



AGATA Pre-processing

Presented by *Ian Lazarus (CCLRC, Daresbury Lab)*

Carrier card: *IPN Orsay (Pierre Edelbruck, Christophe Oziol, Xavier Grave)*

Segment and Core Mezzanines: *CSNSM Orsay (Denis Linget, Sebastien Lhenoret, Lounis Benallegue, Bruno Travers)*

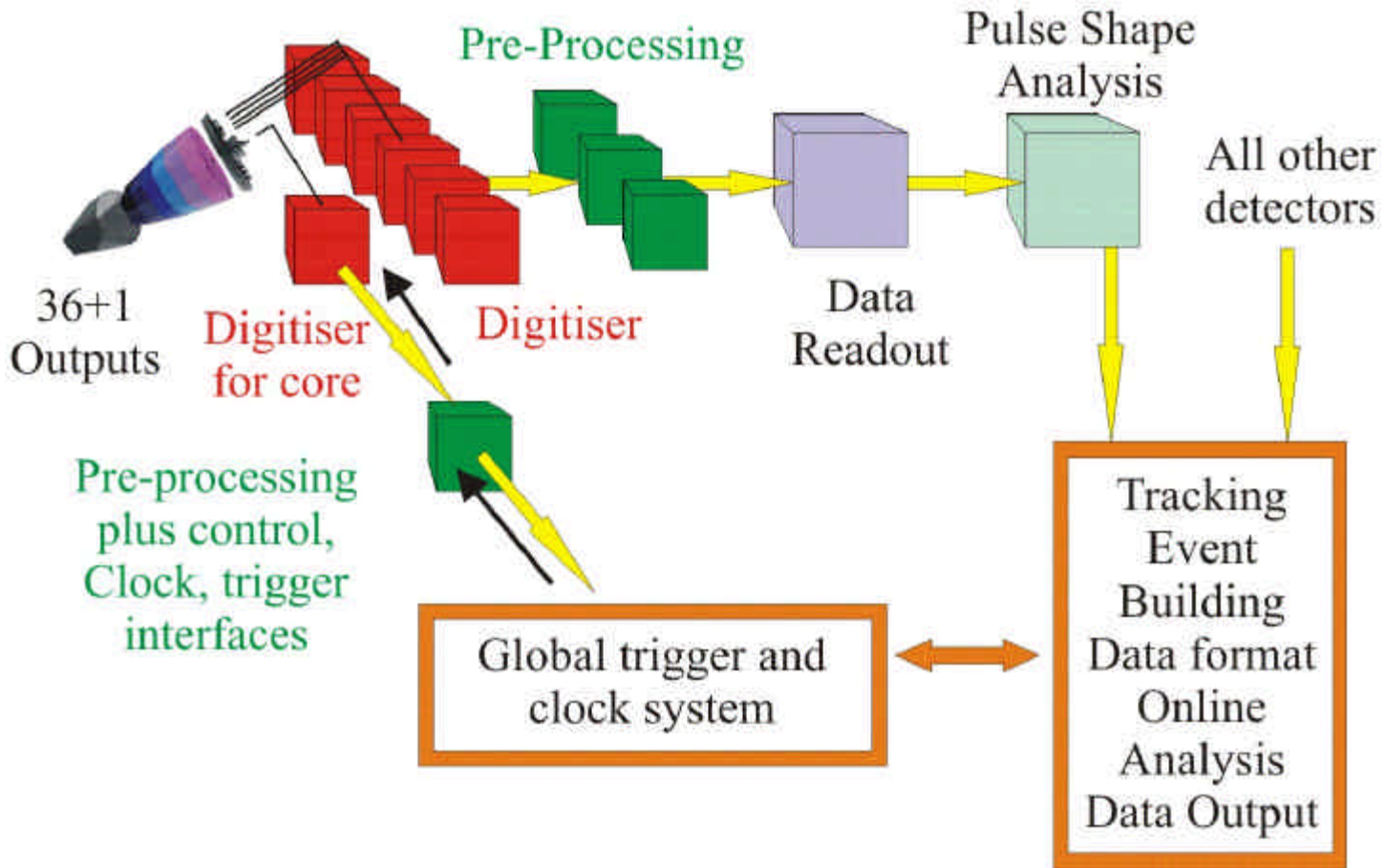
GTS Mezzanine: *INFN Padova (Marco Bellato, Roberto Isocrate, Damiano Bortolato)*

Krakov University (Miroslaw Zieblinski, Barbara Dulny)

IReS Strasbourg (Christian Weber)

AGATA System diagram- the big picture

Schematic of the Digital Electronics and Data Acquisition System for AGATA





AGATA Pre-processing News

- Pre-processing will be implemented in ATCA- PCI Express (no CPCI prototype)
 - Saves time
 - Saves money
 - Increases risk
- First hardware ready (GTS mezzanine)
- Simulation and preparatory design work done for other hardware. E.g. FPGA power.
- System C simulations under way for pre-processing and GTS (CVS repository at IPN Orsay).

ATCA Crate

AdvancedTCA™

Schroff®



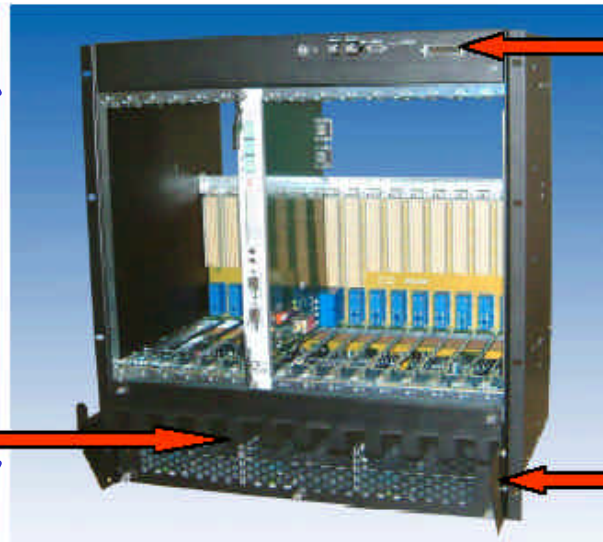
16 Slot Chassis Features Front View

53.3 cm

55 cm

**3 Removable
Low Cost Fan
Trays**

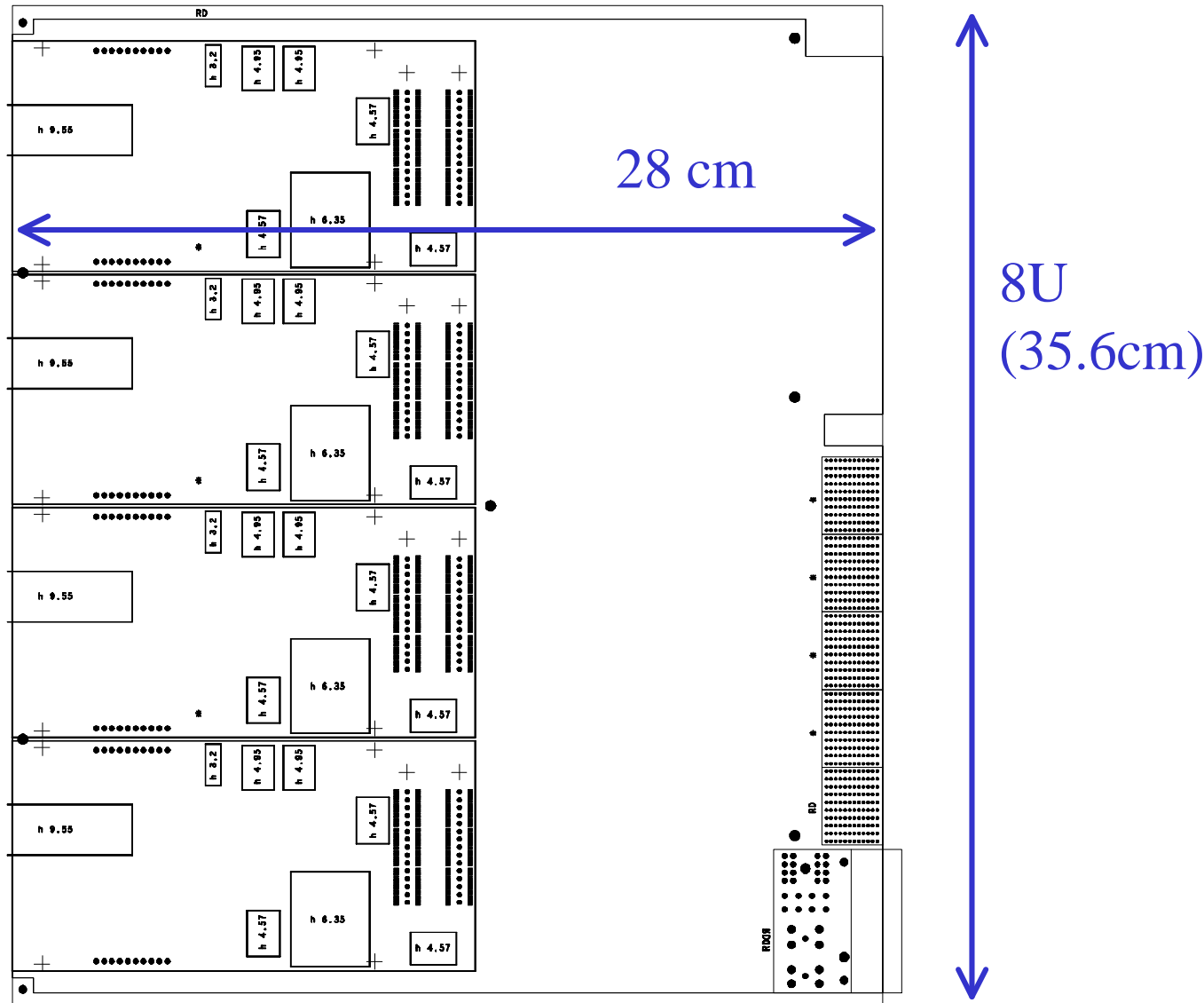
- In production version, 14 and 16 slot fan trays identical



Alarms/LEDs

Dual Compact Shelf Managers on either side of fan trays

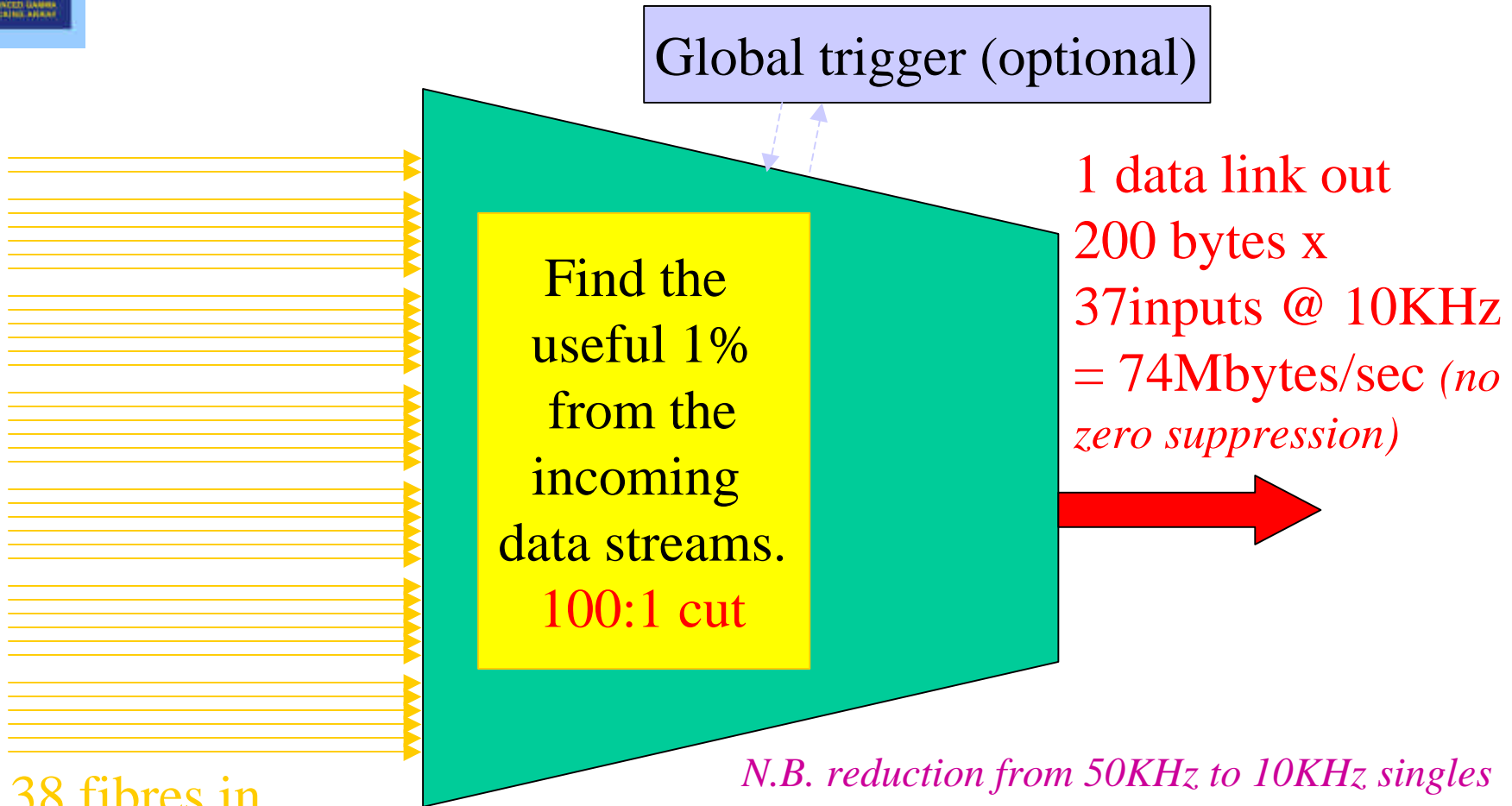
ATCA Card with 4 CMC mezzanines



What does pre-processing do? (i)

- Deserialises data from the digitiser
- Extracts all useful parameters which can be calculated on a per-channel basis in real time.
 - Energy
 - Digitiser input offset control,
 - Time Over Threshold (preamp saturation = Pion energy)
 - Trigger (core only)
 - Timestamps the data when a local core trigger is found
 - +??
- Passes on these parameters, with leading edge of the digitised trace, to PSA.

What does pre-processing do?



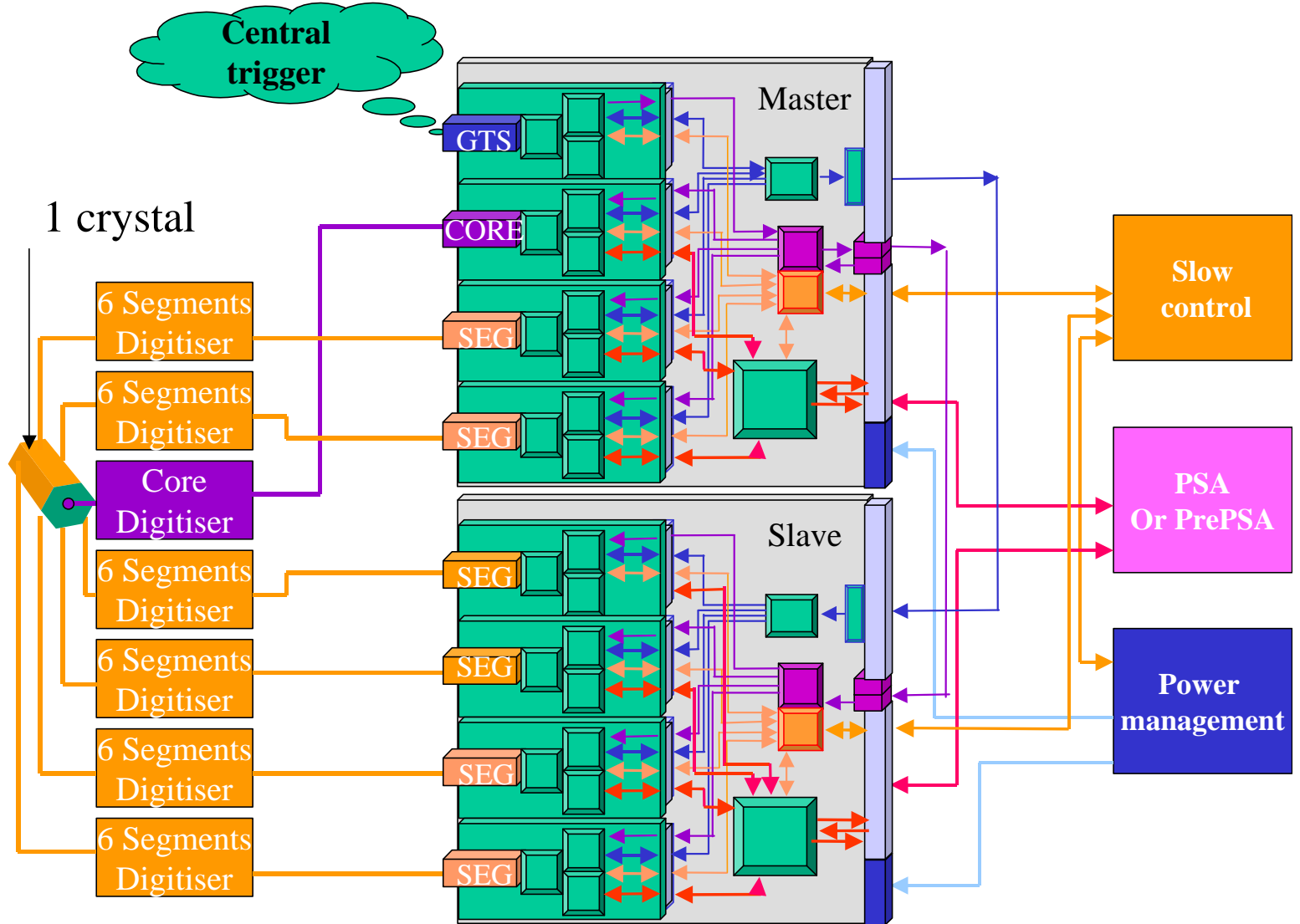
38 fibres in
(Core low/high gain + 36 segs).
= 38 x 2Gbps (7.6 Gbytes/sec)

N.B. reduction from 50KHz to 10KHz singles rate is for demonstrator only (to help PSA). Preprocessor output rate for full AGATA will be higher- 35 or 50KHz- this is under discussion now (processing will be 50KHz anyway).

What does pre-processing do? (ii)

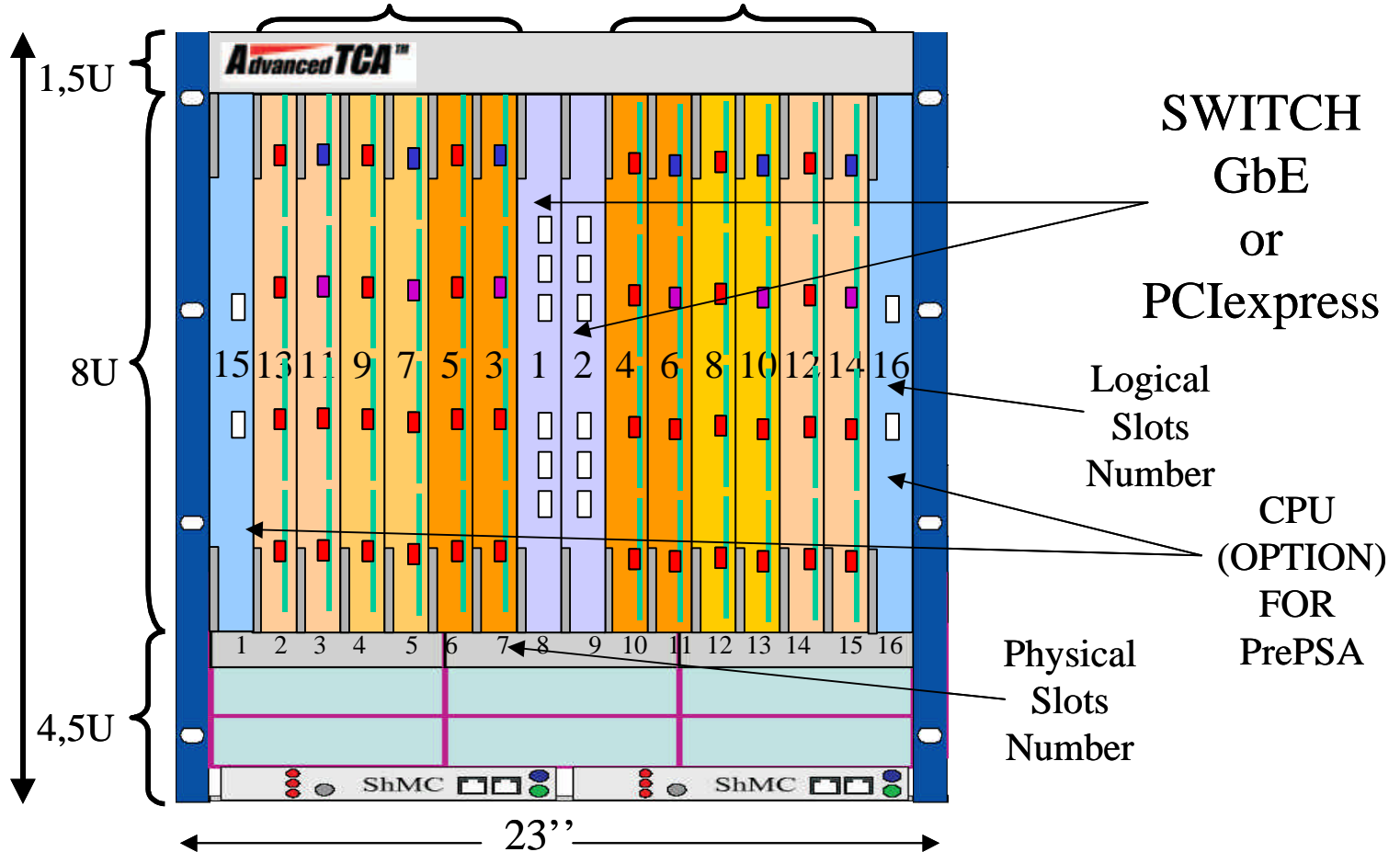
- Interfaces with Global Trigger via GTS mezzanine to reduce data rate if necessary
- Sends GTS clock and clock synch to digitiser
- Concentrates and buffers data ready for transfer to PSA
- Prepares data for PSA (could perform zero suppression if needed)

Pre-processing for 1 crystal



Pre-processing for 2 Clusters

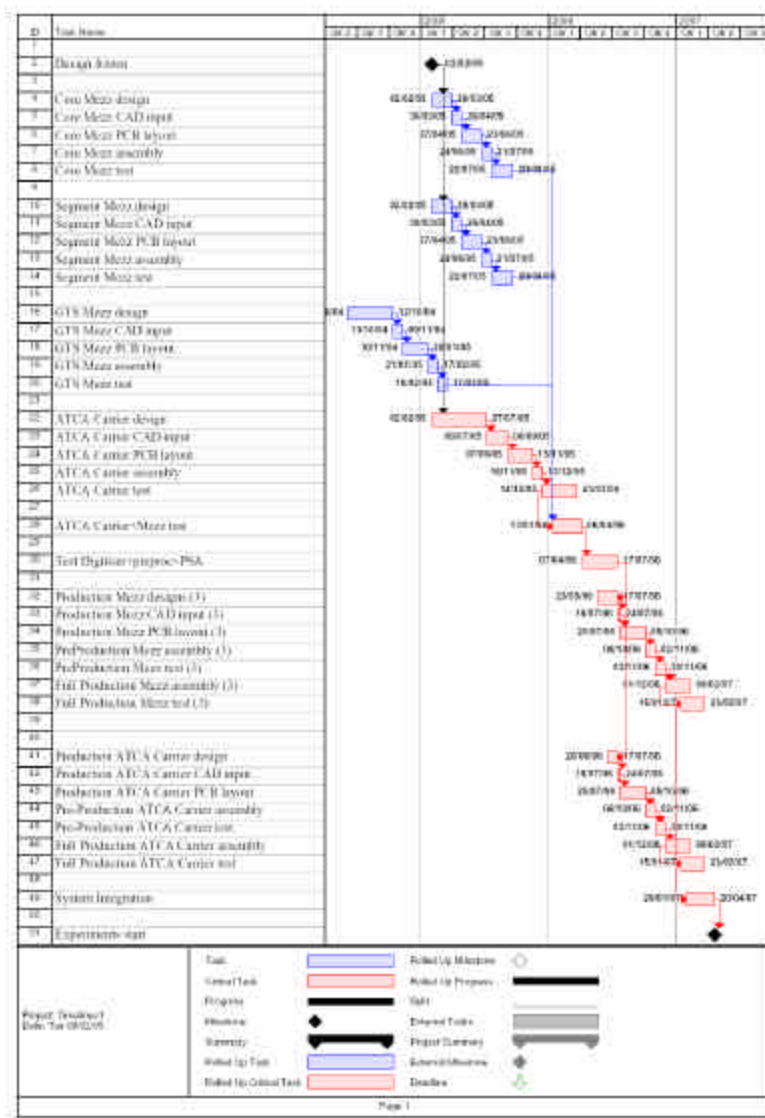
3 X 2 Carriers = 3 X 2 Carriers =
1 cluster 1 cluster



Timescale

- All prototype mezzanines (hardware and VHDL code) ready Summer 2005
- ATCA Carrier prototype ready end 2005
- Test ATCA carrier with mezzanines Q1 2006
- Test prototype digitiser, pre-processing, GTS and PSA with detector (Q2 2006)
- Make production pre-processing cards Q3, Q4 2006
- Deliver tested pre-processing cards Q1 2007

Gant chart for pre-processing h/w.



Prices

- Production price: €30k (+ tax) per crystal including ATCA crate and infrastructure.
(25% cost reduction over last year!)
- Prototype price will be higher due to NRE and ATCA infrastructure not being shared over 6 crystals.

Summary

- Main news is that we go direct to the ATCA-PCI Express implementation.
- Risk is a higher due to use of new technology, but is acceptable when weighed against the benefits (time and cost).
- Progress is slower than originally planned but still OK for overall project schedule and saves money by cutting out interim CPCI version.
- Large team (over 10 people) working hard- thanks!