Beam Interlock System

B. Puccio   MPP Internal Review   17-18th June 2010

- ## Stable system

  Intensively used (~1000 emergency dumps since Nov.09)

  Get confidence thanks to Operational tests *(see next slide)*

  No false dump

  High availability, except for:

  VME-bus controller board failures (*same problem with BI crates)*

  BE/CO is aware of this issue. A solution/cure is expected…

  few failures with redundant PSU installed in CIBU

  Thanks to redundancy, never lead to a beam operation disruption.

  3 failures with redundant PSU of the VME crate

  Always a primary side fault, together with a permanent short

  => open the circuit breaker.

  Unfortunately, only one UPS "reglette" is installed in each BIC's racks; in other words: our redundancy is useless!

  No immediate solution. Waiting for feedback from BE/CO & Elcotron…

● Controllers are installed in: CCR, SR3, SR7, UA (23,27,43,47,63,67,83,87), UJ33, TZ76, US15, USC55 and UJ56

UJ56 case: a move to USC55 is already scheduled (shutdown 2012?)

(re-commissioning has to performed)

Other cases: still waiting for R2E inputs

(a move to the surface is technically possible; simply a question of cost..)

● CIBUs are always installed in the User Systems' racks.

The most critical cases are UJ14, UJ16, RRs,…

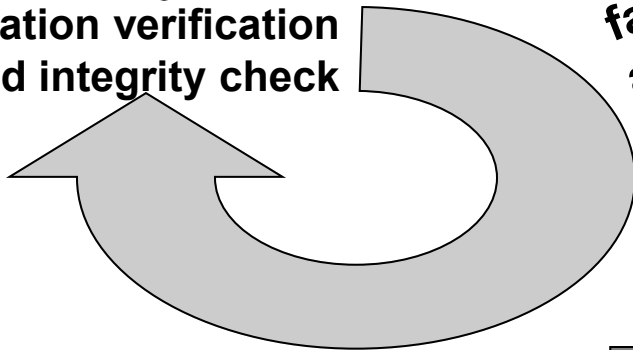If User System equipment is moved, CIBU will be obviously moved.

Irradiation tests performed: the CIBU is most likely less sensitive than the host Equipment.

Thanks to redundancy, SEU will not compromise safety but obviously could provoke a beam dump.

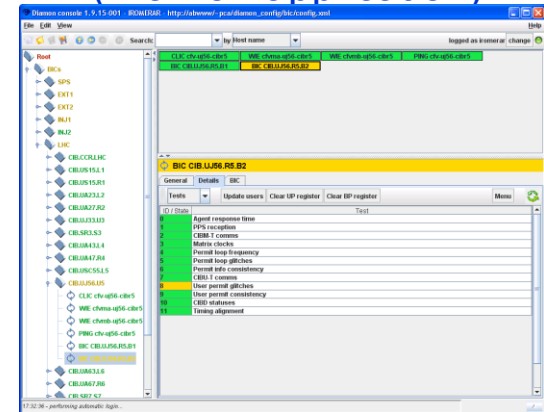## Pre-Operation checks (launched by Beam Sequencer)
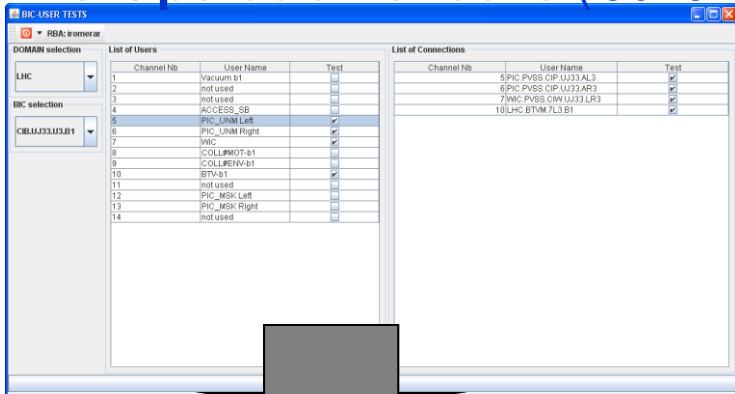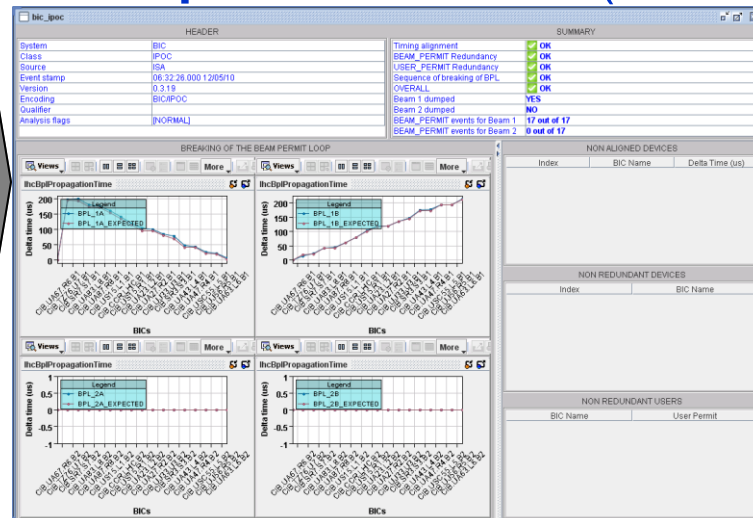

configuration verification and integrity check

During Operation
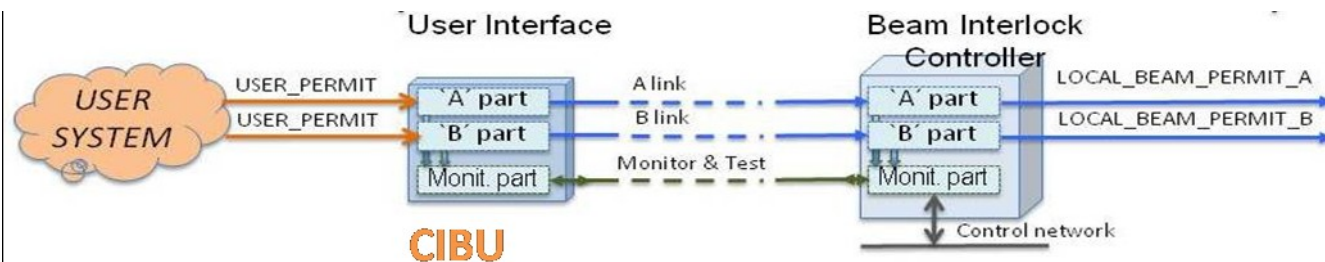(DiaMon application)

fault diagnosis and monitoring

response analysis

Post-Operation checks (included in PM)

BIS design allows 100% Online test coverage:

Connections could be tested from end-to end

⇨recovered "good as new"

But only from the input connectors...

In order to avoid blind failure, the User_Permit signal changes must be regularly checked ⇨   **Automated Tests**

- Already available with only:
    - BLM and BTV systems
    - PIC, WIC and FMCM

- Required for:
    - Collimation (Environmental parameters)
    - Collimation (Motor positions)
    - Vacuum
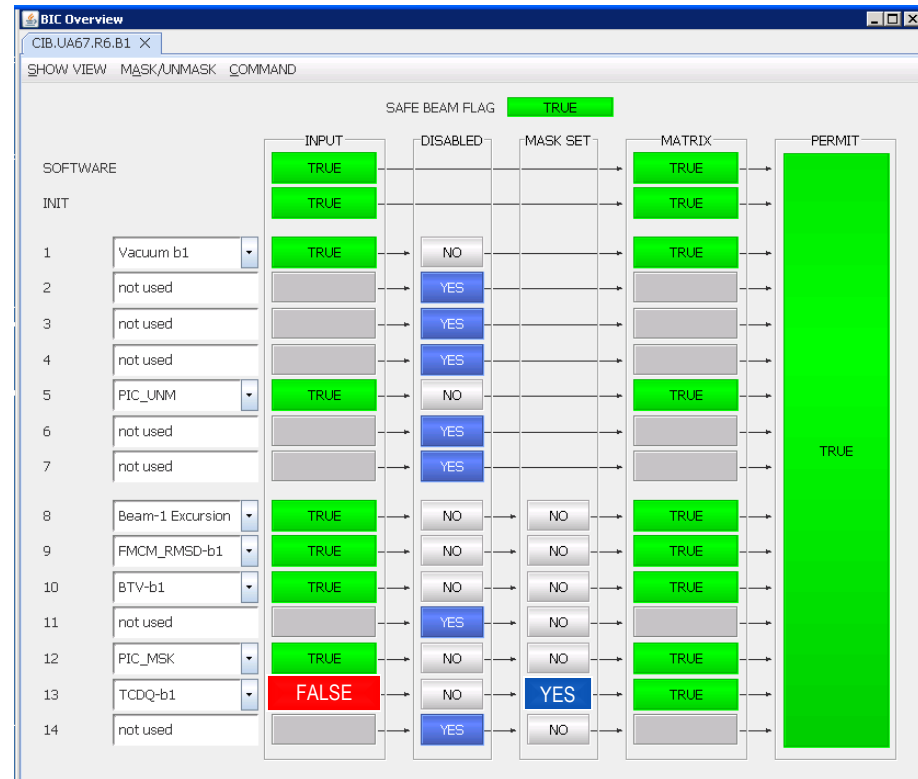   - Experiments (detector parts)
    - Experimental Magnets
    - ...

- FESA property (for VME based system)
 <u>and</u> PVSS framework (for PLC based system) are both available

MI team is willing to help but it's up to the User System team to implement the

functionality and write the code.

It has been foreseen to force the Safe Beam Flag to FALSE before the ramp…

As an additional safety level,

what about the "removal" of the masks?

(could be implemented without difficulty)

- Stable HW system despite few availability issues:

  Not related to BIC boards; under investigation with help of BE/CO.

- Radiation issues? *will be only related to machine availability*
  move of BIC in UJ56 already scheduled; for the other locations:
  we will follow R2E advices

- Monitoring and Test SW in operation:

  - Pre-Operational checks recently integrated in LHC Beam Sequencer

  - Post-Operational checks are included in PM analysis

  - BIS Java application and *Diamon* application both give on-line diagnosis

  - CIBU Automated tests increase the level of confidence:

    To be done by the User System team
    Partially implemented; need MPP recommendation for (re)activating the "process"

- Masks removed before the ramp?

  Waiting for a decision...

Fin

Thank you for your attention