

Towards One Calibration Scheme

- Some overview where we stand and where we go + open points
- Some thoughts to steer a discussion how we will operate during data taking phase
- We always said that the jet/etmiss calibration scheme will not be decided before the data taking
- Aim is to prepare for a recommendation in 2010 not to take one today to discuss some possibilities and to see where the consensus is

Past and Future Milestones

Choice of jet algorithm
Jan/April 09

Anti-kt as default for calibration efforts

DPD definition
March 09

DPD content ok for all calibration work
→ Work needed to optimise event selection

Jet calibration streams
for early data analysis
May/June 09

Calibration streams defined
Technical solution tested
Organisational aspects exercised

today

Comprehensive plan for systematic determination
Sep 09

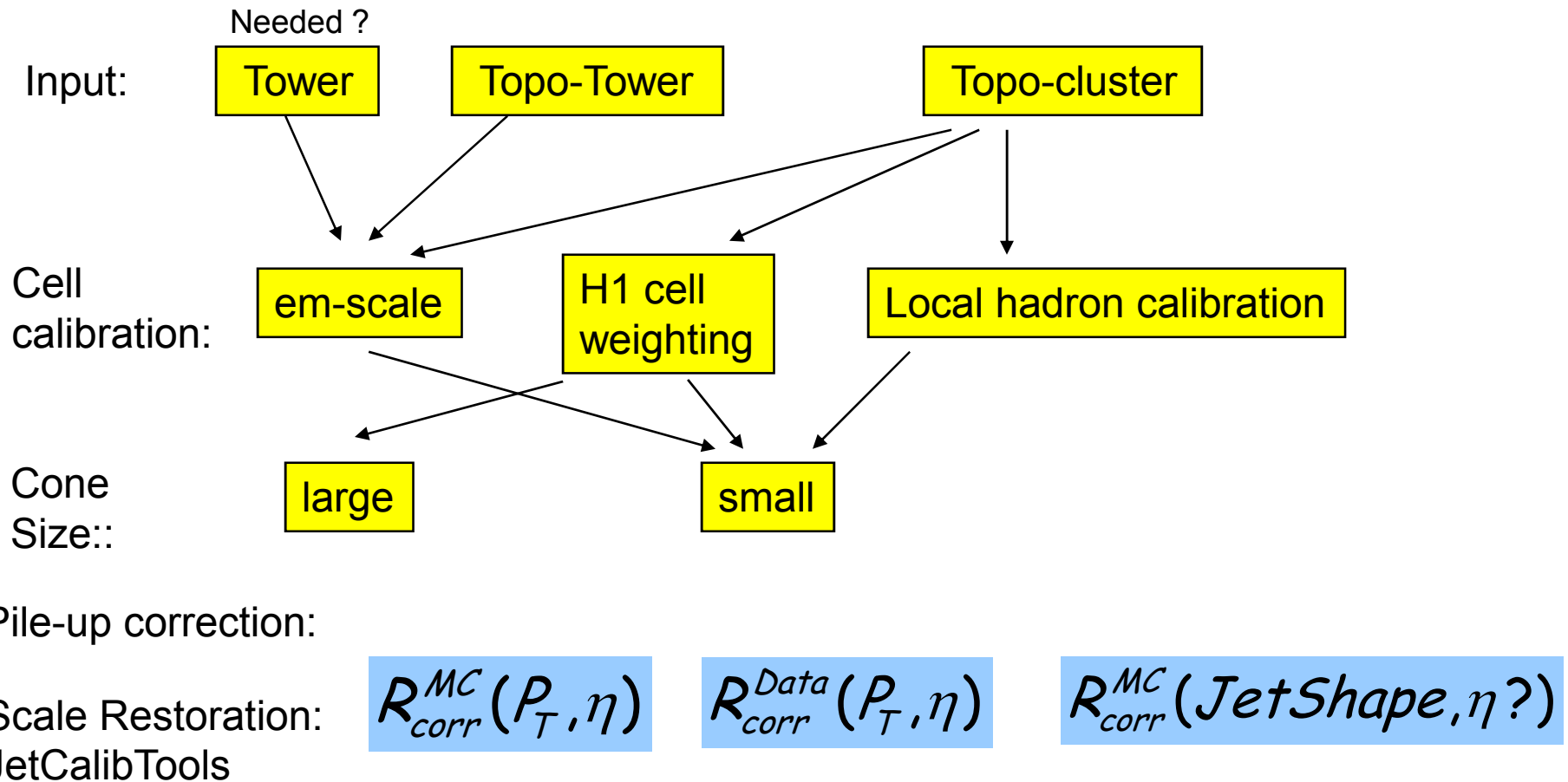
Consistency jet and Emiss calibration
Oct 09

Data Analysis

- Evaluate in situ performance
- Systematic comparison Data/MC

Strategies for Early Data Analysis

Investigate six jet collections with early data on DPD/D2PD



Default calibration is stored in JetMomentStore for each jet, can be replaced by Other calibration either stored in JetMomentStore or from DB

→ Allows to explore several possibilities + have something usable fast

Data Analysis: Possible Time-line and Goals

Obviously goals and time line have to be discussed Atlas wide !

*What criteria ?
Who decides ?*

First few pb^{-1}

Produce first jet distributions
Data/MC comparison
In-situ performance

Winter conferences 10

First few 10 pb^{-1}

In view of first data, decide first calibration for ATLAS
Defendable systematics: 5-10%
Precision/resolution not important

Summer conferences 10

Full data set $100\text{-}200 \text{ pb}^{-1}$

Calibration for first physics calibration
Reasonable precision: e.g. few %
Sound uncertainty, aim for good resolution
→ ATLAS JES publication (should contain comparison of various schemes)

To be discussed in HCWS 2010
early 2011

Long term planning for 1 fb^{-1}

Precision on scale uncertainty (Goal: 1%)
Best possible resolution
→ Final ATLAS JES publication

to be discussed in HCWS 2011
ready in 2012 ?

Data Analysis: Criteria for Defendable Jet Energy Scale

Criteria for JES justified, documented and ready for use:

First few pb^{-1}

Winter conf. 10

First few 10 pb^{-1}

Summer conf. 10

Full data set 100-200 pb^{-1}

2011

Long term planning for 1 fb^{-1}

Will depend on overall man-power and LHC physics outcome

Central region

Preview forward region

Preview pile-up ?

Defendable scale uncertainty from in-situ performance

Performance in full range required ? (forward ?)

Robustness: small number of corrections easier to control?

1) Small tails on jets/Etmiss

2) Small scale uncertainty from in-situ performance

→ to be defined in jet/Etmiss performance package

Reasonable agreement Data/MC

(no amplification in $(\text{em/calib})_{\text{Data/MC}}$)

3) Reasonable resolution (compromising resolution with scale

4) Simplicity/Maintainability: not too many corrections that depend on each other, smallest dependence on jet context

Could follow two strategies: 1) as for 2010 data set

2) best potential for 1 fb^{-1}

1) No tails

2) Potential to reach 1% energy scale

based on in-situ performance and Data/MC

3) Potential for best resolution

Benchmarking

- Today first discussion about criteria for jet/etmiss calibration
- Plan is to implement benchmark plots in Jet and Etmiss performance package
 - 1) Observables
 - 2) Selection cuts
 - 3) Data-set
- Possible to finish before data taking ?
- Everybody will be able to run this package and to look at the code
- Possible to run various calibrations on equal footing
- Follow up meeting at Tuesday afternoon in the Atlas week

Possible Calibration Scenario

Impossible to predict, have to wait for data.

Everybody has its own point of view and expectations...

Start with calibration schemes of today (based on MC), compare data/MC

Assume here that MC will have some serious problems to describe data
(This assumption is conservative)

1) a) Start with em-scale (assume here that photon is sufficiently well measured)

Use gamma-jet/dijet in-situ performance to establish scale factor vs E_t
(uncertainty “balanced not equal calibrated” taken as full uncertainty ~5-10% ?)

b) In parallel working on data/MC comparisons: jets, isolated tracks etc.

2) After having worked on/validated MC

Use MC to establish corrections/compare to in-situ methods

Use gamma-jet and E/p in-situ performance to establish systematic uncertainty

Add in other in-situ performance: Z+jets, W-mass in $t\bar{t}$

→ check, if systematics improved

Atlas Plans for Approval of Results

- ATLAS has already laid down detailed procedures for journal publications and preliminary results (see https://twiki.cern.ch/twiki/pub/Atlas/OperationModelOverviewDocument/physics_policy.pdf)
 - they apply for physics results and for performance publication
 - approval in group, Pub com, refereeing, comments by collaboration etc.→ ultimate sign-off is responsibility of physics coordinator and PUB com chair
- What algorithm and uncertainties should be used for analysis involves both performance and physics convenors.
- Analysis using “recommended” prescriptions from CP groups will most likely be reviewed and approved much faster than non-standard prescription. They need to be discussed in the performance and physics groups and approved by convenors

The Atlas policy document for approval also states:

- a) Official samples have to be used
- b) Algorithms and tools for the production of official samples need to be approved by the performance group
- c) The algorithms must be driven by Job Options that are part of the official release

Therefore, all potential calibration methods must be part of the official release

In addition, jet/etmiss group should give recommendation to ATLAS (for standard cases) that is defined via a tag (release/DB)

→ Strategy has to be agreed on in Jet/Etmiss group

Data Analysis: How to Achieve a Recommendation ?

Proposal:

First few pb^{-1}

Winter conferences 10

First few 10 pb^{-1}

Summer conferences 10

Full data set 100-200 pb^{-1}

2011

Long term planning for 1 fb^{-1}

Convenors give recommendation to ATLAS after dedicated Jet/Etmiss work-shop 1-2 days
Discussions trying to reach consensus

Some possibilities open for discussion:

- 1) Group of people involved in Jet/Etmiss try to reach consensus in consultation with SM/Top/exotics/SUSY convenors after dedicated Jet/Etmiss workshop try to reach consensus, final recommendation by convenors, if needed
- 2) Decision taken in 1-2 workshop*in consultation with SM convenors/physics coordination after a review panel has scrutinised the decision process and material final recommendation by convenor

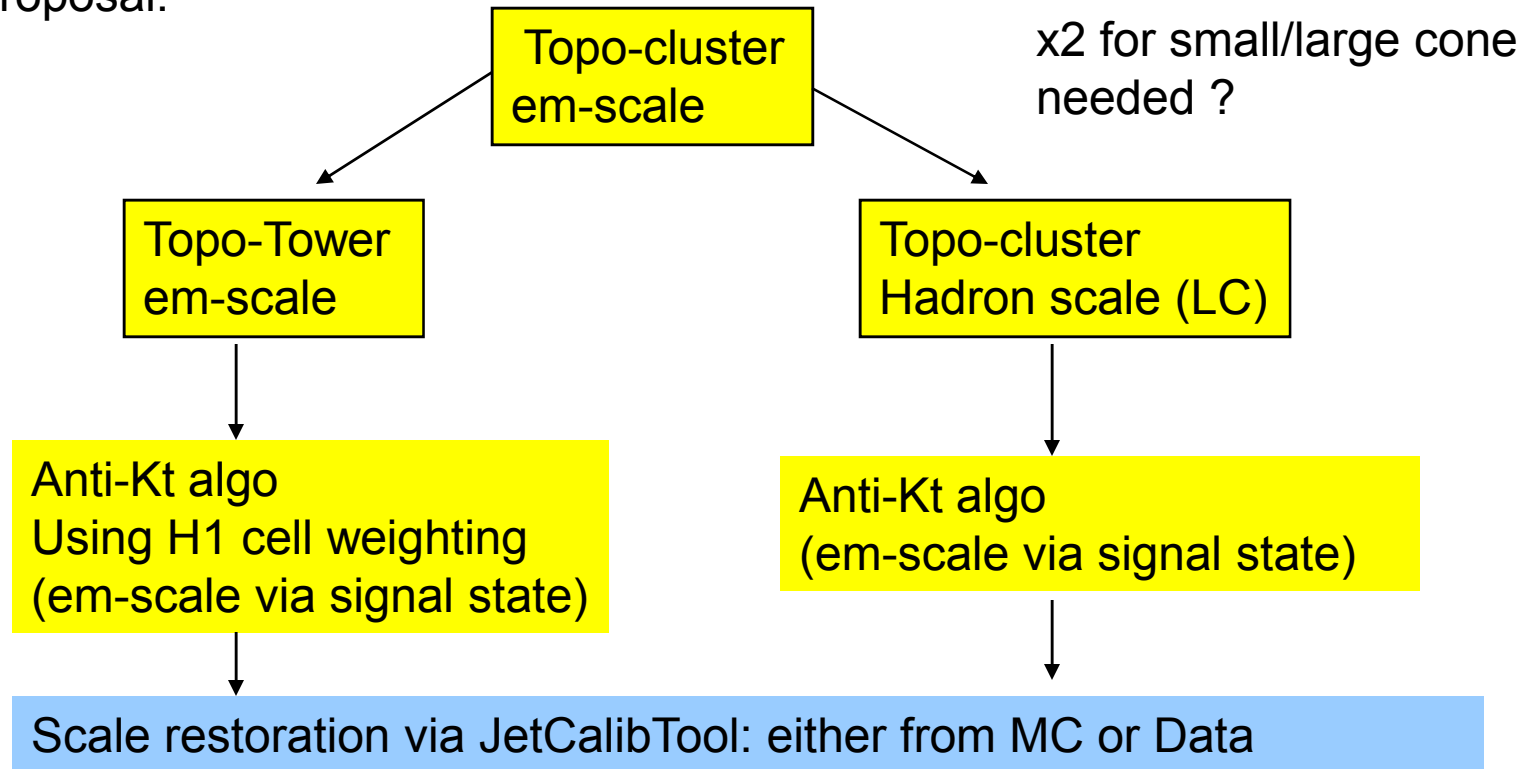
*Question:

Do such meeting for JES recommendation need to be hold at CERN and not outside ? Probably, yes

What Jet Collection on AOD by default ?

Everything is set-up in flexible way, em-scale, LC/H1 clusters available on AOD but requires some knowledge and is therefore error prone

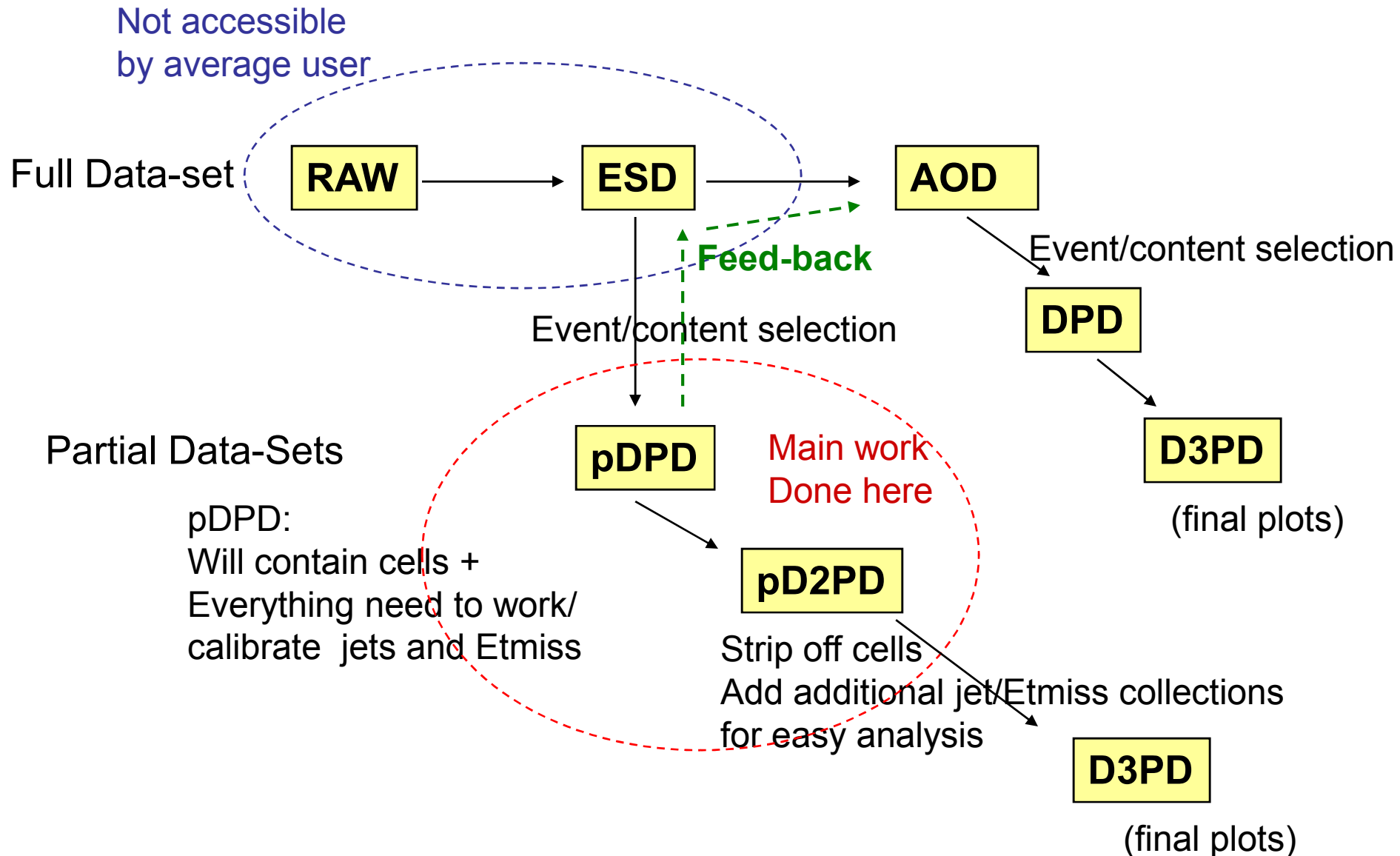
Proposal:



Need small and large cone: 4 collections

In 2010: We should put jet collection that is basis for default JES on AOD (full dataset) together with default scale factor, even if it can be redone.

Reminder Data-Formats/Analysis Model



Jet Algorithm

Anti-kt algorithm will be default to concentrate Jet/Etmiss calibration efforts

Atlas cone to be phased out ? ..to be replaced by SIS-cone ?

Need on long term also to provide tools for other jet algorithms
(scripts to redo from pDPD, AOD, tools to get calibrations)
e.g. Kt, Cambridge for subjet analysis

Open Points/Action Items for next few months

- Gamma-jet analysis essential to assess jet performance
 - need strong analysis group with strong links at CERN
 - common data-sets derived from pDPD needed ? work organisation ?
- Strategies for MC tuning has to start with first data
 - need strong analysis group committed taking long term perspective
- Strategies for systematic uncertainty determination need to further developed
- Single isolated track analysis (E/p) needs more attention
- Consistency of jet and Etmis calibration to be addressed
(How to include flexible jet calibration (use of JetCalibTool) into Etmis)
- Strategy for Etmis commissioning to be worked out
- Revisit content of jet and Etmis performance package
Design calibration package to derive jet calibration in Athena