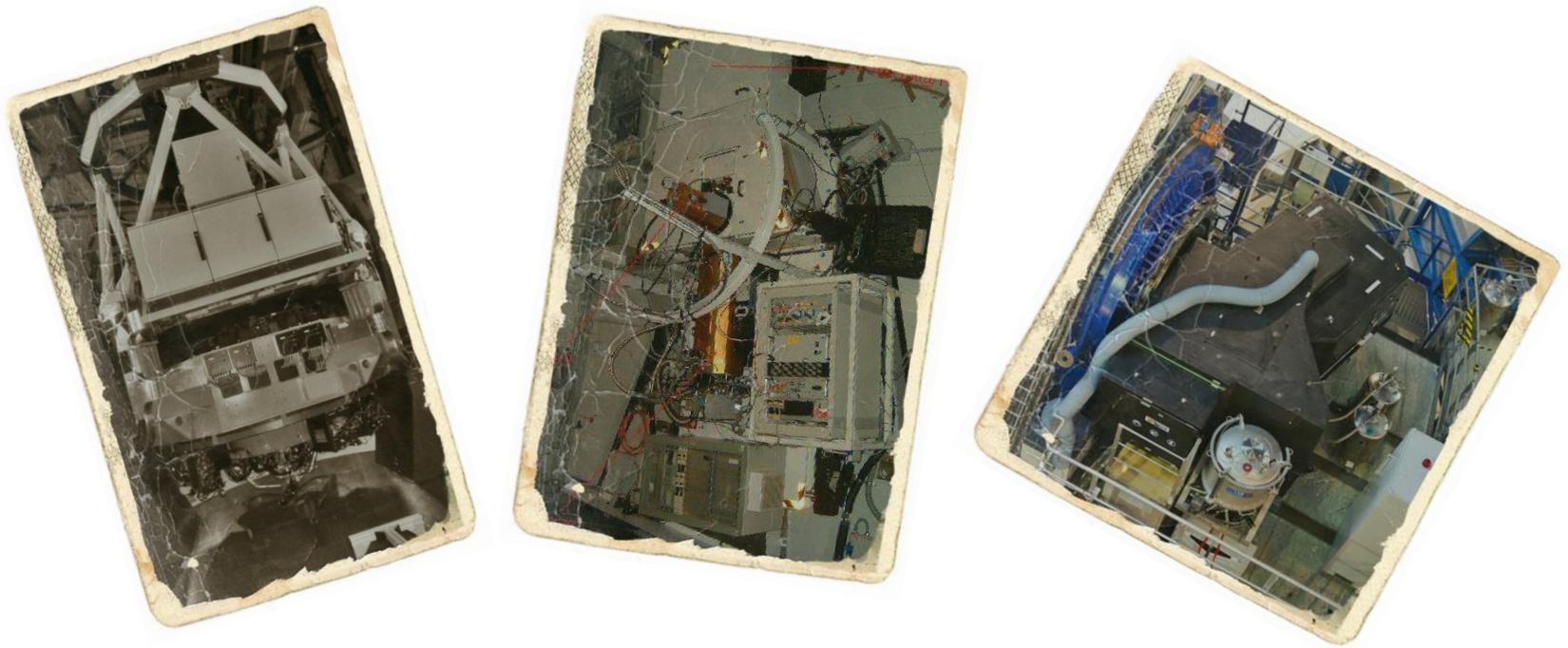


Instrument Control Software activities at INAF-OAPd

A. Baruffolo

on behalf of: D. Fantinel, B. Salasnich, M. De Pascale, D. Ricci, A. Balestra and many others



INAF – ICT Workshop – Bologna Nov 28, 2017



Outline of the talk

- Overview of past projects
- SPHERE
- ERIS
- SOXS
- WEAVE
- SHARK-NIR
- MAORY
- Common themes & trends



Past projects: the early days

- SW Development for Instrument Control @ OAPD dates back > 25 yrs
- Base SW for TNG TCS & INS (early 1990's)
 - collaboration OATS & OAPD
 - supervisory HP WS + HPUX
 - local control PDOS + VME SBCs
- On the same platform:
 - CCD data acq. system for Asiago 1.8m telescope
 - INS for AdOpt@TNG
 - Included T/T module developed in OAA
 - High-order AO w/commercial RTC (ThermoTrex Co.)
 - On-board Speckle camera with real-time data processing

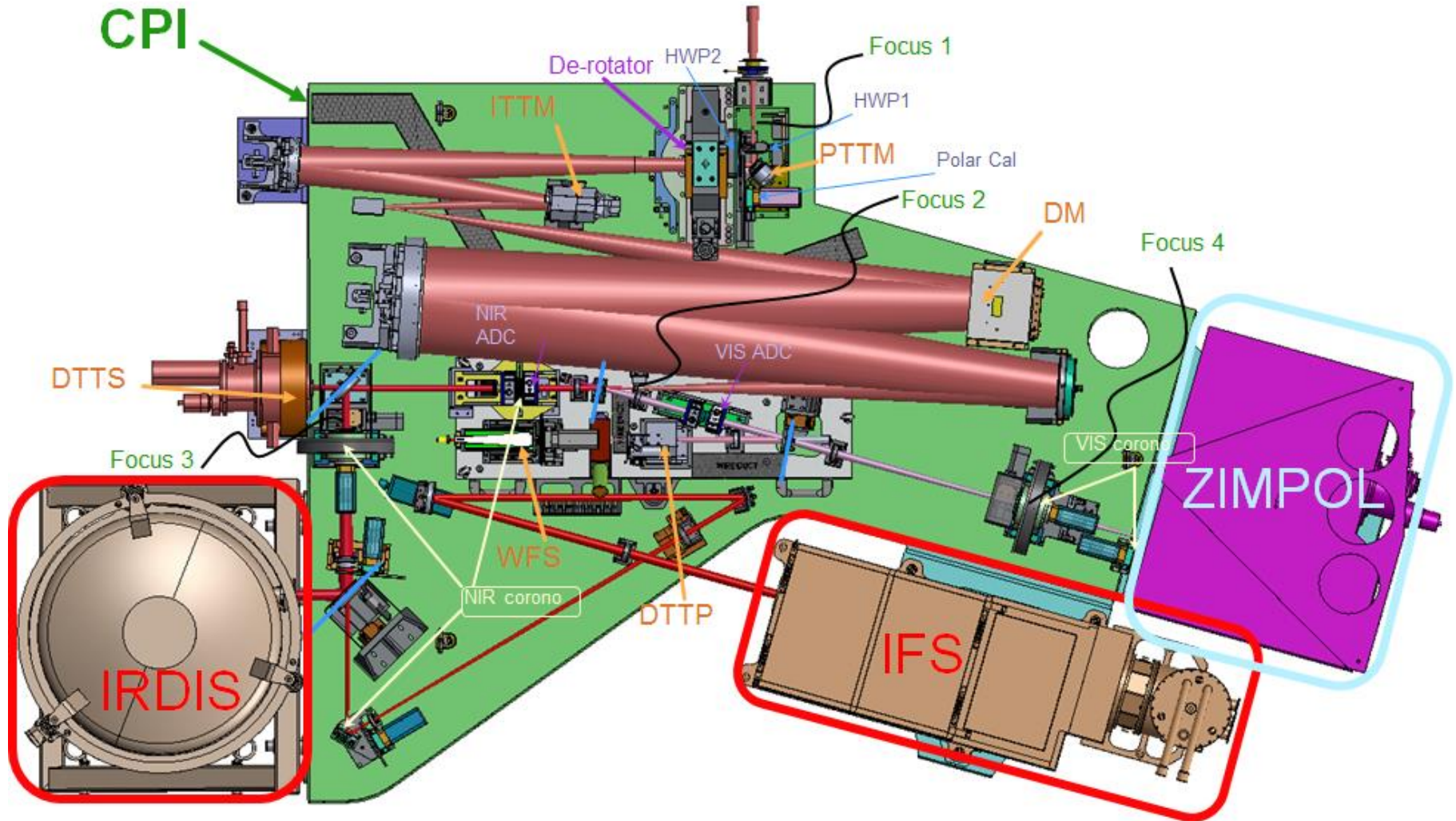




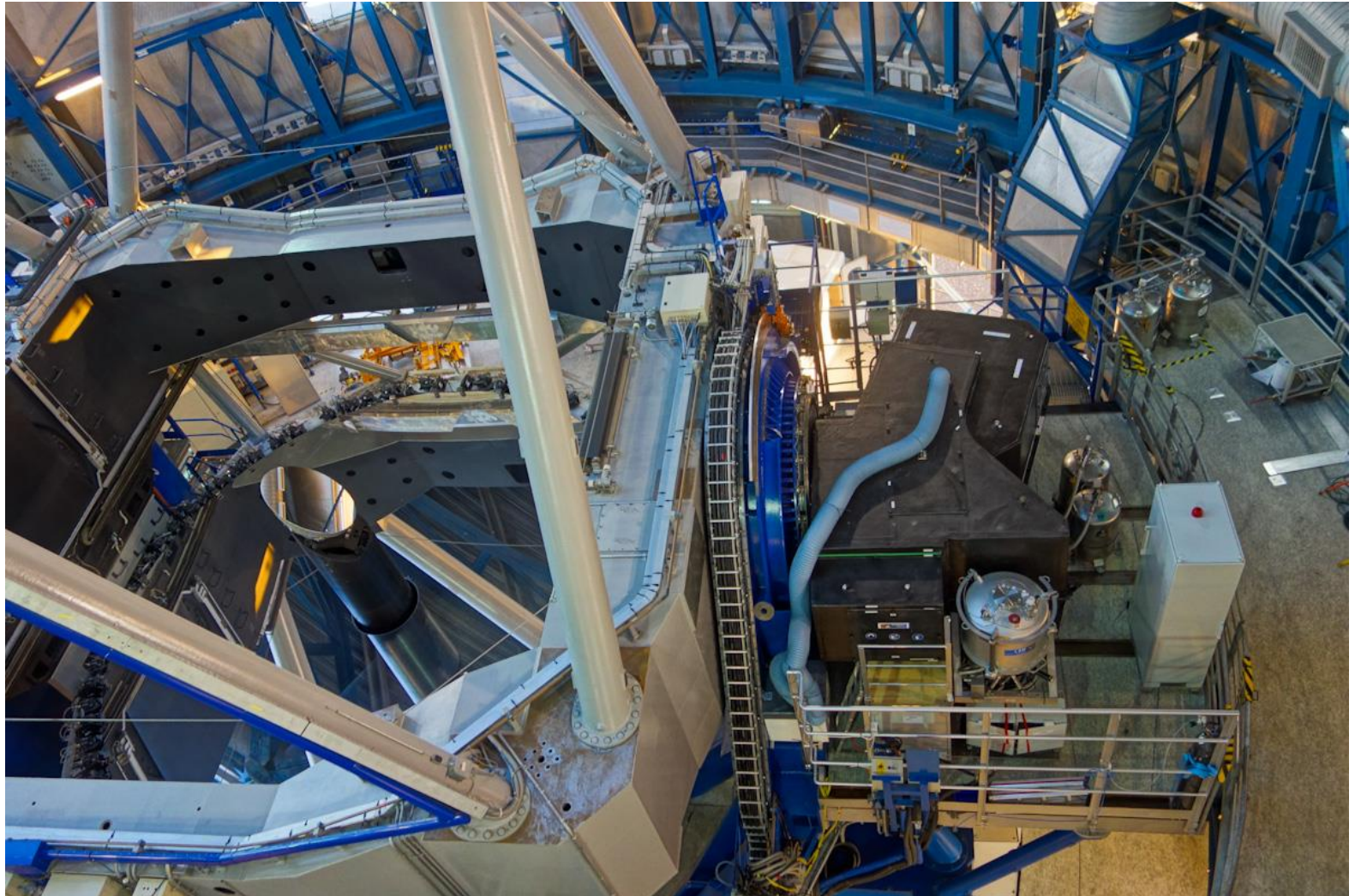
Past projects: SPHERE

- Planet finder for the VLT (UT3)
 - Built-in XAO module (SAXO)
 - Three science channels
 - Very complex, high number of devices, many modes, >100 templates
 - Last project to use “old” VME-based LCUs
- First Light in March 4, 2014
- In operations since 2015

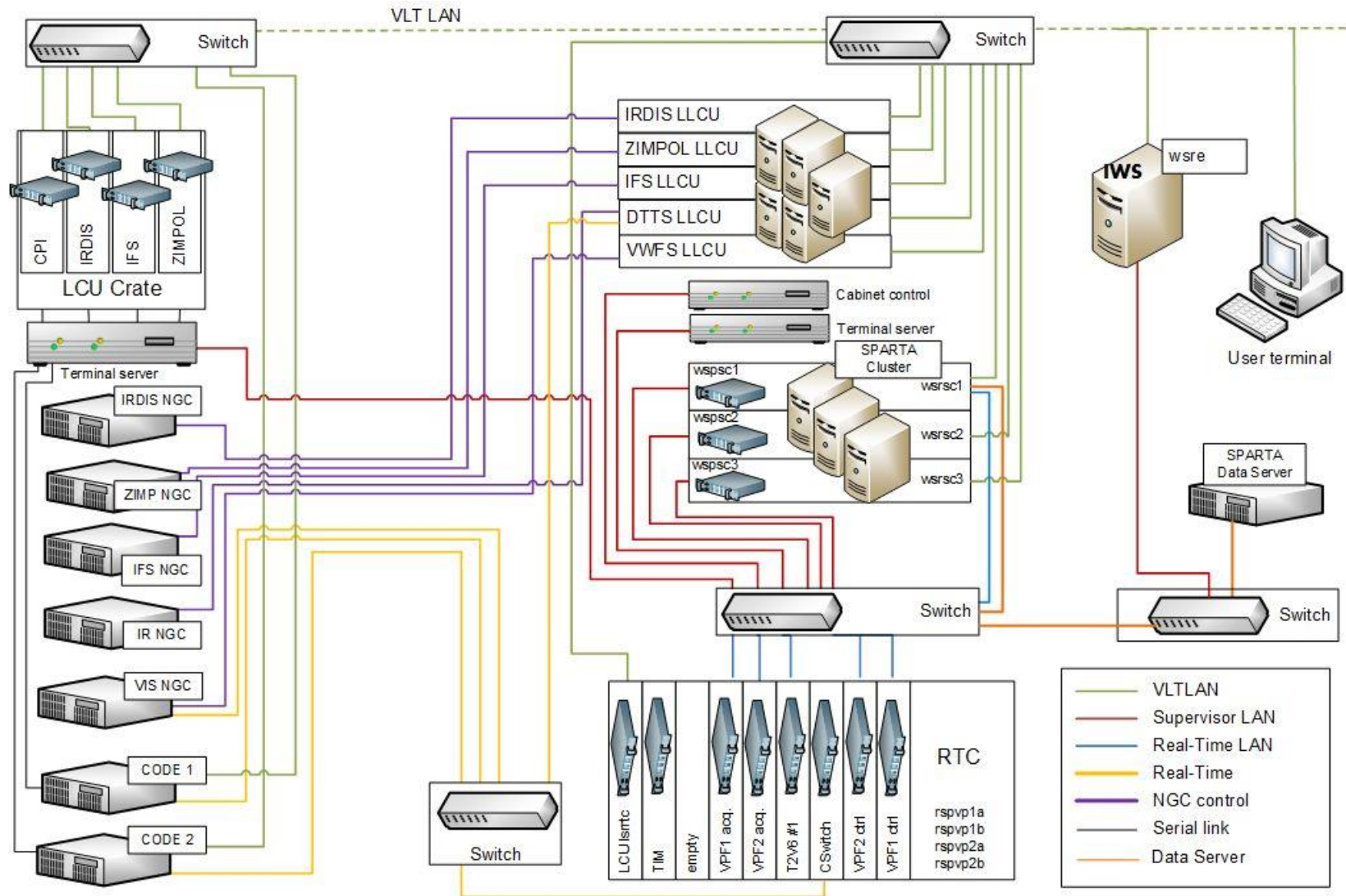
SPHERE Overview



SPHERE @ UT3



SPHERE Control Network



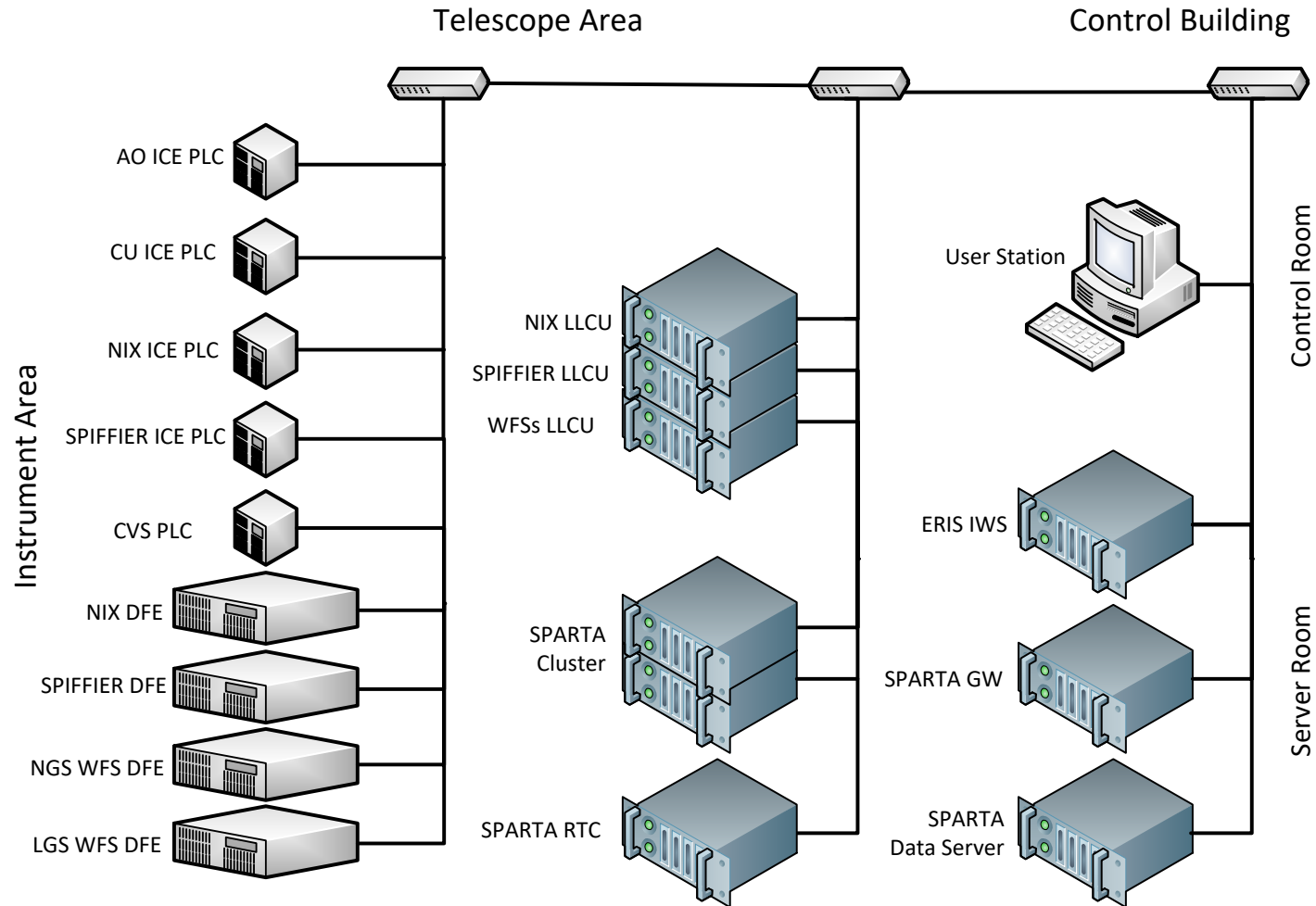




ERIS

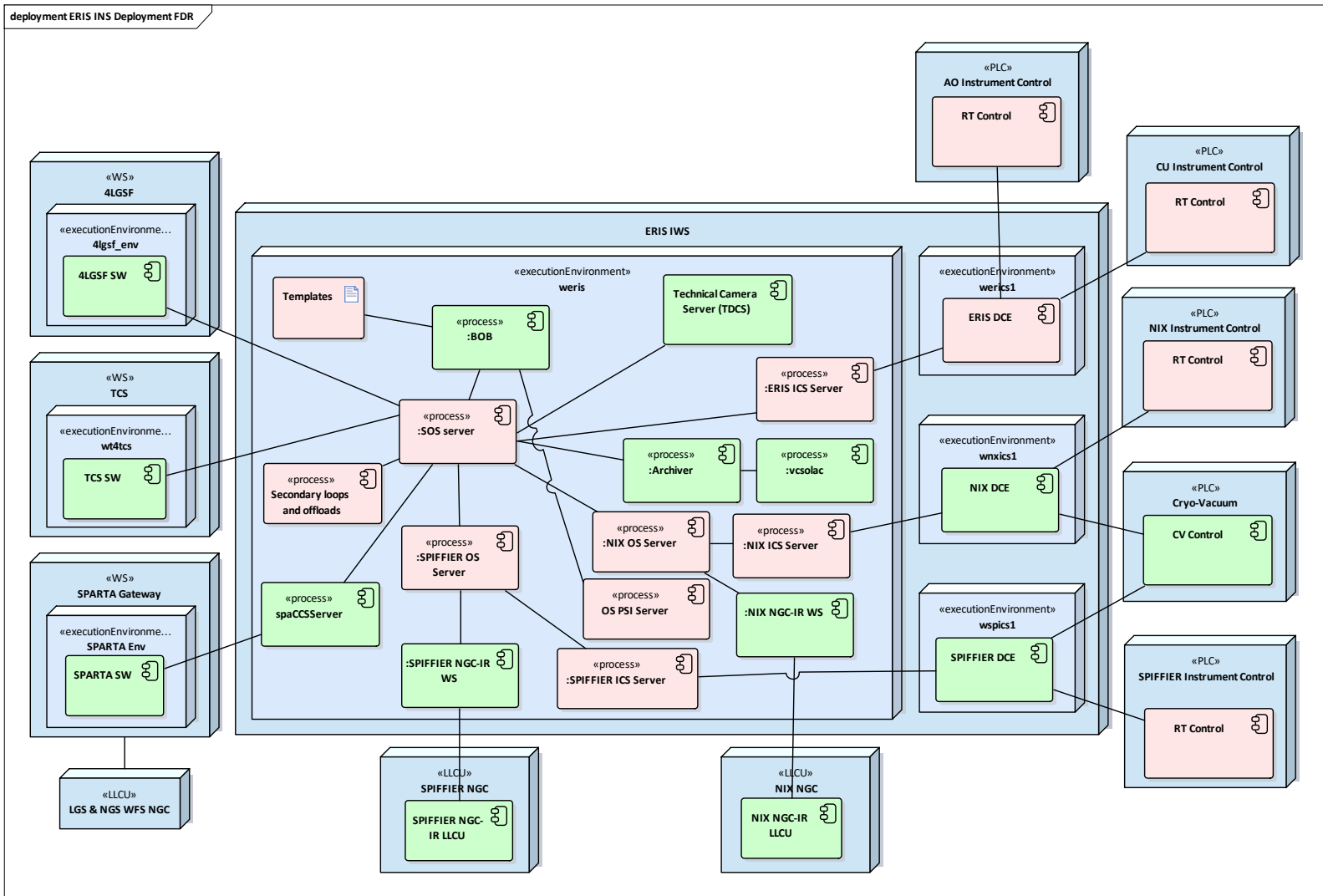
- New “workhorse” instrument for VLT/AOF
- 1 LGS WFS, 1 NGS WFS
 - AO Modes: Full, NGS, Seeing Enhancer
- 2 science channels:
 - NIX: HCI, LSS
 - SPIFFIER: IFS
- FDR end May 2017
- Expected on sky mid 2020.

ERIS



ERIS

deployment ERIS INS Deployment FDR

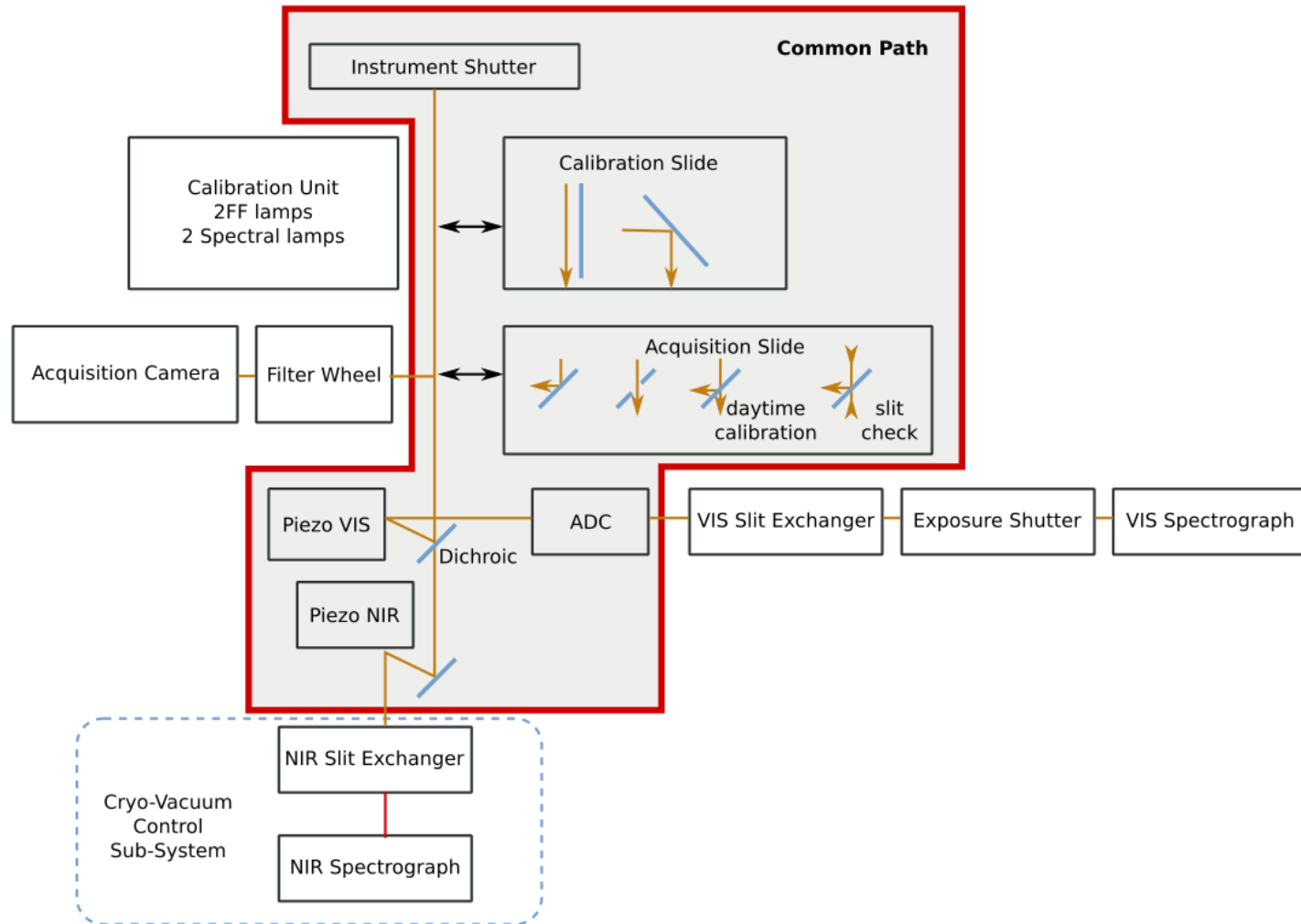




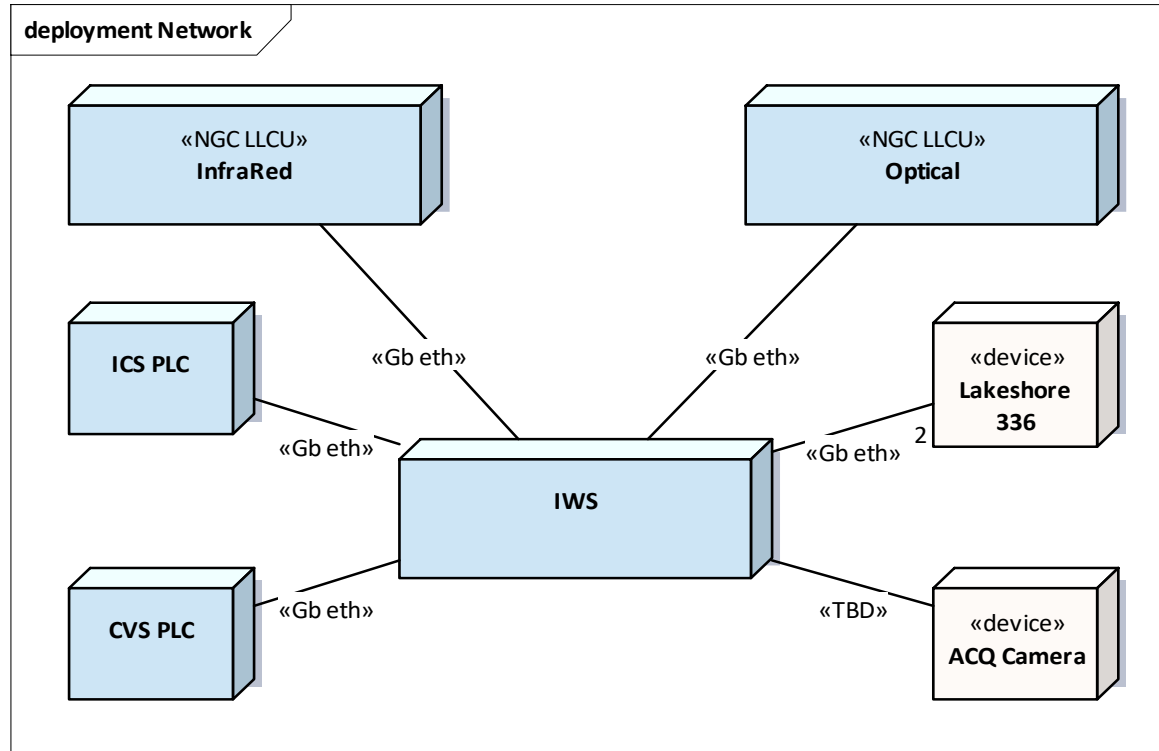
SOXS

- Spectroscopic facility for NTT
 - follow-up of transients
 - wavelength coverage from UV to NIR
 - two spectroscopic channels
 - COTS camera for 2nd-ary guiding and “light imaging”
- Passed PDR in July 2017
- Aims to be on sky by 2020

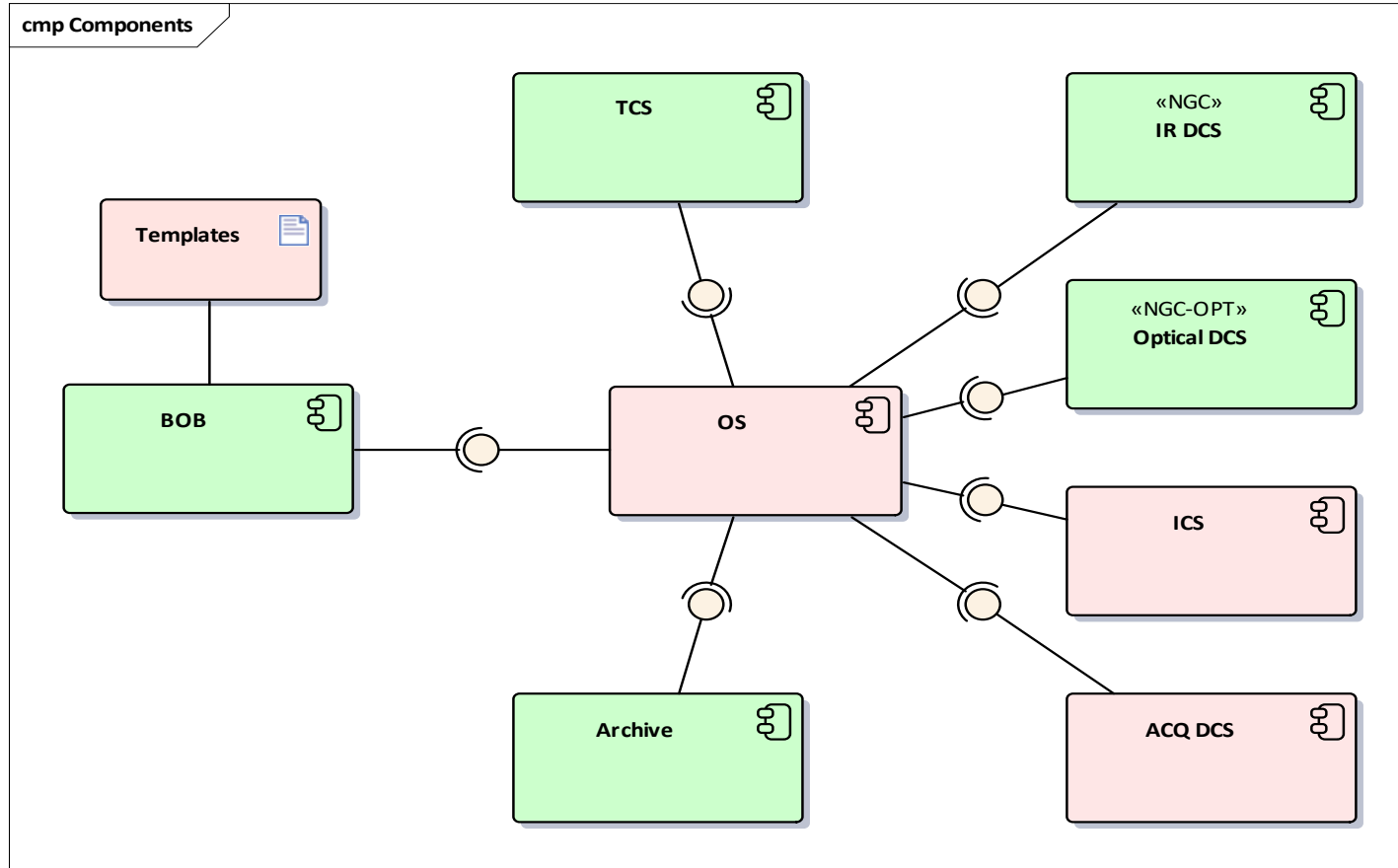
SOXS Instrument Concept



SOXS Control Network



SOXS INS Architecture (PDR)

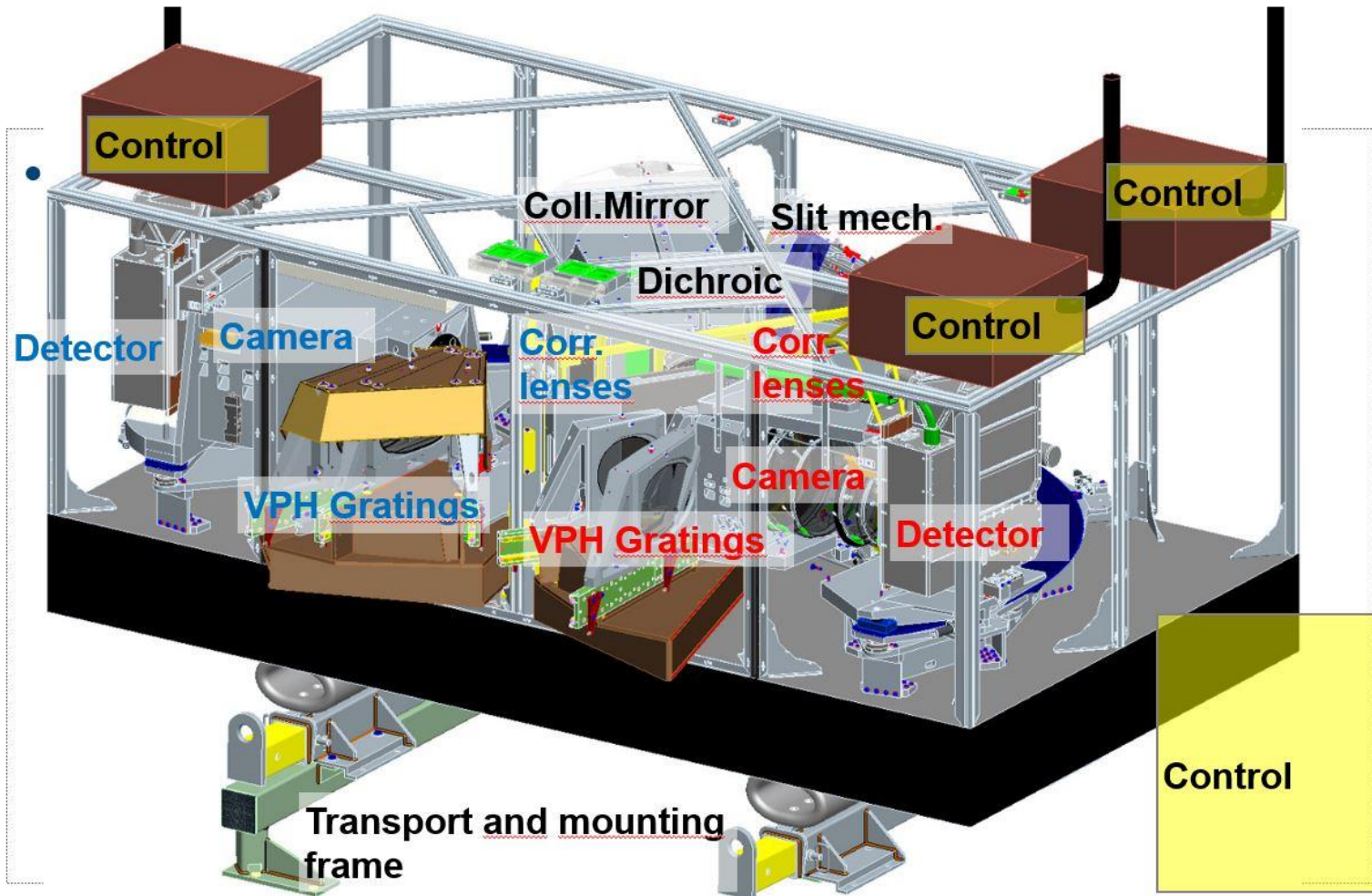




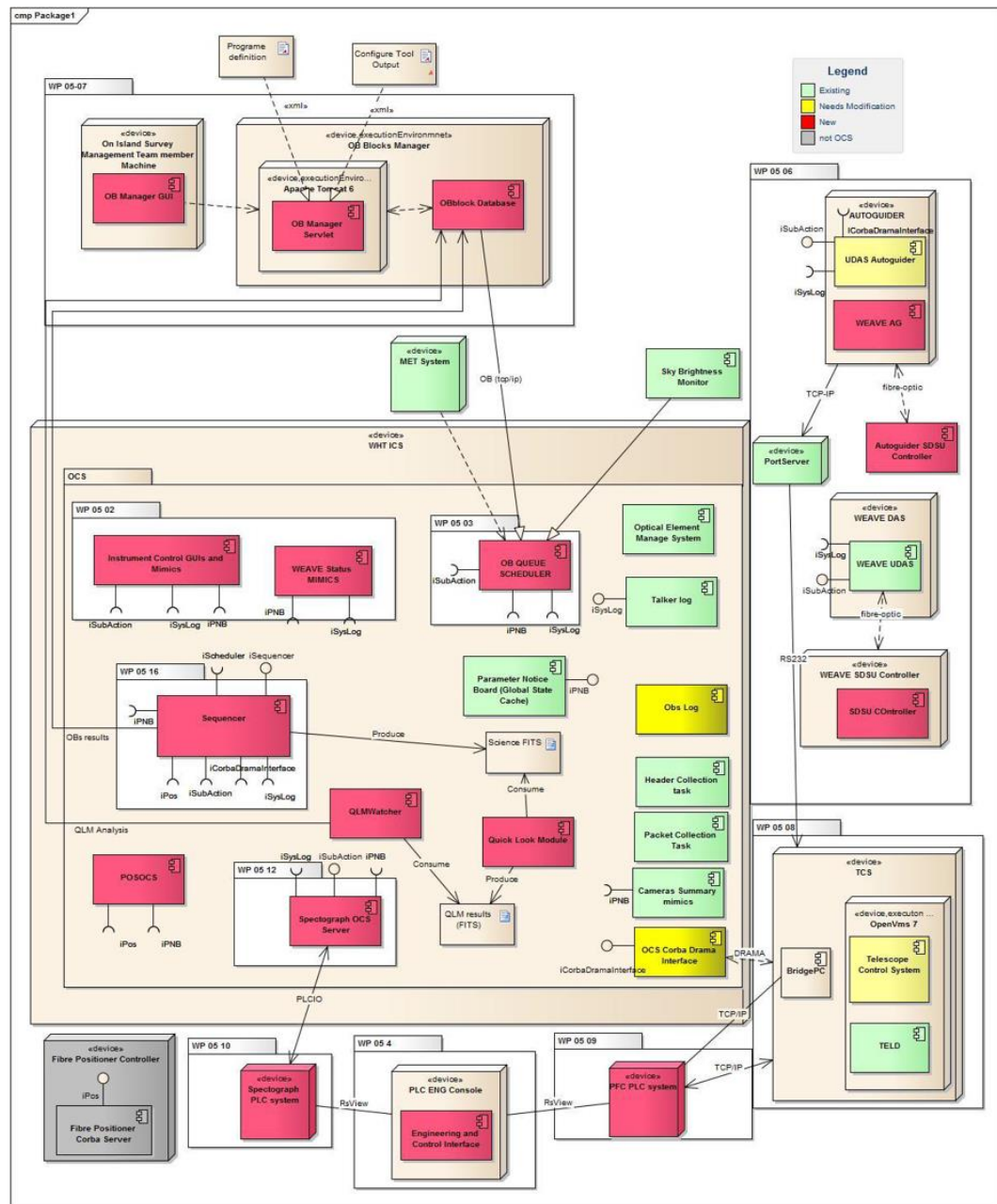
WEAVE

- multi-object, multi-IFU spectrograph
- 2-degrees prime focus FoV @ WHT
- pick-and-place positioner
 - 1000 fibers
 - 20 IFUs
 - 1 large IFU
- single, dual-beam spectrograph @ Nasmyth
- Expected on sky beg. 2019

WEAVE Spectrograph



WEAVE SW Architecture

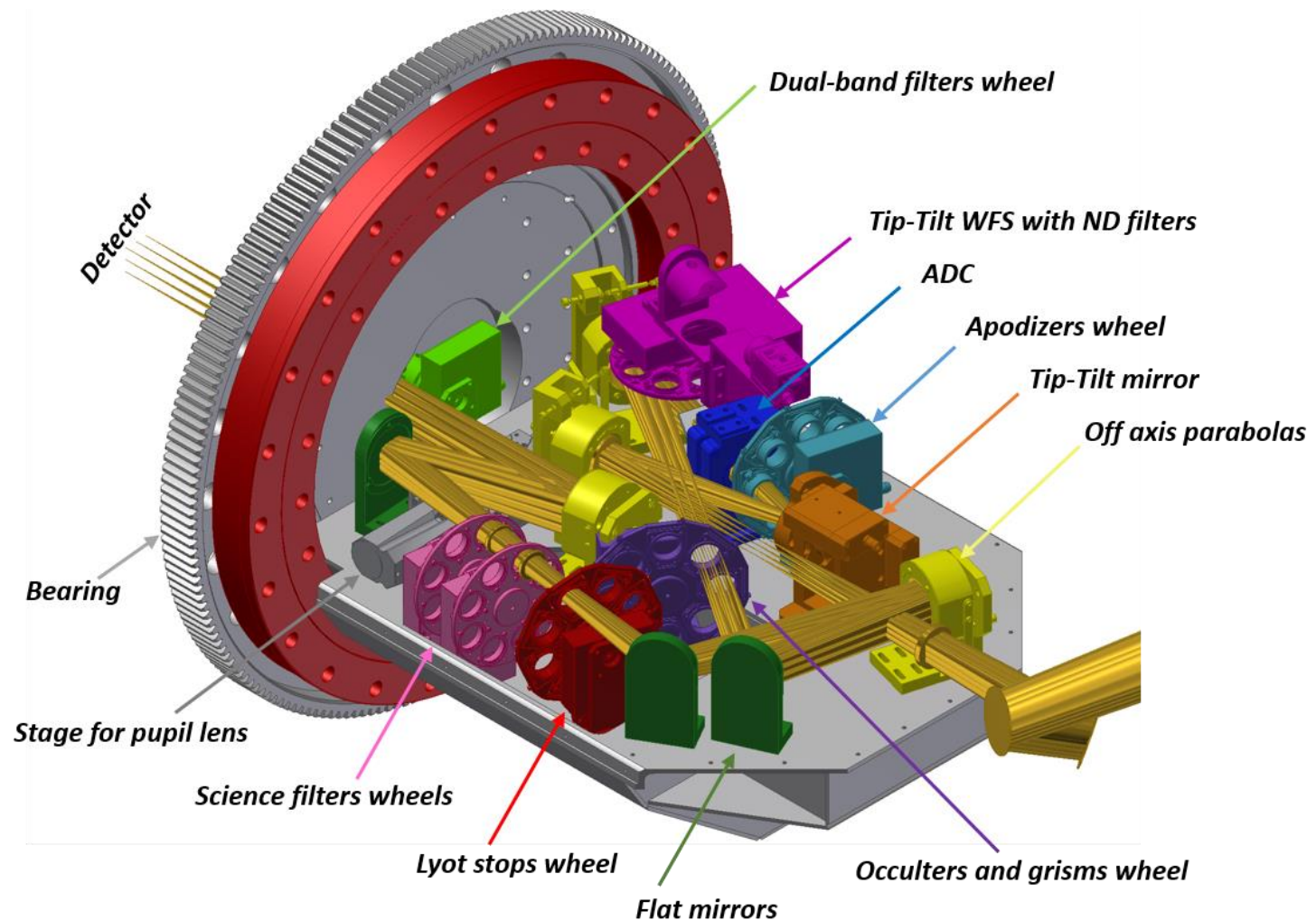




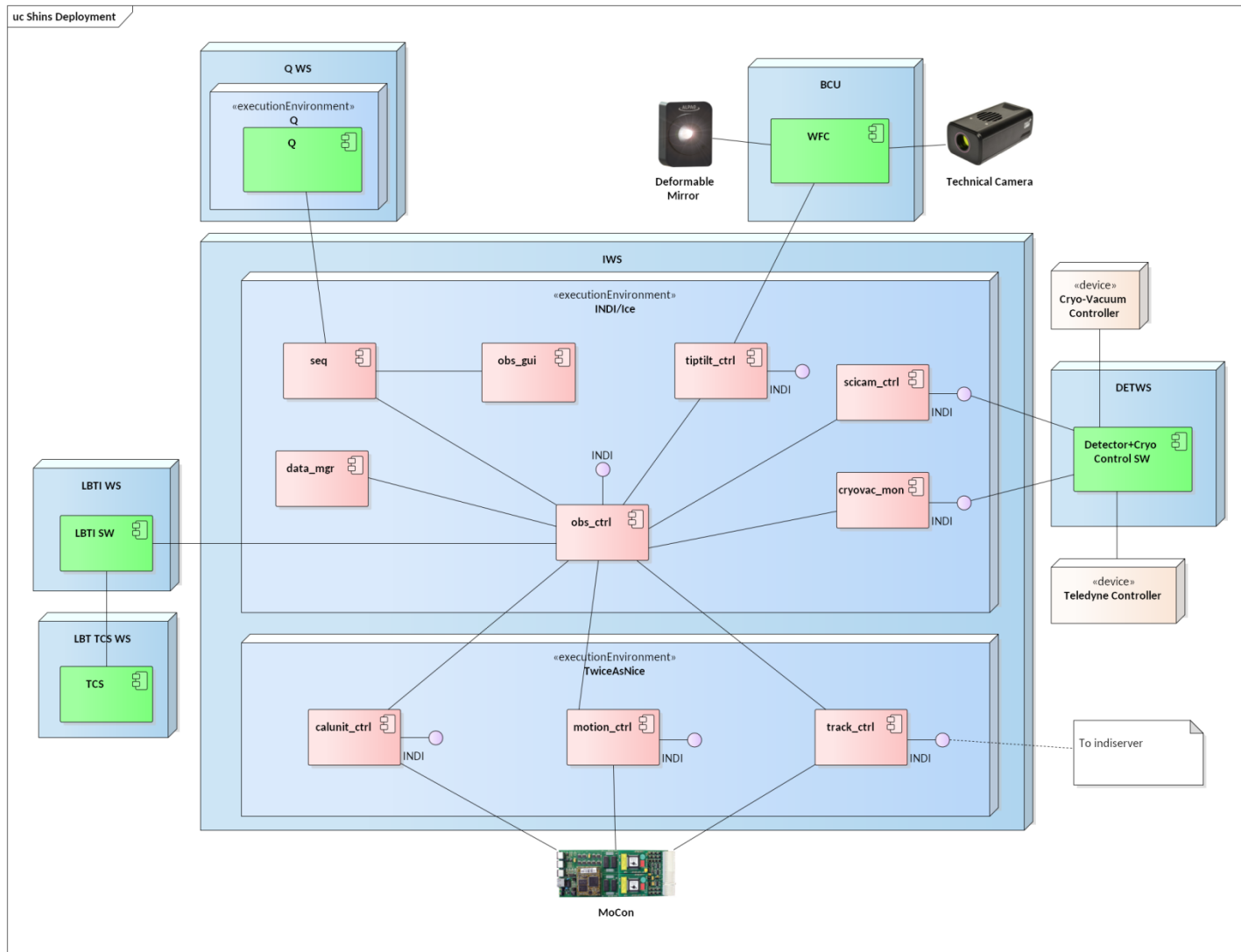
SHARK

- Coronagraphic Camera for LBT
 - exploit FLAO performances in NIR
 - coronagraphic direct imaging and spectroscopy
 - features on-board residual-TT correction
- Expected on sky ~mid 2019

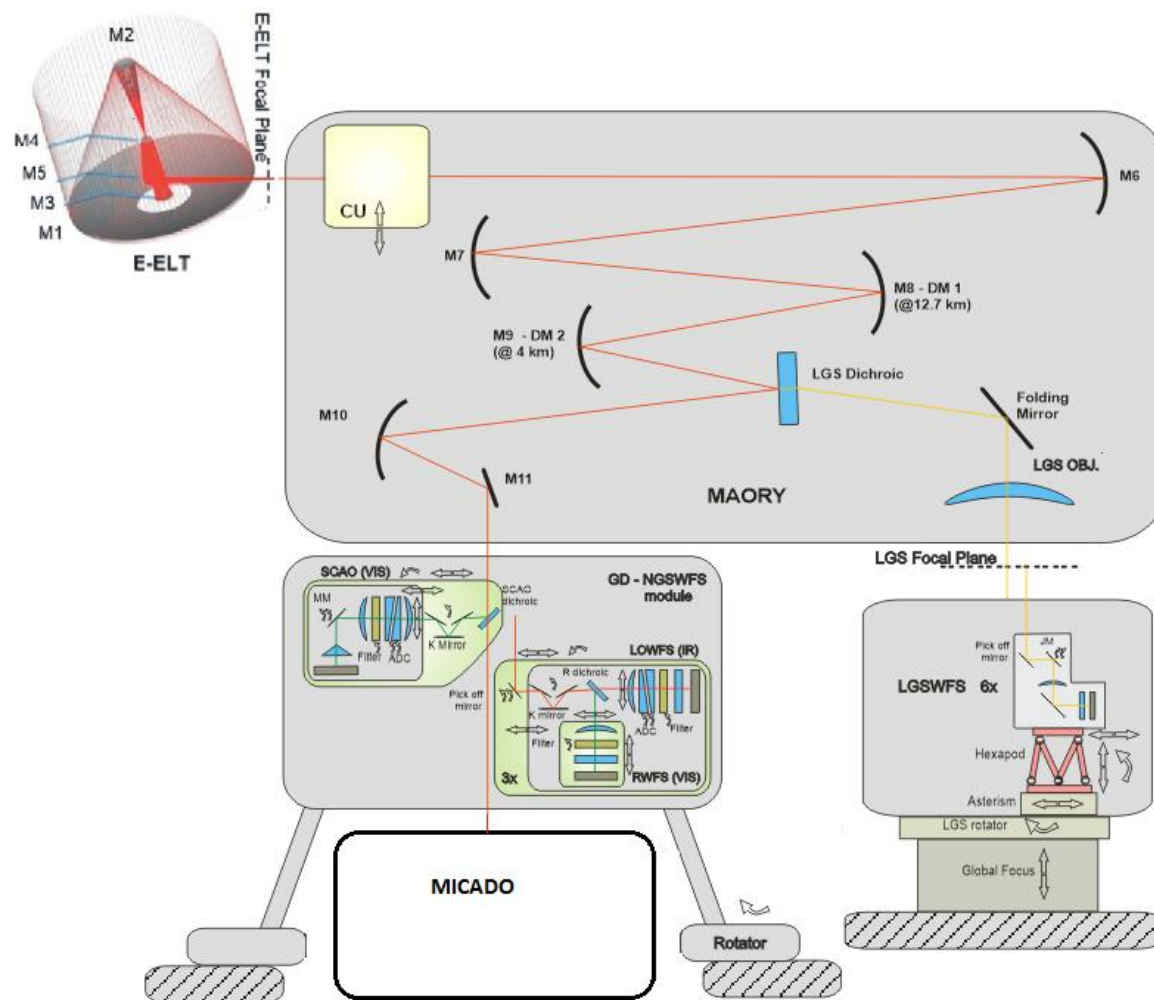
SHARK Concept



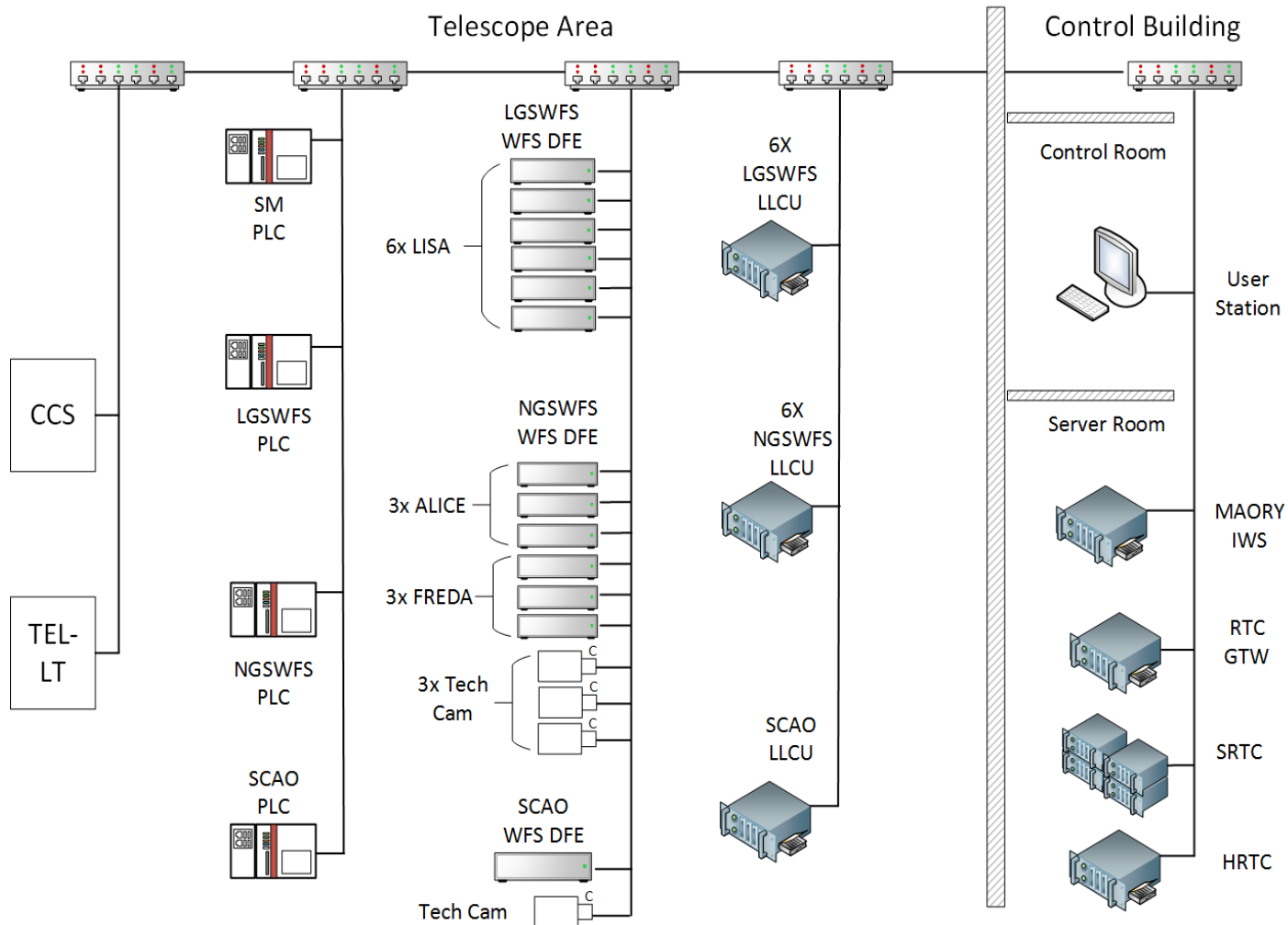
SHINS Architecture



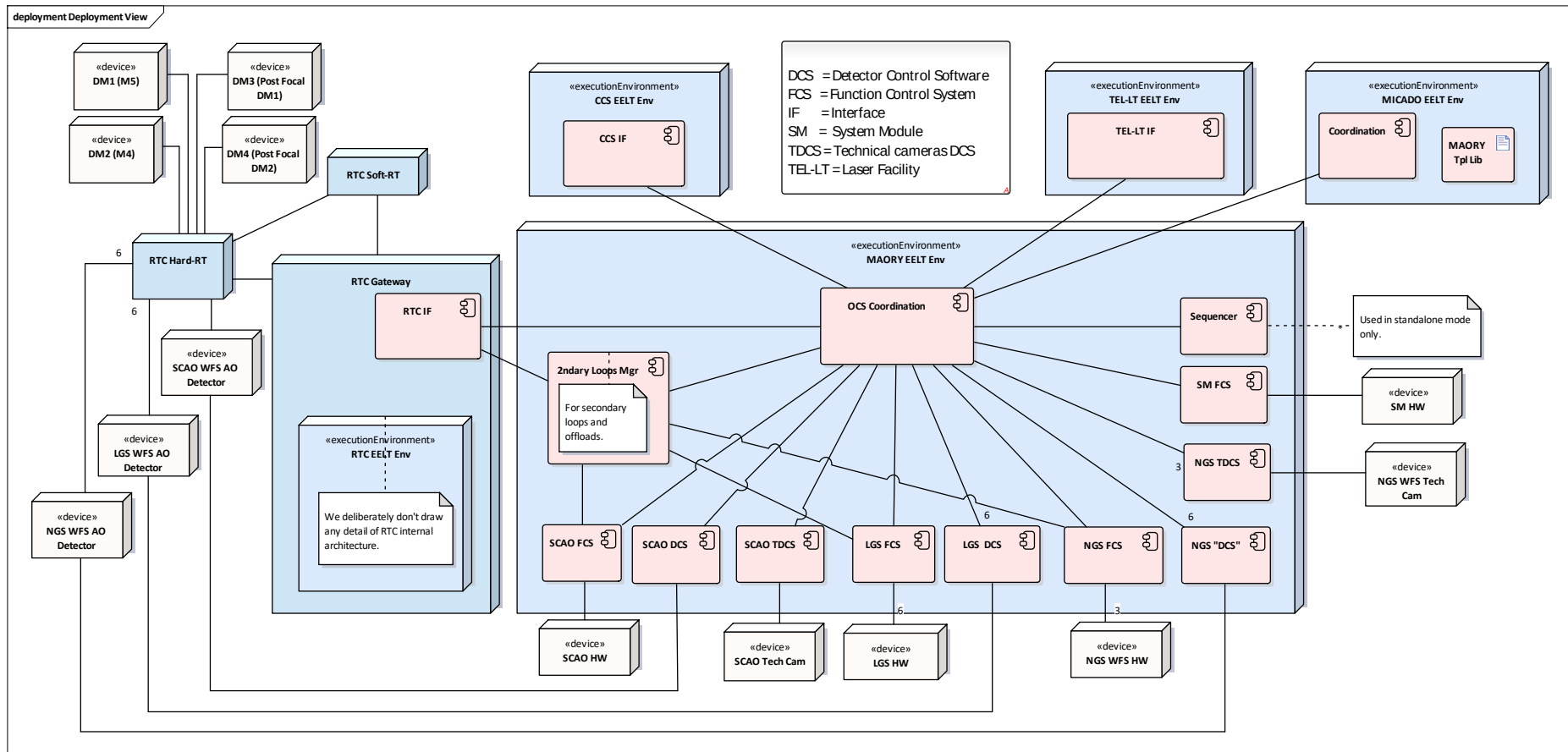
MAORY



MAORY Control Network



MAORY ICS SW Architecture





Themes & Trends

- Instrument control network
 - Instrument WS (non RT) coordination/monitoring
 - Local control units (RT) functions/detectors control
 - RT control
 - AO RTC
 - Detector control: embedded in dedicated controller
 - Tracking Axes (ADC, DROT, LGS focus, NGSWFS...)
 - motors/actuators: embedded in dedicated controller
- VME => PLC (PAC)
 - VLT/ELT: Beckhoff



Themes & Trends - 2

- Instrument SW Architecture
 - old-style: GUI embedding logic
 - VLT-style: OB + templates + GUIs commanding control SW



INS Development Process

- Often Low Ceremony/Informal
- When formal, often waterfall-like, but:
 - requirements never really frozen at PDR
 - significant design changes after FDR
- Modeling tools used to generate “pretty pictures”
 - notable exception: VLTSW WSF2



Tools of the trade

- Design tools:
 - Sparx Systems EA
 - NoMagic MagicDraw (ESO)
- Build tools:
 - auto-tools, ad hoc Makefiles, VLTSW pkgin
 - ELT will use waf
- Test tools
 - ad-hoc scripts
 - VLTSW TAT
 - ELT robot framework



Tools of the trade - 2

- Remote access
 - NoMachine NX
- Virtualization Technologies
 - VMs for development and testing