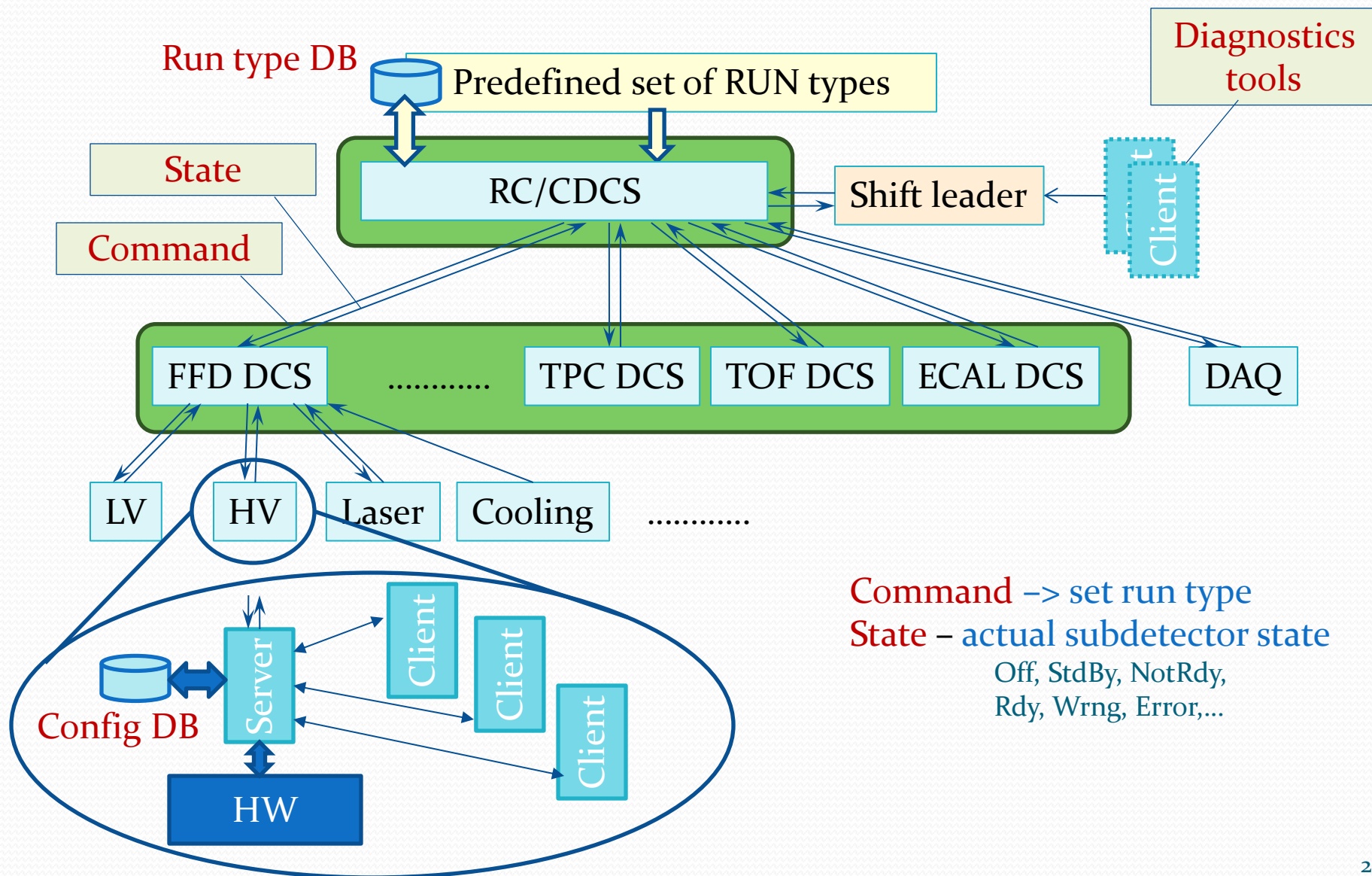


# State of MPD DCS and plans for 2025

S.Sergeev

# MPD DCS structure



# Interfaces actual state

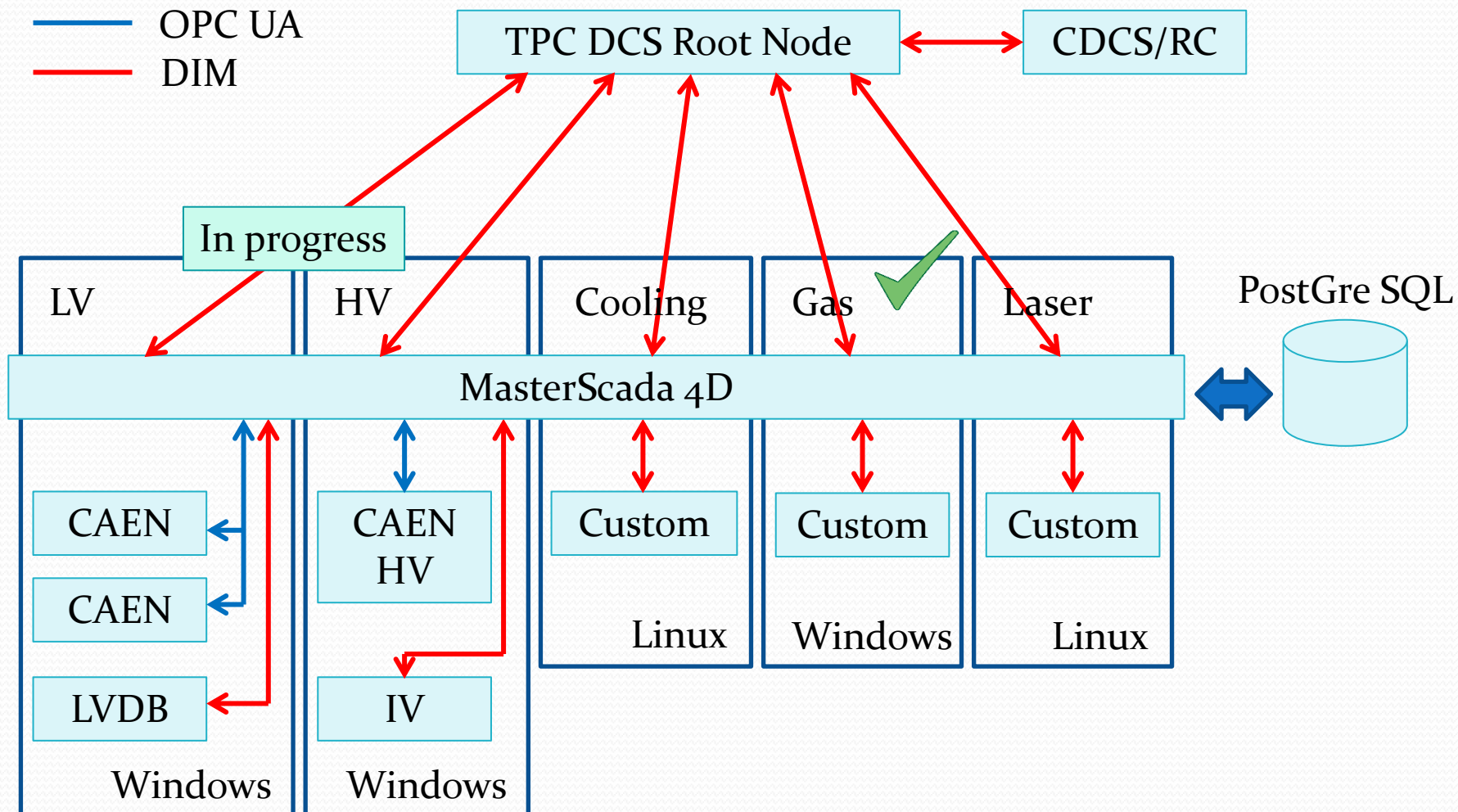
Agreed with subdetector teams and tested

- Solenoid -> MS<sub>4</sub>D -> DIM -> CDCS
- DAQ -> DIM -> CDCS
- ITS -> WINCC OA -> DIM -> CDCS
- TPC -> MS<sub>4</sub>D -> DIM -> CDCS
- FFD -> home-made hw/sw -> DIM -> CDCS
- ECAL -> Tango -> DIM -> CDCS
- TOF -> Tango -> DIM -> CDCS
- fHCAL -> DIM -> CDCS
- Lumi -> Tango -> DIM -> CDCS

# DCS framework

- **Central DCS application** – prototype runs
- **Subdetector root node** - prototype runs
  - Has GUI
  - Adjustable for subdetector architecture
  - Joins Linux and Windows computers
- **Converter local files <-> DIM** – final version runs
- **Hardware Server Emulator** – runs
- **DIMTree** - DIM address space browser (runs at Windows and Linux)
- **Started TPC integration.** During this process the Root node application to be modified

# TPC DCS



Interface MasterScada\_4D <-> DIM ready

# CDCS manager I

The screenshot displays the MPD Central DCS Manager v1.12 interface, which is divided into several functional areas:

- Top Bar:** Contains the application title "MPD Central DCS Manager v1.12" and standard window control buttons (minimize, maximize, close).
- Navigation Tabs:** Located below the title bar, including "Main", "Configuration editor", "Logs", and "Settings". The "Main" tab is currently active.
- Left Panel (Configuration List):**
  - Includes a "Refresh" button and a "Config tag" field set to "Config420240529103140".
  - A tree view of "MPD configs" with expandable items: Config1, Config2, Config3, **Config4** (selected), Config5, Physics\_A2B, ZY\_Working, and Zy-config.
- Center Panel (System Tree):**
  - Shows a hierarchical tree of the MPD system components, each with a status indicator (green square for running, red square for stopped or error).
  - Root: **MPD** (running)
  - Children:
    - DAQ d** (running)
    - Subsystem1** wwwqrtgwwrtgqretgwrtd (running)
    - Subsystem2** stopped
      - Value1 wrefgwrtdAa (running)
      - Value2 (running)
    - ECAL** wrtgwrt (running)
    - FFD** gwqrtgwwrt;ghnqwoq (running)
      - Cooling** OK (running)
      - Tmax 32.5 (running)
      - HV ok (running)
      - Laser** 10 (running)
        - Frequency 1000 (running)
        - Power 50 (running)
        - State (running)
        - Temperature 28 (running)
      - LV (running)
    - FHCAL** Ready (running)
    - Magnet** (running)
      - Current 1200 (running)
      - Temperature 2.3 (running)
      - TPC 20 (running)
      - Zy eltempletem\_MPD\_DCS\_State\_Zy (running)

- Bottom Left Panel (Controls):**
- Buttons: "Initialize", "Start Run", "Pause", and "End Run".
- A "Run Nbr" field with the value "0" and a spinner control.
- Right Panel (Logs):**
- A scrollable text area displaying a log of system events and commands.
- Log entries include timestamps (e.g., 30.09.2024 10:30:37) and messages such as "DAQ ini command", "ECAL ini command", "FFD ini command", "FHCAL ini command", "TPC ini command", "Zy ini command", and "done" status reports for various components.

# CDCS manager II

MPD Central DCS Manager v1.12

Main Configuration editor Logs Settings

Load Scan Build Tree Save

C:\Sergueev\FDD\CentralDCS\Lazarus\CDCS\_Configs\Config420; ...

DCS\_Command=Unknown  
MPD\_DCS\_State/DAQ  
MPD\_DCS\_IniCmd/DAQ  
MPD\_DCS\_State/DAQ/Subsystem1  
MPD\_DCS\_State/DAQ/Subsystem2  
MPD\_DCS\_State/DAQ/Subsystem2/Value1  
MPD\_DCS\_State/DAQ/Subsystem2/Value2  
MPD\_DCS\_State/ECAL  
MPD\_DCS\_IniCmd/ECAL  
MPD\_DCS\_State/FFD  
MPD\_DCS\_IniCmd/FFD  
MPD\_DCS\_State/FFD/Cooling  
MPD\_DCS\_State/FFD/Cooling/Tmax  
MPD\_DCS\_State/FFD/HV  
MPD\_DCS\_State/FFD/Laser  
MPD\_DCS\_State/FFD/Laser/Frequency  
MPD\_DCS\_State/FFD/Laser/Power  
MPD\_DCS\_State/FFD/Laser/State  
MPD\_DCS\_State/FFD/Laser/Temperature  
MPD\_DCS\_State/FFD/LV  
MPD\_DCS\_DisplayCmd/FFD/LV  
MPD\_DCS\_State/FHCAL  
MPD\_DCS\_IniCmd/FHCAL  
MPD\_DCS\_State/Magnet  
MPD\_DCS\_State/Magnet/Current  
MPD\_DCS\_State/Magnet/Temperature  
MPD\_DCS\_State/TPC  
MPD\_DCS\_IniCmd/TPC

MPD

- DAQ d
  - Subsystem1 wwwqrtgwwrtgqretgwrtd
  - Subsystem2 stopped
    - Value1 wrefgwrtdAa
    - Value2
  - ECAL wrtgwrt
  - FFD gwqrtgwwrtgghnqwoq
    - Cooling OK
      - Tmax 32.5
      - HV ok
    - Laser 10
      - Frequency 1000
      - Power 50
      - State
      - Temperature 28
    - LV
  - FHCAL Ready
  - Magnet
    - Current 1200
    - Temperature 2.3
  - TPC 20
  - Zy eltempltem\_MPD\_DCS\_State\_Zy

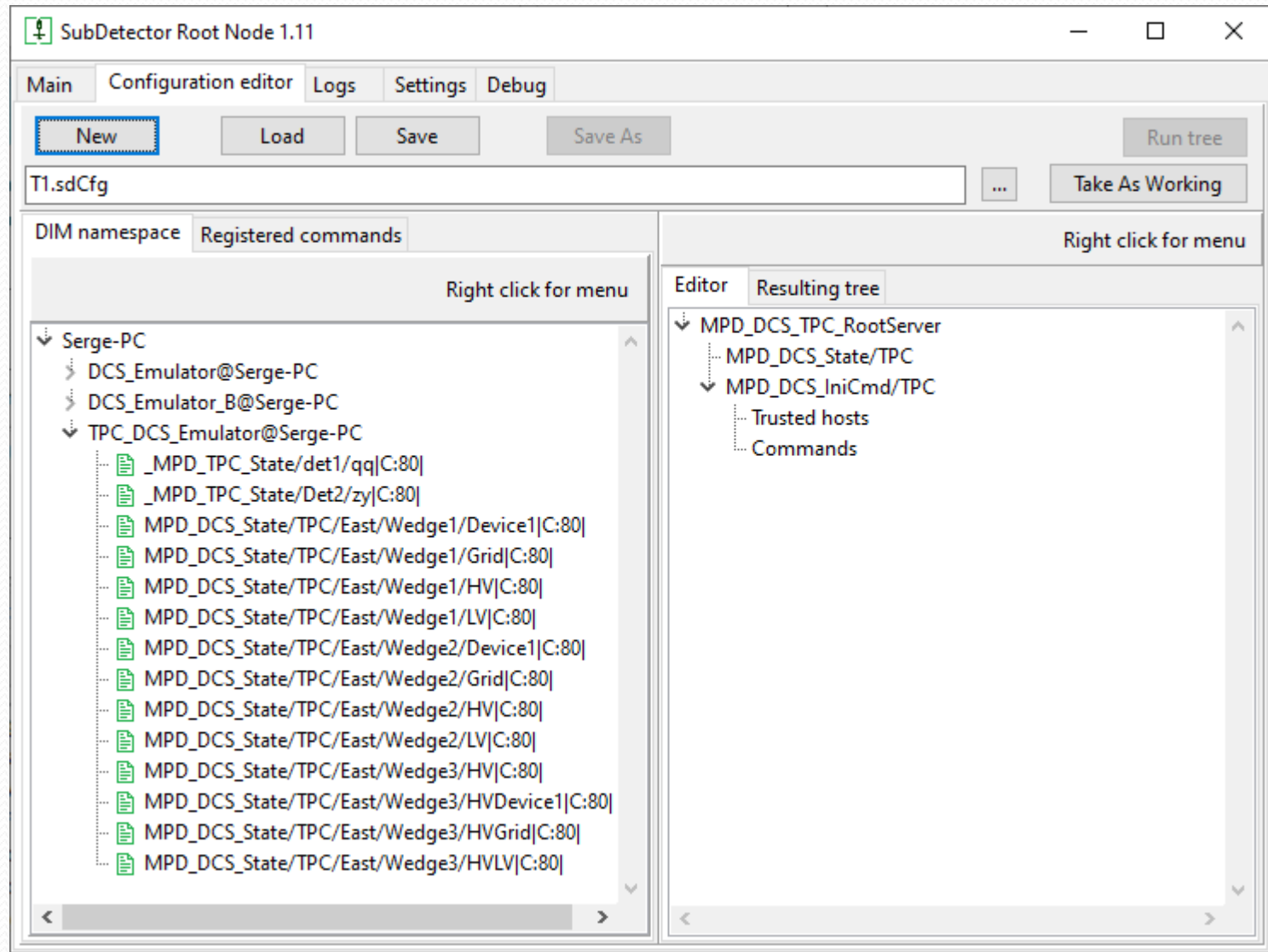
30.09.2024 10:30  
30.09.2024 10:30  
30.09.2024 10:30  
30.09.2024 10:30  
30.09.2024 10:30  
30.09.2024 10:30  
30.09.2024 10:30  
30.09.2024 10:30  
30.09.2024 10:30  
30.09.2024 10:30  
30.09.2024 10:30

# SubDetector Root Node I

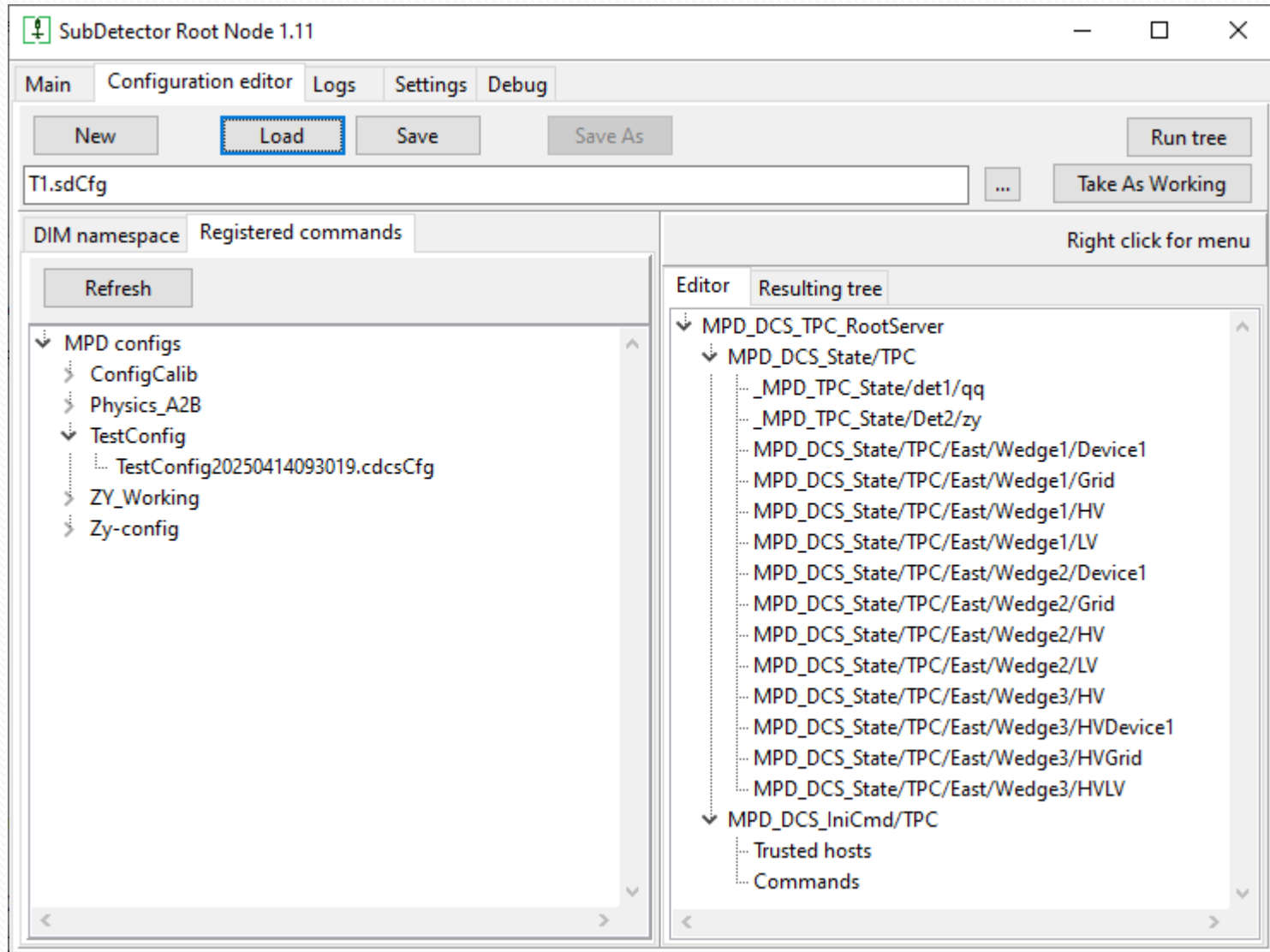
- Receives states of subdetector subsystems using DIM Info Services
- Builds resulting subdetector state
- Receives commands from CDCS.
- Parses CDCS commands and converts to subdetector subsystems commands.
- Sends commands to subdetector subsystems using DIM Command Services
- GUI for configuration command editing
- Adjustable for MPD subdetectors



# Root Node, DIM item selector



# Root Node, Command selector



# Root Node, Test run

The screenshot displays the 'SubDetector Root Node 1.11' application window. The interface includes a menu bar with 'Main', 'Configuration editor', 'Logs', 'Settings', and 'Debug'. Below the menu bar are buttons for 'New', 'Load', 'Save', 'Save As', 'Run tree', and 'Take As Working'. The 'Configuration editor' tab is active, showing a file named 'T1.sdCfg'.

The main area is divided into two panes. The left pane, titled 'DIM namespace', shows a tree structure under 'Serge-PC' with the following nodes:

- DCS\_Emulator@Serge-PC
- DCS\_Emulator\_B@Serge-PC
- TPC\_DCS\_Emulator@Serge-PC
  - \_MPD\_TPC\_State/det1/qq[C:80]
  - \_MPD\_TPC\_State/Det2/zy[C:80]
  - MPD\_DCS\_State/TPC/East/Wedge1/Device1[C:80]
  - MPD\_DCS\_State/TPC/East/Wedge1/Grid[C:80]
  - MPD\_DCS\_State/TPC/East/Wedge1/HV[C:80]
  - MPD\_DCS\_State/TPC/East/Wedge1/LV[C:80]
  - MPD\_DCS\_State/TPC/East/Wedge2/Device1[C:80]
  - MPD\_DCS\_State/TPC/East/Wedge2/Grid[C:80]
  - MPD\_DCS\_State/TPC/East/Wedge2/HV[C:80]
  - MPD\_DCS\_State/TPC/East/Wedge2/LV[C:80]
  - MPD\_DCS\_State/TPC/East/Wedge3/HV[C:80]
  - MPD\_DCS\_State/TPC/East/Wedge3/HVDevice1[C:80]
  - MPD\_DCS\_State/TPC/East/Wedge3/HVGrid[C:80]
  - MPD\_DCS\_State/TPC/East/Wedge3/HVLV[C:80]

The right pane, titled 'Resulting tree', shows a tree structure under 'MPD\_DCS\_TPC\_RootServer' with the following nodes:

- MPD\_DCS\_State/TPC
  - \_MPD\_TPC\_State
    - det1
    - Det2
  - MPD\_DCS\_State
    - TPC
      - East
        - Wedge1
        - Wedge2
        - Wedge3
          - HV overheating
          - HVDevice1 Ready
          - HVGrid Ready
          - HVLV Ready

# Disk file to DIM Converter

- Reads local files containing subsystem state with refresh period ~1 sec. Converts content of file to DIM Info item
- Checks “heart beat” and generates OFF state if no data refresh occurred during predefined time
- Receives DIM commands from subdetector Root Node and records command content to a disk file
- One file – one DIM item
- One subdetector could run Converter copies at different computers
- To be ready in mid-November for Windows and by the end for Linux

# Safety issues

- Each DIM command contains a process ID and a name of a computer issued the command (Command Source ID, CSID)
- Root node has a possibility to create a list of trusted hosts which could send a command
- Each command service should check a CSID of a command
- The CDCS publishes its CSID and root nodes could get it in a real time mode
- The Root Node also publishes its CSID and hardware servers also could get it in a real time mode
- DIM protocol does not allow to have two items with the same name in a common name address space so there is **no simple way** to send a command by mistake

# Plans for 2025

- TPC integration
- Other subdetectors?
- Migration of CDCS manager to Linux
- Modification of the RootNode application for Linux (to have common version for both Windows and Linux)

# Thank you

# DCS emulator

DCS components emulator 1.6

Config file name:  Server name:   ☒ Load at startup ☒ Real Time Emulation

MPD_DCS_State/DAQ	Message 0	message0	Send
MPD_DCS_State/DAQ	3	d	
MPD_DCS_InitCmd/DAQ	30.09.2024 10:30:37 Config420240529103140		
MPD_DCS_State/DAQ/Subsystem1	3	wwwqrtgwwrtgqretgwrtd	
MPD_DCS_State/DAQ/Subsystem2	3	stopped	
MPD_DCS_State/DAQ/Subsystem2/Value1	3	wrefgwrtdAa	
MPD_DCS_State/DAQ/Subsystem2/Value2	3		
MPD_DCS_State/ECAL	3	wrtgwrtd	
MPD_DCS_InitCmd/ECAL	30.09.2024 10:30:37 Config420240529103140		
MPD_DCS_State/FFD	3	gwrtgwwrt;ghnqwoq	
MPD_DCS_InitCmd/FFD	30.09.2024 10:30:37 Config420240529103140		
MPD_DCS_State/FFD/Cooling	3	OK	
MPD_DCS_State/FFD/Cooling/Tmax	3	32.5	
MPD_DCS_State/FFD/HV	3	ok	
MPD_DCS_State/FFD/Laser	3	10	
MPD_DCS_State/FFD/Laser/Frequency	-1	1000	
MPD_DCS_State/FFD/Laser/Power	-1	50	
MPD_DCS_State/FFD/Laser/State	3		
MPD_DCS_State/FFD/Laser/Temperature	3	28	
MPD_DCS_State/FFD/LV	3		



# CDCS interface I

- RC/CDCS subscribes to published by subdetectors **state InfoItems** with names  
MPD\_DCS\_State/<subdetector name>
- Run configuration contains subdetectors list used in a run
- RC/CDCS sends run type name (text) to all **CommandItems** of subdetectors being in a list. **CommandItems** should have a name like  
MPD\_DCS\_IniCmd /<Subdetector name>









# CDCS interface II

- Each subdetector DCS root node could (should?) have a **CommandItem** with name  
MPD\_DCS\_DisplayCmd/<subdetector node name>  
A command received by this **CommandItem** should start diagnostic tool (see below)
- DAQ should have additional Info/Command items to provide **vital information** to/from the RC/CDCS (to be discussed with DAQ team)

# CDCS interface III

- RC/CDCS has a **CommandItem MPD\_DCS\_Messages** to receive messages from subsystems/subdetectors
- Format of message should be like (to be discussed)
  - `<subdetector name>_<severity level>_<message text>`
    - `<severity level>` defines a way to process the message
      - 0 -> just to show in a window. Could be scrolled by messages arriving later
      - 1 -> stays at the screen until confirmed
      - 2 -> stays at the screen until confirmed + sound alarm if not confirmed during defined time (1 min as an example)
      - 3 -> stays at the screen until confirmed + instant sound alarm
- All messages have a text content

# States and colors

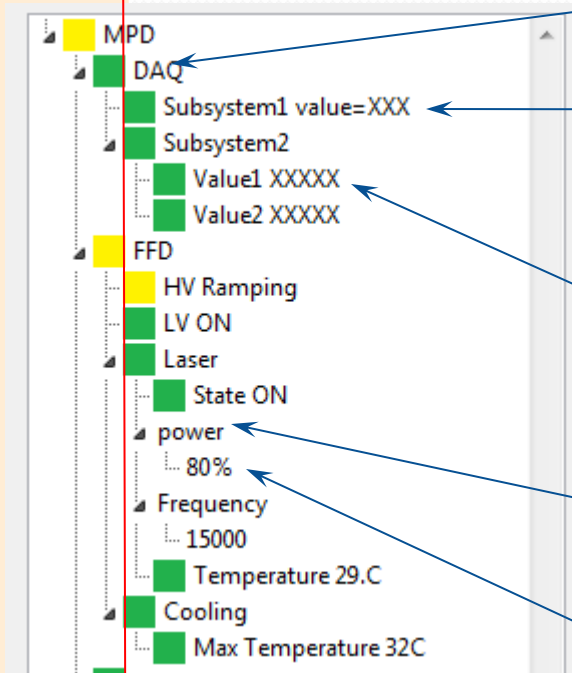
-  State=-1, Item does not have a state, no color to be displayed
-  State=0, OFF - any of sub-elements **does not respond**
-  State=1, StdBy – any of sub-elements is in **stand-by** mode
-  State=2, NotRdy – any of element is in **transition** state  
(Time-out should be implemented)
-  State=3, Ready – all elements are **OK**
-  State=4, Wrng – any of elements is in **Warning** state
-  State=5, Error – any of elements is in **Error** state
-  State=6, Ignrd – node in **Partitioned** state

# Extended display (to be discussed)

- A subdetector should provide a set of diagnostics tools stated by a `CommandItem`  
    `MPD_DCS_DisplayCmd/<subdetector name>`
- This should be an application running at a CDCS PC or a web-page running AJAX script (?). The web server could be provided by a CDCS. Page content should be developed by the subdetector team and could be located at a common disk space
- Start parameters are defined in the `CommandItem` command content

# Extra parameters interface

MPD state is built using 1-st level nodes



“MPD\_DCS\_State/DAQ”, content=“3”

“MPD\_DCS\_State/DAQ/Subsystem1”,  
content=“3\_value=XXX”

“MPD\_DCS\_State/DAQ/Subsystem1/Value1”,  
content=“3\_XXXXX”

“MPD\_DCS\_State/FFD/Laser\_power”,  
content=“-1”

“MPD\_DCS\_State/FFD/Laser\_power/”,  
content=“-1\_80%”

Obligatory

Extra info to display in the tree, defined by subsystem/subdetector