Global DetectorNetwork
Status and Plans

Joachim Mnich
DESY
March 21st, 2005

- **What is the Global Detector Network?**
- **Summary of previous meetings**
- **Plans**

What is the Global Detector Network

The Linear Collider is a truly worldwide enterprise

- **only 1 machine**
- **only 1 or 2 experiments**

⇒ different attitude wrt previous large HEP projects

Independent of selected site
the accelerator & detector will be

developed, constructed, operated and "owned"

by all participating countries, laboratories & physicists

International collaboration on machine & detector R&D already established

→ 1999: Global Accelerator Network (GAN)

→ 2002: Global Detector Network (GDN)

GAN:

- **Any of the competing laboratories is too small to build the LC on its own**
- **Tight collaboration between the labs is needed to succeed**
- **Keep laboratories without LC intact & alive**

⇒ Reduce importance of accelerator site to a minimum

Same arguments hold for the detector

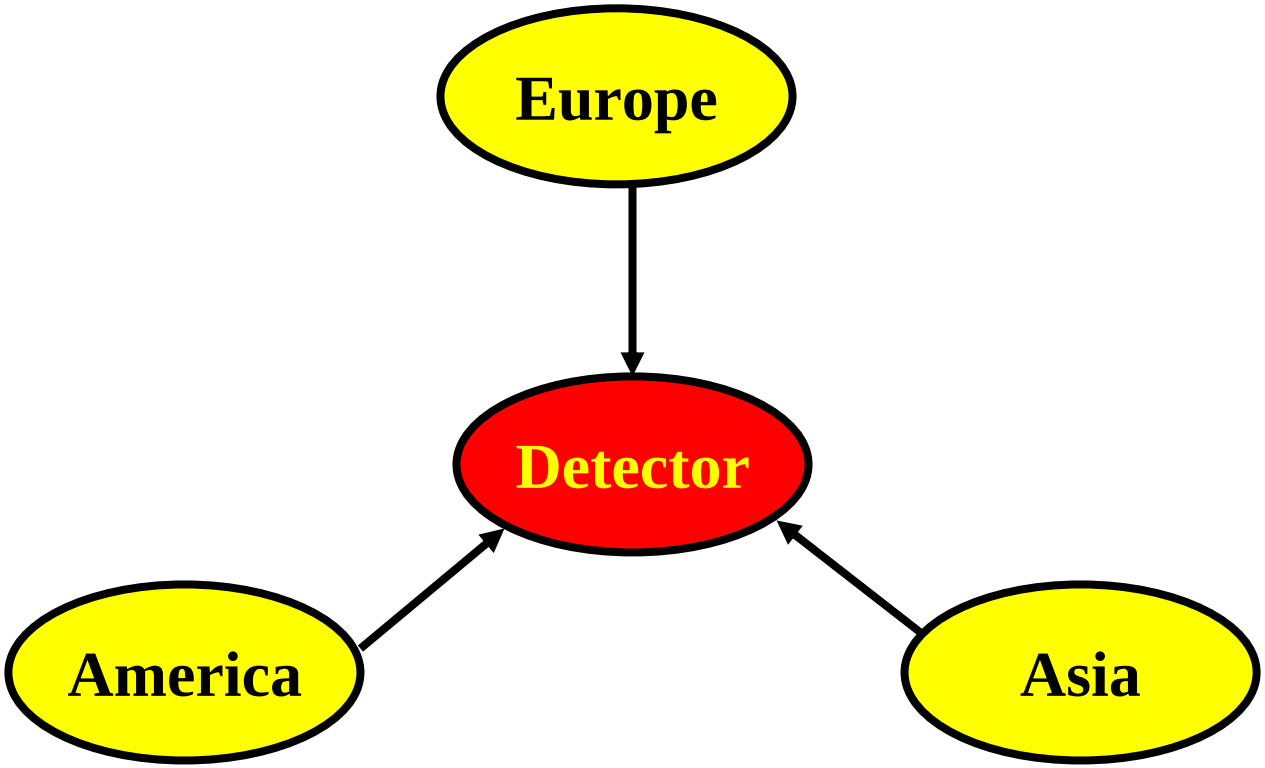
Even though particle physicists have large experience to design & build large detectors in international collaboration

(e.g. LEP & LHC)

→ GDN

Global Detector Network

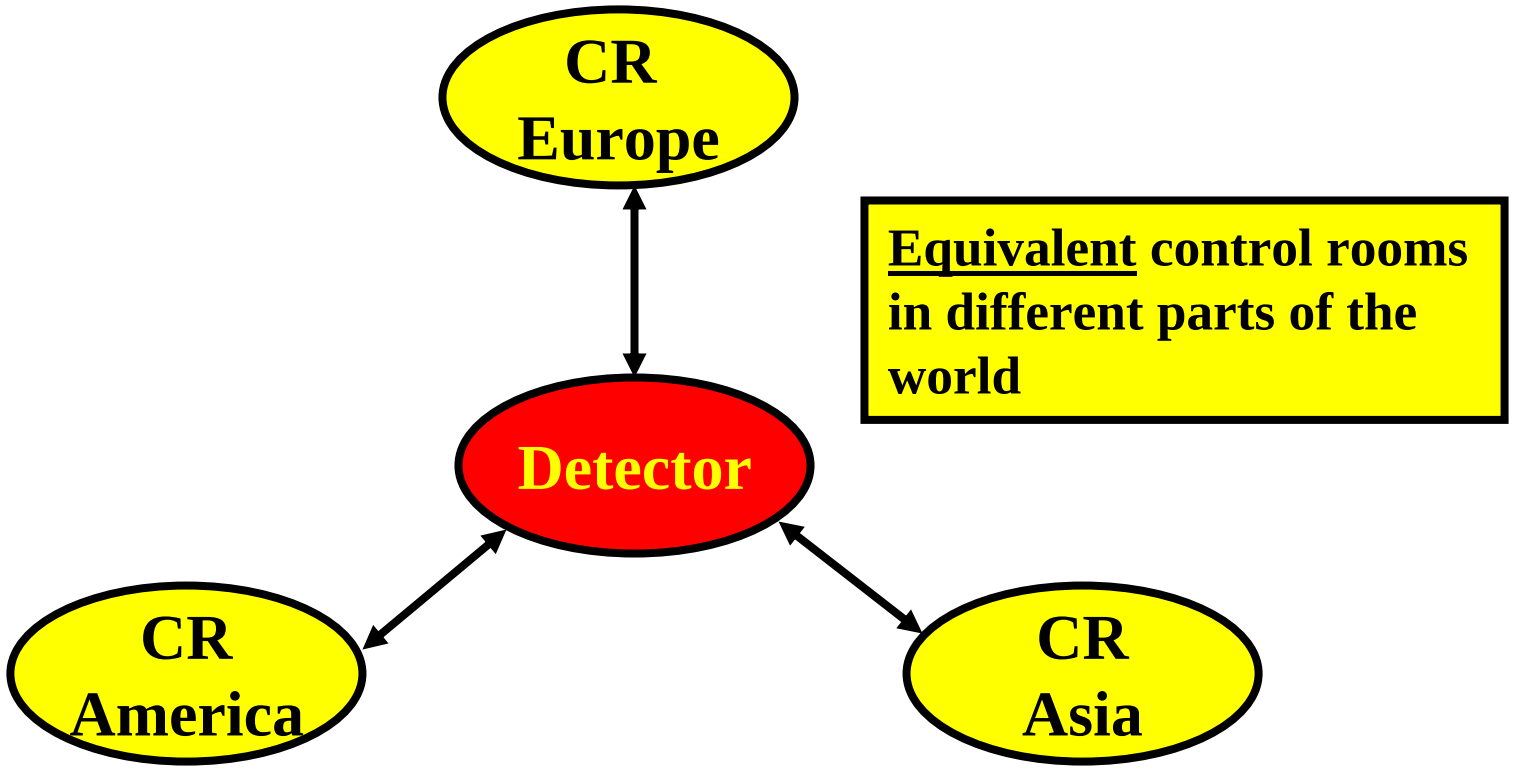
I) Design and construction of the detector (and the accelerator)



- **Contributions to the detector from labs & institutes all over the world during R&D and construction phase**

Global Detector Network

II) Operation and maintenance of the detector



- **Full monitoring & control over entire detector from remote control rooms (CR)**
- **Minimisation of local intervention**

Important issues to be addressed:

o **Detector design, particularly electronics:**

all components must be controlled remotely even in case of failure

- **diagnostics: no need for green or red LEDs at modules**
- **problem fix: no way for immediate manual intervention**
  local crew needed, e.g. for replacing modules
  acting on instructions from remote CR

o **Technical questions:**

- **what kind of data to be transfered between detector & CR**
- **necessary bandwidth for data exchange**
- **...**

Important issues ...

- **Safety & security:**
  - **need absolutely stable data link between CR and detector**
  - **external security: inhibit unauthorized access by strangers**
  - **internal security: inhibit unauthorized access by collaborators**
  - **internet or isolated special net**
  - **...**
- **Social/psychological questions:**
  - **how to make an operator feel responsible for a complicated and expensive apparatus very far away**
  - **legal responsability in case of accident**
  - **training of operators**
  - **evaluation and application of common rules in different cultural enviroments**
  - **do we want to push the remote control to the technical limit**
  - **...**
- **Several of the above issues addressed and solved (?) by modern experiments (HEP and non-HEP)**
- **Many problems in common between GAN & GDN**

Previous GDN workshops:

- **2002 ECFA/DESY workshop at Prague**
  Foundation & initial discussions

- **2003 IEEE conference at Portland**

JM	**Introduction to the GDN**
Rick van Kooten	**D0**
Emilio Meschi	**The CMS Online & DAQ System**
Alexei Klimentov	**AMS02 Computing and Ground Data Handling**

- **2003 ECFA workshop at Montpellier**

JM	**Highlights from Portland**
Günter Eckerlin	**DAQ in a GDN**

- **2004 LCWS at Paris**

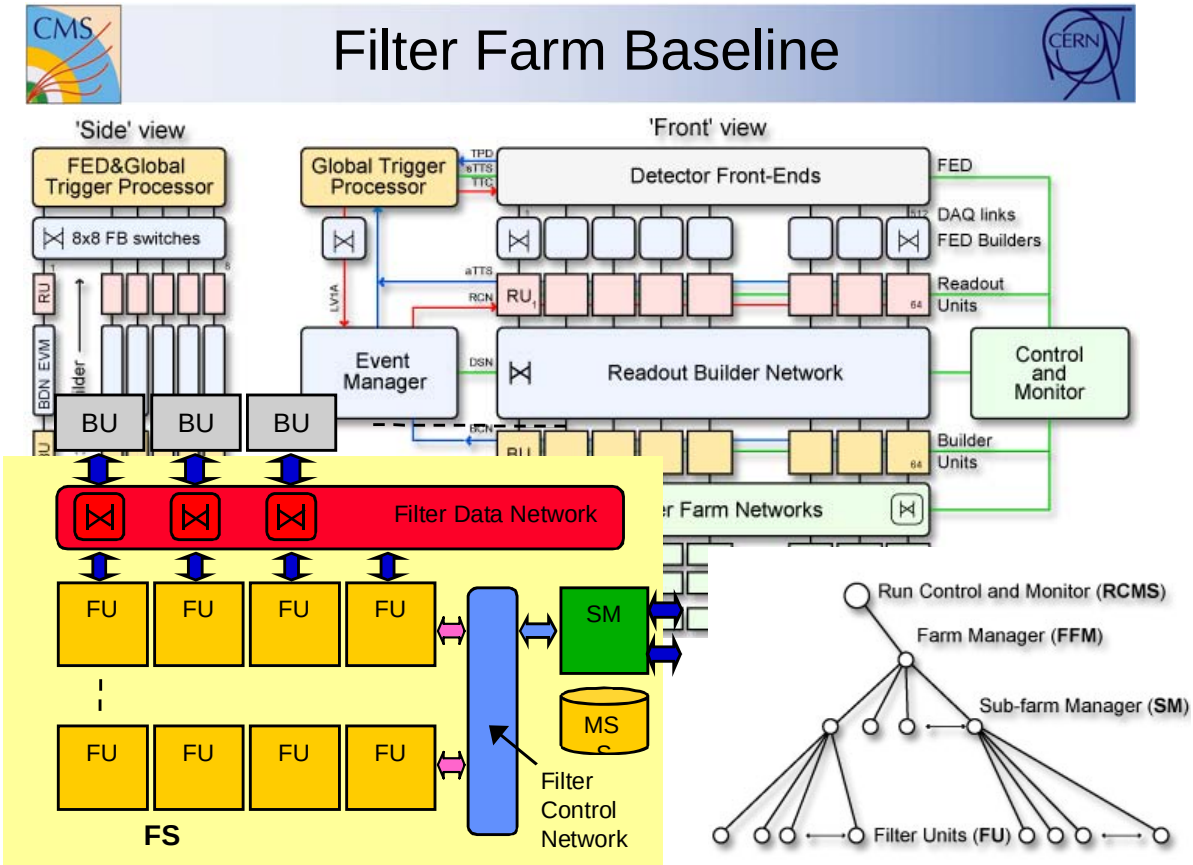
JM	**Introduction & Status**
Günter Eckerlin	**DAQ in a GDN**
Patrick Le Du	**Experience with DØ remote shifts**

- **2004 ASI: Symmetries and Spin (Prague)**

Jan Valenta	**GDN: Data acquisition at the LHC (Poster)**

Examples

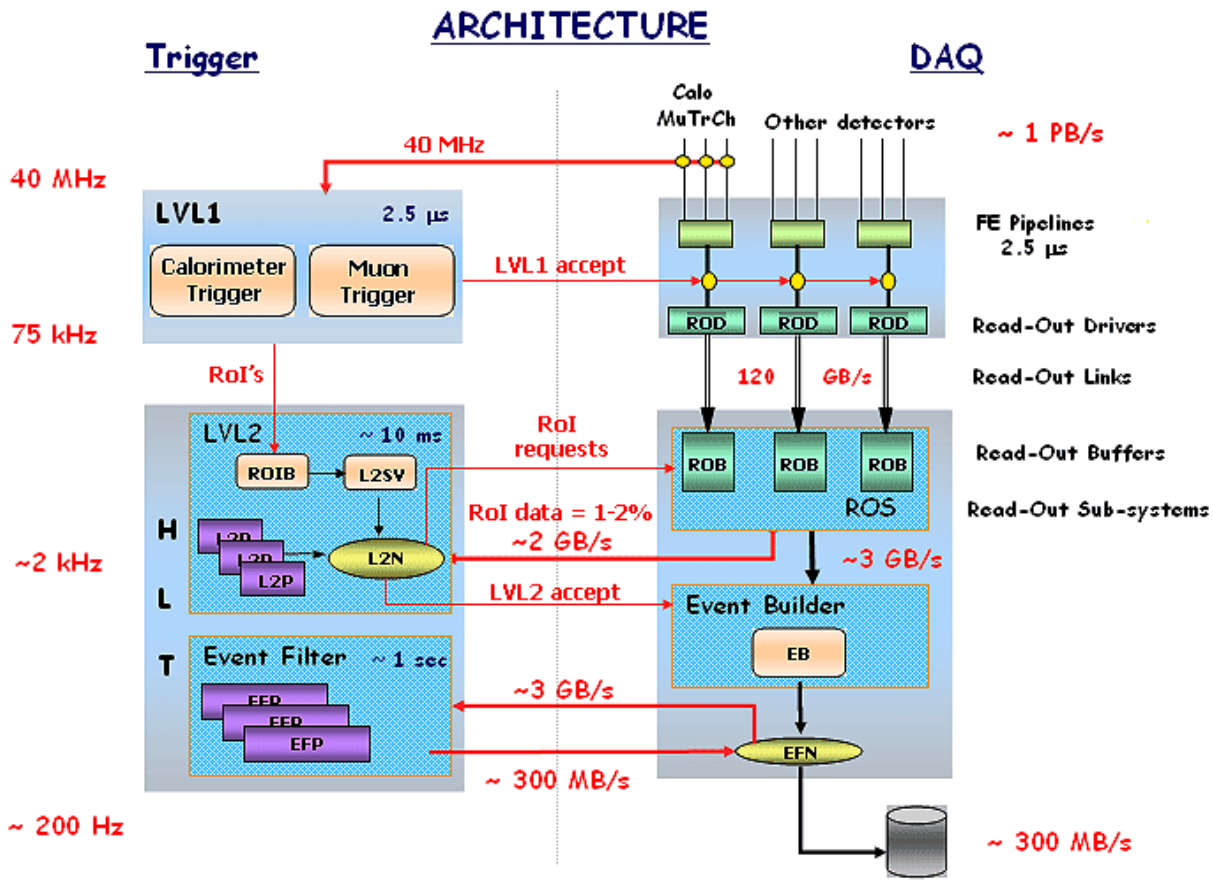
CMS DAQ system



- **hierachical structure**
- **can be completely controlled remotely**

J. Mnich GDN Status and Plans

ATLAS DAQ system



- **conceptually very similar to CMS**
- **remote control of high level trigger easy to implementy**

AMS Experiment

The AMS02 detector is supposed to search for anti-matter on the ISS

- **AMS01 was flown on the space shuttle in 1998**
  ➔ experience in remote detector operation
- **Very limited possibilities for interventions by astronauts (prohibitive costs)**
- **Redundant electronics & data storage**
  „online“ transmission to earth + local storage
- **Very complicated communication routes (imposed by NASA requirements)**

D0 Offline Shifts

SAM GRID INFORMATION & MONITORING SYSTEM

Launching the Monitoring System:

Please click at the map to monitor the execution sites.
Get information about the submission sites
Get information about the advertised sites.

Participating Experiments:

● D0 ● CDF

Important issues for GDN discussed at previous meetings:

- **Detector design:**
  Hierachical structure of detector
  (subdetector electronics, trigger, DAQ)
  Redundancy at higher level

- **Advanced communication technology**

- **Question of commissioning phase**
  What is it? What defines end of it?

- **More input from non-HEP experiments**
  (large area cosmic ray experiments)

- **GDN functionality requires redundancy**
  costs additional money

Documentation and contact

- **Web page collecting info**
  e.g. talks from the workshops

  http://www-hep.fzu.cz/gdn/ **by Jan Valenta** **valenta@fzu.cz**

- **Contact persons:**

America:

Rick van Kooten	**rvankoot@indiana.edu**
Mike Hildreth	**mikeh@omega.hep.nd.edu**

Asia:

Keisuke Fuji	**keisuke.fuji@kek.jp**

Europe:

Joachim Mnich	**Joachim.Mnich@desy.de**
Vaclav Vrba	**Vaclav.Vrba@fzu.cz**

Conclusion and outlook

- **GDN concept:**
  - **technically possible**
  - **some aspects already included in current detector generation**
  - **full GDN functionality to be incorporated from early detector design**
    - **in particular DAQ system**
    - **but important for all detector compoments**

- **Plans:**
  - **relaunch discussion in ILC community**
  - **intensify discussion with experts from**
    - **modern experiments HEP/non-HEP**
    - **modern communication technology**
    - **GAN**

- **Next goal:**
  - **guidelines for detector designers**