Status of Detector Description

Joint SPD S&C and SPD Physics and MC meeting

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SPD detector description in SPDRoot

SPDRoot detector description

- The detector description in SPDRoot is located in the code of framework.

- The geometry description is completely parameterized. The parameters for the code that generates the geometry are located in **spdroot/common** directory. The files format here is unfriendly for new users.

- The main part of the geometry description is contained in **spdroot/spdgeometry** and **spdroot/passive** directories.

- The description of a part of the detectors is right in head directory.
  For example: **spdroot/farish**.

- Geometry version control is performed at Git level.

SPDRoot detector description

Advantages:
- SPDRoot allows the user to quickly change the geometry of the detector.

Disadvantages:
- The user needs to recompile the entire framework to change the geometry parameters.
- Several versions of the same subsystem' geometry are contained in directories.

SPD detector description in GeoModel

Current status

- The description of the detector is a C++ project.

- It contains several classes:
  - SPDMaterialBuilder - a class in which materials are defined
  - SPDMaterialList - a singleton class is responsible for accessing materials.
  - The geometry is described in separate classes.

- Currently, 3 subsystems have been described in full and 1 partially.

- Access to the detector description is carried out through working with the db file.

Sensitive detector in Geant4 (now)

adding a flag «_sens» + «_type of sensitive volume» to GeoModel logical volume name

creating of Geant4 geometry from GeoModel geometry

getting logical volume store, filtering volumes

adding selected volumes into sensitive detectors

Sensitive detector in Geant4 (plan)

writing sensitive volumes names into external file

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creating of Geant4 geometry from GeoModel geometry

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getting from logical volume store volumes with names from external file

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adding selected volumes into sensitive detectors
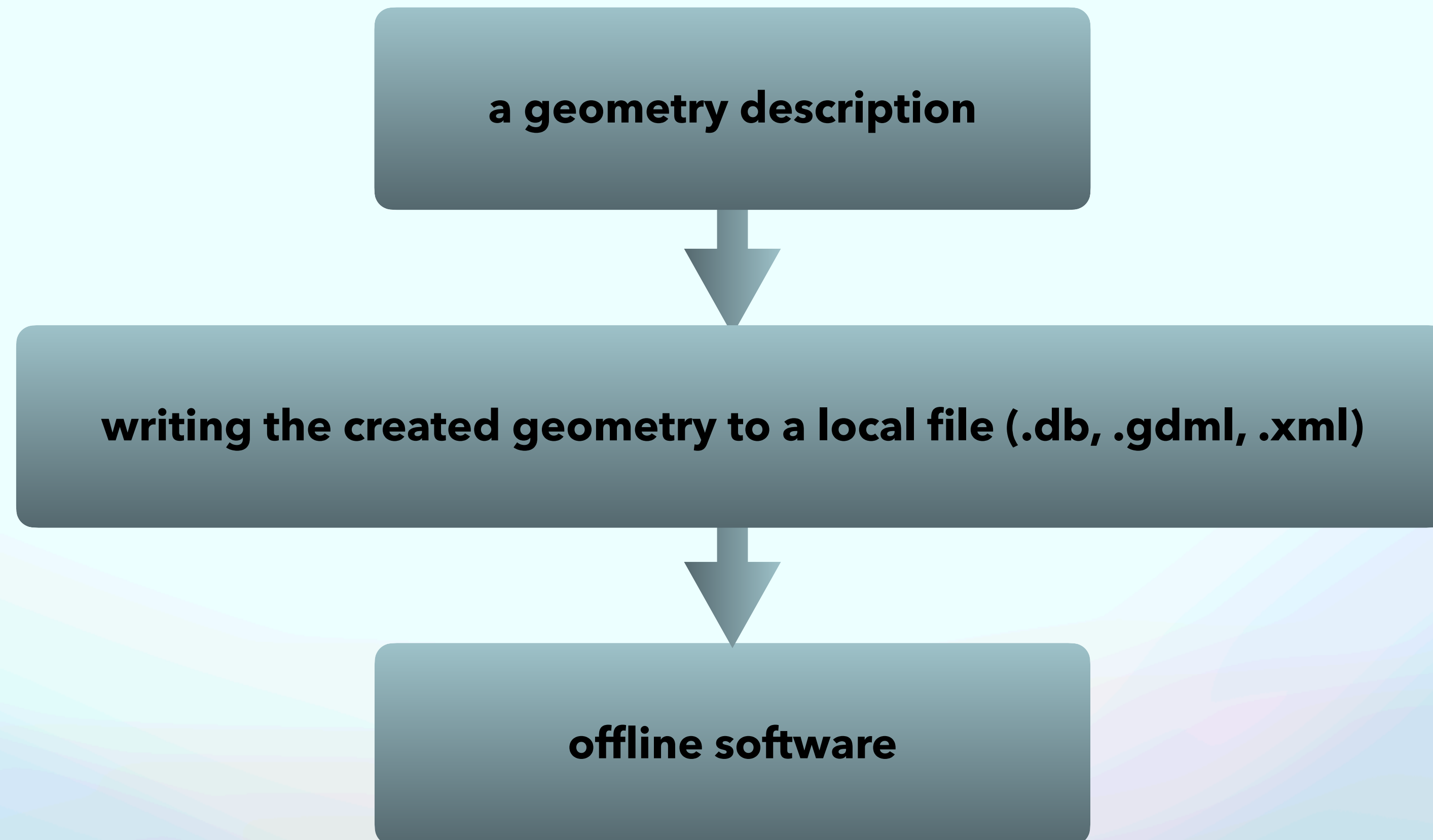
SAMPO and GeoModel

Status integration

- **GeoModelSvc** - provide access to the db file, build the GeoModel geometry

- **G4GeoModelTool** - build the Geant4 geometry from GeoModel geometry

- **G4DetectorConstructionSvc** - declaration of sensitive volumes

- **G4FieldTool** - need to be developed

- Usage of detector description in reconstruction?

Geometry versioning

The mechanism of interaction with GeoModel

a geometry description

↓

writing the created geometry to a local file (.db, .gdml, .xml)

↓

offline software

Geometry versioning

- The detector description will stored in a separate directory. SAMPO just need in path and db files' name.

- The version of detector description will be code into name of db file. **Naming convention is required.**

- **Is it possible to extract only one subsystem without loading the entire detector description into memory?**
  No, neither GeoModel DB manager nor the conversion mechanism of GeoModel data to a Geant4 geometry allows us to do this.

  Solution: after each detector description edit generate a database with a description of the entire detector and generate separate databases with a description of the subsystems.

Next steps

- Update sensitive detector mechanism;

- Range system inner structure description;

- Usage detector description in reconstruction.

Thank you for your attention!