

# Towards an LDC Reconstruction

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Jenny List  
LDC Meeting  
June 21, 2007

- Organisational remarks
- Comments from a Marlin beginner
- Towards a standard reconstruction
  - What do we expect?
  - Where are we?
  - What is feasible as first step?
  - What can be envisioned on the long term?

# Organisational Remarks: Webpage

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- We have a webpage now: <http://www-flc.desy.de/ldcoptimization>
  - What there is already:
    - Documents -> meetings: all meetings up to now with their talks
    - Software:
      - links to ilcsoft and lcsim.org
      - How to run Marlin for the first time
  - What is not yet there:
    - Physics analyses topics
    - People working on optimization
    - Collection of older talks concerning the subject
    - MC generators, analysis tools
    - .....
- => your input is highly welcome!**

# Comments from a Marlin beginner

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- Very, very, very good support!
- Once some basics are understood, it is not difficult to get started
- For further newcomers even more easy with the recipe page: <http://www-flc.desy.de/ldcoptimization/marlinhowto.html> contains also some explanations of issues not immediately clear to me - needs:
  - To be checked by an expert
  - To be extended towards how to set up an analysis
- What is still confusing:
  - Version numbers: even with global version tag version numbers of subpackages are still needed in some places
  - The impression that RAIDA should be used instead of ROOT => clarify reco processor checkplots <-> analysis

# RAIDA Functionality

- very nice to have a generic interface!
- histograms work fine
- way of creating/filling Ntuples worries me:

```
static AIDA::ITuple* ntuple ;
static String[] columnNames = { "iFlat = 0", " fGauss = 3.", " fFlat =-2." };
static Class[] columnClasses = { Integer.TYPE, Float.TYPE, Float.TYPE };
ntuple = AIDAProcessor::tupleFactory(this)->
    create( "ntuple", "ntupleLabel", columnNames, columnClasses, "");
```

- in event loop:

```
tuple.fill(0, r.nextInt(20) );
tuple.fill(1, (float)r.nextGaussian() );
tuple.fill(2, r.nextFloat() );
tuple.addRow();
```
- think of having 100 variables and adding / removing variables...  
=> very error prone ! (... and what about storing arrays?)
- Compare root tree / hbook columnwise ntuple:

```
float fQ2;
tree->SetBranchAddr("Q2", &fQ2);
tree->Branch("Q2", &fQ2, "Q2/F");
tree->Fill();
```

# Towards an LDC Reconstruction

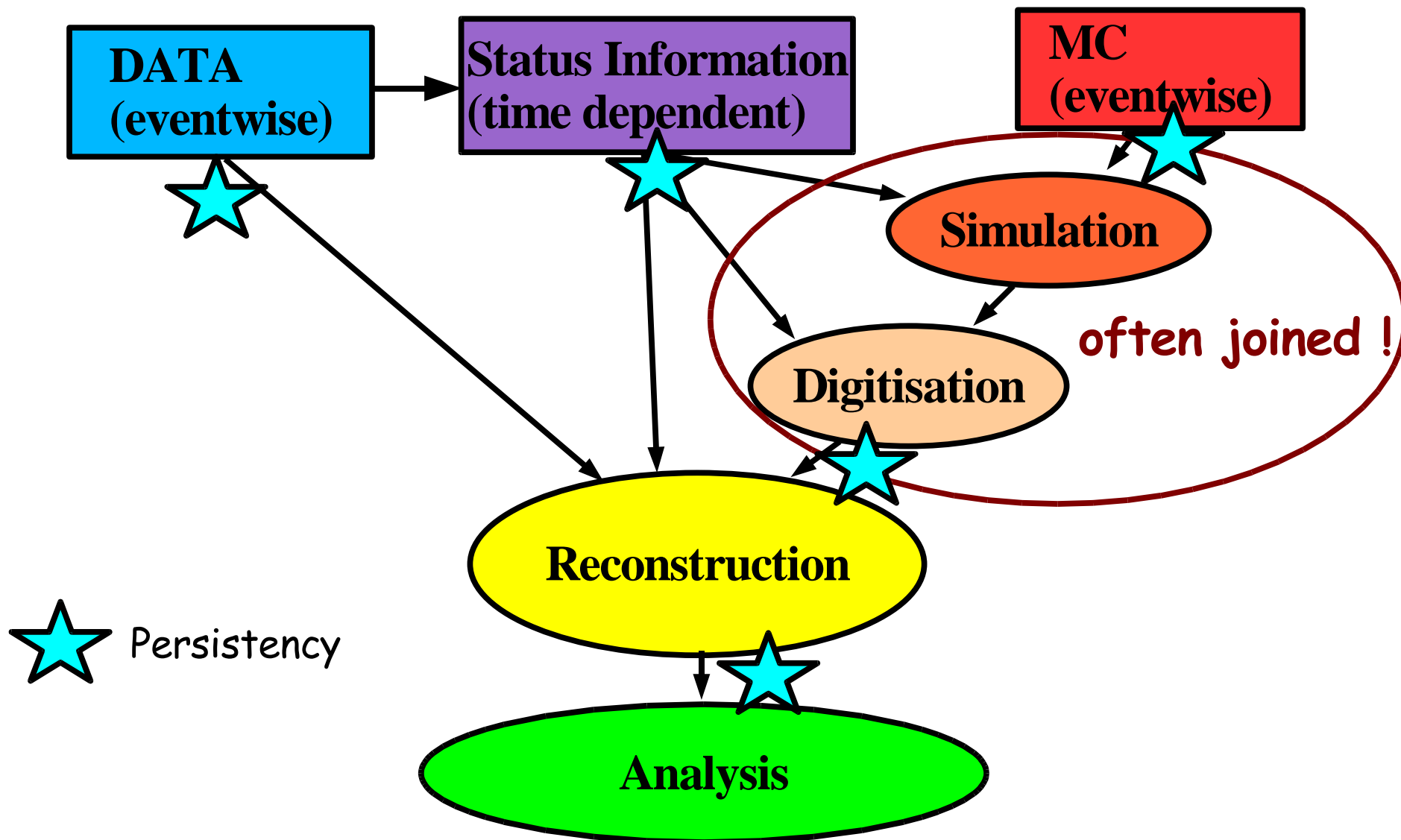
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- What do we expect?
- Where are we?
- What is feasible as first step?
- What can be envisioned on the long term?

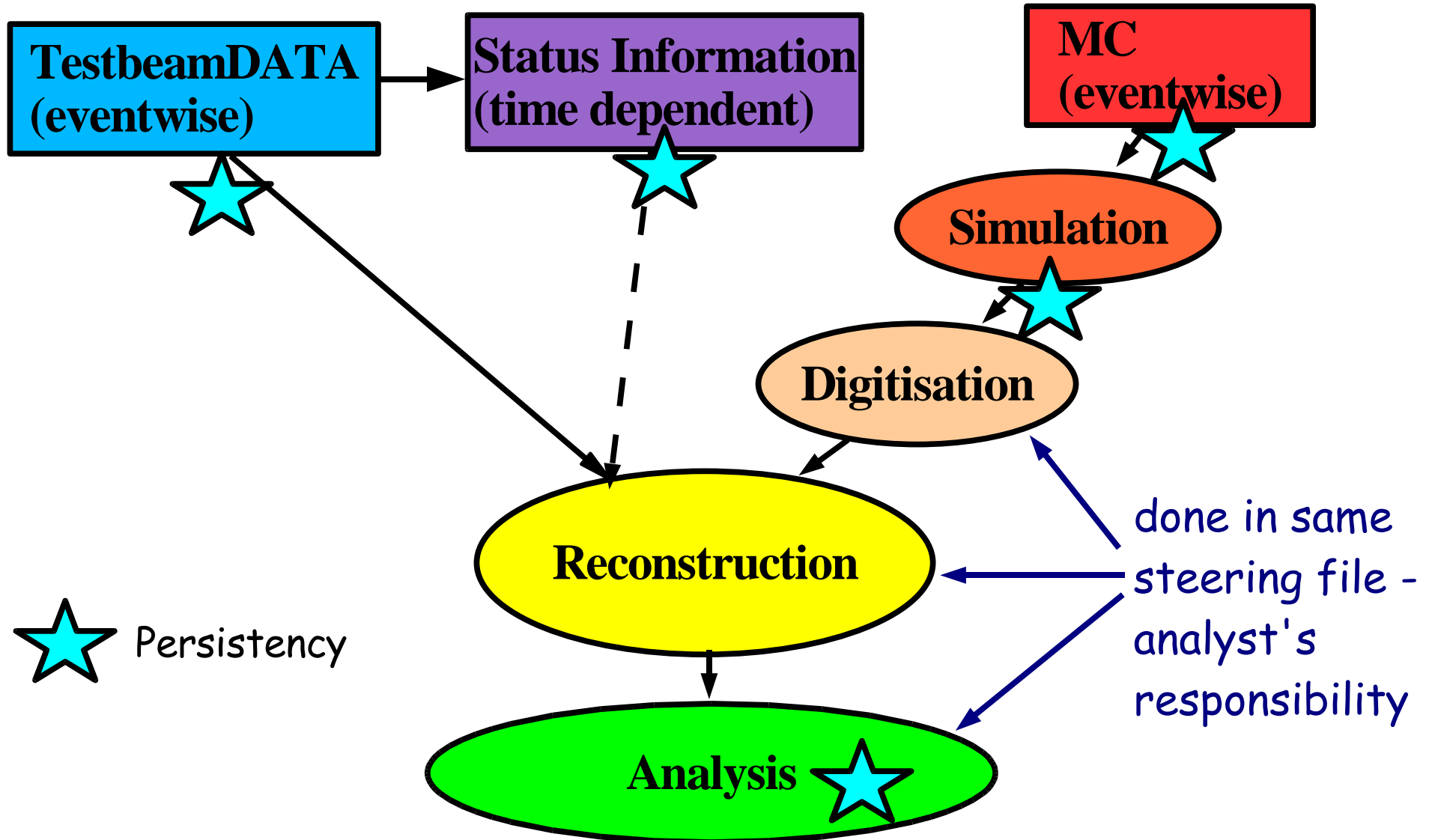
# What do we expect?

- Think of a mature experiment of your choice (H1, OPAL, BaBar, ...):



# What do we have?

- Currently focus is on developing reconstruction algorithms:



# Strengthening Detector Optimization

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- Focus more on running same analysis on different detector models
- Well documented pool for
  - generator files
  - simulated files + matching GEAR files
- Provide an default “best current knowledge” for
  - digitisation
  - reconstruction
  - calibration (!)
- Of course neither digitisation nor reconstruction can be fixed now  
-> **Analysts need to improve or customize items above, but an easy start should be made possible.....**
- Establish common root tree as basis for analysis to allow sharing of analysis techniques

# Strengthening Detector Optimization

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- Don't forget the testbeam:
  - We need easy transfer from knowledge gained in reconstruction & analysis of testbeam data!!!
  - > be able to run algos expecting database also on MC....
- Think of push-pull:
  - we should find out about realignment and recalibration constraints
  - > may want things like dead channels, (mis)alignment constants etc also for pure MC
- There are also machine parameters to look at:
  - beamstrahlung, pair background, ....
  - > need mechanism to overlay physics events with n background events according to machine parameters

# First steps

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after discussions with Frank and Jörgen:

- keep separation between simulation and digitization
- provide common root tree (a la "Bonn / Kuhlsches ntuple") (-> Jörgen)
- disentangle digitization, reconstruction and analysis:
  - assemble "default" digitization steering file
  - assemble "default" reconstruction steering file
  - may need small changes to processors for compatibility
  - JL will start but will need expert support - first request:  
everybody using Marlin: please send me your favoured steering file -  
how many different "flavours" of doing things are there in our group?
- develop "include" mechanism for steering files, such that digitization & reconstruction can be one-line additions to analysis steering file (-> Frank)
- develop overlay mechanism for machine background (your name?)

# On a longer time scale

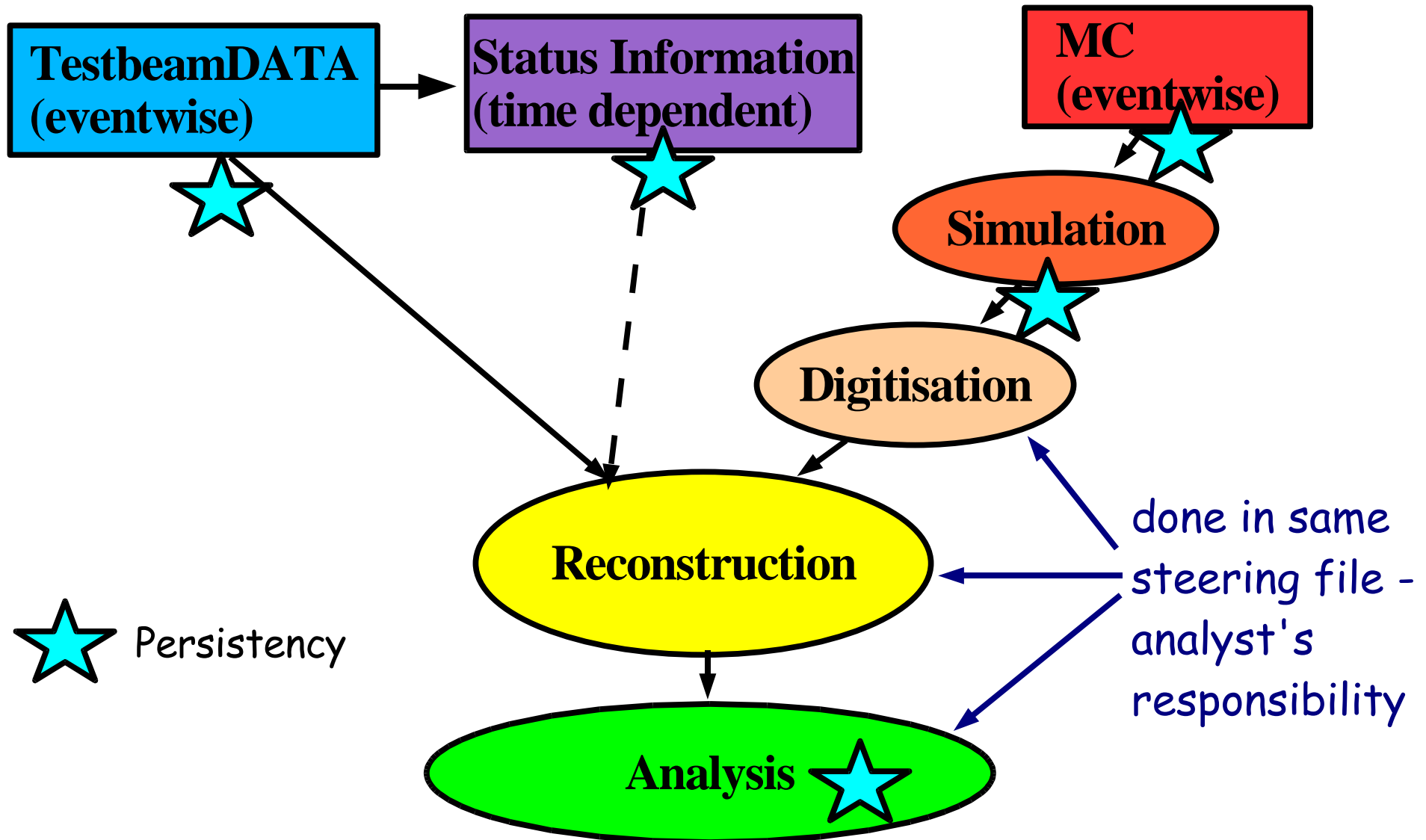
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- currently each processor can have one default value for each parameter
- many parameters depend on detector model, mokka version, ....
- once the most suitable parameters for a certain production have been determined, we need an effective way of distributing the knowledge:
  - avoid duplication of work
  - avoid stupid mistakes (editing numbers in large steering files is very flexible, but also error prone....)
- think about using conditions database also for MC ?
  - assign "timestamp" to identify production details
  - get default parameters for reco processors if available or a warning/error else
  - keep in mind testbeam compatibility & alignment studies.....

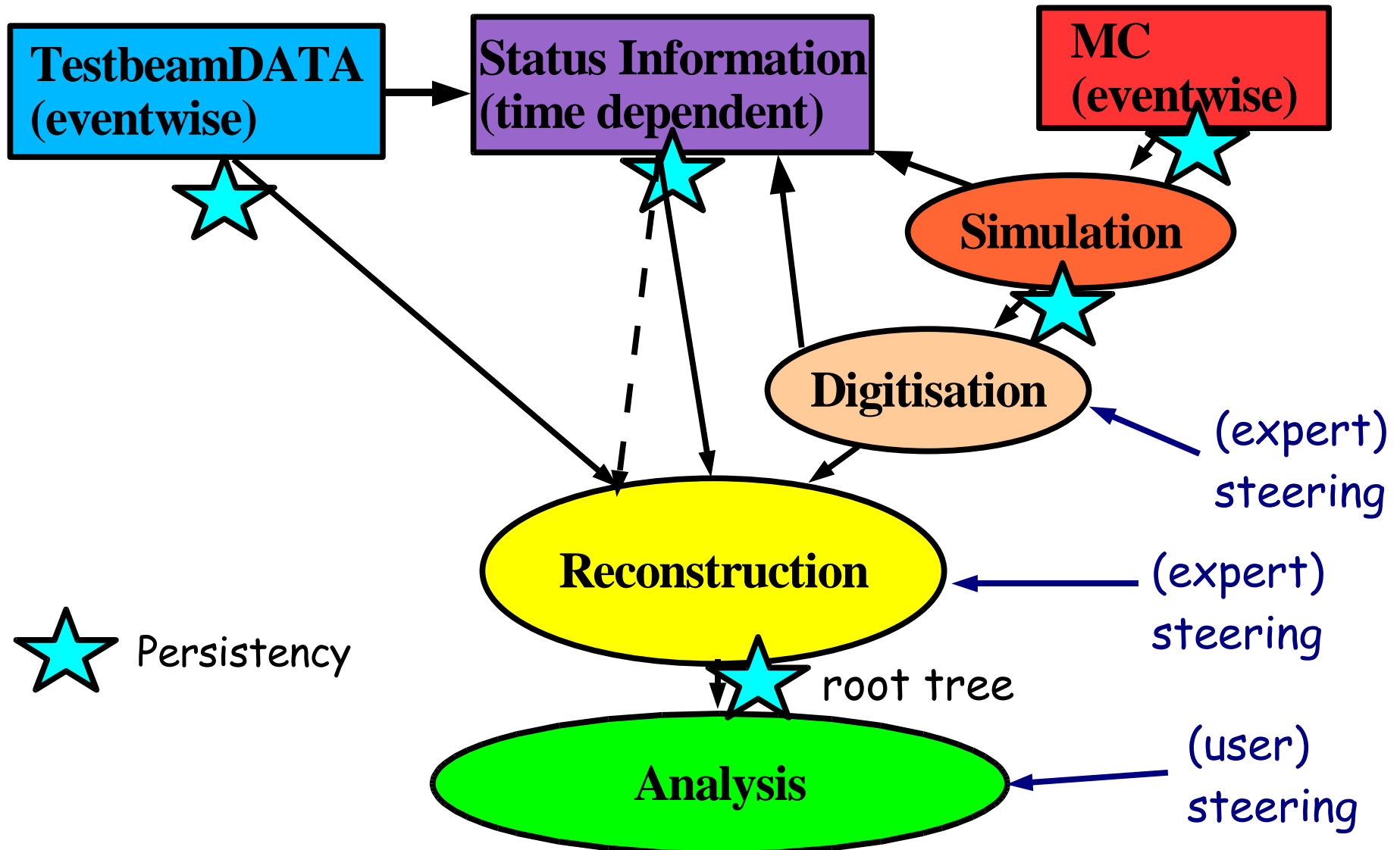
# What do we have?

- Currently focus is on developing reconstruction algorithms:



# What could we have?

- Currently focus is on developing reconstruction algorithms:



# What else?

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- MC samples?
  - with help of Andreas get  $500\text{fb}^{-1}$  of full SM @ 500 GeV from SLAC (Whizard, 2- $\rightarrow$ 2,4,6; see <http://ilcagenda.linearcollider.org/getFile.py/access?contribId=60&sessionId=69&resId=1&materialId=slides&confId=1296>)
  - simulate them in LDC - which flavour(s)?
  - needs discussion with Ties, Henri, and probably many others
  - should include Adrian's new forward region
- local batch cluster common with ATLAS is being set up (-> Wolfgang, Philip)

# Summary

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- LDC Optimization webpages are developing - have a look!
- First measures to facilitate detector optimization:
  - provide central SM MC
  - local batch cluster
  - provide "default" digitization and reconstruction steerings
  - provide common root tree
- machine background overlays? (+ many other issues...)