



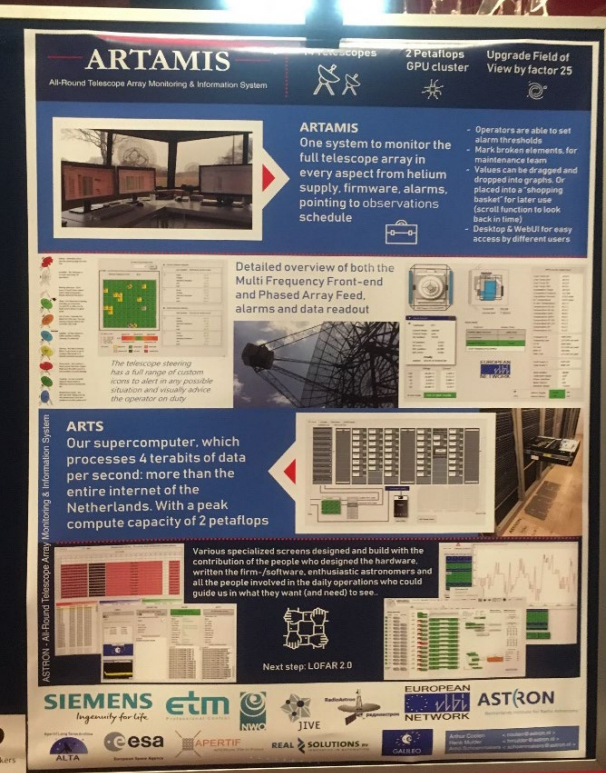
Monitoring & Control

Henk Mulder

ILT-T0 meeting

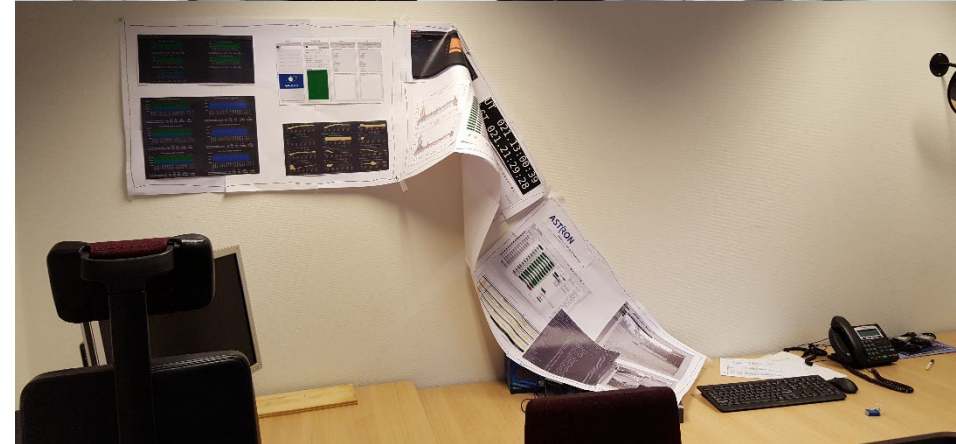
6 Nov 2019

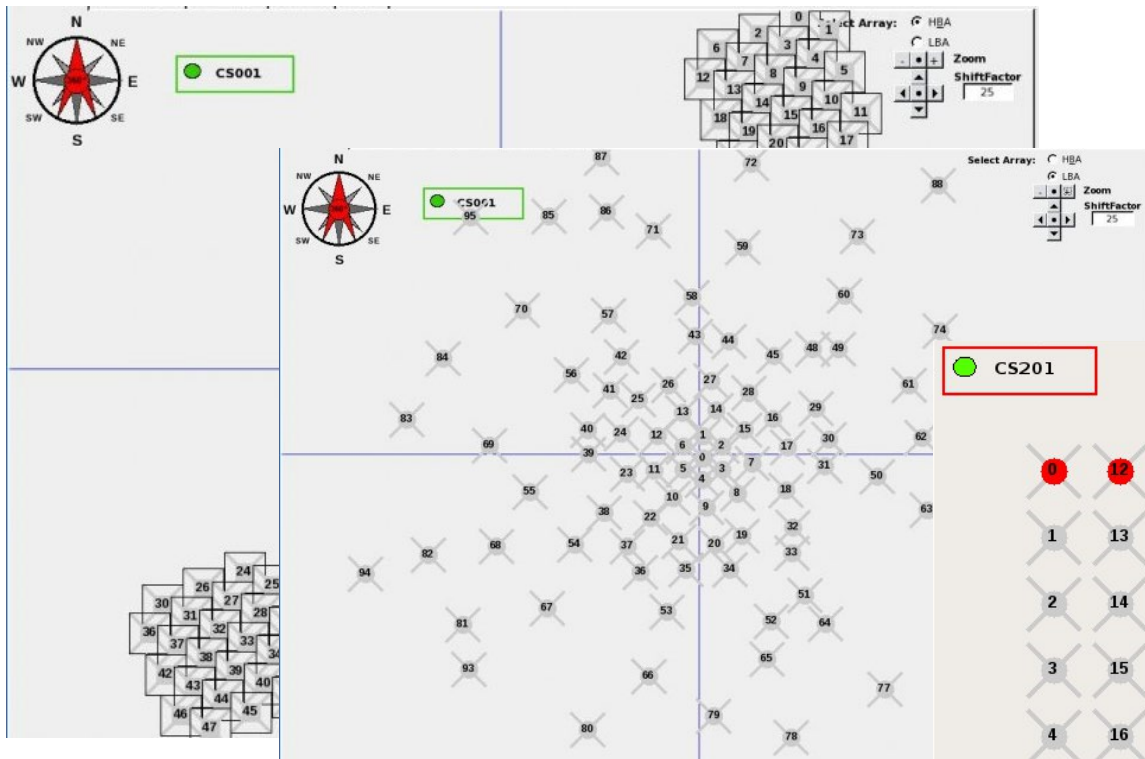




Operations..

- Documenting field maintenance / writing procedures / making a wiki (preparing for the moment Henri goes to R&D)
- Galileo satellite tracking
- Replacement of Real Time Station Monitor & Station Test (MMIS)
- Lots and lots of Apertif work





Station view (Tile/ Antenna info)

Last states: ☐ show all states

| Prio | Time | State comment |
|------|-------------------------|---------------|
| 50 | 2018.06.18 08:47:26.779 | |
| 50 | 2018.06.18 09:18:09.931 | FLAT |
| 50 | 2018.06.18 10:06:50.487 | HN |
| 40 | 2018.06.18 11:26:23.484 | FLAT |
| 50 | 2018.06.18 11:45:16.510 | FLAT |
| | | |
| | | |
| | | |

Select state to set:

Select LBA/HBA comment to set:

☐ Set recursive (to all childs)

Station_List

LBA

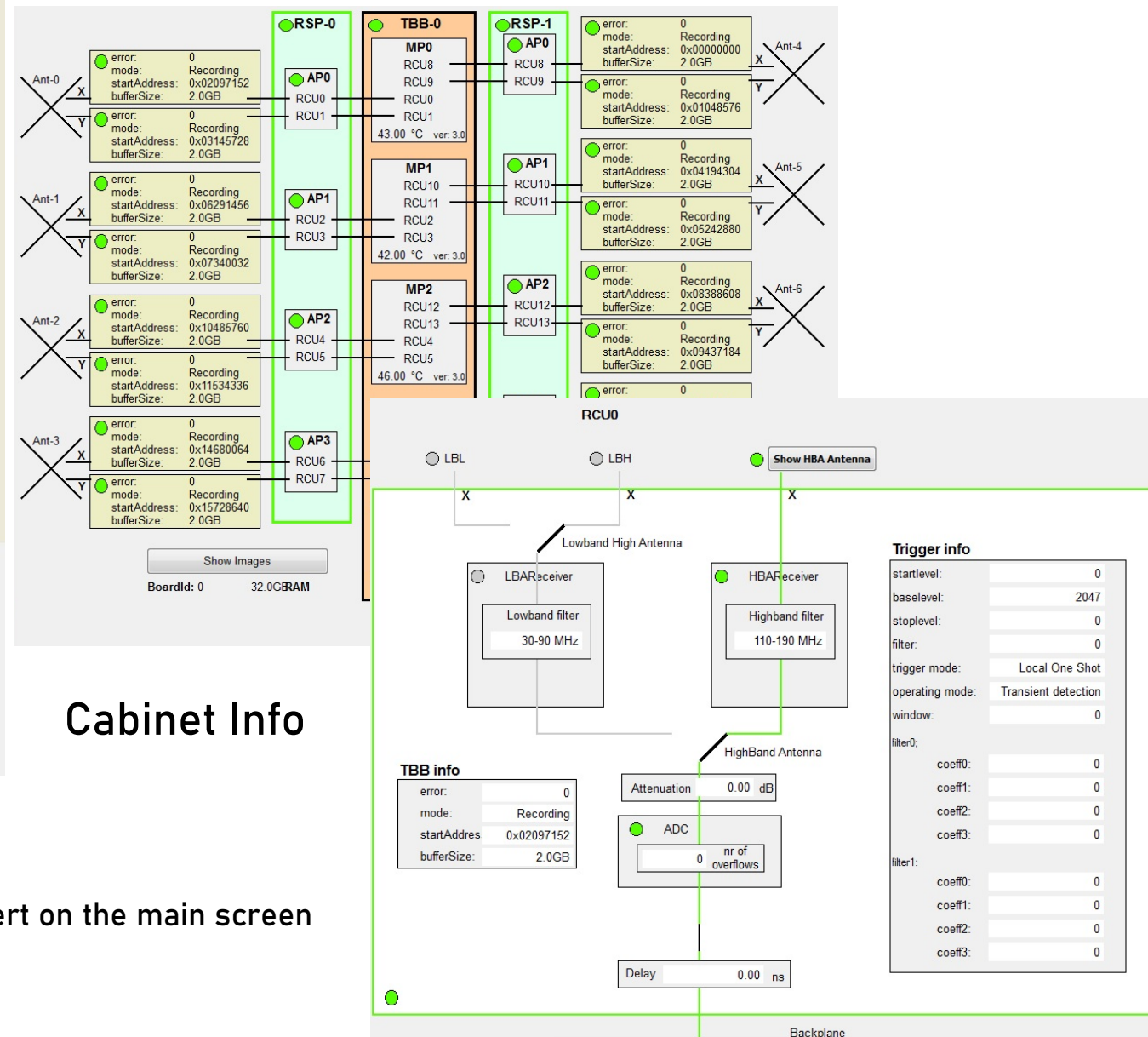
HBA

| Priority | Time | DP element/Description | Alert text | State comment | Direction | Acknc |
|----------|-------------------------|------------------------------------|------------|---------------|-----------|-------|
| 50 | 2018.06.18 11:45:16.510 | CS201LOFAR_PIC_LBA000.status.state | Broken | FLAT | CAME | x |
| 50 | 2018.03.19 15:21:05.679 | CS201LOFAR_PIC_LBA040.status.state | Broken | | CAME | x |
| 50 | 2018.01.16 11:36:12.368 | CS201LOFAR_PIC_LBA012.status.state | Broken | | CAME | x |
| 50 | 2018.01.10 12:41:31.995 | CS201LOFAR_PIC_LBA038.status.state | Broken | | CAME | x |
| 50 | 2017.11.17 13:16:28.333 | CS201LOFAR_PIC_LBA088.status.state | Broken | | CAME | x |
| 50 | 2017.11.17 13:16:12.785 | CS201LOFAR_PIC_LBA089.status.state | Broken | | CAME | x |

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Alarmfilter

Cabinet view (boards/fans/..)



Cabinet Info

on/off
Temp 19.2°C
Humidity 33.9%RH
DoorControl
Mode off

on/off
Temp 19.2°C
Humidity 34.7%RH
DoorControl
Mode off

on/off
Temp 19.2°C
Humidity 41.31%RH
DoorControl
Mode off

CS001

Use the station icon on the antenna overview or alert on the main screen

Mode: ☒ Actual ☐ Historical

Timerange: Begin: 2018-6-20 13:34:50 End: 2018-6-21 14:34:50

System: CS201

Prio/State: ☐ Off (0) ☐ Operational (10) ☐ Maintenance (20) ☐ Test (30) ☐ Suspicious (40) ☒ Broken (50) ☐ DP Offline (60)

State comment:

GO!

| Priorit | Time | DP element/Description | Alert text | State comment | Direction | Ackno | Ack.time |
|---------|-------------------------|---|------------|---------------|-----------|-------|-------------------------|
| 50 | 2018.06.18 11:45:16.510 | CS201:LOFAR_PIC_LBA000.status.state | Broken | FLAT | CAME | x | 2018.06.21 10:04:32.080 |
| 50 | 2018.03.19 15:21:05.679 | CS201:LOFAR_PIC_LBA040.status.state | Broken | | CAME | x | 2018.03.19 15:32:57.635 |
| 50 | 2018.01.16 11:36:12.368 | CS201:LOFAR_PIC_LBA012.status.state | Broken | | CAME | x | 2018.01.16 11:36:21.801 |
| 50 | 2018.01.10 12:41:31.995 | CS201:LOFAR_PIC_LBA038.status.state | Broken | | CAME | x | 2018.01.15 07:51:37.089 |
| 50 | 2017.11.17 13:16:28.333 | CS201:LOFAR_PIC_LBA088.status.state | Broken | | CAME | x | 2017.11.20 10:13:24.321 |
| 50 | 2017.11.17 13:16:12.785 | CS201:LOFAR_PIC_LBA089.status.state | Broken | | CAME | x | 2017.11.20 10:13:21.993 |
| 50 | 2017.11.17 13:15:58.532 | CS201:LOFAR_PIC_LBA093.status.state | Broken | | CAME | x | 2017.11.20 10:13:25.441 |
| 50 | 2017.11.17 13:15:51.001 | CS201:LOFAR_PIC_LBA092.status.state | Broken | | CAME | x | 2017.11.20 10:13:27.686 |
| 50 | 2017.07.20 06:57:19.272 | CS201:LOFAR_PIC_Cabinet1_Subrack2_TBBoard5.status.state | Broken | | CAME | xxx | 2017.07.24 08:15:40.562 |
| 50 | 2017.07.20 06:57:19.270 | CS201:LOFAR_PIC_Cabinet1_Subrack2_TBBoard4.status.state | Broken | | CAME | xxx | 2017.07.24 08:15:40.562 |
| 50 | 2017.07.20 06:57:19.268 | CS201:LOFAR_PIC_Cabinet0_Subrack1_TBBoard3.status.state | Broken | | CAME | xxx | 2017.07.24 08:15:40.561 |
| 50 | 2017.07.20 06:57:19.266 | CS201:LOFAR_PIC_Cabinet0_Subrack1_TBBoard2.status.state | Broken | | CAME | xxx | 2017.07.24 08:15:40.561 |
| 50 | 2017.07.20 06:57:19.264 | CS201:LOFAR_PIC_Cabinet0_TBBoard1.status.state | Broken | | CAME | xxx | 2017.07.24 08:15:40.560 |
| 50 | 2017.07.20 06:57:19.261 | CS201:LOFAR_PIC_Cabinet0_Subrack0_TBBoard0.status.state | Broken | | CAME | xxx | 2017.07.24 08:15:40.526 |

```

#uses "ApertifCommon.cti"

string selected_dish = "RT2";

// Let the panel react on the choice of dish made in the selectionrow.
public void setSelection(string dish)
{
    selected_dish = dish;

    // blink vibri or apertif screen depending on chosen dish
    // RT0 and RT1 are vibri only and RT2....RTD are Apertif only
    if (ApertifCommon_isVLBDish(selected_dish))
    {
        pnl_aperitif_view.visible = FALSE;
        pnl_vibri_view.visible = TRUE;
    }
    else if (ApertifCommon_isApertifDish(selected_dish))
    {
        pnl_aperitif_view.visible = TRUE;
        pnl_vibri_view.visible = FALSE;
    }
    else
    {
        DebugIf(myPanelName() + " Wrong dishname given: " + selected_dish);
    }

    // make the choice clear in the "Buttons"
    for (int i=1; i<= dynlen(wart_dishes);i++) {
        if (dish == wart_dishes[i])
        {
            shape s = getShape(wart_dishes[i]+"_selection");
            s.setBorderStyle(SS_SUNKEN);
        }
        else
        {
            shape s = getShape(wart_dishes[i]+"_selection");
            s.setBorderStyle(SS_RAISED);
        }
    }

    // Set the chosen dish on the top of the screen
    txt_dishInView.text = "Dish in view: " + dish;
}

```

Hardware RT7 LOG1 mUpper warning limit

Hardware RT7 LOG1 mUpper warning limit

Hardware Alerts / Current / Running

Hardware Acknowledge

Hardware Insert comment

Hardware Trend

Hardware Details

Alarming, trending / history



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Alarmfilter

Add as curve to trend...

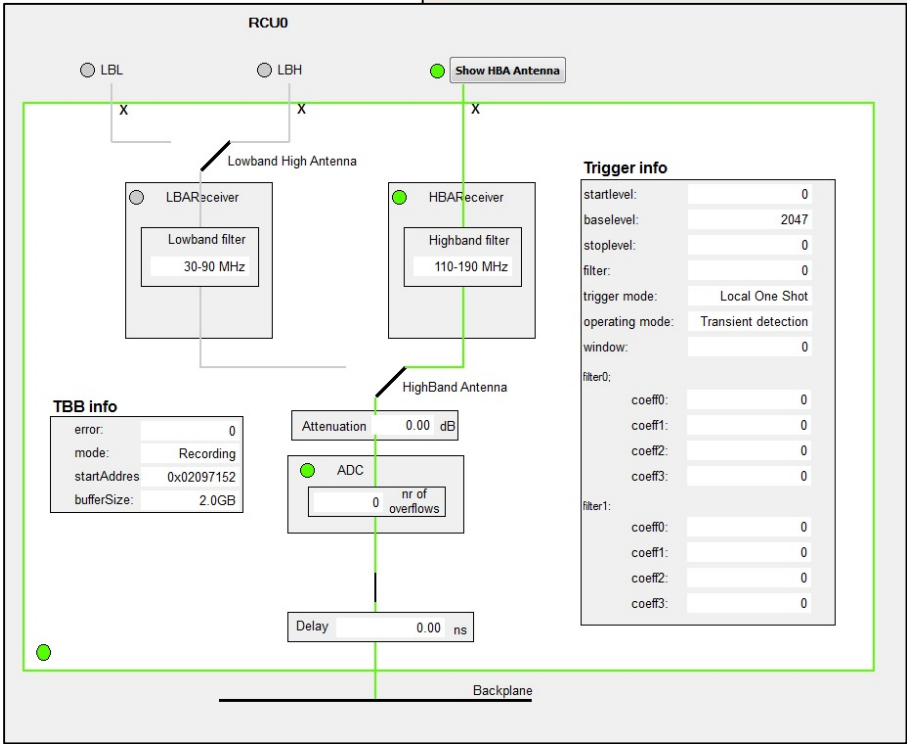
Add as curve and open trend...

Show trend

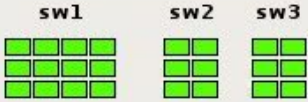
NEW!

Local and single station monitoring

- panels run on the station
- 3.16 web browser access

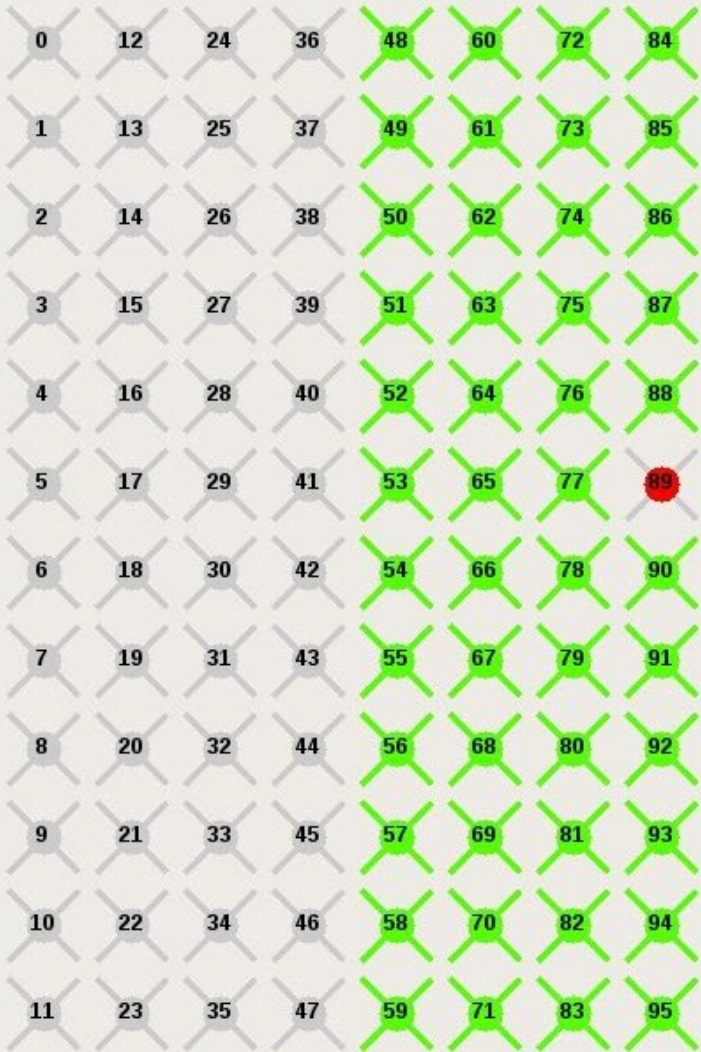


● DE601



Cabinet View

LBA



HBA

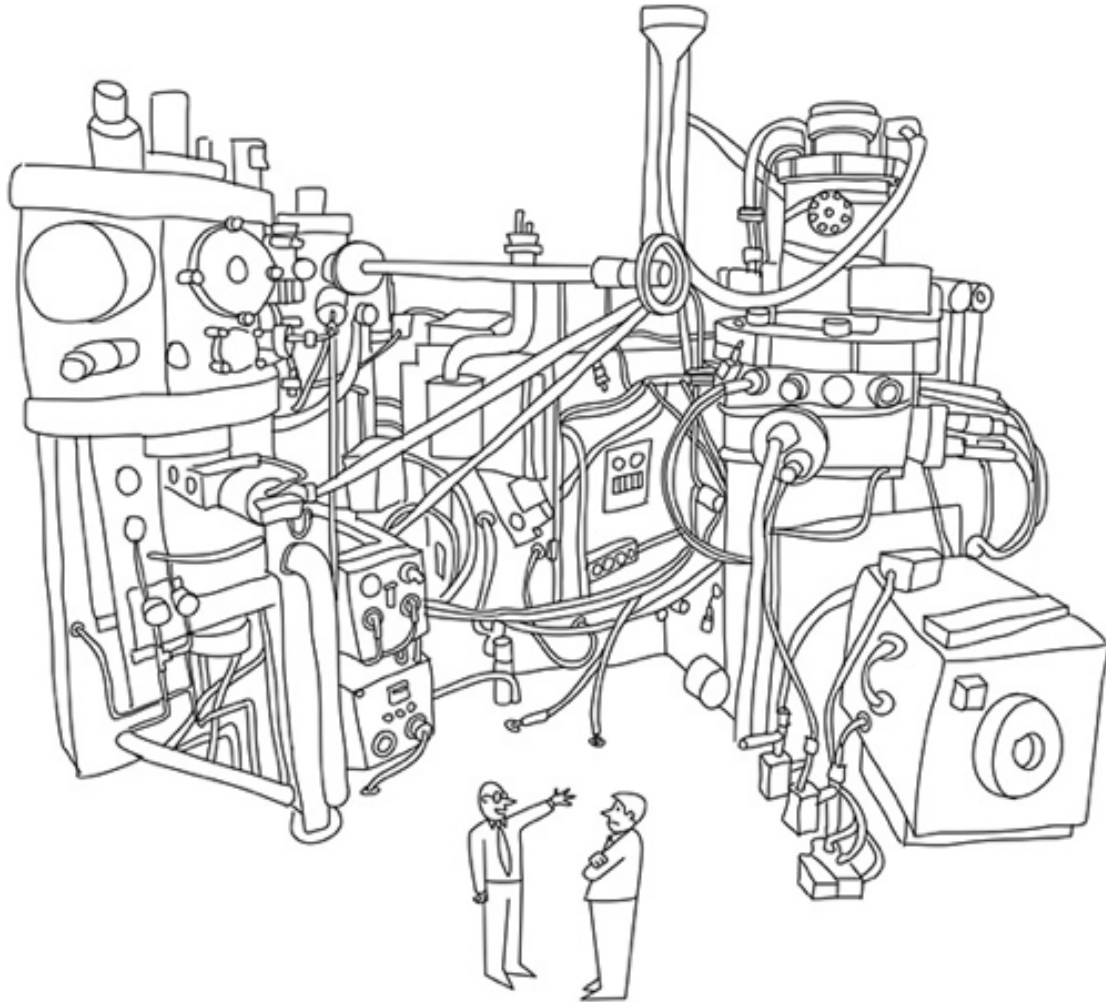


Alarms for antenna / cabinet / etc

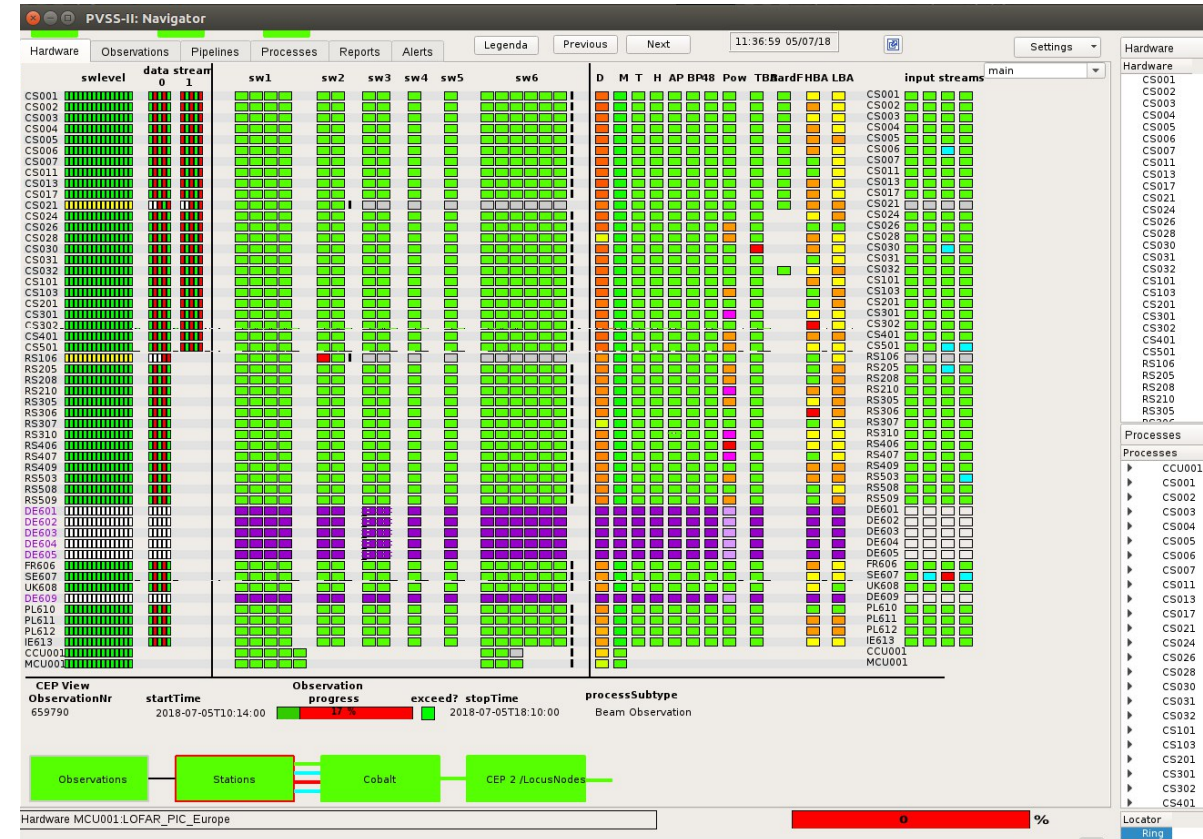
0/0

Alarmfilter

It works



(honestly) it's ready for an upgrade



Designed and build in the beginning of LOFAR

Status Overview

| Location | Telescope | Cabin Status |
|-----------------|-----------|--------------|
| RT0 | | |
| RT1 | | |
| RT2 | | |
| RT3 | | |
| RT4 | | |
| RT5 | | |
| RT6 | | |
| RT7 | | |
| RT8 | | |
| RT9 | | |
| RTA | | |
| RTB | | |
| RTC | | |
| RTD | | |
| Centr. Building | | |
| Server Area | | |

General (e)VLBI Sensors / Weather Cryolab RFI plots other

Lab

READY TEMP

| Control Mode | State | Status | Dec | Ha | On Pos |
|--------------|-------|--------|--------|--------|--------|
| value | value | value | value | value | value |
| value | value | value | value | value | value |
| apertif | auto | ready | 45.001 | -0.001 | FALSE |
| apertif | auto | ready | 45 | 0.001 | FALSE |
| apertif | auto | ready | 44.999 | 0.001 | FALSE |
| apertif | auto | ready | 45 | 0.001 | FALSE |
| apertif | auto | ready | 44.999 | -0 | FALSE |
| apertif | auto | ready | 45.000 | 0.001 | FALSE |
| apertif | auto | ready | 44.999 | -0 | FALSE |
| apertif | auto | ready | 45.000 | -0.001 | FALSE |
| apertif | auto | ready | 45 | 0 | FALSE |
| apertif | auto | ready | 45 | -0.001 | FALSE |
| apertif | auto | ready | 45.000 | -0 | FALSE |
| apertif | auto | ready | 44.998 | -0.001 | FALSE |

Temp Air 00.00 Celsius
Wind Speed Current 00.00 m/s
Wind Speed Avg 00.00 m/s (10 min)



UniRack00

PACBoard00: D 3v3D 9v6A 9v6PCBPLL

FAN-Tray: F00F00F00F00F00F00F00F00F00F00F00Temp

FrontNodes:

GNode00GNode00GNode00GNode00GNode00GNode00GNode00

GNode00GNode00GNode00GNode00GNode00GNode00GNode00

UniBoard00

VoltCurrEtherTemp

Back Nodes

GNode00GNode00GNode00GNode00

ADC0000T

0000pps

ADC0000T

0000pps

ADC0000T

0000pps

ADC0000T

0000pps

ADC0000

0000

ADC0000

0000

ADC0000

0000

ADC0000

0000

UniBoard00

VoltCurrEtherTemp

Back Nodes

GNode00GNode00GNode00GNode00

ADC0000T

0000pps

ADC0000T

0000pps

ADC0000T

0000pps

ADC0000T

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ADC0000

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ADC0000

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ADC0000

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ADC0000

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UniBoard00

VoltCurrEtherTemp

Back Nodes

GNode00GNode00GNode00GNode00

ADC0000T

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ADC0000T

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ADC0000T

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ADC0000

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ADC0000

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ADC0000

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UniBoard00

VoltCurrEtherTemp

Back Nodes

GNode00GNode00GNode00GNode00

ADC0000T

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ADC0000T

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ADC0000T

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ADC0000

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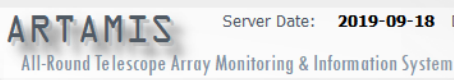
ADC0000

0000

ADC0000

0000

First thing I build in WinCC OA
(color scheme based on the Navigator)








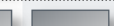





































Server Date: **2019-09-18** Day of Year: **261** MJD: **58745** || Server Time: **14:19:29** LST: **14:34:45**




4:19:30 PM

| | | | | | | | | |
|---------|--------------------|--------------|---------|-------------------|---------|-----------|--------------------|-------|
| General | Telescope Steering | Observations | (e)VLBI | Sensors / Weather | Cryolab | RFI plots | Spectrum Analyzers | other |
|---------|--------------------|--------------|---------|-------------------|---------|-----------|--------------------|-------|


| Location | Telescope | Cabin Status |
|---|---|---|
|  RT0 |  |  |
|  RT1 |  | |
|  RT2 |  |  |
|  RT3 |  |  |
|  RT4 |  |  |
|  RT5 |  |  |
|  RT6 |  |  |
|  RT7 |  |  |
|  RT8 |  |  |
|  RT9 |  |  |
|  RTA |  |  |
|  RTB |  |  |
|  RTC |  |  |
|  RTD |  |  |

 Apertif
 ARTS

Centr. Building



Server Area



| Control Mode | State | Status | Ha | Dec | On Pos | Storm | Request | Moving | |
|--------------|-------|----------|--------|-----|--------|-------|---------|--------|-------|
| manual | auto | ready | -0.000 | ABS | 45.001 | Yes | FALSE | TRUE | FALSE |
| | | ok | -0.000 | | 0.001 | | | | |
| manual | auto | ready | 0.001 | ABS | 44.999 | Yes | FALSE | TRUE | FALSE |
| | | ok | 0.001 | | -0.001 | | | | |
| apertif | auto | tracking | 16.035 | - | 29.806 | Yes | FALSE | FALSE | FALSE |
| | | ok | -0.002 | | 0.001 | | | | |
| apertif | auto | tracking | 16.035 | - | 29.806 | Yes | FALSE | FALSE | FALSE |
| | | ok | -0.002 | | 0.001 | | | | |
| apertif | auto | tracking | 16.034 | - | 29.806 | Yes | FALSE | FALSE | FALSE |
| | | ok | -0.002 | | 0.001 | | | | |
| apertif | auto | tracking | 16.034 | - | 29.804 | Yes | FALSE | FALSE | FALSE |
| | | ok | -0.002 | | -0.002 | | | | |
| apertif | auto | tracking | 16.035 | - | 29.807 | Yes | FALSE | FALSE | FALSE |
| | | ok | -0.001 | | 0.002 | | | | |
| apertif | auto | tracking | 16.035 | - | 29.806 | Yes | FALSE | FALSE | FALSE |
| | | ok | -0.001 | | 0.001 | | | | |
| apertif | auto | tracking | 16.035 | - | 29.806 | Yes | FALSE | FALSE | FALSE |
| | | ok | -0.002 | | 0.001 | | | | |
| apertif | auto | tracking | 16.035 | - | 29.806 | Yes | FALSE | FALSE | FALSE |
| | | ok | -0.002 | | 0.001 | | | | |
| apertif | auto | tracking | 16.035 | - | 29.806 | Yes | FALSE | FALSE | FALSE |
| | | ok | -0.002 | | 0.000 | | | | |
| apertif | auto | tracking | 16.035 | - | 29.807 | Yes | FALSE | FALSE | FALSE |
| | | ok | -0.002 | | 0.002 | | | | |
| apertif | auto | tracking | 16.035 | - | 29.806 | Yes | FALSE | FALSE | FALSE |
| | | ok | -0.002 | | 0.001 | | | | |
| apertif | auto | tracking | 16.036 | - | 29.807 | Yes | FALSE | FALSE | FALSE |
| | | ok | -0.002 | | 0.002 | | | | |

[illegible]

JSON age (RT0/1)

2019.09.18 16:19:21.599

Steering Hardware











DCU / LOG

UniBoards / Powerunit

DCU Rack 0X (0) on RT3 Rack temp 37.34

| | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|
| ● | ● | ● | ● | ● | ● | ● | ● |
| DCU00 | DCU01 | DCU02 | DCU03 | DCU04 | DCU05 | DCU06 | DCU07 |
| LO1 | LO1 | LO1 | LO1 | LO1 | LO1 | LO1 | LO1 |
| LO2 | LO2 | LO2 | LO2 | LO2 | LO2 | LO2 | LO2 |
| Channel | Channel | Channel | Channel | Channel | Channel | Channel | Channel |
| 003 | 007 | 011 | 015 | 019 | 023 | 027 | 031 |
| 002 | 006 | 010 | 014 | 018 | 022 | 026 | 030 |
| 001 | 005 | 009 | 013 | 017 | 021 | 025 | 029 |
| 000 | 004 | 008 | 012 | 016 | 020 | 024 | 028 |
| Temp | Temp | Temp | Temp | Temp | Temp | Temp | Temp |
| 37.8 | 36.8 | 37.5 | 35.5 | 36.0 | 00.0 | 39.3 | 37.6 |









DCU Rack 0Y (2) on RT3 Rack temp 37.94

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |
| DCU16 | DCU17 | DCU18 | DCU19 | DCU20 | DCU21 | DCU22 | DCU23 |
| LO1 | LO1 | LO1 | LO1 | LO1 | LO1 | LO1 | LO1 |
| LO2 | LO2 | LO2 | LO2 | LO2 | LO2 | LO2 | LO2 |
| Channel | Channel | Channel | Channel | Channel | Channel | Channel | Channel |
| 067 | 071 | 075 | 079 | 083 | 087 | 091 | 095 |
| 066 | 070 | 074 | 078 | 082 | 086 | 090 | 094 |
| 065 | 069 | 073 | 077 | 081 | 085 | 089 | 093 |
| 064 | 068 | 072 | 076 | 080 | 084 | 088 | 092 |
| Temp | Temp | Temp | Temp | Temp | Temp | Temp | Temp |
| 35.0 | 39.8 | 38.5 | 35.8 | 37.8 | 39.0 | 39.3 | 38.5 |

DCU Rack 1X (1) on RT3 Rack temp 31.91

| ● | ● | ● | ● | ● | ● | ● | ● |
|---------|---------|---------|---------|---------|---------|---------|---------|
| DCU08 | DCU09 | DCU10 | DCU11 | DCU12 | DCU13 | DCU14 | DCU15 |
| LO1 | LO1 | LO1 | LO1 | LO1 | LO1 | LO1 | LO1 |
| LO2 | LO2 | LO2 | LO2 | LO2 | LO2 | LO2 | LO2 |
| Channel | Channel | Channel | Channel | Channel | Channel | Channel | Channel |
| 035 | 039 | 043 | 047 | 051 | 055 | 059 | 063 |
| 034 | 038 | 042 | 046 | 050 | 054 | 058 | 062 |
| 033 | 037 | 041 | 045 | 049 | 053 | 057 | 061 |
| 032 | 036 | 040 | 044 | 048 | 052 | 056 | 060 |
| Temp | Temp | Temp | Temp | Temp | Temp | Temp | Temp |
| 30.8 | 32.5 | 00.0 | 29.8 | 32.5 | 33.0 | 32.3 | 00.0 |

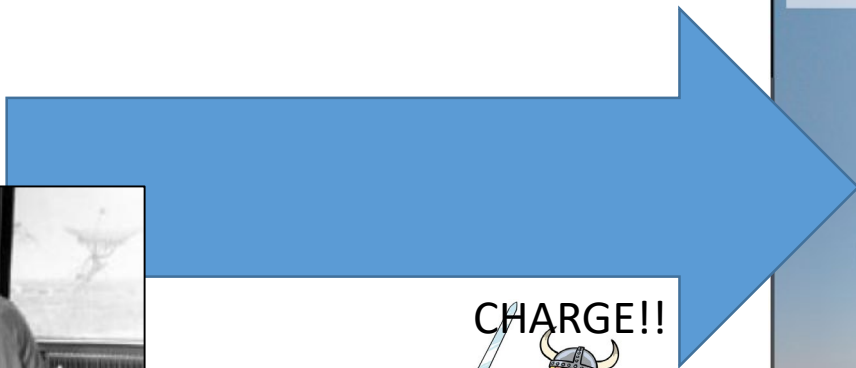
DCU Rack 1Y (3) on RT3 Rack temp 31.72

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |
| DCU24 | DCU25 | DCU26 | DCU27 | DCU28 | DCU29 | DCU30 | DCU31 |
| LO1 | LO1 | LO1 | LO1 | LO1 | LO1 | LO1 | LO1 |
| LO2 | LO2 | LO2 | LO2 | LO2 | LO2 | LO2 | LO2 |
| Channel | Channel | Channel | Channel | Channel | Channel | Channel | Channel |
| 099 | 103 | 107 | 111 | 115 | 119 | 123 | 127 |
| 098 | 102 | 106 | 110 | 114 | 118 | 122 | 126 |
| 097 | 101 | 105 | 109 | 113 | 117 | 121 | 125 |
| 096 | 100 | 104 | 108 | 112 | 116 | 120 | 124 |
| Temp | Temp | Temp | Temp | Temp | Temp | Temp | Temp |
| 32.8 | 32.0 | 32.0 | 30.5 | 00.0 | 31.8 | 31.3 | 31.8 |

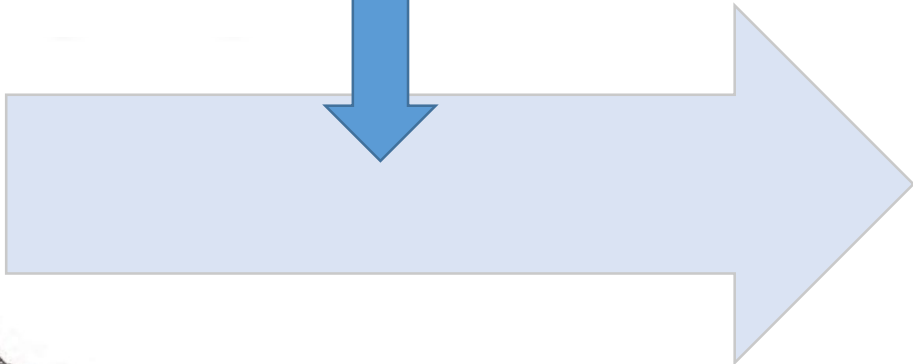
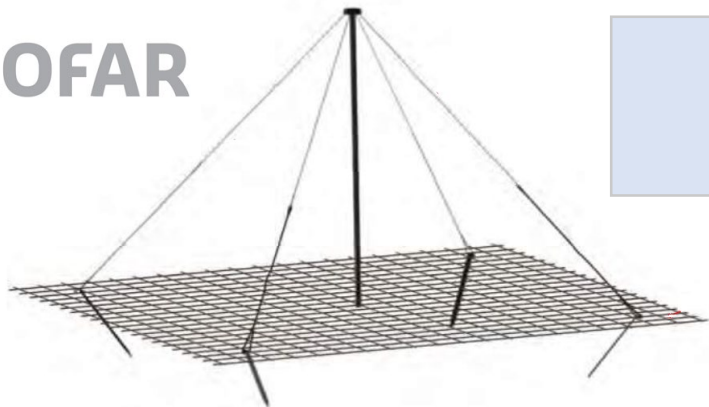
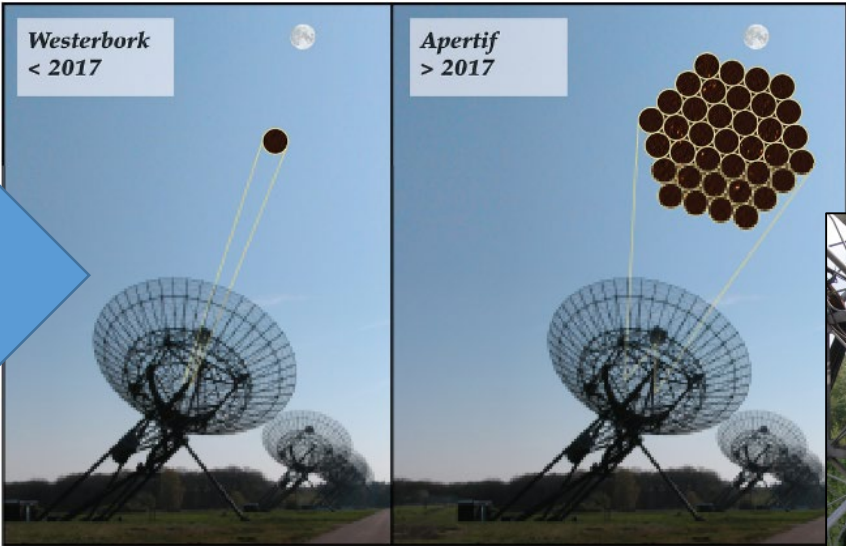
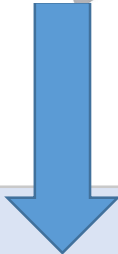
| | | | | | | | | | | | | | | | | |
|---------|------|--------------|----|----|----|-------|-----|----------|------|--------------|----|----|----|-------|-----|----------|
| LCU-RT3 | ● | O0 | O1 | O2 | O3 | Plock | PLL | PLL Temp | ● | O0 | O1 | O2 | O3 | Plock | PLL | PLL Temp |
| | LOG0 | LO1 4680 MHz | | | | | DIV | DIV Temp | LOG1 | LO2 2800 MHz | | | | | DIV | DIV Temp |

| | |
|----------|-------|
| Avg Temp | 34.73 |
|----------|-------|

1 and a half years later.. (drag and drop alarms -> graphs/trends, customizable alarm levels, spectrum analyzer read-outs, RFI sensor, observation schedule, json and external website readout..)



CHARGE!!

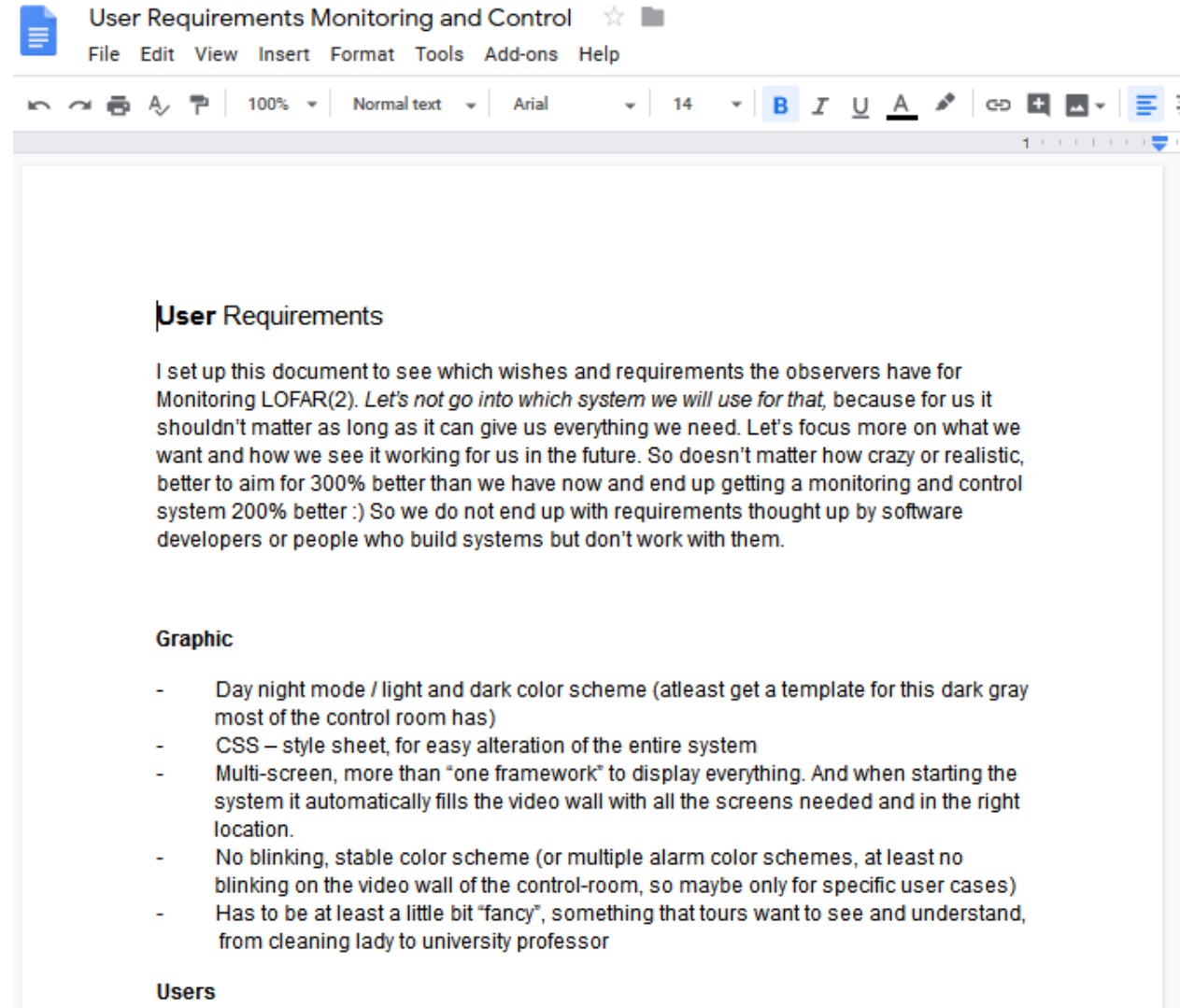


Step 0, get the software people to give us version 3.16 so we can use the ILT Navigator

Battle plan step 1:

- Put requirements / wishes on paper

need
WHAT DO YOU ~~WANT~~?



The screenshot shows a Google Docs interface with the title 'User Requirements Monitoring and Control'. The document content is as follows:

User Requirements

I set up this document to see which wishes and requirements the observers have for Monitoring LOFAR(2). *Let's not go into which system we will use for that, because for us it shouldn't matter as long as it can give us everything we need. Let's focus more on what we want and how we see it working for us in the future. So doesn't matter how crazy or realistic, better to aim for 300% better than we have now and end up getting a monitoring and control system 200% better :) So we do not end up with requirements thought up by software developers or people who build systems but don't work with them.*

Graphic

- Day night mode / light and dark color scheme (atleast get a template for this dark gray most of the control room has)
- CSS – style sheet, for easy alteration of the entire system
- Multi-screen, more than “one framework” to display everything. And when starting the system it automatically fills the video wall with all the screens needed and in the right location.
- No blinking, stable color scheme (or multiple alarm color schemes, at least no blinking on the video wall of the control-room, so maybe only for specific user cases)
- Has to be at least a little bit “fancy”, something that tours want to see and understand, from cleaning lady to university professor

Users





Plan!?

