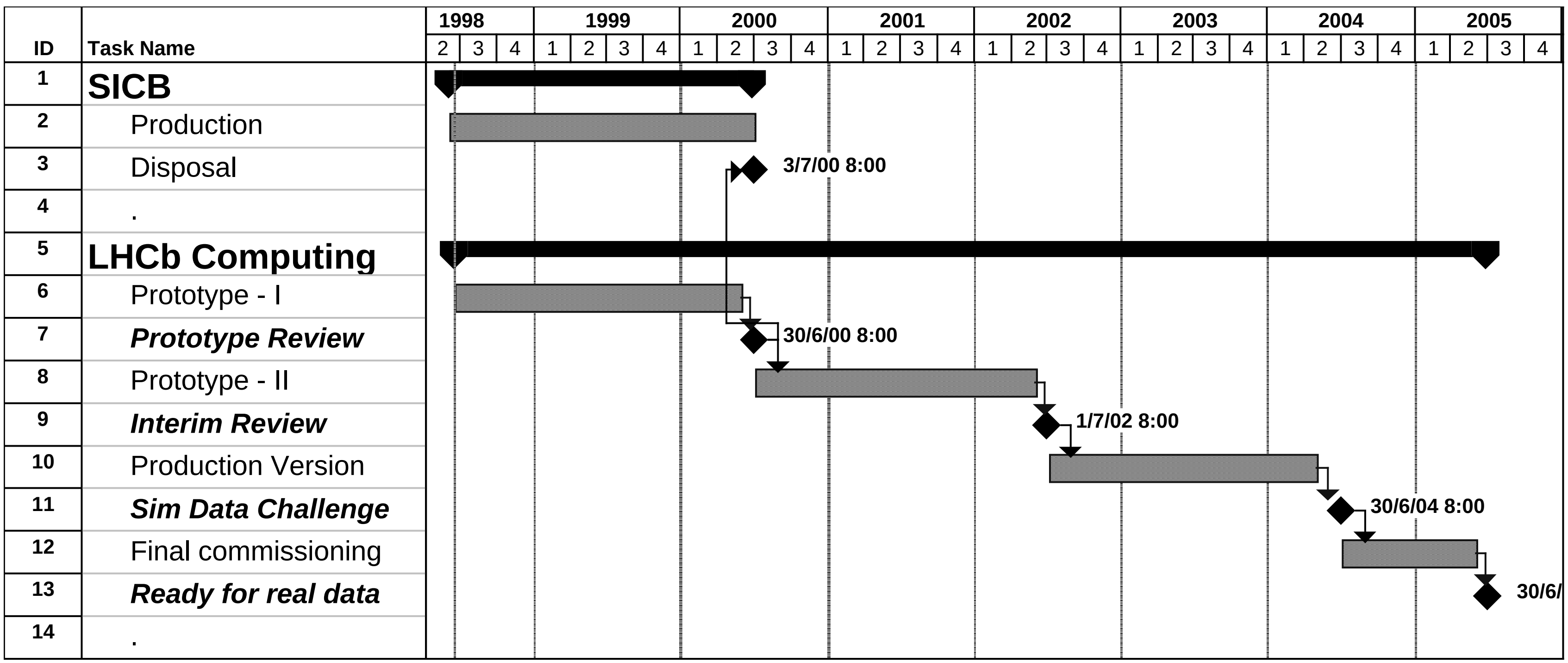
Computing R&D and Milestones

LHCb Plenary

June 18th, 1998

These slides are on WWW at: ***http://alnts1.cern.ch/~cattanem/lhcb/Plenary980618/index.htm***

The Big Picture



Plans for SICB

- **SICB will be discarded when new software with same or superior functionality will be available**
  - **Current planning: July 2000**
- **Until then:**

  <u>Production simulation will continue with SICB</u>
  - **Store event generator record to be available for analysis**
  - **Interface to other event generators**
  - **Studies of alternative detector layout options**
  - **Enhanced detector response simulation**
- **AIX, HP-UX, DEC/Unix, WNT (all available at CERN)**
- **Linux (with help from interested institutes)**

Activities

Programme of work for ~ next two years:

- **Activity 1 - Working Prototype of new LHCb software**
- **Activity 2 - Software Development**
- **Activity 3 - Computing Model**
- **Activity 4 - Collaborative Working**

Activity 1- Working Prototype

- By end 1999, produce a new working prototype of LHCb software incorporating:
  - model of the LHCb detector geometry
  - database containing ~ 1,000,000 simulated events (~100 GB)
  - framework for processing events
  - detector response simulation toolkit
  - pattern recognition algorithms for tracking, RICH, calorimetry,..
  - toolkit of analysis algorithms
  - interactive framework for data analysis
- When in production, stop development of SICB

Where are we gOOing?

You are here	January 2000?
SICB	OO Frameworks
FORTRAN	C++ toolkits
ZEBRA banks	OO event + geometry models
ZEBRA and ASCII files	OO database (Objectivity/DB)

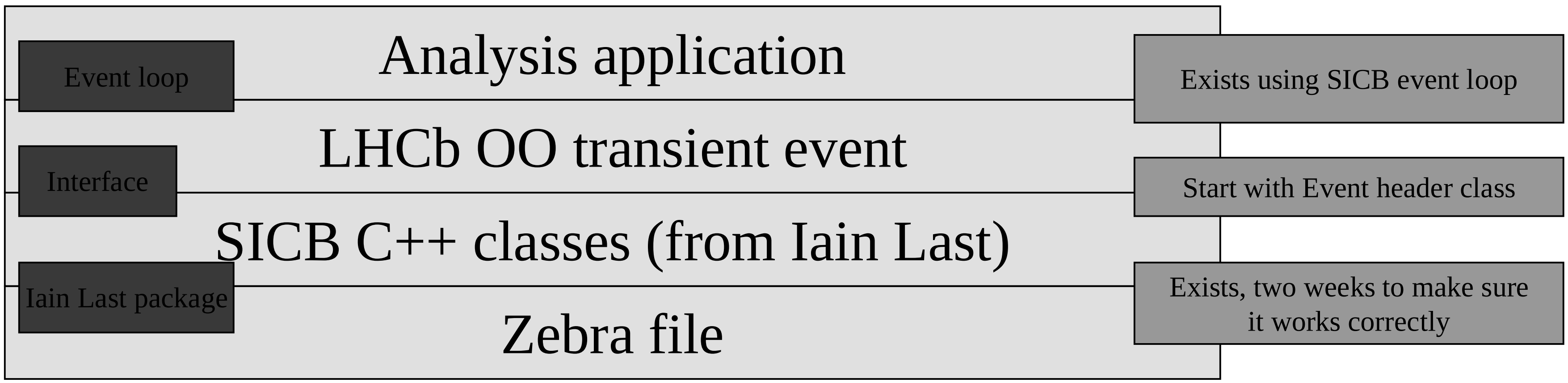
Activity 1 - R&D

- **Evaluation of database approach to event storage**
  - **develop *transient* event model for raw, reconstructed, and analysis data**
    - **subdetector groups**
  - **develop *persistent* storage model (HEPODBMS, Objectivity, MSS)**
    - **work with RD45, HPSS**
    - **LHC Mass Storage Project (online data recording)**
  - **study data access patterns and clustering strategies**
  - **GOAL: assess benefits/limitations for data analysis activities**
- **Program frameworks**
  - **study architectural models and build frameworks for LHCb applications**
  - **evaluate standards that can be used to integrate software components (CORBA, DCOM, RMI)**

Event model + analysis framework

(P.Colrain, I.Last, P.Binko, M.Cattaneo)

- **Goals - short term:**
  - **Provide access to SICB data from C++ (SICB++)(mid-July)**



  - **Collect requirements for transient event object model (summer)**
  - **Writing processed data back to ZEBRA files is NOT a priority**

Activity 1 - R&D

- **GEANT4 Evaluation**
  - **β release in July '98, first production version end '98**
  - **develop overall scheme for detector geometry integrating various *views* (CAD, GEANT4, reconstruction) (F.Ranjard, P.Binko)**
  - **develop detector response algorithms**
    - **subdetector groups**
  - **compare physics results, performance etc with SICB (GEANT3)**
- **Reconstruction**
  - **develop pattern recognition algorithms**
    - **subdetector groups**
  - **study performance, suitability for use in trigger**
- **Analysis Algorithms**
  - **develop toolkit for analysis**
    - **Physics groups**

Physics toolkits

- Encourage physicists to use "SICB++" to develop toolkits and algorithms
- GOALS:
  - Gain widespread experience with new technologies
  - Collect requirements for transient and persistent event model
    - Class structure, data access patterns etc.
- Activities starting:
  - Analysis toolkit ("axlib" replacement) (A.Jacholkowska et al.)
    - Start by collecting requirements from physics analyses
    - Develop toolkit (with OO experts) to be used as alternative to SICB
  - MUON reconstruction (P.Colrain)
  - RICH reconstruction (D.Liko, N.Neufeld)
  - Tracking (NIKHEF)
  - …???

Activity 1 - R&D

- **Interactive Analysis**
  - **Compare available toolkits PAW, ROOT, and LHC++ (HEPInventor, IrisExplorer) (M.Frank)**
    - **use VXD test beam data for direct comparison**
  - **Goal: produce a report answering questions such as**
    - **What do we like about package *xxxx*?**
    - **What don't we like about package *yyyyy*?**
    - **What functionality is missing?**

Activity 2 - Software Development

- Documentation templates for user requirements, project plans, costings..
- Choose a method and tool for designing LHCb software
- Evaluate PC platforms (NT, Linux)
- Support for coding and testing (compilers, debuggers)
- Develop code management and software release scheme
- Develop automatic code documentation scheme

Work with LHC SDE project (led by IT/ IPT group)
Need to develop a "core" of experienced OO programmers
First SDE definition by September '98
Need a mature process and SDE by end '99

Activity 3 - Computing Model

- **Compute facilities - PC farms running NT or Linux**
  - with other LHC experiments and IT/PDP group
- **Event Filter farms - PC farms embedded in DAQ system**
  - with other LHC experiments and IT/PDP group
- **"Data Management and Computing Using Distributed Architectures"**
  - with other LHC experiments in a proposed LCB project (need LHCb person)
  - study use of collaboration computing resources for production work (simulation, analysis)
  - study options for distributing data to regional centres, institutes, desktop
  - simulate and study data access patterns and the resulting network loads and costs they imply

Activity 4 - Collaborative Working

- **Revise collaboration database to use new CERN database**
  - **PIE project - Persons, Institutes and Experiments**
- **Revise web structure, page templates, security policy and tools for management of web pages**
- **Produce guidelines for making documents - prepare for TDRs.**
- **Videoconferencing**
  - **participate in LCB project**

Competion!!

- We need 3 names for the new LHCb packages
  - Analysis framework
  - Reconstruction program
  - Simulation program
- Please send me suggestions
- Winner(s) will be announced at next LHCb week...