The End-to-End Operations Model of the Very Large Telescope (VLT)

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VLT End-to-End Model

- From Design to Operations: 15 years of e2e
- Key implementation concepts: modes, types and ranks
- From Programs to Publications: e2e performance
- Prospect

e2e design: integrated data flow

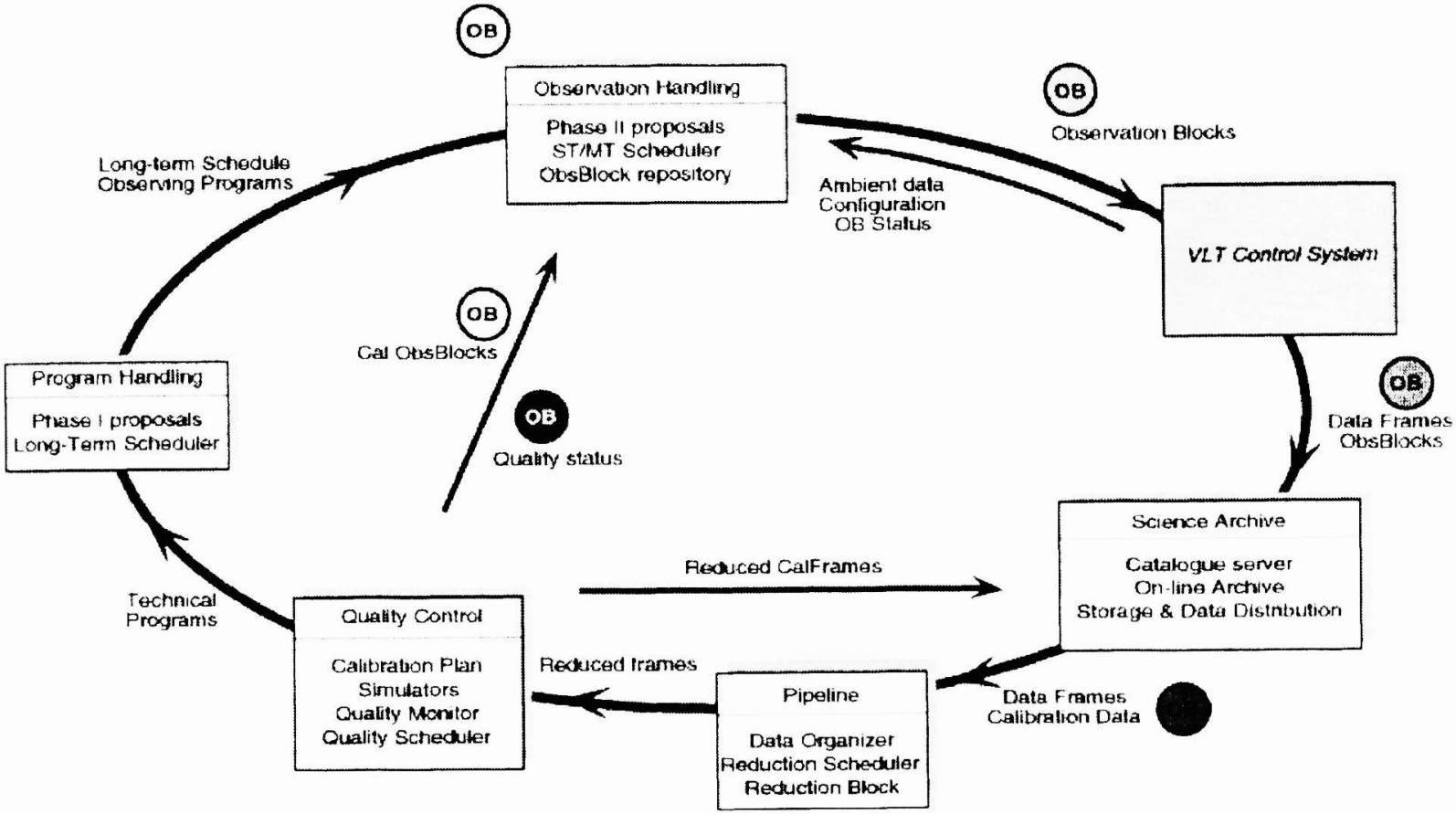
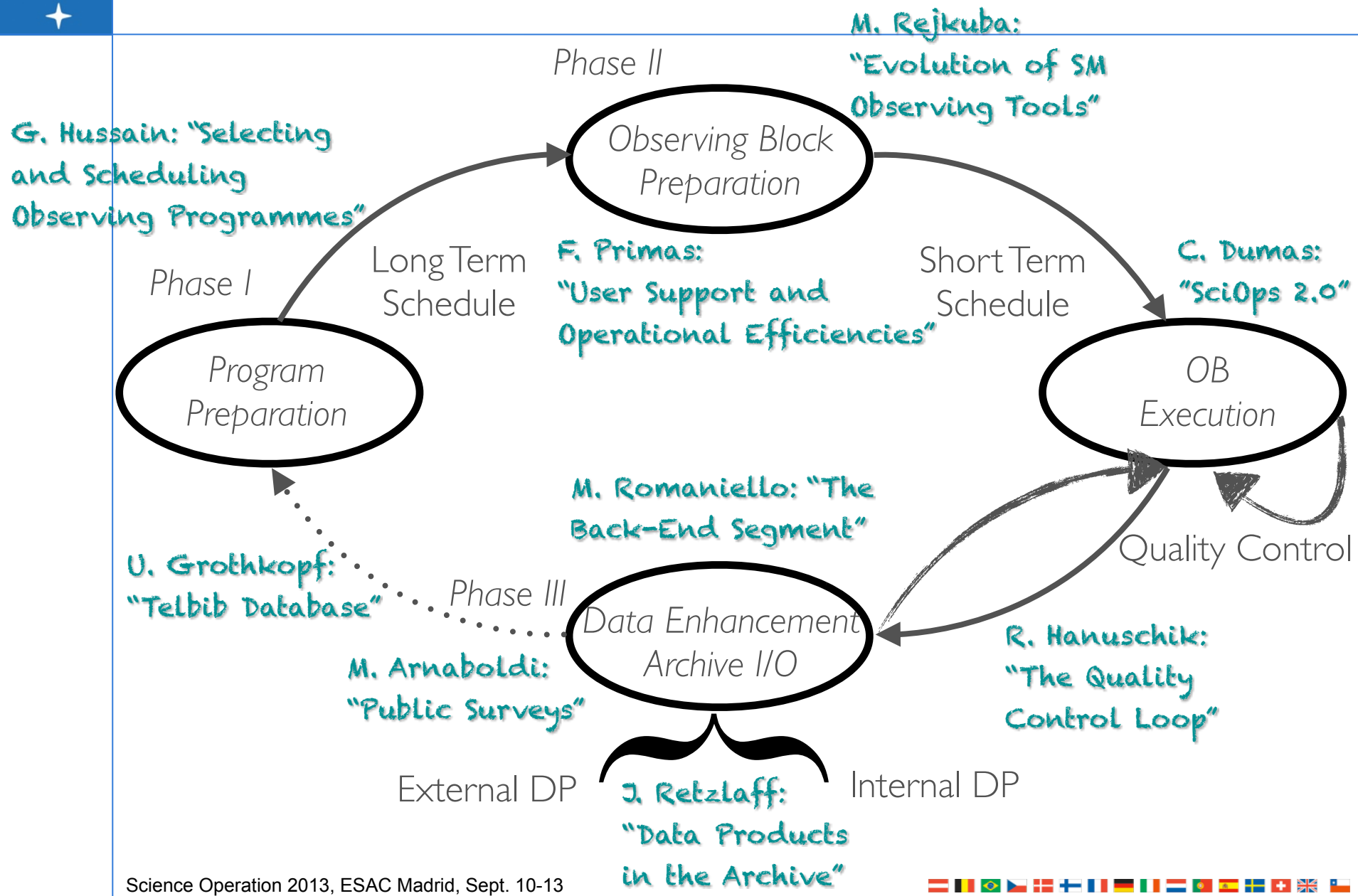


Figure 1 : The VLT Data Flow System. OB : Observation Block

Quinn, P. J. *et al.* VLT Data Flow System: from concepts to operations. *Proc. SPIE Vol. 3349* **3349**, 2–9 (1998).

VLT e2e as of 2012



The flexibility of the VLT e2e system

- main observing modes:
  - queue *and* classic
- program types:
  - allow broad programmatic response to many scientific and community requirements, incl. ultra-fast response times
- program ranks:
  - allow to prioritize the most scientific valued programs
  - allow to adapt to changing atmospheric conditions

Modes, Types and Ranks (I)

- Service Mode (Queue):
  - 2/3 of available science time
  - optimizes the schedule of programs with adequate ambient conditions
  - retains the integrity of the e2e system (calib., archive)
- Visitor Mode (Classic):
  - 1/3 of available science time
  - technically challenging
  - benefits from real-time decisions in presence of VA
  - retains attachment (trust) of community and ESO
- delegated Visitor Mode:
  - fixed slots, short runs
  - executed by on-site night support

Modes, Types and Ranks (II)

- Program Types
  - Normal (Observing Cycle - 6 month period - based)
  - Large (strategic, >100 hrs, spans several cycles)
  - Directors Discretionary Time (~5%, flexible schedule)
  - Target of Opportunity (require trigger, <5%)
    - Rapid Response Mode (<6 min reaction to start observing)
  - Guaranteed Time Observations (payback to consortia)
  - Calibration (<3%, supplement calibration plans)
  - Host-state (Chilean time, ~10%)
  - non-members state
  - VLT-XMM (synergy, ~80hrs/year)

Modes, Types and Ranks (III)

- A rank:
  - 1/2 of available science time in SM
  - highest scientific ranks according to the OPC
  - Observatory commits *all possible effort* for completion in a given observing period, and may carry-over.
- B rank:
  - 1/2 of available science time in SM
  - second half in OPC ranking that qualify for execution
  - Observatory commits *best effort* for completion
- C rank:
  - 10-20% additional scheduled “filler programs”
  - cover free parameter space (observability, weather)

From Programs to Publications (I)

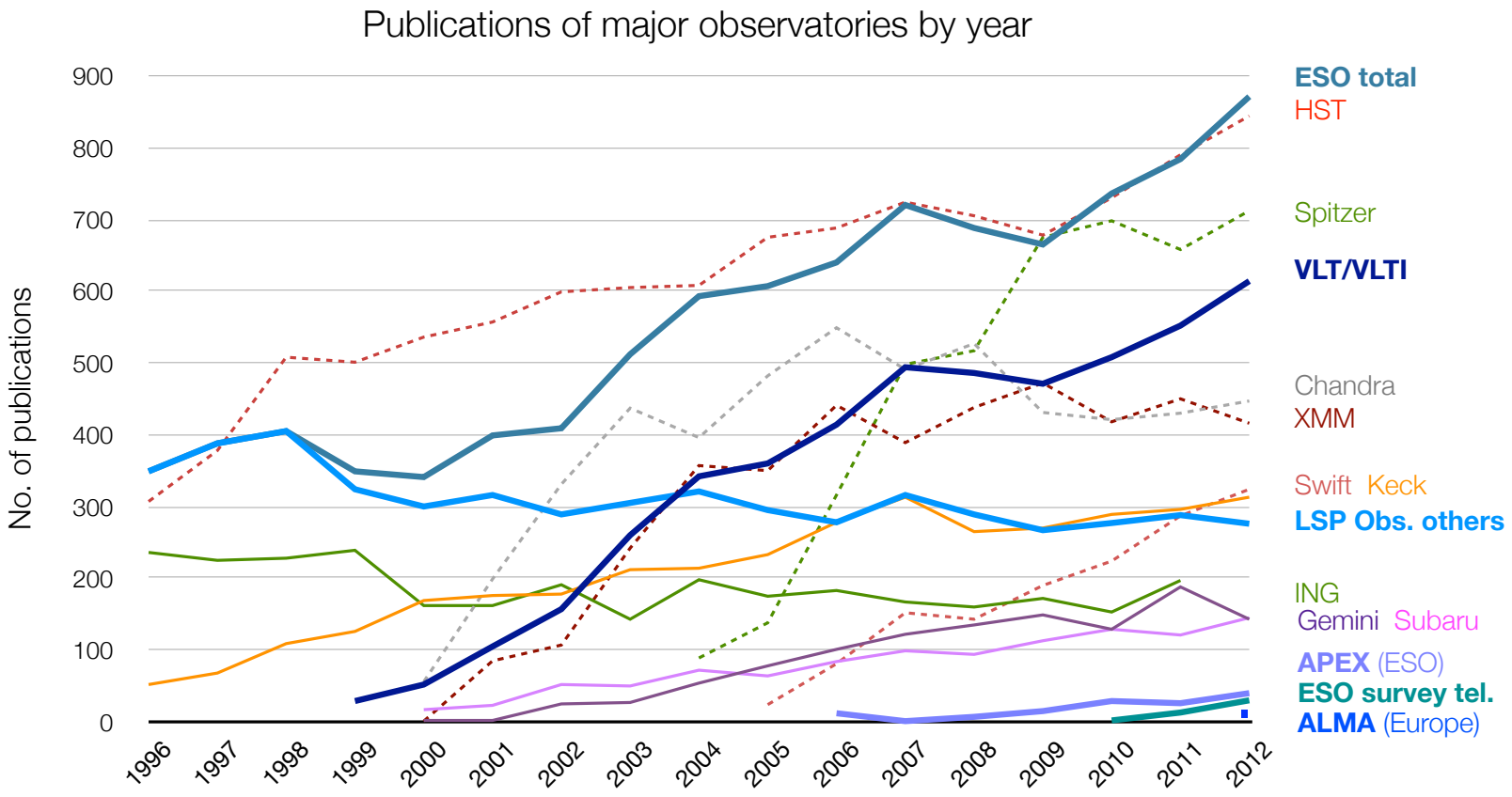
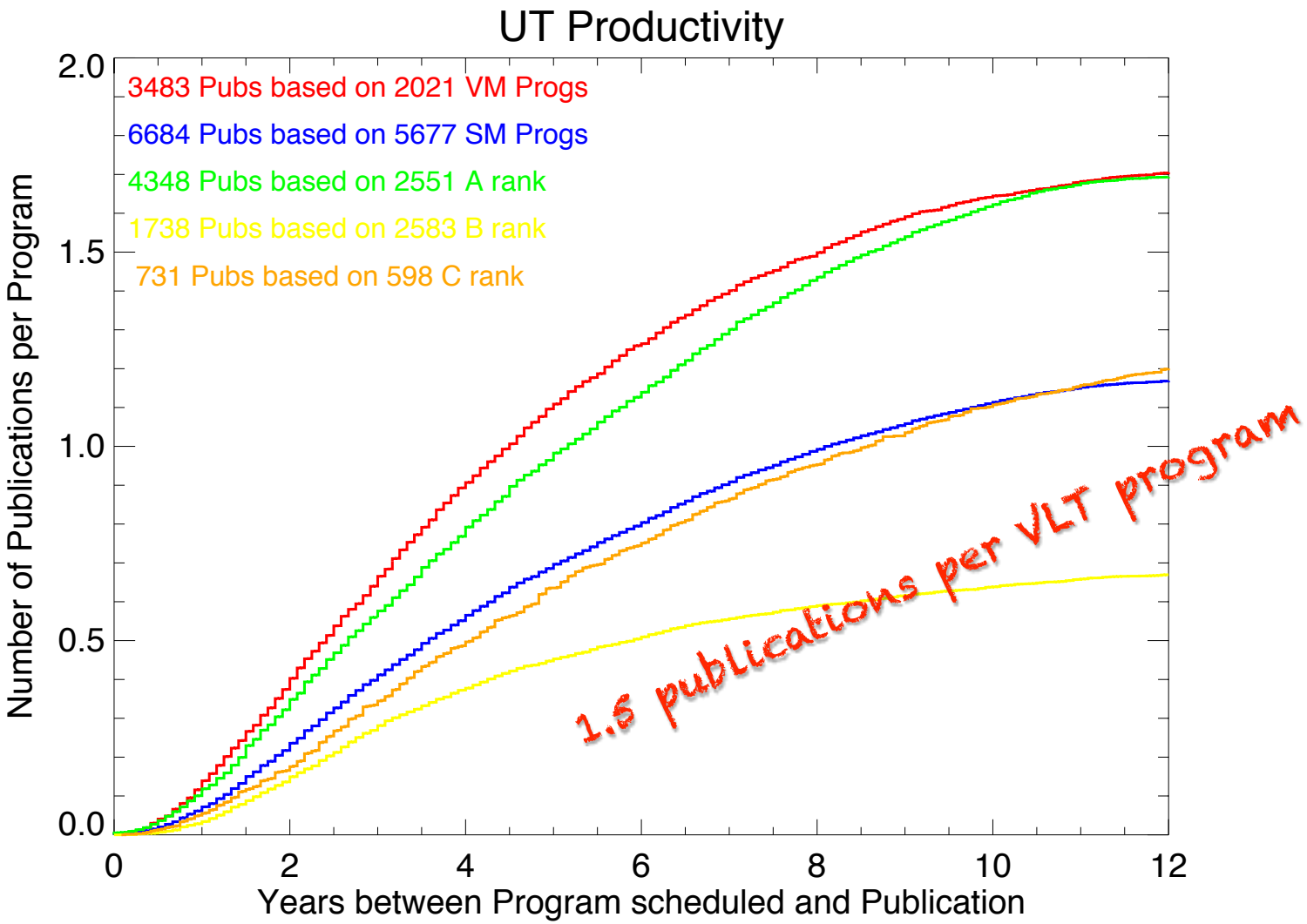


Fig. 3: Refereed publications by ESO and other observatories.
Thick lines: ESO facilities. Thin lines: other ground-based facilities. Dashed lines: space-based facilities.
Please note that selection criteria for inclusion or exclusion of papers vary among observatories

U. Grothkopf et al., http://www.eso.org/sci/libraries/edocs/ESO/ESOstats.pdf

From Programs to Publications (II)

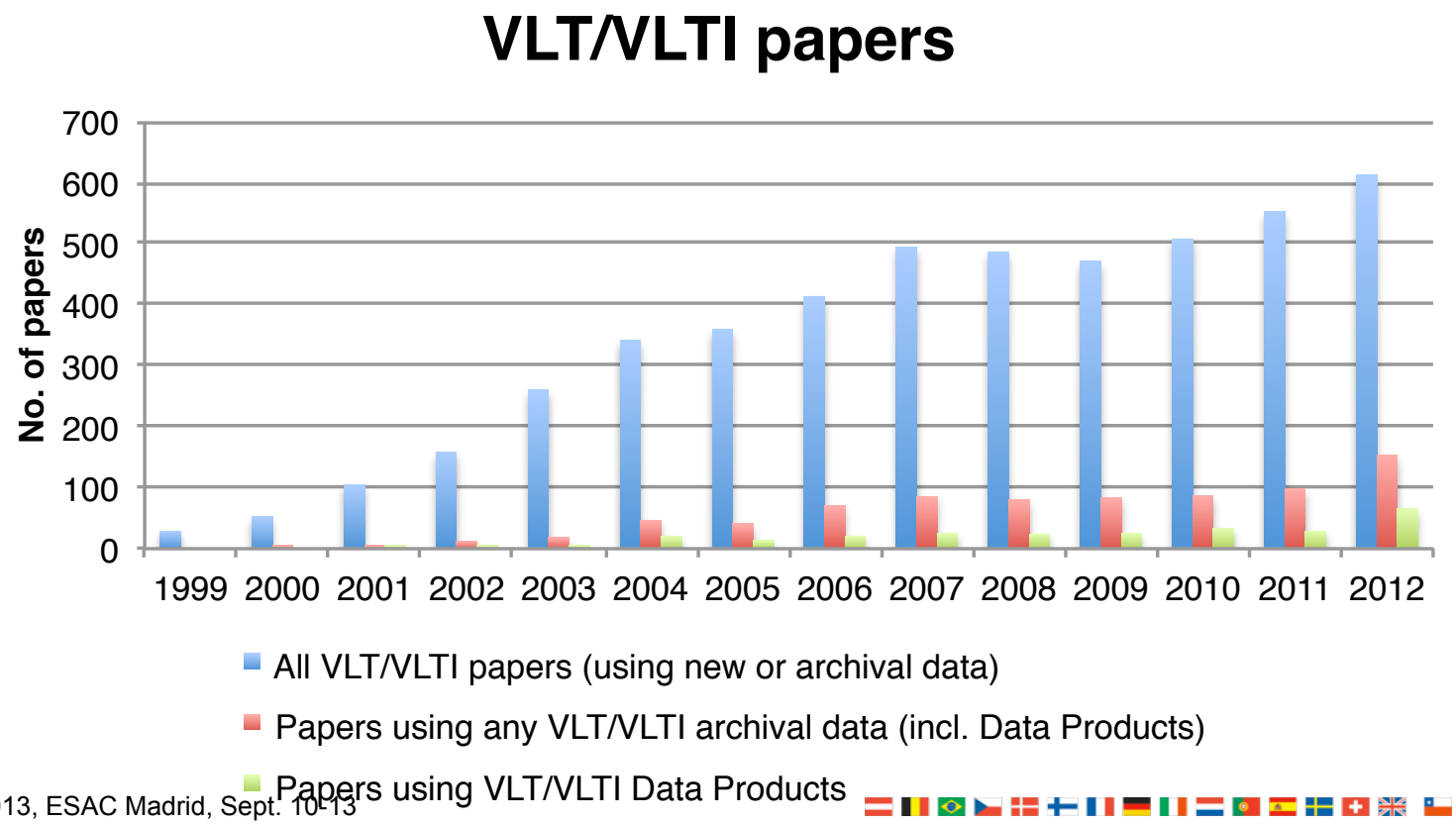


Recent and up-coming extensions

- Public Surveys: VST, VISTA, Spectroscopic
  - M. Arnaboldi: "Public Surveys: Goals, Status and Policies"
  - J. Retzlaff: "Data Products in the ESO Archive"
- ALMA support: European ALMA Regional Center
  - I. de Gregorio: "ALMA Science Operations"
  - E. van Kampen: "Calibrating ALMA"
  - P. Andreani: "European ARC: A Model of Users Support"
  - S. Randall: "The ALMA Observing Tool"
  - F. Stoehr: "The ALMA Science Archive"
- APEX/La Silla: the small ESO sites/projects
  - F. Montenegro: "The Challenge of Delivering APEX Data..."
- The European ELT: just another Telescope...?!

The ESO Archive: a Treasure Chamber

- data consistency, quality and calibratibility ensured by SM
- common infrastructure enables DR for many applications
- data standards (VO) enable compliancy of SGDP
  - increasing community involvement



Some Conclusions

- The VLT e2e model has been proven to be:
  - accepted by users and community
  - robust (standardized procedures, controlled quality)
  - flexible (implementation of science goals)
  - performant (operational efficiency, science metrics)

- Areas of further development/evolution
  - internal workflows (consolidation)
  - scheduling (optimization)
  - support modes (eg remote VM)
  - archive (user-friendly, content)