

struct is being developed to aid the task of capturing the sequence structure in Perl. A *parser* of MAD 8 file will have to be written.

The *deviations to LattElements*, that carry the errors and corrections information, will be built from a MAD output file, the STRUCTURE file. The latter is a flat machine output which lists relevant errors information element by element.

DEVELOPMENT PLAN

This is the plan we discussed and agreed upon for integrated UAL software development in the next few months, with some superimposed deadlines arising from the RHIC and LHC projects.

| | CESR | BNL | | UAL |
|-----|------|------|-----|-----|
| | | RHIC | LHC | |
| JUL | ↑ | ↑ | ↑ | ↑ |
| AUG | ↓ | ↓ | ↓ | ↓ |
| SEP | | ↑ | ↑ | ↑ |
| OCT | | ↓ | ↓ | ↓ |
| NOV | | ↑ | ↑ | ↑ |
| DEC | | | | |

For the sake of clarity I will spell out the meaning of the keywords on the arrows.

CESR PERL interface: Perl code to facilitate build up of the CESR SMF from CESR database.

RHIC SMF: Conversion of RHIC SMF code to feed Perl Interface to (new) SMF.

RHIC SMF tracking: Tracking RHIC described by (new) SMF. It will initially use FTPOT for corrections and teapot++ for tracking (hence needs the SMF<-->fort.7 connection). Will use full teapot++ when teapot++ draft is available.

MAD Ftpot Sixtrack: Short term tracking effort for LHC, on BNL and CERN systems.

LHC SMF: More specifically, “real machine” level of LHC SMF. Needs the MAD8 LHC sequence parser.

PERL Sequence: Perl construct to aid the writing of the LHC MAD8 Parser.

MAD8 Sequence parser: Captures MAD8 LHC sequence and uses PERL Sequence.

SMF<-->fort.7: Code that links (both ways) the SMF to Fortran Teapot.

teapot++ draft: C++ Teapot, including most analysis and corrections. Draft, to be tested.

UAL: Perl interface, new SMF, etc.

The **SMF classes** were modified over the last year and new secondary metadata collections were added for the purpose of optimization. The software is now stable and no major revisions (other than possible bug fixing) are foreseen in the near future.

The **Perl interface** to UAL was described and a copy of the slides can be found in the attachments. The interface is very flexible and supports advanced features such as superposition of elements, families of elements, etc. A few additions to the interface were suggested and agreed upon, during the working sessions, such as the methods *name(arg)*, to set the name of a Lattice Element, and *index(name)* which returns the index of a Lattice Element keyed by name.

A new Perl construct, the **Perl Sequence**, is being developed, to facilitate the task to initialize SMF from a MAD (Version 8) sequence.

CESR SMF

A preliminary description of CESR exists already and a **Perl interface** is being developed to facilitate the build-up of the SMF from the CESR “database” - a collection of several heterogeneous file describing the accelerator.

RHIC

The RHIC SMF description, developed last year, worked with the previous release of the SMF software: data from the RHIC database are manipulated and used to feed the (old) SMF classes in memory (see attachments). The software has to be updated to use the **Perl interface** to build the new SMF.

Once the RHIC SMF is built, the full **Teapot++** is needed for the purpose of simulation. At the moment, the analysis and correction part are not yet implemented. For that reason, and that of backward compatibility, it is necessary to ‘repair’ the broken link between SMF and fort.7, that is the link between SMF/Teapot++ and Fortran Teapot.

LHC

Many software requirements arise from the collaboration with the LHC and the need to build up a simulation environment that supports it. (see attachments).

In the **short term** (< 6 months) the following tools will be used:

MAD: The official CERN environment is MAD and all machine and error description of the LHC is based on MAD syntax and constructs (sequence, scripts and subroutines). One needs to be able to continue running MAD jobs and tracking for the purpose of comparing results. The capability of doing so is already in place both on the BNL and CERN systems.

SIXTRACK: Sixtrack is used purely as a tracking and postprocessing engine since it inherits machine description, errors and corrections from MAD. MAD generates output that are sixtrack input files.

FTPOT: The capability exists now to convert MAD “twiss” output files to TEAPOT (fortran) input files. A previously existing program was modified before and during the workshop to achieve this for the LHC. This also opens the possibility of LHC tracking with TEAPOT.

In the **medium term** (~6 months) we build and use the **LHC SMF**:

GenElement definitions and the *sequence of LattElements* will be built from the Version 8 MAD file as translated (using an existing translator) from a Version 9 MAD file. A *Perl sequence con-*

July 17, 1997

Summary of Mini -Workshop on UAL and CESR, LHC, RHIC lattice description

LNS, Cornell, July 10-11, 1997

F.Pilat, N.Malitsky, R.Talman, S.Tepikian, G.Trahern, J.Weil

The main *goals* of the mini-workshop were to review the status of the UAL (Unified Accelerator Library) software and the projects that use this software for machine lattice description, such as CESR, RHIC and the LHC and to make a plan for integrated software development for UAL and its applications. Another goal was the discussion of simulation software tools needed for the US-LHC collaboration in general and in particular Ftpot (fortran teapot).

List of participants: Cornell N.Malitsky (NM), T.Pelaia (TP), D.Sagan (DS), R.Talman (RT)
BNL F.Pilat (FP), S.Tepikian (ST), G.Trahern (GT), J.Weil (JW)

The *agenda* for the 2 days was the following:

Thursday, 10 July

- | | | |
|------------|------------|---|
| 9:00-12:00 | NM | Description of PERL SMF interface and discussion of open questions. |
| | RT, NM | Implementation of SMF LHC lattice description (also Ftpot). Discussion. |
| | FP, GT | Special problems of incorporating measured field errors. |
| 1:30-2:30 | FP, JW | Accelerator physics seminar at Wilson Lab. "Plans for RHIC and Report on Commissioning So Far". |
| 3:00-5:00 | NM, FP, GT | working group on UAL (computer). |
| | RT, ST, JW | working group on FTPOT (computer). |

Friday, 11 July

- | | | |
|------------|-----|--|
| 9:00-12:00 | NM | Description of PERL SMF interface. |
| | GT | SMF implementation of RHIC. |
| | TP | PERL interface to CESR database. |
| | DS | CESR lattice description - BMAD. |
| | JW | Description of BNL's LHC responsibilities. |
| | FP | Details of LHC description (SMF). |
| | ST | Details of LHC description (Ftpot). |
| 1:30-3:00 | All | Planning for the future. |

What follows is an attempt to summarize the various topics that arose during the presentations and the discussions.