15 years of VLT end-to-end Operations

15 years experience (and data!) with VLT-e2e process allow a critical assessment of its performance.

- complements analysis of e.g. over-subscription rates, downtime statistics, publication metrics, ...
- addresses some “observations” from VC, STC, Users, our own:
  - idle time?
  - Programme completeness?
  - SM rank performance?

Goals:
- improve our understanding of operational efficiencies with regular monitoring (DOME)
- identify and remedy weaknesses in the implementation of operational concepts
VLT science time:
Available ... Scheduled ... Executed

Projectable Losses
Weather (10%)
Technical (3%)

Problematics
Carry-under (<1%)
Idle (1%)
Carry-Over (20%)
Repeat (5-10%)
"Operationally Problematic Aspects"

- Impact of bad weather in Period 85
- Start of “Idle” monitoring

Evolution of Repeat/Carryover/Idle/Carryunder Time

- Telescope Time [nights]
- Impact of revised observation scheduling?
Service Mode Run Completion Fractions

- No time dimension considered here (i.e. carry-over)
- No Large Programmes considered here
VLT Science Return: Methodology

- Relate Observing Programs (7,764) to their Scientific Return (10,321 refereed pubs, 316,337 citations, mid ‘13)
- Introduce Metrics to define Scientific Return
  - **Productivity** (Quantity: Number of ref. Papers per Program)
  - **Impact** (Quality: Citations of Papers per Program)
  - **Merit** (Normalized Impact per Observing Time Invest)

- Concentrate on main modes, Visitor, Service, Priority Implementation (rank classes A/B/C)
- Several caveats…
VLT Science Return: Productivity

UT Productivity

3575 Pubs based on 2077 VM Progs
6746 Pubs based on 5687 SM Progs
4299 Pubs based on 2534 A rank
1718 Pubs based on 2556 B rank
729 Pubs based on 597 C rank

Benchmark XMM (2000-2012):
6105 ref. papers
6684 Observations
Ness et al, 2014, AN 335

1.5 publications per VLT program after 10 years....
The fraction of programs with (refereed) publications is 50% (VM) and 37% (SM).

The fraction of SM programs with publications is 42%, 32% and 36% for A, B and C rank classes.

Approximately half of all programs are “young” (<6 years after schedule) and are expected to lead to additional publications.

The expected fraction of programs with refereed publications 12 years after scheduling is about 62% (VM) and 52% (SM):

- 56% (A), 50% (B) and 52% (C)
Completeness Distribution Function

UT Completeness

1256 A rank Programs
1589 B rank Programs
336 C rank Programs

95% completeness for A-rank programs
75% completeness for B/C-rank programs

Completeness of SM Programs [%]

Users Committee, April 10, 2014
VLT Science Return: Completeness
Probability of a Publication

The publication probability increases only weakly with completeness of A/B/C programs.
VLT Science Return: Productivity?!

Why do ~ 50% of all VLT programs not produce any refereed publication?

- Ask the PIs:
  - lost interest: data/idea outdated?
  - easier to get data than to analyse?
  - scooped: already published by others?
  - issues with data quality/quantity (completeness)?
  - un-publishable negative/non-confirmatory results?

- Compare to other Observatories… (priv. comm.)

- Inherent to the scientific process!
  - best experimental hypothesis have a 50% chance not being proven (K. Popper)
  - conceived difficulties/non-value to publish negative results (**but**: Michelson-Morely, *Journal of Negative Results in Biomedicine*)
  - rejection in refereed journals (10% Abt 1988, 10-20% A&A)
The publications based on a VLT program typically yield ONE citation/year PER hour of UT time.

Way Forward: Review Observing Program Implementation

- **ESO/DOO** (within Coun. 996-rev 2004 science policy)
  - Review the *mode fractions and execution priorities* (Visitor/Service-A/B/C ratios)
  - Review the *repetition reasons and criteria*
  - Review the *program completeness criteria*
  - Review the *carry-over policy*

- **OPC**
  - *Increase number of programs adapted to fill the condition/constraint space*

- **Community**
  - *poll PIs*
  - *close loop* proposal – data – publication