Preliminary 'Exploratory' Meeting with Equipment Group Representatives - 15th. March

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Preliminary Meeting

- ***Attractiveness of Hardware Sharing***

  1) Reduction of overall required effort?

  2) Improved homogeneity in final (LHC) control system?

- ***Successful Hardware Sharing***

⇨ **Timing, Field buses, VME bus, PLCs** *- Well in hand…..*

- ***Imposition of Hardware Sharing***
  - ⇨ **Diversity of equipment may mean that single common solution requires more effort.**
  - ⇨ **May not even succeed => zero solution (worse than several !)**
- ***Imposition of standards:***
- **Limit h/w and s/w platforms and support to 'supported standard' types ??**

- ***Coherent results best achieved by proper definition of functionality rather than the methods to realize the equipment***

Preliminary Meeting Contd.

⇨ ***Some diversity in methods and approach is beneficial:***

⇨ ***Keeps a base of in-house expertise, encourages new ideas, encourages follow up of outside industrial developments, etc.***

   !!! Valid only if this expertise and experience is shared by all.

⇨ Forum for the **sharing of experience and knowledge** between equipment groups

⇨ **Collaboration is a pre-requisite for sharing**

Preliminary Meeting Summary - Some Remarks

- **Sharing works best if initiated at start of development/project – needs good specification**

- **Some specialised parts can be taken 'as is' e.g. sensors and conditioners. <u>Many shared/shareable items exist already</u>**

- **Purchase of COTS equipment is an excellent form of sharing - *first choice* !**

- **Experience has shown that adapting an existing development for a new application is not generally worthwhile, even although it may seem attractive at the outset.**

- **Sharing evaluation effort is efficient and encourages further cooperation e.g. Equipment radiation tests.**

- **Collaboration on issues such as Post Mortem and Time-Stamping would be welcome.**

- **Newsgroup and mailing list would be a useful way to exchange information and improve communication. Put information on the Web.**

LHC CP Hardware Sharing Session

- **Participants:**

  Guy Baribaud SL/BI, Gary Beetham SL/CO, Edmond Ciapala SL/HRF, Rossano Giachino SL/OP, Daniel Perrin TIS/TE, Marco Pezzetta TERA, Bruno Puccio SL/CO, Pedro Ribeiro SL/CO, Adriaan Rijllart LHC-IAS, Javier Serrano PS/CO

- **Preliminary meeting between Equipment Group representatives 15 March 2001**

- **Discussion:**

  ⇨ **Collaboration on activities - Sharing of experience and knowledge. Platforms. Support. etc**

  ⇨ **Common needs - common developments**

General shareable activity areas

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- **Bus systems – VME (G64) PCI other**

    - **VME well established**
    - **Mezzanine Modules**
    - **Some interest in PCI and CPCI -> PXI**
    - **Could be followed up**

General shareable activity areas

- **Embedded uP systems in general –**
  Hardware - Software - real time operating system issues

  - **Non- support of OS9**
  - **Use of mC/OS, AMX, LynxOS, Linux**
  - **Put real time in PCA level**
  - **Use of FPGA, VHDL etc to replace micro-controller**

    - **Widely Used in various groups**
    - **Joint PS/SL, LHC B etc**
    - **Interest in many groups - needs learning !**
    - ***Modularity, programmability, facilitates reuse and sharing***

General shareable activity areas

- **DSP hardware & software – platforms and support**

  - **Use in PS, RF, BI, PO others**
  - **Filters and fast data processing**
  - **Generally COTS modules, stand alone or introduced into hardware**
  - **Programming by supplier or in-house**

  - ***Information could be better spread ?***

General shareable activity areas

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  - **Acquisition systems in general, COTS or other**

    - **VME based - CERN + COTS**
    - **LabView systems in widespread use**
      - **Mainly in instrumentation applications**

      See Later

Common Developments for LHC

- **Many 'Standard' modules/ elements already available:**

    - **Signal Conditioners - temperature pressure etc. (LHC)**
    - **GPS interfaces (SL-CO) Timing interfaces**
    - **Radiation tested fieldbus interfaces and components**

    Information can be found from various sources

Common Developments for LHC

- **Function Generator**

  SL CO design

  => Clients SL HRF, Others ?

  - **Timing interface**
    - **Time of Day Event driven ?**
    - **Classical Timing ?**
    - **SPS related injection events !**
  - **Timing WG Official Solution ?**
  - **Hardware integration**
  - **Special development ?**

Common Developments for LHC

- **Remote direct analog signal transmission**

   e.g. Tunnel to surface or PCR -=> Cabling economy

   - **Via multiplexed channels**
   - **Directly over individual fibres**
   - **IP transmission ?**

Common Developments for LHC

- **Diagnostics and acquisition equipment**

    - **PXI/PCI/VME dedicated systems - (COTS)**
    - **NAOS replacement ?**

        - **VXI obsolescence**
        - **Non support of VxWorks**
        - **Triggering on LHC scale ?**

    - **Need a common solution**

Common Developments for LHC

- **Interlock Systems**

  - **Power Permit and Beam Permit systems**
  - **Other equipment where design not yet done**

    - **Review of past solutions**
    - **Technology to use**
      - **- relays/solid state - mixture ?**
    - **Analysis of reliability**
    - **Clear definition of interface between equipments**
    - **Redundancy**
    - **Diagnostics of the system itself (LEP RF experience)**

  - *Machine Protection working group + Equipment group collaboration*

Common Developments for LHC

- **Post Mortem**

  - **Possible Architecture - 2 or more layers**

    - **One input per equipment to BP or PP controller**
    - **Many inputs for each equipment at lower layer**
      - **LEP RF example**
      - **Other machines ?**

  - **Scope of MP working group ...**

Common Developments for LHC

- **RF Interests - and others ??**

  - **Machine state and parameters to be transmitted over timing:**

    - **Energy**
    - **Current**
    - **Mode**
    - **Bucket Number / Injection batch**

Common Developments for LHC ?

- **RF Interests - and others ??**

  - **Slave Ethernet for equipment connection:**

    - **Independent of main Ethernet**

    - **Connection of industrial equipment**
    - **Connection of instrumentation**
      - **Direct Ethernet**
      - **Via adapters e.g. GPIB**
    - **Connection of in-house equipment**

Conclusions

- **Collaboration**

  - **Mail list / news group - Web pages for info - EDMS**
    - **Encourage exchange of information**
    - **Inform of new developments**

  - **Keep it ongoing**

- **Common Developments**

  - **Many systems designed but many important systems still to be implemented !**

  - **Now is the time to resolve the issues**

Final Remarks

- **Thanks to participants at both meetings**

- **Foregoing far from a complete account ….**

  Apologies for omissions, errors etc.

  Sharing session only partially representative

  RF system bias ?

- *Encourage everyone to consider what they need from others*