



Instrument Control Software Activities at INAF-OAPd



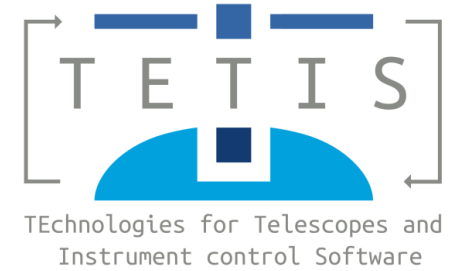
A. Baruffolo

on behalf of OAPd ICS team

CSN5 Forum della Ricerca Sperimentale e Tecnologica in INAF – Bologna, 23 giugno 2022

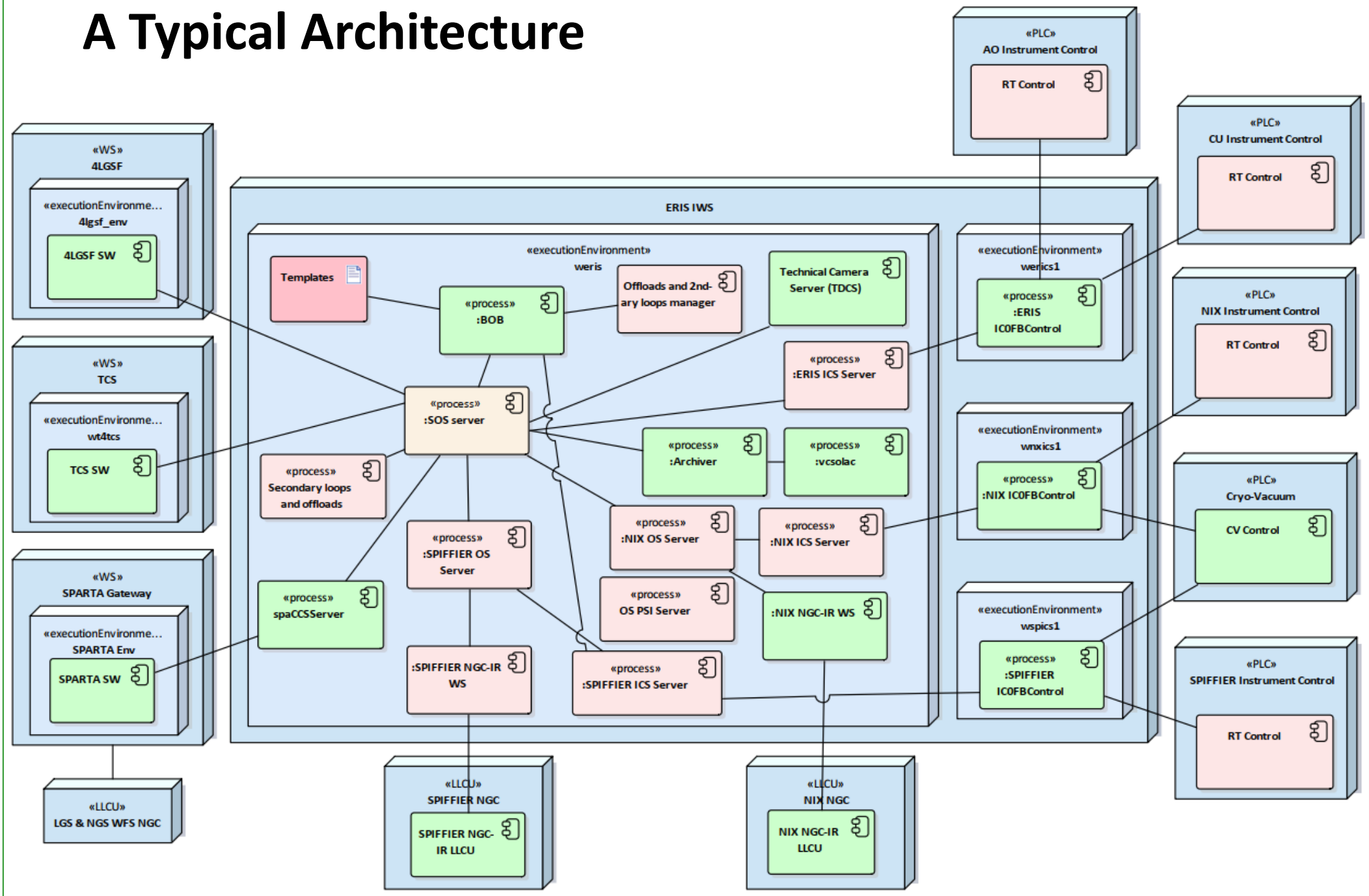


“What”



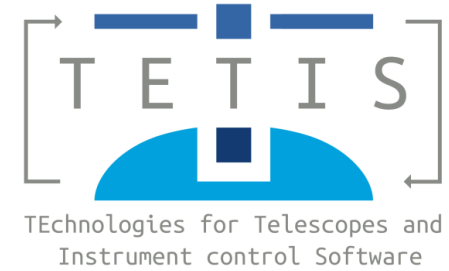
- Instrument Control SW (ICS or INS) for Optical/Infrared Instruments for ground-based Telescopes, with or without Adaptive Optics
- Full WP responsibility or contribution
- AdOpt@TNG, OmegaCAM, MAD, LBC, SPHERE, WEAVE, CRIRES+, ERIS, SHARK-NIR, SOXS, MAVIS, MedRes/SPHERE+, MORFEO (was: MAORY)
- Prevalence of Instruments for ESO Telescopes

A Typical Architecture





“What’s in”



- Device control (low level): FB/Beckhoff PLC, C/C++
- Function control (user view): mostly C/C++
- Coordination software: C++
- Procedures (Target Acquisition, Observation, Calibration, Maintenance): Tcl, Python
- On-line processing (NCPA, Strehl, object detection, ...): C/C++, Python, Tcl
- Graphical User Interfaces: Tcl (+ VLTSW Tk), Python, C++
- Test SW: Tcl, shell, C/C++, Python

BOB Broker for Observation Blocks (t.ob.248275@werns)

File Edit Configuration Errors Help

OBS: (file) -> bob -> ERIOS OS

Next observation blocks:

- Maintenance - Maintenance - Condor
- ERIS_nixMG_acc_LGS (ERIS_nix_acc_LGS) - NIX acquisition in MG mode
- DET
- DIT = 2.0
- NDIT = 1
- READOUT = SLOW_GF_UTR
- DP
- CATG = ACQUISITION
- TECH = IMAGE

Template log-messages

Paused before starting at 2022-06-14T01:26:05

Embedded OSF - @werns

File Edit Configuration Errors Help

Name: BOB Date: 2022-06-13

BOB - Remaining Time until End: 00:00:00

- ERIS AO LGS acquisition
 - Preset
 - LGS Setup
 - LGS Centering
 - LGS Loop closure
 - LO Acquisition
 - Start NGS sky follower
 - Stop AG and enable Probe Guiding mode
 - Set DSM to full AO
 - Close LO loop
 - Offload Loops
 - Gain Optimization
 - Start HO gain optimization
 - Start LO gain optimization
 - Undo HO gain optimization
 - Undo LO gain optimization

Continue Skip & Continue Abort Reset Close

ERIS Control - @werns

File Std.Options Options Engineering Telescope Instrument MLGSF Help

State **ONLINE** Instrument mode **nixIMG**

AO WFS & CU	SOS/OS	ICS	(N)DCS	T	State
SPARTA	ONLINE	ONLINE	ONLINE	E	ONLINE
AO WFS-ICS	IDLE	IDLE	IDLE	L	IDLE
CU-ICS	ONLINE	ONLINE	ONLINE	E	NORMAL
NIX	ONLINE	ONLINE	ONLINE	S	Tracking YES
NIX-ICS	IDLE	IDLE	IDLE	C	PA 150193 716
SPIFFER	ONLINE	ONLINE	ONLINE	O	DEC -340358 019
SPIFFER-ICS	IDLE	IDLE	IDLE	P	E ALT 76 15803

Exposure status FINISHED Available space Disk: 371 GB of 1675 free ...

NGC NIX	Exp.time	Remaining	Image File
NGC NIX	3	1	ERIS_DACTS_OPTIM165_0009.fits
NGC SPIFFER	3	1	ERIS_IPS_BABYSTEP164_0061.fits
AO-NGS TECH	1	0	ERIS_TDCS_2022-06-14T01:04:29_200.fits

RTC **ONLINE** Deployed Config: ERIS_LGS LGS WFS NGS WFS

AO LOOPS \AUXILIARY LOOPS\ ROTATORS \TRACKING\ OFFSETS\ GRABBING\ DSM\ 4LGSF\

State Substate

NGS HO NOT-DEPLOYED NOT DEPLOYED OPEN LOOP IDLE ALL

NGS LO (T) ONLINE CLOSEDLP OPEN LOOP RUN ALL

LGS ONLINE CLOSEDLP OPEN LOOP CLOSE ALL

LGS JITTER ONLINE CLOSEDLP OPEN LOOP REACQUIRE-LO

TRUTH SENSING ONLINE IDLE OPEN LOOP CLOSE-LO

Command Feedback Window Options

SPARTA LGS mode - WFS & DSM display - @wernsgw

LGS WFS pixels

LOOP MATRICES

LGS WFS Jitter acu DSM LO WFS frz.

Pupil pos JM FS

Cursor information X: Y: VALUE:

DSM skip %

Atmosphere/Perf. Seeing: 0.75 (arcsec) L0: 24.2 (meters)

LGS performance 0.95 Corrected variance ratio 69.1 (%) WFS Current Flux 2016.8

LO WFS pixels

Underfill. LO Loop Closed

Overfill. JM Loop Closed

Camera Gain 400 LGS Loop Closed

Low: High: Error

ERIS_LGS Plots

spenlooppanel - @wernsgw

File Std.Options Configuration State RID NGS Tools RTC box Engineering Help

Global state **ONLINE** running Error Alarm Clear Alarms Configuration ERIOS_LGS

Main state **ONLINE** running Busy L0AcqOptimizer.run

Loops: HO CJK C LO C NGC Overillum DSM set LGS underillum LO underillum DSM skip DSM clip Reset count RTC Box status

LGS Loop LGS Acq LGS Men' LO Loop Recorder Jitter CalibLGS CalibJitter CalibFilterOffload CalibLO BraWfM Modes

LODet NGC LOAcq LOAcqOptim LOLoopMonitor

running idle running LCU

init init init init

OK Overill. OK 159316 OK OK

UPDATE Sim. UPDATE

Temp Press rHum Subst 50 Measure: Measure: Measure: Measure:

15.9 120.65 79.8 C iPa %

Gain 400 1 Set

LO Pipeline RUN IDLE LOCr LCU LOCrAVC LOPixelConcetr L0LoopConcetr

LO loop CLOSE OPEN closedlp closelp openlp ONLINE Freq. 16.67 ONLINE Freq. 499.94

KP -0 KI -0.01 SET init 158214 init 158221 running FC 158221 running FC 158235

AVC CLOSE OPEN UPDATE OK OK IDLE ONLINE MB/s 1.8313 init MB/s 2.3248

OK Conn. OK Conn. OK Conn. OK Conn.

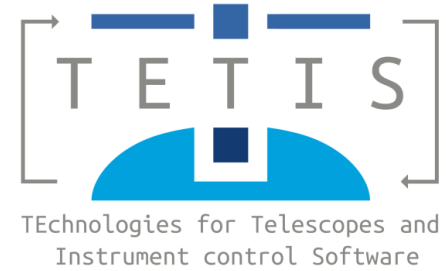
Command Feedback Window Options

```

00:47:59 > Restarting DBGateway (VLT8W-11925)
00:47:59 exit > INVOKED **
00:48:00 exit > REPLY / L OK
00:48:00 off > REPLY / L OK
  
```



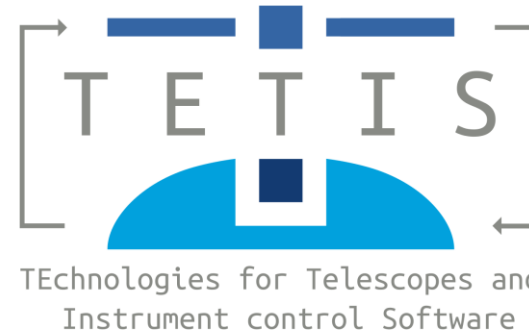
“How”



- For many (but not all) projects: formal, waterfall-like process
 - Requirements, Conceptual Design, Final Design, Construction, Sub- and System Integration, Testing, Verification
- Increasing emphasis on PA/QA (see A. Balestra talk tomorrow)
- Tools
 - Modeling: Cameo, Enterprise Architect
 - Build: auto-tools, Makefile, waf
 - Issue tracking: Jira, Trac, Redmine
 - Jenkins for automated testing
 - VMware VMs for development and testing
 - Remote access: NoMachine NX



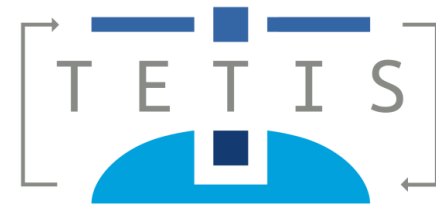
Collaborations



ESO, USM/MPE, IPAG, LAM, NUIG,
Uni. Leuven, Uni. Liège, Obs. Paris
Meudon, UK/ATC, LBTO, TNG, ING,
...



The Team



Technologies for Telescopes and
Instrument control Software

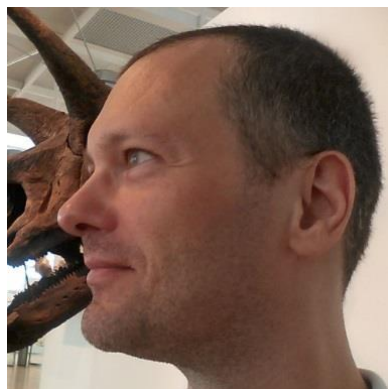
Daniela



Baru



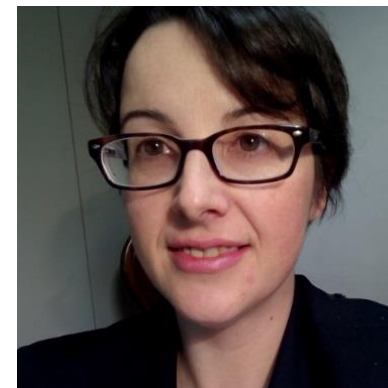
Bernardo



Davide



Rosanna



Elia



Salvatore



Fulvio



Andrea



Marco