The CUBES Software Ecosystem

Giorgio Calderone (SSE)
INAF-OATs

CUBES Phase B KOM meeting
The SW ecosystem

- Instrument control software:
  - Low-level (hardware control);
  - High-level (templates, observation coordination);
- Exposure Time Calculator;
- End-to-end simulator;
- Data reduction pipeline;
- Observation preparation;
- Data Analysis.
Work packages

CUBES WBS Proposal for Phase B

CUBES 0000
Stefano Cristiani

PROJECT MANAGEMENT
WP 2000
Roberto Cirami / Paolo Di Marcantonio

RISK MANAGEMENT
WP 2100
Vincenzo De Caprio

SCIENCE
WP 1000
Cyrille Opitom

EXTRAGALACTIC
WP 1200
Valentina D’Olorico

SOLAR SYSTEM
WP 1300
TBD

SYSTEM ENGINEERING
WP 3000
Matteo Genoni / Alessio Zanatta

OPTICS
WP 5000
Walter Seifert

MECHANICS
WP 6000
Julian Stürmer

DETECTOR
WP 7000
UK TBD

CALIBRATION
WP 8000
Bruno Castilho

ELECTRONICS
WP 9000
Igor Coretti

FIBER LINK
WP 10000
Scott Case

AEIT
WP 11000
Giorgio Pariani

SOFTWARE SYSTEM ENGINEERING
WP 4000
Giorgio Calderone

LOW LEVEL/FCF
WP 12100
OATS PostDoc

PA/QA
WP 14000
Vincenzo De Caprio

DATA REDUCTION
WP 12500
Guido Cipani

DATA ANALYSIS
WP 12600
Rodolfo Smiljanic

EXPOSURE TIME CALCULATOR
WP 12700
Mariagrazia Franchini

ON-SITE PREPARATION
WP 12400
Rodolfo Smiljanic

FORE/OPTICS
WP 5100
Martyn Wells

OPTO-MECHANICS
WP 6100
Julian Stürmer

VACUUM & CRYOGENICS
WP 7200
Stephen Watson

DISSEMINATION
WP 13000
Silvia Piranomonte

CRYOSTAT CONTROL
ELECTRONICS
WP 7300
Chris Waring

Detector Software
WP 7400
UK TBD

SLICER
WP 5200
Ariadna Calcinces

GLOBAL STRUCTURE
AND HANDLING
WP 6200
Eduardo Redaelli

TEMPLATES/
MAINTENANCE
WP 12300
Ingo Streda

END-TO-END
SIMULATOR
WP 12800
Marco Landoni / Andrea Scuderi / Matteo Genoni

SOFTWARE WP12000
Work packages

SOFTWARE SYSTEM ENGINEERING
WP 4000
Giorgio Calderone

LOW LEVEL/TCF
WP 12100
OATs PostDoc (PDM)

HIGH LEVEL/OCF
WP 12200
Giorgio Calderone

TEMPLATES/MAINTENANCE
WP 12300
Ingo Stilz

END-TO-END SIMULATOR
WP 12800
Marco Landoni/Andrea Scaudio/Matteo Genoni

OBSERVATION PREPARATION
WP 12400
Rodolfo Smiljanic

DATA REDUCTION
WP 12500
Guido Cupani

DATA ANALYSIS
WP 12600
Rodolfo Smiljanic

EXPOSURE TIME CALCULATOR
WP 12700
Mariagrazia Franchini

Paolo Di Marcantonio (ad interim)
CUBES and its software ecosystem: instrument simulation, control, and data processing.

CUBES (Cassegrain U-Band Efficient Spectrograph) is the recently approved high-efficiency VLT spectrograph aimed to observe the sky in the UV ground-based region (300-400 nm) with a high-resolution mode (~20K) and a low-resolution mode (~5K). In this paper we will briefly describe the requirements and the design of the several software packages involved in the project, namely the instrument control software, the exposure time calculator, the end-to-end simulator, and the data reduction software suite. We will discuss how the above mentioned blocks co-operate to build up a "software ecosystem" for the CUBES instrument, and to support the users from the proposal preparation to the science-grade data products.
Documents for Phase B

- **Delivery**: mid-October 2022;
- **E-ELT Instrument Control System Development Process Requirements (ESO-267497, v. 1, R-IDP-31)**:
  - Instrument Software User Requirement Specifications;
  - Instrument Software Functional Specifications;
  - Instrument Software Management Plan;
- **Dataflow for ESO Observatories Deliverables Specifications (ESO-037611, v. 4, Tab. 1848)**:
  - Instrument package (§4.2);
  - Data Reduction Library Specifications (§4.3);
  - Exposure Time Calculator Specifications (§4.8);
  - Observation Preparation Tool Specifications (if needed, §4.10);
Phase B: commitments

CUBES “Software” meeting:
Recurrent (14 days), starting from Feb. 3rd, 10.00 AM (CET)

Tools:
- Doc. concurrent editing: Overleaf, MS Teams;
- Doc repository: Owncloud;
- Management: OpenProject (proposal).

<table>
<thead>
<tr>
<th></th>
<th>Italy</th>
<th>Germany</th>
<th>Poland</th>
<th>Brasil</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSE</td>
<td>0.25</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Control</td>
<td>0.25</td>
<td>0.3</td>
<td>0</td>
<td>0.3</td>
<td>0.85</td>
</tr>
<tr>
<td>OPS, DRS, DAS</td>
<td>0.2</td>
<td>0</td>
<td>0.3</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>ETC, E2E</td>
<td>0.6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1.3</strong></td>
<td><strong>0.3</strong></td>
<td><strong>0.3</strong></td>
<td><strong>0.3</strong></td>
<td><strong>2.2</strong></td>
</tr>
</tbody>
</table>
OpenProject
web-based project management system

Features:

- Ticketing;
- News (blog);
- Discussion forum;
- Document repository;
- Meeting list;
- Hierarchical wiki;
- Powerful search facilities;
- E-mail notifications.

Purpose:

- Dedicated tool for management, communication and knowledge gathering (no more search through emails);
- Track discussions and decisions;
- Maintain “live” and updated documents (e.g. schedules), collect material for ESO documents;
- Formalize knowledge transfer process ("much knowledge in organizations is tacit or hard to articulate");
- Reduce individual efforts to find informations!

It is open source (with optional paid features and SaaS), and it has already been installed on our premises. We will test it within the “CUBES software” group, and possibly propose adoption for the whole project.