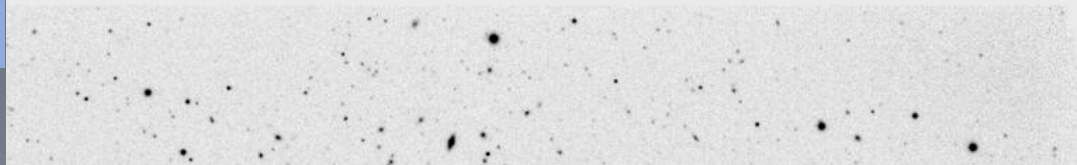




# COLIBRI PROJECT STATUS

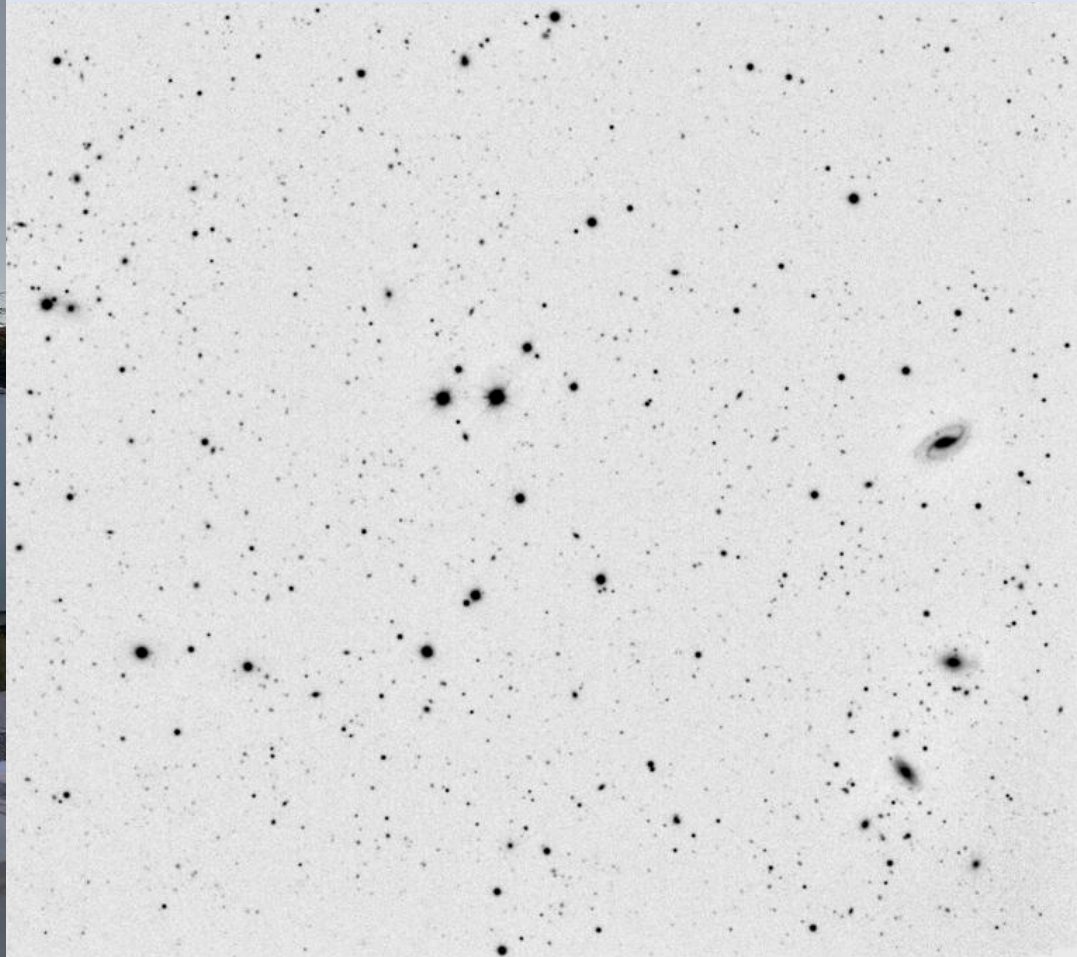
- TELESCOPE AITV ACTIVITIES
- WORK PACKAGE STATUS
- NEXT STEPS

François & Johan presentation



## Telescope AITV AT OHP

*Main results*



# COLIBRI PROJECT STATUS – AITV @OHP

## LESSON LEARNED

### TOTAL NUMBER OF HOURS SPENT FOR TESTING TELESCOPE ALONE

#### @OHP:

- ~174 h during day (114 h with Astelco),
- ~164 h during night (53 h with Astelco)
- spread on ~65 days/nights

**THE TOTAL INCLUDES 3 FULL ALIGNMENT PROCEDURES PERFORMED BY  
ASTELCO FOR A TOTAL OF 140 H (40 H NIGHT, 100 H DAY)**



# COLIBRI PROJECT STATUS – AITV @OHP

## PROBLEM FACE DURING THE TESTS

### HARDWARE:

- Alignment issues, mostly due to derotator misalignment.
- EMC issue that didn't allow DDRAGUITO operations, due to bad filter selection.
- M2 bipods ungluing, due to an error in the gluing step.
- Lack of PT30 gas that didn't allow to run the camera at nominal temperature
- Dominance of astigmatism in image quality.
- Cloud Sensor failure
- Straylight from unbaffled OGSE.
- Wrong design of the instrument interface of the elevation cable wrap.
- Issue with second derotator cabling in electrical cabinet.

### SOFTWARE:

- Seeing monitor failure
- PLC Communication failure
- Weather page often faulty
- Some failure on the ASTELOS due to derotator soft limits

■ Still ongoing but soon to be fixed

■ Solved

■ Could happen in the future

# COLIBRI PROJECT STATUS – AITV @OHP

## DDRAGUITO OPERATION SUMMARIES

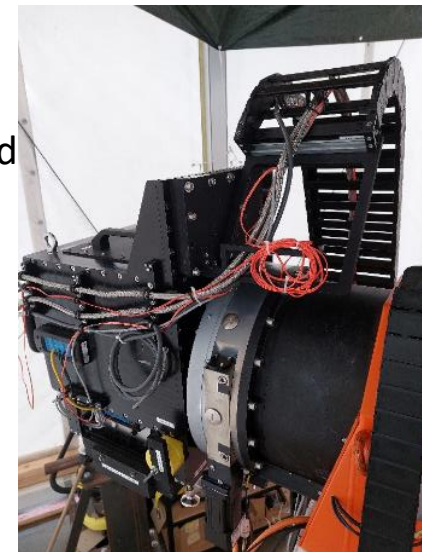
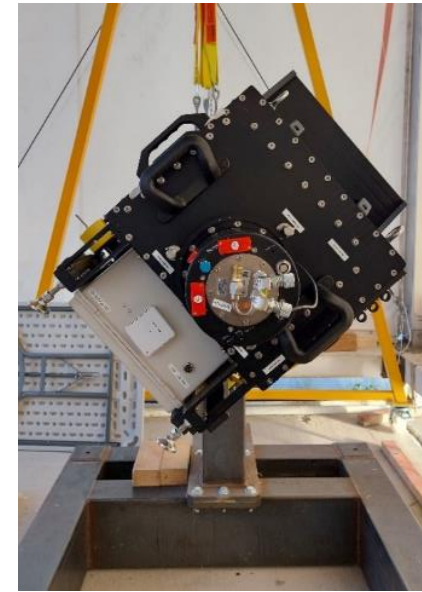
### 27 DAYS SPENT FOR TECHNICAL OPERATIONS OF DDRAGUITO IN FRANCE:

- Alignment checks at LAM 3 days.
- Assembly of DDRAGUITO @OHP lab, 10 days.
- Camera pumping 6 h x3 (repeated before each observing campaign).
- Compressor recharge 1 day.
- Cable routing in the telescope cable wrap 2 days.
- Balancing 2 days.
- Mounting and dismounting from telescope 1 day each (x3).

### TOTAL NUMBER OF DAYS/NIGHTS SPENT FOR TESTING DDRAGUITO @OHP:

- ~26 days/nights (deep fields, image quality, system efficiency, pipeline data, and much more).
- ~22 days/nights with Alan at OHP (14 days/nights dedicated to TCS tests).
- ~4 nights with Alan remotely connected (worked well!).

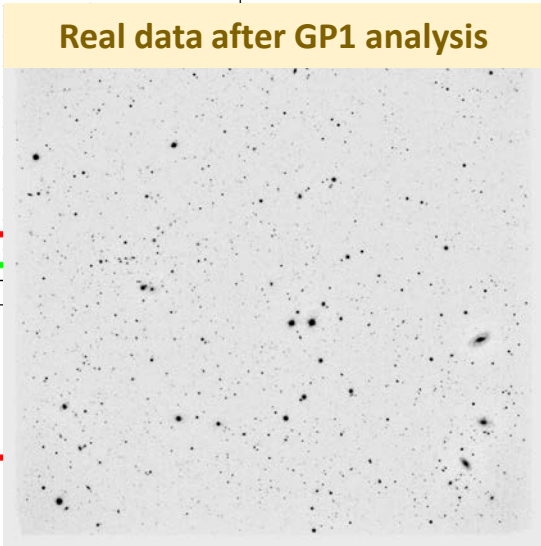
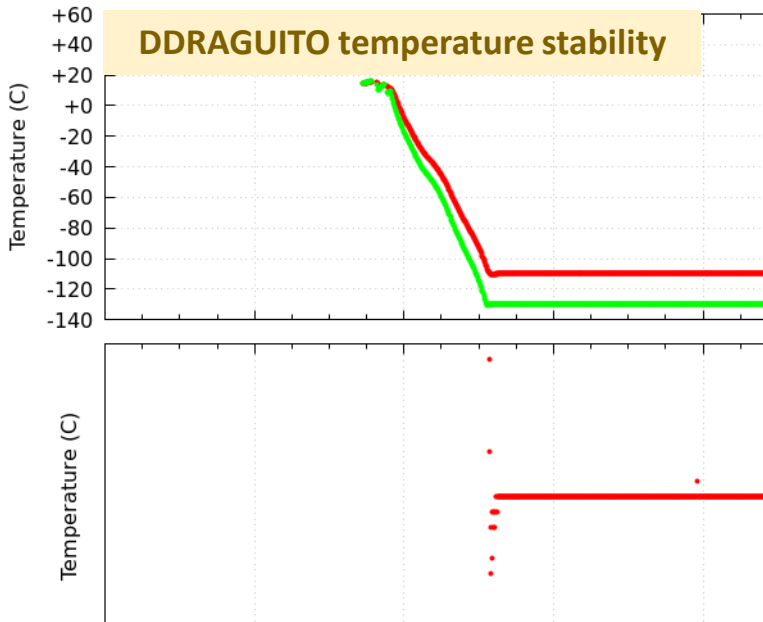
Special thanks for the very good AITV  
documentation from our Mexican colleagues



# COLIBRI PROJECT STATUS – AITV @OHP

DDRAGUITO March 2023 – 3rd tests campaign

71 days of work



# COLIBRI PROJECT STATUS – AITV @OHP

## TELESCOPE IMAGE QUALITY SUMMARY

### Telescope image quality – Up-to-date wavefront error budget

|                                  | WFE RMS Blue (nm) | WFE RMS Red (nm) | WFE RMS CAGIRE (nm) |
|----------------------------------|-------------------|------------------|---------------------|
| Theoretical telescope            | 175               | 175              | 175                 |
| Real telescope                   | 97                | 97               | 97                  |
| Telescope-Instrument Alignment   | 102               | 103              | 72                  |
| Rotations                        | 85                | 98               | 44                  |
| Instrument Optics                | 221               | 94               | 95                  |
| Detector Flatness                | 6                 | 6                | 59                  |
| <i>Theoretical telescope</i>     |                   |                  |                     |
| <b>TOTAL (without rotations)</b> | <b>299.8</b>      | <b>223.8</b>     | <b>219.8</b>        |
| <b>TOTAL (with rotations)</b>    | <b>311.7</b>      | <b>244.4</b>     | <b>224.2</b>        |
| <i>Real telescope</i>            |                   |                  |                     |
| <b>TOTAL (without rotations)</b> | <b>262.1</b>      | <b>170.0</b>     | <b>164.6</b>        |
| <b>TOTAL (with rotations)</b>    | <b>275.5</b>      | <b>196.2</b>     | <b>170.4</b>        |
| <b>2 pixels</b>                  | <b>343</b>        | <b>343</b>       | <b>585</b>          |

Last updated wavefront error measured by Shack-Hartmann:

97nm RMS total

Residual astig: 77nm RMS (with one actuator; 2 actuators planned for OAN)

Residual coma: 35nm RMS

Residual spherical aberration: 36nm RMS

Validate IQ on other Nasmyth (to be done)

# COLIBRI PROJECT STATUS – AITV @OHP

## TELESCOPE ACCEPTANCE BY THE PROJECT

### ACCEPTANCE

- Based on the verification of the requirements (compliant matrix)
- Most of the performances are compliant.
- Some performances are only partially compliant.
  - ✓ Minor or only marginally not compliant (e.g. 0.6" of tracking accuracy instead of 0.45"). Could be accepted as is.
- Straylight, flat field, throughput, not verified at telescope level.



### CONCLUSION

- Telescope meets specification in terms of optical quality
- DDRAGUITO full-field images are good
- Procedures for OAN installation and commissioning are currently defined
- We are ready to dismount and pack the telescope (2<sup>nd</sup> half of June)





# COLIBRI PROJECT STATUS – AITV @OHP

Where are we now

| TASK   | START                                | END      | DURATION  | STATE |
|--|--------------------------------------|----------|---|-------|
| <b>TELESCOPE final installation and commissioning</b>  | 08/2020                              | 02/21    | 15 days / 15 nights   | 100%  |
| <b>TRR – Tests Readiness Review</b><br><i>Start of the AITV phase at OHP</i>   | 18/11/20                             | 19/11/20 | 2 days  | 100%  |
| <b>TELESCOPE ALONE VALIDATION</b><br><i>With OGSE (FLI, SBIG, Manta, Shack Hartman, OGSE assembly)<br/>Included new telescope alignment and checking</i> | 03/21                                | 03/22    | Weather & Astelco dependent<br>At least 50 entries in the elog<br>About 26 nights | 100%  |
| <b>DDRAGUITO DELIVERY AT OHP</b><br><i>Check in lab at LAM, preparation at OHP, installation</i>   | 04/21                                | 06/22    | 3 days at LAM<br>10 days at OHP   | 100%  |
| <b>TELESCOPE &amp; DDRAGUITO VALIDATION</b><br><i>New alignment &amp; full tests of DDRAGUITO</i>  | 06/22                                | 03/23    | In total 71 days (3 sessions of tests)  | 100%  |
| <b>SOFTWARE VALIDATION</b>   | July 2021                            | 03/23    | In parallel of DDRAGUITO testing  | 100%  |
| <b>DDRAGUITO Packing</b><br><i>Ready for shipping</i>  | April 2023                           |          | 3,5 days  | 95%   |
| <b>TELESCOPE ACCEPTANCE</b><br><i>before shipment to OAN</i>   | 18 & 19 April 2023<br>Date still TBD |          | 2 days – Internal Key point<br>With committee to be planned                       | 50%   |
| <b>COLIBRI Packing</b><br><i>PLC, seeing monitor, balancing tool, network, AITV tools</i>  | From 30 of May 23                    |          | 2 weeks   | 0%    |
| <b>TELESCOPE DISMOUNTING, PACKING AND SHIPPING</b>   | 12 to 23 of June                     |          | Delivery end of August /<br>September 2023  | 0%    |

# COLIBRI PROJECT STATUS – AITV @OHP

CAGIRE EMC test @ OHP – oct 22

**GOAL: checking that the telescope is not disturbing the control system of the CAGIRE Detector.**

- CAGIRE AITV plan phase 2A
- System under test: NGC2 + PA2 + CL2



## Results:

- **No effect, same value of CDS noise at IRAP and OHP around 16 ADU.**



**CAGIRE Close Electronics Balancing before its installation on the telescope**



**CAGIRE Close Electronics Balancing before its installation on the telescope**

# COLIBRI PROJECT STATUS – AITV @OHP

## CAGIRE Status – Main tasks

### Main steps on going at IRAP:

- Cryostat delivery: end of June 2023
- Tests of the cryocooler with long hoses in progress
- Alignment stage: ship back to the manufacturer (minors corrections)
- Optics: all are within the specifications
- Software:
  - Science I/F with TCS
  - Engineering I/F (already running at IRAP)

### Detector:

- Delivery at CPPM in January 2023
- Kickoff at CPPM in February 2023
- Opening of the detector box with CNES: 1st of June 2023
- Delivery at IRAP: November 2023 + 6 months of integration

**Lake of human resources which can cause some delay in the tests.**

**No estimation for the moment.**

### Planning:

- Acceptance at IRAP: May 2024
- Installation @ OAN: July 2024

# COLIBRI PROJECT STATUS – AITV @OHP

## SOFTWARE Status

### Telescope Control Software (TCS – A. Watson) – interaction with:

- Telescope: almost finished (optimization of slews, minor bug, automatic pointing map)
- Dome: not implemented (no dome for the moment)
- Instruments: partially (DDRAGUITO: OK, DDRAGO almost complete, CAGIRE not implemented)
- PLC: complete, some functions to be tested @ OAN
- Scheduler: not implemented, in June 2023
- Alerts: partially done
- GP1 & GIC: complete (with DDRAGUITO test)
- DB: not tested

### Scheduler (S.Lombardo):

- Test in progress on a virtual machine at LAM under Ubuntu
- Discussion with Alan to interface with TCS
- Final version in June 2023
- Scheduler software becomes obsolete → evaluation of another software such as TOM

# COLIBRI PROJECT STATUS – AITV @OHP

## SOFTWARE Status

### **PLC (F. Dolon):**

- In tests on the AITV platform @ OHP since summer 2021
- Some hardware issues solved
- Some interfaces to check possible only @ OAN (louvers, dome...)
- Documentation in progress

### **CDB (C. Moreau):**

- Architecture well defined and ready
- Deployment of the infrastructure at LAM: S1 2023
- First test with the DDRAGUITO data which are stored on the NAS
- Deployment of the docker container to UNAM: S2 2023

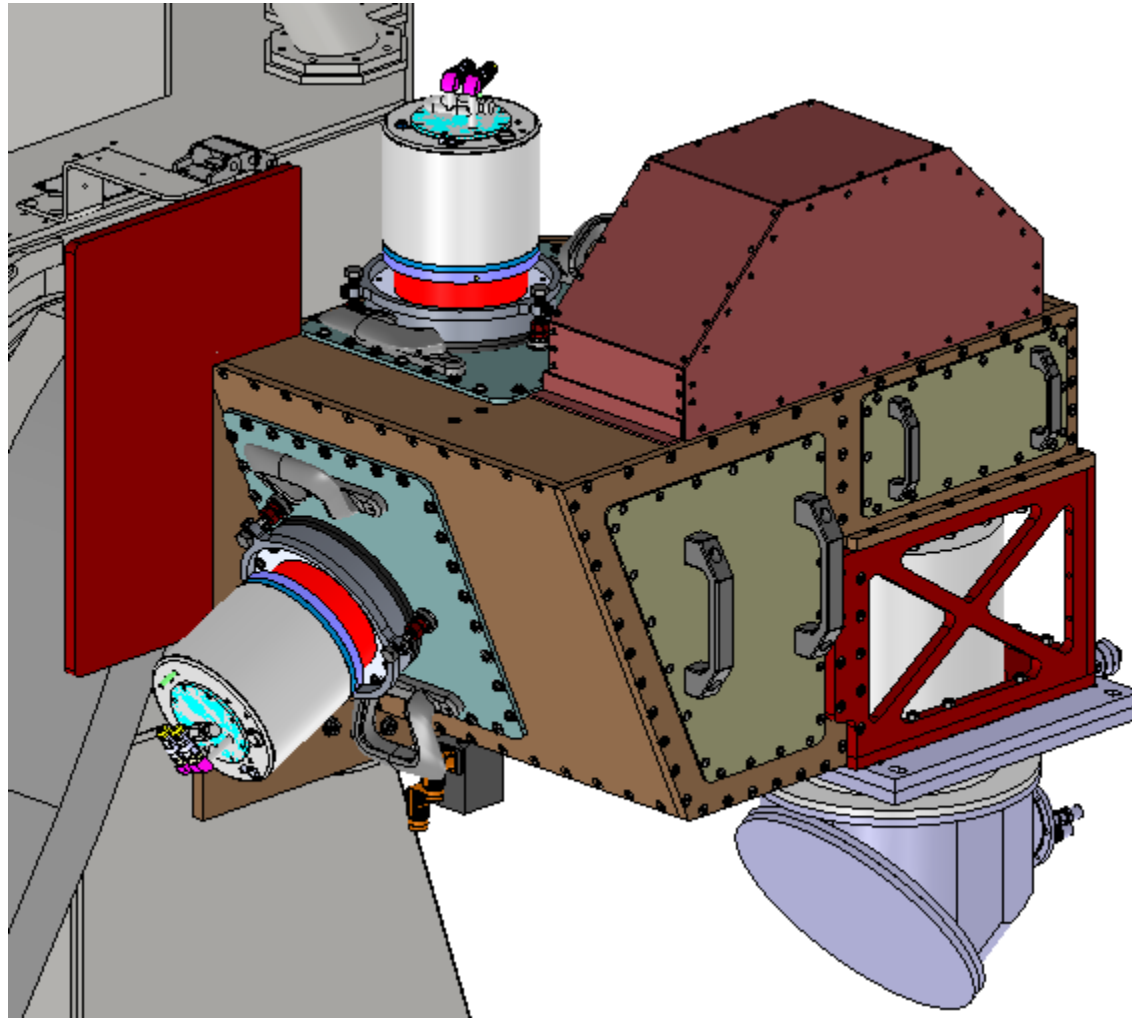
### **GIC (H. Benabar) & GP1 (D. Dornic & N. Butler & T. auphan):**

- GIC & GP1: well advanced, under test during the AITV Tests @ OHP
- <http://gic-web.colibri-obs.org:3000/gic-web>
- **Refer to Damien presentation**

# COLIBRI PROJECT STATUS – AITV @OHP

## DDRAGO Status

FOR DDRAGO STATUS, refer to Alan's presentation



# COLIBRI PROJECT STATUS – AITV @OHP

## INFRASTRUCTURE

**T0** is the green light to start the installation at the summit and is given by the building state

- Foundations last pouring expected: *end of May 2023*
- Building is assembled and mounted: *June - July 2023*
- Dome installation: *August 2023*



**Precise schedule of the telescope installation**



**Building assembly & check at Ensenada**



**Foundation last pouring @ OAN**

# COLIBRI PROJECT STATUS – AITV @OHP

## NEXT OPERATION ORGANIZATION – not consolidated

End of August 2023 : AT CONTAINER DELIVERY - 2 days - UNAM

- Telescope storage in the warehouse at the Observatory
- Telescope UPS cabling and power up

August to September 2023 : before telescope installation – UNAM / LAM

- **All equipment for the mirrors coating shall be ready and at the Observatory:**
  - Tools for coating,
  - Tools for mirrors handling,
  - Building crane, building trap door, truck for mirrors transportation on site
- **Building finishing** (AC unit, louvers, electricity...)
- Installation of the UPSs for the telescope and dome
- Rack for instruments
- Network installation (firewall, switch, storage, configuration)
- GIC & GP1 computers installation

End of September 2023 : PLC Part 1 – 10 days – OHP / UNAM

- PLC (cabinets, sensors, Weather mast) installation & cabling in the building
- First check



**No more heavy work  
in the telescope room**



# COLIBRI PROJECT STATUS – AITV @OHP

## NEXT OPERATION ORGANIZATION – not consolidated

**October 2023** Telescope installation & training of UNAM team – *12 days – ASTELCO, UNAM, LAM*

- Mirrors preparation:
  - M1 & M2 barrel dismounting, moving to 2m facilities, cleaning, coating, installation in barrels
  - M3 cleaning
- In the meantime Telescope installation in the building
- Telescope cabling
- Telescope and dome controller interconnection and test
- Installation of M1 & M2 in the telescope
- Alignment of M1 & M2, checking on sky at Cassegrain focus
- Alignment of M1, M2 and M3, checking on sky at Nasmyth focus

**October 2023** : Telescope performance validation on sky – *3 days – ASTELCO, UNAM, LAM*

- Telescope validation on both Nasmyth on sky with OGSE.
- Telescope acceptance by the project



# COLIBRI PROJECT STATUS – AITV @OHP

## NEXT OPERATION ORGANIZATION – not consolidated

**November 2023** : DDRAGO commissioning - UNAM

- Balancing.
- Installation on the telescope derotator.
- Installation in the control room(control command)
- Test on sky

**November 2023** : PLC Part 2 – 10 days – *OHP / UNAM*

- End of programming
- Complete testing & Final check
- Acceptance



**December 2023** : DDRAGO acceptance by the project



# COLIBRI PROJECT STATUS – GENERAL PLANNING

