The evolution of Observing Tools at ESO

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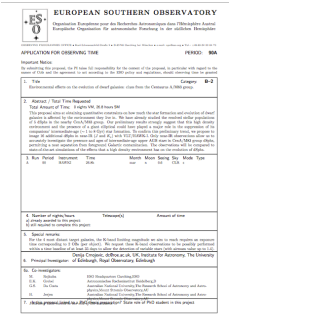
Data flow end-to-end tools

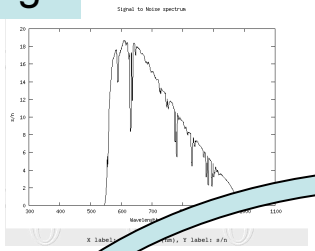
Proposals handling & Long-term scheduling

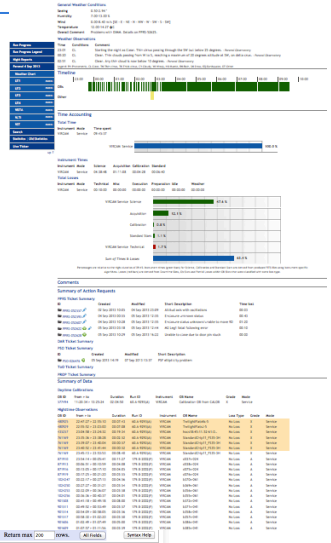
Observation preparation, execution & reporting

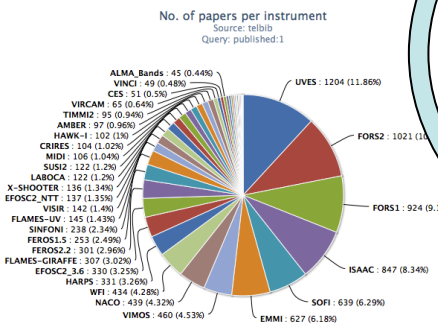
Science return: Data Products & Publications

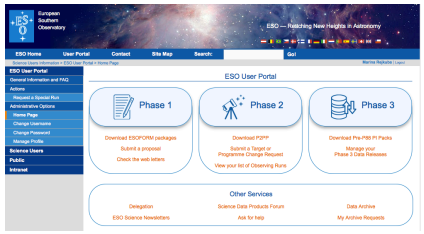
Post-observation: archive, quality control, data reduction pipelines

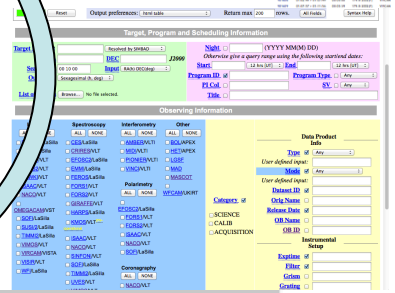


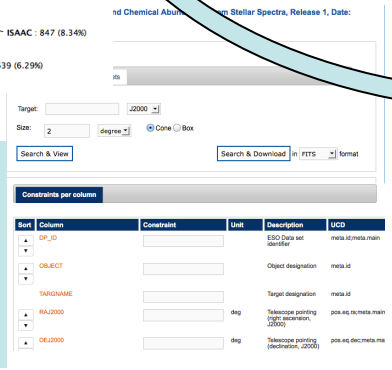


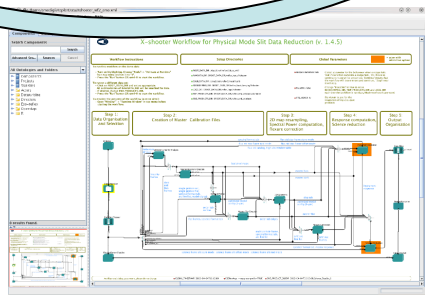


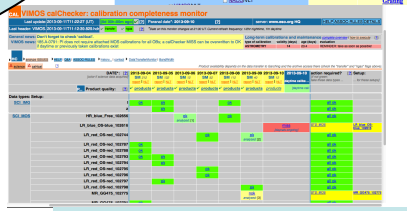




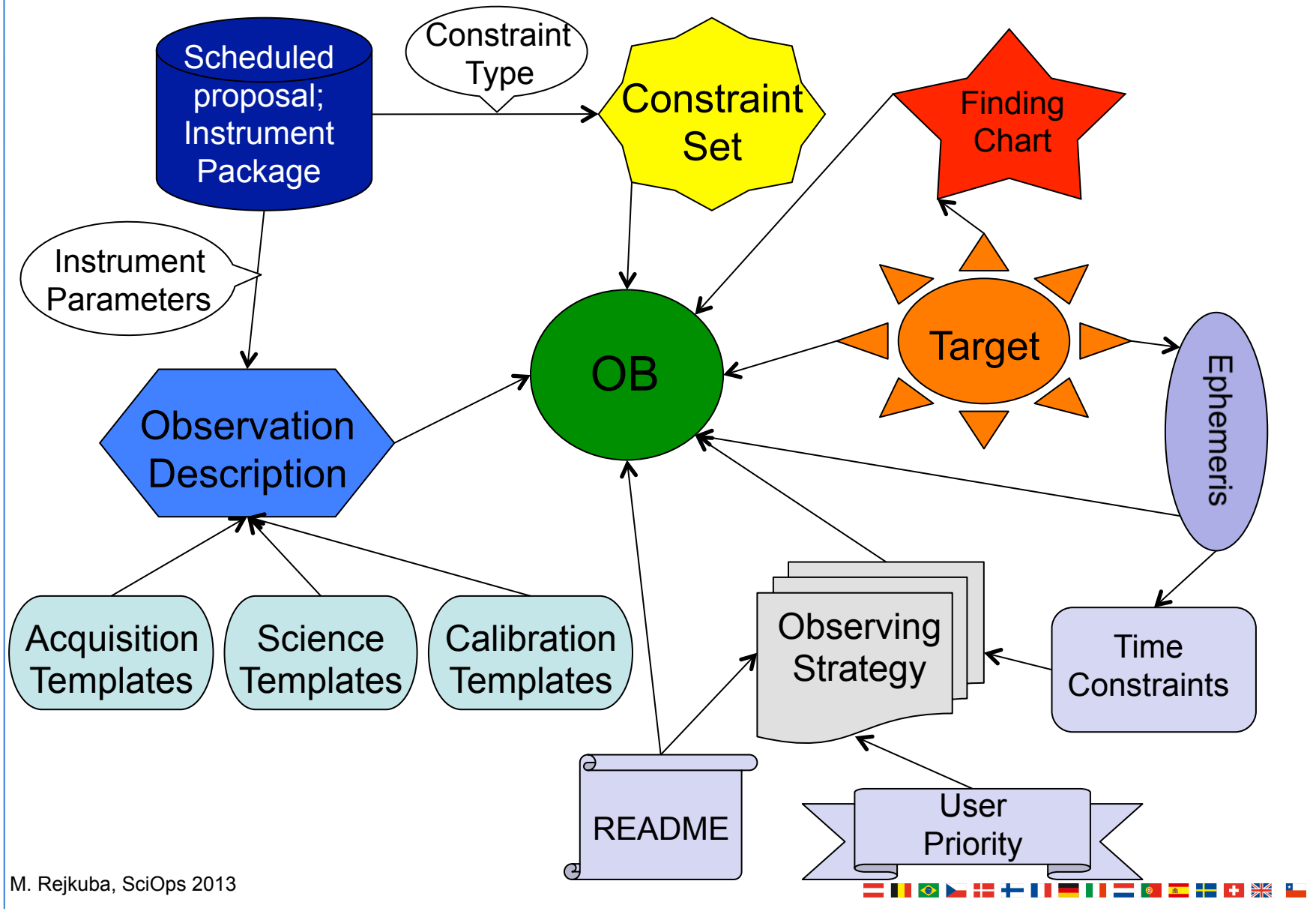








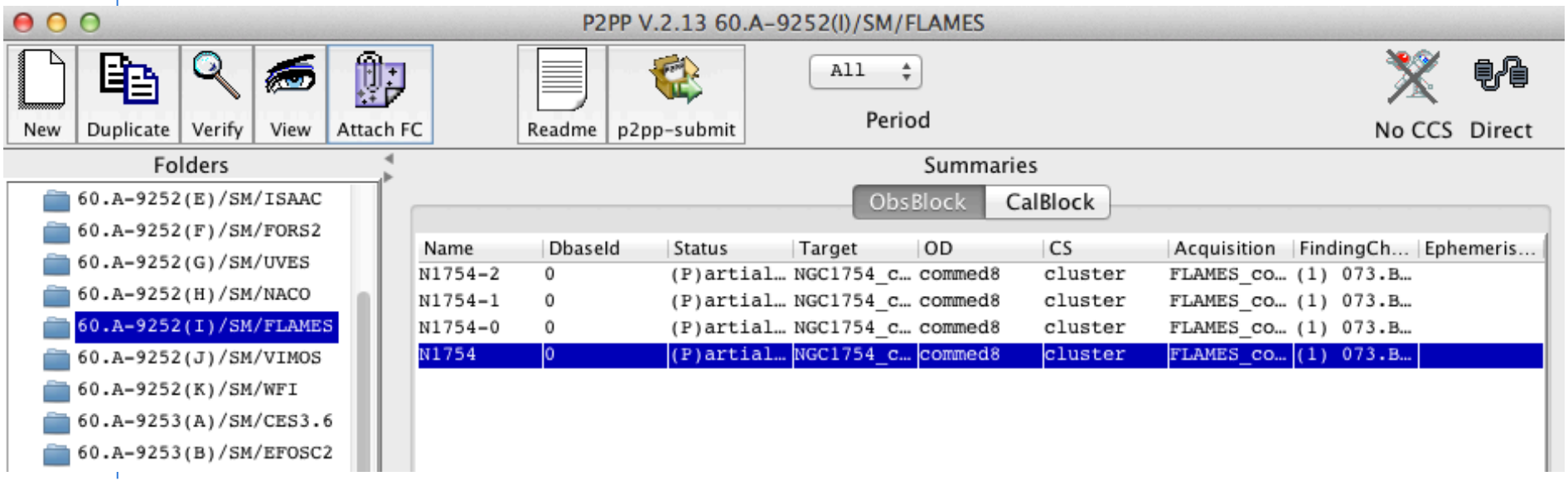
Service Mode observing material



Phase 2 material preparation: P2PP

- Preparation and submission: Phase 2 Proposal Preparation Tool (aka P2PP)
  - version 1 (tcl/tk) → version 2 (java) incl. README+FC+Eph
- Basic units Observation Blocks (OBs)
  - Instrument package (templates, EVM, ETRM, COSMO)
  - Observation Description, README, Finding Charts, Ephemeris file
- User Support Department: Phase 2 material review & approval

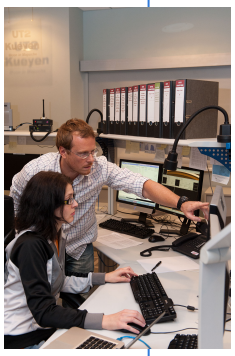
Poster by S. Mysore



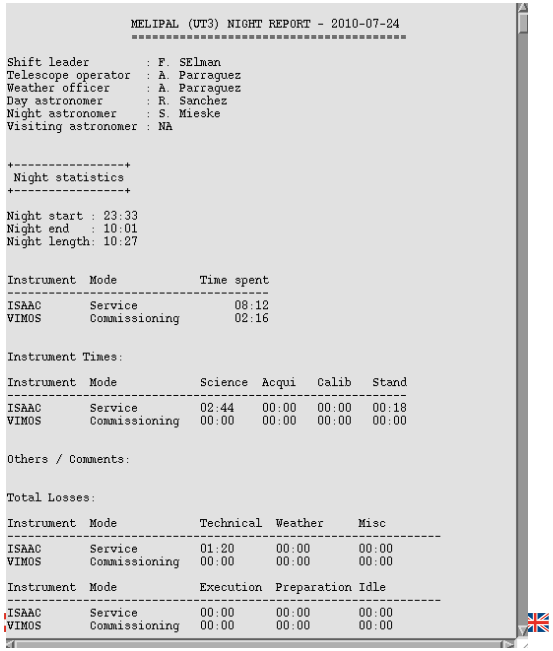
At the telescope: observing tool OT

- Medium Term Scheduling
  - Observing Queues
  - Web pages – observing runs overview

- Short Term Scheduling
  - observing queues: 3 rank classes x 3 instruments
  - calibration and maintenance queues
  - short term scheduling – astronomers



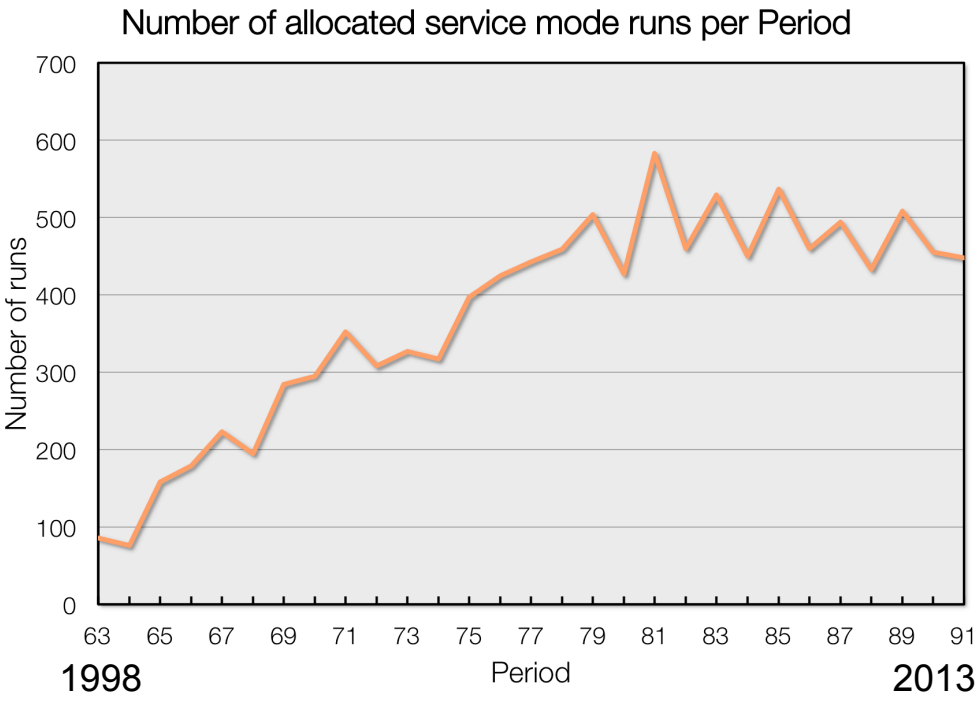
- Night Reports sent daily via e-mail
  - User Support Department
    - manual OB status updates
  - Quality Control Group

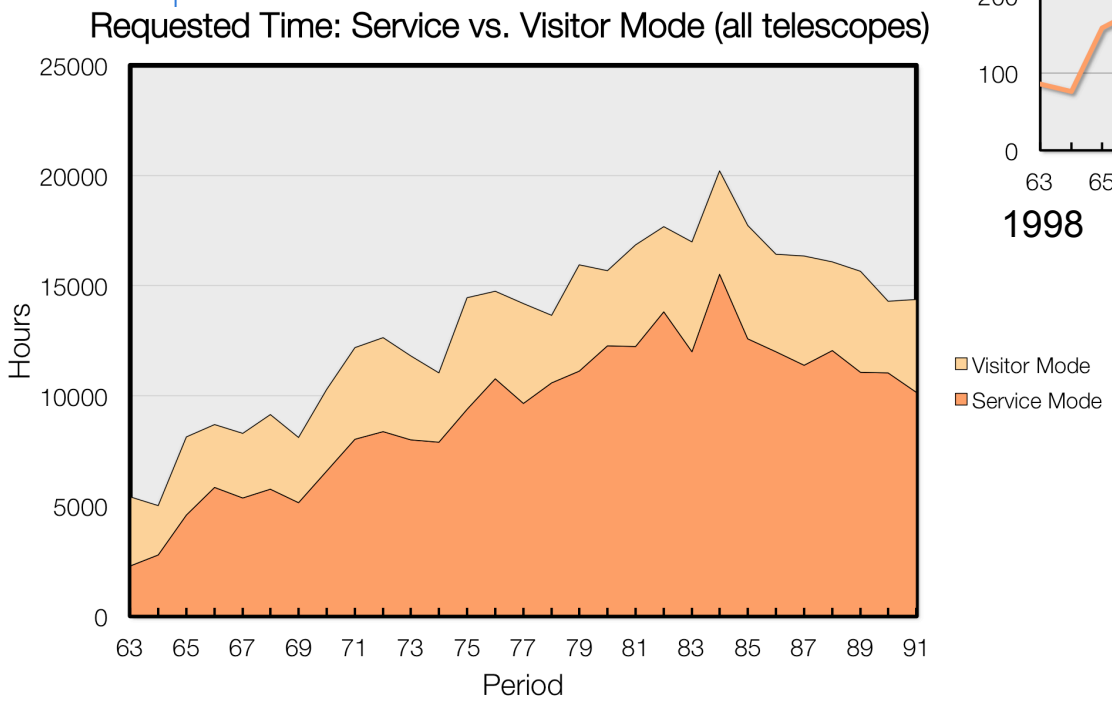


```
                MELIPAL (UT3) NIGHT REPORT - 2010-07-24
                =======================================

Shift leader        : F. SElman
Telescope operator  : A. Parraguez
Weather officer     : A. Parraguez
Day astronomer      : R. Sanchez
Night astronomer    : S. Mieske
Visiting astronomer : NA


+----------------+
 Night statistics
+----------------+

Night start : 23:33
Night end   : 10:01
Night length: 10:27


Instrument  Mode            Time spent
-------------------------------------
ISAAC       Service              08:12
VIMOS       Commissioning        02:16


Instrument Times:

Instrument  Mode            Science  Acqui   Calib   Stand
-----------------------------------------------------------
ISAAC       Service           02:44   00:00   00:00   00:18
VIMOS       Commissioning     00:00   00:00   00:00   00:00


Others / Comments:


Total Losses:

Instrument  Mode            Technical  Weather     Misc
-----------------------------------------------------------
ISAAC       Service           01:20      00:00       00:00
VIMOS       Commissioning     00:00      00:00       00:00

Instrument  Mode            Execution  Preparation Idle
-----------------------------------------------------------
ISAAC       Service           00:00      00:00       00:00
VIMOS       Commissioning     00:00      00:00       00:00
```

VLT+VLTI visitor vs. service mode

- **Service Mode at ESO:**
  - ~70% of the requested and allocated time





  - ~450 new observing runs every semester

Observing Tools version 3

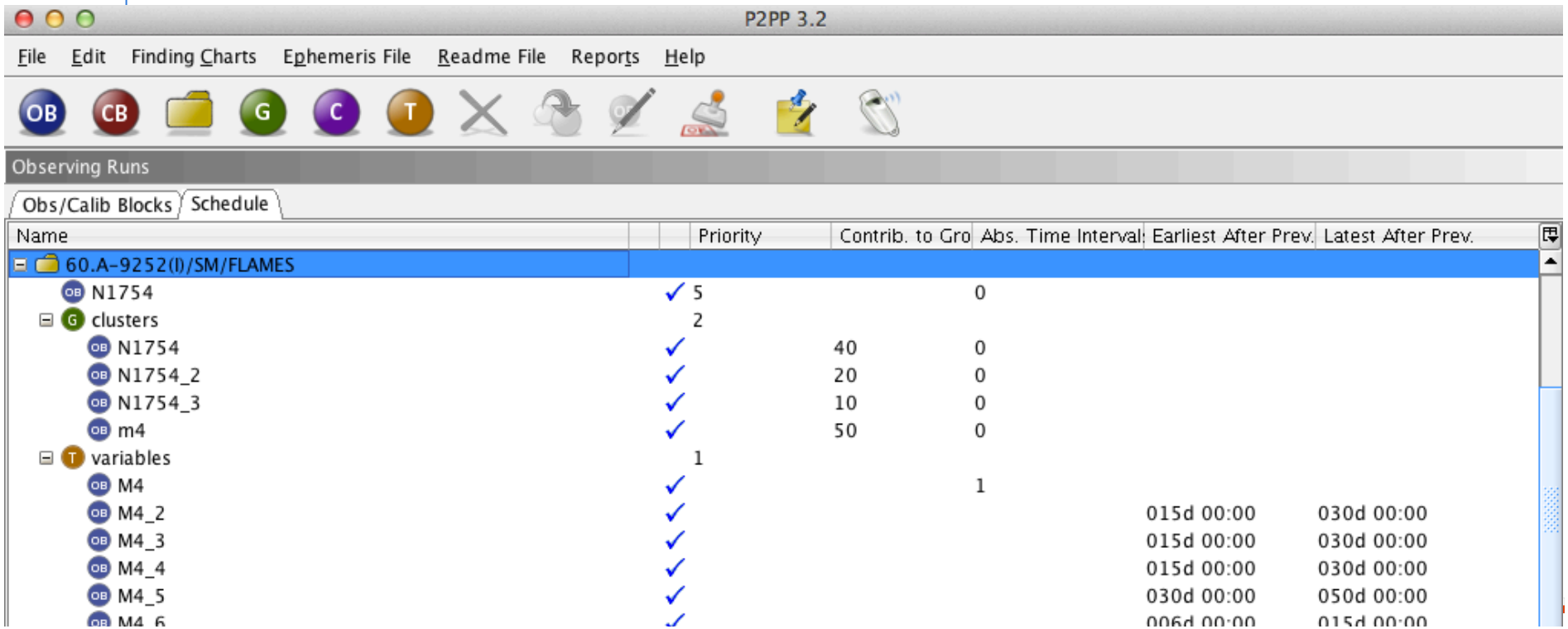
- Why new observing tools?
  - Primary driver: Public Surveys (VISTA & VST telescopes)
  - Few but very large programmes:
    - Thousands of OBs (VVV submission for P91: 6712 OBs!)
    - No astronomer at the telescope during night (drive telescope + instrument, select next observation, perform QC, log observations, problem reporting)
- Why changing tools for VLT and VLTI?
  - Minimize errors, optimize the scheduling, increase efficiency
  - Observation strategy in free text format README file
    - observations must be spaced by at least 3 days **(time link)**
    - OB1 and OB2 must be taken together **(concatenation)**
    - complete all observations of target A before starting B **(groups)**
  - Manual time accounting, obs. logging, OB status updates

Observing Tools version 3

- Observation preparation tool: **P2PP3**
  - Design of computer literate observing strategy
  - Phase 2 delegation
- Observing Tool for Service Mode: **OT3**
  - Effective ranking engine
  - Integrated reporting
- Observation reporting tool: **NLT & gNLT**
  - Automatic harvesting of observation slots; telescope statistics
  - E-mail subscription to observations notification
- New Operations Databases
  - Full replication Garching ⟺ Paranal

P2PP3

- Design of complex long-term observing strategy
- Most of the observation instructions are encoded in the OBs and the scheduling containers (linked OB execution)
- Generation of hundreds of similar OBs for surveys
- Phase 2 delegation

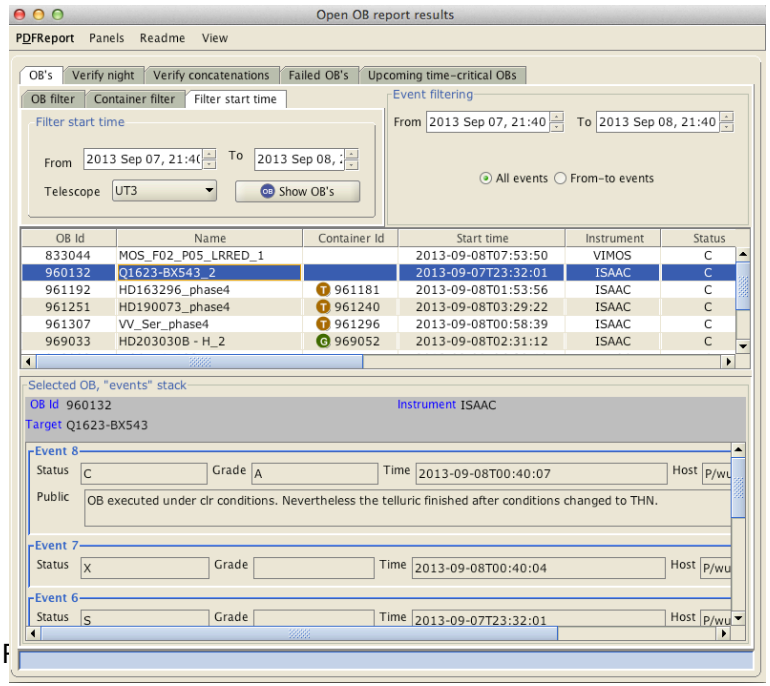


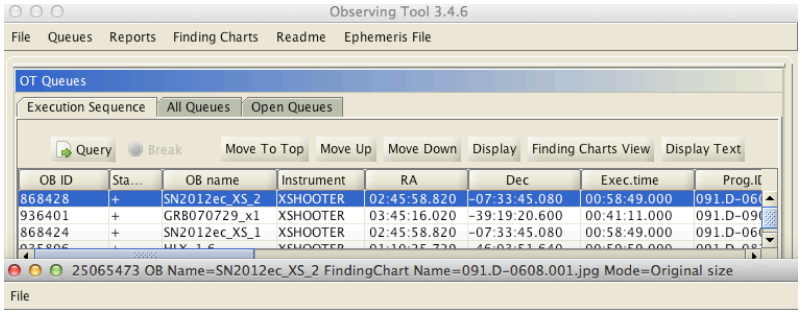
Scheduling Containers: P2PP3 → OT3

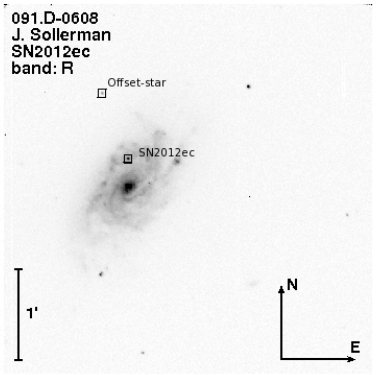
- **CONCATENATIONS**
  - Set of observations that **must** be executed back-to-back ("super observing block")
  - Example: science + standard star calibration
- **TIME-LINKS**
  - **Relative** time dependencies between observations with a minimum and possibly also maximum time-delay
  - Ideal for time-monitoring
- **GROUPS**
  - Preferentially execute all observations from one group before starting execution of another group

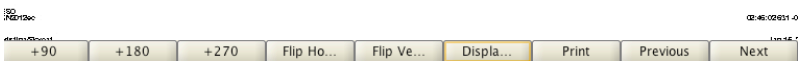
OT3

- Observing queues & execution sequence
- Observations filtering and ranking →short term schedule
- Observations logging: QC0 grade triggers status update with immediate database replication Paranal-Garching
- Reports – e.g. up-coming time-critical observations
- OB database browser





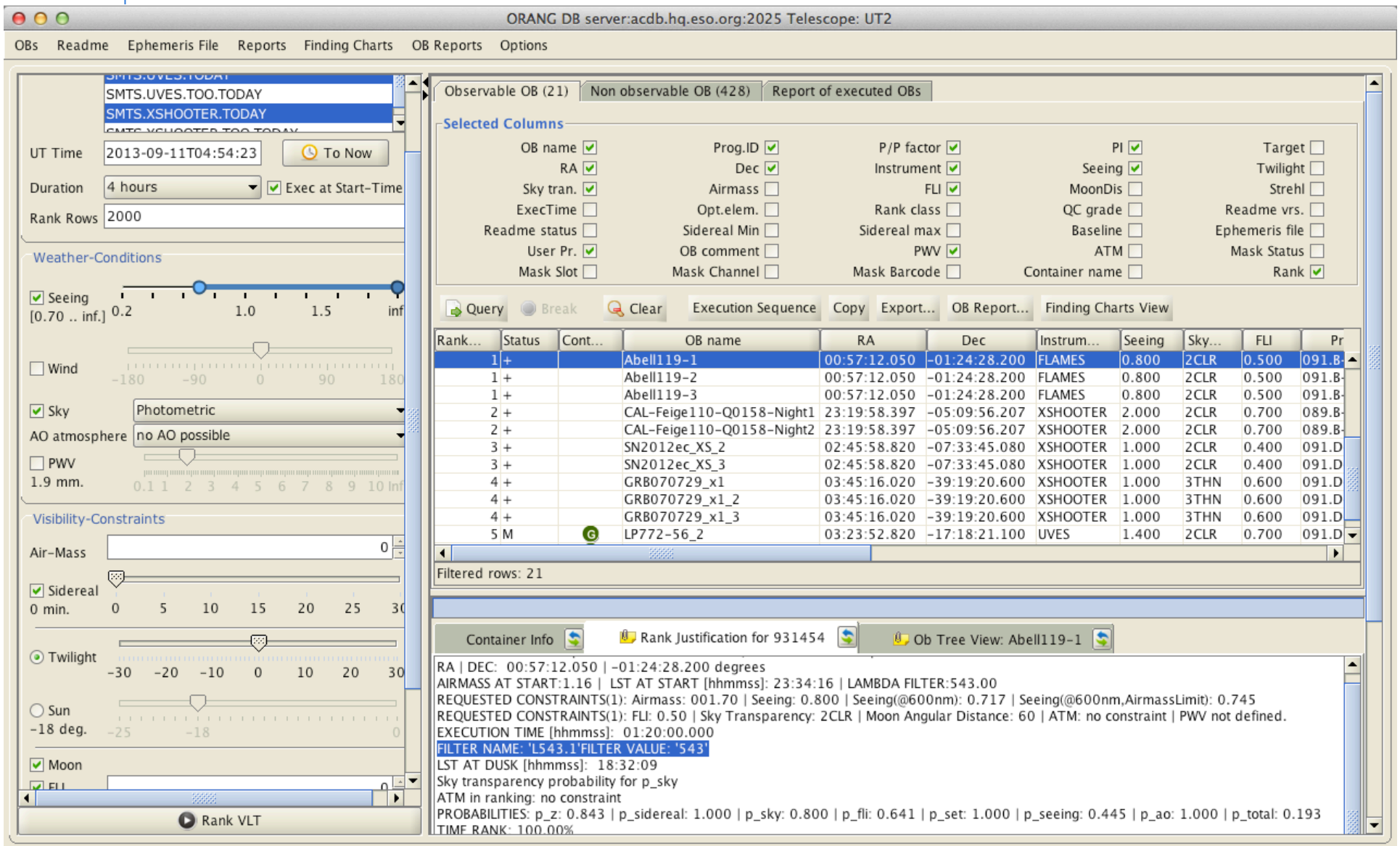




Short term scheduling

- **Step 1: Observations Filtering**
  - seeing, airmass, sky transparency, moon
  - image quality as a function of airmass & filter (λ)
  - wind, AO friendly atmosphere, availability of laser or masks
  - sidereal time, absolute time (include long-term schedule)
  - **Result**: Observable vs. Non-observable queue
- **Step 2: Observations Ranking**
  - scientific ranking of the programme (OPC rank class)
  - combined probability of the realization of observing constraints → observability class
  - time critical score + setting target score
  - user priority, group score, group contribution
  - **Result**: ranked list + rank justification

Short term scheduling



Next Generation Night Log Tool

- Web based tool
- Automatic observation logging – user can add comments and assign observing mode or time loss
- Automatic problem reporting
- Nightly Statistics – telescope/instrument times

- Customized Reports for users & links to the Archive
- Subscription to e-mails with PDF night reports
- Run Progress pages – access to Phase 2 and data delegates

How large is an early type galaxy halo?

Run Code	Instrument	Mode	Allocated Time	Moon	Seeing	Run State	Progress
290.B-5040(B)	ISAAC @ UT3	Service	5.0 hours	No Restrictions	0.6	OPEN	OBs: 2 of 5 OBs, 40.0% 1.7 of 5h, 33.8%

OB Summary

OB Details »

OB ID	Date	from > to	OB Name	Grade	Weather
955265	23 / 24-Mar-2013	06:48:59 > 07:33:22	N5128_F7_J1	A	
955269	1 / 2-Apr-2013	08:53:00 > 09:39:00	N5128_F7_J2	C	
955269	19 / 20-Apr-2013	02:44:43 > 02:57:57	N5128_F7_J2	X	
955269	20 / 21-Apr-2013	05:04:16 > 05:50:57	N5128_F7_J2	A	

OB Details

OB 955265 | 24 Mar 2013 06:48:59 > 07:33:22 | 00:44:23 | Service Mode | A

Instrument	ISAAC
Name	N5128_F7_J1
Target	NGC 5128-F7
PI	Marina Rejkuba
Run	290.B-5040(B)
Container	Group 955264
Public Comments	
Weather	ACD

Constraint	Fulfilled	Requested
Seeing	Yes	0.6
Sky Transparency	Yes	THIN
Airmass	Yes	1.4
FLI	Yes	1.0
Moon Distance	Yes	40
Fringe Quality	n/a	
Ellipticity	n/a	
I.Q. variation	n/a	

OB 955269 | 02 Apr 2013 08:53:00 > 09:39:00 | 00:46:00 | Service Mode | C

Instrument	ISAAC

Concluding remarks

- Tools development in a running environment
- Iterative, incremental development approach – feedback!
- Staged deployment – include experience from operations
- Documentation, knowledge & skills
- Very positive feedback: external and ESO users

“I don’t understand how we could run service mode before”