SPENVIS
Java Geometry Definition Tool

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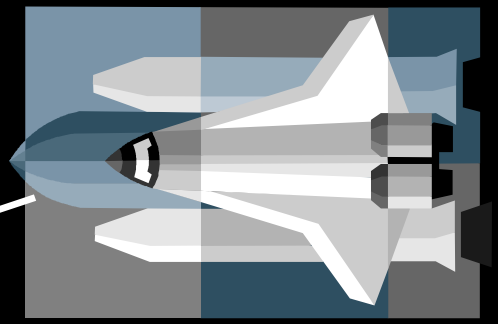
Outline

- Introduction
- News since last Workshop in 2010
- Program use
- Application Example (JUDE UV imager)
- Format Exchange (CAD -> GDML -> CAD)

Introduction

Easy to use
& free

Java Geometry
Definition Tool



Immediate visualisation
of the geometry

In-/Export

Load / Save
binary format

Export

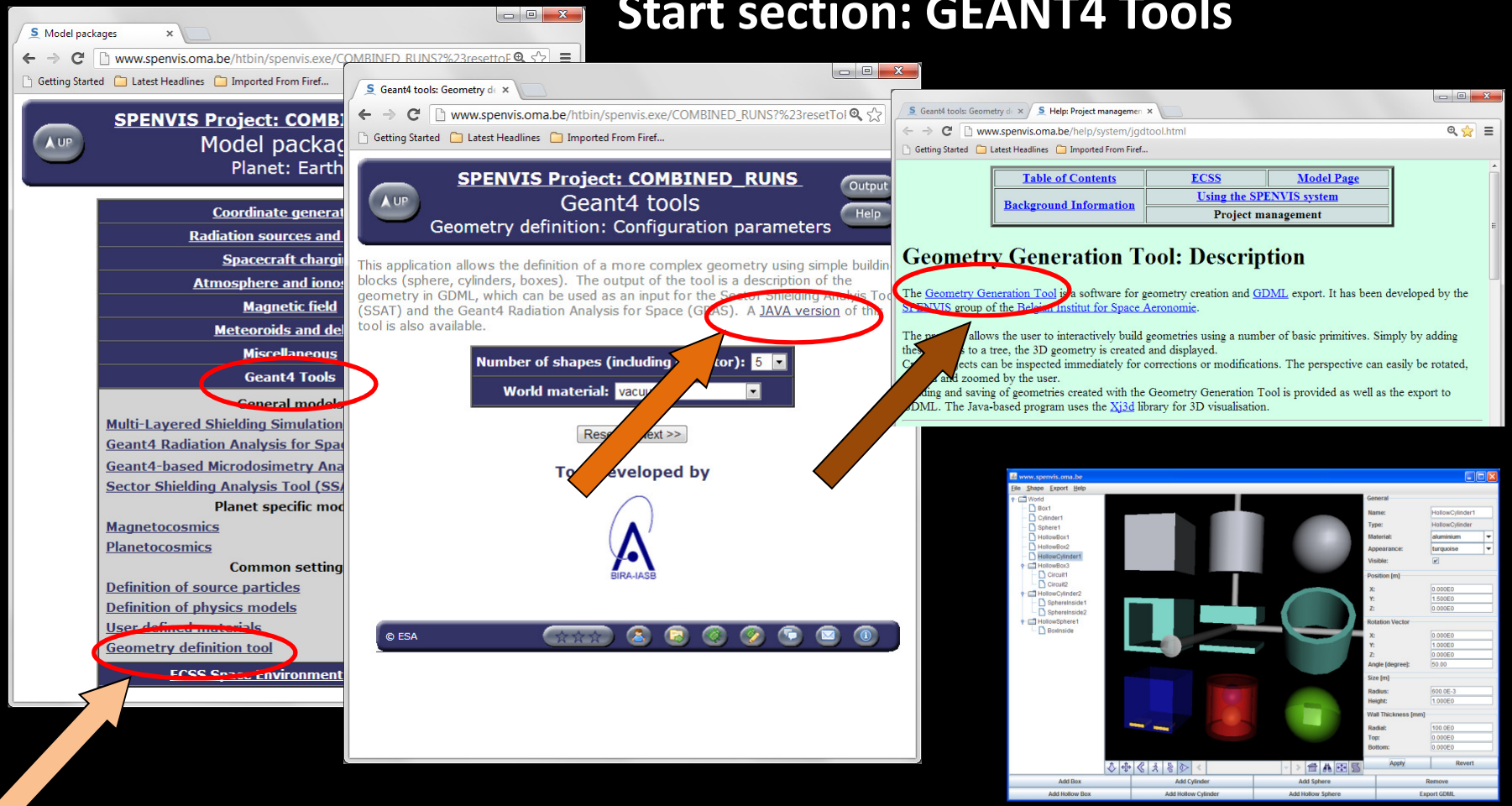
GDML
(GEANT4 format)

News since 2010

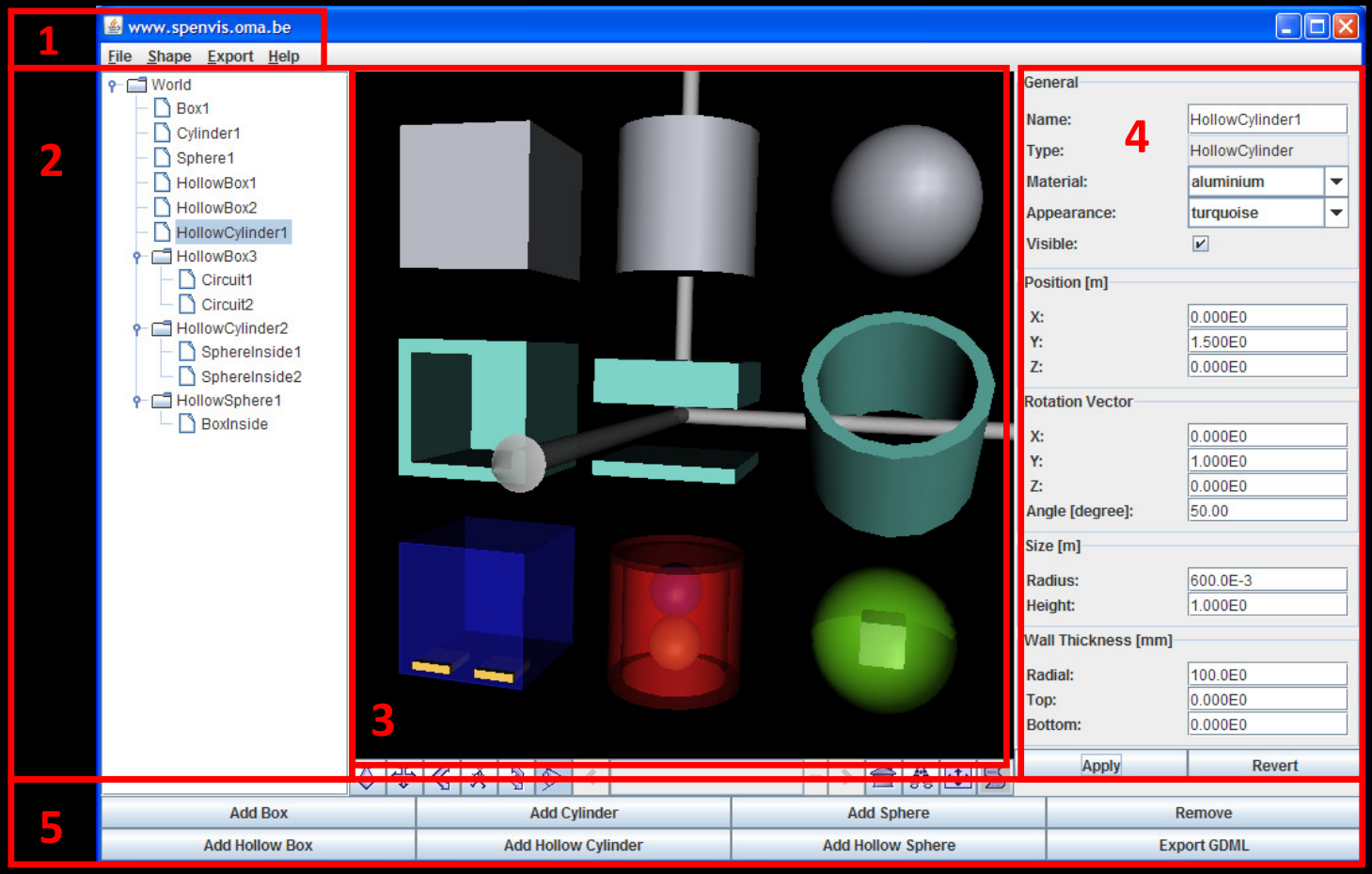
- SPENVIS Workshop-2010 presentation: www.spenvis.oma.be/download/suw2010/presentations/8419_HETEY.pdf
- Since, no fundamental change
- Several bug corrections, two important:
- 1) Physical volume tags now include a name attribute, prefixed with “pv_”, SPENVIS-bug-207, e.g. <PHYSVOL NAME=“pv_Box1”>
- 2) Rotation direction now in line with SSAT/GRAS, see SPENVIS-bug-196

Program Use: Access

Start section: GEANT4 Tools



Required: Java Web-Start 6.0+ & Internet Connection



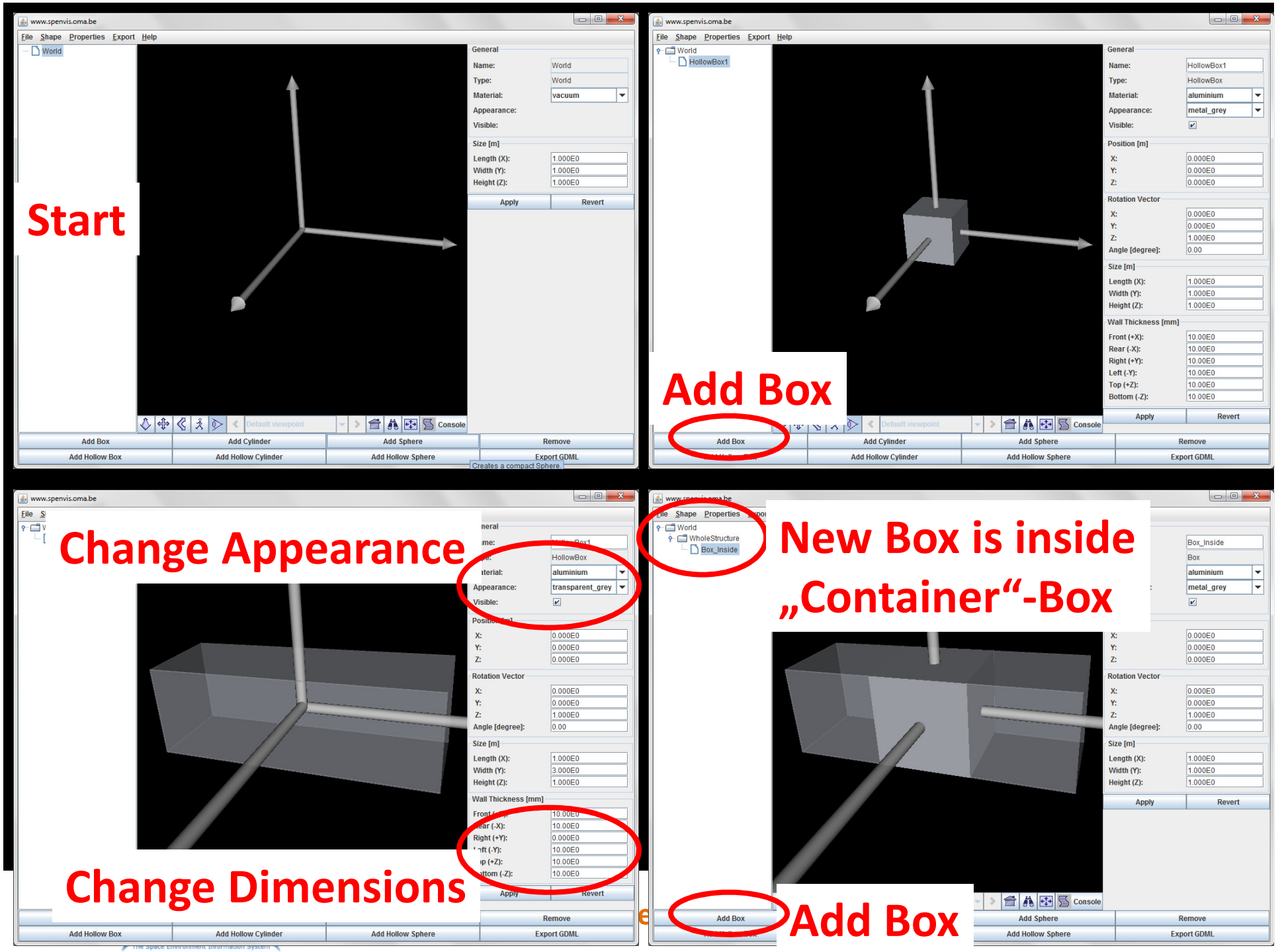
1: Menu bar

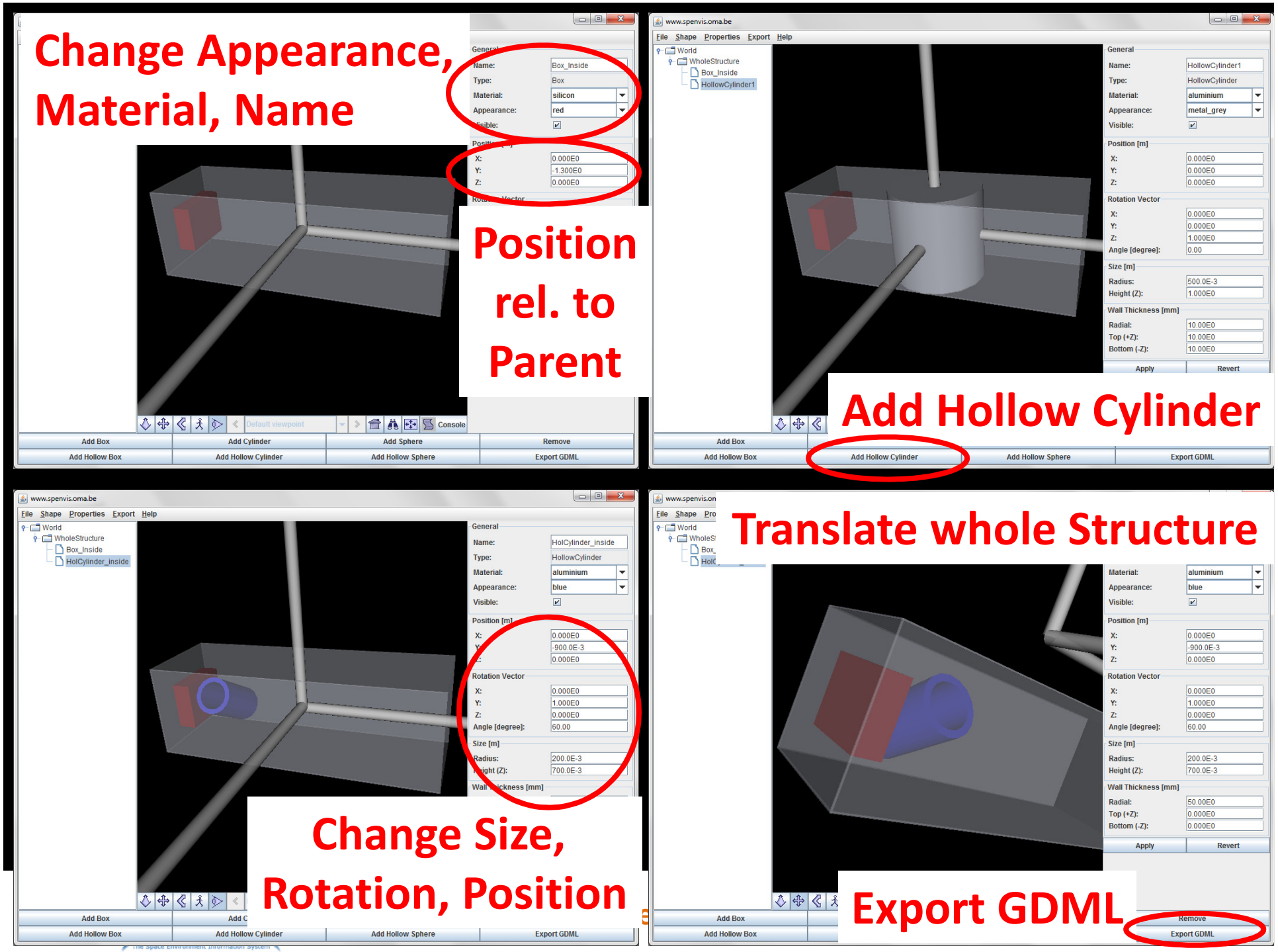
2: Tree panel

3: Visualisation panel

4: Property panel

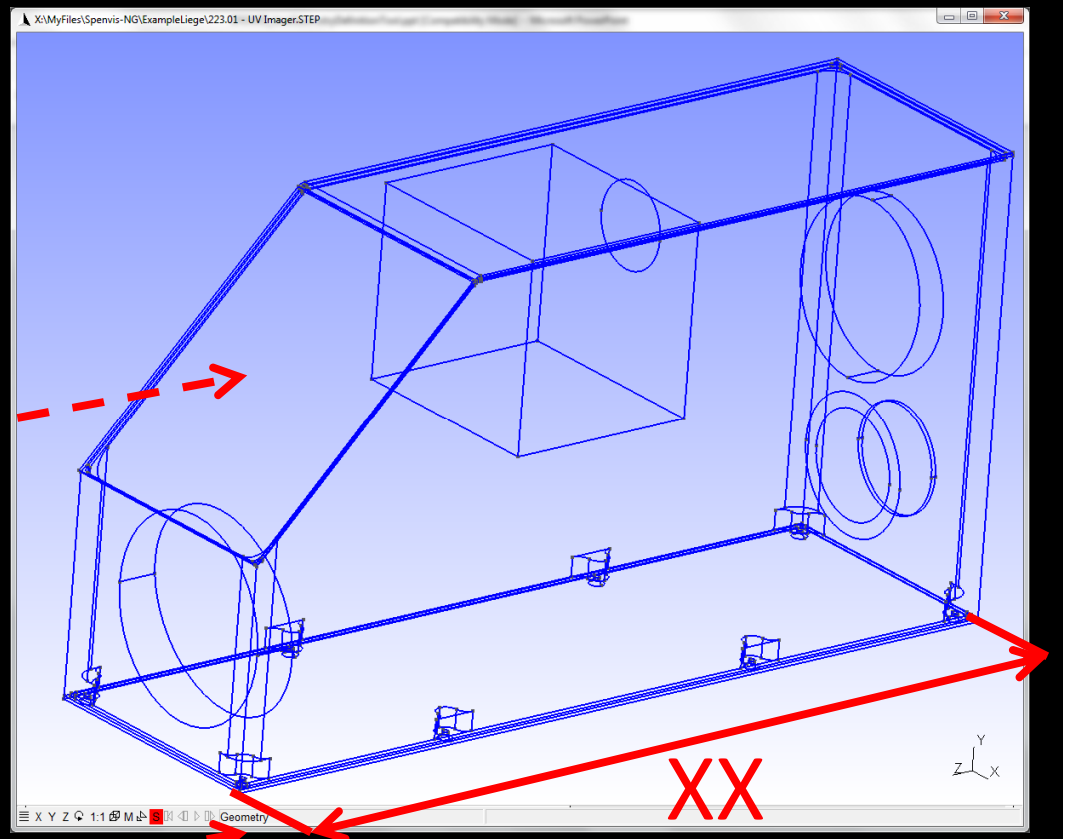
5: Action buttons


Start
Add Box
Change Appearance
Change Dimensions
New Box is inside
„Container“-Box
Add Box

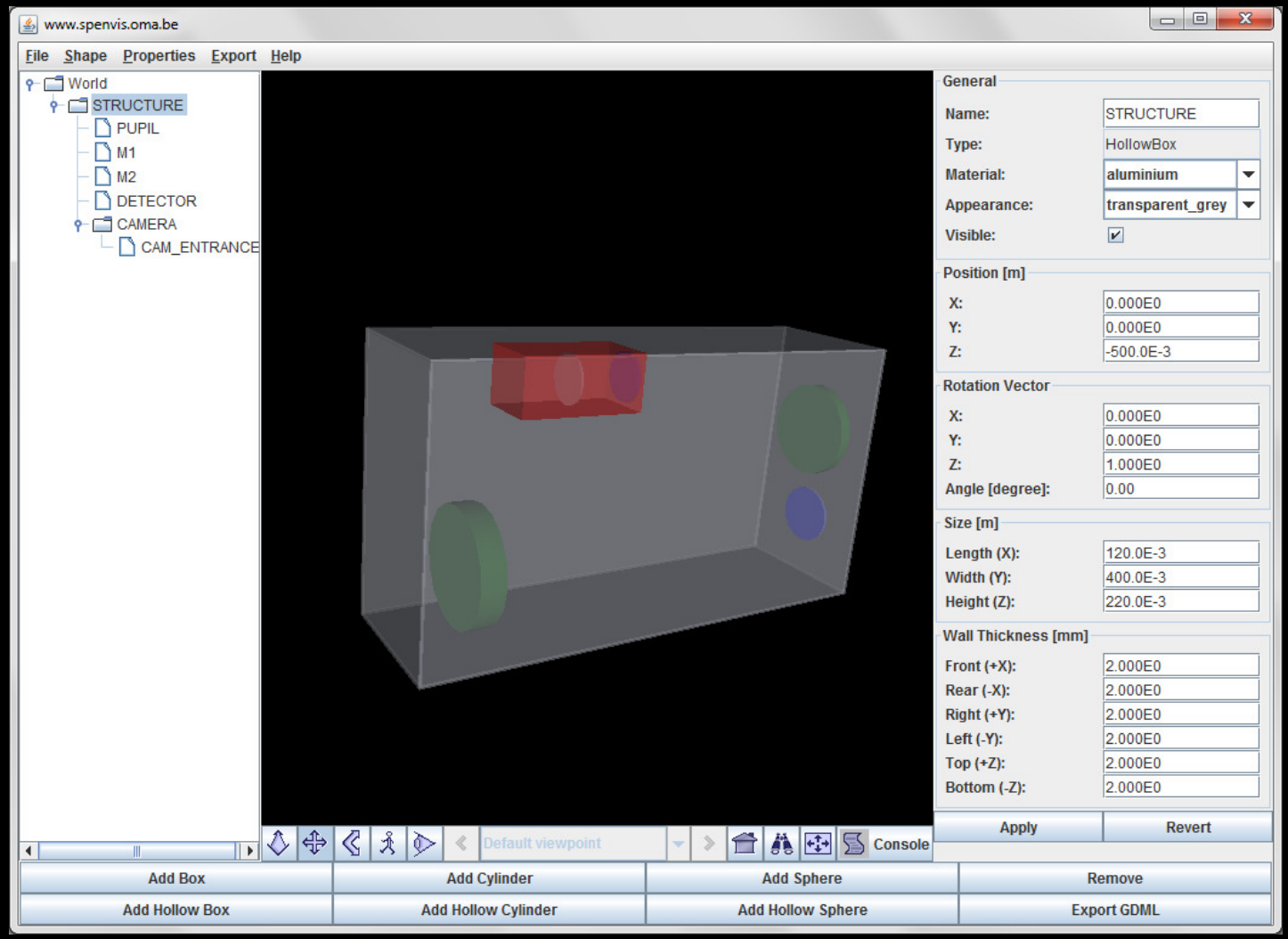

Change Appearance, Material, Name
Position rel. to Parent
Add Hollow Cylinder
Change Size, Rotation, Position
Translate whole Structure
Export GDML
www.spenvis.oma.be
File Shape Properties Export Help
World
WholeStructure
Box_Inside
HollowCylinder1
HolCylinder_inside
General
Name:
Type:
Material:
Appearance:
Visible:
Position [m]
Rotation Vector
Angle [degree]:
Size [m]
Radius:
Height (Z):
Wall Thickness [mm]
Radial:
Top (+Z):
Bottom (-Z):
Apply
Revert
Add Box
Add Hollow Box
Add Cylinder
Add Hollow Cylinder
Add Sphere
Add Hollow Sphere
Remove
Export GDML
Console

Application Example (JUDE Imager)

- See presentation by L. Rossi (Uni Liège)
- Start: CAD geometry in STEP format
- Geometry simplification req. (box, sphere, cyl.)
- Dimensioning "by hand"



Application Example (JUDE Imager)



Format Exchange (CAD <-> GDML)

- Basic question:
  How to transform CAD to GDML?
  => NO easy solution!!
- CAD programs (CATIA, Pro/Engineer) do not (yet) export to GDML
- But CAD programs use tree-structure for geometries, which could be adapted to the XML structure of GDML

CAD Exchange Formats: IGES, STEP

- IGES (latest version: 1996)
- STEP (still under development), not unified

```
HEADER;
FILE_DESCRIPTION (( 'STEP AP203' ),   '1' );
...
DATA;
#1 = LINE ( 'NONE', #1, #2 ) ;
#2 = CIRCLE ( 'NONE', #61, 4.999999999999997300 ) ;
#3 = CARTESIAN_POINT ( 'NONE',  ( 40.00262149313690700,
84.16671534130532000, 3.08981016039067360 0 ) ) ;
#4 = CARTESIAN_POINT ( 'NONE',  ( 39.99733838508482400,
78.89163304442807600, 3.50342743911256570 0 ) ) ;
...
```

Lines, Surfaces

Points

Format Exchange: GDML Format

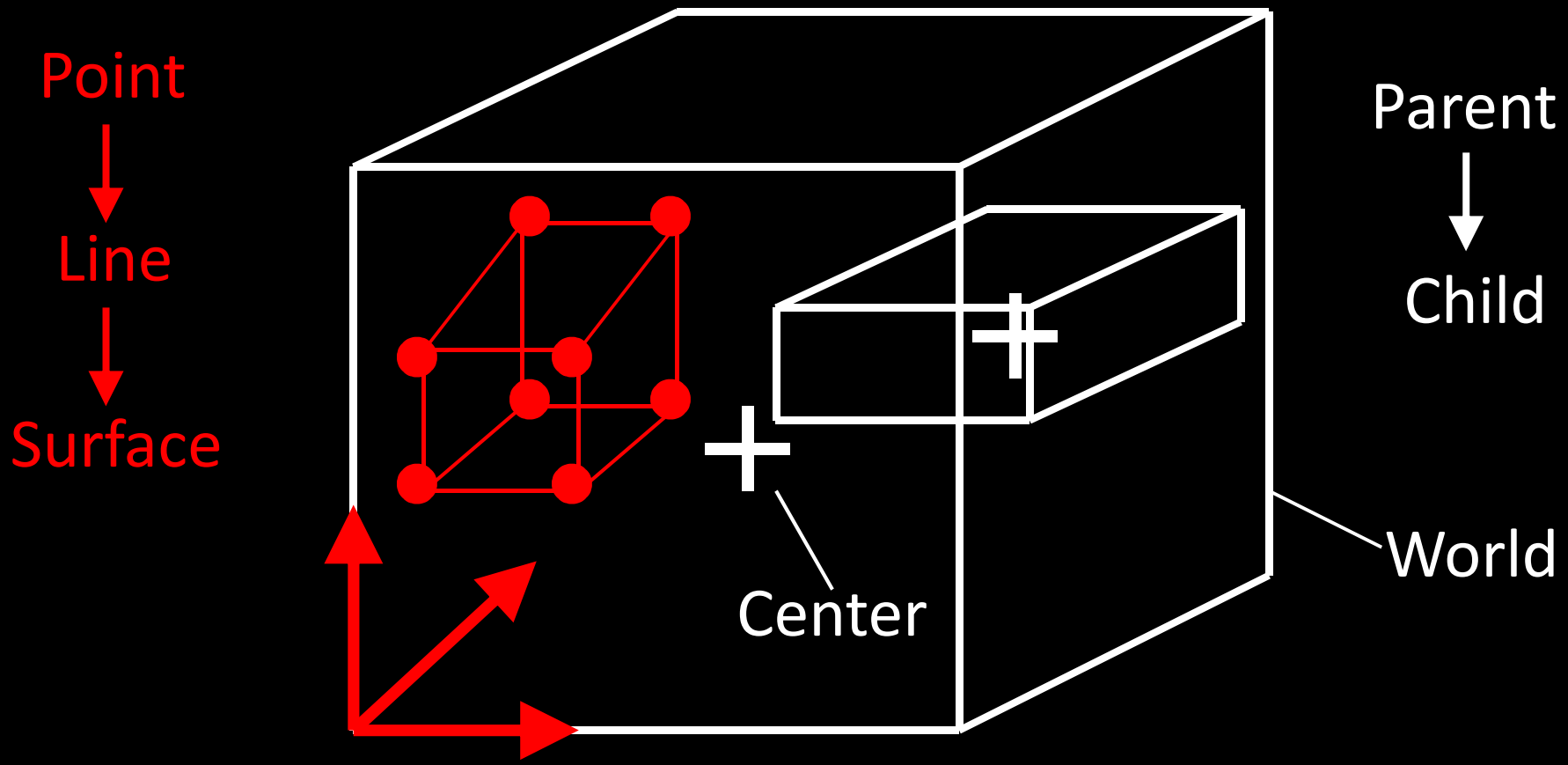
- GDML is XML based meta-language to run GEANT4
- Shape-based geometry definition, not node-based
- Geometry in tree structure

```
<define> … </define>
<materials> … </materials>
<solids> … </solids>
<structure>
  <volume name="Box1"> … </volume>
  <volume name="World"> …
    <physvol>
      <volumeref ref="Box1" /> …
    </physvol>
  </volume>
</structure>
```

General Definitions

Structural Tree:
„Box1“ inside „World“

CAD vs. GDML



Arbitrary geometries → Only GDML geometries

Format Exchange

- Special tools from GEANT4 community
- FASTRAD: GDML creation (free version is limited)
- Esabase2 (not tried)
- FreeCAD: GDML=>CAD for simple geometries, e.g. box & cylinder (reported)
- http://www.solveering.com STL=>GDML basic translation functionality (reported)
- For new developments: OpenCascade (C++ library for CAD, STEP/IGES interfaces exist)

End