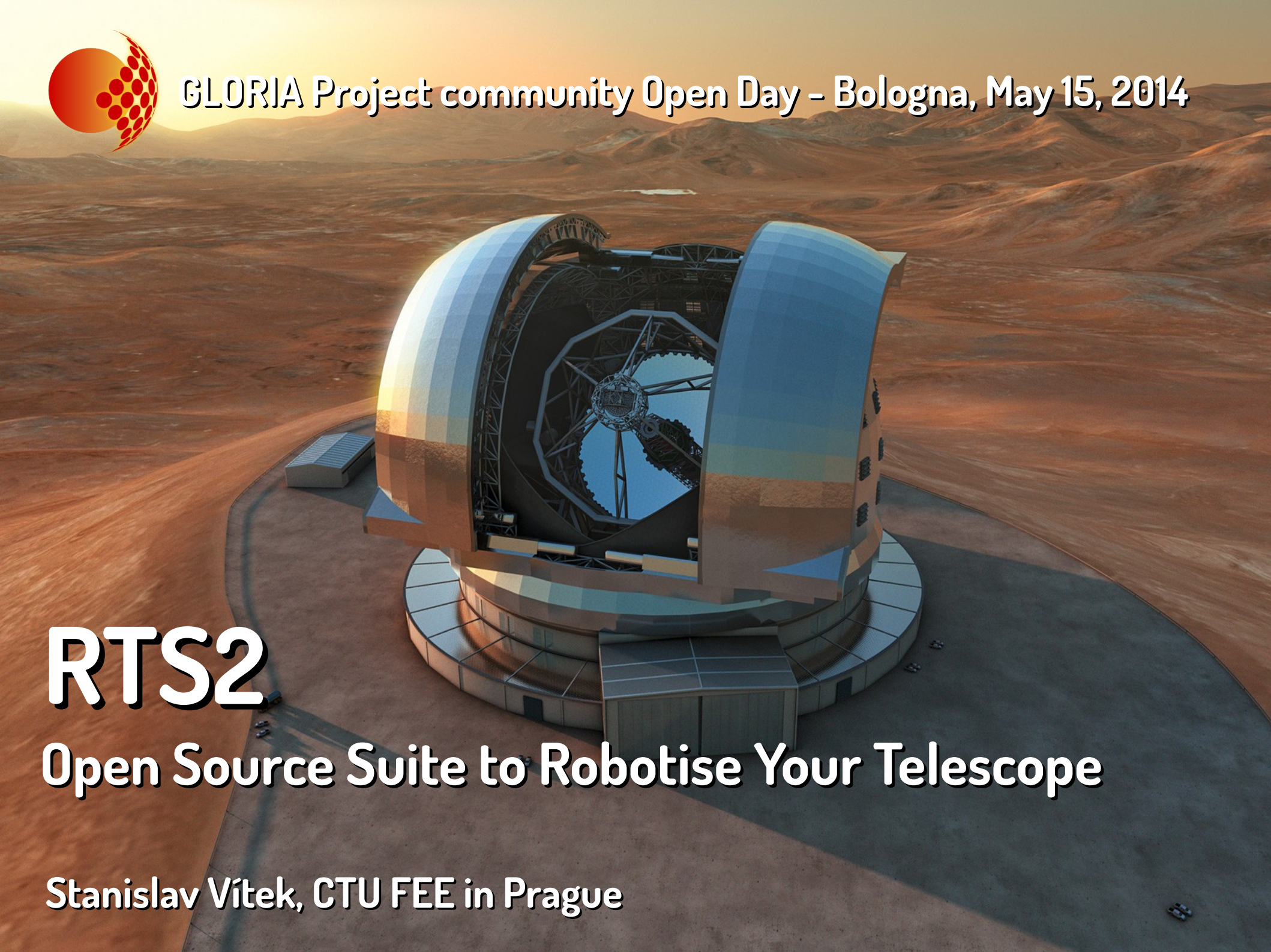


GLORIA Project community Open Day - Bologna, May 15, 2014

RTS2

Open Source Suite to Robotise Your Telescope

Stanislav Vítek, CTU FEE in Prague

What

is robotic telescope?

Automated Scheduled Telescope

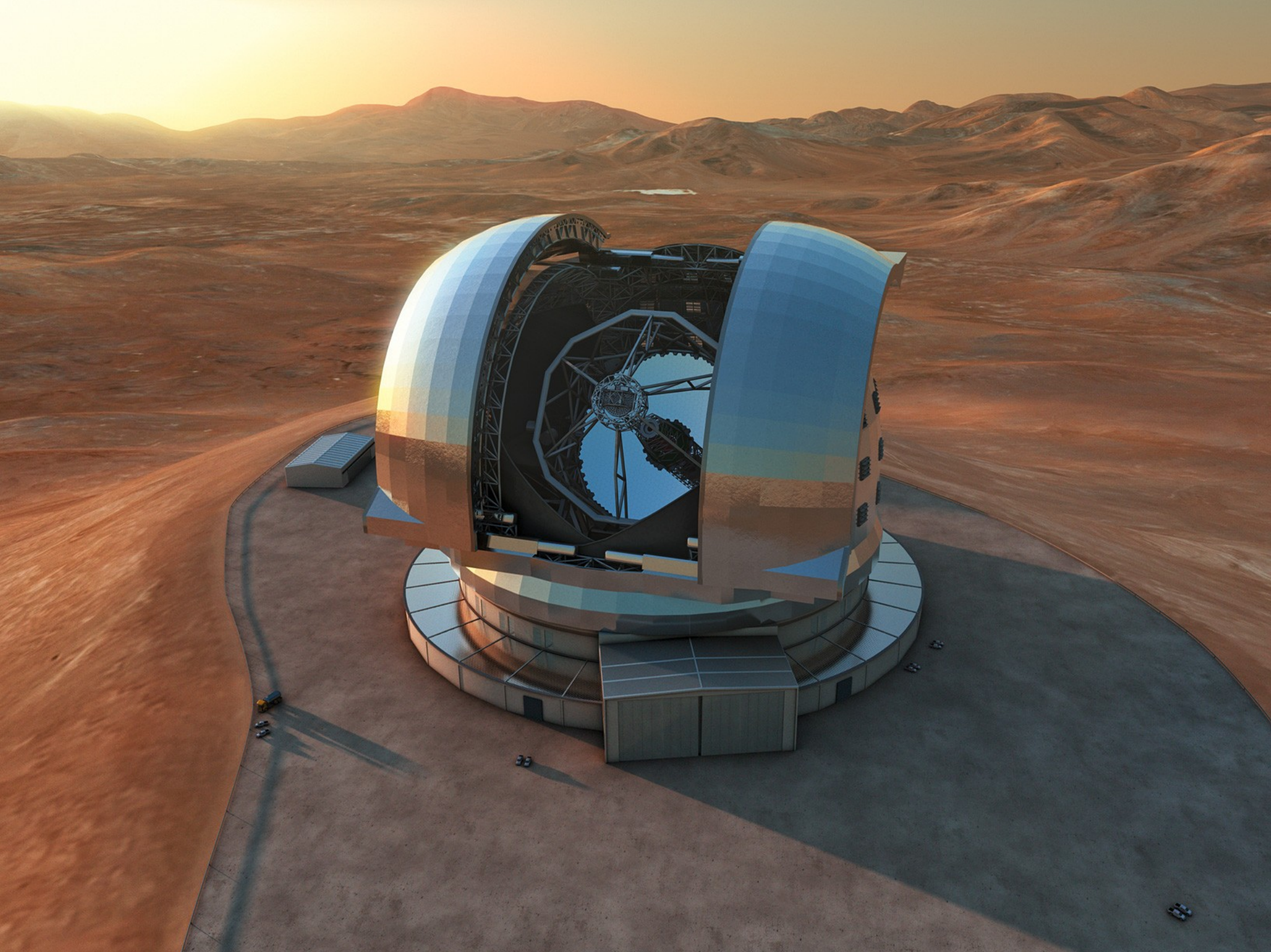
Remotely Operated Telescope

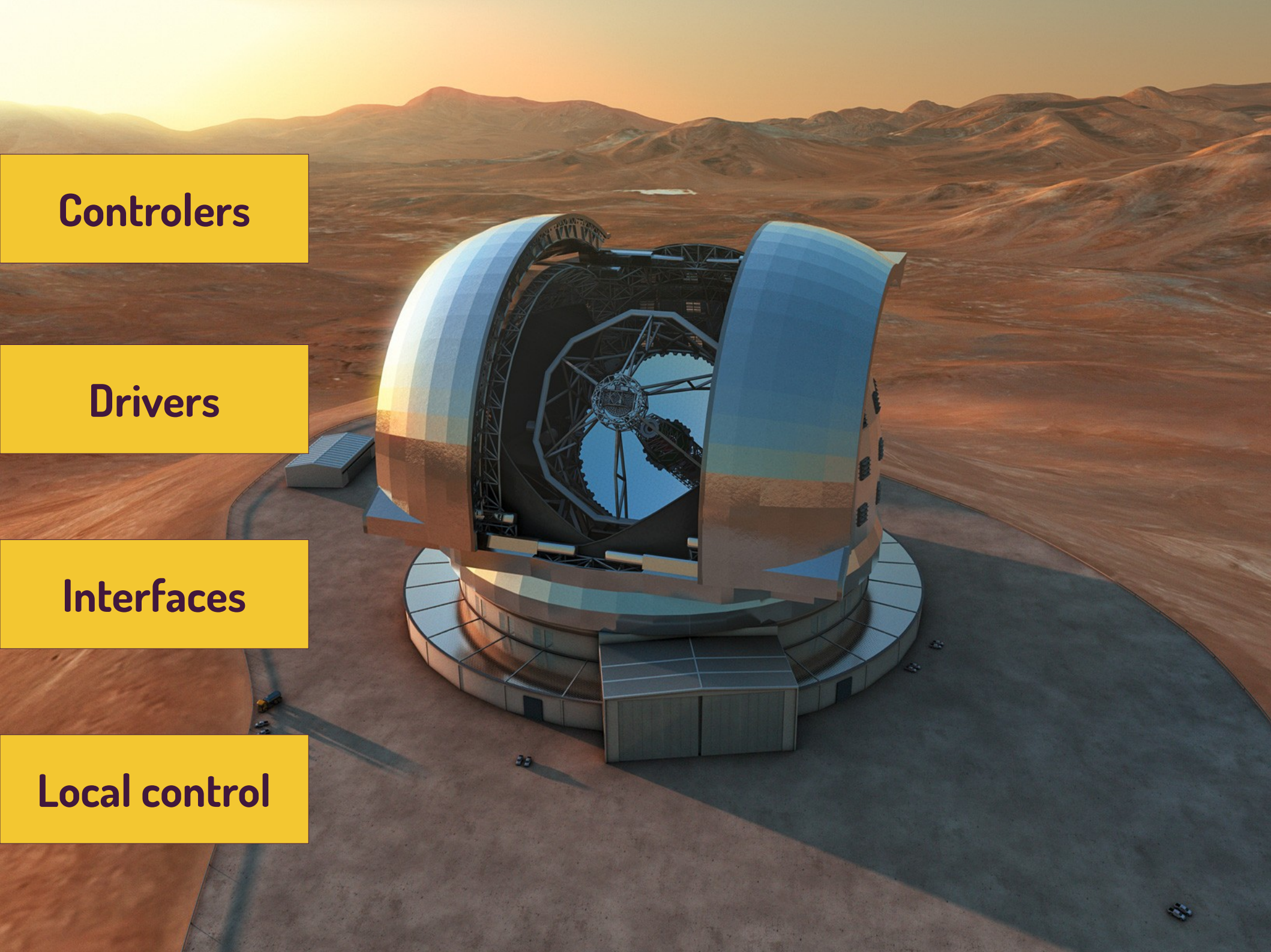
Robotic Autonomous Observatory

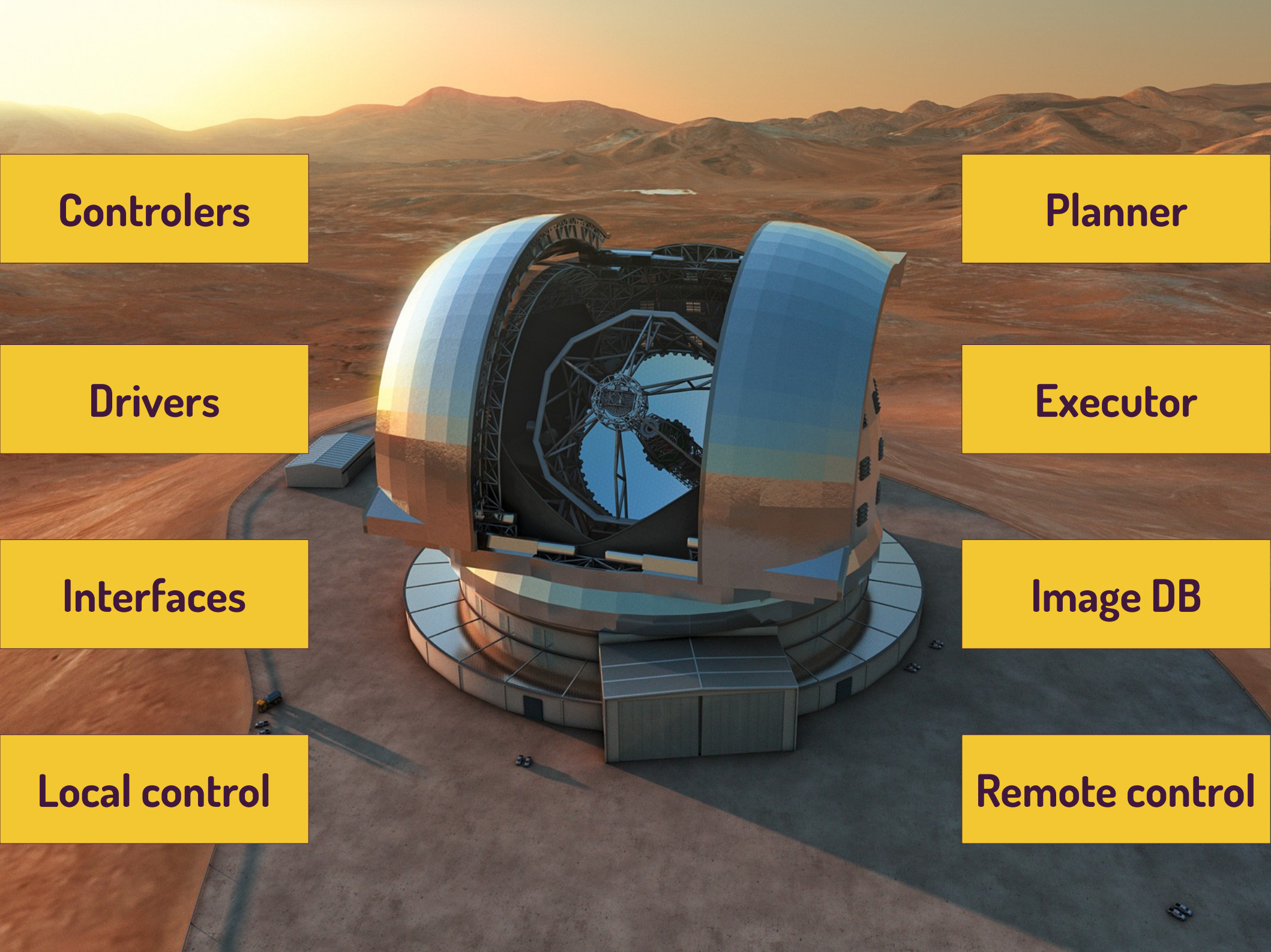
Robotic Intelligent Observatory

How

to robotise telescope?




Controlers
Drivers
Interfaces
Local control

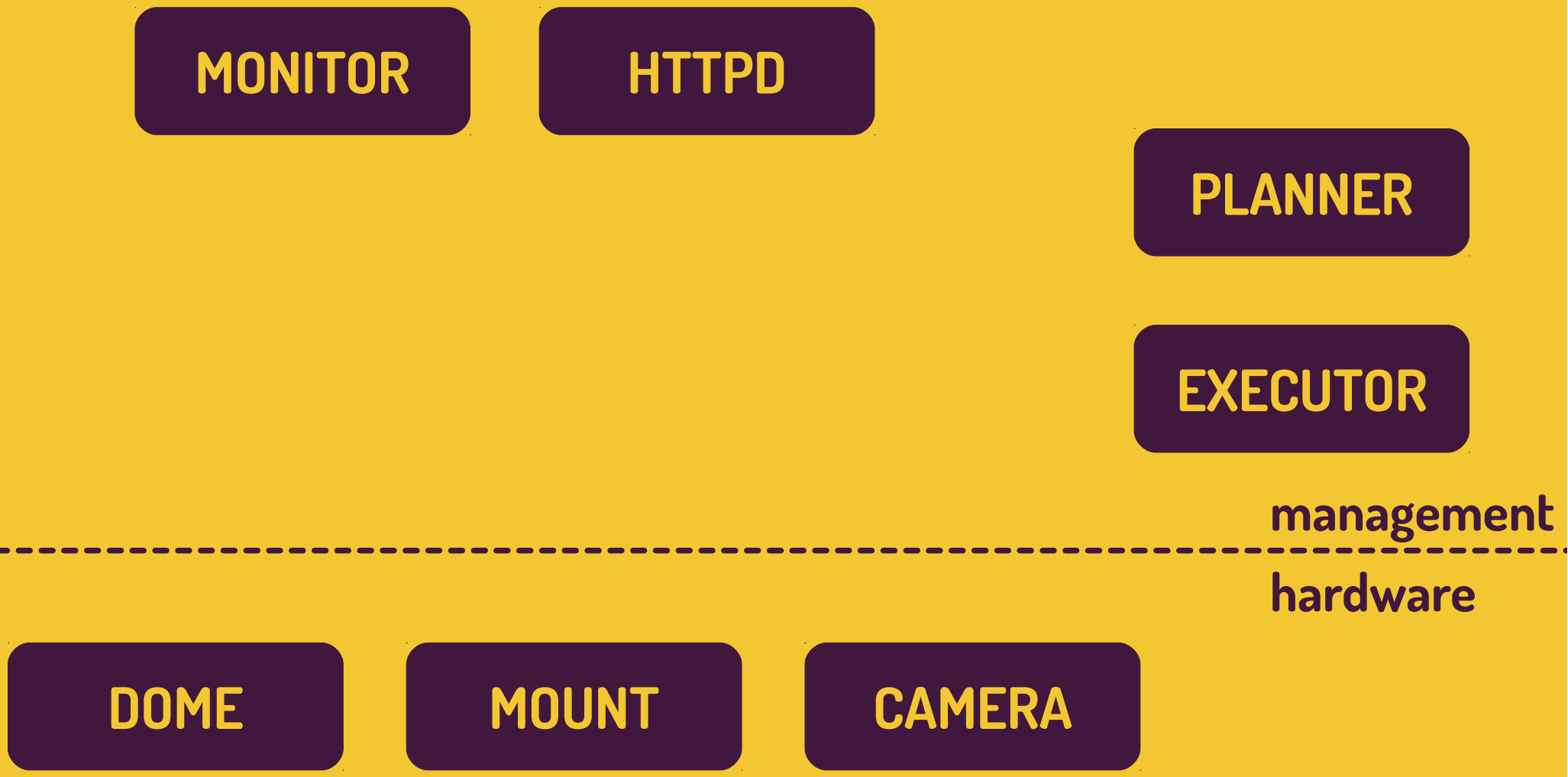

Controlers
Drivers
Interfaces
Local control
Planner
Executor
Image DB
Remote control

RTS2!

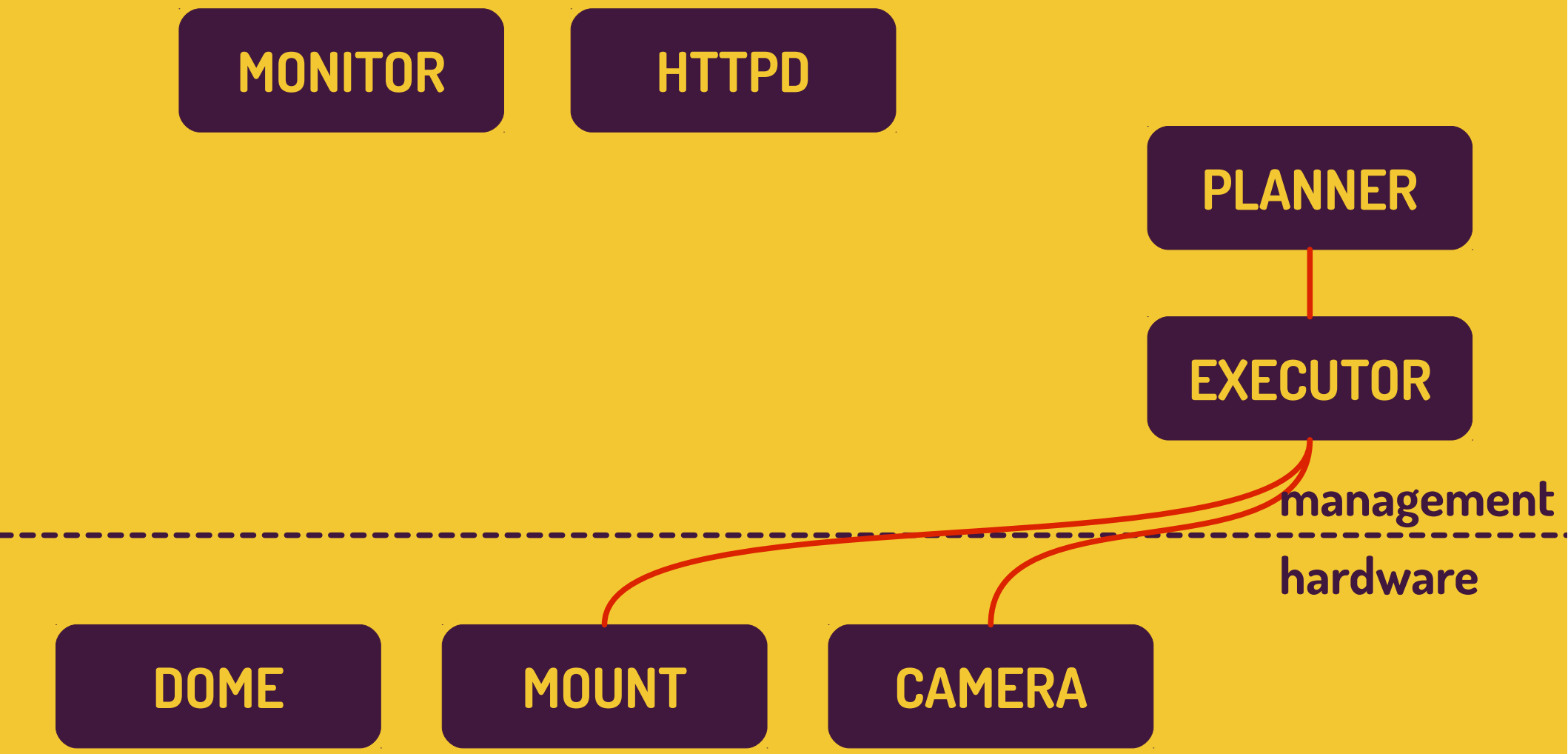
Features

- Development started in 1999, first test on the real hardware 2000
- Primary intended for GRB follow-up observations
  - able to interrupt observation anytime
- Modular, open-source environment
- Scheduling
  - Queue, plan, merit function based target selection
- Full remote control
- Different observational scenarios
  - GRB, mosaic images of celestial targets, etc.
- Simulated (dummy) devices, for testing

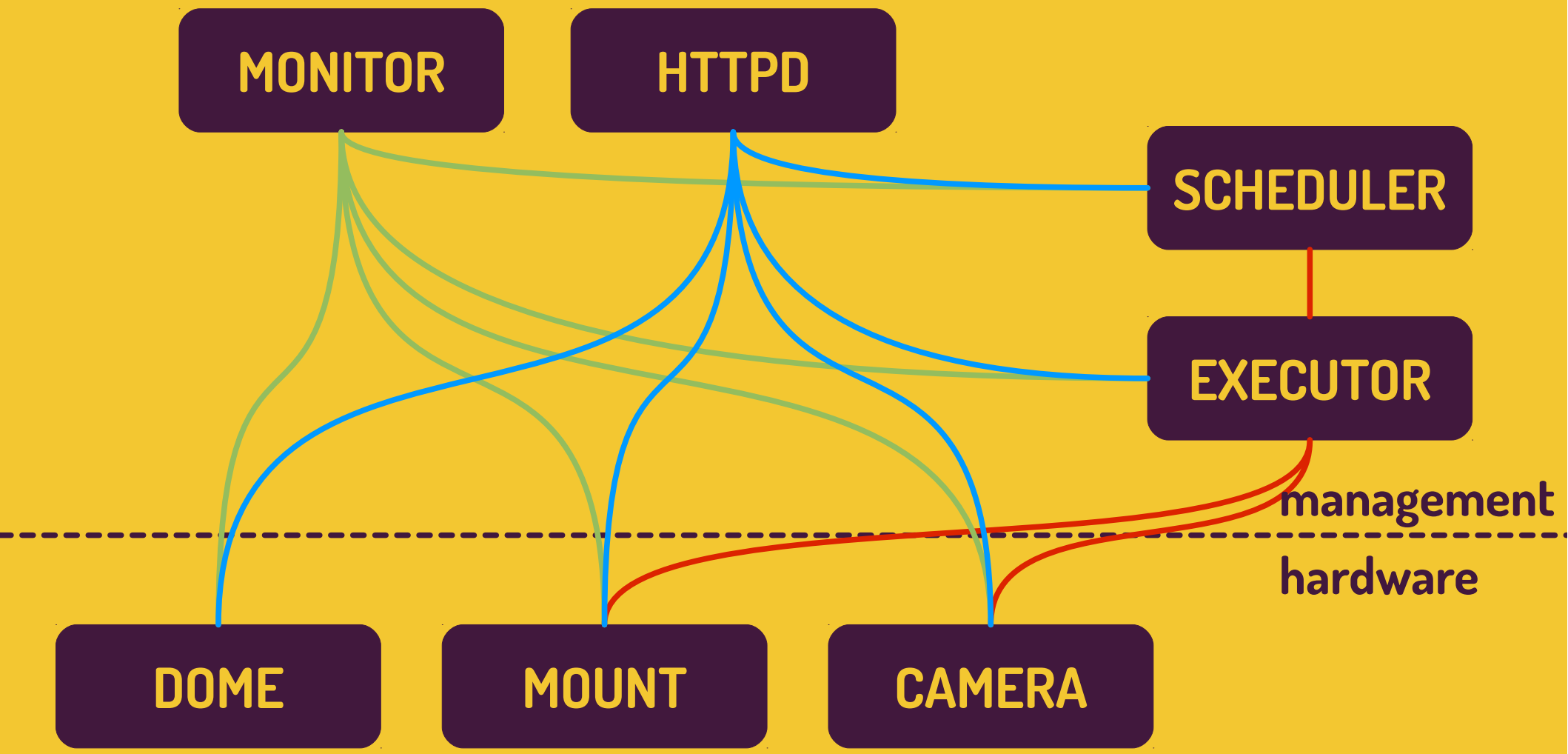
RTS2 structure



RTS2 structure



RTS2 structure



Supported devices

Mounts

- Meade and LX200 clones, Losmandy GoTo, Celestron NextStar, ...

CCD

- SBIG, Apogee, FLI, Andor, Moravian Instruments, ...

Focusers, filter wheels

- Optec, FLI

Meteo stations

- Davis

Others

- Custom domes, robotic hand, cloud and rain sensors, ...

How to get it working

Download

- Public SVN repository

Compile and run

- Preferably on Unix like systems, known installations on Win or Mac
- Installation script for Debian (Ubuntu) OS

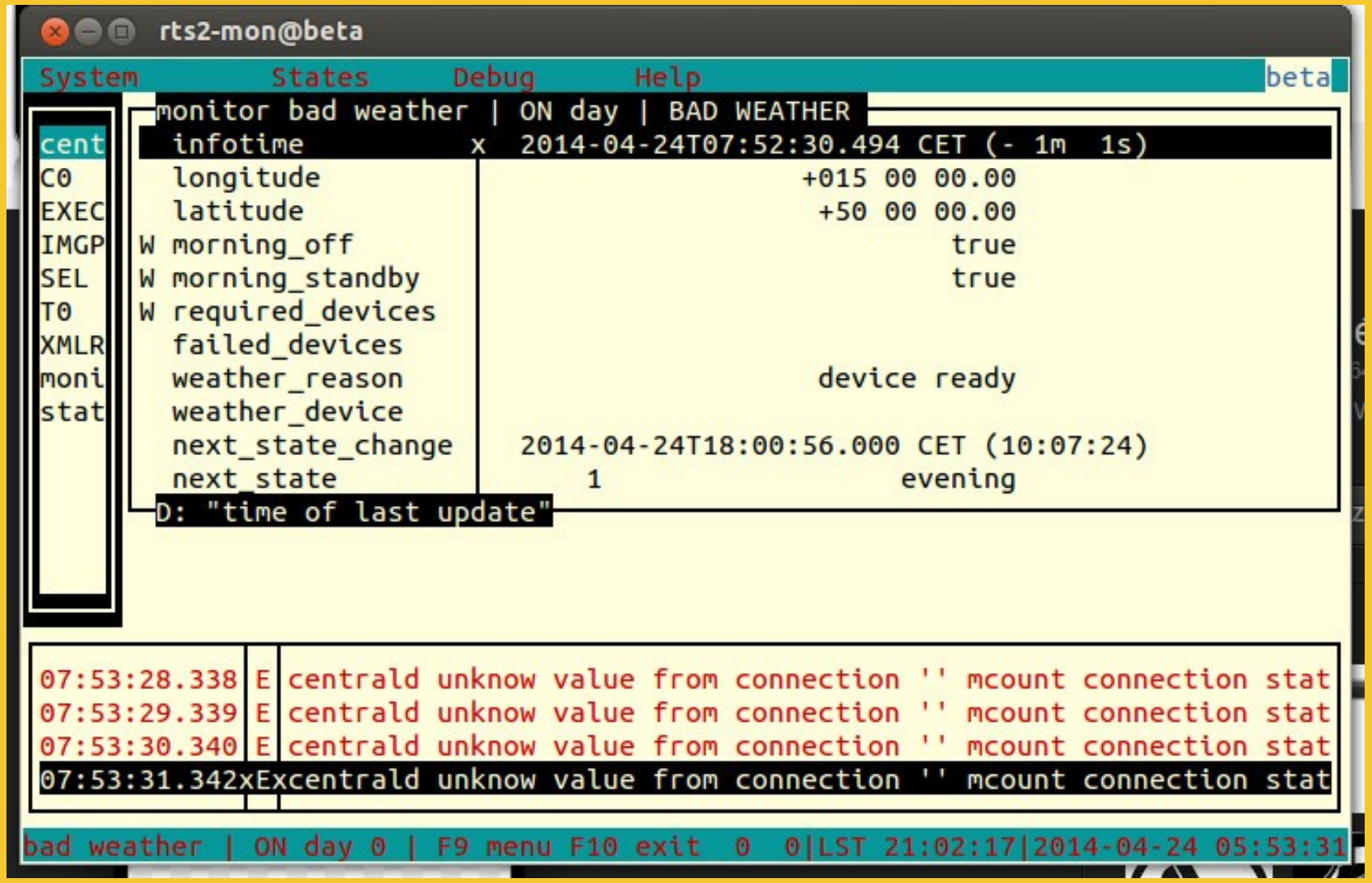
Play

- Dummy drivers allow you to play with RTS2 without any telescope

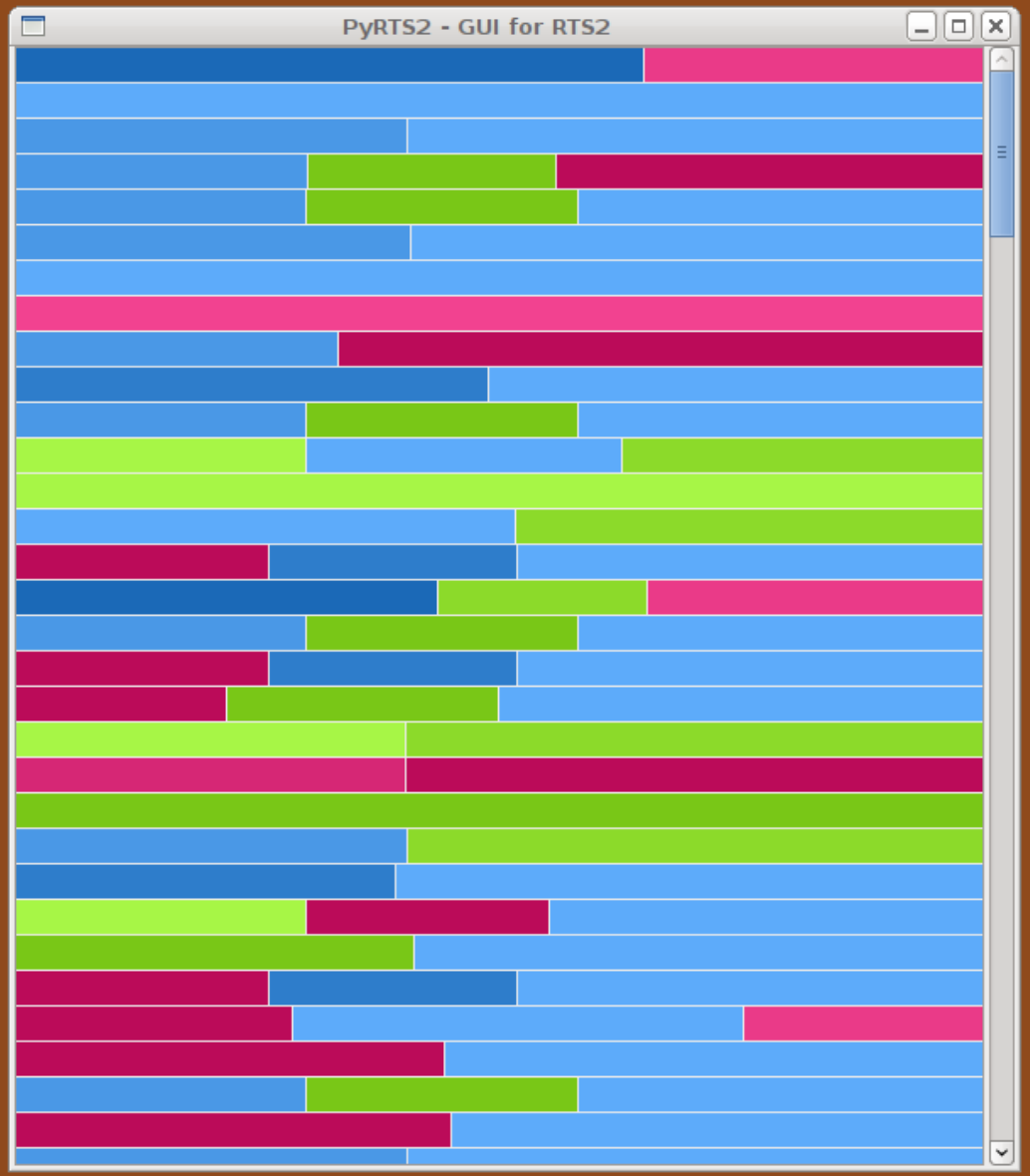
Contribute

- Write your custom driver, connect into (GLORIA) network

RTS2 monitor



RTS2 GUI



Details of ticket 23

Ticket ID	23
Target	42
Name	MAblank9
Rise	2008-11-19 03:39:39
Transit	2008-11-19 10:00:57
Set	2008-11-18 16:26:09
Account	2
Scheduling from	NULL
Scheduling to	NULL
Start	2008-11-17 20:36:02.756000
End	2008-11-18 08:36:02.756000
Duration	12:00:00

Zavřít

Details of ticket 13

Ticket ID	13
Target	32
Name	CAblank2
Rise	
Transit	2008-11-19 04:42:08
Set	
Account	2
Scheduling from	NULL
Scheduling to	NULL
Start	2008-11-18 03:22:53.756000
End	2008-11-18 08:36:02.756000
Duration	5:13:09

Zavřít

Details of ticket 10

Ticket ID	10
Target	29
Name	MAblank6
Rise	2008-11-18 20:27:38
Transit	2008-11-19 02:33:00
Set	2008-11-19 08:38:22
Account	2
Scheduling from	NULL
Scheduling to	NULL
Start	2008-11-18 01:14:55.756000
End	2008-11-18 08:36:02.756000
Duration	7:21:07

Zavřít

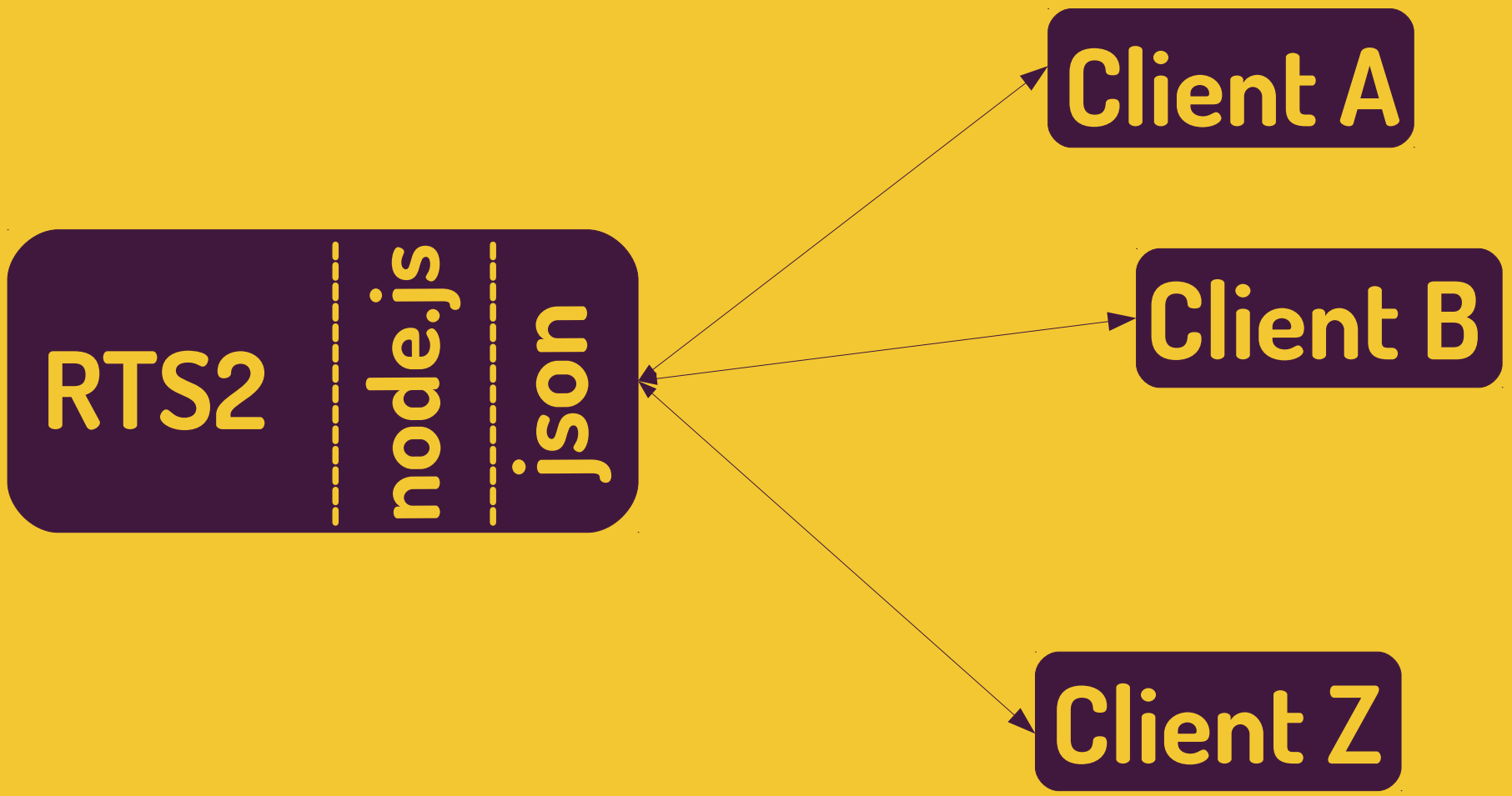
JSON API

http://localhost:8889/api/get?e=1&d=IMGP

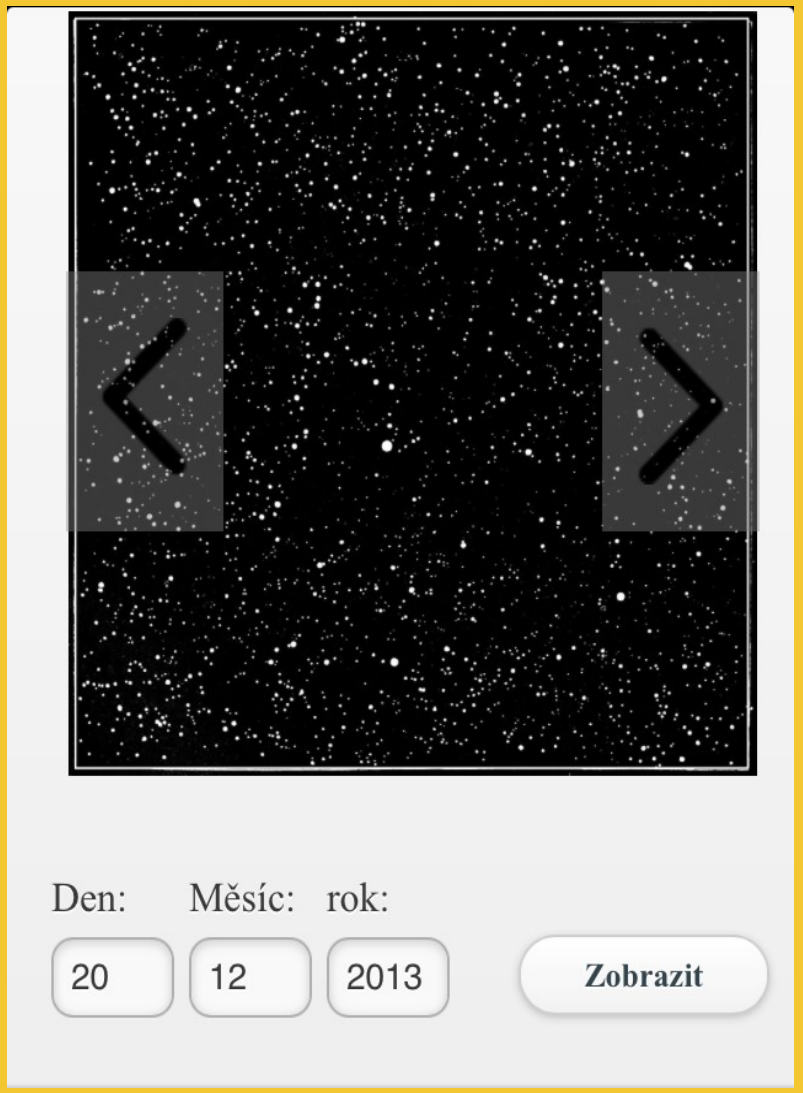

```
{
  "infotime":[16778243,1398315771.415523052215576171 88,0,0,"time of last update"],
  "apply_corrections":[50332678,1,0,0,"apply corrections from astrometry"],
  "astrometry_timeout":[50988034,3600,0,0,"[s] timeout for astrometry processes"],
  "good_astrom":[2,0,0,0,"number of images with astrometry"],
  "no_astrom":[2,0,0,0,"number of images without astrometry"],
  "failed_images":[2,0,0,0,"number of images with failed processing"],
  "dark_images":[2,0,0,0,"number of darks"],
  "flat_images":[2,0,0,0,"number of flats"],

  ..
  ..
}
```

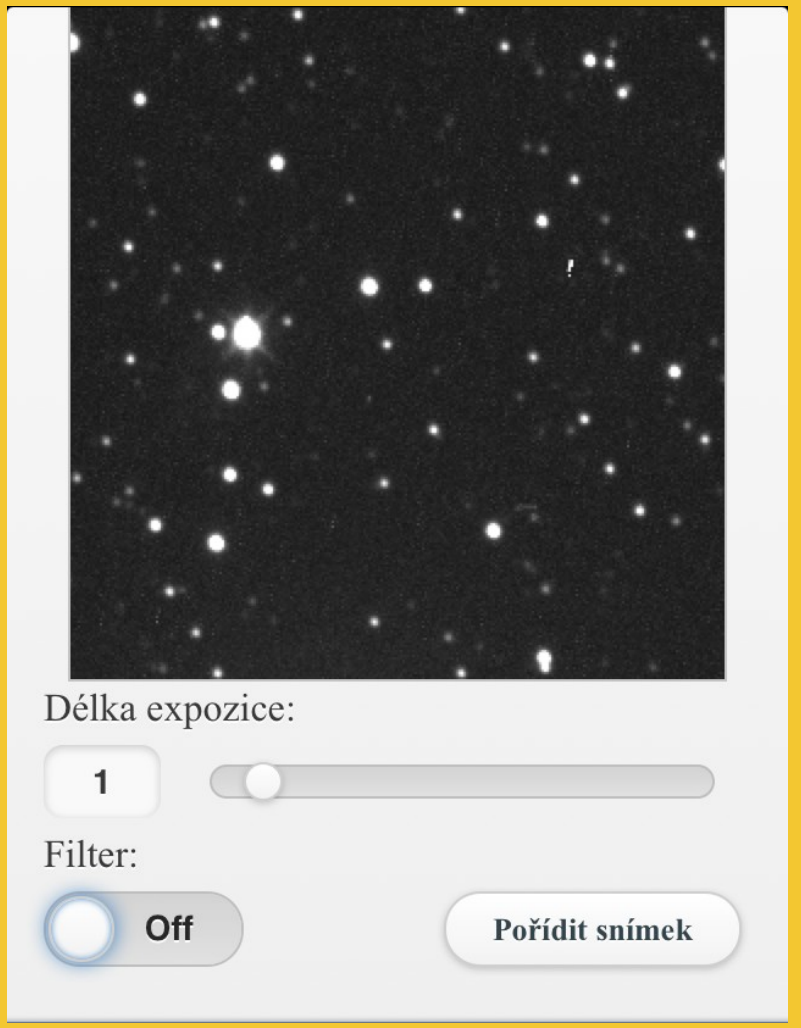
Current development

WebSocket based mobile control application



Current development

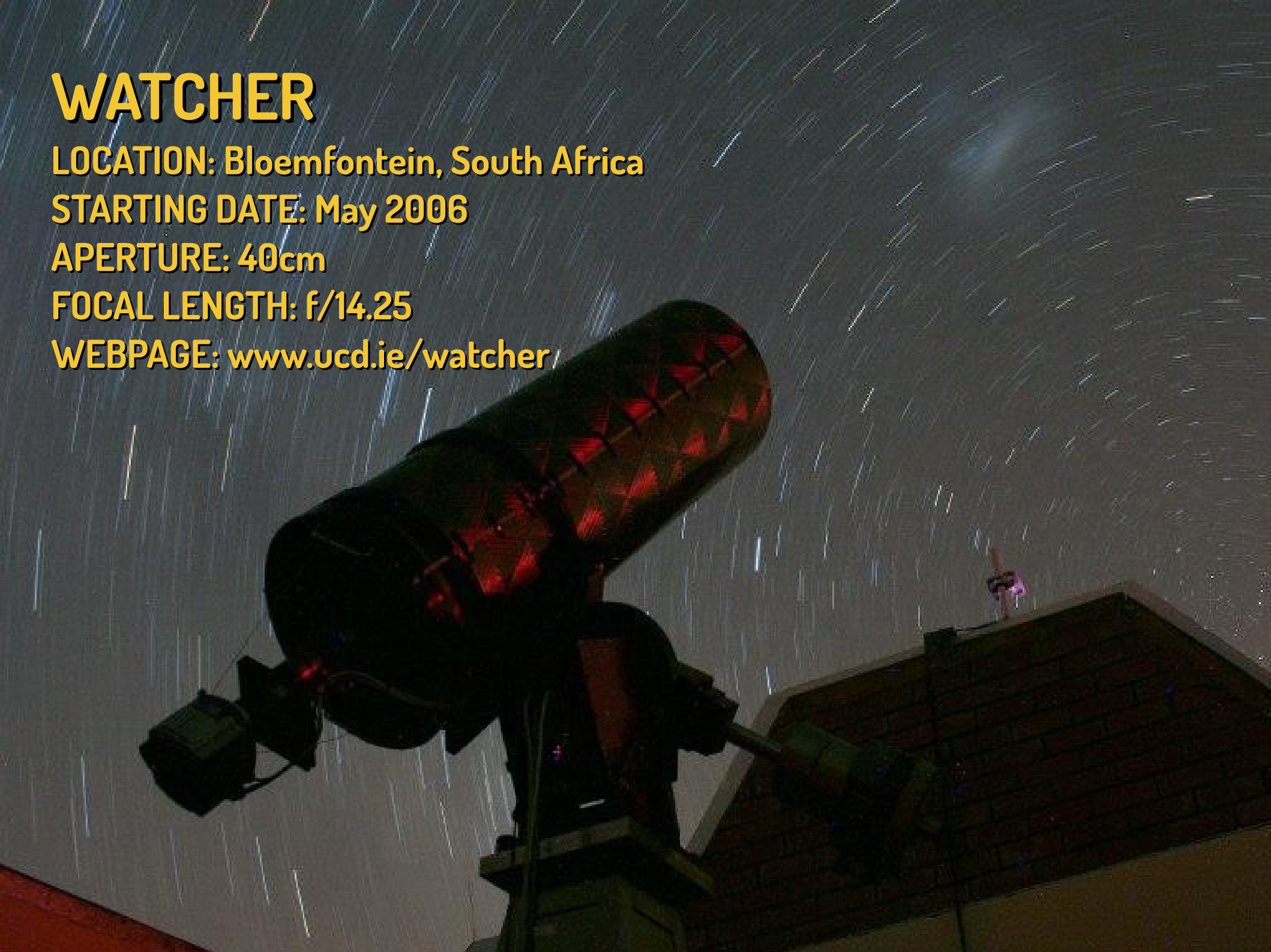




WHERE

is RTS2 running?


BOOTES1B
LOCATION: Andalucía, Spain
STARTING DATE: October 1997
FILTERS: None (W)
APERTURE: 0.3m
FOCAL LENGTH: 1175mm
WEBPAGE: bootes.iaa.es


WATCHER
LOCATION: Bloemfontein, South Africa
STARTING DATE: May 2006
APERTURE: 40cm
FOCAL LENGTH: f/14.25
WEBPAGE: www.ucd.ie/watcher

CAHA 1.23

LOCATION: Calar Alto, Spain
STARTING DATE: RTS2 ~ 2009
APERTURE: 123cm
FOCAL LENGTH: f/8

OSSERVATORIO ASTRONOMICO

LOCATION: Regione Autonoma Valle d'Aosta, Italy

More and more telescopes

BART, **D50, SORT** Onrejov, Czech republic
BOOTES 1A, **1B**, **IR**, **2**, **3**, **4**, **5**, **6**, **7**, **8**, ...
FRAM, Argentina, Pierre Auger observatory
Mount Abu 0.5m, Guru Shikhar, India
CAHA 1.23m, Calar Alto, Spain
VERMES, Switzerland
RATIR, multichannel 1.5m, Mexico
LSST testing lab, Harward University, USA

Feature matrix

Funcionality	CCD commander	CCD Ware	DC-3 Dream	Audela	Talon	RTS2
Open source				x	x	x
Modular	x	x	x	?	?	x
Device failure survalability					?	x
Observatons database			x	?		x
Autofocusing	x	x	x	x	x	x
Twilight skyflats	x	x	x	x	?	x
Email alerts		x		?		x
Fast ToOs			x	x	?	x
Astrometry support	x	x	x	?		x
Autoguiding	x	x	x	x		x
External scripts	x		x	x		x
Stdin/stdout scripting						x

HOW

to connect RTS2 into GLORIA?

Choose proper mode

Interactive

- Solar experiment
- RTI connector – Java based SW, Tomcat

Batch (scheduled)

- Night experiment
- GLORIA is able to use RTS2 infrastructure

Contact us

- We will evaluate if your telescope is prepared
- If so, we will register telescope into the system

Questions?