Operations

- Autonomous observatories works without human in the loop
  - And they fails without human in the loop
- So what to do with failures?
- The most common approach should be:
  - Try to solve it
  - If you cannot solve it, report it to human
  - Then the question is how to report it..

Thinks to keep care of

- Roof
  - If it fails, you have a problem..
- Devices
  - If device fails, you cannot observe

RTS2 current state

- Current code have code for dome
  - Each dome uses different code
  - Not generic
- Dome code can
  - Send email on dome changes (open, close,..)
  - Send email on failures
  - Call external program to do something

RTS2 dream state

- List of devices which needs to be present to start observation
  - Camera, mount, dome, weather,..
  - If device is not present, observation does not starts
- Procedures to solve problems in place
  - If FRAM roof cannot close, try to open it a bit, then try to close again
- If that fails, send notification
  - Most probably using external program

Notifications

- Template for notification
  - Dear operator,

    device(s) dev_name are not present in the system Bootes 2. Please do something so they will be present.
- Or..
  - Dear operator,

    it is raining at Bootes 2, but dome does not close. Please do something! Fast!

Notifications - channels

- Email
- Web?
  - Log of failures
  - Currently I log error messages to database, but they are not as usefull as I hoped for (yet)?
- Jabber/ICQ?
- Skype call?
- Phone call?

Failures - FRAM

- FRAM
  - One critical roof failure
    - Solved by local staff (wrap telescope in plastics)
  - Few roof failures
    - Solved by replaced electronics
  - Camera failure ~ once / month
    - Hopefully solved by new driver
  - Photometer failures
    - Solved by remote reboot

Failures - Watcher

- Filter wheel
  - Now finally fails, the hope is it will be tracked to cabling failure (finally, after 2 years of operation)
- Dome failure at beginning
  - Funny story how to not uses 3 phases grid..
  - Solved after ~ 2 months of troubles
  - From that time without a single failure

Failures - Watcher

- Paramount
  - ~ once / month remote reboot
  - Failed motherboard after lighting, solved in ~ 4 months
- Meteo (Davis)
  - Needs occasional restarts (~ 2 / year)
- Network issues
  - Security in South Africa is funny..

Failures - BART

- Once dome opened in winter
  - Most probably my mistake, I though I am operating FRAM, in fact I was operating BART
  - Some snow gets in, some damage to electronics
  - Solved
  - Human error, not software (but I agree software warn more clearly)

Failures - BART

- LX200
  - Disaster
- Titan
  - Quite better, some failures
  - Solved by contact to R. Goerlich
- Cameras
  - Constant issues
  - SBIG, FLI
  - FLI improved by new driver

Failures – Bootes IR

- Cover opened with snow coming in
  - Problem with telescope referencing prevent from closing it
- Issues with dome
  - SEP (Somebody Else Problem – contractor)
- Problems with telescope
  - Mostly SEP – static electronics, ...
  - Those high speed motors are still a kind of rocket science...

Failures – Bootes 2

- Dome ”works”
  - Although we feel it must fail sometimes, it was never an issue
- Mount
  - Funny grounding
  - Now problem with encoders
    - The question is if IA software will ever be able to detect those..
  - Once hit a dome
    - And once near miss..

Bootes 1A, 1B

- Problems with network
  - INTA is more crazy about security then Bloemfontein university
- Various failures
  - Gemini board left in high humidity
  - Cameras
  - Lighting
  - Mounts