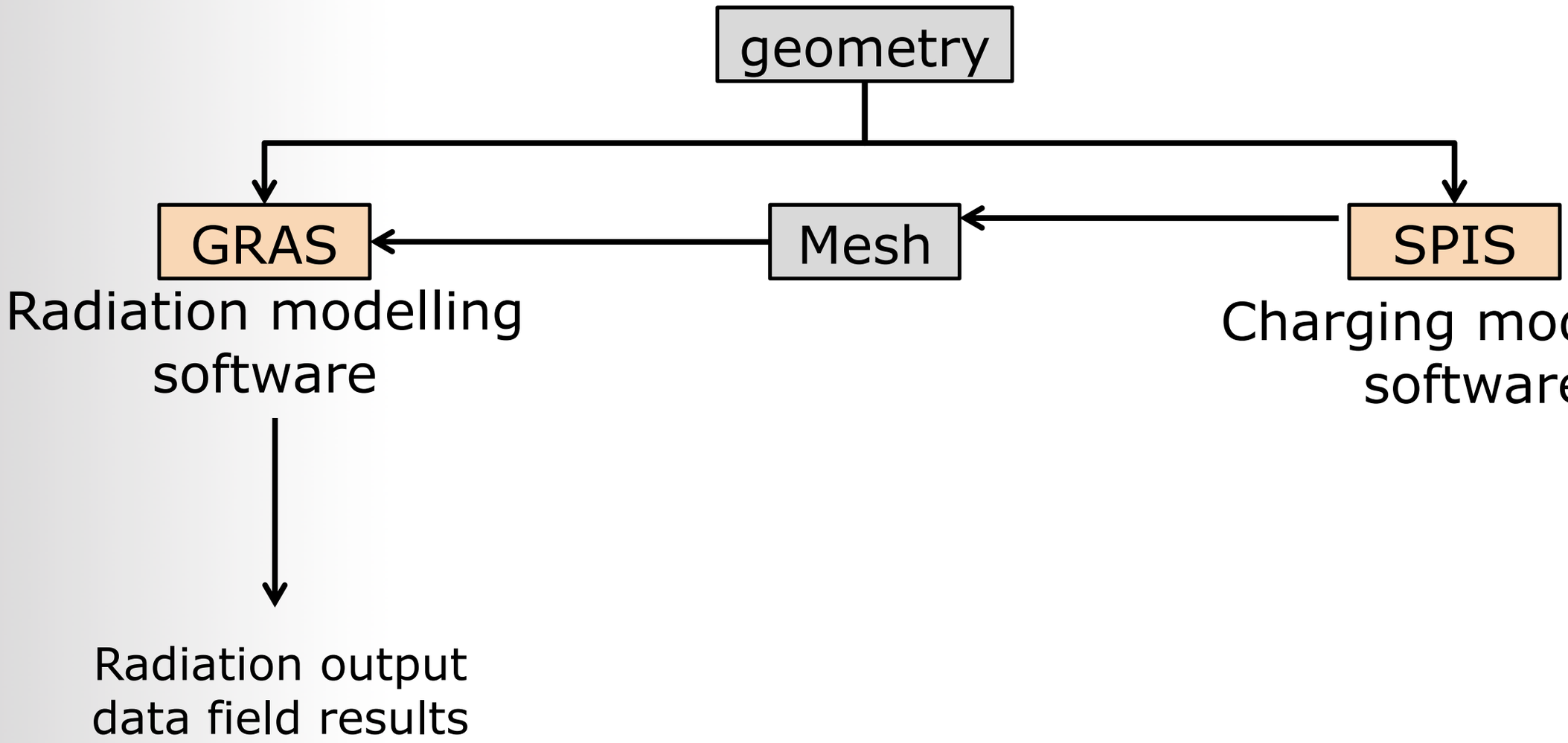

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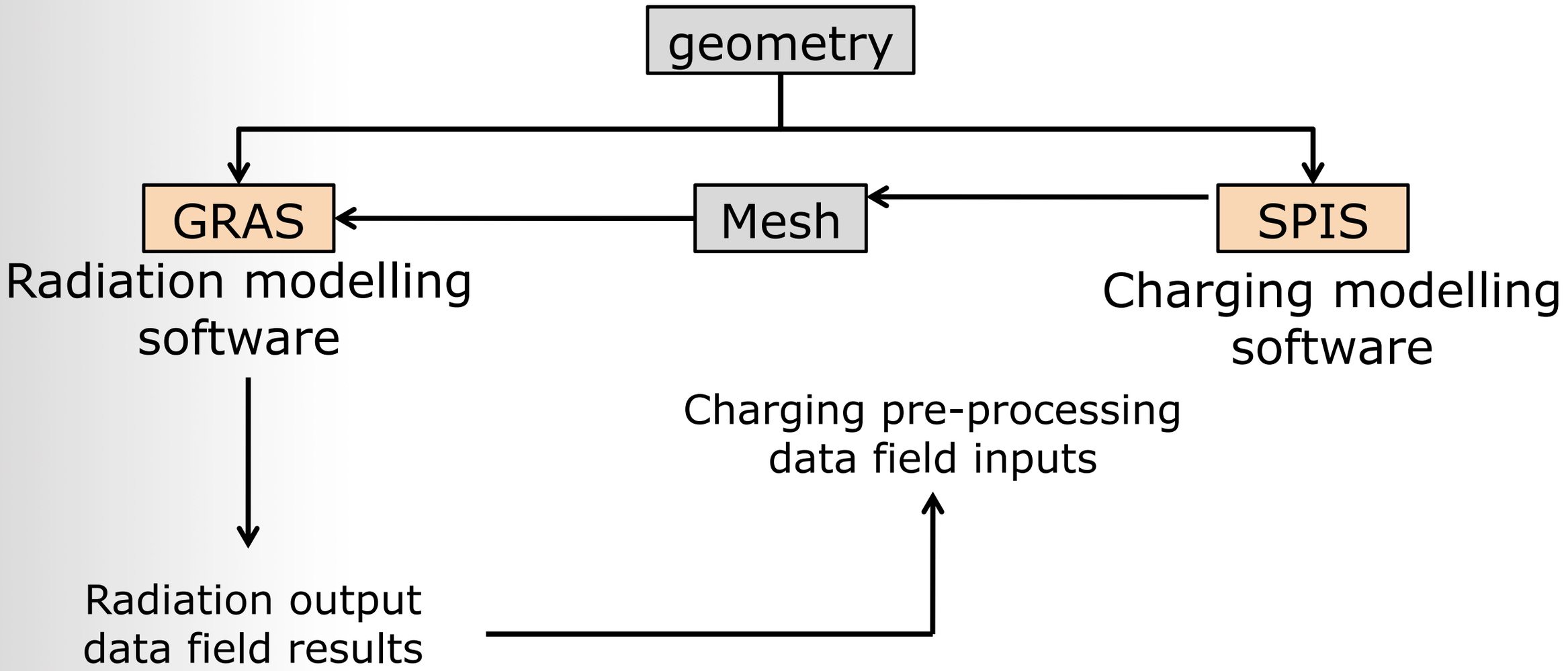

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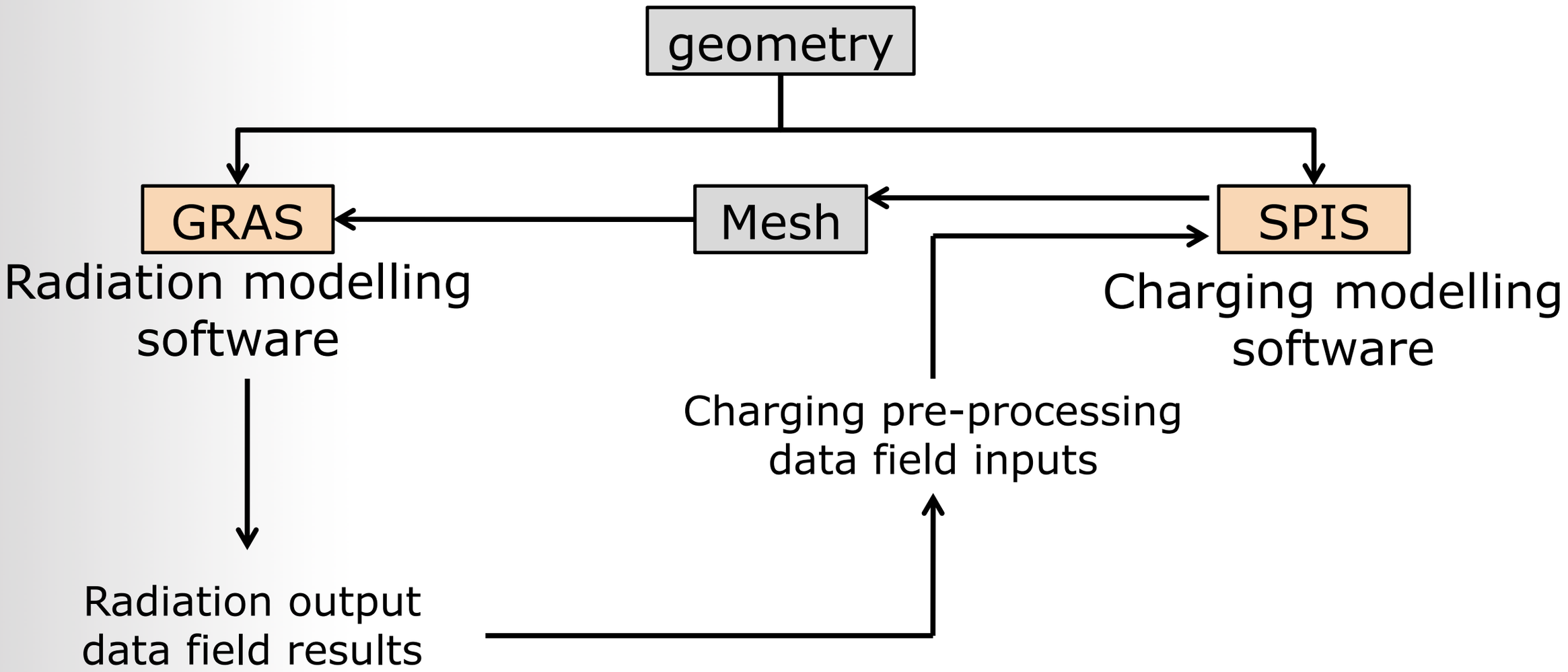

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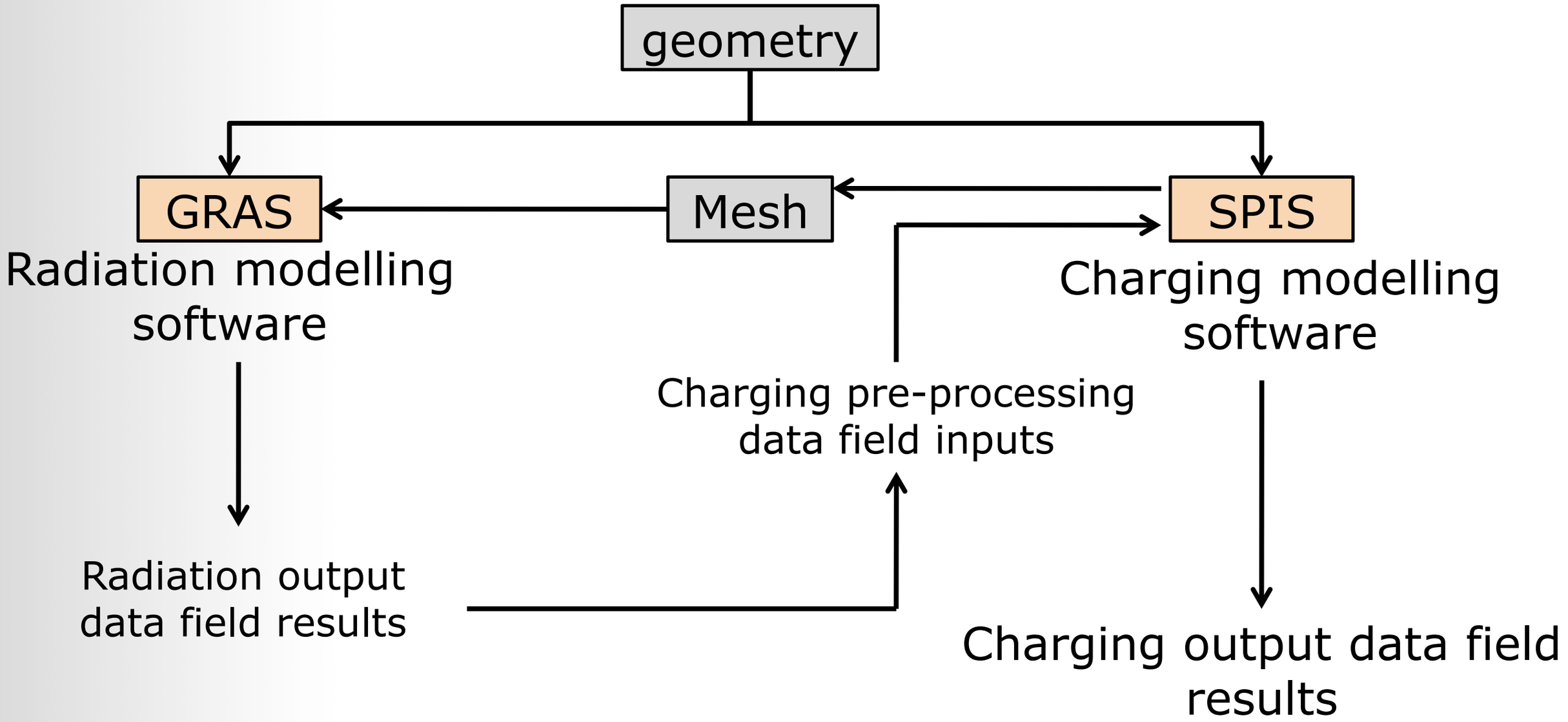

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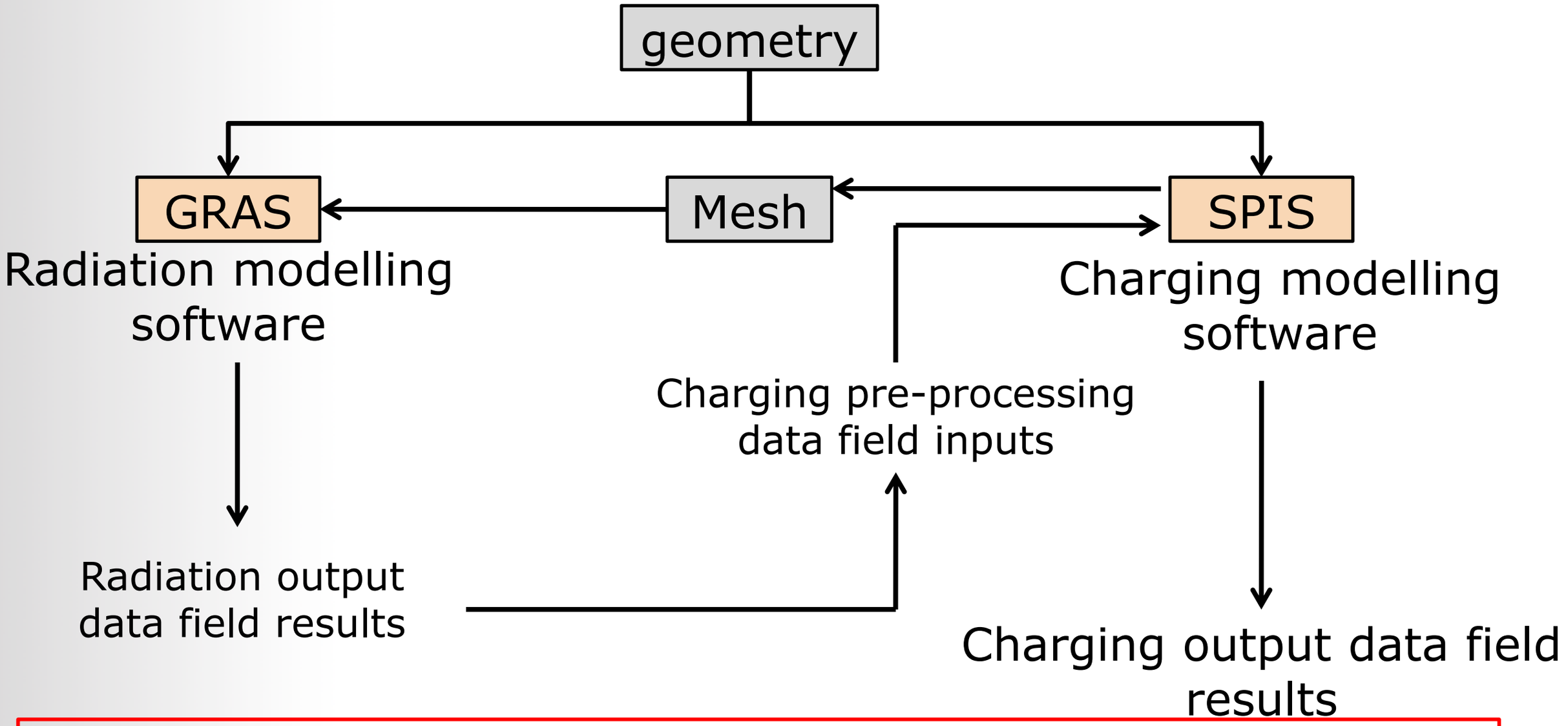
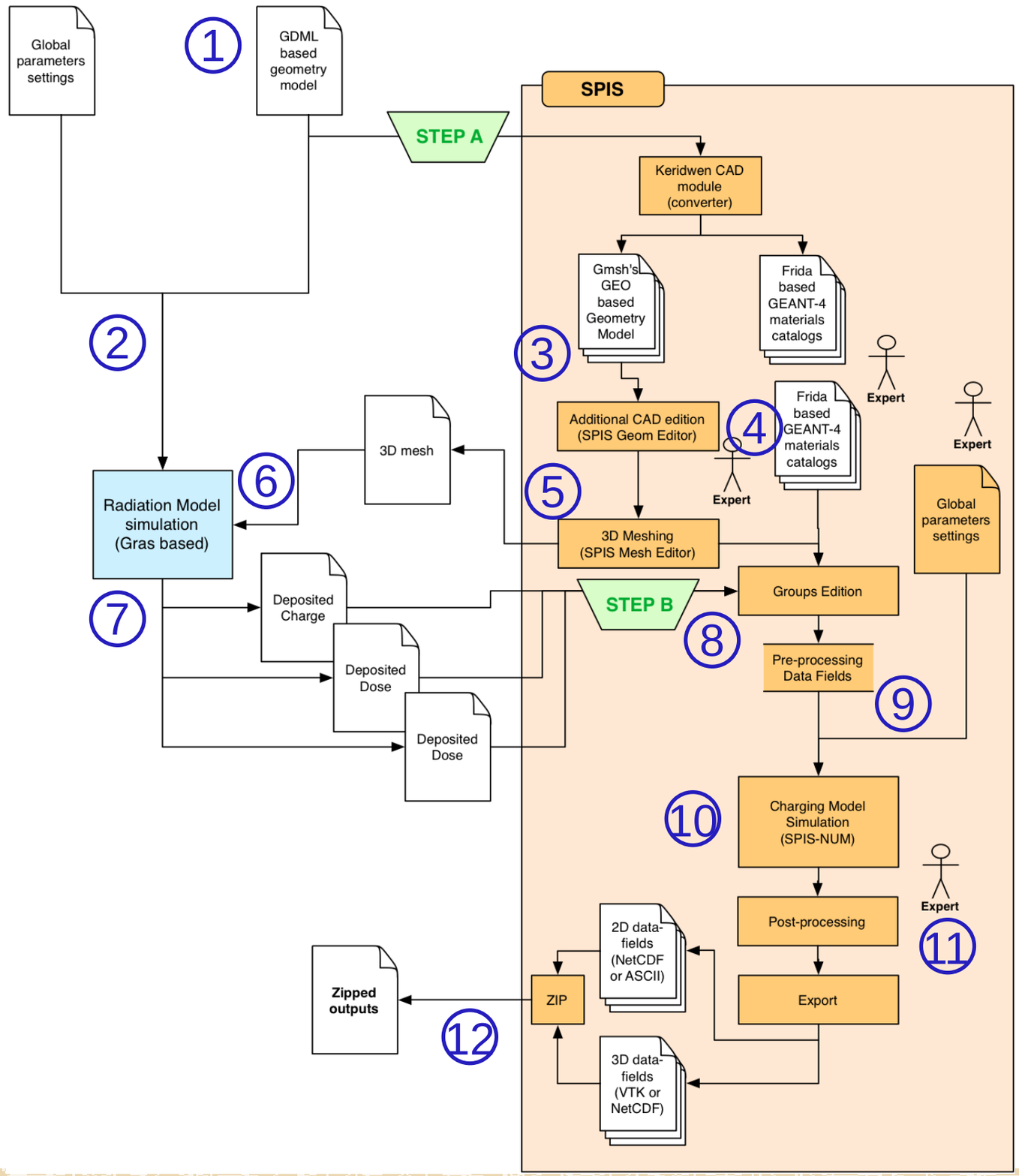


This presentation focus only on SPIS-UI improvements developed in CIRSOS context.
For more precision about CIRSOS please contact flei@radmod.co.uk

Context

Detailed collaboration scheme

1) Initial geometry in GDML from the CIRSOS Geometry Manager and stored in the CIRSOSDB;
2) Loaded into GRAS for radiations modeling.
3) GDML converted into Gmsh'geo files using keridwen CSG-to-Brep CAD conversion module
4) If needed extra CAD manual operations by experts in SPIS;
5) Meshing of the the computational domain and adapt mesh;
6) Mesh exported to GRAS through CIRSOS;
7) Radiation simulation performed in GRAS. The computed deposited dose, charges and cumulated doses are converted as data fields on the same Gmsh-mesh file. This file is returned to SPIS through CIRSOSDB.
8) These ones loaded into SPIS as pre-processing data-fields;
9) Pre-processing operations for the charging model performed in SPIS as usual;
10) Charging simulation is done in SPIS as usual;
11) Related post-processing is done in SPIS as usual
12) Final packing of generated outputs



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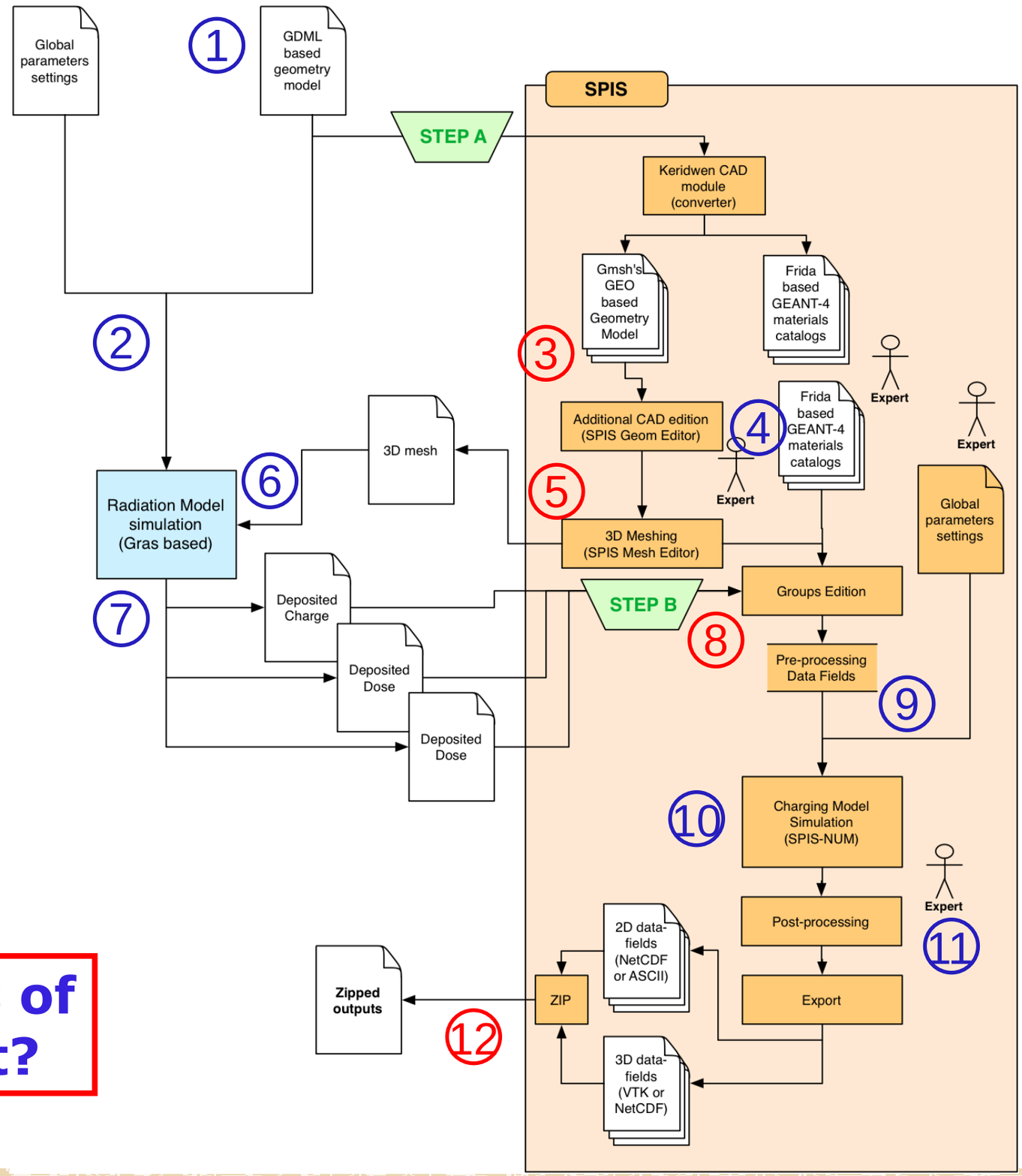
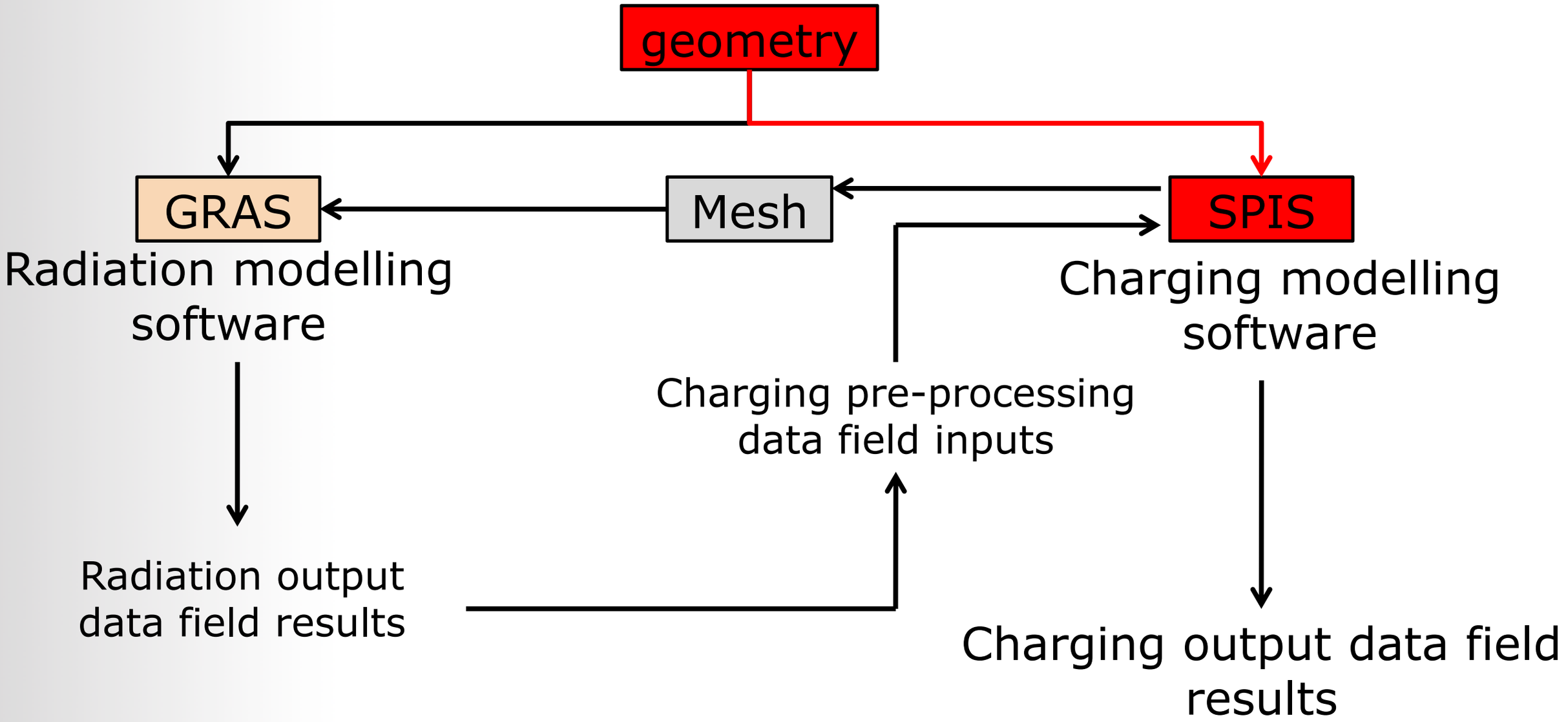
What are the improvements of SPIS-UI in CIRSOS context?



Outline

- Direct GDML-to-geo converter in geometry editor
- Improvement of mesh editor
- Import of external pre-processing data fields in group editor
- Packaging of generated outputs

Direct GDML-to-Geo converter



Direct GDML-to-Geo converter

Development of a new direct GDML-to-GmshGeo converter

- Based on Keridwen CAD modules and SPIS's geometrical templates
- Allow to convert geometries keeping a clean B-rep description
- Currently support only "basic" shapes
- Can extended to new shapes by new templates
- Include geometrical operations
  - Translation
  - Rotation
- Include units conversion (e.g. mm to m, degree to radian)
- Handling of physicals and groups flags (partial)
- Pre-setting of local mesh resolution
- Do not support:
  - Complex shapes yet (e.g. torus)
  - Boolean operations
  - Coordinates systems conversion

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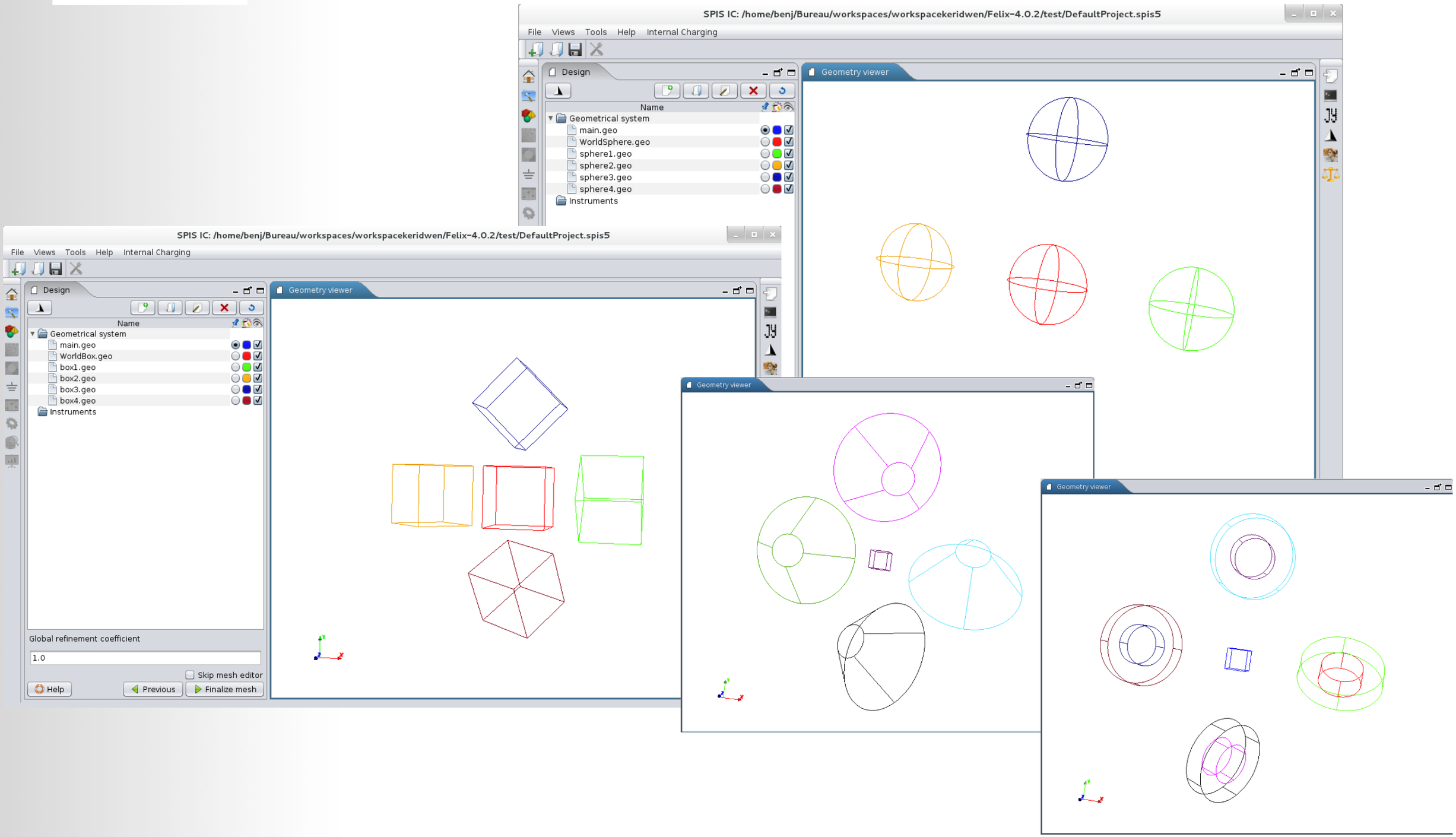
Direct GDML-to-Geo converter

STEP A

Import of the geometry

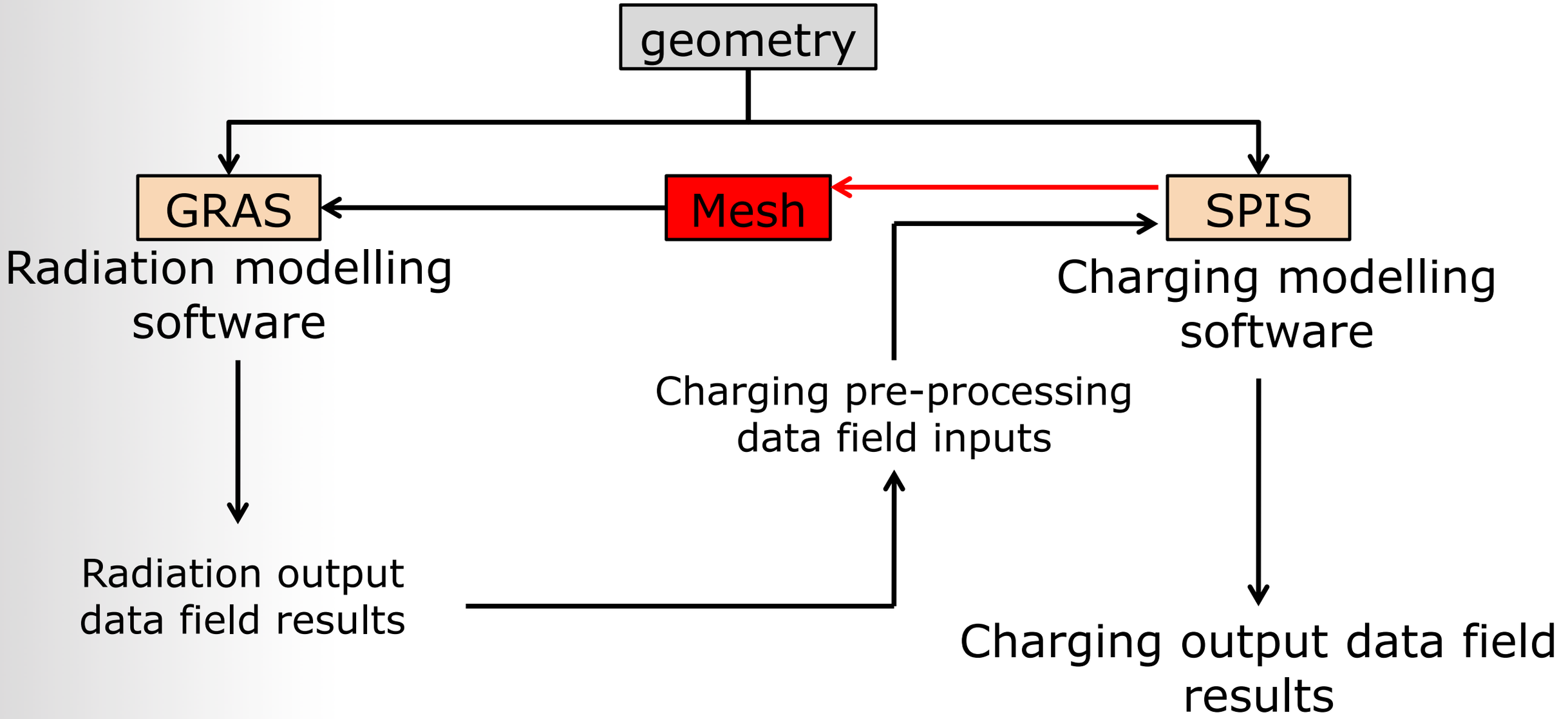


Direct GDML-to-Geo converter

Ideal scenario:
- geometry automatically converted from GDML to Geo.

Real scenario:
- geometry model needs are different for GRAS and SPIS
- geometry adaptation by SPIS users in modelling charging context

Improvement of mesh editor

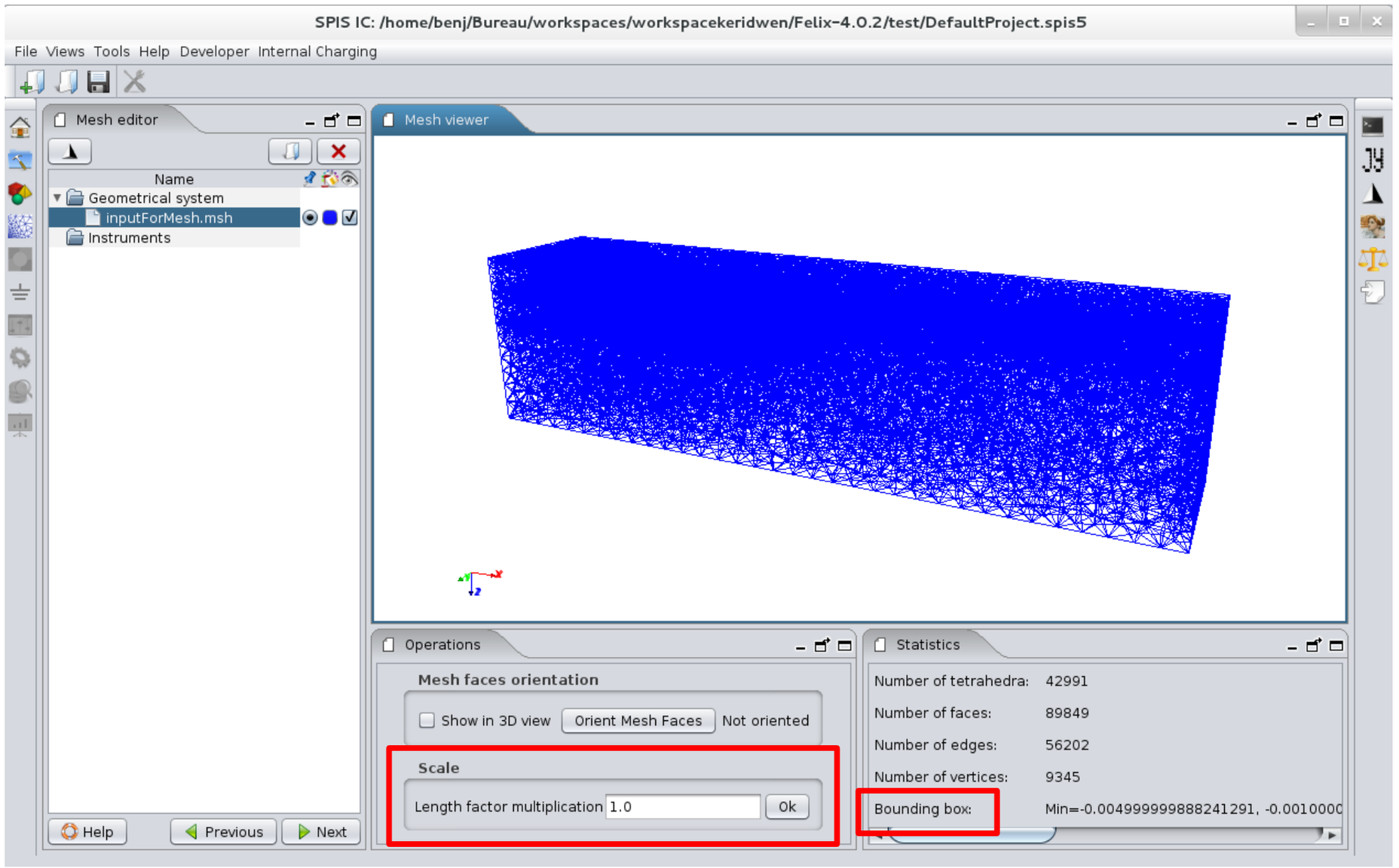


Improvement of mesh editor

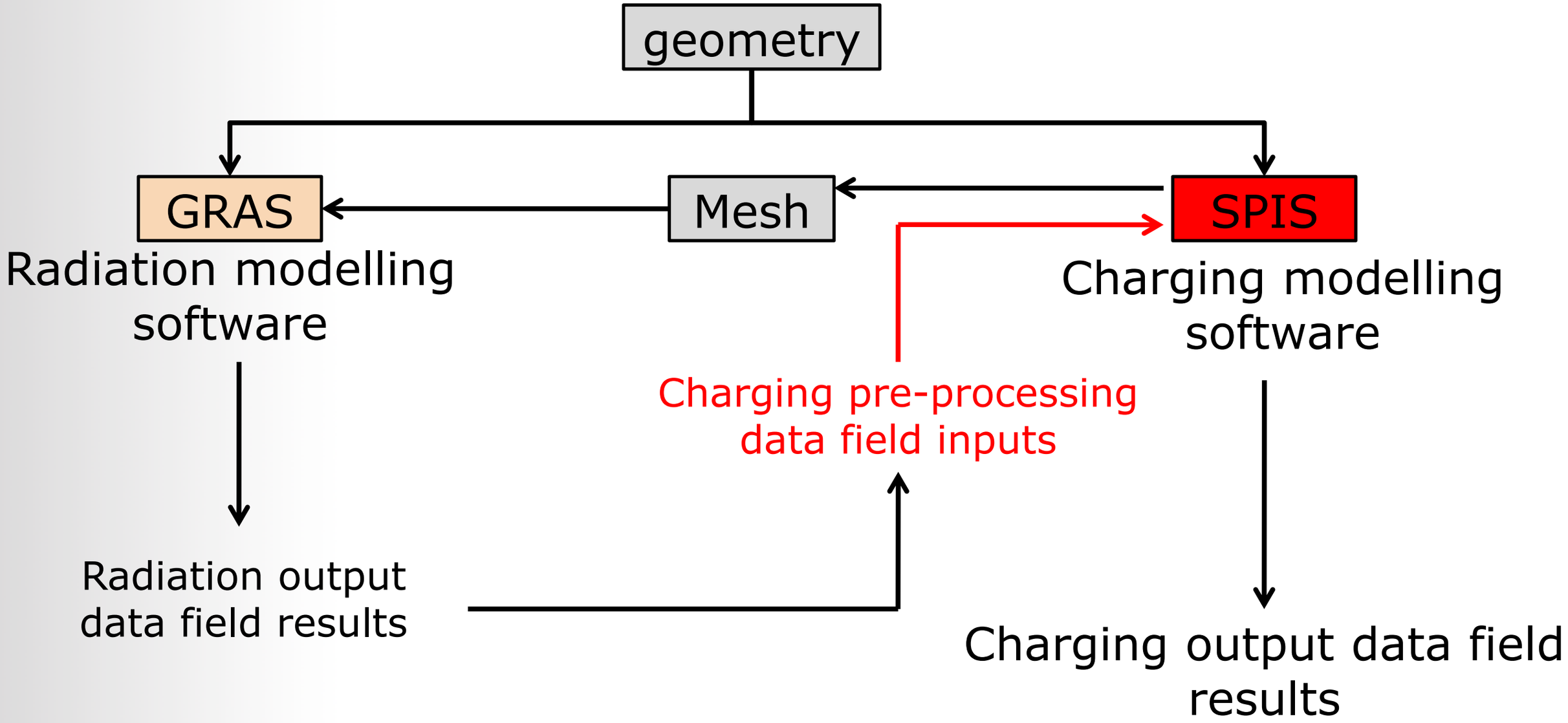
Mesh generation in SPIS

- Generation of the volume mesh
- Scale feature
- Bounding box additional information

Gras unit = mm
SPIS unit = m



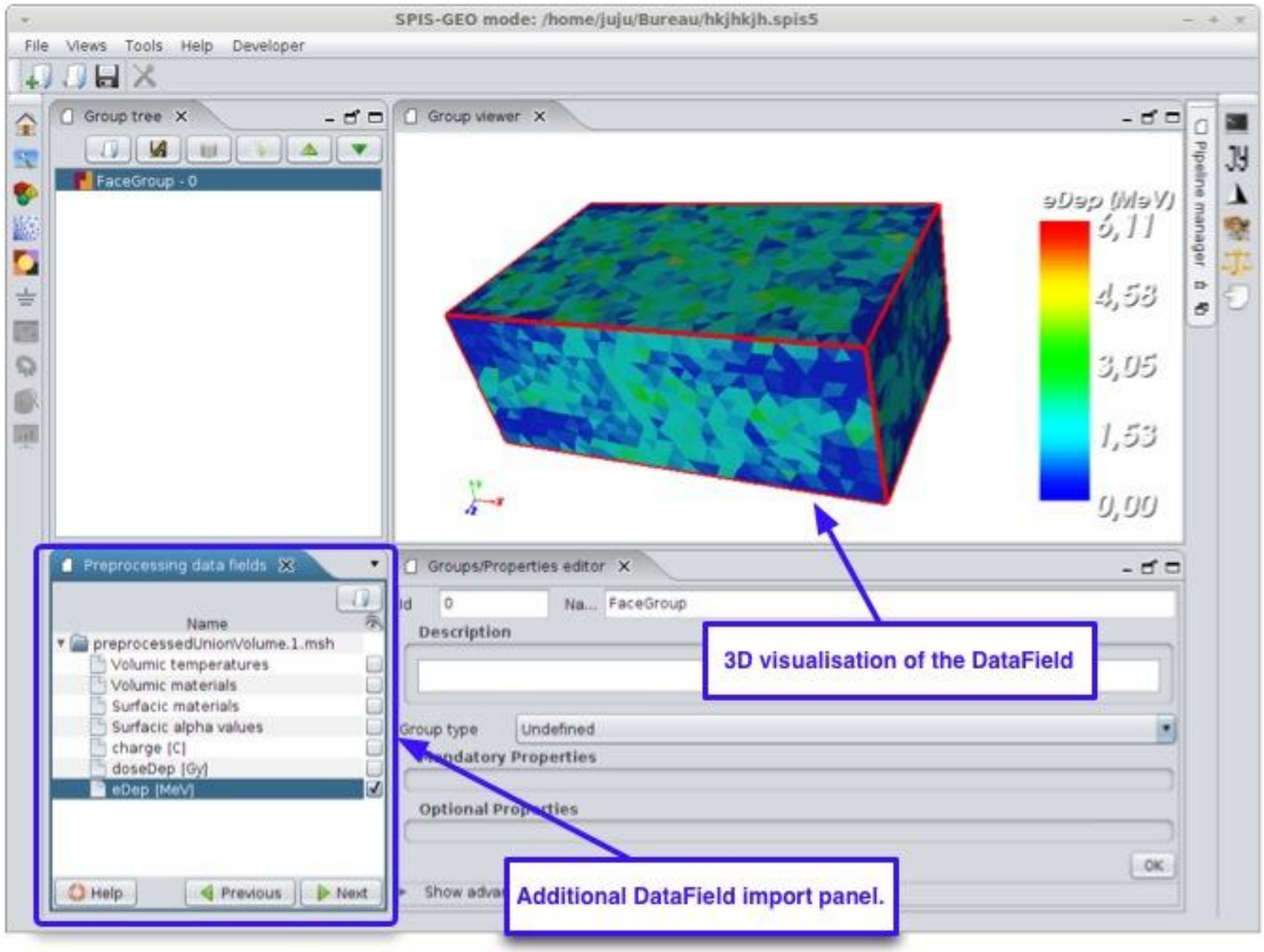
Import of external pre-processing data fields



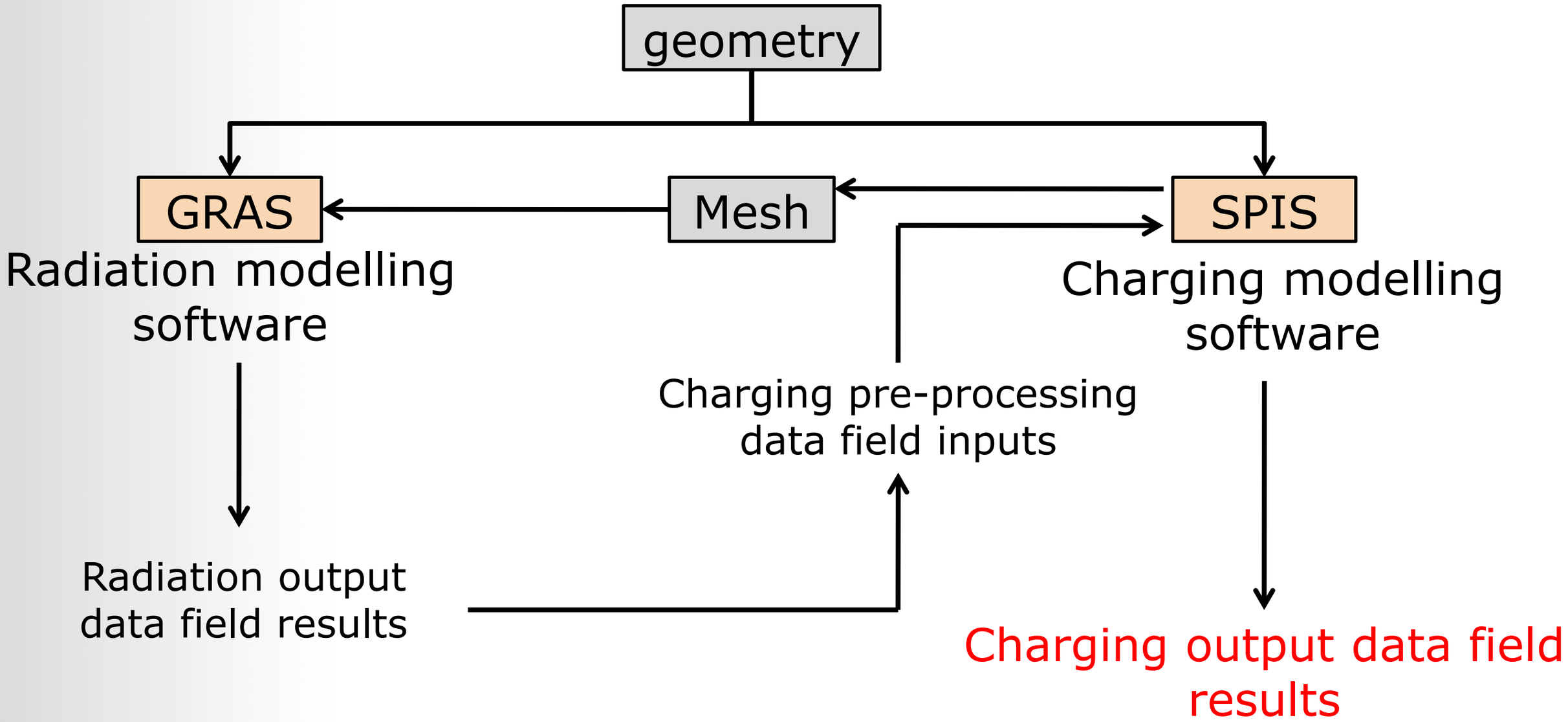
Import of external pre-processing data fields

Generic pre-processing fields loading

- Possibility to load
  - Scalars, vectors
- Localized on:
  - Nodes
  - Edges
  - Surfaces
  - Polyhedra
- Deployed on volumes as well as surfaces
- Data fields format supported
  - Gmsh mesh
  - SPIS NetCDF
- 3D visualization of imported data fields



Packaging of external outputs

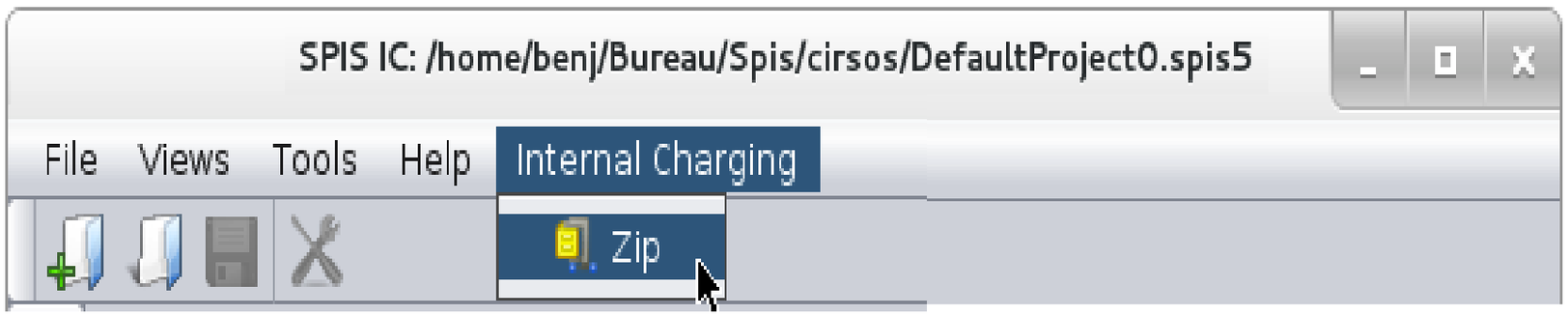


Packaging of external outputs

- Lot of data produced by SPIS
- Until now, local application of SPIS
- Shared data in CIRSOS context
  - Problem 1: disk footprint on the data base
  - Problem 2: bandwidth constraints on the network transfer

Final packing of generated outputs

- Adding zipping function in SPIS (see Internal Charging menu)
- Pack all generated outputs (DataField)
  - Reduce the disk footprint on the data base;
  - Reduce the constraints on the network transfer



Conclusion

- GDML-to-Gmsh geometry converter developed
- Manage spatial mesh unit
- Import external pre-processing data fields
- Generate zip file from SPIS outputs to share them

All operations not automated.
Need manual expertise

Questions?