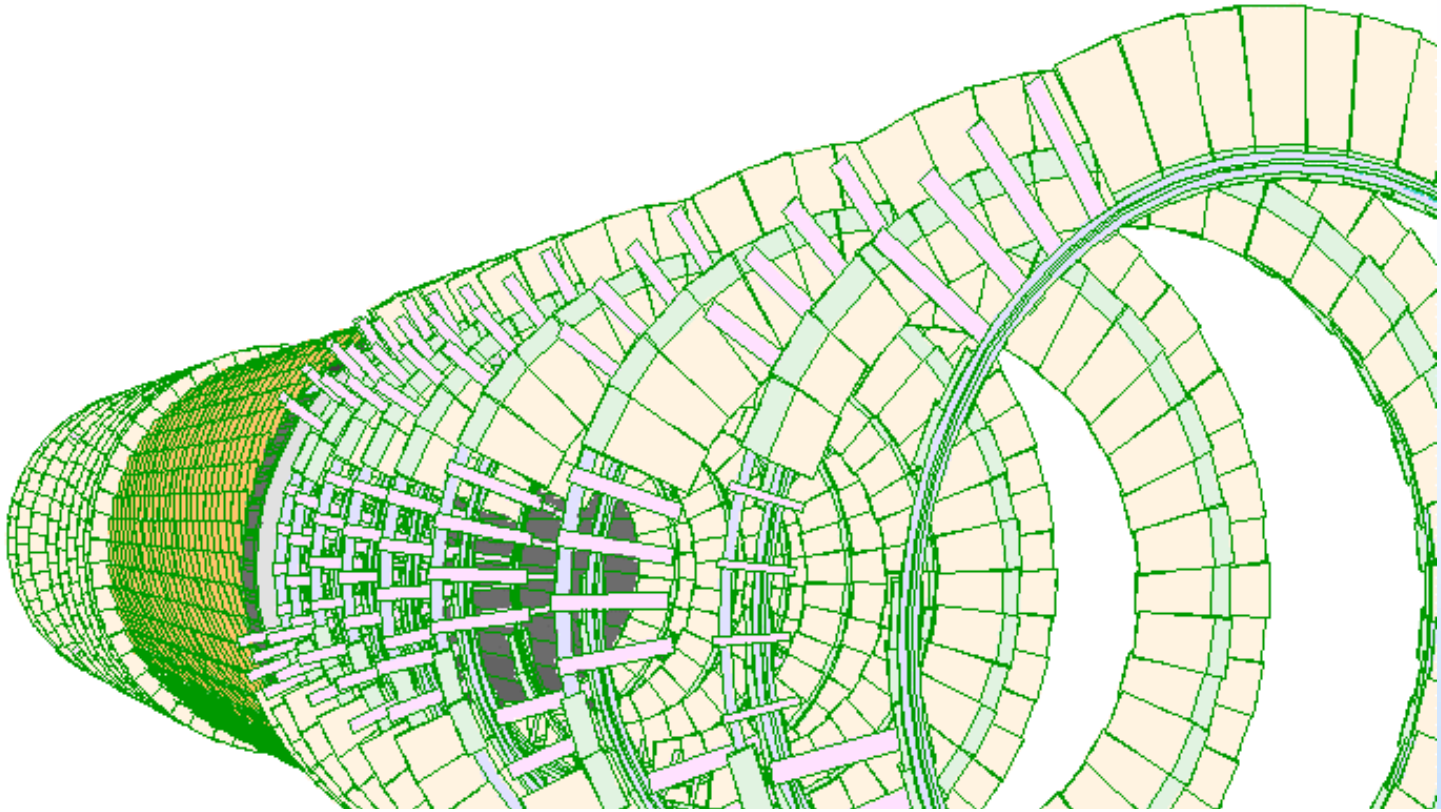


An AGDD "XmlFileBuilder"

Christopher.Lester@cern.ch

AGDD_XmlFileBuilder

- Why do we need XmlFile builders?
- What do we want from them?
- What can AGDD_XmlFileBuilder do?
- Where can you get it?

The problems ... part 1

AGDD/XML files contain ...

- Repeated numbers. Eg: tubes of similar design sharing common diameters but having different lengths.
- Functionally related numbers.
  Eg: $translation_x = width/2 + \cos(\theta_{stereo})$
- Algorithmically related numbers. Eg:

```
const int N=10; // number of trds
for(int n=0; n<N; n++) { // loop over each trd
        trdSkew[n]=atan(n); // set skew angle
}
```

The problems ... part 2

AGDD/XML files contain ...

- Repeated strings. Eg: ID definitions, and subsequent IDREFs.
- Functionally computed strings.
  Eg: waferName = "SCT_" + (inner ? "inner" : "outer") + "_wafer";
- Algorithmically computed strings. Eg:

```
const int N=10; // number of wafer types
for(int n=0; n<N; n++) { // loop over each wafer
    // set name for wafer type ...
    waferTypeName = "SCT_waferType_" + n;
}
```

The problems … part 3

AGDD/XML files **do** have sources …

- Databases
  - Assembly Breakdown (ABS)
  - Production database
- Drawings
- Even peoples memories!

… and all these change and update frequently.

XmlFileBuilders can read some of these, and help keep XML files up to date.

XmlFileBuilders - what do we want from them?

- **Freedom:**
  - Freedom to use the **full power** of any developed language (C++, Java, Fortran, Perl, …) when building our XML file.
- **Simplicity:**
  - Close relationship between builder code and output XML, but ...

XmlFileBuilders - what do we want from them …

- **Benefits:**
  - "Out of order" building
  - Reference management
  - Syntax handling (<pos>…</pos>)
  - Strong syntax checking
  - **Independence of output format / DTD**
  - Define complex constructions

What is AGDD_XmlFileBuilder?

- In the ATLAS software under
  offline/DetectorDescription/AGDD_XmlFileBuilder
- The set of C++ tools comprises
  - library
  - user tool classes
    - (and implementation classes …)

AGDD XmlFileBuilder in Action

```
// Make new box:
Box * myBox = new Box;

// Set it's parameters:
myBox->setName("myWafer");
myBox->setBox(length, width, height);
myBox->setMaterial(silicon);    // various possibilities ...
```

AGDD XmlFileBuilder in Action

```
// Make a positioner. We will use PosXYZ:
 PosXYZ * boxPos = new PosXYZ;

// Set the positioner's parameters:
boxPos->setVolume(myBox);          // Says what to position
boxPos->setRot(10*degree, 0, 0);   // Gives a rotation
boxPos->setXYZ(0, 100*mm, 0);      // Gives a translation
```

AGDD XmlFileBuilder in Action

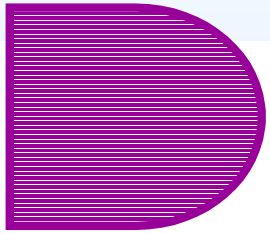
```
// Make a composition:
 Compos * doubleWafer = new Compos;


// Fill the compostion:
doubleWafer->setName("double_wafer");  // Name the compos
doubleWafer->addPos(boxPos);           // What to put in
doubleWafer->addPos(someOtherBoxPos); // … etc ...
```

AGDD XmlFileBuilder in Action

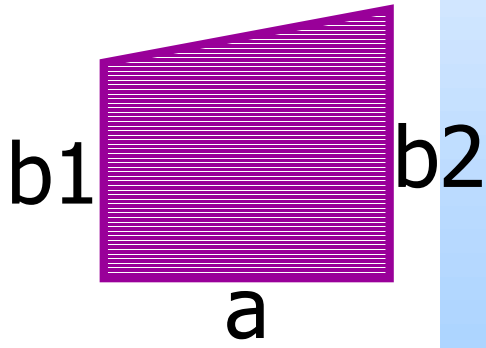
```
// Make a section:
 Section * mySection = new Section;


// Set the top volume, and print XML file!
mySection->setName("SCT_sensitive");
mySection->setTopVolume(doubleWafer);
mySection->setAuthor("Christopher Lester");
mySection->buildTheRoot();   // Fixes geometry in stone!
mySection->sendMeTo(cout);   // Alternatively print to a file ...
```

Advanced features

Use shapes which are not in the DTD, without forcing Marc to produce a new version of Persint!



```
// Make a halfTrd:
HalfTrd * shapeNotInDTD = new HalfTrd;
```




```
// Set the top volume, and print XML file!
shapeNotInDTD->setName("wedge");
shapeNotInDTD->setHalfTrd(a, b1, b2, thickness);
```

Advanced features

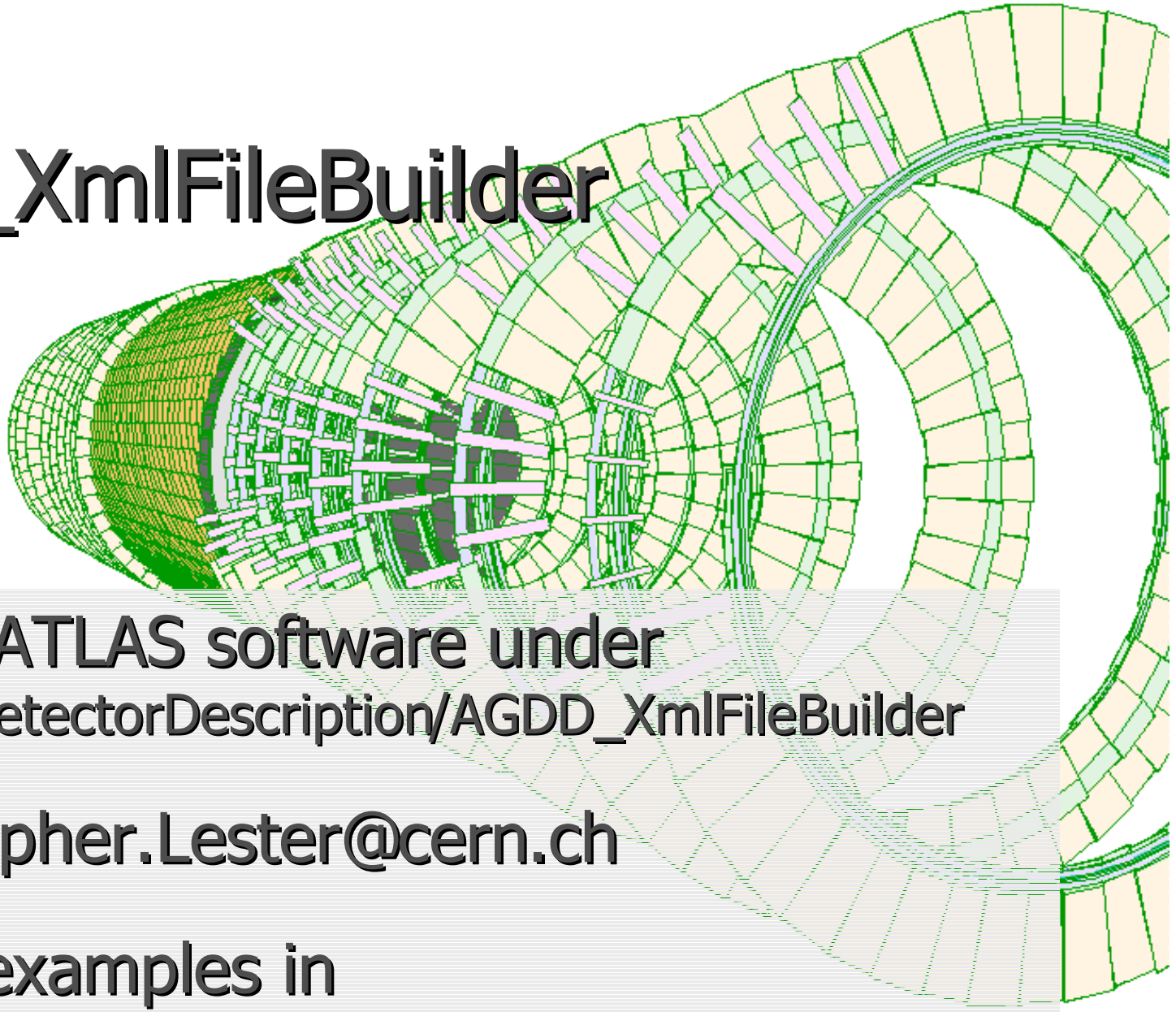
When two things are similar but not quite the same ...

```
// A function to return a complicated object:
Compos * makeComplicatedLayer(int layerNumber) {
        Compos * layer = new Compos;

        layer->setName("SCT_layer_"+layerNumber);
        if (layerNumber==2) {
                // Build the layer in a special way
        } else {  /* Build the layer in the normal way */  };

        return layer;
};
```

Benefits summary

- Frees users from some limitations of AGDD/XML
  (see "What do we want?" slides)
- Permits external sources of "fundamental parameters" from which to build XML files
- Meets goals for functional and algorithmical operations on parameters
- Permits complex objects to be manipulated

AGDD_XmlFileBuilder

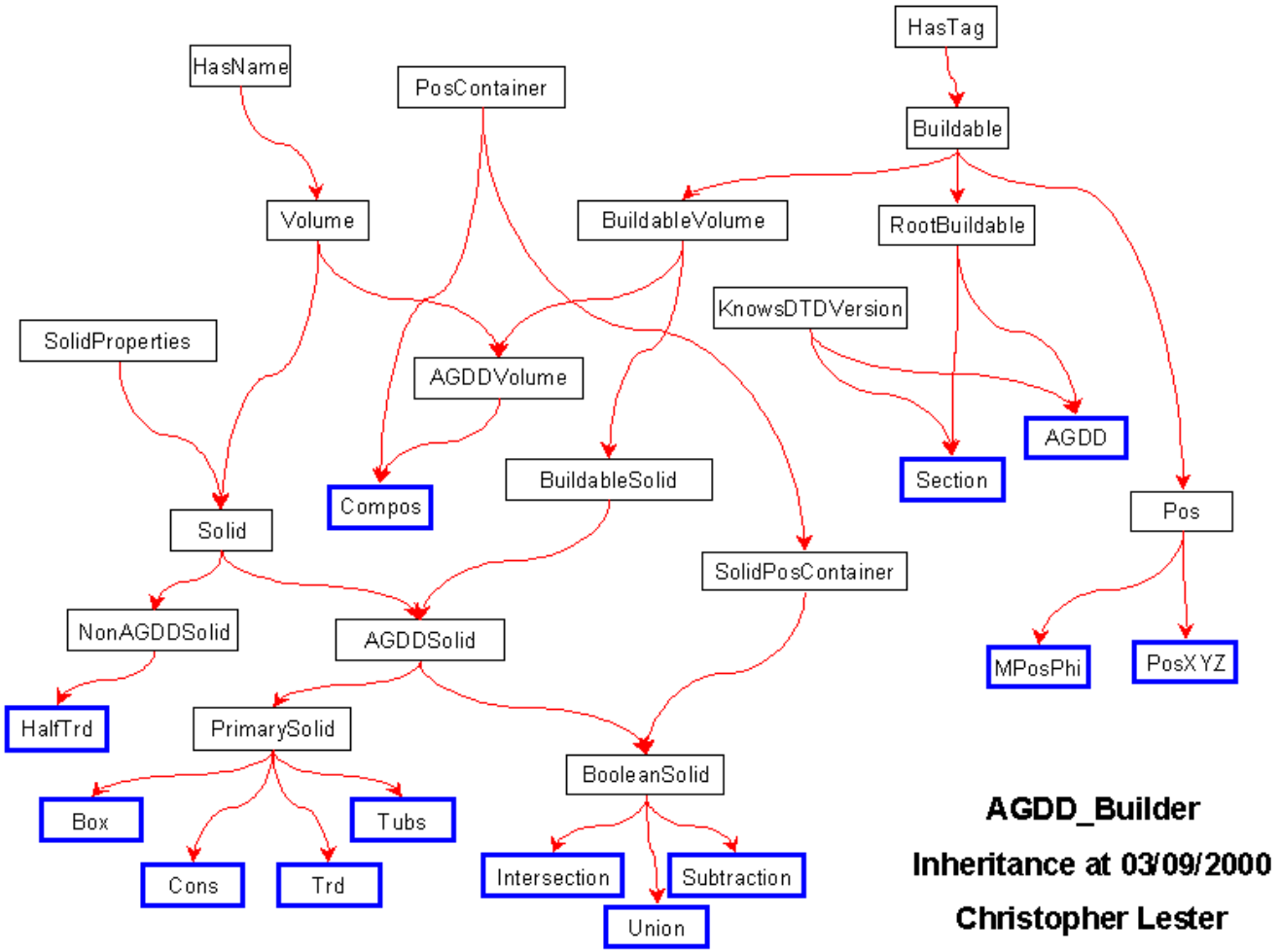


- In the ATLAS software under
  offline/DetectorDescription/AGDD_XmlFileBuilder
- Christopher.Lester@cern.ch
- Some examples in
  offline/InnerDetector/InDetDetDescr/SCT_AGDD_XmlFileBuilder

Down-sides:

- Someone has to maintain it ! :(
- Tools must update with each DTD
  - OK if update is minor
  - Hard work if change is major?
    - At least the geometry code has a hope of staying the same
- Three things to version:
  - Inputs
  - Tools
  - GeoCode

AGDD_XmlFileBuilder



Internal workings ...