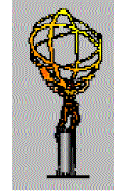
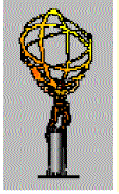


Potential show-stoppers

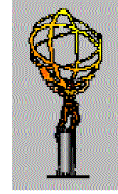


- ◆ *Which areas of the trigger have the highest risk factors, in terms of:*
 - ◆ **Cost-to-complete**
 - ◆ **Effort**
 - ◆ **Trigger Performance (*Slice Test Programme*)**
 - ◆ **Production**
 - ◆ **Installation and Commissioning**
 - ◆ **Operation and Maintenance**

- ◆ *Can we plan now for backup solutions in critical places?*



Potential show-stoppers



◆ Cost-to-complete:

Prob Impact

◆ **WHAT IF** - pricing of a major component increases sharply - e.g. recent price rises with PPrASIC?

Low

Low

◆ Current price trends are *downwards* - especially FPGAs

◆ Buy required number of devices as soon as possible

◆ **WHAT IF** - costs of 9U board assembly (*or re-work*) prove very high?

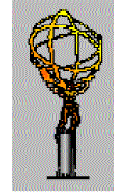
Medium Low

◆ Discuss and negotiate details with several companies soon

◆ **Overall - LOW Risk Factor**



Potential show-stoppers



◆ Effort:

Prob Impact

- ◆ **WHAT IF** - on-line software in all institutes continues to suffer very severely from lack of people

High **High**

- ◆ Back-up solutions???

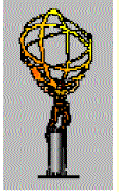
- ◆ **WHAT IF** - electronic engineering support (*currently adequate*) starts to decline (*very vulnerable to market forces*) **Medium** **Medium**

- ◆ Back-up solutions???

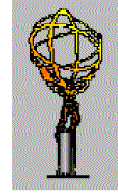
- ◆ **WHAT IF** - level of firmware support remains sub-critical (*there is currently no contingency*) **Low** **Medium**

- ◆ Trade cost savings in hardware items for extra engineering effort

- ◆ **Overall - HIGH Risk Factor**



Potential show-stoppers



◆ Trigger Performance (Slice Test Programme) - 1:

Prob **Impact**

- ◆ **WHAT IF** - assembly of 9U boards containing fine-pitch BGAs continues to be a very difficult procedure?

Medium **Medium**

- ◆ Carry out test assembly trials with several companies to assess problems
- ◆ Modify architecture to allow use of lower-density components

- ◆ **WHAT IF** - PB exhibits unacceptable crosstalk/BERs, either between CPMs (JEMs) or between CPMs (JEMs) and CMMs?

Low **High**

- ◆ Re-simulate, re-design and re-make PBs

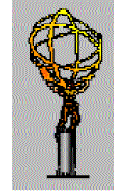
- ◆ **WHAT IF** - high insertion forces with current PB connectors creates an unreliable system?

Low **High**

- ◆ Re-survey market for high-density low-insertion force connectors
- ◆ Modify PB and Processor board designs to use alternative connectors



Potential show-stoppers



◆ Trigger Performance (Slice Test Programme) - 2:

Prob **Impact**

- ◆ **WHAT IF** - studies over wide phase-space reveal low-level fatal PPrASIC bug(s)?

Medium **Medium**

- ◆ Re-design ASIC and re-submit → programme delay
- ◆ Consider radical architectural change(s) → FPGA with serial LVDS O/Ps

- ◆ **WHAT IF** - system-wide timing procedures prove to be unmanageable?

Low **Medium**

- ◆ Prepare detailed test plans for timing methodology

- ◆ **WHAT IF** - on-line software is not fully written/debugged (→ *extended Slice Test programme* → *delayed PRRs*)?

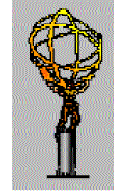
High **Medium**

- ◆ Back-up solutions ???

- ◆ **Overall - MEDIUM Risk Factor**



Potential show-stoppers



◆ Construction:

Prob Impact

- ◆ **WHAT IF** - assembled/tested PPrMCMs have very low yield
(→ *major re-work could delay completion of trigger*)?

Low **Medium**

- ◆ Valuable lessons should be learnt from Slice Test programme to enhance yield

- ◆ **WHAT IF** - assembly of 9U boards with FP BGAs is low-yield
(→ *extensive time-consuming and expensive re-work*)?

Low **Low**

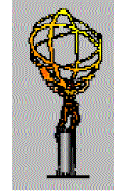
- ◆ Continue to explore state-of-the-art techniques available in industry

- ◆ Explore possibility of using more than 1 assembly company

- ◆ **Overall - LOW Risk Factor**



Potential show-stoppers



◆ Installation and Commissioning:

Prob Impact

- ◆ **WHAT IF** - key components or sub-systems are not available on time?

High High

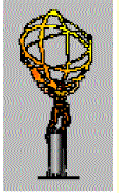
- ◆ Monitor progress regularly - anticipate problems with critical items

- ◆ **WHAT IF** - on-line software is not fully debugged
(→ *extended commissioning* → *delayed trigger availability*)?

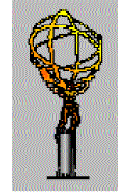
High High

- ◆ Back-up solutions???

- ◆ **Overall - HIGH Risk Factor**



Potential show-stoppers



◆ Operation and Maintenance:

Prob **Impact**

- ◆ **WHAT IF** - a custom component suffers a high rate of “infant mortalities”?

Low **Medium**

- ◆ Consider establishing appropriate burn-in procedures
- ◆ Provide for higher levels of spare components and associated modules

- ◆ **WHAT IF** - we lose key engineering people during operation (→ *lack of continuity* → *maintenance becomes difficult*)?

High **Medium**

- ◆ Establish a good system of continuous information transfer

- ◆ **WHAT IF** - documentation is not systematically maintained - e.g. firmware version control, etc (→ *maintenance difficult*)?

High **Medium**

- ◆ Establish rigorous documentation system

◆ **Overall - MEDIUM Risk Factor**